Second Edition

METHAMPHETAMINE USE

Clinical and Forensic Aspects

Sandra B. McPherson • Harold V. Hall • Errol Yudko
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Prologue: Methamphetamine Abuse Myths

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“When Eric Smith tossed his 14-year-old son’s head out his van window out onto a New Mexico highway, he thought was disposing of a demon. But Smith’s grisly act last July was just another bizarre outburst blamed on methamphetamine” (Davis, 1995). That article went on to quote a University of California–Los Angeles (UCLA) psychotherapist, Ron Siegal, who had made something of a specialty of methamphetamine (meth) murders and who indicated that meth was associated with a significant range of bizarre murder scenarios.

Recent history has documented a first wave of methamphetamine use and abuse occurring in 1988 in Hawaii. Subsequently, there was some reduction in the use of this drug, only to see a rise in the mid-1990s, and an ongoing wave of increased use, primarily from west to east across the country. Chapters 1 and 2 of this text provide significant detail regarding historical aspects of use and also some of the interwoven factors that connect various levels of society and governments to producers and users.

History is instructive. Stimulant drugs were in use in 3000 B.C. in China, but it was not until 1887 that amphetamine was first manufactured synthetically. Forms of amphetamine have been and are used in medical practice. Homemade or even mass-produced methamphetamine for the nonlegitimate market involves high levels of inconsistency and potential harm due to lack of quality control, as well as lack of dose control and the complications that ensue in any addictively responding population.

In the following chapters, it will be documented that methamphetamine, in common with most drugs of abuse, has variable effects, but has significant dangers associated with it, perhaps more than a substantial number of substances. It will also, however, be documented that the degree of social control exerted over a drug is not necessarily associated with the degree of potential social harm. Finally, it will become evident to the reader that although knowledge has increased about the impact and qualities of this substance, as well as about its use, much remains to be understood that is relevant to both forensic involvement and clinical issues.
Ten Myths

1. *The use of methamphetamine and indeed all mind-altering substances is pathological and sick. We should quickly focus on objective intervention methods to cure this disorder.*

   This myth proceeds from the disease model of drug use, as well as incorporating a moral call to arms. In actuality, motivation to take methamphetamine is varied, the effects on people are sometimes negative, and the key to effective intervention is to take into account both the user’s motivation and his or her drug-related behavior. A most important core truth is that many people use methamphetamine and other drugs, including alcohol, to feel better, perform better, and achieve better. Interventions which ignore that there is a probable underlying positive motivation for use are likely to be highly ineffective.

2. *Establishment organizations—particularly government and health professions—can and have effectively addressed methamphetamine abuse. Nonestablishment organizations, such as crime syndicates, do not control the methamphetamine trade because it can be made in the bathtub or the trunk of a car.*

   As will be seen in the data presented below, establishment organizations created the methamphetamine problem in the first place. Crime organizations maintain and profit from it. The overall methamphetamine problem is supported by various organizations, by user vulnerability, by addictive potentials, by propagandistic and misleading marketing, and by serving competing and cooperative power interests.

3. *Methamphetamine users know the effects and their limits. The effects of methamphetamine are predictable and controllable.*

   At the current state of our knowledge, it has been effectively demonstrated that methamphetamine impacts are unpredictable, except for large, dose-specific effects. It is true that users typically know how they feel when they take the drug, as well as knowing their own history of use. However, because many cannot be sure that what they have received on the street is relatively pure or significantly contaminated and relatively high or low as to dose level, there are things they cannot effectively predict, such as their rate of tolerance, when they may lose self-control, or when they may move into a psychotic state. (Home meth makers do not function from the standpoint of producing a certain chemical formula; instead they follow recipes obtained from the Internet or peers. The end result is extremely variable.)

4. *Methamphetamine doesn’t cause cerebral injury.*

   Although it is true that some drugs that have been treated as if they were serious problems (marijuana comes to mind), the fact is that
methamphetamine does cause neurological damage. Chapter 5 provides detailed information about cerebral injury that has occurred in virtually all mammalian species that have been studied. Even more concerning, in humans, one dose of methamphetamine has been known to send an individual into a demented state and has produced strokes in otherwise healthy individuals. More chronic deficits have also been demonstrated and are reported herein.

5. **Methamphetamine abuse can be understood in isolation, apart from other conditions.**

   Methamphetamine abuse cannot be understood in isolation, as is true of any addictive responses. Any understanding of the impact of methamphetamine requires some knowledge of the individual’s lifestyle, history, and the use/abuse cycles in which the individual has engaged. The vast majority of methamphetamine use is associated with other drugs of varying types and quantities. Well-known phenomena, such as cross-reverse tolerance (increased sensitivity) to other drugs have been documented.*

6. **Because methamphetamine-related effects are largely unpredictable, it is not possible to know whether a user will be violent to others and the self.**

   There is truth in this particular statement. Methamphetamine use increases the risk of violence to self and others. However, most users do not commit murder or suicide or other serious violence. The connection between methamphetamine and violence, which would allow a prediction, has not yet been determined. As will be seen in Chapter 6, the use of actuarially based systems does allow reasonable prediction of violence, even in the absence of an excellent understanding of all of the links involved. However, actuarial risk schemes need to be accompanied by an individually based assessment that looks at the adequacy of the database, makes an analysis of distortion and deception, documents whether there has been significant basal violence, considers whether there is the presence of triggering stimuli, looks at the part played by opportunity, and evaluates inhibitory functioning.

* An illustrative case occurred in 2001: *State of Hawaii v. Michael Lawrence* involved an individual who stabbed a vacuum cleaner salesman who came to the door, dragged him outside, cut him up in pieces, placed his body parts in bags, and drove to a refuse center to dispose of the body parts. During the trial, there were multiple indicators of lying and malingering, including claims of hearing voices speaking German (the defendant later admitted he did not understand German). The defendant did admit to drinking several cups of strong coffee daily to recapture the high from methamphetamine use. He was describing cross-reverse tolerance. Defense experts testified they had never heard of such a phenomenon, in spite of the two dozen empirically based articles from human and animal literature that were presented in the court. The defendant was found not guilty by reason of insanity. He continues to drink several cups of black coffee a day in his psychiatric ward at the state hospital.
7. The most dangerous time for violence to self or others is when the user is methamphetamine intoxicated.

Actually, “tweaking” is the most dangerous time (see Chapter 5, Figure 5.1 and Figure 5.2). That phase occurs when the user is coming down from a methamphetamine high and is feeling paranoid, hypersensitive, irritable, and impulsive. This phenomenon is well enough understood that it is taught to police and families, following guidelines that have been promulgated through the National Institute of Justice (2000). However, it needs to be recognized that these guidelines are based on expert opinion rather than on documented empirical studies.

Tweaking intervention guidelines include:

a. Keep a social distance—preferably a 7 to 10 foot radius. Do not tackle the tweaker alone.
b. Do not shine bright lights on the tweaker. Light stimulation can be a trigger to violence.
c. Approach the tweaker using slow speech and low-pitched vocalization. Tweakers hear sounds at a fast pace and a high pitch. A side effect for some is a constant electrical buzzing sound in the background.
d. Movements should be slow and hands visible in order to lower the perception of threat.
e. Keep the tweaker talking. A silent tweaker is considered more dangerous than one who is speaking because the paranoid thoughts can easily become the primary controller of the tweaker’s behavior and anyone in the scene becomes part of the paranoid delusional system.
f. Do not try to win arguments or verify information. Based on case experience, Hall has concluded that a history of violence acts as an intermediary variable that increases the chances of violence when a person is under the influence. However, it is probably not methamphetamine by itself that causes the violence unless the dose is very high.

8. Methamphetamine abuse therapy is a time-limited kind of programmed intervention with definable steps, methods, and time periods for implementation.

There are therapies that are time limited and some of them have been effective. However, many methamphetamine-related problems require attention for the lifetime of the individual. Of significant importance, is that deficiencies in selective attention and working memory may not be recaptured regardless of the intervention program, and a former user may have to carry lists and reminders in order to manage his or her daily life. It was previously (and erroneously) believed that all cognitive improvement from brain insults takes place in a relatively short
period of time of 6 to 12 months. However, more recent literature has suggested that improvement in central nervous system (CNS) functioning may continue beyond a decade and a half (Yudko, Hall, and McPherson, 2003). Ironically, virtually all insurance reimbursement is based on short-term managed care.

9. **Methamphetamine treatment programs are demonstrably effective.**

As will be seen in Chapter 14, treatment programs vary as to effectiveness, and the specific drug involved is not going to be as important as the history of the individual, the conditions of use, the overall social setting within which the individual must function posttreatment, and the kinds of ongoing support systems that are available in cases where drug use has created long-term deficits. Methamphetamine, which can create those long-term deficits, is a particular contributor to the need for extended treatment. Again, as will be detailed in pages to come, interventions have included drug courts, but these alternative justice programs are usually not available to persons who commit violent offenses. The bottom line in treatment is that multimodal therapies are much more likely to demonstrate effectiveness than some of the more traditional approaches to drug and alcohol abuse.

10. **The methamphetamine problem is overwhelming and will continue to destroy the society.**

As will be seen in Chapter 2, there has been a social setting where methamphetamine abuse in particular has had broad-based social, psychological, and medical impacts (see Greenfeld’s [2001] account of his experience in Thailand). However, in general, almost all epidemics, including behavioral ones, diminished due to a variety of factors even without problem-specific intervention. The Bubonic Plague raged for 2 years in 1348, killed one-fourth to one-third of the population in Europe, and dissipated (Wikipedia, 2007). As these authors have reviewed ongoing incidence statistics, there has been some ebb and flow of use indicators. Public education has made some difference, and there is ongoing effort to design meth-specific intervention approaches as part of the overall drug treatment armamentarium.

**References**

In the first edition, Errol Yudko provided some historical material and some commentary to set the stage for the philosophy underlying the work. That background information is now elaborated in the first chapter of this edition. The basic approach and concern of the authors has remained essentially the same, bolstered by additional material and research that was garnered after initial publication. Methamphetamine is a destructive element in the lives of many people and contributes to ruptures in the social fabric. But the need to engage in “splitting”—seeing life in simple good and bad terms—and simplistic solutions emphasizing heavy-handed enforcement strategies has never succeeded when it comes to substance use and abuse. Readers will find methamphetamine to be no exception to that observation. As with every major issue in a complex society, drug use and abuse has multiple causes, multiple courses, individual and idiosyncratic impacts, and cannot account on its own for other associated ills. Sound bites and political campaigns and culturally limited foreign policies to the contrary, the answers to methamphetamine-related problems will be found in complex and positive strategies that consider the needs of people rather than emphasize further deprivations in their lives.

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Dr. Yudko’s research interests include the effects of pharmacological agents on aggressive and defensive behavior in both humans and nonhuman animals, the endocrinology of addiction and craving, models of substance abuse prevention in adolescents, the psychometric qualities of scales used to measure substance use, and effective methods of providing distance education. He recently received the Tanaguchi Award for Excellence and Innovation for his work in researching and delivering online courses. He has published or presented more than 30 professional papers. He is frequently called upon to provide training for educators, counselors, and others interested in understanding substance abuse. Dr. Yudko is an ad hoc reviewer for *Addictive Behaviors*, the *Journal of Studies on Alcohol*, the *Journal of Substance Abuse Treatment, Computers & Education*, the *Journal of Traumatic Stress*, and *Substance Abuse Treatment, Prevention, and Policy*. 
Background and Scope

Methamphetamine and its precursors are substances that alter perception, mood, and behavior. From what is known, the use of drugs to change the inner world—and with effects on behavior in the outer world—has been characteristic of human history. The interweaving of drug seeking and using with politics and government is considered in this section.
To make alcohol, it is simply necessary to expose a source of sugar, usually in the form of some kind of plant material, to the air. Yeast, which is found throughout the world in abundance, eats the sugar and excretes alcohol. Barley was domesticated about 10,000 years ago. Beer was being made by the Sumerians, the first recognized city–state, as early as 6000 B.C. The recipe was discovered in *Hymn to Ninkasi*, the goddess of brewing (Prince, 1916). Beer was also used as an ingredient for several Sumerian recipes.

The Code of Hammurabi, the first written legal system, was developed between 1795 B.C. and 1750 B.C. Four of the laws from the code pertained to the regulation of alcohol use and focused on proper payment. Harsh punishment for violations included death by drowning and burning (Johns, 1904).

**Fundamental Factors**

Psychological, social, and political factors all interact to explain the use of drugs and the social response to that use. A review of historical data serves to illustrate that interaction. It can be noted that governments and law enforcement authorities have not infrequently acted to scapegoat substance use to divert attention from other issues. By not addressing more primary sources of stress, as well as by not considering the biopsychosocial nature of addictions, the real foundations for problematic use receive little needed attention.

Historically, blaming drugs for social problems has led to the regulation of those drugs through legislation. Furthermore, after every attempt to control a drug through legislation and enforcement, the use of a different drug escalates. When humans are stressed, or experiencing some other predisposing factor for drug use, something causes them to seek refuge in an altered state (Yudko et al., 1997). Rather than an emphasis on penalties, proactive attention to poverty, poor education, racial inequality, and negative role models would be a more productive way to reduce drug use.
The Early American War on Alcohol

Americans have tended to overendorse chemical solutions to their problems and at the same time have viewed drug use as symptomatic of moral laxity. Thus, even though Americans have access to alcohol and cigarettes, two of the most dangerous drugs available in America, less harmful substances like marijuana are declared illegal. Further, there is a tendency to endorse “natural” substances and reject synthetic ones. However, there is only one periodic table. The elements that form that table combine together to make compounds. Whether these compounds are products of plant life or laboratory activities, the resulting chemical has a defined set of characteristics.

The American legal system evolved from the British legal system. The British war on drugs started in 1327 with laws that limited the number of establishments that could sell alcohol (Austin, 1979). These laws later evolved into limitations on when alcohol could be sold. These new laws were followed by an unprecedented increase in drunkenness that lasted for 500 years. Another factor in Britain was the deliberate introduction of cheap gin as a way to deal with the Industrial Revolution factory abuses—a drinking worker population raises less protest. What was not anticipated was the by-product of fetal alcohol syndrome and effects that added to society’s burdens for ensuing generations (Lemoine, 1968). Some of the laws that regulated drinking in Britain have lasted until the modern day. Very crowded pubs close by 11:00 P.M. on weekdays and are closed during church-going hours on Sundays, which does not end consumption but constrains it to certain temporal parameters.

The North American War on alcohol started around 1620, when the Puritans arrived from Britain on the Mayflower. A quote from the Mayflower log reads, “We could not now take time for further search or consideration, our victuals having been much spent, specifically our beer.” The Puritans carried with them 42 tons of beer, 10,000 gallons of wine, and 14 tons of water. They came from a society where alcohol was culturally acceptable. Nonetheless, their home government had begun to pass legislation to control its use 300 years prior. These new arrivals followed suit and within 10 years of colonization began legislation to regulate the use of alcohol (Lee, 1963).

In 1629, the Virginia Colonial Assembly introduced the first laws concerning the use of alcohol in the New World (Cherrington, 1920): “Ministers shall not give themselves to excess in drinkinge, or riott, or spending their tyme idellye day or night.” In 1633, in Plymouth Colony, the sale of more than 2 pence worth of spirits was prohibited to “anyone but strangers just arrived.” In 1637, in Massachusetts, it was ordered that, “no persons shall remain in any tavern longer than necessary occasions.”

The ambivalence of the early Americans over the use of alcohol is reflected in the inconsistent behavior observed by historians. While the early
colonists were legislating against the use of alcohol, they were finding ways to ensure they had access to it. In 1640 the first distillery had been built on Dutch-owned Staten Island. These contrasts continued into the next century. Alexander Hamilton’s Revenue Act of 1791 called for the taxation of whiskey, which incited the Whiskey Rebellion of 1794 when farmers refused to pay the tax. Taxmen were tarred and feathered. George Washington was forced to call out the militia. The military won, but Thomas Jefferson repealed the Revenue Act soon afterward (Hogeland, 2006).

**The First Temperance Movement**

From 1792 to 1810, the number of working distilleries in the United States increased from 2,597 to 14,191 (Cherrington, 1920). The average annual per capita consumption of alcohol rose from 2.5 gallons in 1792 to 7.1 gallons in 1830. The growth of alcohol-related problems (that is, violence, poverty, loss of morality) was blamed on the increased consumption of hard liquor. The first American temperance movement began in 1826. Thanks to a 1784 pamphlet by Benjamin Rush, beer was labeled as good and whiskey as bad (Rush, 1814). Rush was a physician and a signer of the Declaration of Independence. He concluded that the effect of hard alcohol was damage to the part of the brain that controlled morality. Interestingly, at the same time that the morality model of alcoholism was developed, the concept of alcoholism as a disease was also developed by the same Dr. Rush.

Thus, hard alcohol was the identified enemy. A multinational effort that crossed the barriers of social class arose in opposition. The effort reached all the way to Hawaii, where early prohibitionist laws against the use of alcohol led to riots in 1825. The effect of the war on hard alcohol was an increase in the use of beer and wine that persisted until the second temperance movement, thus illustrating that attempts to control drug use without trying to modify the social influences at work simply lead to people switching drugs (a pattern seen in the rise of methamphetamine use in the face of effective targeting of marijuana in Hawaii) (Morgan and Beck, 1994).

**The Second Temperance Movement**

The failed temperance movement of 1826 gave way to the second temperance movement. The buildup to the second temperance movement began in 1851 with the prohibition of alcohol in Maine. By 1855, 13 states had passed prohibition laws. By 1868, 9 had already repealed those laws. Interestingly, around the same time the American states were passing prohibitionist laws, U.S.–Hawaiian treaties were being signed by Kamehameha III permitting the sale of American liquor in Hawaii. The second temperance movement officially began in 1874 with the organization of the National Prohibition
Party. They decreed that all alcohol was “evil.” Over the next 15 years, 7 more states would adopt prohibition, and 4 would repeal it (White, 1998).

**Historical Notes on Patent Medicines**

Alcoholic elixirs and painkilling opiates constituted the majority of the “remedies” to which patents were granted during the eighteenth and nineteenth centuries. During the second half of the nineteenth century, when the temperance crusade was at its peak, some of the citizens who were signing the pledge were drinking alcohol in the remedies they relied on, including many patent medicines advertised as containing none. People developed a strong thirst for bitters, and the same individuals who stigmatized distilled liquors defended the use of alcohol to preserve the medicinal properties of vegetable extracts. Although some drank bitters seeking health and relief, for a lot of them alcoholic bitters were pure subterfuge. The opium habit was also stimulated by nostrums in both adults and children. In this case, however, the effect was even more perverse because opiates sedated the pains, giving the false impression that people were on the road to recovery, while in actuality diseases were becoming more serious (Harvey, 2002).

Patents granted in the eighteenth century were not approved on the basis of empirical evidence to support the healing properties of such substances, but rather on claims of authority. Pectoral drops, oils of any kind, female pills, elixirs, bitters, balsams, powders, pulmonic syrups, and many more remedies digested in alcohol were justified in terms of speculative theory or presumed empirical experience. Producers used Latin names and were successful in getting the substances into official pharmacopoeias. Falsification of credentials or using names of nonexistent prestigious physicians to advertise their products was a common practice. One of the most extravagant resources was to claim ancient and esoteric origins of the ingredients used in the concoctions. Some remedies were proclaimed as made from ancient formulas recorded in hieroglyphics on papyrus scrolls found under mummies of Egyptian pharaohs. Others were promoted as famous Near Eastern cures, which had wrought “wonders in Bethlehem and Jerusalem, in Sodom and Gomorrah.” However, suggestion and gullibility were what really turned the selling of nostrums into a very profitable business at the time. Purveyors exaggerated small symptoms and transformed normal physiological manifestations into dread signs of incipient pain and death. Advertisements included lists of unspecific symptoms—some of which might be present in a person not really sick—that frightened people into the medicine habit. Once started, they kept on, if only to get their money’s worth from what they had bought (Harvey, 2002).

The types of patents granted at different times in history tended to reflect then current theories as to causes of illness. In fact, a monistic theory of disease was behind patent medicines. At some point in time, for example, it was
believed that all diseases were caused by excessive excitability of the blood vessels. As hypertension was the only cause, relief of this pressure was the sole cure. Bleeding and purging was therefore considered the best remedy for any illness. At other times, it was thought that stomach dysfunction was the cause, and a huge appetite for stomach remedy developed across the country. In fact, “Bilious Pills” was the first medicine patented by an American, Samuel Lee, in 1796. Such pills were composed of gamboge, aloes, soap, and nitrate of potassa, and besides biliousness they would also supposedly cure yellow fever, jaundice, dysentery, dropsy, worms, and female complaints. Later, it was alleged that the cause of all illness was cold, and the remedy heat. Steam baths and “hot” botanicals like red pepper, and the use of emetics, purgatives, enemas, and sweat-producing herbs, were considered to clear the body of all “obstructions,” let the stomach function properly, and thus preserve the natural heat-balance among the body’s basic elements. More recently, in the early nineteenth century, indigestion and constipation were considered the sources of all illness, and purges of various potencies became the most popular substances prescribed by physicians. This was a time when many medicine makers saw their wealth multiplied just by selling laxatives. Finally, when the germ theory of disease became popular, new nostrums were developed to destroy microbes. Again, a specific remedy was sovereign: it could bring all disease under absolute control* (Harvey, 2002).

At least four factors contributed to expansion of the market for vendors of packaged remedies (Harvey, 2002):

1. Presence of demand: The willingness to use complicated concoctions (mostly purgatives, carminatives, opiates, emmenagogues, and liniments, containing what many would consider unpalatable ingredients) came from the fact that a lot of people got sick, and medical knowledge was limited. Patent medicines were seen as a panacea for rheumatick and scorbutick, vapours, hysterick and melancholly fits, and many other diseases that came along with industrialization and urbanization, such as tuberculosis, typhoid, typhus, yellow fever, and cholera.

2. The expansion of advertising: The nostrum promoter counted on the press to carry his or her message to potential customers, and the papers depended on patent medicine advertising for needed revenue.

3. Changes in patent and copyright legislation: The federal government helped promote the nostrum boom, mostly unwittingly. In 1793,

* This type of thinking was not limited to the nineteenth century. In Cleveland, in the late 1960s, a mental health clinic and a special education department paid consultant fees to a self-proclaimed expert on attention deficit-hyperactivity disorder (ADHD) who demonstrated a “cure” using high dose vitamins. The mixture produced flushing of the subject which “proved” its efficacy. The vasodilation, of course, had no curative impact on hyperactivity or attentional problems [McPherson, personal observation].
Congress enacted a law to “promote the Progress of Science and useful Arts” by granting patents to inventors, which were then obtained by nostrum makers to expand their products.

4. Changes in postal tariffs: In the 1840s, Congress enacted markedly lower postal rates that allowed editors to send their papers without postal charge to subscribers. This subsidy prompted an increase in subscriptions, increasing the readership for the patent medicine advertisements. Further, the new laws allowed for cheaper mailing of direct promotional materials.

Medicine producers were good at adapting their products to changing social circumstances over time. For example, before the American Civil War, they had been advertising their products to slave owners as being especially efficacious for illnesses common to slaves. During the Civil War, posters with photographs of soldiers were used to advise the use of remedies to protect them from “the fatal maladies of the Southern swamps, and the poisonous tendency of the impure rivers and bayous.” When the fighting was over, thousands of soldiers returned to civilian life with ruined digestions, malaria, wounds, emotional disturbances, and other ailments that were to cause them trouble for the rest of their lives. Nostrum makers were aware of this and took advantage of this situation to increase their sales (Harvey, 2002).

Over time, as major discoveries were made that explained disease using scientific method, patent medicines reached their apogee. The nostrum business achieved the largest sales and the most unscrupulous promotion America had yet seen. In 1905, a leading drug trade journal listed the names of over 28,000, and the next year a witness before a Congressional committee estimated that there were 50,000 patent medicines made and sold in the United States. Thus, in 1859, the proprietary medicine industry had an output valued in census figures at $3,500,000, but by 1904, the sum had multiplied by more than 20 times. At retail prices, the nostrum-taking American public paid many millions more (Harvey, 2002).

The War on Opiates and Cocaine

The advent of modern pharmacology paved the way for the first North American encounter with stimulants. Stimulants were nothing new to the old world; ephedra, ma huang, chat, coffee, and coca had been used by various cultures for many thousands of years. Chinese physicians had used ma huang, which we know as ephedra, as a medicinal herb for 5000 years. Other stimulants were used by other cultures. Chat was used 2000 years ago by Roman gladiators to overcome fatigue during gladiatorial combat (Wadler, 1994). Coffee was used in Persia since a.d. 900 (to treat measles and lust)
and spread to Europe by the 1600s (Ray and Ksir, 2002). Interestingly, the Muslims had their own war on drugs, over coffee (actually coffeehouses), in the seventeenth century. The coffeehouse was a prime spot for plotting the overthrow of governments (Blum, 1969). Coca leaf was chewed by the Incas in their religious ceremonies for centuries (Byck, 1987). In the sixteenth century, the Spanish began cultivating coca to improve South American Indian worker productivity (Mann, 1994).

During the nineteenth century, pharmacology was in its infancy. Whiskey and brandy were considered by physicians and the populace to be medicinal drinks, even as alcohol was being demonized by the movers and shakers of the first temperance movement. Advances in drug extraction techniques and the development of the syringe would soon add morphine, cocaine, and amphetamine to the list of medicines (Ksir, Hart, and Ray, 2006).

Cocaine was extracted in 1859. The invention of the syringe in 1853, combined with the demonizing of alcohol, led to cocaine’s increased popularity. The extracts from the coca leaf were used in a range of medicinal drinks and also in Coca-Cola. Cocaine use was widespread; users included numerous prominent people, among them Sigmund Freud who was one of cocaine’s greatest proponents although he would change his opinion after witnessing how devastating cocaine addiction could be (Doweiko, 2001). Increased opiate use soon followed.

Opiates, cocaine, and alcohol were so widely used that by the early 1900s they became the main livelihood of street peddlers. The ingredients of the “snake oil” concoctions that they sold were kept secret. There was no federal regulation of their contents. There was no law that forced the manufacturers to disclose the ingredients of these “ultimate cure-alls.” The effect was to cause an estimated 0.3% of the population to become drug addicted (Musto, 1991). The medical community began to question the claims made about these elixirs. The Pure Food and Drug Act of 1906 was passed to prevent the misbranding of foods and drugs (Ray and Ksir, 2002). In response, there was an immediate decline in substance abuse and addiction. Apparently, informing the public that favorite medicines were highly addictive drugs was enough to cause behavior change (Musto, 1999).

In the meantime, the decline went unnoticed by politicians who encouraged paranoia about addictive drugs to further their careers. The lead figure was a former physician named Hamilton Wright who asserted that opiates were the cause of all human suffering. In a move that was remarkably similar to the way other drugs have been targeted in the modern world, Wright questioned prison wardens, police chiefs, and doctors about the nature, effects, and prevalence of opium use. The picture that he got was bleak. Americans had a worse opium problem than the Chinese. It was the evidence that he collected from these professionals that would be used to start his crusade against opium (Gray, 2000).
However, prison wardens, police chiefs, and doctors either work on the front lines or receive reports from those who do. They experience daily exposure to many of the problems that are related to drug use. This constant exposure may cause them to overestimate the gravity of the situation. In fact, by the time Wright collected his data, opium use had reached a 10-year low. Physicians had controlled what little use there was by prescribing opiates to their addicted patients* (thereby eliminating the crime, disease, and other social problems associated with the drug). The bias inherent in the group that Wright surveyed supported his war on drugs that would eventually lead to increased drug use, prohibition, the formation of organized crime, and a murder rate three times what it was before his report was presented (Musto, 1999).

The Harrison Act of 1914 was a tax law designed “to provide for the registration of, with collectors of internal revenue, and to impose a special tax upon, all persons who produce, import, manufacture, compound, deal in, dispense, or give away opium or coca leaves, their cults, derivatives or preparation, and for other purposes” (Terry and Pellens, 1928). Tax law was the legislative vehicle chosen because the Constitution prevented the formation of a national police force for the enforcement of any other category. The original intent of the act was to help the Chinese control the importation of opium. However, the inclusion of Great Britain, which was having its own problems with morphine, heroin, and cocaine (and were the very ones who introduced opium to the Chinese), led to the control of coca leaves being included in the act (Gray, 2000).

To get his law passed, Wright evoked the specter of racism: “Cocaine is often the direct incentive to the crime of rape by the Negroes…” and “One of the most unfortunate phases of the habit of smoking opium in this country is the large number of women who have become involved and are living as common-law wives or cohabiting with Chinese…” In 1914, the Harrison Act was passed (Gray, 2000).

Immediate responses included editorials in the New York Medical Journal and American Medicine warning of negative consequences and increased usage. Four years later, the predictions were documented—the use of narcotics increased as a result of the Harrison Act (Brecher, 1972).

* In his book Dark Paradise: Opiate Addiction in America Before 1940, David Courtwright [2001] indicated that nonfiction autobiographical literature of the time supported that the typical opium addicts were white southern housewives who used laudanum [a mixture of alcohol and opium].
The Later American War on Alcohol

It was not over yet. Prohibition was enacted in 1920. Prohibition was followed by a fourfold increase in the murder rate and a 24% increase in other crimes. Law enforcement incursions into Fourth Amendment* rights increased as did police corruption. Criminals, such as Al Capone, were turned into role models (Gray, 2000). The changes in drinking patterns that had been caused by the first temperance movement (reduced hard alcohol use and increased beer and wine use) were reversed (reduced beer and wine use, increased hard alcohol use) (Warburton, 1932). The failure of prohibition led to increased penalties for distributing alcohol, which further failed to change drinking patterns. Prohibition was repealed in 1933. It is significant to note that prohibition was enacted as the 18th Amendment to the Constitution. It was thought at the time that a repeal would be impossible to achieve because no constitutional amendment had ever been repealed (nor has any other since). However, the 21st Amendment was passed to the repeal the 18th Amendment (Gray, 2000).

New Horizons: The War on Other Drugs

The War on Marijuana

In the 1920s, a “new drug” called marijuana (which had been used to make rope and clothing since before George Washington grew it) was brought to the attention of Congress. Marijuana had been used medicinally since 2737 B.C. when Emperor Shen Nung wrote a pharmacy book recommending the use of marijuana to treat “female weakness, gout, rheumatism, ben ben, constipation, and absent mindedness” (Snyder, 1970). American and European physicians had been using it as a hypnotic, anticonvulsant, analgesic, as treatment for migraine headaches, and to treat rabies since the 1800s (Elliot, 1992; Grinspoon and Bakalar, 1992, 1993, 1995; Ray and Ksir, 2002). In 1926, newspaper articles began associating marijuana use with violent crime, and the frenzy began.

In the 1920s, Harry Anslinger was the U.S. Commissioner of Narcotics. In his biography, McWilliams (1990) characterized Anslinger as “a cross between William Jennings Bryan and Reverend Jerry Falwell” (as quoted by Gray, 2000, p. 73). It was a new position in a new branch of the government. Anslinger first tried to “save” prohibition through tougher enforcement.

* “The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.”
When prohibition ended, Anslinger found a new scapegoat. Thus, although in 1931 he had reported to Congress that marijuana use was not a problem, by 1935 he had changed his mind. Marijuana was upgraded to an evil “as hellish as heroin.” In a Congressional hearing in 1937, Anslinger reported that marijuana trafficking had increased at such an alarming rate “that it has come to be the cause for the greatest national concern” (Gray, 2000, p. 76). Media interviews with the police confirmed for the country that this drug was the new scourge. Hearst then discovered the “marijuana menace,” and newspapers of the day began campaigns replete with false facts and fear mongering that connected marijuana use to violence, mental illness, and minority group membership (Gray, 2000).

Anslinger and his experts told stories of ax murderers and cop killers who were driven to their crimes by the devil weed. He originated the “gateway theory of drug addiction” (that is, the theory that marijuana use leads to harder drugs). The concern that he prompted in Congress led to the passage of the Marijuana Tax Act in 1937. This act required the registration and taxation of those importing, buying, or selling marijuana (Ray and Ksir, 2002). As soon as marijuana was placed within Anslinger’s domain, the crisis seemed to diminish. The numbers of users that Anslinger reported dropped dramatically. His draconian approaches to control were presented as “obviously working.” However, almost every statement made by Anslinger during that time period was discredited (The LaGuardia Report, 1944).

**LSD from 1938 to 1970**

While Congress was examining ways to control the use of amphetamine, marijuana, opiates, and barbiturates, there were other recreational drugs being developed. In 1938, in the Sandoz Laboratories in Basel, Switzerland, Dr. Albert Hofmann synthesized d-lysergic acid diethylamide, commonly known as LSD (Ray and Ksir, 2004). In 1943, Hofmann accidentally imbibed a solution of LSD. He subsequently reported psychotropic effects. In 1953, Sandoz applied to the U.S. Food and Drug Administration (FDA) for authorization to study the drug. Over the next 13 years the drug would be used by the psychological community for psychotherapy (Clark, 1975), by the covert criminal justice community as truth serum (Taylor and Johnson, 1976), and by individuals for recreation (Weil, 1963). In response to perceived increased street use of LSD, the U.S. government outlawed the use, sale, and possession of psychedelic drugs in 1965 in spite of the fact that use was apparently waning. Use was immediately documented to rise based on hospital admissions (Feldman, Meyer, and Quenzer, 1997). Sandoz stopped sponsoring its study in 1966. By the mid-1970s, both scientific and recreational interest in the drug had reduced, though recreational use would cycle through lows and highs over the next 20 years (Morgan and Beck, 1994).
Ephedra to Amphetamine

Around 1927, at the same time the newspapers were provoking fear of marijuana, the U.S. medical community began to explore the use of ephedrine as a treatment for asthma (Karch, 1996). Ephedrine is the active ingredient in the Chinese herb ma huang (Ross and Chappel, 1998). Its uses were effectively applied to treating low blood pressure, nasal congestion, a variety of respiratory conditions (Karch, 1996), and thermogenic weight loss (loss through heat production) (Dyck, 2000). As supplies dwindled, pharmaceutical companies searched for a synthetic alternative. Amphetamine was first synthesized in 1887 (Kaplan and Sadock, 1996), but no attention was paid to it until the medicinal uses for ephedrine were understood (Feldman et al., 1997). However, negative effects were also soon documented, including anxiety, insomnia, urinary retention, heart palpitations and arrhythmias, headache, confusion, hallucinations, tremors, seizures, strokes, hypertension, coronary artery spasm, angina, intracranial hemorrhage, and death (American Society of Health Systems Pharmacists, 1999; Cupp, 1999; Graedon and Graedon, 1991; Karch, 1996). Ephedra then became useful in the manufacture of methamphetamine.

On December 30, 2003, the FDA released a consumer alert about the dangers of the use of ephedrine:

The Food and Drug Administration (FDA) is alerting the public to its forthcoming determination that dietary supplements containing ephedra present an unreasonable risk of illness or injury, and should not be consumed. The agency has notified firms manufacturing and marketing these products that it intends to issue a final rule prohibiting their sale, which will become effective 60 days after its publication.

On April 12, 2004, over objections of the dietary supplement industry, ephedrine was officially banned. It took 80 years, thanks to the Dietary Supplement Health and Education Act, which allows makers of “dietary supplements” to make any claims they want about a product with no regulation. The ban was reversed on April 14, 2005, by Federal Judge Tena Campbell, but by this time, the Combat Meth Act of 2005 was passed by Congress which restricted the sale of pseudoephedrine, a cold remedy that is similar to ephedra and can be used to manufacture methamphetamine. So far no evidence has been provided that even remotely suggests that this legislation has reduced methamphetamine use.

Amphetamine’s Wartime Use

By the 1930s, all the major effects of amphetamine were known. While researching the effects, it was discovered that amphetamines could awaken
dogs that were under anesthesia. This discovery led to the use of amphetamines, in pill form, to treat narcolepsy (Feldman et al., 1997). It is likely that amphetamine was used by Japanese, British, German, and American soldiers during World War II (Brecher, 1972; Feldman et al., 1997; Lovett, 1994). U.S. and Japanese army personnel may have used amphetamines to stay awake and alert while assigned to especially long periods on duty (Feldman et al., 1997; Suwaki, 1991). Air Force pilots have been given amphetamine to use during long missions. During Operation Desert Storm, 65% of U.S. pilots reported using amphetamine during combat missions (Emonson and Vanderbeek, 1995).

**The Regulation of Legal Drugs**

While researching the effects of amphetamine in 1930, it was discovered that amphetamine had similar properties to ephedrine. It would soon be used to treat narcolepsy (Feldman et al., 1997), asthma (Karch, 1996), and rhinitis (Karch, 1996). Medicinal use of amphetamine would escalate over the next 40 years. The drug would be used to treat both diet and mental health issues. In 1937, the same year that Anslinger was fighting his war on marijuana, amphetamine became available as a tablet (Ray and Ksir, 2004) and was used both medicinally and recreationally. In the 1930s during the campaign against cocaine, opiates, and significantly marijuana, and with the increased availability due to medical use of amphetamine, people once again shifted use (Ksir et al., 2006). However, amphetamine was potentially significantly more damaging than the drugs it was replacing.

The advances in technology that allowed mass production of new drugs then resulted in safety concerns and federal regulation. In 1938, the FDA, previously called the Bureau of Chemistry, was given the authority to make sure drugs were safe under the Food, Drug, and Cosmetic Act of 1938. A manufacturer would have to submit a New Drug Application (NDA) to the FDA. The NDA would include “full reports of investigations which have been made to show whether or not such a drug is safe for use.” The 1938 law had the effect of changing the FDA from an organization that would try to track down unsafe products after they had been put on the market into a gatekeeper that made sure that only safe products made it into the marketplace (Ray and Ksir, 2004).

The 1906 and 1938 laws made drugs pure and safe but did nothing to ensure their effectiveness. The Kefauver-Harris Amendments of 1962 set out provisions for testing drugs for their efficacy. Two stages were specified: first, animal testing on at least two species including at least 2 years of toxicology studies; second, clinical investigation of the drug’s effects on humans involving three phases:
1. Phase 1 trials are performed on a very small population of healthy volunteers to understand absorption and excretion of the drug, as well as effects and side effects. If there are no serious side effects, a manufacturer can move on to phase 2 trials.

2. Phase 2 trials are larger scale and involve the patient population that the investigators are interested in treating.

3. Phase 3 trials are conducted with thousands of participants. At the end of the phase 3 trials, the FDA balances out the effects of the compound versus its side effects and determines if the benefits outweigh the costs of its use. If the cost-benefit analysis comes out on the side of benefit, then the drug will be approved for sale. The manufacturer is still required to test the drug for long-term consequences, but after it is made available to the public.

Legislation of the 1960s and 1970s

The Kefauver–Harris amendments of 1962 were introduced during a time of fear. The drug thalidomide had been observed to cause birth defects. American youth were experimenting with amphetamine and barbiturates. The public was sensitized to the harmfulness of both licit and illicit drug use (Ray and Ksir, 2004).

Amphetamine use became so common that college students in the 1950s and 1960s used amphetamines to stay awake all night to study for exams. Long-haul truckers named the drugs that they used after how much amphetamine was needed to make the trip. To get halfway across the United States, truckers used “St. Louies,” and for a transcontinental truck run, “West Coast turnabouts” were used (Feldman et al., 1997). In the 1960s, California users of amphetamine began using speedballs, a combination of amphetamine and heroin taken intravenously (Ray and Ksir, 2004). It was such a mixture that caused the death of John Belushi. As the 1960s progressed, it became evident that these drugs, though not considered addictive, had many negative side effects. In response, legislation redefined amphetamine as a dangerous drug, which increased media attention and led to increased use (Ray and Ksir, 2004).

A series of high-profile drug-related crimes led Congress to pass the Drug Abuse Control Amendments of 1965. These incidents included an airplane crash in which the pilot was taking barbiturates, a multivehicle accident on the New Jersey Turnpike in which Benzedrine was implicated, a pair of teenagers who were killed in a fire after an overdose of barbiturates, and a murder committed by perpetrators who were under the influence of barbiturates. What was not appreciated was that these events, which occur rarely in people who abuse barbiturates and amphetamine, are common for abusers of alcohol. However,
alcohol was not addressed by the legislation. The Drug Abuse Control Amendments of 1965 covered “depressant and stimulant drugs” as well as “any other substance found to have a potential for abuse” but did not include legal drugs.

**Standardizing Drug Laws**

The inconsistent drug laws that had been adopted over the century were pulled together into the Comprehensive Drug Abuse Prevention and Control Act of 1970. Title II of this act was called the Controlled Substances Act (CSA). The CSA defined five schedules of drugs:

1. Schedule I drugs are defined as those considered to have high potential for abuse, with no recognized medical use in treatment in the United States. Some examples include phencyclidine (PCP), gamma hydroxybutyrate (GHB), methylenedioxymphetantamine (MDA), 3,4 methylenedioxymethamphetamine (MDMA), heroin, ibogaine, lysergic acid diethylamide (LSD), marijuana, mescaline, peyote, psilocybin, and Rohypnol. The label of “no recognized medical use” is controversial because lawmakers rather than doctors did the categorization.

2. Schedule II drugs are those with a high potential for abuse or dependence, and some recognized medical use. These are available only by prescription. Some examples include cocaine, Ritalin, most opiates, some barbiturates, and methamphetamine/amphetamine.

3. Schedule III drugs are those deemed to have less potential for abuse than those in Schedules I and II. They have recognized medical uses and are also available only by prescription. Examples include anabolic steroids, some barbiturates, combinations of codeine with aspirin or Tylenol, and ketamine.

4. Schedule IV drugs are those deemed to have a low potential for abuse relative to drugs in Schedule III. They also have recognized medical uses and are available only by prescription. Examples include compounds that are used to treat anxiety such as Xanax, Librium, and Valium, some barbiturates such as phenobarbital, and a few opiates used to treat mild pain.

5. Schedule V drugs are deemed to have a lower potential for abuse relative to drugs in Schedule IV. These drugs may or may not require a prescription. Examples include cough suppressants and drugs used to treat diarrhea.

**Effects of Increased Controls**

Most of the amphetamine used in the 1960s and 1970s came from legal sources. As controls tightened on its use, illegal manufacture increased,
and methamphetamine replaced amphetamine. Methamphetamine with its greater potency is also potentially more hazardous to users. Furthermore, because it is created through illicit means, it is less pure than industrially manufactured amphetamine.

**Closing the Twentieth Century**

Physicians of the Haight Ashbury Free Clinic in San Francisco tried to warn the public of the dangers of amphetamines by coining the phrase “speed kills.” However, after the federal redefinition of amphetamine as a dangerous drug, illicit methamphetamine laboratories began to emerge in San Francisco. Motorcycle gangs took over the manufacture of methamphetamine and began to distribute it along the Pacific Coast. By the 1970s, the use of methamphetamine crossed barriers of gender, race, and social class. In the 1980s, methamphetamine manufacture consolidated in the San Diego area. Mexican traffickers became involved in the manufacture and distribution soon thereafter. The market soon spread to the Southwest and Midwest (Anglin et al., 2000).

Increased illegal manufacture of methamphetamine included experimentation that resulted in a new form of the substance, methamphetamine hydrochloride (ice), which could be smoked. In the 1980s, youth in Hawaii reported smoking methamphetamine and it soon spread to California (Ray and Ksir, 2002). Doweiko (2005) suggested that there is historical evidence that ice was brought to Hawaii from Japan by army troops during World War II. However, it is perhaps more likely that the supply in the early 1980s was imported from Far East sources in the Philippines, Japan, Korea, and Taiwan (Laidler and Morgan, 1997). Use increased in the 1990s as the suppliers shifted to Mexico- and California-based organizations, which were supplemented by extended kinship networks of whole families or neighborhoods (Laidler and Morgan, 1997).

**Drug Wars of the 1980s**

During the 1980s there were two drug wars taking place: the South American war on cocaine and the North American war on marijuana. These activities were fundamentally linked. The war on cocaine changed the world markets for drugs. Manufacturers and dealers had to find new markets and new products. As cocaine became more expensive, users began looking for alternatives. Drug cartels began “testing” new products. At the same time, marijuana eradication efforts began in Hawaii. Eradication efforts drove the price of marijuana up. A group of Southeast Asian entrepreneurs realized
that money could now be made in Hawaii. They decided to test-market the
smokable form of methamphetamine. They were very successful.

Based on surveys of ice users, it was concluded that the successful reduc-
tion of available marijuana led to increased costs of that substance. “Ice”
became a drug of substitution for many former marijuana smokers. Further-
more, as use continued, the impact in terms of increased illegal and aggres-
sive behavior on the part of formerly “mellow” marijuana users added to the
region’s social problems (Morgan and Beck, 1994).

The Omnibus Drug Act

In 1988, with the intention of reducing demand for drugs, the Omnibus Drug
Act (also known as the “Chemical Diversion and Trafficking Act”) toughened
penalties for drug users, established a Cabinet-level “drug czar” (Director of
National Drug Control Policy), added registration requirements on airplanes
and boats, dealt with arms sales and money laundering, and added the death
penalty for murder connected with drug-related felonies. Later amendments
added that students convicted of drug-related crimes lost the availability of
federal financial aid. This act never led to reduced drug use. In fact, added
provisions that allowed police to confiscate properties would soon lead to the
Los Angeles sheriff’s department murdering an innocent man for his Malibu
beach property (Office of the District Attorney, 1993).

Drug Wars of the 1990s

In a classic example of a positive feedback loop (in which each correction
increases rather than decreases the problem), governmental policy caused an
increase in amphetamine use and the resulting upswing then led to tighter
laws that then resulted in increasing usage. Furthermore, the Crime Control
Act of 1990 arbitrarily increased the penalties for smoking methampheta-
mine instead of snorting or injecting it. Continuing the escalation, the
Comprehensive Methamphetamine Control Act of 1996 instituted penalties
for possessing legal materials if the courts “believed” that they were intended
for the purpose of the manufacture of methamphetamine.

A Note on Education as Strategy

Although the efforts to deal with drugs have primarily featured attempts to
control and punish, there have also been educational efforts with particular
interest in the young. These programs, however, have not necessarily rested
on available research findings and therefore may not have the desired impact.
For example, one of the very interesting things about adolescent substance
use is that when a young person believes that many people are using a drug,
he or she becomes more likely to use that drug (Hansen, 2001). That propensi-

Summary

It is considered a truism that only by knowing history can undesirable pat-

ters not be repeated. But it is also a truism that human beings have immense
capacity to repeat across generations and within individual lives the counter-

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Methamphetamine abuse is fast becoming ubiquitous. Various studies by the United Nations show that methamphetamine is consumed in almost every region of the world, in some places outstripping cocaine and heroin as the drug of choice, and is the single most frequently reported illicitly manufactured drug (United Nations, 1997). Since the mid-1980s, the world in general and the Pacific region in particular have experienced a huge increase in methamphetamine abuse, with nine times the quantity seized in 1993 as was seized in 1978 (United Nations, 1997). In the United States, as of 1990, an estimated 5.2 million persons 12 years of age and older reported using methamphetamine at least once (National Household Survey on Drug Abuse, 1991). In 1991, 7% of respondents in a large survey reported using methamphetamine at least once, with the highest use in the 18- to 25-year-old age group (Kaplan, Sadock, and Grebb, 1994). However, by 2007, as has been seen historically in drug use trends, use had stabilized (United Nations, 2007).

U.S. Department of Justice statistics show that for the period from 1990 to 1996, 64% of high school seniors could easily obtain methamphetamine. Step-by-step instructions to manufacture methamphetamine are on the Internet. Nearly half of all methamphetamine users will develop cardiovascular symptoms, with the percentage higher in chronic abusers (Beebe and Walley, 1995; Lynch and House, 1992). One-third of heavy users will develop bizarre, frankly psychotic behavior and will suffer hallucinations (Bell, 1973; Griffith, Cavanaugh, and Oats, 1969). Psychosis can occur after only one dose (Ando, Hironaka, and Yanagita, 1986). Ando and colleagues observed signs in individuals they evaluated that are strongly suggestive of brain damage after a single usage.

Increasing incidence of a condition known as “meth mouth” has paralleled use. Methamphetamine causes dryness of the mouth which then precipitates to increased cavities. There is a concomitant craving for sweets which compounds the problem along with dental neglect. The end result is severe deterioration of teeth occurring at young ages. Dental costs incurred
at jails have increased in consequence of the use and then arrests that follow (Davey, 2005).

Impact of the substance can also be seen in the perspectives of those dealing with the problems “on the ground.” Thus, Darryl Perry, Honolulu Police Department Narcotics/Vice Division, indicated that three-fourths of the Honolulu Police Department’s Narcotics/Vice Division resources go to narcotics investigations dealing primarily with ice (“Arrested Males on ‘Ice’,” June 12, 2002). Kat Brady, Community Alliance on Prisons coordinator, theorized that marijuana eradication efforts forced drug users to turn to methamphetamine. “I think that Green Harvest has had a devastating effect on Hawaii,” she said. Brady praised the law approved in 2002 that includes ice users in a program to send nonviolent, first-time offenders to drug treatment instead of prison (Honolulu Star-Bulletin, June 12, 2002).

Pound quantities of crystal methamphetamine arrive in Hawaii from the southwest regions of the United States, smuggled by couriers and by private post such as FedEx and DHL. Local addicts can purchase ice from a variety of sources; dealers are abundant throughout the state. Most of the methamphetamine labs seized in Hawaii are capable of producing ounce quantities. In 2001, there were 30.0 kg of methamphetamine seized in the State of Hawaii by U.S. Drug Enforcement Agency (DEA) agents, and only 7.9 kg of marijuana seized (U.S. DEA, 2002).

Current Trends in the United States: National Surveys on Drug Use

Estimates of methamphetamine are available from three sources, each of which uses different types of data:

1. The 2004 National Survey on Drug Use and Health (formerly called the National Household Survey on Drug Abuse [NHSDA]) collected by the Office of Applied Studies (OAS) of the Substance Abuse and Mental Health Services Administration (SAMHSA).* This source is designed to produce drug and alcohol use incidence and prevalence estimates in the general U.S. civilian noninstitutionalized population age 12 and over. Most of the data are collected using audio computer-assisted self-interviewing (ACASI) to provide a high level of privacy and confidentiality. For the 2004 survey, 67,760 interviews were completed, and each state’s sample was approximately equally distributed among three major age groups: 12 to 17 years, 18 to 25 years, and 26 years or older.

* http://www.drugabusestatistics.samhsa.gov/systems.htm#NSDUH
2. The 2004 report of the Drug Abuse Warning Network (DAWN)* sponsored by SAMHSA. DAWN is a public health surveillance system that monitors drug-related visits to hospital emergency departments of acute-care hospitals in the United States, and drug-related deaths reported by 145 medical examiner jurisdictions in 43 metropolitan areas.

3. The Community Epidemiology Work Group (CEWG)† is an epidemiology network that functions as a drug abuse surveillance system to identify and assess current and emerging drug abuse patterns, trends, and issues using multiple sources of information. The network is composed of researchers from 21 areas in the country‡ who conduct semiannual meetings to present drug abuse indicator data, survey findings, and other quantitative and qualitative data compiled from local, city, state, and federal sources.

The NSDUH report presented in September 2005 examined trends and patterns in the prevalence and incidence of methamphetamine use from the 2002, 2003, and 2004 National Surveys on Drug Use and Health. Questions about methamphetamine use were included as part of the module on nonmedical use of prescription-type stimulants. Methamphetamine as recorded by NSDUH included both prescription preparations (that is, Desoxyn® and Methedrine) and nonprescription/illicit methamphetamine. NSDUH did not include abuse and dependence questions on methamphetamine as such, so the report provided information on abuse and dependence involving any illicit drug and any stimulant among current methamphetamine users.

As Table 2.1 indicates, methamphetamine use among the civilian noninstitutional population age 12 or older remained stable between 2002 and 2004. However, there was some increase in the number meeting dependency criteria. Averages for 2002, 2003, and 2004 indicated that the rate of past-year methamphetamine use was higher for young adults aged 18 to 25 (1.6%) than for youths ages 12 to 17 (0.7%), who, in turn, had a higher rate than adults age 26 or older (0.4%). Among all persons 12 years of age or older, the rate of past-year use was higher among males (0.7%) than females (0.5%).

The highest rates of past-year methamphetamine use were found among Native Hawaiians or other Pacific Islanders (2.2%), American Indians or Alaska Natives (1.7%), and persons reporting two or more races (1.9%). Past-year methamphetamine use among Caucasians (0.7%) and Hispanics (0.5%) was higher than among African Americans (0.1%) or Asians (0.2%).

* http://DAWNinfo.samhsa.gov/
‡ Atlanta, Baltimore, Boston, Chicago, Denver, Detroit, Honolulu, Los Angeles, Miami/Ft. Lauderdale, Minneapolis/St. Paul, New Orleans, New York City, Newark, Philadelphia, Phoenix, St. Louis, San Diego, San Francisco, Seattle, Texas, and Washington.
The 50 states and the District of Columbia were divided into thirds based on the percentage of the population aged 12 or older who had used methamphetamine in the past year. Twelve states in the West, seven including Nevada (2.2%), Wyoming, and Montana (1.5% each) ranked among the top third of states for past-year methamphetamine use. Connecticut (less than 0.1%), New York, and North Carolina (0.12% each) were among the states with the lowest rates; all nine states in the Northeast were in the lowest third.

The rate of past-year methamphetamine use was higher in counties in small metropolitan areas (0.7%) and counties not in metropolitan areas (0.8%) than in counties in large metropolitan areas (0.5%).

According to the 2004 report of the Drug Abuse Warning Network (DAWN) published in 2006, of 106 million visits to hospital emergency departments (EDs) in the United States, 1,997,993 (about 19%) were drug related. Out of this total, nearly 1.3 million ED visits were associated with drug misuse or abuse. Of those ED visits involving drug misuse or abuse,

- 30% involved illicit drugs only.
- 25% involved pharmaceuticals only.
- 15% involved illicit drugs and alcohol.
- 8% involved illicit drugs with pharmaceuticals.
- 14% involved illicit drugs with pharmaceuticals and alcohol.

Of the 940,953 drug-related ED visits that involved a major substance of abuse, 102,843 (about 11%) involved stimulants, including amphetamines and methamphetamine. Cocaine caused the majority of drug-related ED visits for that year (383,350 or almost 41%); 23% involved marijuana, and 17.2% heroin. Data for other illicit drugs, such as PCP, Ecstasy, and GHB, appeared at much lower frequencies. The rate of ED visits involving cocaine,

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<th>Table 2.1 Methamphetamine Use: Patterning over a 3-Year Span</th>
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<td>Sample</td>
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<td>Number of first-time users past year</td>
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<tr>
<td>Mean age</td>
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<tr>
<td>Number of past users who met criteria for abuse on dependence on any drug</td>
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<td>Number of past-month meth users abusing or dependent on stimulants</td>
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marijuana, heroin, and stimulants did not differ between males and females. The rates were highest for patients aged 18 to 24 for both marijuana and stimulants. The rates for patients aged 21 to 54 tended to be similar for cocaine and heroin, with lower rates for younger and older patients.

Nearly a quarter (23%) of all drug-related ED visits involved alcohol in combination with another drug or alcohol alone. In 2004, alcohol was most frequently combined with

- Cocaine (83,816 ED visits)
- Marijuana (33,954 ED visits)
- Cocaine and marijuana (19,697 ED visits)
- Heroin (14,669 ED visits)

Although the majority of suicide attempt ED visits in 2004 involved multiple drugs (64%), illicit drugs, such as cocaine (11% of visits) and marijuana (8% of visits), were relatively infrequent. Stimulants, including amphetamines and methamphetamine, were found in only 3% of visits related to suicide attempts. Most of the suicide attempt ED visits involved psychotherapeutic agents, such as benzodiazepines or antidepressants (56%). Central nervous system (CNS) agents, primarily analgesics (pain relievers), were involved in slightly less than half (47%) and included both prescription and over-the-counter (OTC) formulations. Less than one-third (31%) involved alcohol.

When considered in relation to the population of the United States, ED visits associated with illicit drugs are relatively infrequent but vary across the major drugs. Thus, per 100,000 population, there were 13 visits for cocaine, 73 for marijuana, 55 for heroin, and 35 for stimulants.

Finally, the CEWG 2006 report included the following:

1. In 2005, most methamphetamine (meth) abuse indicators were higher than those for cocaine and heroin in six CEWG areas: Denver, Honolulu, Los Angeles, Minneapolis/St. Paul, Phoenix, and San Diego. Meth indicators increased in four of these areas and remained at very high levels in Honolulu and San Diego. Indicators also increased to a relatively high level in Seattle. In San Francisco, methamphetamine indicators leveled off after substantial increases from 2001 and 2004. Although still at relatively low levels, increases in methamphetamine abuse indicators were also reported in Baltimore, Boston, Chicago, New York City, and St. Louis (p. 21).

2. Although the number of small clandestine methamphetamine laboratories and high-capacity superlabs (capable of producing 10 or more pounds in a single production cycle) continued to decrease in and around CEWG areas, the production and transportation of methamphetamine from Mexico reportedly increased.
3. Data for 2005 reporting periods show that admissions for primary abuse of methamphetamine, as a proportion of total admissions excluding alcohol, continued to be highest in Hawaii (57.8%), San Diego (50.2%), Arizona (32.5%), and Los Angeles (30.9%).

4. The 2005 treatment admissions data from seven of nine CEWG areas suggest that compared with cocaine and heroin abusers, primary methamphetamine admissions were more likely to be female, Caucasian, and younger than 25.

Clearly, methamphetamine is no longer just a big-city problem. Methamphetamine is being made and distributed in some of the country’s most rural areas. Children aged 12 to 14 years old who live in smaller towns are 104% more likely to use methamphetamine than those who live in larger cities. One of the reasons that methamphetamine is such a threat in rural areas is because it is easy and cheap to make. Drugs that can be bought over the counter at local stores are mixed with common ingredients to make methamphetamine. Small labs to cook the drug can be set up in kitchens, on countertops, in garages, or even in moving vehicles. Although superlabs with sophisticated traffickers still supply the majority of methamphetamine, these smaller tabletop labs have increased exponentially in the last decade, setting an alarming trend. More than 20% of the methamphetamine labs seized in 2001 had children present (U.S. DEA, 2002).

Use is increasing among men who have sex with men and use other drugs, young adults who attend “raves” or go to private clubs, homeless and runaway youth, commercial sex workers, members of motorcycle gangs, and people in occupations that demand long hours, mental alertness, and physical endurance. Emerging evidence indicates that users increasingly are administering methamphetamine intravenously. Injecting the drug puts the user at increased risk of contracting HIV/AIDS, hepatitis, and other infectious diseases (National Institute on Drug Abuse [NIDA], 1999).

Amphetamine treatment admissions are on the rise. In 1993, amphetamine treatment rates were high in California, Oregon, and Nevada. By 1999, high treatment admission rates were reported in most states west of the Mississippi. Methamphetamine accounted for 94% of all amphetamine treatment admissions reported to the Treatment Episode Data Set (TEDS) in 1999. In 1993 in the United States, the admission rate for primary methamphetamine abuse was 14 admissions per 100,000 age 12 or older. In 1996, the admission rate for methamphetamine abuse was 24 admissions per 100,000 age 12 or older in the United States. In 1999, the admission rate for methamphetamine abuse was 32 per 100,000 age 12 and older in the United States (DASIS, 2001).

In the “heartland” of continental United States, negative impacts mirror those observed in the Pacific and on the west coast. Interesting correlates have been observed of the “progress” of this drug. Newspaper articles give
a flavor of the effects, signal the importance of the phenomena, and often reference more scientific documentation. Thus, in northeastern Pennsylvania, the Warren County *Times Observer* ran as its lead story on June 7, 2005, “Crisis Mode with Meth” (Smith, 2005a). Figures on methamphetamine lab seizures for Warren and immediately adjacent counties were provided by the Pennsylvania State Police. The seizure pattern was west to east—52 in two immediately western counties, 9 in Warren and southern adjacent counties, none in counties more easterly; the pattern was thus consistent with the overall west to east trends predicted earlier and demonstrated at the present time. There was a regional conference regarding the substance; hospital workers and social service agency personnel reported significant upswings in problems addressed that were caused by increasing methamphetamine abuse. Participants pointed to growing costs of dealing with addiction to the substance and lack of resources (Smith, 2005b).

A month later, *USA Today* in its “Money” section featured the cost of methamphetamine to industry. In addition to human interest accounts illustrative of the dangers of the substance, statistics from the American Management Association 2004 Workplace Testing Survey, along with data from SAMHSA and NIDA, illustrated increasing abuse, the rise (west to east) in hospital admission rates, and perhaps most interesting, the concurrence of increasing methamphetamine use with decreasing marijuana and cocaine use. From a business perspective, observers indicated that even though reduction of substance abuse was a welcome finding for industry, the rise in methamphetamine use signaled a variety of costly problems. Behavioral problems were noted to be important considerations—irritability, lack of productivity, paranoia, and inability to work on team projects all added to the more concrete costs of health deterioration (Armour, 2005).

Urban perspectives in the midland are similar. In Cleveland’s *The Plain Dealer*, Harrop (2005) detailed costs of abuse in the Midwest. He reported that 1,000 children were in state custody in Iowa due to use by parents. Methamphetamine use accounted for 62% of prison admissions in the state. He noted that people use meth to stay awake, in some cases to hold a second job due to economic problems. However, the dollar costs of addiction to the substance make the strategy of using it to extend wakefulness and energy a false economy. Reportedly, meth was being sold almost openly at truck stops. The writer also felt the drug was associated with severely deteriorated moral values, citing the man who instructed his children to shoot anyone who came near his “family lab.”

**Global Perspectives**

Although the focus of this volume is on forensic applications associated with methamphetamine abuse in the United States, the substance is produced and
marketed globally. Accordingly, it is appropriate to give some consideration to transnational aspects. It is also important to appreciate the interweaving of local, national, international, political, and ethnic factors that play a part in the spread of methamphetamine.

Geopolitical Interconnections

Current information available through government and other sources clearly illustrates that methamphetamine, in common with other drugs, is embedded in a complex multilevel international set of factors and connections. In effect, there are multiplex networks that disseminate information about illicit drugs and facilitate the distribution and trade in the substances (see, for example, “War on Drugs,” January 23, 2001). This network has been facilitated by existing connections and routes established during the colonial period of the 1700s and 1800s, and it also reflects current competing or converging interests of governments and criminal organizations (United Nations, 2000).

One of the precursors of today’s methamphetamine distribution network was the poppy trade out of Iran, Afghanistan, and Pakistan. The primary conduit to Europe and the United States was through Turkey, which remained a preferred route by which heroin and hashish/cannabis was moved (United Nations, 2000). It is hypothesized that these connections are no longer one way, but rather represent a complex of international highways. Thus, although methamphetamine in its various forms is created in laboratories throughout the world, most Ecstasy has been produced in the Netherlands and secondarily in Belgium and then shipped elsewhere. The spread of Ecstasy into Southeast Asia followed some of the original European colonization routes and has been facilitated primarily by Israeli criminal organizations. In Western and Eastern Europe, the criminal organizations primarily responsible for distribution and trade have been Russian (United Nations, 2000).

Ecstasy as a methamphetamine derivative has an interesting history. It was first created in Germany in 1912 for use as an appetite suppressant. It was subsequently discovered by psychotherapy practitioners in the United States and seen as a facilitator of that process, at least for a short while. However, by 1988, it had become a Schedule I controlled substance. Even earlier, in 1977, it had been so classified in the United Kingdom. Ecstasy consistently has been misrepresented as a drug that has no serious physical impacts and essentially is an innocuous recreational substance. Its availability serendipitously co-occurred with the rise of “acid house” and “techno” music and a young people’s fad of staying up all night and dancing. That fad, incidentally, began on the Spanish island of Ibiza, also known as XTC Island, and thus the name of the drug. In 1988, the “summer of love” unfolded in the United Kingdom with young people thronging to music and laser-light parties in
fields and warehouses. Ecstasy was the primary enhancer and maintainer of the frenetic activity (United Nations, 2000).

Global trends reported at the United Nations included that there was a reduction in opium and morphine seizures, probably reflecting the reduction of production in 2001. Production rose again in 2002, but there was also an increasing use of diluted forms of heroin, leading to no significant impact on heroin seizures. Cocaine was stable, as was methamphetamine in North America and amphetamine in Western Europe. However, methamphetamine seizures decreased in East and Southeast Asia in 2001, reversing a trend that had been seen there. Similarly, Ecstasy seizures decreased in 2001, reversing a prior trend of significant increase over several years (United Nations, January 20, 2003).

The primary location for methamphetamine manufacturing was the Czech Republic, but there has been a spread to neighboring countries. The Netherlands continued to be important for Ecstasy manufacture. When contrasts were made between the Americas and other parts of the world, seizures of stimulants including amphetamine and methamphetamine showed dramatic upswings in the Americas compared to Asia and Europe where there were only slight increases from 1995 to 1996 with a leveling off at that point. Conclusions as to the identity of major issues across the globe insofar as drug problems were concerned, were as follows:

1. Widespread nonlegal cultivation of opium, particularly in Afghanistan.
2. Aggressive drug trafficking in cocaine using new routes and creative concealment methods.
3. Underrating of cannabis abuse in its potential to cause problems for health and the social fabric, particularly in Africa. (McPherson would see the need to identify marijuana as a gateway drug and to focus what is in all likelihood undue attention in that direction as a continuing U.S. preoccupation [see Chapter 1] that detracts from the needed focus on methamphetamine and other severely problematic substances.)
4. Significant rise in synthetic use and manufacture (including methamphetamine and derivatives).
5. Need to require stronger controls over precursors before they get used in manufacture (United Nations, January 20, 2003).*

A study of Turkey’s place in the general international drug trade is illustrative of the way in which various interests are addressed and shows similarities to what has been seen in South America. Criminally based organizations,

* In the United States, states have responded at this level by changing policies and laws governing pharmacies with over-the-counter cough medicines now available only behind the counter and with limitations on amounts. Similar procedures are being instituted in Canada.
which facilitate the movement of drugs through Turkey and have since the days of the Afghanistan/Pakistani/Iran Triangle, are well established and are covertly supportive of and supported by the Turkish government. Assassinations of human rights activists and other persons critical of the government have been part of the quid pro quo that takes place, and it is not uncommon for persons with drug connections to be publicly overt about their occupations or identity. The government has given private armies connected to these organizations control of whole regions (United Nations, 2000). If, as is likely, the same conduits that send drugs from Central Asia into the West now also facilitate the movement of Ecstasy from Western Europe into Iran, a certain irony but a practical reality is illustrated.

The continuation of interwoven history, geography, and politics is also illustrated in the Turkish situation. Turkey, which historically had only some economic interests in the drug trade, became more dependent on that source of revenue as a consequence of the Gulf War of 1991. That war closed off Turkey’s access to Iraqi oil, with the result that there was an immediate and ongoing increment in the degree to which the government was supportive of the drug trade. Interestingly, just as the United States and Western European countries did not significantly pressure Turkey to end its persecution of the Kurds and the destruction of their villages, the West took relatively low notice of the enhanced Turkish activity facilitating the drug trade (United Nations, 2000).

Finally, there is a clear link established between the operation of terrorist organizations and the ongoing drug trade operations. Given the current world situation and the multinational efforts to identify and control terrorist groups, hidden money sources have become extremely desirable. Drug money is one such hidden source. Accordingly, drug-ring financing of terrorist groups has been extensively documented (see, among others, Klein, 2002; Roberts and Marin, 2002; Solomon, 2002).

There have been reports of use of methamphetamine as part of suicide bomber “preparation” (Hughes, 2005). Certainly, aspects of methamphetamine effects would be consistent with such application. Enhanced feelings of invulnerability, some dissociation from underlying self-protective behavioral mechanisms, and the increased sense of energy and excitement would all support the goal of preparing an individual to take his or her life as part of an attack on largely symbolic (and innocent) targets.* However, these reports

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* A recent psychological model for understanding the progress of politically motivated violence suggested a series of five levels; the “Fifth Floor,” from which action emanates, was described as requiring psychological distancing that defeats biological and psychological mechanisms mitigating against intraspecies violence as well as needing to occur without personal contact with victims (Moghaddam, 2005). Methamphetamine intoxication would easily fit within such a model.
are not independently confirmed, and it is common for governments in the region to provide misleading information of this type.

**Government Complicity as a Factor**

It is reasonable to understand that while drugs have always exercised a certain controlling influence outstripping the desires of societies to end their abuse by virtue of addictive potentials of human beings, it also needs to be understood that the profit motive has never been far from the drug-maker’s operations. That statement can be validated in terms of the legitimate as well as nonlegitimate drug operations. Furthermore, in the case of nonlegitimate operations, some degree of covert or overt government complicity becomes an issue. Thus, the behavior of the Turkish regime is an obvious example of significant government support for drug-related operations that have international implications. Similarly, the operations in Colombia have been closely tied to more legitimate political levels. Even Israel only made illegal money laundering in drug-related cases as of 2000 (World Drug Report, 2000). Given that for some years a major source of the trafficking and delivery systems has been Israeli-based criminal organizations, the lack of concern for reducing the profit level through forfeiture is at least an omission of significance. In other words, even if not intended, it became in fact a hidden support for the trade.

It is equally clear that international coordination is a necessary part to any successful interventions into criminal drug operations. For example, in one particular case, two immigrants were arrested in Capetown, South Africa. They agreed to testify against the local arresting officer who supposedly was going to help them evade arrest, obviously for some type of compensation. They were accused of being the suppliers of methamphetamine to a crime syndicate located in St. Petersburg, Russia, where crystal methamphetamine is referred to as “tik.” The case was apparently solved (and the corrupt arresting officer prosecuted) by virtue of cooperation of Russian intelligence with the authorities in South Africa (Allafrica.com, February 2006).

In general, countries in the Middle East have made illegal and immoral any substance involvement, including alcohol. Nonetheless, as observed by Afsarifard, in these same nations, upper-status persons engage in said behavior and rarely suffer legal consequences. In addition to selective enforcement, it can be hypothesized that highly authority-driven government systems may derive a benefit from drug use in their populations. With the development of computer technology, there is easy access to major sources of nongovernment-approved information. Having large segments of the younger and more likely to rebel population self-absorbed and drug using may be viewed as a desirable way to eliminate challenges to the power base. Such a strategy might underlie differential enforcement and also may be reflected in the lack of extensive support for substance abuse treatment programs.
Business Aspects: MDMA as a Case in Point

The ratio of production costs for MDMA (or Ecstasy) to revenues obtained is extremely favorable. The history, production, and use patterns of MDMA as they have occurred across the world illustrate effective business operations. The substance moved from an intended therapeutic drug to become a recreational drug. Controls were attempted in the United States and Western Europe by labeling it a controlled substance and making possession and use illegal. Consistent with the experience of Prohibition, Ecstasy’s popularity rose dramatically starting in the late 1980s and increased throughout the 1990s as a favorable climate of youthful extremism, popular music, and erroneous belief systems combined to make a ready market for a drug whose profit margin was excellent. Throughout Europe, MDMA has been effectively “advertised” as a harmless drug. It is often combined with other drugs (notably cocaine and alcohol) to create a variety of effects. Based on seizure patterns, by 1999 there was a serious increase in its use and it had become the second most commonly abused drug after forms of cannabis in the European market. Large-scale producers created pills imprinted with pop logos such as smiley faces and car brand signs, all of which were consistent with the notion that the pill was relatively harmless. These makers would also customize logos for large orders (World Drug Report, 2000). The described business patterns are those well known to any legitimate marketing and production organization.

Methamphetamine and the Middle East

McPherson and Afsarifard have had experience in the Middle East and Northern African region. Afsarifard was born and raised in Iran, and has lived in the United States since 1976. In recent years, he has returned to Iran to conduct training in mental health and substance abuse and has consulted with government and private providers of those services. McPherson spent some time in Gaza, the West Bank, Israel, and Egypt, evaluating from a human rights perspective health-related issues with an emphasis on mental health and substance abuse and the treatment programs established to serve Palestinians in 1990. Although there are strong prohibitions against alcohol and drug use in the Islamic world and those areas influenced by the traditional force of that religion, substance-related problems have never been unknown and did show significant increment in recent years, especially from the 1960s forward. Furthermore, the long-standing link between the production of heroin and narcotics and Central Asia and its export to the West has been known as a prime factor in some of the earliest identified serious drug abuse problems in the United States. What has not been adequately appreciated
is the ongoing global aspect of drug production, drug trade, and drug use in the case of methamphetamine. Its constituent parts have been tracked in transit to and from the United States and abroad. Ecstasy, in particular, is a phenomenon that has spread throughout the world (World Drug Report, 2000; also, see Seper, 2002; Trickey and Kennedy, 2002).

Whenever there is a global trade in any substance, licit or illicit, political as well as social implications become intertwined. The situation with methamphetamine is no exception. Problems involving methamphetamine use of the type detailed throughout this volume have been noted in Thailand, Spain, Germany, Canada, the United Kingdom, Australia, the Czech Republic, Iran, Palestine, Israel, India, and Egypt, among others. A search of major news releases for 2000 to 2002 produced 196 articles detailing meth-related events in countries throughout the world (see “The Battle against Ecstasy,” 2001; Chu, 2002; Russo, 2002; Sot, 2001; Tremlett, 2001; “Woman nabbed,” 2001). Ecstasy is viewed as a global trade item. Politically, the emergent issues of terrorism and drug links, which have been initially spotlighted in the U.S. press as a means by which terrorist organizations in the Middle East are funded, are becoming known as having much more complex political/social aspects (see especially articles by Bruce, 2002; Klein, 2002; Krikorian, 2002; Solomon, 2002; “U.S. Drug Ring Tied . . .,” September 3, 2002). Drug rings have been identified as Israeli organized, crime based, operating out of a country generally viewed as an ally of the United States (“Israelis Said at Head,” May 3, 2001). The universality of the drug trade then allows competing national and political interests to selectively perceive their opponents as supporting the use of drugs as a way to engage in hostile interventions in the ongoing struggle.

Interestingly, a peace initiative in Gaza and the Territories involved a meeting of addictions and mental health specialists who were Israelis and Palestinians. Supported by the U.S. government, the conference looked at more adequate programs of intervention. Although it was marred by difficulties with Israeli regulations that initially hampered attendance, the conference did result in a reduction of misperceptions and the establishment of a more adequate basis for treatment along with the mutual recognition of the problems that the contemporary drug trade was creating for both peoples (Isralowitz et al., 2001). Ha’aretz has documented, for example, the problems of Ecstasy in Israeli society with its association to violent criminal acts including gang rape (“A Long Night of Horror,” May 11, 2001; “Four Charged with Gang Rape,” May 17, 2001).

**Implications of Cultural Factors**

Historically, the Arab and Islamic cultures had a more advanced view of mental health issues in general than was found in Western practice and
literature. As early as 1900 B.C., original papyri included discussions of mental illness as a somatic phenomenon (of course, hysteria was considered the effect of an inappropriately wandering uterus but that was not particularly different from some of the much later notions in the Western world as well; methods of intervention, though logically based in their theory and having no true physiologic accuracy, would nonetheless have been fairly successful as hypnotic/suggestion interventions). The Koran defines madness using words that imply supernatural spirits, both good and bad, and emphasizes the importance of respect. Furthermore, the prophets were often viewed as having conditions that were characterized by mental health symptoms of modern parlance but which were considered to make them able to properly innovate and help society. Persons seeking religious ecstasy, not to be confused with the drug, often manifested symptoms that were psychotic-like, a phenomenon not dissimilar from the history of certain religious groups in the 1800s in the United States and prior to that in Europe during medieval times. However, the Islamic explanation for mental illness has consistently returned to emphasize the unity of body and psyche, thus anticipating the contemporary bio/psycho/social approach to both mental health and substance abuse (Okasha, 1999).

Some specifics regarding different countries may be illustrative of the widespread problems that are now presenting to the world. Afsarifard, for example, received a phone call from one of the Iranian mental health professionals with whom he maintains contact. This psychiatrist asked whether there was anything known about methamphetamine because it appeared in his practice that it was becoming a drug of choice among upper- and upper-middle-class persons. (Users were identifying it as harmless. The inquirer was uncertain as to its negative potentials.)

In the course of his work in Iran and subsequent contacts with professionals there, Afsarifard has learned that the government has published reports indicating that there are 3 million addicts and alcoholics in the country. However, unofficial estimates are much higher, suggesting that close to 10% of the population of 60 million is addicted. Given the fact that two-thirds of the Iranian people are under the age of 30, these figures would indicate that drug use is an epidemic among the youth (see also Taghibeiji, 2001).

In spite of the strong religious prohibitions against such indulgence, Afsarifard observed that in most major cities in Iran, the street level of drug trafficking is rampant and obvious. It is difficult to pass a street corner without being propositioned to purchase drugs. Although there are major economic problems related to very high unemployment and high inflation, drug cost has remained inexpensive. Alcohol manufactured illegally in bootleg-type settings is also rather inexpensive; however, brand-name liquor is quite costly.

Interestingly, it is known that alcohol use in the Gulf countries was more problematic than it was in Egypt where the Islamic link to governmental
control was far more limited (Okasha, 1996). From the standpoint of the United States, of course, there was the infamous Iran Contra scandal that involved illegal international trades in arms, money, and influence with complex interrelationships to drug trafficking in spite of seemingly active ongoing antidrug policies in the United States (Hartung, 1994). Current historians have ranked then President Ronald Reagan’s decision to engage in that debacle as the ninth of ten most egregious presidential errors in the country’s history (Dunbar, 2006).

**Comparative Drug Use Patterns**

Okasha (1999) indicated that the 1980s involved an increase in the abuse of heroin and narcotics in the Middle East. However, contemporary reports based on seizure patterns and other data support the presence of a strong methamphetamine use trend occurring throughout the 1990s in all parts of the world. Ecstasy in particular has been at the forefront of increased use (World Drug Report, 2000).

Another potent factor in use patterns involves intercultural experience. For example, persons from North African and Middle East countries living in Rome who became involved in drug use and drug treatment showed multiple use patterns including injecting habits that led to HIV seropositivity; duration of residence in Rome was a significant factor in drug use patterns (Spizzichino et al., 1995).

**Treatment Approaches**

Addiction treatment in Iran, as observed by Afsarifard, is becoming more popular. However, there is emphasis on the physical aspects of treatment as overseen by a physician, usually a psychiatrist, including detoxification and titration of the addict from the drug of choice. Opiates are still the most common substances abused, and often, longer-acting opiates are used for the process and then continued, thus creating an ongoing use picture. The practice has become a major source of income for some physicians who thus have a major incentive to continue to operate in that fashion. To the extent that a psychosocial aspect is included, a 12-step recovery model similar to that found in the United States is in place. Addicts and alcoholics usually enter treatment either due to major medical consequences or extreme family situations. Social pressures that often result in intervention in the United States are not commonly noted. Authorities deal with alcohol- and drug-related offenses as violations of civil and religious law; there is no direct connection between treatment and judicial systems.

In Egypt, as the mental health system has developed and modernized, the availability of treatment for drug abuse as well as mental health problems
has become much more adequate in the cities. There are modern facilities and there are medical and nursing schools. However, most people in these regions remain more comfortable with either traditional healers or with trying to cope on their own with aberrant behavior among relatives. There are both shame and religious or cultural prohibitions against modern forms of psychotherapy. Interventions had to be revised and developed that were culturally consistent to be at all acceptable to identified patients. Following acute care in Egypt, it was even more difficult to gain acceptance for aftercare. In the cities, there were aftercare facilities, but they were sparse if available and rarely used outside of the more sophisticated urban settings. Obviously, from the standpoint of the treatment of drug abuse, the resistance of the population and the lack of facilities for those who would accept them decrease the long-range potential for treatment effectiveness (Okasha, 1999).

Observations by McPherson in 1990 in Gaza and the West Bank indicated that most of the mental health professionals were Western trained, usually in the United States but also in the United Kingdom, and returned to their homeland to provide service. Cultural sensitivities, if observed, could facilitate therapeutic interventions. Thus, treatment of a woman for depression or related problems could only take place if she came with her mother-in-law or possibly by way of her mother-in-law coming for the information necessary to treat the daughter-in-law. The joint project mounted by Israel and Palestine from 1997 to 1999, and which involved support for research on prevalence and development of treatment options, indicated not only the achievement of an unusual peace initiative, but also the accessibility of the populations involved to treatment when it is proposed under culturally sound conditions (Isralowitz et al., 2001).

**European Perspectives**

Although patterns of use have followed a trajectory across the United States moving eastward from the Pacific Rim to west coast to east coast, the picture in Europe has shown a much less linear pattern. Trends noted to date suggest that even though methamphetamine remains as having significant potential to increase, its use and abuse have been centered primarily in the Czech Republic and secondarily in the United Kingdom. However, the transportation of drugs throughout Europe is such that there can be no comfort taken in other areas that methamphetamine will continue to be a lower- rather than high-level drug problem. In general, it is noted that the obviously increasing methamphetamine problems appear centered in the United States, Australia, some of Africa, and Southeast Asia, whereas in Europe, when drug use is evaluated across different substances, amphetamines remain more common than methamphetamine. Nonetheless, MDMA (Ecstasy) is significantly present.
Some Legal Data

Europe has not implemented the kind of strenuous criminalization of substance abuse and high penalties that are characteristic of the laws of the United States. However, within European legal communities, it was noted that there is an increasing concern for looking at criminal justice strategies. Criminal justice studies have tended to look at drug offenses rather than methamphetamine-related offenses per se. Thus, between 1998 and 2003, offense reports increased in most European Union (EU) countries, particularly in Estonia and Poland. Reports decreased in Belgium, Spain, Italy, Hungary, Malta, Austria, and Slovenia. In EU member states, offenses related primarily to drug use or possession (39% in Poland to 87% in Austria and United Kingdom, Czech Republic 91%). In Italy and Spain, drug use and possession are not criminal offenses, so dealing and trafficking were the categories of criminal action. (As detailed in Chapter 4, Spain was the site of a study of Ecstasy as a therapeutic agent.) Surveys carried out in 2004 in the Czech Republic and in Finland during 2000 to 2003 provided some interesting findings. In the Czech Republic, 40% of thefts and 30% of burglaries were drug related, not including alcohol abuse. In Finland, homicides committed by offenders under the influence of alcohol versus committed under the influence of illicit drugs, were 6% compared to 64% (European Monitoring Centre for Drugs and Drug Addiction, 2005; van Solinge, 2004).

Research and Treatment Aspects

European experts, in common with colleagues in the United States, are looking more and more closely at biological bases. At a conference in 2000 in Hungary, significant bio-based research was reported in both Western and Eastern Europe. Thus, in Bulgaria there has been measurement of metabolic activation of leukocyte and phagocytic activity in mice using contrasts between methamphetamine, fluoxetine, and a combination of the two drugs. Research on possible neurotoxicity associated with Ecstasy (which has remained a question that is not yet completely settled) was presented (NIDA, 2000). This focus was then augmented in refined approaches to epidemiological data collections. Models used in the United States have been proposed for use in Europe.

Treatment approaches vary. It was noted that outside of opioid substitution therapy to deal with heroin, there were not a lot of options for biologically based treatments, and other approaches did not show high success rates. In one session, “science based methamphetamine treatment protocols” were discussed which had been developed under the auspices of NIDA and the University of California. Manuals for the approach are available (www.drugabuse.gov or www.nida.nih.gov). Cultural and social constraints play
important roles; in Budapest, it was noted that Hungarian abusers tend to seek treatment only when required to do so or if families insist or because of medical emergencies that occur secondary to use (NIDA, 2000).

**Russia and the Confederated Independent States**

Emerging to have significant global impact, Russia and the former Soviet States, now the Confederated Independent States (CIS), are a bloc sharing some history and culture but also encompassing vast diversity.

There is ongoing involvement in Russia with its immediate neighbors around drug-related issues as well as with more far-flung foreign states, even including Nicaragua. With respect to methamphetamine and related substances, Ecstasy has begun to make itself known in Russia, usually a poor quality as compared to that available for higher amounts of money in the Netherlands. HIV/AIDS is found associated with drug use and methamphetamine in particular. (McPherson would note that given the lack of sterilization procedures and needle reuse practices, and the rise of resistant tuberculosis [TB] strains in hospitals and prisons in the USSR, vulnerability to HIV/AIDS is likely to be higher than in the West.) There is now a legislative and monitoring scheme, which has resulted in higher levels of criminal detection and control. There is also witness protection legislation. Six witnesses in criminal cases were homicide victims in 2003, and there is regular pressure to change testimony, which reflects the activity levels and connections between organized crime and other levels of the society.

In 2003, there were multiple seizures of ephedrine that originated in Turkey. Education is being used to try and implement prevention strategies. A problem throughout the system involves money laundering and the fact that Russian banks do not follow conventional procedures that prevent that kind of activity. As stated in the narcotics control report of the State Department’s Bureau of International Narcotics and Law Enforcement Affairs:

> Russia remains vulnerable to criminal financial activity because of a number of contributing factors, namely, vast natural resource wealth, pervasiveness of organized crime, and a high level of corruption. Other factors include porous borders, Russia’s role as a geographic gateway to Europe and Asia, a weak banking system, and under-funding of regulatory and law enforcement agencies. Criminal elements from Russia and neighboring countries continue to use Russia’s financial system to launder money …

There is an ongoing intertwining of terrorism financing via the Internet and criminal and drug-related transactions (State Department’s Bureau of International Narcotics and Law Enforcement Affairs, March, 2005).
Treatment

Some years ago, when the Soviet Union was still operative though verging on its collapse, a group of Russian doctors visited the hospital where Afsarifard and McPherson were affiliated. These professionals were specifically interested in finding ways to adapt Western treatment approaches to their national context. Discussions focused in part on the need to reconfigure the religious notion of God or a “higher power” into a more acceptable socialist concept. In 1992, following the end of the USSR, McPherson visited mental health and social services facilities in Volgograd and Volshsky and found strong interest in moving to medical/educational approaches to drug and alcohol treatment. However, it was still possible in 2006 to find much more punitive models, one of which was detailed as the “most brutal drug treatment center in Russia.”

Withdrawal is handled with “isolation, bread and water.” On the first day of treatment, young addicts are often beaten with belts, “until their buttocks turn blue.” (It was indicated the staff buys new belts once a week because they get too soft from the beatings.) The theory of treatment is that drug addicts are “animals … (without) … a sense of values.” After the beating, patients are then handcuffed to beds to undergo withdrawal while given bread and water. They are then sent out to perform physical labor and if there is any relapsing or resistance, there are reprisals. The treatment lasts for 12 months, and parents have been known to pay over a thousand dollars, a significant sum in Russia, in order to get their children off of drugs in this fashion. The center is allegedly mob connected and has been part of a vigilante effort to go after the local drug trade. Located in Yekaterianburg, officials there suggest that the approach should be exported to the West (Nelson, 2006).

Asia and Points East

Methamphetamine is a far from new phenomenon in Asia. Several hundred years ago, an essentially similar substance was part of traditional Chinese medicine. In 1919, it was synthesized in the contemporary form. The center of production in Asia is the Golden Triangle border area between Burma, Laos, and Thailand. Production from the Triangle goes primarily to Thailand, China, and India. The drug has had significant and devastating impact on Southeast Asia. About 60 years ago, soldiers were given methamphetamine to keep going for long periods. Environmental hazards have been documented. Children who live near labs have been exposed to fumes and toxic substances. Also, these substances have leached into the soil, which may create problems for future generations (BBC News, June 15, 2004).

Issues of government complicity seen elsewhere on the globe have also emerged in Asia. For example, in the Democratic People’s Republic of Korea
(North Korea), there is substantial trafficking based on evidence from seizures in over twenty countries around the world since 1976. Given the levels of state control in that country, some degree of government compliance would seem likely. As an example, a case occurred in February 1995 when Russian police in Vladivostok detained two North Korean employees of a state logging company, seizing heroin. With respect to methamphetamine, significant seizures in Japan have been documented, and there have also been intelligence-based indications of North Korean importation of ephedrine. In his report to the Senate, Director William Bach raised the issue of a “state directed conspiracy to manufacture and traffic” (U.S. Department of State, May 29, 2003).

A Firsthand Account

An unusual participant observer story was written by a U.S. reporter who succumbed to methamphetamine addiction while in Asia. The details were instructive as to the personal and social costs the drug has exacted in an Asian setting.

As previously indicated, ephedrine was first synthetically created by Japanese scientists who obtained it from the Chinese mayo herb in 1892. It is currently manufactured in China in city areas such as on the outskirts of Beijing. Organized crime participants obtain the substance from local producers, shipping it to Japan, Taiwan, Indonesia, Australia, Thailand, and other places. As addicts become less and less competent in making money in any kind of conventional jobs, they move into nonlegal or antisocial mode, the women frequently becoming prostitutes. In an interesting reference to cultural attitudes, the author quoted Yoshitaka Yamada, superintendent of the Japanese Drug Enforcement Division of the police force, as saying, “the Japanese like stimulants because it suits their hardworking character.” The article also documented the rise of Western-style intervention/treatment projects, which have had only some limited success (Greenfeld, 2001).

The Thais refer to methamphetamine as yaba, which means “mad medicine,” and reflects their observation that a majority of people who become addicted and chronic users wind up psychotic. The drug has resulted in significant increases in demands for mental health treatment in the region. Initially, a kind of excursion activity for the well-educated, methamphetamine became the staple of the underclass. Entire slum neighborhoods became involved in bingeing on the drug. When the supply would run out, that entire community then faced a group experience of “crashing,” at which point the potential for hostile and aggressive behavior was noted to radically increase. Use occurring within families led to deterioration of the usual ties and supports that family offers (Greenfeld, 2001).

One of his stories featured a woman named Jackie, who was depicted as living a life where the only meaningful or satisfying moments were those
obtained under the influence of the drug. The writer, in the context of reflecting on his own addiction and sobriety after treatment, ended the article with the following (Greenfeld, 2001):

About me are flea-infested dogs, puddles of stagnant water … garbage … the stench of smoldering trash. The horror of this daily existence is tangible … a hit of the mad medicine is the easiest way … but I walk away … I doubt they ever can. They have so little to walk toward. (p. 10)

**A Canadian Perspective**

Canada shares cultural values, history, and ongoing economic ties with the United States. Not dissimilarly, there have been unresolved tensions between criminal justice philosophies of retribution, proportionality, incapacitation, restitution, and rehabilitation. Although a case could be made for less punitive approaches than are found in its southern neighbor, both public and professional sources articulate conflict in this area (Doob, 2000). A brief study using a small group of participants of opportunity in Toronto provided some insight into how the need to rehabilitate along with the recognition of the importance of maintaining a safe society combined in the view of a small but experienced Canadian cohort.

Using a semistructured interview* consisting of eleven questions with an opportunity to add material, seven respondents were successfully contacted. Two were MA-level therapists (a psychology assistant and a marriage and family counselor), one was a crisis worker, also MA level, one was a police officer, and three were members of a prison staff (substance abuse therapist, corrections officer, and program officer). All were presented with a series of questions (see Appendix 2.1). Respondents were also asked whether their opinions could be quoted with attribution or not.

Content of their responses was remarkably similar, and the conclusions that can be drawn as to the perceptions of this small but reasonably experienced group are as follows.

First, there was a clear, unanimous perception of increased use of methamphetamine in the country. Also noted was that the rural areas had become centers for production and delivery with the result that local farmers were being asked to keep fertilizers secure to make it more difficult to obtain certain ingredients. The typical user profile presented by this group was that of a very young and often female person. One respondent noted that the factor of

* McPherson is indebted to Aaron Farrell, Ph.D., for soliciting respondents and conducting the interviews during his doctoral studies at Fielding Graduate University, Santa Barbara, California.
weight control, along with the general problems of alienation and attachment problems, combined to make the females vulnerable to use. However, another respondent noted that there was a recent spread from the adolescent female to young adults and young mothers. One respondent, however, felt there were no definitive demographics. Crimes associated with meth use were notably theft, robbery, prostitution/sex for drugs, and also violence associated with either dealing or obtaining money for the drugs. When asked about appropriate consequences, the group generally spoke in terms of different kinds of treatment and intervention and noted the need for more options in that regard. However, producers of meth were generally seen as meriting much more severe penalties. With respect to interventions, innovative programs either exist or are being proposed and were supported by this group. Thus, it was recommended that there be an emphasis on community youth and parent education and on multisystem efforts. One rather interesting program mentioned was the use of dogs as therapist assistants in helping addicts get past their dependency.

One specific legal change similar to what has occurred in the United States with respect to laws specifying additional penalties has occurred in the inclusion of methamphetamine in Schedule I of the Controlled Drugs and Substances Act. Penalties have thereby increased to include from 10 years up to life sentences.

Respondents were generally aware of the physical and cognitive problems that methamphetamine can visit upon users. However, there are no special efforts currently in place to either assess for neurological deficits or program for the same in intervention efforts. This very informal and limited study thus produced responses consistent with what is generally known about this drug and what has been found in much broader research efforts.

Consistent with the above report, information indicating increasing use, production, and related medical and law enforcement problems in eastern Canada has become available. There is specific concern for the same spread from west to east that occurred in the United States. A poignant example of the destructiveness of the drug was found in a long poem written by a young girl in jail on drug charges. Although she clearly knew of the impact and danger of methamphetamine, she was found dead shortly after release from jail, a methamphetamine needle in her arm (communication from Constable Payette, June 2006).

**Conclusion**

In this chapter, some important principles were developed that are essential to an understanding of methamphetamine as a current and increasingly important drug of abuse throughout the world. It is felt that the presumptive
employment of largely U.S.-marketed punitive law enforcement strategies needs to be replaced with a philosophy of harm reduction. Such an approach is consistent with the more recently emerging drug courts in the United States and the implementation of therapeutic jurisprudence in Australia and New Zealand. Similarly, in Europe there is more of a tradition of intervention over punishment as the guiding knowledge base. Primary conclusions supported by a more inclusive and global perspective are as follows:

1. Methamphetamine use is a global phenomenon.
2. Methamphetamine use is supported by pop culture and developmental (adolescent) vulnerability.
3. Methamphetamine use is facilitated by propagandistic and misleading marketing.
4. Methamphetamine use is maintained by individual addictive potentials.
5. Methamphetamine use serves competing and cooperative power interests.

Consistently, the most effective approaches to dealing with methamphetamine abuse will need to engage not only modern treatment programming appropriately adapted to varying cultural contexts, but also a prevention strategy that considers multiple world interests and interrelationships. The only reasonable context for such prevention programming is one of international organization, respect, cooperation, and an ending to unilateralism.

Appendix 2.1: Canadian Survey Questions

1. What is your perception of meth use as to increasing, decreasing, or ongoing stability in your region? (Both specific figures and general impressions are sought.)
2. What is your perception of meth users; what profiles appear valid at present?
3. What, in your experience, is the association of meth to criminal activity, including not only violations of drug-related laws, but also other crimes such as theft or violence?
4. What might be the most appropriate legal consequences of meth use and abuse?
5. What might be the most appropriate legal consequences of meth production?
6. What are your opinions as to the best ways to reduce use and production of meth?
7. In Hawaii, the reduction of available marijuana may have led to increased use of methamphetamine. Do you know of any similar dynamic that might exist in your jurisdiction?
8. Have there been any changes in your legal structure—new laws or official regulations—which directly reflect problems created by methamphetamine?

9. Do you find meth users, particularly those considered addicted, to be different from other types of addicts?

10. Meth causes specific and sometimes devastating organic damage. Is there any routine screening and inclusion in treatment planning of identified brain impacts?

11. To what degree is treatment based on traditional methods, including reading, listening to lectures, and group process?

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Biochemical aspects of methamphetamine are an ongoing subject of laboratory study with the usual advantages and limitations that pertain to comparative work when it comes to understanding implications for human use. Observations in the world of humans suffer from the uncontrolled variables that limit the degree of certainty that can be assigned to conclusions about this particular substance. Nonetheless, law reflects, at least in part, the findings of science but may omit the uncertainties with insecure results for real-life cases.
Mechanisms of Methamphetamine Action

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Mechanisms and Dynamics

Neurotransmitter Action

Understanding the mechanism of action of methamphetamine requires some understanding of neurophysiology. Because the discussion here is brief, readers who wish to further their knowledge of neurophysiology are referred to Pinel (1997). In short, the active unit of the nervous system is the neuron (Cajal, 1917; Schwann, 1839). A neuron is an elongated cell (up to 2 m) that sends messages to other cells through the process of electrochemical signaling (Adrian, 1913; Bernstein, 1902; Dale, 1914; Loewi, 1921; Sherrington, 1897). An electrical impulse, called an action potential, travels the length of the cell to initiate the release of a chemical messenger, called a neurotransmitter. The neurotransmitter substance diffuses across a gap between the cells, called a synapse, where it is chemically bound to a protein called a receptor. The binding of the neurotransmitter to the receptor is equivalent to the receipt of a message.

The process of release of the neurotransmitter from the presynaptic neuron, the neuron on the sending side of the synapse (the neuron on the receiving side is called the postsynaptic receptor), is called exocytosis. Neurotransmitter substances are generally packaged in vesicles (De Robertis, Rodrigues de Lores Arnaiz, and Pallegrini de Iraldi, 1962). These vesicles sometimes have protein units known as transporters that can extract neurotransmitter substances from the cell cytoplasm, the viscous fluid on the inside of the cell, and package them on the inside of the vesicle. In response to an action potential, the vesicle fuses with the cell membrane and releases neurotransmitter into the synapse (Fatt and Katz, 1952). The process of exocytosis is calcium dependent; it occurs only in the presence of calcium (for review, see Smith and Augustine, 1988).

After it has been released, the neurotransmitter diffuses across the synapse and binds to a receptor on the postsynaptic membrane. The message of
the neurotransmitter depends on the function of the receptor. Some common messages are “produce an action potential,” “suppress an action potential,” or “begin a long-term change by activating specific proteins.” As long as the neurotransmitter substance remains in the synapse, its message will be received by the postsynaptic neuron. Thus, a mechanism must exist to remove the neurotransmitter. There are, in fact, several such mechanisms. One such mechanism is through the degradation of the neurotransmitter. Another, more important to the present discussion, is through the reuptake of the neurotransmitter into the presynaptic neuron.

A drug that binds to a postsynaptic receptor and activates it is called an agonist of that receptor. A drug that binds to a receptor, does not activate it, and blocks the binding of the endogenous ligand is known as an antagonist. When a drug mimics the action of a neurotransmitter, it is said to exert agonistic effects. When a drug does the opposite, its effects are known as antagonistic. Amphetamine and methamphetamine are indirect agonists of the dopamine system. Implications of this dynamic will be discussed in more detail below.

**Control of Neurotransmitter Levels**

In addition to degradation and reuptake, negative feedback and end-product inhibition are two other ways the cell is able to control the levels of neurotransmitter released into the synapse. Some cells have autoreceptors, which are responsible for negative feedback. In such a case, a receptor on the presynaptic neuron (called an autoreceptor or presynaptic receptor) acts to turn off a cell when enough neurotransmitter has accumulated in the synapse to activate it. This mechanism prevents the cell from releasing “too much” neurotransmitter at one time. End-product inhibition is the mechanism by which the neuron regulates the amount of neurotransmitter that it synthesizes. When enough product (neurotransmitter) is available, the product itself deactivates the enzymes responsible for its production.

A psychoactive drug can have an effect at any or all of the above-mentioned processes (receptor binding, degradation, synthesis, release, packaging, and reuptake). The most common site of action for a psychoactive drug is at the postsynaptic receptor. However, psychoactive drugs can affect both postsynaptic receptors and presynaptic receptors.

**Physiological Effects of Amphetamine**

Neurotransmitters can be classified as large or small. Large-molecule neurotransmitters include the peptide transmitters such as the opiates. Small-molecule transmitters include the monoamines and the amino acid transmitters. The monoamines can be further subdivided into the
Mechanisms of Methamphetamine Action

catecholamines and the indolamines. The present discussion focuses on the monoamines. The catecholamines include the neurotransmitters norepinephrine (NE), epinephrine (Epi), and dopamine (DA). The only indolamine is serotonin (5-HT). The term catecholamine refers to a benzene ring with two attached hydroxyl groups, called a catechol.

Early studies hypothesized that methamphetamine inhibited the reuptake of NE, DA (Azzaro, Ziance, and Rutledge, 1974; Harris and Baldessarini, 1973), and 5-HT (Taylor and Ho, 1978). More importantly, it was found that methamphetamine also acts as a potent DA-releasing agent (Arnold, Molinoff, and Rutledge, 1977; Azzaro et al., 1974; Raiteri et al., 1975) and NE-releasing agent (Kuczenski and Segal, 1992). Most of the research attempting to elucidate the mechanism of methamphetamine action has focused on DA because the DA system, which regulates feelings of reward, motor coordination, motivation, and hormonal release, is thought to be primarily responsible for the behavioral changes observed in methamphetamine use.

DA is synthesized in the cytoplasm in a series of enzymatic steps beginning with the amino acid precursor tyrosine. Tyrosine is converted to levodopa (l-DOPA) in the presence of tyrosine hydroxylase (TH). TH is the rate-limiting step to DA synthesis. l-DOPA is then converted to DA in the presence of aromatic amino acid decarboxylase. In a DA neuron this is the last step. In neurons that release NE, another step is required in which DA is converted to NE in the presence of DA-beta-oxidase.

DA is then stored in vesicles from which it will be eventually released into the synapse. From the vesicles it is released into the synapse in both Ca^{2+}-dependent and Ca^{2+}-independent manners. Ca^{2+}-dependent release is regulated by the firing of an action potential. Ca^{2+}-independent release is spontaneous. One major effect of amphetamine is to cause an increase in the amount of DA released spontaneously from the neuron (Robertson, Damsma, and Fibiger, 1991). This release is regulated by autoreceptors. Many chemicals can alter the release of DA by binding to DA autoreceptors (for example, achetylcholine, prostaglandins, endorphins, and so forth).

After release, the action of DA can be terminated either by reuptake into the presynaptic cell, through enzymatic degradation, or a combination of the two. Catecholamine reuptake occurs against a concentration gradient and thus requires energy. The energy seems to be provided by the Na^+ gradient and fueled by the sodium-potassium pump. Thus, chemicals that alter the activity of this mechanism can alter DA reuptake. Other mechanisms for altering DA reuptake, and in particular, how amphetamine and methamphetamine interact with the DA transporter, will be discussed below.

DA can be degraded through the action of monoamine oxidase (MAO) and catechol-O-methyltransferase (COMT). MAO is typically found bound to mitochondria. Thus, its actions take place inside the presynaptic neuron. It exists in two forms, MAO-A and MAO-B, so named because they have
different binding affinities to certain compounds. DA, however, does not discriminate between them. COMT also exists in two forms, one is membrane bound, and the other is free in solution. Thus, COMT can act in the synapse or in the presynaptic neuron. Drugs that can block the activity of these enzymes can cause an increase in synaptic DA.

After release, DA can diffuse across the synapse to bind to a postsynaptic receptor or bind to an autoreceptor causing end-product inhibition. Six forms of DA receptor are divided into two families (D₁ and D₂). The D₁ family is divided into D₁ and D₅. The D₂ family is divided into D₂A, D₂B, D₃, and D₄.

Amphetamine causes an increase in spontaneously released DA by reversing the activity of the DA reuptake transporter (Bonisch, 1984). This effect was shown by observing the activity of radioactively labeled amphetamine applied to the terminus region of a dopaminergic neuron (Zaczek, Culp, and DeSouza, 1991). Further, amphetamine-stimulated DA release is inhibited by drugs that block the reuptake of DA (Fischer and Cho, 1979; Liang and Rutledge, 1982; Raiteri et al., 1975). Finally, amphetamine has no effect in genetically engineered mice that do not have the gene that codes for the DA reuptake transporter. Taken together, these findings lead to the exchange diffusion model of amphetamine action. In this model, the amphetamine molecule binds to the reuptake transporter and is taken up into the cell. The transporter is turned around in the process and begins to pump DA out of the cell instead of into the cell.

The weak base model is a second potential mechanism for the spontaneous release of DA in the presence of amphetamine. This model proposes that, at high doses, amphetamine actually diffuses into the neuron where it interacts with the vesicle (by changing its pH—the name “weak base”) and causes DA to leak into the cytoplasm of the cell, thereby providing more cytoplasmic DA to be pumped out into the synapse via the exchange diffusion model (Sulzer, Maidment, and Rayport, 1993; Sulzer and Rayport, 1990).

Amphetamine has several other effects on the DA system as well:

1. Low concentrations of amphetamine enhance the synthesis of DA. This is thought to occur because amphetamine causes the cell to become DA deficient. The cell responds by producing more DA.
2. High concentrations of amphetamine inhibit DA synthesis by binding to presynaptic autoreceptors.
3. Amphetamine also inhibits the enzyme (monoamine oxidase) that degrades DA.

**Dopamine (DA) Pathways**

Feldman, Meyer, and Quenzer (1997) identified 10 distinct DA pathways in the central nervous system:
**Mesostriatal System** (also known as, the nigrostratial pathway)—Cell bodies of the substantia nigra, ventral tegmental area, and retrorubral project to the nucleus caudatus putamen, globus pallidus, and nucleus accumbens. This system is important to motor control and breaks down in patients with Parkinson’s disease.

**Mesolimbocortical System** (also known as mesocortical system) —Cell bodies of the ventral tegmental area, substantia nigra, and retrorubral nucleus project to the septum, amygdala, hippocampus, nucleus of the diagonal band, anterior olfactory nucleus, and limbic cortical areas. This system may become hyperactive in schizophrenia. This system is also the central reward pathway and is likely responsible for compulsive drug abuse.

**Mesodiencephalic System**—Cell bodies of the substantia nigra and ventral tegmental area project to the subthalamic nucleus and lateral habenula. This system is also involved in motor control.

**Mesopontine System**—Cell bodies of the substantia nigra and ventral tegmental area project to the locus coeruleus. This system may play a role in arousal.

**Diencephalospinal System**—Cell bodies in the dorsal and posterior hypothalamus, zona incerta, and caudal thalamus project to the thalamus. This system may play a role in complex motivated behaviors (e.g., food consumption and sexual behavior).

**Periventricular System**—Cell bodies in the mesencephalic periaqueductal gray and periventricular gray of the caudal thalamus project to the periaqueductal gray and medial thalamus and hypothalamus. This system may play a role in pain perception.

**Incertohypothalamic System**—Cell bodies of the zona incerta and periventricular hypothalamic nuclei project to the zona incerta, anterior, medial preoptic, and periventricular hypothalamus. This system mediates endocrine function.

**Tuberohypophyseal System**—Cell bodies of the arcuate and periventricular hypothalamic nuclei project to the median eminence and intermediate and posterior lobes of the pituitary. This system also regulates endocrine function.

**Periglomerular Dopamine Neurons**—These cells are in the olfactory bulb.

**Retinal Dopamine System**—These cells exist in the retinas of some species.

**Tolerance and Sensitization**

Tolerance is defined as a diminished response to a drug after repeated administration. In the case of amphetamine, tolerance to the anorexic, hypothermic, cardiovascular, and reinforcing effects has been reported (Lewander, 1971; Miller and Gold, 1989; Perez-Reyes et al., 1991). Reports from chronic...
amphetamine users confirm a significant amount of tolerance to the euphoric effects of amphetamines (Grinspoon and Hedblom, 1975; Kramer, Fischman, and Littlfield, 1967), which tends to result in tremendous dose increases by chronic abusers. The physiological mechanism for tolerance to amphetamine use is unclear but seems to occur at the cellular level.

An interesting effect of chronic amphetamine abuse is reverse tolerance, or sensitization. That is, use of the drug leads to a stronger subjective effect of the drug at a later time. Repeated, intermittent use or a single use seems to lead to this phenomenon. The use of the drug amphetamine can lead to cross-sensitization, which was originally defined as a hypersensitivity to stress (Robinson and Becker, 1986), but has come to be associated with hypersensitivity to a number of drugs as well.

**Neurotoxicity**

Methamphetamine neurotoxicity has been well documented in animals (Ellison et al., 1978; Koda and Gibb, 1973; Seiden, Fischman, and Schuster, 1975) but is less clear in humans (Ernst et al., 2000). However, Buffenstein, Coel, and Combs (1997) used single-photon emission computed tomography (SPECT) scanning to show brain deterioration in methamphetamine abusers that continued for months after abstinence (see Figure 3.1). Other

![Figure 3.1](image)  
**Figure 3.1** *Top left:* Frontal view of brain of young adult male. Progressive damage 4 months post last methamphetamine use. *Top right:* Lateral view of same person. *Middle:* Normal brain of young adult male. *Lower left:* Lateral view of 44-year-old male posttraumatic brain injury. *Lower right:* Overhead view of brain of 61-year-old male with dementia. (Scans made at Queen’s Medical Center, Honolulu, Hawaii, and provided by the Pacific Institute for the Study of Conflict and Aggression, Kamuela, Hawaii.) *(See color insert following page 72.)*
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Similar demonstrations have followed up to the present (Young, 2004). Methamphetamine seems to be toxic to dopaminergic neurons (Ricaurte, Seiden, and Schuster, 1984; Ricaurte et al., 1988; Wagner et al., 1980) and serotonergic neurons (Hotchkiss and Gibb, 1980; Morgan and Gibb, 1980), but not noradrenergic, cholinergic, and gamma-aminobutyric acid (GABA)-ergic neurons (Hotchkiss, Morgan, and Gibb, 1979; Morgan and Gibb, 1980; Wagner et al., 1980). The mechanism for DA neurotoxicity is better understood than the mechanism for 5HT neurotoxicity and may involve methamphetamine triggering the release of large quanta of DA (O’Dell, Weihmuller, and Marshall, 1991). In fact, drugs that block DA protect against methamphetamine neurotoxicity (Fuller and Hemrick-Luecke, 1980; Hotchkiss and Gibb, 1980; Ricaurte et al., 1984). Positron emission tomography (PET) studies have identified the loss of striatal dopamine transporter (DAT) in abstinent meth abusers 1 to 3 years after their last use (Volkow et al., 2001).

Several other putative mechanisms for METH neurotoxicity have been proposed (Cadet, Jayanthi, and Deng, 2003). These include the process of apoptosis (Cadet et al., 2003; Stumm et al., 1999), oxidation (Cadet et al., 1994; De Vito and Wagner, 1989; Giovanni et al., 1995; Seiden and Vosmer, 1984), excitotoxicity via glutamate release (Yamamoto, 2001), temperature homeostasis (Bowyer et al., 1994), and ion dysregulation (Callahan et al., 2001).

Drugs with chemical compositions similar to amphetamine and methamphetamine tend also to be neurotoxic. MDMA (3,4-methylenedioxymethamphetamine; also known as Ecstasy, XTC, X, and E) is one such compound. MDMA has been shown to be neurotoxic in rats (Schmidt, 1987; Stone et al., 1986), pigeons (LeSage, Clark, and Poling, 1993), and nonhuman primates (Ricaurte et al., 1988). The evidence for a neurotoxic effect in humans has been much more controversial (Holland, 1999). In fact, because of an error that led to the mix-up of drugs in an experimental laboratory, there is currently no evidence that recreational doses of MDMA are toxic in primates (Ricaurte, Yuan, and McCann, 2003). Chronic MDMA abuse has been shown to cause deficits in the following areas: recall (Morgan, 1999); visual and verbal memory in low intellectually functioning males, but not females or high intellectually functioning males (Bolla, McCann, and Ricaurte, 1998); working memory (Wareing, Fisk, and Murphy, 2000); and complex tests of attention (McCann, 1998). The damage may be related to 5-HT neuronal injury (Reneman et al., 2000), but a recent review found that “5-HT depletions in MDMA users are not necessarily synonymous with neurotoxic damage” (Baumann, Wang, and Rothman, 2007).

Neuropharmacology of Amphetamines

Amphetamines are rapidly absorbed orally and have a rapid onset of action, usually within 30 to 40 minutes of oral ingestion. Methamphetamine may
also be taken intravenously, whereupon it has an immediate effect. Certain forms, the "designer amphetamines," may be inhaled. Crystal methamphetamine, the smokable form of this drug, has an onset time that can be measured in seconds, a subjective feeling of intoxication for up to 8 hours, and a half-life of 12 to 36 hours.

Tolerance, the requirement of progressively higher doses over time to obtain the same effect, occurs with all forms of amphetamines. This phenomenon, in part, accounts for the addictive nature of methamphetamine. Increases in methamphetamine doses from 5 to 1000 mg per day in a single year are not uncommon as a reflection of rapid tissue tolerance in methamphetamine users (Trustees of Indiana University, 1995). As a result of tolerance in long-term abusers, doses as high as 20 times the initial dose may be needed to achieve the same high that the abuser experienced early in his or her drug use history (Haight-Ashbury Training Manual, 1997). This pattern suggests that knowledge of the behavioral indicia of intoxication, abuse, and dependence, in addition to an understanding of the neuropharmacology of methamphetamine, is indispensable. When compared with other psychostimulants, such as cocaine, methamphetamine has been shown to be less physically addictive in animal studies (Dackis and Gold, 1990). Nevertheless, the psychological addictive potential of methamphetamine is extremely high; many abusers continue their use despite knowing that they are at significant risk for florid psychotic symptomatology, including command hallucinations and disorganized cognition.

The primary effects of methamphetamine are related to the release of catecholamine, particularly DA, from presynaptic neurons in the brain. The drug appears to exert its greatest effect on dopaminergic neurons projecting from the ventral tegmental area to the cerebral cortex and the limbic system, nerve bundles commonly referred to as the "reward pathway" that is thought to be implicated in the addictive potential of methamphetamine (Kaplan, Sadock, and Grebb, 1994).

The designer amphetamines (e.g., MDMA, MDEA, MMDA, 2,5-dimethoxy-4-methylamphetamine [DOM]) release DA, norepinephrine, and serotonin. As a result of their effect, individuals ingesting these substances experience both stimulant and hallucinogenic effects. Thus, the designer amphetamines exert a broader spectrum of effects than methamphetamine alone.

Conclusory Note

Research over what is now an extended period of time has included substantial work at fairly molecular levels, some of which is reflected in the above. In addition, there has been an ongoing interest and study of the relationship of some of these neurobiological findings to behavior, including both addiction
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to, or abuse of, methamphetamine and treatment. The findings are unde-

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(+)-3,4-Methylenedioxymethamphetamine (MDMA, “Ecstasy,” E, Adam, X, XTC) is a methamphetamine analogue. It has hallucinogenic, psychostimulant, and multiple behavior-altering activities (Green, Cross, and Goodwin, 1995). Although it was discovered serendipitously in 1912 by Merck Pharmaceuticals, its use as a psychotherapeutic/recreational drug was unknown until the late 1970s. By the early 1980s, as the popularity of the “rave party” increased, so did use of MDMA. In 1985, prior to its classification as a Schedule I drug, it was being evaluated for its use in psychotherapy. A fearful Congress and Drug Enforcement Administration (DEA) successfully petitioned for its classification as a Schedule I compound with no evidence that it was at all harmful (Rosenbaum, 1991).

Recreational use of MDMA has been on the rise for the past 20 years (Peroutka, 1987; Pope, Ionescu-Pioggia, and Pope, 2001; Schuster et al., 1998). Increases in the rate of MDMA use have continued despite reductions in the use of other substances (Johnston, O’Malley, and Bachman, 2001a, 2001b). This trend has been international (Abraham et al., 1998; Hibell et al., 2000; see also Chapter 2).

Although there have been occasional deaths indirectly caused by the use of MDMA (Henry, Jeffreys, and Dawling, 1992), it is widely considered by its users to be a “safe” drug. The illusion of safety stems from lack of the obvious negative effects that other amphetamine-type compounds induce. MDMA does not cause an increase in aggressive behavior, and its users do not experience paranoid schizophrenia. According to the Drug Abuse Warning Network (DAWN), less than 0.3% of drug-related emergency room visits are due to MDMA. In fact, most users are normal adolescents. The problems with MDMA are far subtler than those associated with methamphetamine. MDMA is neurotoxic. The observable long-term behavioral effects seem to be specifically linked to impairments of memory and attention in a subpopulation of individuals.

**Myths about MDMA Use**

Before discussing the known and suspected effects of MDMA, it is important to dispel the myths about its use:
1. MDMA drains your spinal fluid.
2. MDMA causes Parkinson’s disease (PD).
3. MDMA is an aphrodisiac.
4. MDMA is a “date rape drug.”

First, no known pharmacological agent drains spinal fluid. Second, 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) is the chemical agent that was featured in the film *The Frozen Addict*. When made improperly, that drug becomes a very potent neurotoxin that can cause brain damage that may cause a syndrome similar to PD. Because it has four letters and starts with an *M*, MPTP is often confused with MDMA. There has never been a single research report that suggests that MDMA causes PD. Third, MDMA is not an aphrodisiac. Although MDMA use is correlated with high-risk sexual behavior (Klitzman et al., 2002) it is not known to be causal. In fact, it may reduce sexual functioning (Milani, Turner, and Parrott, 2000). (McPherson would note, however, that in clinical/forensic contexts, users have reported enhanced desire for sexual activity during intoxication. In general, it is not totally uncommon for drugs to be associated with reduced capacity, but increased subjective need states may be due to disinhibition.) Fourth, a date rape drug is difficult to define. There are certain drugs (alcohol, barbiturates, benzodiazepines, and dissociative anesthetics) that have been used by certain unscrupulous individuals or groups to intoxicate a woman to the point where she could not defend herself from, or even remember, a rape. MDMA does not have the characteristics of any of these compounds. Users are conscious and aware. There is no reason to believe that MDMA is a “date rape” drug.

**Neurotoxic Properties of MDMA in Nonhuman Animals**

Accumulating evidence has documented that MDMA is a selective serotonergic neurotoxin in rodents and nonhuman primates (Battaglia, Yeh, and Desouza, 1988; Ricaurte et al., 1992; Stone et al., 1986). MDMA has been shown to be neurotoxic in rats (Schmidt and Taylor, 1987; Stone et al., 1986), pigeons (LeSage, Clark, and Poling, 1993), and nonhuman primates (Ricaurte et al., 1992). MDMA-induced serotonergic neurotoxicity exhibits with four characteristic features:

1. Reduced levels of serotonin and its metabolite, 5-hydroxyindole acetic acid (5-HIAA) (Schmidt and Taylor, 1987) indicate that serotonin is being both released and “turned over” (broken down and reused) less frequently.
2. Reduced numbers of serotonin reuptake transporters (Battaglia et al., 1988) indicate that at the same time serotonin release and reuse is inhibited, the molecular mechanism that recycles it is also inhibited.
3. Reduction in tryptophan hydroxylase (TPH) activity (Stone et al., 1986) indicates that the enzyme that synthesizes serotonin is also inhibited.

4. MDMA produces a loss of serotonin-containing neurons (Commins et al., 1987; Slikker et al., 1988).

Similar to the mechanism by which methamphetamine is neurotoxic, there is evidence that MDMA may indirectly cause neurodegeneration by promoting dopamine (DA) release (Colado et al., 1999). Later in the text, we discuss the mechanisms by which methamphetamine causes DA release. These are calcium-dependent and calcium-independent processes: Ca\(^{2+}\)-dependent release is regulated by the firing of an action potential; Ca\(^{2+}\)-independent release is spontaneous. MDMA can also release DA by the same two mechanisms: a calcium-dependent process (Gudelsky, Yamamoto, and Nash, 1994) and a calcium-independent nonvesicular transporter-mediated process (Nash and Brodkin, 1991; Shankaran et al., 1999). Drugs that block DA transmission have been shown to be effective in attenuating the neurotoxic effects of MDMA. For example, depletion of DA stores by inhibiting the enzyme that makes DA, tyrosine hydroxylase, and blockade of the protein that transports DA both protect serotonergic terminals from MDMA neurotoxicity (Nash and Brodkin, 1991).

The exact mechanism responsible for MDMA-induced neurotoxicity is not known. The two prominent theories are that it may be induced by oxidative stress caused by the increased DA release (Sprague and Nichols, 1995) or by hyperthermia (Malberg, Sabol, and Seiden, 1996).

A recent review has reappraised the literature on neurotoxicity in rats. Above, we noted that the assumption that MDMA is neurotoxic is based on convergent evidence. These authors found that high-dose administration of MDMA does produce 5-HT depletion in the forebrain. However, the doses of MDMA that cause such depletions “do not reliably increase markers of neurotoxic damage such as cell death, silver staining, or reactive gliosis.” MDMA administered to rats does cause changes in 5-HT levels, associated hormone levels, and behavioral change, but it may not cause damage (Baumann, Wang, and Rothman, 2007).

**Neurotoxic Properties of MDMA in Humans**

The evidence for a neurotoxic effect of MDMA in humans has been much more controversial than for methamphetamine. Ethical and methodological problems have made evaluation of the effects of MDMA on humans difficult. These difficulties include the inability of researchers to be sure what drug was taken, and how much of it was taken, by a research participant. Ecstasy tablets can contain from 40 to 150 mg of MDMA as well as a variety of other
psychotropic compounds. Researchers have to rely on self-report by subjects, which can be contaminated by misdirection (the user could be lying), problems with recall (the user may not remember how much drug he or she took), or simply misinformation (the user may be misinformed about what drug he or she took).

Perhaps the most important methodological issue has to do with studies that include poor control groups. Most MDMA users also use other drugs. For this reason, any study that tries to evaluate the effect of MDMA on human subjects should have two control groups. One of these groups should be a traditional control group of individuals that use no drugs. The other should be a polydrug-use group of individuals that use a variety of drugs but not MDMA. This way the effects of MDMA could be separated from the effects of other drugs. Very few studies of the effects of MDMA have been appropriately controlled. A recent review identified three types of studies that have been used to examine the neurotoxic effects of MDMA in humans (Curran, 2000).

The first type is neurobiological research. Consonant with the animal research described above, the concentration of 5-HIAA in the cerebrospinal fluid of MDMA users is reduced compared with that of non-MDMA-using controls (McCann et al., 1994; Ricaurte et al., 1990). This finding indicates reduced serotonergic turnover as described above. Further, the literature on humans has provided a measure of reduced serotonergic reuptake transporters. In one such study, which reflected a direct connection between MDMA and altered serotonergic function in humans, the positron emission tomography (PET) scans of 14 self-affirmed MDMA users who had been abstinent from the drug for 21 days were compared with those of 15 nondrug-using controls. This study indicated that there were fewer serotonin transporters (the molecules that are responsible for serotonergic reuptake into the presynaptic neuron; see Chapter 3) in the brains of the drug users than in the brains of the control group. Human studies that examine the effect of MDMA on tryptophan hydroxylase (TPH) activity and serotonergic cell loss have not been conducted.

The second type of research focuses on psychological functioning. Acute effects of MDMA tend to be positive (Greer and Tolbert, 1986). These effects include intimacy with others, euphoria, heightened sensual awareness, and increased physical and emotional energy. Prior to concerns about the potential neurotoxicity of MDMA, it was hoped that the drug could be used for couples therapy. However, the long-term effects may be very negative. Frequent recreational users of MDMA exhibit poor performance on neurocognitive measures (Bhattachary and Powell, 2001; Gouzoulis-Mayfrank et al., 2000; McCann et al., 1999; Morgan, 1999; Rodgers, 2000; Verkes et al., 2001). Specifically, memory and attention seem to be impaired by MDMA use (for review, see Morgan, 2000; Parrott, 2000; Reneman et al., 2000; Reneman et
al., 2001). Chronic MDMA abuse has been shown to cause deficits in the following areas: recall (Morgan, 1999); visual and verbal memory in low intellectually functioning males, but not in females or in high intellectually functioning males (Bolla, McCann, and Ricaurte, 1998); working memory (Wareing, Fisk, and Murphy, 2000); and complex tests of attention (McCann et al., 1999). These deficits may (Bhattachary and Powell, 2001; Gouzoulis-Mayfrank et al., 2000; McCann et al., 1999; Morgan, 1999) or may not (Fischer et al., 1995) be permanent. Special note should be made of the work by Bolla et al. (1998). In that study, the sex and IQ of the participants were measured. The authors determined that the negative effects of MDMA use may be observed only in lower intellectually functioning males. Females and higher intellectually functioning males may be protected.

The third type of research focuses on psychiatric symptomatology. Serotonin is involved in most psychopathology, and MDMA alters the serotonergic system. Thus, MDMA should have some effect on psychiatric functioning. This literature, however, is impossible to evaluate because most studies have examined only polydrug users with inappropriate control groups, completely confounding the effects of MDMA with those of other drugs.

In 2002, George Ricaurte of John Hopkins School of Medicine published a report in Science entitled “Severe dopaminergic neurotoxicity in primates after a common recreational dose regimen of MDMA.” His conclusion, at the time, was that recreational doses of MDMA damaged DA neurons and thus could lead to pathology associated with the damage of those systems. However, after it was determined that there was an accidental mix-up with a vial of methamphetamine, the paper was retracted (Ricaurte et al., 2003).

**MDMA as Treatment**

In spite of concerns that led to the listing of MDMA as a Schedule I substance, there is ongoing research into the therapeutic uses of the drug in the treatment of psychiatric/psychological problems. As above indicated, MDMA has been characterized as having impacts for which there is no good scientific evidence (spinal fluid drainage, aphrodisiac, date rape). Those assertions continue unsupported. There has also been concern that Parkinson’s disease (PD) can be caused by MDMA. However, as already indicated, that observation may actually reflect action of MPTP rather than MDMA; MPTP can occur when MDMA is improperly made (Gahlinger, 2004). Since the first edition of the book, there has been some continued investigation into movement disorders as a by-product of the use of MDMA. Resting for the most part on case studies, the evidence continues to support that neurological disorders of a Parkinson-like character are rare and apparently represent idiosyncratic complications that cannot be simply attributed to ingestion of
Thus, while anecdotal accounts of neurotoxicity have been reported and there is evidence of serotonin system impacts, MDMA cannot be characterized as a proven causal agent in neurological disorders in humans (Mithoefer et al., 2003). There have been some demonstrations in comparative studies for MDMA to have neurotoxic potentials (Martinez-Price et al., 2002; Ricaurte et al., 2003). Given the lack of closure on this issue, the appropriateness of considering MDMA as a treatment tool can be questioned on ethical grounds. Nonetheless, serious proposals have been made to consider whether MDMA has beneficial impacts for therapeutic purposes. In fact, reports exist for both anecdotal and clinical findings of benefit, and there is at least one proposal accepted for a more formal study protocol of the use of MDMA as an adjunct in psychotherapy in cases of posttraumatic stress disorder (PTSD) and depression (Bouso and Ryan, 2001; Doblin, 2002; Greer, 1985; Greer and Tolbert, 1998; Mithoefer, 2004; Riedlinger and Montagne, 2001).

At the theoretical level referencing posttraumatic conditions, the notion is that MDMA reduces or completely extinguishes the fear response to emotionally threatening material, thereby allowing the individual to reform associative links and reduce PTSD impacts (Bouso and Ryan, 2001; Metzner & Adamson, 2001). The theory with respect to depression is that the drug will increase the presence of positive emotional states or even act as an alternative antidepressant (Riedlinger and Montagne, 2001). The first serious study, approved by the FDA but taking place in Spain (in the United States, MDMA has been criminalized and therefore such studies were difficult to mount), included a “clinical plan” and associated research with a cost of about $5 million. The research design was the approach apparently established originally by Pfizer with respect to Zoloft. The study is referenced by its author as “adequate and well controlled” (Doblin, 2002). In 2004, the FDA approved Mithoefer’s proposal for a study in the United States (CNN.com, 2004; Mithoefer, 2004).

The literature, as it has been and is developing in regard to the use of MDMA and therapy, is troubling in certain respects. First, in the clinical case studies there are references to a thousand years of use of hallucinogenic drugs to create spiritual enlightenment (Metzner and Adamson, 2001; Naranja, 2001; Sessa, 2005; Wolfson, 1986). To the extent that the use of MDMA as a therapeutic adjunct is based on the enthusiasm of psychotherapists whose backgrounds are less scientific and more spiritualistic and mysticism based, one is more than reminded of the 1960s and the history of lysergic acid diethylamide (LSD) and other hallucinogens. Although it is true that the use of drugs for enlightenment has been characteristic of many different religious cultures, that historical fact is no more persuasive than that MDMA is an excellent and appropriate adjunct in the treatment of PTSD and depression.
than the subjective report of many alcoholics, with an underlying depressive condition, to the effect that alcohol ingestion improves their status. The inducement of an elated state or other alteration of consciousness does have immediate and positively experienced benefits but has not been demonstrated to have much else in the way of therapeutic potentials. As with the use of a depressant, alcohol, to treat depression, the use of hallucinogens to treat psychological ills is, in fact, more likely to complicate than to correct.

Finally, the theories of treatment incorporated overtly or implicitly in the literature representing MDMA are at the very least outdated and certainly inconsistent with current research into therapy. PTSD is not best treated by repeated exposure to the traumatic event, even in memory. Although conventional and effective treatments for PTSD may include during acute phases a debriefing process, in fact, the best treatment involves reduction of exposure, increasing of coping skills, and reframing of future expectations. For both depression and PTSD, cognitive behavioral approaches that reduce emotional reactivity and increase a sense of personal regulation and control have been demonstrated repeatedly to reach scientifically respectable support. Using a drug that reduces personal control capacities as part of a reexperiencing therapy is entirely inconsistent with the developed literature on the effective means for addressing these problems (Aspinwall and Richter, 1999; Aspinwall and Taylor, 1992; Berwin, Dalgleish, and Joseph, 1999; Foa and Rothbaum, 1998; Taylor, 1983; Wilson and Raphael, 1993).

In the case of depression, the best treatment has involved the use of antidepressants, which in complex ways increase regulatory functions in diverse areas, including sleep cycles and energy levels (Clark and Beck, 1999). The result of those impacts is to allow the patient to then follow broad-based biopsychosocial treatment plans involving nutrition, exercise, and psychotherapy.

In conclusion, it would appear that while the jury is still out on aspects of the beneficial versus detrimental impacts of the use of MDMA, a conservative view would not support its use over established medical and psychological treatment modalities.

Conclusions

There have been numerous criticisms of the research that has evaluated the effects of MDMA. One such criticism is that the doses of MDMA given to animals for experimental purposes are far higher than the doses taken by recreational users (Saunders, 1995). However, when the metabolic rates of the animals tested were taken into account, it was determined that the dosages that were neurotoxic to animals were equivalent to the dosages used recreationally by humans (Ricaurte et al., 2003). Some drugs do affect human and nonhuman animals differently. The only way to know is through experimentation.
The available evidence from studies of human MDMA users suggests but cannot prove conclusively that there is a direct relationship between MDMA use and alterations of serotonergic neurotransmission and cognitive impairment. The MDMA users who are typically studied are polydrug users. They have used drugs prior to, during the time of, and after the studies that have evaluated their performance. Many of the drugs that are commonly used (marijuana, alcohol, and methamphetamine, to name but a few) by today’s adolescents can cause both serotonergic alterations and cognitive deficits. Recent studies provide conflicting evidence about the relative contributions of MDMA and cannabis to both serotonergic alterations and cognitive deficits (Rodgers, 2000; Croft et al., 2001). Because of ethical concerns (we cannot give humans drugs that we believe may cause neurodegenerative damage), it has been impossible to design a study that would prove conclusively that MDMA causes this type of damage. We have had to rely on correlational studies and analogous animal models to elucidate the effects of MDMA. These studies have tended to support the role of MDMA as a neurotoxin.

Many proponents of MDMA still argue that the potential benefits of its controlled use outweigh any negative effects that it may have (J. Holland, Congressional Testimony, 2001). These proponents suggest that under controlled clinical use, the drug is not neurotoxic. They suggest that the negative effects occur only after repeated chronic use. However, there is a growing body of evidence that suggests that observable (i.e., behavioral) deficits occur much later than physiological deficits (i.e., brain alterations) (Frederick et al., 1998; Taffe et al., 2001; Winsauer et al., 2002).

References


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The cerebral damage caused by methamphetamine intoxication can be formidable. Prolonged use is associated with injury to the dopamine system. Essentially, continued methamphetamine use likely leads to axonic degeneration of the dopamine axon terminals in the striatum, frontal cortex, nucleus accumbens, and amygdala. Hypersensitization of neurons occurs, for example, in increasing sensitivity of D₁ receptors. It is important to note that changes in catecholamines alone cannot explain behavior in humans when they are methamphetamine intoxicated.

Animal studies across several species demonstrate that high dosages of methamphetamine damage nerve cells (Swan, 1997). In rats, one high dose is enough to cause damage to neurons; prolonged administration increases the number of neurons that are killed off (Swan, 1997). Twelve to eighteen months after exposure, serotonin-producing nerves grow abnormally or not at all. Buffenstein, Coel, and Combs (1997) showed through single photon emission computed tomography (SPECT) scanning of methamphetamine abusers in Hawaii that brain deterioration continues for months after abstinence, a finding that, if consistently cross-validated, suggests another unique and pathological feature of methamphetamine (see Chapter 3, Figure 3.1).

Not surprisingly, high doses of methamphetamine can cause death. A male under arrest died with a blood content greater than 60 mg per liter after swallowing a “baggie” of methamphetamine (Logan, Weiss, and Harruff, 1996). A toxic reaction in humans can occur at levels as low as 50 mg of pure methamphetamine for nontolerant users. Ischemic stroke is associated with methamphetamine inhalation (Rothrock, Rubenstein, and Lyden, 1988). Massive strokes are fairly common. One of the authors of this chapter conducted a neuropsychological evaluation of a 30-year-old, previously normal, federal employee who suffered multiple strokes and a vascularizing dementia after a single methamphetamine intoxication. Although a family history of strokes for members in their sixties and seventies was revealed,
representing a possible vulnerability for the client, methamphetamine appeared to cause the client’s strokes long before they would normally be expected, given the inheritance factor. Methamphetamine taken intranasally has caused caudal thalamic infarctions in an abuser (Sachdeva and Woodward, 1989). Ischemic stroke is associated with methamphetamine inhalation (Rothrock et al., 1988).

In sum, much of the data suggest there is no way of establishing a “safe” or “unsafe” level of methamphetamine for a particular person, or even for the same person with repeated doses. With other drugs, and certainly with alcohol, use of the particular substance must continue for a given time period (e.g., 12 months) and be accompanied by maladaptive behavior to qualify for a Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV; American Psychiatric Association [APA], 1994) diagnosis of substance abuse. Preliminary data suggest that these criteria cannot be applied with any confidence to methamphetamine abuse where a small number of intoxications can create catastrophic changes in physical and mental functioning.

Unpredictable Effects of Methamphetamine

There are multiple factors, in addition to its untoward effects on nontolerant users, which cause the impact of methamphetamine to be unpredictable. The properties of methamphetamine can create unpredictable reactions. Further, there may be impurities in the drug. Methamphetamine manufactured in clandestine labs is frequently impure (Kram, Kruegel, and Kruegel, 1977; Sinnema and Verweij, 1981). Methamphetamine can be used to “cut” other drugs, which means that interactive effects must be considered. Also, a variety of toxic chemicals can be used as the precursors from which methamphetamine can be formed (e.g., ephedrine and pseudoephedrine, benzyl chloride, benzyl cyanide, methylvamine); or as reagents, substances that react with precursors (e.g., hydriodic acid, iodine, mercuric chloride, sodium cyanohydridoborate); or as solvents (e.g., ethanol, ethyl chloroform, acetone). Residues of these substances may contaminate the final product.

There are two basic methods for producing methamphetamine, each of which requires 2 to 4 days to produce a batch. One method involves the reaction of phenyl-2-propanone (P-2-P), phenylacetic, and methylamine. The other method uses ephedrine as a precursor chemical, which does not necessitate use of a controlled precursor. This method, referred to as the ephedrine/red phosphorus method, requires the use of hydrogenator. Red phosphorus is on the list of less-restricted chemicals in many states, and information that this chemical can be obtained from the fireworks and matchmaking industries has been widely disseminated on the Internet since 1996 (e.g., see deadlock@paranoia.com). The striking pad on match covers is about 40%
red phosphorus and 30% antimony sulfide, with lesser amounts of glue, iron oxide, manganese dioxide, and glass powder. Some of these chemicals, alone or in combination, can cause toxic reactions in the methamphetamine user. In addition, the ephedrine/red phosphorus method often produces “garbage” methamphetamine. Unless simple precautions are taken, which are typically not followed by makers who are often chronic methamphetamine users themselves, high amounts of iodoephedrine and azirine are produced as contaminants.

Most methamphetamine is not the clear, pure hydrochloride salt a chemist might associate with the drug, but contains impurities that can be identified by their color as follows:

- **Red**: Methamphetamine from pseudoephedrine; the red coloring of the tablet was not washed away.
- **Orange**: Ephedrine sulfate was used; the sulfate was reduced to sulfur.
- **Purple**: The iodine from the phosphorus–iodine reaction was not chemically washed.
- **Green**: Copper somehow made its way into the mixture, possibly because of the mixing vessel.
- **Brown**: A tabulating agent or oxidized red coloring was present in the reduction.

Use of drugs other than methamphetamine affects the user’s response to methamphetamine. Cocaine intoxication causes cross-tolerance to discriminative and reinforcing effects of methamphetamine in animal studies (Peltier et al., 1996). It is important to understand that although the terms to describe cross-reverse tolerance (i.e., sensitivity) vary as shown in Table 5.1, they refer to the same concept; the terms can be gleaned from the animal and human literature, *DSM-IV* (APA, 1994) and *DSM-IV-TR* (APA, 2000), and other sources.

Polydrug abuse is the rule rather than the exception in adult offenders (Kassebaum and Chandler, 1994; see also the court clinic survey reported in Chapter 11). Repeated use of methamphetamine alone can decrease sensitivity and increase tolerance to more methamphetamine (Ando et al., 1996). Even innocuous foods can cause cross-reverse tolerance (that is, sensitivity) to methamphetamine. In many users, caffeine increases sensitivity to the effects of methamphetamine (Ando, Hironaka, and Yanagita, 1986). Cocaine, levodopa (L-dopa), and a variety of other substances have been associated with cross-reverse tolerance. Most abusers are aware of this phenomenon and will deliberately attempt to recreate the effects of methamphetamine by using these substances when methamphetamine is unavailable. Alcohol, a central nervous system suppressant, is commonly used by addicts to decrease the effects of amphetamines, especially during withdrawal periods. In *State v.*
Michael Lawrence (2001), the defendant drank coffee to reexperience a methamphetamine-like “rush,” including on the day he dismembered the murder victim, a Kirby vacuum cleaner salesman who came to his house. Table 5.2 lists some of the many studies from the empirical literature involving both humans and animals that show the association between caffeine and methamphetamine. The common theme from the literature is that methamphetamine causes a lasting sensitivity to relapse. Various animal studies cited above (e.g., see Ando et al., 1986) suggest that relapse into states resembling methamphetamine intoxication can be triggered by environmental stress. These findings have not been generalized to humans. Replication of these findings for humans would suggest that the sudden onset of a state resembling a paranoid state could occur months or even years after an individual’s last intoxication from methamphetamine. Some interesting implications may exist for legal cases where criminal responsibility is confronted by voluntary ingestion: at what point in time does use of a drug no longer “count” as a barrier to raising a sanity defense?

Table 5.1  Terms Used to Describe Methamphetamine-Like Effects by Another Substance Following Termination of Methamphetamine

<table>
<thead>
<tr>
<th>Term</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Sensitivity</td>
<td>Asami, Kuribara, and Tadokoro (1986), <em>Yakubutsu Seishin Kodo</em></td>
</tr>
<tr>
<td>4. Cross-reverse tolerance</td>
<td>Fujii, Kuribara, and Tadokoro (1990), <em>Yakubutsu Seishin Kodo</em></td>
</tr>
<tr>
<td>5. Cross-reverse tolerance behavioral</td>
<td>Tadokoro and Kuribara (1990), <em>Nippon Yakurigaku Zasshi</em></td>
</tr>
<tr>
<td>sensitization</td>
<td></td>
</tr>
<tr>
<td>like action (e.g., diet pills, khat)</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* Based on a partial review of the literature. Other journals include *Life Sciences; Psychopharmacology; and Pharmacology, Biochemistry, and Behavior*. Substances producing methamphetamine-like effects reported in the literature include caffeine, phenobarbital (an antiseizure medication), theophylline (a stimulant found in tea), methylphenidate (a compound commonly found in diet pills which is structurally different from methamphetamine but with methamphetamine-like stimulant properties), L-dopa (used in treatment of Parkinson’s disease), bromocriptine (a compound with antidepressant properties), morphine, benzphetamine (a mixture of benzadrine and other methamphetamine compounds), ephedrine (a component of methamphetamine), and cocaine.
### Table 5.2 Caffeine and Methamphetamine-Like Effects (Studies by Date of Publication)

<table>
<thead>
<tr>
<th>Study</th>
<th>Subjects</th>
</tr>
</thead>
</table>

**Note:** Based on a partial review of the literature. Other sources of information include (a) the clinical-forensic evaluation/treatment of methamphetamine abusers by Harold V. Hall, PhD, ABPP (1988–2001); (b) consultation with Errol Yudko, PhD, Assistant Professor, Department of Psychology, University of Hawaii, Hilo, and consultant to Big Island Substance Abuse Center; (c) a special report of the Pacific Institute for the Study of Conflict and Aggression entitled Methamphetamine use and the mental health expert witness in criminal-forensic contexts, by H.V. Hall, S.B. Twemlow, and S.B. McPherson (January 1999); and (d) the defendant in *State v. Michael Lawrence* (September 1, 1999, evaluation).
The Symptomatic Patterns

The clinical symptoms of methamphetamine use are primarily sympathomimetic in nature and are well documented in the literature on humans and animals (Ando et al., 1996; Ashizawa et al., 1996; Beebe and Walley, 1995; Chuck et al., 1996; DeVito and Wagner, 1989; Logan et al., 1996; Peltier et al., 1996; Rothrock et al., 1988; Sachdeva and Woodward, 1989; Tadokoro and Kuribara, 1986; Tohhara, Kato, and Nakajima, 1990; Wolkoff, 1997). At low doses, methamphetamine causes generally positive effects, such as increased alertness, energy, euphoria, elevated self-confidence, persistent activity and work, increased talkativeness, increased sexual pleasure and hypersexuality, a sense of well-being, increased strength, and a loss of appetite. The egosyntonic, pleasurable nature of methamphetamine intoxication explains its persistence as well as the addictive cycle that usually emerges.

Table 5.3 and Figure 5.1 depict methamphetamine intoxication and its general effects on violence potential and reality testing. The increase in violence potential and the decrease in reality testing are associated with increasing dosages. Note that reality testing in homicides may be preserved under mild effects of methamphetamine, but that delusional homicides are the hallmark of severe impairment as a result of this drug.

Higher doses of methamphetamine may result in negative symptoms such as disorganized or purposeless physical activity, tremors, muscle tics, slurred speech, muscle spasms (hyperflexia), motor instability, incoordination, gait ataxia, bruxism (that is, teeth grinding), and athetosis (for example, strange motor movements). Affective symptoms include agitation, restlessness, rage, panic, and anxiety. Somatic sensations include numbness of the skin and limbs. Hallucinations may occur as well as strong feelings of paranoia with a severe amphetamine-induced psychosis. Most high doses of methamphetamine are associated with a clear sensorium. Violent behavior toward others with increased risk-taking behavior has been observed frequently. Hyperthermia (extreme rise in body temperature) is common. At high dosages, difficulty with urination, irregular heartbeat, convulsions, stroke, coma, and death have occurred.

The period following intoxication (“coming down” or “on the crash”) is characterized initially by restlessness, irritability, and a craving for the drug, along with fatigue and long periods of sleep. Confusion, disorientation, and hunger are common during this period.

Chronic symptoms of methamphetamine use include motor problems, depression, irritability, fatigue, exhaustion, and formication (delusions of insects crawling on the skin). Persisting neuropsychological symptoms associated with chronic methamphetamine use have been noted in animal and human investigations. Such symptomology includes visual-spatial disturbances, memory encoding and retrieval problems, lowered attention and
<table>
<thead>
<tr>
<th>Duration/Dose</th>
<th>Methamphetamine Intoxication</th>
<th>Methamphetamine Delirium</th>
<th>Violence Potential</th>
<th>Methamphetamine Delusions</th>
<th>Impairment of Reality Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease</td>
<td>Euphoria</td>
<td>Anxiety and irritability increases, sometimes resulting in extreme paranoia or panic-like delirium</td>
<td>Decrease</td>
<td>Occurs in as many as two-thirds of chronic users</td>
<td>Decrease</td>
</tr>
</tbody>
</table>

- Initial decreased anxiety
- Disinhibition
- Heightened interest in the environment

- Feelings of increased competence
- Increased self-esteem
- Clear sensorium without cognitive confusion or hallucinations
- Extreme impulsiveness, including violence
- Irresponsibility or disinhibition

Note that paranoid delusions can be experimentally induced by prolonged amphetamine administration.

Delusions are related to amount and duration rather than subject's predisposition to psychosis.

(Continued.)
Table 5.3  Some Behavioral and Cognitive Effects of Methamphetamine Use (Continued)

<table>
<thead>
<tr>
<th>Duration/Dose</th>
<th>Methamphetamine Intoxication</th>
<th>Methamphetamine Delirium</th>
<th>Violence Potential</th>
<th>Methamphetamine Delusions</th>
<th>Impairment of Reality Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impaired judgment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grandiosity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Atypical generosity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypersexuality</td>
<td>Disorientation similar to organic delirium with alternate in perception of time, place, and person</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypervigilence</td>
<td>Reality testing may be preserved if the effect is mild, but delusional homicides do exist when reality testing is severely impaired</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compulsive repetitive actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mania</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychosis or Bipolar Affective Disorder</td>
<td>Delusions last longer than for cocaine, often for several days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Effects and Diagnosis of Methamphetamine Use

concentration (especially selective attention), and executive dysfunction such as delayed responses and perseveration. A long-lasting amotivational syndrome, probably associated with dopamine depletion, often sets in. Circadian variations upset the sleep–wakefulness cycle. Flashbacks associated with threatening stimuli have been noted. Symptoms similar to paranoid schizophrenia, a disorganized lifestyle, persistent delusions, poor judgment, and irresponsibility, have been observed. As discussed earlier, the user may realize that visual and auditory hallucinations stem from methamphetamine use, but will continue with the pathological behavior anyway. A diminished social life with compromised coping abilities is a natural consequence. Fatal liver, heart, kidney, and lung disorders, as well as brain injury due to cerebral bleeds and other factors, have been implicated. There is a lowered resistance to disease. Acne, sores, corneal ulcerations, and skin disorders such as dry, itchy skin may occur (see, for example, Chuck et al., 1996). As alluded to earlier, a chronic reverse tolerance (i.e., sensitivity) to a variety of chemicals including cocaine, ephedrine, L-dopa, and morphine often ensues. Relevant to forensic issues, methamphetamine users may use such drugs as a substitute for methamphetamine, and amphetamine psychosis may be induced or exacerbated by such drugs (Tadokoro and Kuribara, 1986). Weight loss is usually striking, along with malnutrition, avitaminosis, and other problems in nutrition and appetite.

Withdrawal

Table 5.4 and Figure 5.2 present aspects of methamphetamine withdrawal. The effects on the user’s mood during this period are considerable. Violence potential is increased during withdrawal, furthered by an entrenched delusional system and compromised ability to cope.

Symptoms of withdrawal from methamphetamine are typically opposite its acute effects. A recent analysis of 21 patients in recovery from methamphetamine addiction during the first 3 weeks of abstinence identified the

Figure 5.1 High-intensity pattern of abuse cycle.
following symptoms: depression, fatigue, increased sleep, increased appetite, vivid dreams, agitation, anxiety, tension, craving frequency, inactivity, irritability, anxiety, paranoid ideation, and suicidal ideation (McGregor et al., 2005). These authors further concluded that withdrawal symptoms were greatest in those patients who were older, used methamphetamine longer, and who self-reported the highest levels of dependence. This finding is of particular import in light of a recent study, which showed that craving was highly predictive of subsequent relapse among patients in treatment for methamphetamine use (Hartz and Galloway, 2001).

### Diagnosis

Terms used by mental health experts have diverse meanings and one should not assume that one understands the meaning of expert testimony unless

<table>
<thead>
<tr>
<th>Duration and Dose</th>
<th>Acute Withdrawal: The Crash</th>
<th>Chronic Withdrawal and Mood Dysfunction(^a)</th>
<th>Violence Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low dose</td>
<td>Recovery in most low-dose first-time users</td>
<td>Decreased capacity to perceive reward or pleasure; follows several hours to 3 days after the crash after a period of hypersomnolence</td>
<td>Violent potential increases as dose increases</td>
</tr>
<tr>
<td></td>
<td>Mildly depressed mood and anxiety</td>
<td>Increased anxiety, inactivation</td>
<td></td>
</tr>
<tr>
<td>Medium dose</td>
<td>Craving with sometimes commission of crimes to obtain money</td>
<td>Irritability, restricted feelings of pleasure in drug-free life</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A wish to escape from the hyperstimulated dysphasia with increased use of sedative drugs and alcohol to induce sleep, hypersomnolence and hyperphagia</td>
<td>High anxiety, severe depression, loss of temper</td>
<td></td>
</tr>
<tr>
<td>High dose</td>
<td>Unipolar depression in some, withdrawal and chronic mood dysfunction in chronic abusers</td>
<td>Mood disorders</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Methamphetamine is physiologically as well as psychologically addictive, but the symptoms are primarily expressed psychologically.

those terms are defined explicitly. The expert should employ the *DSM-IV* (APA, 1994) classification system to differentiate among methamphetamine intoxication, abuse, dependence, and withdrawal or other special symptoms of methamphetamine-induced conditions.

Absent combinations of drugs (for example, polysubstance dependence), the possibilities for methamphetamine-related diagnoses in *DSM-IV* (listed under Amphetamine or Amphetamine-like disorders because of common properties and general arousal effects) are as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>304.40</td>
<td>Amphetamine Dependence</td>
</tr>
<tr>
<td>305.70</td>
<td>Amphetamine Abuse</td>
</tr>
<tr>
<td>292.89</td>
<td>Amphetamine Intoxication</td>
</tr>
<tr>
<td>292.0</td>
<td>Amphetamine Withdrawal</td>
</tr>
<tr>
<td>292.81</td>
<td>Amphetamine Intoxication Delirium</td>
</tr>
<tr>
<td>292.xx</td>
<td>Amphetamine-Induced Psychotic Disorder</td>
</tr>
<tr>
<td>.11</td>
<td>With Delusions</td>
</tr>
<tr>
<td>.12</td>
<td>With Hallucinations</td>
</tr>
<tr>
<td>292.84</td>
<td>Amphetamine-Induced Mood Disorder</td>
</tr>
<tr>
<td>292.89</td>
<td>Amphetamine-Induced Anxiety Disorder</td>
</tr>
<tr>
<td>292.89</td>
<td>Amphetamine-Induced Sexual Dysfunction</td>
</tr>
<tr>
<td>292.89</td>
<td>Amphetamine-Induced Sleep Disorder</td>
</tr>
<tr>
<td>292.9</td>
<td>Amphetamine-Related Disorder Not Otherwise Specified (NOS)</td>
</tr>
</tbody>
</table>

Only two of these conditions (Codes 292.89 and 292.81) denote methamphetamine intoxication at a particular time. An expert’s diagnosis of

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*Withdrawal often does not begin until 30-90 days after last drug use.*

**Figure 5.2** Binge pattern of abuse cycle.
methamphetamine abuse or dependence for the time of an alleged offense, for example, does not imply that the affected person was methamphetamine intoxicated before or during the commission of that alleged crime. Both abuse and dependence refer to the emergence of a maladaptive pattern within a 12-month period, but as has been seen, that pattern may be triggered by short-term usage.

As a caveat, although these diagnoses are helpful, they can imply greater precision than is, in fact, present. Standards should be improved to specify the degree of change and to separate normal alterations of consciousness from pathological states. Until that occurs, we are left with a rudimentary classification system. Using the DSM-IV criteria, a diagnosis of methamphetamine intoxication for a particular time requires that the following occur:

A. Methamphetamine use shortly before or during a relevant event. An altered state of consciousness must be present, even though metabolites may still be in the body from previous methamphetamine use or from other substances.

B. Clinically significant maladaptive behavioral or psychological changes (e.g., euphoria or affective blunting; changes in sociability; hypervigilance; interpersonal sensitivity; anxiety, tension, or anger; stereotyped behaviors; impaired judgment; or impaired social or occupational functioning) that developed during, or shortly after, ingestion of methamphetamine.

C. Two (or more) of the following, developing during, or shortly after, ingestion of methamphetamine:
   (1) Tachycardia or bradycardia
   (2) Pupillary dilation
   (3) Elevated or lowered blood pressure
   (4) Perspiration or chills
   (5) Nausea or vomiting
   (6) Evidence of weight loss
   (7) Psychomotor agitation or retardation
   (8) Muscular weakness, respiratory depression, chest pain, or cardiac arrhythmia
   (9) Confusion, seizures, dyskinesias, dystonias, or coma

D. The symptoms are not due to a general medical condition and are not better accounted for by another disorder.

According to the DSM-IV, the diagnosis should specify whether delusions or perceptual disturbances (for example, hallucinations, sensory illusions) occurred in the absence of delirium. Again, these are not precisely separable from normal levels of suspicion or normal mild sensory distortion. Sensory interpretation, including distortion, is fundamental to all perception.
By convention (and assuming the accuracy of the defendant’s report), intact reality testing means that the accused knew that the perceptual disturbances were induced by methamphetamine.

When perceptual disturbances occur in the absence of such knowledge, a diagnosis of Methamphetamine-Induced Psychotic Disorder, with Hallucinations (or sensory illusions) should be made, as methamphetamine psychosis closely resembles paranoid schizophrenia. The clinical experiences of some reviewers of this book (see Appendix I at the end of this book) indicated that delusions and hallucinations are not the equivalent of loss of contact with reality (for example, many schizophrenics and methamphetamine abusers suffering from psychotic symptoms can shift immediately from delusional and hallucinatory activity to respond to the realistic requirements of a situation).

The diagnoses of Methamphetamine-Induced Psychotic Disorder, Mood Disorder, Anxiety Disorder, Sexual Dysfunction, Sleep Disorder, and NOS conditions (as in other symptoms not included in the above conditions) imply intoxication or withdrawal from methamphetamine when the symptoms are in excess of those usually associated with the intoxication or withdrawal symptoms, but only when the symptoms are sufficiently severe to warrant independent clinical attention. For clarity, the evaluator must specify whether those methamphetamine conditions occurred with onset during intoxication or with onset during withdrawal.

### Absorption, Excretion, and Half-Life

The route of administration of methamphetamine has a direct effect on the speed of absorption and thus potency of effects of the drug. Methamphetamine is absorbed in seconds when smoked or injected which leads to a feeling called a “rush.” The speed of absorption when powdered methamphetamine is taken intranasally can be measured in minutes. When taken as a pill, absorption rates are slowest (10 to 30 minutes) (Feldman, Meyer, and Quenzer, 1997).

Methamphetamine is metabolized by the liver at a slow rate and excreted primarily in the urine (intact or as metabolites). The elimination half-life ranges from 4 to 5 hours but can be more when urinary pH is high.

### Sexual Behavior

There is a disproportionately high rate of methamphetamine use among gay and bisexual men (Shoptaw et al., 2005). The Substance Abuse and Mental Health Services Administration, 2001, reported that “In Los Angeles
County, approximately 11% of the gay–bisexual men report using methamphetamine in the previous 6 months, which is 20 times higher than the general population” (SAMHSA, 2001). Both homosexuals and heterosexual methamphetamine users (86% of 139 respondents) report using the drug for the purpose of engaging in “marathon” sex (Semple et al., 2005a). This sexual behavior is frequently unprotected. Further, Rawson and colleagues (2002) found that methamphetamine users report increases in sexual performance, pleasure, and sexual obsession while on the drug. They also found that users have numerous sex partners and have a tendency to engage in sexual activity more than the users of most other drugs. The sexual side effects of methamphetamine may be secondary to the drug’s effects on reducing impulsivity (Semple et al., 2005b).

**Cognitive Functioning**

Acute exposure to methamphetamine can improve cognitive performance (Johnson et al., 2005; Mohs et al., 1978), but chronic exposure causes a deficit in working memory, attention, and executive function (Gonzalez et al., 2004; Paulus et al., 2002; Salo et al., 2002; Sim et al., 2002; Simon et al., 2002, 2004; Woods et al., 2005). Further, chronic use of methamphetamine may have an impact on episodic memory (Simon et al., 2000). Simon and colleagues gave their subjects a battery of 11 tests of memory, and methamphetamine users scored significantly worse than controls on the recall of words or pictures (Simon et al., 2000). These effects may be related to specific anatomical changes (reduced size of cingulate, limbic, and paralimbic cortices, as well as hippocampus) observed in chronic methamphetamine users (Chang et al., 2002; Thompson et al., 2004).

The most profound cognitive change in methamphetamine users is likely amphetamine-induced psychosis. Some studies suggest that between 36% and 64% of methamphetamine users experience psychotic symptoms for more than 10 days after their last use (Iyo et al., 1997).

**Summary**

Although some research has documented initial benefits and enhanced positive states for methamphetamine users, the end result of this drug’s impact ranges from somewhat to profoundly negative. Further, the drug appears to significantly potentiate long-term injury and psychobiological vulnerability.
References


6

Empirical Evidence of the Effects of Methamphetamine on Aggression

ERROL YUDKO
HAROLD V. HALL
PAUL MIDSON

The association between methamphetamine and violence has been observed repeatedly. For example, in a murder case in Hawaii, a forensic psychologist testified that San Diego was considered the methamphetamine capital of the world, with methamphetamine found in the systems of 90% of violent defendants or being part of the precipitating events (State v. Monte Louis Young, 1998). The theme of violence runs through all operations associated with the manufacture, sale, and consumption of methamphetamine.

Congressional testimony before the 104th Congress (Subcommittee on Crime, House of Representatives, 1995) provided anecdotal data supporting a strong connection between methamphetamine and violence:

Some of the problems in dealing with this particular drug … are the high violence potential. I run a tactical team that does high violence entries of primarily clandestine drug lab type entries. There are only several teams that will do this mainly because of the hazards involved. The atmosphere can become very poisonous, explosion, chemical contamination, and violence potential, from the weapon problem with the suspects inside. So, this is one of the things that become very important to what I’m doing. There’s, again, weapons involvement. There normally is always high velocity type weapon involvement—Mack 10s, Tech-9s, Uzis, mini Uzis, street sweepers, which is an automatic 12 gauge shotgun, these type of things. (pp. 37–38)

Other similar sources have detailed the violence associated with methamphetamine. Some examples would be the following:

- Phoenix, Arizona, police said methamphetamine was largely responsible for the 40% jump in homicides in 1994.
- In Contra Costa County, near San Francisco, police have found that methamphetamine was involved in 89% of domestic disputes in that county.
In San Diego, rival methamphetamine-smuggling rings were responsible for a series of killings that resulted in 26 deaths. Also in San Diego County, the percentage of methamphetamine detections (in arrestees) rose from 23% in the first half of 1991 to 45% during the same period in 1994.

In San Luis Obispo, California (in May 1995), local authorities requested assistance from the U.S. Drug Enforcement Agency (DEA) in confronting spiraling violence that involved 13 drug-related homicides, committed by gangs engaged in the production and distribution of methamphetamine in that county.

In Tacoma, Washington, police reported that half a dozen homicides were related to a methamphetamine organization that, among other things, pipe bombed the residence of a narcotics detective.

A key question is whether previous violence associated with methamphetamine, especially when it is similar to the instant offense, was the result of a habitual set of violent acts or an isolated event. Historical instances of violence should be examined in terms of variables such as frequency, severity, recency, acceleration, triggering stimuli, opportunity factors, and inhibitions to aggression.

Factors that have traditionally indicated willfulness to commit violence in methamphetamine cases include the following:

- Lengthy time delays between triggers to violence and the instant crime.
- Performance of complex chains of behaviors in order to execute the violent behavior.
- Flexibility of response (e.g., when the perpetrator has multiple weapons with which to inflict harm).
- Predatory versus reactive violence, though the latter can be found in some cases.

Key forensic questions can be formulated as follows:

- Should the defendant have known that the likely outcome of the chain of behavioral events would culminate in violence?
- Did the defendant know that methamphetamine intoxication in this situation, based on the defendant’s history, would likely result in his or her violence to another?

However, evidence such as this is anecdotal in nature, and a number of factors suggest that a more careful analysis is required to understand the relationship between methamphetamine and aggressive behavior. In fact,
one reviewer stated, “...the experimental literature is largely inconsistent. Interpersonal factors that are preexistent to psychostimulant use and aggression to gain access to these drugs may be better explanations of the relationship than the effects of intoxication” (Hoaken and Stewart, 2003).

Methamphetamine may not cause aggression. Such observations that lead to the conclusion that it does may be confounded with polydrug effects, may be mistakes in the direction of causality (aggression may cause methamphetamine use), or may be confounded with some other unmeasured variable. For example, 95% of methamphetamine abusers are alcohol abusers (Derauf et al., 2003). Alcohol is consistently associated with increased aggression and violence (Miczek and Haney, 1994; Pernanen, 1976; Roizen, 1997). Similarly, children who tend to be impulsive/aggressive have a high likelihood of later substance abuse (Cloninger, 1999). Finally, a number of psychosocial factors (poor environment, harsh discipline, family aggression, lack of parental supervision, and exposure to violence) as well as substance abuse contribute to aggressive behavior.

It can be noted that anecdotal evidence provided by numerous judicial and clinical workers has suggested high correlations between aggressive acts and the use of drugs, most prominently stimulants such as methamphetamine. In this chapter, we assume that the effects of methamphetamine on aggressive behavior are similar to the effects of amphetamine. That assumption, however, is not a settled issue. Further, from a comparative standpoint, the effects of the D- and L-isomers of amphetamine on aggressive behavior have been studied in rats, mice, humans, and nonhuman primates.

What we do know is that the relationship is likely to be very complex. It has been speculated that the potential combination of the induced psychoactive effects of amphetamines can lead to dangerous and aggressive behavior (Wright and Klee, 2001). However, there is a body of research suggesting that high doses of amphetamine essentially reduce aggressive behavior (anti-aggressive effects), while lower doses may potentiate aggressive responses. Rodents and primates are frequently used as analogous models for humans in experimentation because ethical considerations preclude the use of human subjects. Further, the brain structures of these animals are similar enough to those of humans to allow us to gather a great deal of insight into the human condition by understanding the effects of drugs in nonhuman animals. It has been shown that continued and consistent amphetamine use can sometimes result in paranoia and delusions, accompanied by other latent conditions such as mood swings and depression.

It is the goal of this chapter, therefore, to illustrate what is known about the relationships between amphetamine use and aggressive behavior based on the experimental and comparative studies that have been done and the available observations of human behavior.
Administration of Amphetamines to Rodent Subjects

As mentioned above, ethical concerns preclude the use of humans in many experimental situations; however, we can understand many features of the human central nervous system by understanding the brains of other animals. The animal most widely used in the area of amphetamine experimentation is the rodent, which has an analogous, rather than homologous, brain structure to humans. In the following sections, we examine the modification of aggressive behavior in rodents by amphetamines. The various aspects of aggressive behavior include the tendency for provoked attack, the influence of environment on behavior, social factors, and the neurological basis of aggression.

Behavioral Observations

When using nonhuman subjects to study aggressive behavior, the typical research methodologies employed by experimenters include pain-, isolation-, and brain-stimulation-induced aggression. However, when making a comparison between animals of different species, the outcomes of these tests yield varying and somewhat contradictory results, which in turn hamper one's ability to generalize to the human population. Additionally, it has been found that the most important aspects of amphetamine-stimulated aggressive and defensive responses vary with the nature of the species involved, the stimulus situation, prior experience with these certain behaviors, and the dosage and chronicity of drug exposure; the last is of primary concern (Miczek and Tidey, 1989).

When observing the effects of amphetamines on the aggressive responses of rodent subjects, the behavioral categories most commonly analyzed are nonsocial exploration, social exploration, immobility, threat/attack, escape/avoidance, and defensive/submissive reactions. The nonsocial exploration category includes behavioral elements such as exploring the surroundings. It has been shown in various studies that acute doses—single or intermittent doses rather than chronic daily doses—of amphetamine increase significantly the occurrence of such exploratory behavior (Moro, Salvador, and Simon, 1997). In the mouse, social exploration involves crawling over and under other mice, grooming, sniffing, and other social interactions. Increased social activity in response to amphetamine is dose dependent. In other words, as the dose of the drug increases, the amount of behavior observed also increases (Moro, Salvador, and Simon, 1996); however, no noticeable effect on social behavior has been observed in subjects treated intermittently—two injections a week or injections on alternating days (Moro et al., 1997). Thus, the chronicity of administration clearly has an effect on the behavioral consequence.
Squatting, crouching, and a general lack of movement comprise immobility and are typically used as an index of fear (Blanchard and Blanchard, 1969). Previous literature showed that both the frequency and the mean duration of this behavior were significantly reduced after amphetamine administration (Moro et al., 1996). Treated mice spent considerably less time motionless with shorter intervals between the periods of movement, which indicated a direct relationship between the administration of \textit{d}-amphetamine (dextroamphetamine) and the rate of motor activity. It also has been suggested that amphetamine may have the effect of reducing fear. However, the effects of amphetamine in that context involve other complexities. Flight from a potentially dangerous conspecific can also be a sign of fear. Whereas acute and intermittent administration of amphetamine has caused an increase in flight from a conspecific, chronic administration has been associated with a reduction in flight (Moro et al., 1997).

Threat/attack behaviors consist of upright, offensive stances, lunging, attacking, and chasing. Moro et al. (1996) found that the total duration of time spent in threat postures was increased by a low acute dose of amphetamine (0.25 mg/kg); however, the total duration of attacks was reduced significantly in comparison with a saline-treated control group at intermediate (1.5 mg/kg) or high (3 mg/kg) dose ranges (Moro et al., 1996, 1997). Furthermore, intervals between the attacks were considerably shorter for amphetamine-treated animals, resulting in a higher rate of attack (Moro et al., 1996). Taken together with the biphasic effect of amphetamine on the duration of attack, this result suggested that amphetamine changes the quality of attack in a dose-dependent manner.

Dose-Dependent Effects

\textbf{Acute Administration}

The administration of amphetamine causes dose-dependent changes in either the type of behavior observed or the intensity of the behavior observed. As described in the previous section, higher doses of amphetamine can result in a disruption in the patterns of aggressive behavior displayed by male mice (Miczek and Tidey, 1989; Moro et al., 1996). This effect was evidenced by (1) repeated attacks separated by shorter time periods and (2) treated mice showing less sensitivity to their opponents’ displays of submission, which, consequently, caused continued attack (Moro et al., 1996). Other studies have shown that distorted perceptions of social signals caused a decrease in the attack and threat behavior of dominant animals to subordinates, in territorial responding toward intruders, and in lactating mothers defending their litters (Miczek and Tidey, 1989).
There is a common belief among health-care workers and workers in the criminal justice system that amphetamine has a dose-dependent effect on aggressive behavior. Research shows, however, that \textit{d}-amphetamine has quite different effects that vary in accordance with species, dose of amphetamine, and the type of stimuli used. Miczek and Tidey (1989) suggest that pain-induced aggressive or defensive reactions in rats and mice were noticeably increased after the administration of low doses of amphetamine. However, at intermediate- to high-dose levels, these effects were reduced or disrupted, along with a decrease in isolation- and extinction-induced aggressive behavior. Moro et al. (1996) obtained similar results in an isolation-induced aggression experiment using 52 male mice. It was found that lower doses (less than 4 mg/kg) increased the occurrence of threat and attack behaviors (especially at 0.25 mg/kg) and produced other ambiguous outcomes, whereas intermediate to high doses (above 4 mg/kg) yielded clear antiaggressive effects. These findings consequently strengthened the principle of rate dependency or dose dependency, which is the idea that varying quantities of amphetamine will have diverse effects on the treated subject, otherwise known as \textit{biphasic} effects. It is interesting to note that the frequency of escape and defensive responses to threat during times of social conflict was increased in a dose-dependent manner in a much less ambiguous way (Miczek and Tidey, 1989). Aggressive and defensive responses are mediated by very different neurological systems. Thus, one possible explanation for the perception that amphetamine leads to aggressive behavior may be a misperception of the nature of aggressive behavior. Caseworkers may be calling “defensive” responses “aggressive” responses.

**Chronic Administration**

Chronic administration—repeated or regular administration over a certain time period—of a drug can have very different effects when compared with acute administration. This common finding occurs because neurochemical changes take place in the brain after repeated drug administration. Thus, chronic administration of a drug can lead to behavioral changes even when the user is not actively under the influence of the drug. Acute effects of a drug that has been administered chronically (i.e., when a chronic user stops using for a period of time and then starts again) also can be different from acute effects of a drug that has not been administered chronically. This sequence occurs, potentially, because the drug can alleviate withdrawal.

Tolerance to the antiaggressive effects of amphetamine has been shown with a daily dose of 1.5 mg/kg for 7 days (Moro et al., 1997). Chronic and acute administration of amphetamine led to increases in defensive and escape behaviors, and no statistically significant differences were discovered between one group of mice that had received seven daily injections of
amphetamine and another that had received the same dosage of saline (Moro et al., 1997).

Note that by using selective antagonists, it has been shown that dopamine receptors of the D2 subtype (see Chapter 3 on Neurotransmitter Action) are most effective in reducing the increased motor activity brought on by amphetamine intoxication (Miczek and Tidey, 1989). This inhibition does not, however, carry over to the disruptive effects on social and aggressive behavior. It would appear that agonism of the D2 receptor is most likely not associated with amphetamine control of aggressive behavior. Other dopamine receptor antagonists such as haloperidol and chlorpromazine have been found to reduce aggressive and social behavior, yet none has reversed the effects of amphetamine on these actions (Miczek and Tidey, 1989).

A more recent study (Sokolov et al., 2004) has examined the role of chronically administered methamphetamine in eliciting aggression in male mice. Methamphetamine was administered intermittently over an 8-week period or given acutely. Acute administration (6 mg/kg) did not potentate aggressive behavior. However, chronic administration significantly increased the number of animals that engaged in biting and “shortened the latency before the first attack.”

Methodological Problems: Distinguishing between Aggressive and Defensive Reactions

A persistent problem in the pursuit of information regarding aggressive behavior is the ways in which the data are gathered and analyzed. As mentioned before, the typical methods of experimentation are isolation-induced, pain-induced, and brain stimulation-induced aggression, as well as intruder–resident models. The problem is that both fear and anger can elicit attack. Pain-induced aggressive behavior is fear induced and thus neurologically specific. Intruder-induced aggressive behavior is anger induced and thus neurologically very different from pain-induced aggressive behavior. There is no reason to predict that amphetamine would affect pain-induced aggressive behavior the same way it affects intruder-induced aggressive behavior.

Another difficulty worth mentioning is the interaction between behavioral categories and the confounding that may consequentially occur. One example is the decrease in immobility associated with amphetamine administration and the corresponding increase in escape/avoidance behaviors that may possibly arise from such escalation in locomotor activity. It seems reasonable that the stimulant effects of amphetamine could perhaps cause a sensation of irritability that would lead to higher rates of occurrence for defensive/offensive categories and otherwise confound the results for...
additional behavioral comparisons. It has been shown, however, that these amphetamine-related increases in motor activity are significant in regard to behavioral transitions such as avoidance and nonsocial exploration, but are not significant when transitions of attack are involved (Moro et al., 1996).

Amphetamines and Their Effects on Dominance Hierarchy in Primates

Humans are primates, as are monkeys and apes. Evolution tends to be very conservative. The brains of humans are similar to those of our cousins. In fact, genetically we are about 98% the same as our primate cousins. Although research that involves monkeys demonstrates the same dose-dependent effects of amphetamine as shown with rodent subjects, the resultant effects on aggressive behavior favor a positive rather than negative relationship (Martin, Smith, and Byrd, 1990; Smith and Byrd, 1984). The effects that amphetamine has on primates’ dominance rank have been examined, and analysis has suggested that these effects are a function of social status and group dynamics (Smith and Byrd, 1984).

Differences of Effects between Ranks

The behavior of dominant animals differs drastically from that of subordinate animals (for review, see Blanchard et al., 1998). We tend to categorize dominant styles of behavior as aggressive and subordinate styles of behavior as defensive. Dominant and subordinate animals also differ from each other neurochemically and hormonally. We can identify the rank of a primate within its hierarchy by observing behavior. When amphetamine is administered to monkeys of different social status within an established colony, the subjects express behavior dependent on their position in the hierarchy. For example, treatment of d-amphetamine causes an increase in aggressive behavior: open-mouth threats, biting, chasing in low- and high-ranking monkeys, with little or no effect on those in the mid-ranks (Smith and Byrd, 1984). Similar effects were observed when measuring rates of affiliative behaviors—grooming, holding, huddling—between the subjects: high-ranking monkeys showed decreases in affiliation with little variance, low-ranking monkeys also displayed reductions but with a larger range of variance, and mid-ranking monkeys conveyed no significant decline in affiliative behaviors (Smith and Byrd, 1984). These findings are extremely important. They suggest that the effect of amphetamine on aggressive behavior is linked to the initial level of aggressiveness of the individual.

Additional discoveries have been made that further illustrate the diverse effects amphetamine has on the dynamics and hierarchy of primate
interaction. Along with the fact that low- and high-ranking monkeys are principally affected, comes a certain directionality of their aggressive displays. High-ranking subjects treated with \( d \)-amphetamine were more aggressive to adults and other superior members of the group, whereas those in the lower ranks displayed greater aggression to juveniles and those with inferior positions in the dominance hierarchy (Martin et al., 1990).

This type of effect, a drug causing individuals to act differently depending on preexisting personality traits, is not unique to amphetamine. A comparison of the animal and human literature on the effects of alcohol on aggressive behavior yields a similar result (Yudko et al., 1997). In fact, the effect of alcohol on aggressive behavior may be bidirectional. In other words, alcohol can cause aggressive behavior in a subclass of the population (that is, in highly aggressive individuals but not in low to moderately aggressive individuals), and alcohol use can be caused by the need of the highly aggressive individual to self-medicate. (This theory assumes that for some, being very aggressive causes increased levels of stress, and that alcohol is used by these individuals to alleviate that stress.) This type of behavior can lead to a cyclic pattern in which the highly aggressive individual becomes involved in situations that cause stress. This person then drinks alcohol to alleviate that stress. The alcohol causes the person to become more aggressive, which causes more problems in the individual’s life. The cycle continues in a self-feeding fashion. These results taken together with the above analysis of the effect of amphetamine on primate behavior suggest that the reports of human aggressive behavior being increased by amphetamine use may be an artifact of highly aggressive individuals tending to take and be made more noticeably aggressive by amphetamine.

**Dose-Dependent Effects**

In contrast to the results reported from rodent research, greater rates of aggressive behavior were observed in correspondence with increases in dosage of amphetamine. Low doses (0.01 mg/kg) produced very little change in aggression, whereas a rapid escalation was observed with subsequent increases (up to 1 mg/kg) (Martin et al., 1990). In Smith and Byrd’s (1984) study, the highest-ranking monkey displayed the largest increase in aggressive behavior in direct relation to the increase in dose, with rates of more than thirty times that of the control group at the highest dose (0.56 mg/kg). According to previous literature and current speculation, an adequately broad range of doses will yield an inverted U-shaped dose-effect curve that is typical of the behavioral effects of psychomotor stimulants (Martin et al., 1990). This finding indicates that increasingly larger doses of amphetamine would eventually lead to the reduction of aggressive behavior.
In regard to affiliative behaviors, one notices a dose-dependent effect on the rate of occurrence that almost parallels that of aggressive behavior. Over a range of doses (0.003 to 0.56 mg/kg), a considerable majority of subjects demonstrate a dose-related pattern of affiliative behavior with little or no effect at lower doses and large decreases at higher levels (0.3 to 0.56 mg/kg) (Smith and Byrd, 1984). These results are also contrary to those found in rodent experimentation, where clear increases of social exploration were observed in male mice following acute doses of amphetamine.

**Amphetamines and Their Effects on Human Aggressive Behavior**

As indicated above, because the possession, use, and distribution of amphetamine are illegal and because the compound causes brain damage, ethical concerns have prevented experimental research on the behavioral effects of amphetamine. Thus, the available literature on the effects of amphetamine in human participants is all correlational. Although there have been reports of high correlations between violent crime and amphetamine use, these studies may be confounded because other drugs such as alcohol are often involved, and users who commit these acts sometimes have aggressive tendencies beforehand (Wright and Klee, 2001). The existing literature does give some indication regarding the effects of various doses and the possible predictions one can make concerning the long-term effects on mental health, but until more research can be performed, we are limited in our understanding the relationship of amphetamine with human aggressive behavior.

**Subjective Analysis**

The advantage of experiments involving human subjects is that people have the ability to describe their immediate emotional states and report their feelings and thoughts. However, these subjective analyses can sometimes be inaccurate, and in a sense become “contaminated” because of participants’ biases or reservations concerning the personal information they disclose, especially involving substance abuse. In a self-report study involving amphetamine users from a metropolitan city in Australia, Vincent et al. (1998) reported that more than one-third of the sample composed of 100 participants had experienced symptoms of depression and anxiety prior to their amphetamine use, and nearly one-third had experienced previous mood swings and aggressive outbursts. In addition, some of the participants believed that their usage had intensified these conditions; almost a quarter of the subjects felt symptoms of depression and anxiety attacks for the first time
Effects of Methamphetamine on Aggression

after they started using the drug, although not all of them associated these symptoms with their amphetamine use. Other research shows decreases in fatigue, increases in vigor, no significant changes in anger or confusion, and a moderate decrease in depression (Cherek et al., 1986). Different subjects from separate studies also show signs of excessive confidence and delusional paranoia (Wright and Klee, 2001).

In subjective experiments, it is important that the participants understand completely what it is that they are analyzing in order to obtain accurate results. When studying the effects of amphetamine on human aggressive behavior, it is essential that we distinguish aggression from negligent, violent crime. Although there is no clear-cut line that separates the two, we can think of violent crime as forceful and offensive acts that violate the norm and possibly lead to malevolent physical violence, whereas aggression is a “hostile or destructive tendency or behavior” (Wright and Klee, 2001). One could therefore generalize from this distinction that violence has a more social, and perhaps even economic, connotation, whereas aggression appears to be associated more closely with psychological factors. In Wright and Klee’s (2001) study, the respondents were asked about any ongoing problems they may have been experiencing with amphetamine-related aggression, and were “encouraged to include in their response incidents that did not result in physical harm to others, but which had produced a conscious awareness of their own hostility” (p. 78). By making such a distinction, one can acquire data that are more representative of the population and variable being studied.

**Observed Behavior**

Experiments have been carried out that use positive and negative reinforcement to examine the effects of amphetamine on aggressive behavior. In one such study, subjects were given the opportunity to gain points that were redeemable for a monetary reward by pressing an assigned button. This was the nonaggressive response. Their point values were systematically reduced by a fictitious partner from whom they could subtract points by pressing a different button, which was the aggressive response. Biphasic results similar to those reported in nonhuman research were observed, with lower doses (5 and 10 mg/70 kg) of \(d\)-amphetamine increasing the rate of aggressive responses and higher doses (20 mg/70 kg) reducing these occurrences to levels found after placebo administration (Cherek et al., 1986). Another noteworthy outcome was that while the rate of aggressive responses was decreased at the highest dose, the amount of nonaggressive responses remained unaltered.

Referring back to the Vincent et al. (1998) study, one can extrapolate generalized correlations between amphetamine use and the behavior and health of the user. One of the outcomes of this analysis was that symptoms such as depression and anxiety were likely to be intensified, and additional problems
including paranoia and aggression could possibly arise with continued use. Furthermore, it was determined that a direct relationship existed between increasing severity of dependence and mental and physical health deficits, which was consistent with the fact that the sample used in the study had considerably poorer mental and physical health and emotional functioning when compared to the general South Australian population. These data support the popular opinion that amphetamines can have severe and detrimental effects on both physical and mental performance.

Concluding Remarks

Research shows that the effects of amphetamine on aggressive behavior are complex and are dependent on the types of variables involved. One such variable would be the kind of species used for experimentation. It can be difficult to make comparisons between species, as there are differing results and differing brain structures. For example, in experiments involving rodent subjects, higher doses of amphetamine lead to a decrease in aggressive behavior, whereas higher doses in monkeys cause an escalation in aggression. In addition, the affiliative behavior of primate subjects clearly has biphasic effects, with rates of occurrence decreasing steadily as the dose increases (Smith and Byrd, 1984), whereas rodent subjects exhibit clear increases in social exploration along the same scale (Moro et al., 1996). Such diversity between species makes it difficult to generalize to the human population. Carefully organized experimentation may be necessary in understanding this variance (but may not overcome the interspecies problems).

Another complexity is the biphasic effect that amphetamine has on behavior. This dose-dependent condition can sometimes lead to difficulties in predictability because there is no clearly defined linear relationship. Even intraspecies effects can have large degrees of variance and so extensive sample sizes are necessary to gain a better perspective. It is interesting, however, that these biphasic results seemingly contradict the common belief that larger doses of amphetamine cause increases in aggressive behavior, when, in fact, it is smaller doses that elicit this condition.

When studying the effects of amphetamine on human behavior, several factors must be taken into consideration before any assumptions can be made. For example, the history of drug use of a patient, the patient’s lifestyle, and the patient’s social status and interactions are all possible influences on his or her drug habits and aggressive patterns of behavior. Wright and Klee (2001) reported some interesting points in the area of amphetamine-related human aggressive behavior. For instance, correlations between amphetamine use and aggression were strongly associated with drug dealing rather than intoxication. Moreover, in regard to the subjects’
patterns of amphetamine use, there were no significant differences between those who reported aggression and the rest of the sample, and no straightforward relationship could be found between amphetamine use and one’s potential for aggressive behavior.

Thus, given the complexity of factors, unreliability of generalization from comparative sources, and limitations on direct observation of impact on humans, it is only possible to come to tentative conclusions. Further, it would appear that the only way we can obtain additional information regarding the aggression and methamphetamine use is to increase the volume of current research and use larger sample sizes to enhance external validity and gain a broader perspective.

References
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Subcommittee on Crime of the Committee on the Judiciary, House of Representatives, 104th Congress, First Session, October 26, 1995 (Ser. No. 49), *Rising Scourge of Methamphetamine in America*.
In spite of what is not known, there is a basis for proceeding as forensic examiners and experts. This section will detail both some general principles and some specific strategies for dealing with cases where the more traditional concerns of forensic work (competency, criminal responsibility, waiver capacity, risk analysis) take place in the context of methamphetamine usage.
The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

—The Fourth Amendment of the U.S. Constitution

Few provisions of the Bill of Rights are as utterly American as the Fourth Amendment of the Constitution. This amendment grew from the experience of the colonials in America as well as from their English roots. “Every man’s house is his castle.” But what of the body of a woman? This chapter evaluates how the courts attempt to balance the rights of a fetus with the rights of its mother. Is it right for the courts or Child Protective Services (CPS) to remove a child from its mother’s care if the newborn tests positive for a drug? Many of us would answer this query with an unquestioning “yes.” However, we tend to make that decision based on the assumption that the drug itself is damaging to the fetus. For most drugs (including cocaine and methamphetamine), this has been difficult to demonstrate using the scientific method. For some drugs (including alcohol and tobacco), the relationship between use and fetal damage is quite apparent. The problem with the current picture is that CPS is likely to remove a child from its mother’s care if there is evidence that the mother was using methamphetamine during her pregnancy, but not tobacco.

Legal Issues and Status

Individual, social, moral, and legal issues converge when addressing the abuse of methamphetamine by pregnant women and the appropriate societal response. In some ways, it might seem that the issue is needlessly complex. Methamphetamine abuse is an illegal activity, punishable within the existing range of statutes at state and federal levels. However, the particular problems
that arise in the case of abuse of methamphetamine in pregnancy do in fact involve significant legal questions across different legal venues.

A search of federal appeals and Supreme Court activity has identified several areas of focus and some reasonably inferred trends. Major issues included maternal rights against self-incrimination and vulnerability to punishment on the basis of nonpermitted testing at the time of birth of the child; maternal custody rights; paternal custody and visitation rights; and individual rights against unreasonable detention.

Maternal Rights against Self-Incrimination and Vulnerability to Punishment Based on Drug Testing by Hospitals

Decisions that have been rendered, and, for that matter, statutes that have been passed in various states, have tended to support incursions into the rights of mothers to protect or secure the needs of children. Certainly such decisions rest on a long-established principle that the needs of the youngest members of society are paramount. However, the cases illustrate not only abstract legal issues but also lifestyles and behaviors that are well known in the field of substance abuse. Although methamphetamine use figures in the cases, sometimes very prominently, it is rarely the only basis on which decisions have been rendered.

Although cases reviewed at levels below the Supreme Court have tended to support protection of unborn and newly arrived children, the one Supreme Court case in point is Ferguson et al. v. the City of Charleston et al. (2001). In that case, a state hospital had used a urine sample from a mother without her permission to check for cocaine in collaboration with law enforcement to identify cocaine abusers and to obtain evidence against them. The Supreme Court, in a six-to-three decision, considered it to be an unreasonable search, if not an unholy alliance. The purposes and the process, however, distinguished that case from others at lower appeals levels where both state laws and individual actions on the part of law enforcement and other agencies have been upheld.

Maternal Custody Rights

The Ferguson case generated significant interest, both from the standpoint of its implications for criminal justice and because of the conflicting issues and values it addressed. Ely (2001), writing in the Chicago Daily Law Bulletin, noted with approval that testing of women and other aspects of their medical care during pregnancy could not be a basis for criminal prosecution. Similarly, In The Legal Intelligencer, Mauro (2001) cited Justice Stevens’ position that the prosocial motives of the government could not become the basis for the loss of Fourth Amendment protections. However, the limits to which
the *Ferguson* decision would be tolerated were illustrated in Flumenbaum and Karp’s (2000) review of the case of *Kia P. v. Long Island College Hospital* (2000). Noting the *Ferguson* decision, the authors nonetheless detailed the basis for dismissal of a lawsuit against the hospital by Kia P. who alleged impropriety by the institution for withholding her child Mora following the birth. The hospital acted on a “good faith” basis due to possible methadone withdrawal symptoms and test findings in the newborn which, if present, could be life threatening (and would mean that the mother had abused the drug during her pregnancy). The appeals court finding affirmed the lower court that no violations existed with respect to Fourth Amendment (due process) rights.

Review of Table 7.1 indicates a clear trend to support the needs of a child born or unborn and other children who may be affected as well. Thus, in decisions regarding custody, usually emanating from juvenile court actions and child protection agency motions for termination of parental rights, the appeals courts have generally acted to protect the children. Certain presumptions are made in these cases and are sometimes detailed in the decisions. Those presumptions include the following:

- Ample scientific evidence proves that maternal use of methamphetamine and other substances does, in fact, cause damage to the developing fetus.
- Maternal involvement in lifestyles where illicit drug abuse is a prominent feature usually renders the mother unable to assert adequate responsibility for a child or children.

Very often, courts proceed from a best interest posture rather than one of requiring proof of child endangerment. For example, in two cases, even though some aspects of the family situation improved, the children’s ages, conditions, and histories were such that placement of them with their biological parents—whose stability was insecure at best—was viewed as an unacceptable experiment (*In the Interest of C.E.*, 2001; *In the Interest of M.S.D. and M.A.D.*, 2001).

Nonetheless, a certain caveat exists. There is a presumption in family law that the relationship between a child and its biological parents will take precedence over all other relationships; the best interest test is not routinely applied in many circumstances and, in some, is excluded as part of the decision-making process. Thus, a problem with drug abuse was an issue in a 2004 case (*In re Adoption of C.S.*). The methamphetamine abuse did not result in the loss of the potential to have parental standing. That case involved a highly conflicted divorce, with a history of interference with maternal visitation and contact. The interference extended to maternal grandparents as well. There was a decree that contained unclear provisions for support from the mother. After she lost the
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<td><em>In the interest of M.S.D. and M.A.D.</em></td>
<td>2001 Iowa App. LEXIS 588</td>
<td>TPR</td>
<td>Affirmed</td>
<td>Mus</td>
</tr>
<tr>
<td><em>In the interest of C.E.</em></td>
<td>2001 Iowa App. LEXIS 649</td>
<td>Denial of TPR</td>
<td>Reversed remanded</td>
<td>MU</td>
</tr>
<tr>
<td><em>In the matter of the Unborn Child of Julie Starks</em></td>
<td>2001 Okla. LEXIS 7</td>
<td>Custody of fetus by holding the mother</td>
<td>Vacated order to dismiss</td>
<td>M, F/P</td>
</tr>
<tr>
<td><em>In the matter of Selana Lee Lucas</em></td>
<td>2001 Ore. App. LEXIS 1589</td>
<td>TPR</td>
<td>Affirmed</td>
<td>MU C</td>
</tr>
<tr>
<td><em>In re Alejandra P</em></td>
<td>2002 Cal. App. LEXIS 702</td>
<td>TPR</td>
<td>Affirmed</td>
<td>MU C</td>
</tr>
<tr>
<td><em>Fernando C. v. Sup. Ct. of San Diego County</em></td>
<td>2002 Cal. App. LEXIS 2783</td>
<td>TPR</td>
<td>Affirmed</td>
<td>MU FU</td>
</tr>
</tbody>
</table>

* Court actions: TPR = termination of parental rights.
* Methamphetamine factors: MU = use in pregnancy; c = child tested positive for methamphetamine at birth; FU = father use of methamphetamine; (F) = father unable to provide for child; M,F/P = production of methamphetamine by mother and father; N = neglect by virtue of use.
two jobs she was attempting to simultaneously hold to meet the support payments, and she could not effectively convince her ex-husband to allow contact with the children, she did, in fact, become methamphetamine involved. She had another child, had some medical problems, but subsequently overcame the difficulties. The father’s new wife petitioned for adoption and maintained that the consent of the mother was not required and the trial court concurred. The appeals court reversed the trial court on a technical financial basis but the remand for a new decision indicated the circumstances favored the mother.

Paternal Custody Rights

Fathers’ rights can also be affected by maternal drug use in pregnancy. In *Michael M. v. Arizona* (2002) the mother had used during pregnancy. After birth, the child was placed first in foster care and then with a relative. In the meantime, the father was incarcerated on charges unrelated to drug abuse, but had petitioned for contact with the child. He was denied contact by the children's services department, an action subsequently ordered by the juvenile court. That court also denied him any opportunity to see his child during the court session even though visitation could have been easily accomplished. The court took the position that because the father was in prison, he did not deserve to see his child until he was released and further stated the child would likely be harmed by prison visitation. The appeals court indicated no support for the notion of harm to the child and also noted that a visit at the time of the original court hearing, now moot, had not merited an outright rejection.

Culture

Some cases revolved around rather unusual factors. In one, the Native American tribe to which she belonged joined the appeal of the mother. It was asserted that the state had failed to provide an appropriate expert witness at the time restoration of parental rights was refused. There was further assertion that the state should have turned over jurisdiction to the tribe. However, the trial court was affirmed. The reasoning at the appeals level was that no cultural issues presented and therefore the law requiring an expert with Native American cultural background did not apply in this case. The appeals court felt the basic requirements for health and safety and security of the child were not met by the mother and could not be reasonably anticipated to be present in the future (*In the Matter of Selana Lee Lucas*, 2001).

Rights of the Fetus

Although most decisions favored termination of parental rights, one illustrated a ruling favoring an appellant mother (*In the Matter of the Unborn
In that case, the Superior Court of Oklahoma remanded a case on the basis that the unborn fetus was not a child under the Oklahoma Children's Act. This case involved the trial court ordering the detention of the mother through the duration of her pregnancy to prevent her ongoing involvement with methamphetamine from damaging the unborn child. However, the issue of the rights of the fetus was also addressed somewhat earlier in *Sheriff, Washoe County, Nevada v. Cathy Encoe* (1994). There the court reasoned that transmission of methamphetamine through the umbilical cord after birth but prior to its being severed allowed the finding that injury to a child rather than to a fetus had occurred. On that basis, a criminal finding of child endangerment by the mother was affirmed. More recently, the Fifth District Court of Appeals reversed the Texas trial court and remanded for reconsideration of sentencing level. The appeals court specifically reversed a sentencing enhancement on the basis that the required endangerment of a child could not have occurred. A pregnant woman had been on the site where manufacturing was occurring; the Court noted that her fetus was not a child (*United States v. Simpson and Mills*, 2003).

Cases involving parental and fetal rights as well as individual freedoms have generated journal commentary. Janssen (2000) directly addressed both methamphetamine cases and the particular balancing of the rights of the different entities that become involved in methamphetamine use in pregnancy. Individuals have been convicted of killing unborn children, but mothers have the right to abort. The issue becomes one of at what point the mother’s willful use of a harmful substance and her decision not to abort constitute a basis for action to be taken against her.

A current case in point is *State of Hawaii v. Aiwohi* (2005). Aiwohi was convicted of manslaughter after it was determined that her 2-day-old child had died secondary to effects of her methamphetamine use the 4 days preceding and including his day of birth. This decision provides an extended analysis of the ways in which methamphetamine or other substance abuse has been treated in the courts when an unborn child is impacted. In essence, two lines of thought can be documented to the effect that acts committed prior to birth cannot be treated as leading to culpability for injury post-birth or contrariwise, that any act committed during pregnancy which ultimately impacts a subsequently born person fulfills the requirements for full culpability. This court in effect took the legally conservative position which requires that a person be born prior to being assaulted for the injury to be against a person. The Court also noted that to extend the definition of person should be left to the legislatures and not formulated by judicial action.

Consistently, and in the face of a rising awareness of methamphetamine abuse and the inability to treat the fetus as a child under existing laws, various states have acted to pass legislation protecting the rights of the fetus. In Missouri, the approach was to confer all rights of citizenship of a minor on
the unborn child. Other states have been somewhat less generous but the trend is clear. In Iowa, where there had been a restriction against criminal penalties for mothers who used methamphetamine, a movement has surfaced to support stiffer penalties specific to methamphetamine abuse. Cited was a 1994 study that found that 4% of infants born during that year were exposed to illegal substances and that nearly half of all these newborns were born to methamphetamine users. The backlash of punitive reactivity, occasioned by the rise in methamphetamine use and its destructive impacts in the country, is perhaps best illustrated in the following sequence. In 1997, the Georgia Court of Appeals had rejected an attempt to charge a woman in connection with pregnancy drug use. Further, in 1998, a woman who shot herself in an attempt to perform an illegal abortion was successful in having the charges dismissed. In 1999, a case involved a woman who gave birth to twins. One died. The death was attributed to the mother’s use of drugs, including specifically amphetamines. She was charged with murder for causing the child’s death (Renaud, 1999).

Legal Perspectives—Summary Statement

In effect, a legal, social, and psychological quagmire exists in the case law and statutes that address methamphetamine abuse in pregnancy. Liberals and conservatives rightly can view perilous “slippery slopes” in any attempts to deal with this area in the context of the courts or by statutory remedy. In the meantime, there is an insecure scientific foundation for raising the issues, and the application of legal sanctions varies not by degree of scientific foundation but by social attitudes and political practicalities. As can be seen in the following section detailing scientific findings, the methamphetamine impacts on fetal well-being may well be significantly less than use or abuse of legal drugs for which no loss of citizen rights is a consequence.

The Effect of Methamphetamine on the Fetus

Significant work identifying methamphetamine use in relation to different factors associated with fetal development has not yet been accomplished. Much of what is known comes from studies of cocaine abuse during pregnancy. It is well established that some drugs have more negative impacts on the fetus than others. Therefore, conclusions derived from the following cocaine studies have to be viewed as tentative.

In the 1980s, the fear of cocaine-addicted babies was extreme in the medical and legal communities. It is now known that the picture of the crack baby with significant brain damage and serious developmental disorders was an exaggeration. There have been some studies that have identified negative effects of cocaine on a developing fetus, but these effects are minor compared
with the horrors that the media of the 1980s would have had people believe. Further, many of the studies are filled with methodological flaws that make it impossible to differentiate between the effects of cocaine and the effects of some other substance or behavior. Similarly, the nature of the participants of a study can affect the results of the study, a factor known as selection bias. Many of the studies of the effects of cocaine on the fetus involve women in drug treatment programs or women suspected of substance use by clinical staff (Zuckerman et al., 1995). It is likely that these women exhibited other behaviors (such as cigarette and alcohol use) that may have worsened (or even were the main contributors to) the identified problems with the fetus. Further, many of the studies of the effects of cocaine on the fetus were correlational. A correlational study examines two variables and notes a relationship between them. In other words, if we measure the amount of cocaine used across the population and the number of birth defects exhibited by infants in that population, we will likely find a positive correlation (as cocaine use rises, the number of defects rises as well). The problem is that such a study does not suggest a causal relationship between cocaine use and birth defects. It is likely that tobacco use is positively correlated with both birth anomalies and cocaine use; thus, it could be tobacco that causes the anomalies, not cocaine. Finally, there are many factors that can cause the negative effects that have been attributed to cocaine use, including polydrug use, low socioeconomic status, chaotic social environment, poor nutrition, poor prenatal care, and an increased incidence of sexually transmitted diseases (STDs) (Holzman and Paneth, 1994; Zuckerman et al., 1995). A recent review of this literature has been provided in the monthly newsletter of the Illinois Teratogen Information Service (Simi, Ormond, and Pergament, 1998). Cocaine studies focused on specific aspects of fetal function illustrate further what is known and not known in this area.

A Lesson from Studies on Cocaine

Spontaneous Abortion—Although there have been some studies that have suggested a correlational link between cocaine use and spontaneous abortion, a recent meta-analysis (meta-analysis is a mathematical method of adding the effects of many potentially contradictory studies in order to determine a consensus) suggests that this is only the case when polydrug use is confounded with cocaine use (Lutiger et al., 1991). This is evidence that use of multiple drugs, not just cocaine, is associated with spontaneous abortion.

Placental Abruption—Placental abruption occurs when the placenta pulls away from the wall of the uterus before labor begins. As with spontaneous abortion, it has been suggested that placental abruption is associated with cocaine use. However, as with spontaneous abortion, several
studies have concluded that this condition co-occurs with polydrug use (Keith et al., 1989; MacGregor et al., 1989) but not with cocaine use (Holzman and Paneth, 1994). In fact, in a 1994 review of the literature, Holzman and Paneth suggest that placental abruption is more likely associated with alcohol and tobacco use than with cocaine use.

Preterm Delivery—Holzman and Paneth (1994) also suggest that preterm delivery may be related to lifestyle rather than to cocaine use. However, they concede that low birth weight, microcephaly, and reduced fetal length have all been observed consistently in cocaine-exposed newborns.

Sudden Infant Death Syndrome—It has also been suggested that cocaine exposure increases the occurrence of sudden infant death syndrome (SIDS). However, a recent meta-analysis found that the risk for SIDS was increased when cocaine-exposed infants were compared with non-drug-exposed controls, but not when compared with polydrug controls (Fares, McCulloch, and Raju, 1997). Once again, the evidence points to a negative effect of polydrug use on the fetus, but not necessarily the use of cocaine on its own.

Behavioral Effects in Newborns—A pattern of withdrawal has been identified in neonates. This pattern includes tremulousness, irritability, abnormal sleep patterns, poor feeding, high-pitched cry, and muscle rigidity (Chasnoff, 1988). Further, it has been suggested that there is a dose-related risk for poor state regulation, attention, responsiveness, orientation, and motor/tone (Delany-Black et al., 1996; Eyler et al., 1998; Hurt et al., 1995; Richardson, Conroy, and Day, 1996).

Structural Brain Abnormalities—Although brain abnormalities have been observed in chronic users of cocaine, no structural brain abnormalities have been observed in those who were exposed prenatally (Eyler et al., 1998; Smith et al., 2001). However, cocaine-exposed rabbit pups display an abnormal structural and neurochemical development of the anterior cingulated cortex, which persists into adulthood and may cause an attentional deficit (Romano and Harvey, 1998). The data from longitudinal studies on the behavioral and neuroanatomical effects of prenatal cocaine exposure are too contradictory to draw any conclusions from them (Hurt et al., 1995; Landry and Whitney, 1996; Loebstein and Koren, 1997; Mott, Packer, and Soldin, 1994; Zuckerman et al., 1995).

Taken together, the above data suggest that while cocaine has some effect on the developing fetus, the extent of that effect is far less severe than we initially suspected. Further, due to numerous methodological flaws, it is impossible to differentiate the effects of cocaine from some other drug. In fact, the abnormalities listed above have all been associated with other, very common legal substances including tobacco, which is associated with low birth weight (Cnattingius et al., 1993), spontaneous abortion (Harlap and Shiono, 1980),
placental abruption (Raymond and Mills, 1993), perinatal mortality (Wer-ler, 1997), preterm delivery (Shiono, Klebanoff, and Rhoads, 1986), SIDS (Haglund and Cnattingius, 1990), and deficits in cognitive development (Naeye and Peters, 1984).

What Is Known about the Effects of Methamphetamine on the Fetus

It seems that the lesson of the 1980s is not being applied to methamphetamine. At the time of writing the first edition, we noted that our knowledge about the effects of methamphetamine on the human fetus was limited. At that time, we stated that we knew far less about the effects of methamphetamine on the developing fetus than was known about the effects of cocaine, alcohol, and tobacco. In fact, the National Institute on Drug Abuse (NIDA) was advertising in the Journal of the American Medical Association (JAMA) as late as 2000 for researchers who would be interested in examining the effect of methamphetamine on the fetus (Marwick, 2000) in hopes that they could head off the unfounded fears that we experienced with the cocaine scare of the 1980s. Most of their knowledge base at that point came from examining the effects of methamphetamine on mouse fetal tissue. Using such comparative studies has serious limitations when it comes to understanding the human condition, because as discussed in Chapter 4 on MDMA (3,4-methylenedioxymethamphetamine, a compound chemically similar to methamphetamine), the effects of brain damage can proceed very differently in rodents than in humans.

In the mouse, we knew that methamphetamine could cross the placenta and affect the embryo (Won et al., 2001). However, anatomical damages resulting from this effect were not observed. We have observed changes in the levels of the neurotransmitters serotonin* (Won, Bubula, and Heller, 2002) and dopamine† (Heller et al., 2001) in the rodent neonate, but the consequences of these chemical changes for the adult animal were unclear.

A review by Plessinger (1998) concluded that “based on findings in humans and the confirmation of prenatal exposures in animals, amphetamines and methamphetamines increase the risk of an adverse outcome when abused during pregnancy” (p. 1). Plessinger further concluded that clefting, cardiac anomalies, and fetal growth deficits have all been observed in studies of both humans and other animals. However, the effects of prenatal...

* For the biochemist, reaggregates of mesencephalic-striatal projections prepared from methamphetamine-exposed embryos showed a significant elevation in serotonin levels at all culture ages compared with reaggregates prepared from saline-treated embryos. Levels of 5-HIAA in reaggregates and culture medium were also elevated in 14- and 29-day-old cultures derived from drug-exposed embryos.

† For the biochemist, dopamine levels were elevated in fetal corpus striatum and the rostral mesencephalon following maternal treatment with 40 mg/kg methamphetamine for 7 or 14 days.
exposure to amphetamines on behavior in humans were confounded by both genetic and environmental factors, which included polydrug abuse. Thus, the study was unable to draw any conclusions about the effect of prenatal methamphetamine exposure on human behavior.

At the time of the writing of the first edition of this book, the policy of CPS in Hawaii County was, if a newborn baby tests positive for methamphetamine exposure,* it will remove the child, and any siblings, from the mother’s care. The policy is not as strict as it once was in that other factors are now taken into account before the child is removed from its parents. An exception may be made if there is another non-drug-using adult living with the mother who will agree to care for the infant. Hospitals around the island are not obligated to test mother or infant for methamphetamine exposure. Some do and some do not. Those who do not cite the need to assure that new mothers come to the hospital for both pre- and postnatal care (if expectant mothers know that they will be tested for drugs and could lose their children, then they may just decide not to use medical services) and the lack of evidence to support a damaging role of methamphetamine on a fetus.

Recent evaluations of methamphetamine use during pregnancy have tended to confirm that the use of this drug maternally should not be of as much of a concern as are the use of alcohol or tobacco (Arria et al., 2006; Derauf et al., 2003, 2007; Smith et al., 2006). Derauf et al. (2003) found that in Hawaii only 0.7% of women used methamphetamine during pregnancy, while 5.3% used alcohol, and 13.3% used tobacco, both known teratogens. In a multisite study of high-risk areas in the United States, Arria et al. (2006) found that 5.2% of women used methamphetamine during pregnancy, while 22.8% drank alcohol, and 25% smoked tobacco. Ninety percent of women who used methamphetamine during pregnancy were using it in conjunction with some other drug (Derauf et al., 2007).

Animal studies of the effects of amphetamine/methamphetamine on the fetus have been largely inconsistent. One study identified some behavioral changes in offspring when pregnant Wistar rats were administered chronic methamphetamine; however, the dose of methamphetamine given also caused a significant weight loss in these animals which likely contributed to the later behavioral observations (Cho et al., 1991). In a study of pregnant female mice, the dose of methamphetamine required to induce mortality and malformation in the fetus was high enough to kill 50% of the mothers and 10 times higher than the dose taken by most addicts (Yamamoto et al., 1992).

Other studies of pregnant rats have found eye defects (Acuff-Smith et al., 1992) and serotonergic deficits (Cabrera et al., 1993; Weissman and

* The standard method for testing a newborn for drugs is the meconium test. Meconium is the fetus’s first fecal matter. The use of the test is questionable because one report suggests that it yields false positives 43% of the time [Moore, Lewis, and Leikin, 1995].
Methamphetamine and Pregnancy

Caldecott-Hazard, 1995) in pups when dams were treated chronically with methamphetamine. However, no effects were observed when the pups were assessed for motor activity, tests of episodic memory, or hippocampal or neostriatal monoamine activity (Weissman and Caldecott-Hazard, 1995).

Human studies have also been difficult to evaluate. Since 1976, Eriksson and colleagues have been engaged in a longitudinal study of 65 children of mothers who used amphetamine during pregnancy (Eriksson and Zetterström, 1994; Eriksson, Larsson, and Zetterström, 1979, 1981; Eriksson, Steneroth, and Zetterström, 1986; Eriksson et al., 1978, 1985, 1989, 2000a, 2000b). Head circumference at age 1 correlated significantly with the extent of maternal amphetamine abuse. However, over 80% of the women in this cohort used alcohol and tobacco, which have also been shown to have an effect on head circumference (Eriksson et al., 2000b). Further, those women who could not give up methamphetamine use during pregnancy were significantly more likely to have been alcohol users, experience psychopathology, and have criminal records (Larsson, Eriksson, and Zetterström, 1979).

Although many of the mothers involved in the study gave up drugs and had normal and productive lives, early follow-ups indicated that some of the other women involved in the study experienced numerous challenges over the following years. These included relapses, custody battles, domestic abuse, and irregular employment (Eriksson et al., 1985). By the time the children were 8 years of age, only 30% remained in the custody of their biological mothers. At this time, the intellectual ability of the children was seen as normal; however, there was a tendency to exhibit an increased level of aggressive behavior. Even though the authors suggested that these behavioral problems were related primarily to amphetamine exposure, they did not rule out poly-drug use or other factors as contributory (Eriksson et al., 1989).

By 10 years of age, 70% of the children in the study had been put into foster homes. They still showed normal intellectual capacity. By this time, socioenvironmental factors were clearly impacting behavior as much or more than the effects of drug exposure (Eriksson and Zetterström, 1994).

The next follow-up occurred at 14 years of age. Head circumference at birth and 1 year of age correlated significantly with school achievement at 14 years of age, and with adjustment at 4 and 8 years of age, but once again the authors were unable to differentiate the effects of amphetamine from other contributory factors (Cernerud et al., 1996; Eriksson et al., 2000), including socioeducational factors (Eriksson et al., 2000).

Conclusion

A review of several lines of evidence suggests that the current trends that have been observed in court and CPS activity are in fact inconsistent with
the present state of science. Science is an ever-changing institution. The scientist believes that when new data appear that discredit a theory, then the theory must be adjusted. The scientist is trained to change his or her beliefs very quickly. The courts and CPS, however, are not. The effect of cocaine on the developing fetus has always been a controversial issue. However, we now know that the damaging effects of cocaine on the fetus are far less severe than the damaging effects of tobacco. Similarly, we do not know if methamphetamine causes fetal damage. This uncertainty is of extreme importance because, in decisions regarding custody, the appeals courts have generally acted to protect the children. We reviewed a body of literature that suggested that the courts have chosen to adopt the point of view that the health of a child is more important than incursion into the rights of mothers. However, if we do not know if methamphetamine is damaging to a fetus, a question can be raised as to whether it is appropriate to punish a mother for use of methamphetamine during pregnancy by removing her child from her care. The hypocrisy of both the court system and CPS is clear when one examines the effects of tobacco on the fetus. Children are not removed from the custody of parents because parents smoke tobacco products even though it is known that tobacco causes severe damage to the developing fetus.

References


In re Adoption of C.S. 2004 Ohio 5933.

In the interest of C.E., 2001 Iowa Appeals, LEXIS 649.

In the interest of M.S.D. and M.A.D., 2001 Iowa Appeals, LEXIS 588.

In the matter of the Unborn Child of Julie Starks, 2001 Oklahoma, LEXIS 7.

In the matter of Selana Lee Lucas, 2001 Oregon Appeals, LEXIS 1589.


Sheriff, Washoe County, Nevada *Cathy Encoe,* 1994, Nevada Appeals, LEXIS 156.


*United States v. Simpson and Mills,* Findlaw No. 02 10434. Fifth District Court of Appeals, 06/16/03.


Forensic psychologists have developed a number of guides and recommendations for how responsible practitioners should operate when entering as expert witnesses (Melton et al., 1997). The same perspectives detailed in forensic texts are capsuled in an article written from a lawyer’s perspective. Lee (2005) suggested there were five primary mistakes made by expert witnesses:

1. Proceeding only on the basis of information provided by the retaining attorney.
2. Acting like an advocate for the case as opposed to an advocate for the data and methods used.
3. Providing reportage too quickly and without forethought.
4. Proceeding with too narrow a case focus and forgetting the importance of looking into the broader context.
5. Providing information, particularly to judges and juries, in ways that do not adequately communicate or adequately respect the intelligence of the listeners.

In the case of expert testimony in methamphetamine-related cases, there are two areas of highly technical considerations that must be managed in addition to the general requirements of good forensic work. The first involves Supreme Court or other legal decisions and standards that are germane to the area. The second is the current scientific status of knowledge of methamphetamine and its effect on behavior, as that might pertain in individual cases. The following material illustrates some of the complexities in these areas.

A search for U.S. Supreme Court cases involving methamphetamine usage revealed a decidedly conservative stance, although dissenting opinions and some majority holdings reflected support for defendants and for Constitutional rights. The few cases uncovered involved Constitutionally permitted search procedures, sentencing guidelines, entrapment procedures, waiver of
plea bargain discussion in admissibility/coercion in the plea bargaining process, hearsay evidence, the right to cross-examination, and double jeopardy.

Several cases looked at reasonableness of search and seizure insofar as to whether the evidence obtained by police should have been excluded from trial. In general, searches were upheld (Florida v. Thomas, 2001; Wyoming v. Houghton, 1999; Arkansas v. Sullivan, 2001; Bond. v. United States, 2000; Ohler v. United States, 2000). The Supreme Court was mindful of the importance of the Fourth Amendment prohibition against unreasonable searches, but it clearly exercised its own prerogative on how the Fourth Amendment was to be interpreted and extended; thus, in Arkansas, the state had appealed the Arkansas Supreme Court ruling that the search was unreasonable, and the Supreme Court found the Arkansas court to have exceeded the Supreme Court precedents (thus ruling against defendant).

In Fowner v. United States (1992), the Court upheld the lower court’s ruling that sentencing based on the amount of a drug could reflect not just the amount for which the defendant was found guilty but also additional material that constituted a nondrug waste product. Similarly, in Kinder v. United States (1992), the lower court was upheld in applying a sentence that reflected an amount of a drug that the defendant had referred to in the course of discussions but was higher than the amount specified in the plea bargaining that allowed a conviction.

In this same vein, in Lopez v. Davis (2001), the Court had upheld that the Bureau of Prisons could apply a standard that classified all drug-related crimes where possession of a firearm might be involved as meeting the standard of violent crime and as justifying exclusion of an individual from opportunities for early release by way of attending drug treatment.

Significant issues arise in the area of entrapment. Investigation of conspiracies to manufacture and sell drugs often involves undercover work and “sting operations.” In such efforts, enforcement agents participate in criminal enterprises as part of obtaining court-worthy evidence. A substantial issue focuses on the individual’s predisposition to commit a given crime. The question involves whether, but for the activity of the government agent, the individual would have remained a law-abiding citizen. The original case involved a reversal of a conviction during the prohibition era (United States v. Sorrells, 1932). However, in United States v. Russell (1973), an agent provided an essential and extremely hard-to-obtain ingredient (phenyl-2-propanone), which is a necessary component used only for the production of methamphetamine.

There had been considerable efforts by law enforcement authorities to end or discourage its sale even to persons licensed to possess it. The Court held that because the defendant was not an unwary person but, in fact, was a very active criminal, his claim of entrapment was without merit. Therefore, the initial appeal that reversed his conviction was reversed and the defendant’s conviction was upheld.
It was noted that the issue should center not on the predisposition of the defendant but rather on the behavior of the government. The dissent took the position that “it is the Government’s duty to prevent crime, not to promote it.” Interestingly, the controlling factor for the dissent was the relative unavailability of this ingredient. The government had argued that this very unavailability demonstrated the awareness and intent of the defendant who had not been able to find it elsewhere until its provision by the government agent.

Plea bargaining is the known vehicle for much of U.S. justice. Certain rules pertain to plea discussions, including that the contents of those plea bargaining discussions may not be later used against the defendant unless that person enters into a waiver. The question then becomes whether or not entering into such a waiver is voluntary and knowing or is in some way coerced. Given the stakes, the potential for relatively powerful coercive factors to enter the picture clearly exists. It was on these grounds that the Court considered *United States v. Mezzanatto* (1995). The Mezzanatto Court ruled that as long as the defendant made the waiver in a knowing and voluntary fashion, no Constitutional guarantees or procedural rules that exist to support the plea bargain process were violated. The dissent was instructive in that it was noted that the next steps might allow defendants to waive their rights against self-incrimination with their statements being used as affirmative evidence against them at trial. In the Mezzanatto case, the waiver consisted of an agreement that statements made during the plea bargaining process could be used to impeach the defendant should his testimony at trial warrant same (presuming that the plea bargain failed). No plea bargain was struck. Mezzanatto’s statements then were used to impeach his subsequent presentation. (He claimed he was not really involved in the methamphetamine production and thought that the other party was using a laboratory to provide the Central Intelligence Agency [CIA] with plastic explosives. Because the investigation included an undercover officer who had provided him with materials that he took to that laboratory, and because he had talked with that officer about those materials and their nature and purpose, this somewhat creative defense at trial did not serve the defendant well.) Cross-examination included references to statements the defendant had made earlier in the course of the plea bargain process that bolstered the government’s case regarding his awareness of and role in the operation.

In a ruling similar to Mezzanatto, the case of *United States v. Dominguez Benitez* (2004) reversed a ruling that was favorable to the defendant. In that case, Benitez had accepted a plea in which it was written that he would be vulnerable to a higher sentencing if a trial court so determined. The outcome was a higher than recommended level, but because the trial court did not mention that agreement in its own words, the defendant had argued he should receive the lower sentence.
Another admissibility issue challenged the confrontation clause included in the Sixth Amendment to the Constitution. Hearsay evidence is generally excluded from the courtroom because there can be no cross-examination of the declarant of the statements. The right of cross-examination is basic to the adversary process. However, exceptions to the hearsay rule have been allowed under certain conditions, including unavailability of a witness and trustworthiness of the statement. In *United States v. Inadi* (1986), the government had recorded statements of a coconspirator who subsequently failed to appear at trial. Furthermore, the defense did not make any effort to obtain the presence of this individual. The Supreme Court took the position that the coconspirator’s statements were admissible on two grounds: the confrontation clause has, as one of its purposes, the pursuit of truth; and delays and other practical matters may make witnesses unavailable and place an undue burden on the government.

A number of cogent points were raised by the dissent. First, it was noted that coconspirators, themselves engaged in criminal enterprise, may or may not be factual in their communications and that there is certainly no reason to presume that they are such. In fact, criminals may communicate with each other to mislead. The fact that they are discussing an enterprise does not mean that either one of them speaks the truth. Additionally, both criminals and noncriminals speak in casual and often ambiguous fashion, and the particular evidence of this case contained many ambiguous statements. Absent the opportunity to cross-examine the individual making the statements, there was no chance to properly clarify the meanings that those statements might have had.

In *United States v. Ursery* (1996), the government had seized property following a criminal conviction on the basis that the house had been used for drug purposes. The Supreme Court opinion affirmed that the use of the civil court for this purpose did not constitute punishment and therefore was not a double jeopardy prohibited proceeding.

Although law enforcement prerogatives were usually upheld, a couple of interesting prodefendant decisions looked at somewhat unique issues. In *United States v. Sheffer* (1998), the defendant submitted to a polygraph, the results of which were that he appeared to be telling the truth about use. However, his urinalysis showed methamphetamine. He subsequently wanted the polygraph admitted as part of his defense, which was denied on a Federal Rules of Evidence basis. His appeal was granted on the grounds that his Sixth Amendment right to present a defense had been breached by the military court. In *Wilson v. Arkansas* (1995), the defendant was upheld in her assertion that the common law “knock and announce requirement” was breached when police came into her home without announcing their presence prior to entering. The police position was that they had a belief that to do so would have been hazardous. The Supreme Court, which remanded the case, did so on
the narrow grounds of the reasonableness of the police posture while specifically affirming that the knock and announce rule may be variously applied, depending upon the situation. Other decisions of note included *Nguyen v. United States* (2002), in which the defendant did successfully appeal, in part, in that the Supreme Court found that the Appeals Court that heard the case did not have jurisdiction, and therefore, a new appeal would have to be made. *Miranda* rights were also implicated in *Fellers v. United States* (2004), which is detailed in Chapter 12.

As the above decisions illustrate, the posture of the Court when dealing with amphetamine-related cases has leaned more toward conservatism and support for law and order than it has reflected concern for defendants’ rights or dangers of Constitutional erosion.

**Daubert Issues: Who May Testify as Experts?**

In *Daubert v. Merrell Dow Pharmaceuticals, Inc.* (1993, 1995), the U.S. Supreme Court considered an appeal from the Ninth Circuit Court of Appeals regarding the admission of expert testimony on the issue of whether or not maternal use of Bendectin caused human birth defects. The plaintiffs were two minors who claimed that they suffered limb reduction birth defects because their mothers had taken Bendectin for morning sickness. The district court had determined that the plaintiffs failed to meet the “*Frye* test” of “general acceptance” for admission of expert testimony and granted summary judgment in favor of the defendants on the basis of their expert’s affidavit stating that Bendectin had not been shown to be a risk factor for human birth defects. The plaintiffs sought to introduce affidavits from eight other scientists on the correlation between Bendectin and limb defects. The Ninth Circuit, relying on *Frye*, affirmed the district court’s ruling (1991).

On appeal, the U.S. Supreme Court overruled *Frye v. United States* (1923), in which it had been held that expert opinion based on scientific technique is inadmissible unless the technique is “generally accepted” as reliable in the relevant scientific community. The Court held that the *Frye* decision was superseded by the adoption of the Federal Rules of Evidence, in particular Rule 702, which provides that expert testimony is admissible “if scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue.” Rule 702 does not require “general acceptance” as a prerequisite to admissibility.

Under Rule 702, “the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable” (*Daubert*, 509 U.S. at 589). When faced with a proffer of expert scientific testimony, the trial judge must first determine, pursuant to Rule 104(a) of the Federal Rules of Evidence, “whether the expert is proposing to testify to (1) scientific evidence that (2) will
assist the trier of fact to understand or determine a fact in issue. This entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and whether that reasoning or methodology can be properly applied to the facts in issue” (Id. at 592–593). Among the factors to be considered in making this determination are (1) whether a theory or technique can be and has been tested; (2) whether the theory or technique has been subjected to peer review and publication; (3) the known or potential rate of error and the existence and maintenance of standards controlling the technique’s operation; and (4) whether the theory or technique is generally accepted within a relevant scientific community (Id. at 593–594). The focus of the court’s inquiry “must be solely on principles and methodology, not on the conclusions that they generate” (Id. at 595). The Supreme Court remanded the case to the Ninth Circuit for application of the two-part test to determine whether or not the expert testimony was properly admissible on the question of whether Bendectin caused the plaintiffs’ limb defects.

On remand, the Ninth Circuit noted that, pursuant to the Supreme Court’s ruling, the court:

Must engage in a difficult, two-part analysis. First, we must determine nothing less than whether the experts’ testimony reflects “scientific knowledge,” whether their findings are “derived by the scientific method,” and whether their work product amounts to “good science.”

Second we must ensure that the proposed expert testimony is “relevant to the task at hand,” i.e., that it logically advances a material aspect of the proposed party’s case. The Supreme Court referred to this second prong of the analysis as the “fit requirement.” (43.F.3d 1311, 1315 (1995), quoting Daubert, 509 U.S. 579; internal citations omitted)

The court’s task was “to analyze not what the experts say, but what basis they have for saying it” (Id. at 1316). To perform their “gatekeeping role,” courts must satisfy themselves that scientific evidence meets a certain standard of reliability before it is admitted. Thus, the expert’s bald assurance of validity is not enough. Rather, the party presenting the expert must show that the expert’s findings are based on sound science, and this will require some objective, independent validation of the expert’s methodology (Id. at 1316). The Ninth Circuit noted that:

One very significant fact to be considered is whether the experts are proposing to testify about matters growing naturally and directly out of research they have conducted independently of the litigation, or whether they have developed their opinions expressly for purposes of testifying. That an expert testifies for money does not necessarily cast doubt on the reliability of his testimony, as few experts appear in court merely as an eleemosynary gesture. But in determining whether proposed expert testimony amounts to good science,
we may not ignore the fact that a scientist’s normal workplace is the lab or the field, not the courtroom or the lawyer’s office. (Id. at 1317)

The fact that an expert’s testimony is based on research conducted independently of the litigation “provides important, objective proof that the research comports with the dictates of good science” (Id.). If the proffered expert testimony is not based on independent research, the party proffering the testimony must come forward with other objective, verifiable evidence that the testimony is based on “scientifically valid principles” (Id.). (In the case of forensic psychologists who provide assessments of individuals and opinions based on that data, as opposed to experts who present findings from ongoing laboratory research, the work of the assessment is a primary basis for the testimony. In such cases, the professional work is conducted for purposes of the litigation. However, such work is acceptable only if the methods employed have independently documented scientific respectability.)

In sum, experts need to subscribe to the notion that scientific methodology is based on hypotheses testing, distinguishing it from other fields of human inquiry. In Daubert, the Supreme Court stated that vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky, but admissible, evidence presented by the expert. Table 8.1 presents sample Daubert questions for experts regarding methamphetamine.

As an example of a case in which Daubert was applied, in United States v. Sylva, Saya, and Burke (1996), the U.S. attorney successfully argued that the defendant’s expert, G.B., a psychiatrist/attorney in Honolulu, used improper methodology to reach conclusions concerning the effects of prolonged and active polysubstance abuse on the credibility of the government’s chief witness, Alfredo Bunag. Dr. B. “intended to testify how Bunag’s polysubstance abuse with particular concentration on his crystal methamphetamine use affect[ed his] ‘ability to remember, relate, and distinguish historical events.’” In an Order Denying Defendant Sylva’s Proffer of Expert Testimony for Failure to Meet the Daubert Standard, filed December 12, 1996, in the above-referenced case, the Court noted that under Daubert, “if a party objects and raises a material dispute as to the admissibility of expert scientific evidence, the district court must hold an in limine hearing (a “Daubert hearing”) to consider the conflicting evidence and make findings about the soundness and reliability of the methodology employed by the scientific experts” (order at pp. 2–3, quoting Daubert, 43 F.3d at 1318, n. 10).

In concluding that Dr. B’s opinions did not fulfill any of the factors set forth in Daubert, the Court reasoned as follows:

First, Dr. [B.’s] opinion is not supported by scientific methodology and procedures. Dr. [B.] never conducted a direct psychological examination of Bunag.
Nor did Dr. [B.] conduct neuropsychologic testing on Bunag which would have involved corroborating Bunag’s memory with other reliable sources. Dr. [B.] did not even witness Bunag’s testimony in this case nor listen to recordings of his pre-arrest conversations nor read any transcripts of his testimony. Rather, Dr. [B.] planned to base his testimony on an affidavit containing hearsay accounts of Bunag’s drug use by four unknown “witnesses.” The affidavit did not even suggest the amount of polysubstance abuse other than with respect to ice. Not only is such evidence inherently unreliable; but Dr. [B.] admitted, it is a methodology unendorsed by any scientific survey, literature

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<tr>
<th>Table 8.1  Daubert Questions for Experts Regarding Methamphetamine</th>
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<td>1. Using your methods of generating findings from your database, what is the rate of error in coming to conclusions for each of the procedures employed? If you do not have these statistics, why don't you have them?</td>
</tr>
<tr>
<td>2. Have you published any articles on the theory or clinical practice on methamphetamine abuse? Have you published any peer-reviewed books or articles?</td>
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<td>3. Are you aware of the literature on the effects of methamphetamine on memory and perception? If so, cite several empirical articles.</td>
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<tr>
<td>4. In coming to conclusions in this case, what are the reliability, validity, and relevance of your findings?</td>
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<tr>
<td>5. Are you testifying based on scientific knowledge and methodology that is scientifically valid? Doesn't that imply that you are aware of the scientific investigation in methamphetamine abuse for studies that have used a sound methodology to connect the literature to this particular case?</td>
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<tr>
<td>6. What is a decision path? Doesn't a decision path illustrate retrospectively that the expert reasoned his or her way from the database to ultimate conclusions? What is your decision path in this case? What is the accuracy of that decision path?</td>
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<tr>
<td>7. What data do you have to support the competing hypothesis that the witness/defendant/victim in this case was methamphetamine intoxicated and therefore may have affected your findings?</td>
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<td>8. Isn't it true that one way to validate competing hypotheses is by examination of corroborating data? Have you done that in this case? What data in this case suggest that you are wrong in your conclusions? Isn't it true that all experts should consider competing hypotheses? Isn't hypothesis testing the essence of science?</td>
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<tr>
<td>9. Isn't it true that the literature states that the purity of methamphetamine can vary widely as a function of precursor agents, additives, and other chemicals? To your knowledge, which precursor agents and additives were associated with the methamphetamine this person abused?</td>
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<tr>
<td>10. Did you cross-validate the memory of the witness in this case? How would you do that?</td>
</tr>
<tr>
<td>11. Isn't another way of evaluating the impact of methamphetamine abuse to look at behavioral effects? What behavioral effects do you see in this case?</td>
</tr>
<tr>
<td>12. Given all of the above, how confident are you that you exhibited a sound methodology and that you demonstrated a connection between the methodology and the facts of this case?</td>
</tr>
<tr>
<td>13. Isn't it true that your conclusions regarding methamphetamine in this case may be faulty if the database on which you relied is incomplete or flawed in some other way? You did not interview family members who had knowledge of his drug habit. What assumptions are you making in failing to consider that data?</td>
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or publication. In fact, Dr. [H., another psychiatrist] went so far as to say that experts in the field could not reasonably rely on such testimony to render an opinion. Accordingly, the Court finds that Dr. [B.] employed unreliable methodology in forming his expert opinion.

Assuming Dr. [B.'s] methodology was accurate, moreover, Dr. [B.] failed tocite with particularity any articles supporting his underlying thesis: that prolonged crystal methamphetamine use has any effect on memory. The government's witness, Dr. [H.], explained this omission by testifying that there is no literature at present which holds that methamphetamine use has any effect on memory. Accordingly, the Defendant also failed to establish that Dr. [B's] theory or technique has been subjected to peer review and publication [Footnote omitted].

Even if methamphetamine use did affect one's memory, both expert witnesses testified that a number of individual variables such as stress, intellect, varying tolerances to the drug, and other health factors must be considered before truly determining the effects of the drug. Here, Dr. [B.] knows nothing about Bunag’s individual characteristics. Accordingly, without some consideration of Bunag's characteristics, Dr. [B.s] opinion would be unreliable. Moreover, Dr. [H.] testified that the predictability of the impact of sustained usage of ice is not reliable.

The presence of individual characteristics goes to another factor in Daubert: the known or potential rate of error. Defendant, however, put forward no evidence on the rate of error in predicting the effects of crystal methamphetamine on memory loss.

In sum, all the Defendant has put forward is Dr. [B's] own testimony concerning the reliability of his opinion. However, “bald assurances of validity” simply do not suffice for Daubert. (Daubert v. Merrell Dow Pharmaceutical, 43 F.3d 1311, 1315 (9th Cir. 1995))

The Court concluded that Dr. B's testimony did not concern scientific knowledge for purposes of Daubert. The Court also ruled that Dr. B's testimony failed to meet the second prong of Daubert that the testimony must aid the trier of fact. The Court noted that the jury “had ample opportunity to evaluate the memory and credibility of Bunag” during his 3 days of testimony, which included aggressive cross-examination on his drug use and his memory. Dr. B would also have been able to compare his testimony to tapes of prearrest conversations. Because the jurors’ exposure to Bunag for over 30 hours would allow them to evaluate his memory and credibility, Dr. B’s further testimony would not aid the trier of fact in determining whether or not Bunag had the capacity to “remember, relate and distinguish historical events.”

The Court also noted the absence of cases in which expert testimony concerning the effect of drug use on a witness's ability to perceive and recall was allowed. In fact, in United States v. Rohrer (1983), the Court stated that such testimony “threatens to usurp the jury’s function of determining guilt.” Agreeing with the caveat in Rohrer, the Court reasoned that even if the
doctor’s testimony was adequate from a *Daubert* perspective, it should not be admitted pursuant to Federal Rule of Evidence 403: its probative value was outweighed by its prejudicial potentials as well as the possibility it posed for misleading the jury.

Dr. B. presented findings based on an almost nonexistent database, consisting of affidavits of two men, themselves methamphetamine abusers, who supposedly knew the government’s witness. Had Dr. B. not made that connection between his knowledge of methamphetamine and the case at hand, his actions may have been allowed and he could have avoided the pitfalls described above.

In *State v. Cachola* (1993), the defendant was charged, among other things, with attempted murder of a man who testified that he (the victim) was intoxicated on methamphetamine. Expert testimony was rendered without the benefit of interviewing the victim. The difference between *Cachola* and *Sylva* was that in the former case, testimony was based on the expert’s clinical training, experience, and findings from the methamphetamine studies. No person-specific conclusions were proffered.

In *Cachola*, the first author was qualified as an expert in forensic psychology. The court allowed opinions regarding the effect of methamphetamine on memory and perception. In addition, hypotheticals were permitted, which then allowed the defense attorney to apply findings about methamphetamine to the alleged victim’s memory and perception of events. *Cachola* was acquitted of the attempted murder charge. The reader is referred to *State v. Fukusaku* (1997) for an additional discussion about the admissibility of scientific evidence and expert opinions and witness credibility. Table 8.2 presents general strategies for cross-examining experts in methamphetamine cases.
Table 8.2  **Expert Witness Cross-Examination Tactics for Methamphetamine Abuse Cases**

<table>
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<tr>
<th>Method</th>
<th>Principal/Example</th>
<th>Counteraction by Expert</th>
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<tbody>
<tr>
<td>1. Make the expert your witness</td>
<td>If you have a strong case on methamphetamine causation, create an ally instead of an adversary (e.g., “You say he was severely addicted to methamphetamine?”)</td>
<td>Anticipate and amplify on leading words/questions of cross-examiner; be familiar with literature showing the opposite findings</td>
</tr>
<tr>
<td>2. Attack the expert's field</td>
<td>Question his or her entire discipline (e.g., “As a psychologist, you know nothing about the metabolism of methamphetamine by the human body, do you?”)</td>
<td>Use as opportunity for educating the trier of fact on the behavioral and neuropsychological effects of methamphetamine</td>
</tr>
<tr>
<td>3. Attack the expert's qualifications</td>
<td>No matter how well trained or experienced the expert, there are always areas where he or she lacks knowledge</td>
<td>Admit your level of experience to the court, which it is hoped includes knowledge of intoxication; better become trained</td>
</tr>
<tr>
<td>4. Expose the expert's bias</td>
<td>The expert's integrity may be for sale if he or she spends much time in court or charges late fees</td>
<td>Know court experience/outcomes of cases and present them to the court</td>
</tr>
<tr>
<td>5. Attack the expert's (second-order) facts</td>
<td>Particularly suited for experts who do no factual investigation but rely on the reports of others</td>
<td>Directly assess defendant, victim, or witness or do not comment on them; answer hypothetical</td>
</tr>
<tr>
<td>6. Vary the hypothetical</td>
<td>Must have a factual basis; this method reveals the decision path of the expert</td>
<td>Know the decision path leading to your conclusions and therefore how varying data change conclusions</td>
</tr>
<tr>
<td>7. Impeach with a treatise</td>
<td>If an expert differs with others in his or her field, the expert may be wrong; easy to do in methamphetamine cases as state-of-the-art is primitive</td>
<td>Do not accept a proffered treatise as authoritative, especially in a rudimentary field like methamphetamine abuse</td>
</tr>
<tr>
<td>8. Attack the expert</td>
<td>The only direct method, this is dangerous and should be avoided in favor of above tactics</td>
<td>Be thoroughly prepared; meet with your attorney prior to court</td>
</tr>
</tbody>
</table>

References

Daubert v. Merrell Dow Pharmaceuticals, Inc., 113 S.Ct. 2786 (1993), on remand, 43 F.3s 1311 (9th Cir. 1995).
Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).
State v. Cachola, First Circuit Court, Cr. No. 92–01 93 (Oct. 11, 1993).
United States v. Rohrer, 708 F. 2d 429 (9th Cir. 1983).
The primary criminal responsibility issue is that of insanity which has had a number of legal definitions. *M’Naghten* (1843) was a strict test of inability to know wrongfulness of act due to mental defects (referencing either retardation or psychosis). Prior to that time, there had been the “wild beast” test that required that the individual function at the level of “infant, brute, or wild beast” (Melton et al., 1997, p. 190). More recently, the *Durham* (*United States v. Durham*, 1955) decision created a much broader potential range of exculpation with the notion that the act would have to be shown as the “product” of mental illness or defect. Shortly thereafter, The American Law Institute (ALI) test (1962) specified either lack of knowledge of wrongfulness (cognitive defect) or inability to refrain (affective prong). A number of states did use the ALI test in part or in total (Melton et al., 1997).

With the attack on President Reagan, a movement began to “reform” the insanity laws and the Insanity Defense Reform Act (IDRA) was passed in 1984 setting the federal standard as essentially a limited cognitive prong only approach reminiscent of *M’Naghten.* Regardless of the standards articulated in the laws, however, the actual applications have shown ongoing complexities. Furthermore, notions of partial responsibility as found in diminished capacity and diminished responsibility, along with changes in the degree to which the contributions of substance abuse are tolerated as leading to some degree of exculpation have continued to result in complex applications and reasoning.

In this chapter, the initial focus will be on some unique aspects of Hawaii’s laws and contributions of case law involving methamphetamine and on the concept of settled insanity.

* A review of state insanity laws reflecting Department of Justice data from 2000 indicated *M’Naghten* basis for 22 states, ALI basis for 20 states, and *M’Naghten* plus irresistible impulse for 3 states. Two states have partial ALI statutes referencing impaired perception. Three states are not categorized in either system.
Hawaii and Pathological Intoxication

The Hawaii Revised Statutes (HRS) define pathological intoxication as “intoxication grossly excessive in degree, given the amount of the intoxicant, to which the defendant does not know the defendant is susceptible and which results from a physical abnormality of the defendant” HRS §702-230(5)(c) (emphasis added).

Despite frequent attempts by defendants to present voluntary intoxication as pathological intoxication, and therefore as an exculpating factor, the courts have consistently maintained that voluntary intoxication is not admissible to negate state of mind to establish an element of the offense. See State v. Souza (1991), State v. Hall (1983), State v. Freitas (1980), and State v. Nuetzel (1980).

In State v. Souza (1991), the defendant admittedly smoked methamphetamine just before he stabbed the victim in the back with a knife. Souza then repeatedly stabbed the victim as the latter attempted to escape, and then pursued the victim in a car, grazing his leg as the victim jumped into the bushes. Souza was subsequently arrested, charged, and convicted of attempted murder in the second degree and unauthorized control of propelled vehicle. On appeal, the Hawaii Supreme Court held that voluntary intoxication was not admissible and that it was a gratuitous defense that is not constitutionally protected as a defense to criminal conduct.

Psychological and psychiatric experts have not been deterred by the courts’ ostensibly clear rulings. In State v. Romel (1990), the facts were straightforward. On June 30, 1988, 18-year-old Romel shot his summer-school teacher while she was teaching English at Aiea High School. At trial, Romel testified that he had been smoking crystal methamphetamine since his junior year and had smoked “ice” every day of summer school up to the time of the shooting. Prior to the shooting, he smoked ice before going to school with his gun. He further testified that the ice made him feel paranoid, and that he believed that the victim–teacher had been picking on him.

A psychiatrist based in Honolulu testified that ice smokers develop a paranoid psychosis similar to the symptoms of paranoid schizophrenia. In a further restatement of general findings from the literature, she observed that large quantities of ice make a person “very paranoid and delusional.” Based on her interview of Romel, she concluded that he had experienced a “severe paranoid hallucinatory or persecutory state,” had gotten to the point of “absolute desperation,” and “felt he had no recourse but to try to kill [the victim], kill the object of his pain.” Unsupported by any statistics or base rate information, she speculated that it “was 99.9 percent that he was not able to choose to stop” taking methamphetamine. She then concluded that the defendant would not have shot the victim had he not been methamphetamine intoxicated.
A clinical psychologist testified that, based on his interview of the defendant and his mother, Romel showed behavior consistent with ice abuse. Based on his interview and police reports, he conjectured that Romel had a minimal history of acting out. He then opined that the chances of the shooting occurring “without some kind of drug involvement would have been negligible, minimal.” He then added that ice “was a major, major contributing factor, if not the causal one of what [Romel] did.”

The state’s expert agreed with the expert psychiatrist’s conclusion that, at the time of the shooting, Romel was paranoid and deluded. He then opined that Romel’s state of mind “was a classic picture of focused delusion,” meaning the false belief directed at a particular set of circumstances. A particular person “is the one responsible for everything and right or wrong[,] everything kind of comes down on that one person.” This expert also failed to incorporate the defendant’s probable history of violence, especially under methamphetamine. Had such an evaluation been performed, the “focused delusion” may have been found to be directed at parties who placed expectations for performance on the defendant.

The jury in the Romel case decided beyond a reasonable doubt that the defendant intended to shoot his teacher. Romel was convicted of attempted murder in the second degree, which meant that, despite the proffered conclusions of the experts on the accused’s drug use, the jury believed he had formed the specific intent to kill his teacher.

In the more recent case of State v. Holbron (1995), unlike those in the Romel case, experts offered diagnoses of multiple mental conditions to explain methamphetamine-related violence. In Holbron, on April 21, 1990, the defendant, in what appeared to be heinous conduct, threw a plate of food brought to him by his girlfriend at her head, then threw a radio at her. Holbron then asked her, “You ready to f______ die?” He then poured gasoline on her and attempted to set her afire with a match. The attempt failed, but a second match ignited the gasoline and the victim suffered severe burns trying to extinguish the flames. The defendant ran out of the house and down the street. The house was destroyed by fire.

Holbron did not dispute the facts, but instead offered the defense that he had “potentially suffered a lot of trauma to the head … and that he has recognized organic difficulties in the way his brain works and the way he functions in a day-to-day situation.” One of the defense experts testified that Holbron’s right frontal lobe was damaged, which created difficulties in impulse control. A second defense expert diagnosed Holbron’s condition as Organic Mental Disorder NOS and an Antisocial Personality Disorder. A third expert diagnosed substance-induced Organic Mental Disorder and Methamphetamine Use.

The defense theory, as argued to the jury on the basis of cerebral damage, was that Holbron’s bizarre actions clearly indicated that he did not have the
requisite state of mind to commit attempted murder. Obviously referring to the amotivational effects of methamphetamine and brain damage, among other factors, his defense attorney then maintained that Holbron was not sufficiently “aroused” by the events of the alleged crimes to the point where he would have formed the specific intent to cause the victim’s death. The defense attorney argued that “if anything, [Holbron] acted recklessly.” The trial ended with the return of the jury’s guilty verdict after 29 minutes of deliberation.

Pathological intoxication has been successfully used as a defense if, by reason of such intoxication at the time of the alleged offense, the defendant lacked substantial capacity either to appreciate its wrongfulness or to conform his or her conduct to the requirements of the law (HRS §702-230(4) and (5)). In other words, pathological intoxication can assume the status of a mental condition and hence may allow exculpation if a link to a cognitive or volitional impairment can be demonstrated.

Such was the case in State v. Kuhia (1992), a landmark case in several respects. Here, the defendant was acquitted by virtue of the affirmative defense of pathological intoxication by methamphetamine, a first in Hawaii, which the defense proved by a preponderance of the evidence. Two important facts were determinative: (1) the defendant was not substance intoxicated at the time he killed the victim; and (2) multiple diagnoses were offered, at least one of which had exculpating potential. In Kuhia, mental health experts, as well as other corroborating evidence, suggested that the defendant suffered from paranoid schizophrenia and an organic delusional disorder, in addition to methamphetamine abuse. The organic delusional disorder was seen as caused by chronic methamphetamine use, impairing his ability to conform his conduct to the requirements of the law.

Kuhia raises the troubling question of the necessity of intoxication at the time of the alleged killing in order to establish pathological intoxication, a clear implication of HRS §702-230. This outcome appears to contradict the general principle limiting the availability of pathological intoxication as a defense in that it permits a defendant to avail himself or herself of a mental condition at the time of the alleged offense that is linked to a history of voluntary self-induced intoxication. Note that in all pre-1998 methamphetamine cases presented in this chapter in which the pathological intoxication defense was unsuccessfully offered, the defendant was methamphetamine intoxicated at the time. Under Kuhia, pathological intoxication could be presented as a defense for a defendant who had not ingested methamphetamine for a considerable period of time, perhaps months or years, before the alleged crime.

In State v. Garringer (1996), the defendant was convicted of robbery. During trial, Garringer admitted that he and a younger accomplice had planned to rob a Jack-in-the-Box. The minor threatened a worker, pounded the shotgun on the counter, where it discharged, and killed the worker. Garringer then grabbed the money from the cash register and the two males fled.
in a car stolen by Garringer prior to the robbery. The defendant testified at trial that he had smoked methamphetamine almost every day for about 2 years and that he and the minor had smoked methamphetamine before the robbery and planned to rob the Jack-in-the-Box after running out of drugs. Garringer testified that “despite feeling the symptoms of withdrawal during the incident in question, he had control over what he was doing.” He never blamed methamphetamine for the robbery. Garringer was convicted of robbery in the first degree and of firearms-related charges.

Garringer later filed an action for postconviction relief. One of the grounds for the requested relief was ineffective assistance of his trial counsel, who had failed to raise the issue of the defendant’s temporary insanity due to the effects of drug usage and had failed to obtain psychiatric evaluations of the defendant prior to trial. The Hawaii Supreme Court held in part that Garringer should have been allowed to clarify his petition by amending it to include factual allegations showing that (1) his appellate counsel omitted an appealable issue; and (2) in light of the entire record, the status of the law, and the space and time limitations inherent in the appellate process, a reasonably competent attorney would not have omitted that issue. The court noted that despite the fact that the defendant’s acquittal in *Kuhia* was based on the affirmative defense of pathological intoxication, Garringer was required to “overcome significant hurdles in order to establish that such a defense was potentially meritorious and that a reasonably competent attorney would not have omitted that issue.”

On remand for a hearing to determine the merits of Garringer’s ineffective assistance of counsel claim, the circuit court found against him. Appeals actions continue to present with no relief granted thus far.

Other cases are of interest in untangling the issues surrounding pathological intoxication. In recent years, the methodology of the sanity examiner has been scrutinized in cases of criminal responsibility in which the role of methamphetamine was minimized, ignored, or misconstrued by the expert. In methamphetamine cases, no longer can it be assumed that a consensus of the three panel §704-404 examiners to the effect that the defendant is mentally incapacitated automatically leads to an acquittal on grounds of physical or mental disease, disorder, or defect.

The key case in Hawaii is *State v. Monte Louis Young* (1998). In that case, on May 10, 1997, shortly before 7 A.M. at the Burger King on University Avenue in Honolulu, Young pulled a hammer from behind his back and began striking the victim, Paul Ulbrich, on the back of the head. The victim’s screams could be heard for some distance. After each blow, Young examined his handiwork as if to survey the damage. After the third blow, Young raised

* Among these hurdles were Garringer’s trial testimony that, despite his use of crystal methamphetamine, he had control over what he was doing, and that he was voluntarily intoxicated at the time of the crime.
the hammer toward a Burger King worker and said, “Get in[side] before I kill you too.” Young leapt over a wall, dropped the hammer in the parking lot, and left in his pickup truck.

According to witnesses and the experts, Young had been acting strangely before the killing, and had heavily abused alcohol and marijuana in the weeks before the instant homicide. He had a history of violent acting out within a strong polysubstance abuse pattern extending back at least a decade. His previous abuse of methamphetamine, apparently his drug of choice when available, was extensive. In 1993, Young’s father had reported a 10-year history of methamphetamine use by Young. Young last became intoxicated on methamphetamine approximately 2 months before the instant homicide.

Computerized tomography (CT) scanning revealed a small subarachnoid hemorrhage and a cerebral contusion in Young’s right parietal area. Based on his strange behavior, evidence of brain damage, and other factors, each of the examiners rendered a diagnosis of Psychotic Disorder NOS, among other diagnoses, and all but one examiner linked that disorder to a substantial impairment in both cognition and volition. The state retained the senior author to comment on the methodology of the sanity examiners pursuant to HRS §704-410. The state also retained the services of a clinical–forensic psychiatrist who had examined Young for the defense 5 years earlier in California.

In its Findings of Fact and Conclusions of Law, the court ruled that Young was guilty of murder in the second degree. The court correctly noted that (1) a condition excluding responsibility is an affirmative defense that must be shown by a preponderance of the evidence; (2) the lack of substantial capacity means “capacity which has been impaired to such a degree that only an extremely limited amount remains”; (3) if Young had “no impairment, or if the impairment was not substantial, a fair-minded [trier of fact] would find the defendant sane beyond a reasonable doubt”; and (4) Young had “failed to prove by a preponderance of the evidence, that he lacked the substantial capacity either to appreciate the wrongfulness of his conduct or to conform his conduct to the requirements of law.” The court also concluded that self-induced intoxication, which is intoxication caused by substances that the defendant knowingly introduces into his body, is prohibited as a defense to any offense, does not constitute a physical or mental disease, disorder, or defect within the meaning of §704-400, and therefore cannot be considered an exculpatory condition that is the product of circumstances that were beyond Young’s control.

In applying this reasoning, the court held that the state had proved, beyond a reasonable doubt, that Young knowingly and voluntarily ingested drugs and alcohol both over a prolonged period of time and in the weeks immediately preceding the homicide. The court viewed these two time periods
of voluntary substance abuse as having caused Young’s several “physical or mental diseases, disorders or defects.”

There are remarkable similarities between Young and Kuhia, including prior substance abuse, which most likely contributed to other diagnosed mental conditions, but no methamphetamine intoxication at the time of the alleged offense. It is speculated that Young will nullify the impact of Kuhia to a substantial degree. The above cases lead to the conclusion that the expert’s decision path as well as Daubert (Daubert v. Merrill Dow Pharmaceuticals, 1993) considerations should be scrutinized closely. The American Law Institute (ALI) test of criminal responsibility leads to a three-part test of insanity:

1. A genuine, sufficiently severe mental disorder;
2. A substantial impairment in the accused’s capacity to appreciate the wrongfulness of his acts and/or in his ability to conform his conduct to the requirements of the law; and
3. A link between the two.*

A heuristic model based on this three-part test for criminal responsibility evaluations was presented by the senior author (1984, 1987) and has direct relevance to methamphetamine cases. This model involves the retrospective analysis of the following:

- The forensic database.
- The type of distortion or deception shown by the defendant.
- The defendant’s reconstruction of the instant offense.
- Long-term (i.e., historical) versus instant crime behavior.
- The defendant’s mental disorder in terms of whether it is sufficiently severe and causally connected to the instant offense.
- Self-determination and choice of crime-related behaviors.
- Conclusions regarding criminal responsibility.

The first recommended step involves the creation of a reliable and valid database, multisourced and interdisciplinary in nature, which forms the basis for all opinions regarding criminal responsibility. The contents of the database are obtained by examining the perpetrator, victim, context of the crime, and other data relevant to the accused’s current and past circumstances. The most important part of the forensic analysis concerning methamphetamine abuse may be the database on which the eventual conclusions are based. Criteria for including data in the database are that they are multisourced and interdisciplinary and are based on information drawn from sources other than the client. It is especially important to gather data from sources that the defendant wishes to conceal because of the likelihood of finding unfavorable information concerning methamphetamine abuse (for example, juvenile records; “expunged” records that may be available in unmodified form at

* In states with the more common M’Naghten-derived model, the same heuristic applies without reference to data as to inability to refrain.
government archive centers; interviews with peers, ex-spouses, and mates; military performance reports; and information from other states or countries). It is helpful for the credibility of the expert to base the forensic evaluation on as many database sources as possible.

The notion of a complete database is critical in evaluating criminal responsibility in situations involving methamphetamine. At this juncture in time, the perception of the court, rather than reality, is the important factor. In Kuhia, the court appeared satisfied that the mental health experts had an adequate database, which then provided the foundation for later acquittal. In Garringer, the defendant asserted in his petition for postconviction relief that he should have been psychiatrically evaluated, thus, in essence, claiming that the court had an incomplete database.

In Young, all the defense experts admitted that their proffered findings could be wrong if the database on which each expert had relied was flawed or incomplete. The state then demonstrated through its own experts and through cross-examination that the sanity examiners' database lacked essential information. For example, the three panel examiners failed to take into account or even properly review existing neuropsychological tests from a defense neuropsychological consultant to the effect that Young had average or better cognitive functioning. Thus, a link between a mental condition based on brain damage and a substantial impairment, even if cerebral injury was established, could not be established.

The next step in the decision process concerning criminal responsibility consists of ruling out or accounting for nondeliberate distortion within (1) the evaluator, (2) the reporting person, and (3) the reported event. Nondeliberate distortion due to anxiety, fatigue, or other factors may largely explain both evaluation and crime behavior and is, therefore, considered first. Nondeliberate distortion for the methamphetamine user at the time of the instant offense may consist of several simultaneously operating factors. Time perception is altered, resulting in unreliable estimates of time. Short-term memory problems, including encoding and retrieval difficulties, may be experienced. Other deficiencies in the perpetrator, victim, and witnesses need to be explored as discussed above.

As the next step in the evaluation process, deliberate distortion, if it exists, should be ruled in by a positive and replicable demonstration of misrepresentation. Deliberate distortion may be shown by the defendant and by cross-validating sources. The evaluation of the defendant’s self-reports in methamphetamine cases should be scrutinized for misrepresentation by examining third-party reports and material evidence of the crime. Psychometric testing by objective measures, such as the Minnesota Multiphasic Personality Inventory–2 (MMPI-2), California Personality Inventory (CPI), 16-PF, and the Millon Clinical Multiaxial Inventory–III (MCMI-III), are appropriate for assessing distortion due to the embedded scales that
accurately measure deception. An inspection of the crime scene is important as much methamphetamine-related violence occurs within a brief time span at a particular site, and an appreciation of the context is helpful to the evaluator. Data derived from the input of significant or knowledgeable others which indicate bias or a given motivational set (for example, desire for revenge or desire to be reunited with the defendant) should be excluded from the data pool or placed in proper perspective by comparison with other known facts. In the murder and attempted murder cases reviewed above—Romel, Holbron, Kuhia, Garringer, and Young—the issue of nondeliberate distortion by the defendant was not raised. Considering the significant effects of methamphetamine use on attention, memory, and other cognitive skills, as discussed previously, the accuracy of the defendant’s recollection needs to be cross-validated and not merely assumed or left unaided in the province of the jury.

Deliberate distortion—particularly faking bad or malingering in order to feign symptoms and conditions—raised as a significant source of concern in these cases was also not addressed. Yet, the base rate for malingering in state-of-mind defenses for felony cases, in general, is conservatively estimated at 20% (Rogers, 1988). There are compelling reasons to suggest that the incidence of malingering may be higher in methamphetamine cases. First, the chances of malingering increase with genuine deficiencies (Hall and Pritchard, 1996), and methamphetamine creates significant cognitive and psychological deficiencies in many abusers. Second, most defendants know, or have been instructed by their attorneys, that methamphetamine abuse or intoxication does not constitute an exculpating condition, as in virtually all cases the drug was taken knowingly and voluntarily. Thus, the search is on by the defense team, including the retained experts, for a condition that may be sufficiently severe and beyond the control of the defendant (for example, a thought disorder such as paranoid schizophrenia). Methamphetamine mimics this psychosis in many respects and thus would be a natural target for incorrect (but unintentional) diagnosis by defense experts. The defendant may, however, as seen by the authors in a number of cases, deliberately deemphasize methamphetamine use and exaggerate or fabricate psychotic features of their behavior.

After distortion and deception are taken into account, as a third step, a defendant’s recollection of an alleged crime is usually helpful to know in inferring his or her state of mind. Even when the defendant does not testify or when state law shifts the burden of rebutting insanity to the government after the defendant has raised the possibility of insanity, presenting the defendant’s state of mind through experts is critical to the successful application of the insanity defense. Although state of mind can often be inferred from eyewitness accounts, material evidence, reports of third parties regarding events before and after the crime, and the defendant’s own description of events, the expert presents the state of mind of the defendant from a professional,
independent vantage point using a well-established *DSM-IV* classification system. Hence, the impact on the court, especially when unrebutted, can be considerable.

In some methamphetamine cases, the accused may not render spontaneous statements or submit to interrogation shortly after the alleged crime. In such cases, an inspection of the crime scene and interviews of cross-validating sources take on even greater importance. In none of the cases cited above did the mental health experts who examined the defendant visit the scene of the crime. In cases where the accused declines to be evaluated by an expert, that professional must refrain from proffering conclusions relevant to criminal responsibility. The expert may, however, comment on the methodology of the other sanity commissioners, as in *Young*, and present information from the literature on methamphetamine abuse.

The fourth step involves conducting a historical analysis of relevant past behavior and comparing it with that shown during the instant offense. The goal is to determine whether the instant offense is typical or atypical for the defendant. Rare events are most likely triggered by high stress or an unusual combination of environmental or internal events in the absence of history. Common events suggest a habitual pattern and are considered more inculpatory. In methamphetamine cases, repetitive violence associated with abuse of this substance is considered inculpatory because it implies recurring choice to aggress upon others.

A key question is whether basal violence associated with methamphetamine, especially when it is similar to the instant offense, was the result of a habitual set of violent acts or an isolated event. Historical instances of violence should be examined in terms of variables such as frequency, severity, recency, acceleration, triggering stimuli, opportunity factors, and inhibitions to aggression.

Historical factors that have traditionally indicated willfulness to commit violence in methamphetamine cases include the following:

- Lengthy time delays between triggers to violence and the instant crime.
- Performance of complex chains of behaviors in order to execute the violent behavior.
- Flexibility of response (e.g., when the perpetrator has multiple weapons with which to inflict harm).
- Predatory versus reactive violence.

Key forensic questions can be formulated as follows:

- Should the defendant have known the likely outcome of the chain of behavioral events culminating in violence?
Did the defendant know that methamphetamine intoxication in this situation, based on the defendant's history, would likely result in violence to another?

Thus, the following two courtroom scenarios present:

Prosecutor: Doctor, you testified that the accused suffered a substantial impairment in mental capacity at the time of the alleged offense. You cited a list of neuropsychological and psychological deficits in terms of his ability to self-control and self-monitor his behavior as reasons for the substantial incapacity, including a history of methamphetamine abuse. You did not examine previous violence, focusing instead on behavior during your evaluation and at the time of the alleged crime. Would your conclusion change if you knew the accused engaged in several dozen other similar acts of previous violence while methamphetamine intoxicated, with rewarding consequences, high-stated self-control, some evidence of planning and rehearsal, and minimal loss of verbal or physical abilities during those violent acts? Why or why not? Cannot one's past violence influence and affect appreciation of wrongdoing and self-control in later violence?

The above can be turned around for the defense, assuming expert testimony to the effect that there was no substantial impairment for a male defendant who admitted to attacking the victim:

Defense: Doctor, would you change your mind if you knew that the defendant (a) had no previous violence at all prior to the instant case and, in fact, worked productively and nonviolently in his job at the plantation for 15 years; (b) had an extremely high cumulative stress level for the year before the violence, as measured by several standardized tests and independently by DSM-IV criteria; (c) was borderline developmentally handicapped with poor coping skills at best; and (d) believed that he had to perpetrate the violence because his life had been placed in danger by the victim? The other examiners considered these facts, why didn’t you?

In short, there is no escape from considering historical influences to criminal behavior. This is because mental capacity to a greater or lesser degree is always influenced by previous experiences. Studies have suggested that historical violence accounts for the major portion of the statistical variance in accounting for exhibited violence (Hall, 1987). A history of violence or, conversely, a benign past, appears to act as a prepotent force of its own, determining to a large extent whether violence will, or will not, occur. In addition to history, triggers to violence and opportunity factors account significantly for incidents of exhibited violence (Hall, 1987). These factors operate whether or not there is a history of methamphetamine abuse.
Historical influences are discussed throughout the cases cited above. In Romel, the examiners noted that the defendant had a history of methamphetamine abuse. However, one examiner, who proffered the ultimately unsuccessful opinion that the defendant was mentally incapacitated, failed to uncover the collateral history of violence. In Holbron, the defense attorney unsuccessfully argued that his client had a history of antisocial behavior (which is usually seen as inculpatory), reflected in several mental conditions, which then caused the defendant to be less aroused by the events of the alleged crime (and therefore presumably less responsible). In Young, the court noted as instrumental to its conclusions that the defendant had no family history of mental health problems but had a strong individual history of (1) polysubstance abuse and, in particular, methamphetamine abuse; (2) Antisocial Personality Disorder, with long-term behaviors associated with this condition; and (3) violence toward others.

As a fifth step, a diagnosis of the defendant’s mental state at the time of the crime usually requires evidence in support of a DSM-IV mental condition. This is the first prong of the traditional three-part test of insanity (that is, establishing a mental condition). For all practical purposes, sanity examiners, at least in this jurisdiction, offer dual or multiple diagnoses to the court. A diagnosis, such as Methamphetamine Intoxication or Abuse, is rarely offered alone because the examiner who wishes to find lack of criminal responsibility knows that voluntary substance abuse is not effective in achieving a favorable outcome, or because a single diagnosis does not reflect the clinical reality of the case. In Kuhia, the eventual acquittal of the defendant was tied to multiple diagnoses, any one of which could have been exculpatory in nature.

Defense attorneys should note that a very high percentage of methamphetamine abusers also have attention deficit/hyperactivity disorder (ADHD) (Eme, personal communication, 1998). The forensic evaluator must determine whether ADHD should be diagnosed in the instant case and factor these observations into his or her conclusions regarding criminal responsibility.

Any psychiatric condition, alone or in combination with existing conditions (i.e., creating interactive effects), provides the basis for lack of criminal responsibility. The situation is even vaguer when the accused was not methamphetamine intoxicated at the time of the alleged offense but had chronically used methamphetamine sometime in the past. Courts need to know, as in Young, that methamphetamine psychosis or methamphetamine-related violence persists for months after abstinence and can be triggered by substances other than methamphetamine to include alcohol, marijuana, cocaine, opiates, and even caffeine. The literature on cross-reversal tolerance (i.e., sensitivity) needs to be shared with the trier of fact.

A proffered diagnosis requires evidence that the condition existed at the time of the crime, regardless of whether or not it also existed prior to or after
the crime. Evidence of a chronic mental disorder (for example, schizophrenia, mental retardation, or cognitive disorder) in existence before the instant offense increases the likelihood that the disorder also existed at the time of the crime, but is not sufficient by itself. Some chronic mental disorders can be in some level of remission or can be controlled with psychotropic medications. Evidence of a mental disorder (for example, depression, anxiety disorder) that arose after the instant crime is irrelevant to a diagnosis at the time of the offense.

The existence of a mental disorder at the time of the instant offense may or may not shed any light on the (legal) blameworthiness of the defendant. The severity of the disorder and its impairment of critical faculties at the time of the offense mediate its exculpatory effect. As a sixth step, the analysis of self-control and choice by the accused is central to the determination of criminal responsibility. Intact self-control and choice for the time of the alleged crime, which can exist along with delusional or hallucinatory behavior, often lead to a finding of criminal responsibility. Conversely, impaired self-control frequently results in exculpation or mitigation of responsibility for the instant offense. In sum, the evaluator should analyze the instant offense for the defendant’s abilities and deficits in areas relevant to behavioral self-regulation. An exclusive focus on limitations, pathology, and deficiencies is a fundamental mistake.

Whether or not methamphetamine use is an issue, parameters to be considered during the alleged commission of the crime by the defendant include the following:

- Coherence and other characteristics of speech suggesting intact verbal expression.
- Intensity and appropriateness of affect, especially during portions of the crime sequence that would normally produce strong emotion.
- The focus of the crime, ranging from nebulous to markedly specific.
- Level of substance intoxication during or shortly before the alleged offense.
- Current, long-range mental conditions such as retardation or focal brain damage.
- Behaviors requiring immediate, short-term, and historical memory skills of discrete sensory modalities or a combination of modalities.
- Gross-motor, fine-motor, perceptual-motor, and motor-sequencing skills.
- Presence of bizarre behavior.
- Level of anxiety and stress reactions.
- Presence of delusions or hallucinations.
- Presence of depressed or expansive mood.
- Planning and preparation.
- Cognitive awareness of criminality.
• Level of physical activity
• Self-reported control

The defendant’s activities during the week (or longer) before the instant offense should be examined for behavioral deterioration, especially in self-care, work productivity, and in the central love relationship. For many of these parameters, quantitative measures on an empirically validated, Likert-scale format can be obtained from the Rogers Criminal Responsibility Scale (Rogers, 1988) and the Schedule of Affective Disorders and Schizophrenia (Spitzer and Endicott, 1978).

Other considerations include the use of a weapon designed for attack, such as a gun, knife, or nunchuka, or a tool that could easily inflict harm (e.g., hammer, screwdriver). The presence of any such weapon during an offense would indicate a chain of responses more subject to control (i.e., selecting, obtaining, concealing, carrying, reaching for, and attacking with the weapon). Chains of responses usually call for shifts in behavior programs and lessen the likelihood of impulsivity. The next level of complexity involves use of a weapon that could be used for attack that the perpetrator found at the scene of the crime. A defendant’s use of his or her body to club, strangle, or kick a victim suggests a primitive response. An attack with certain parts of the body, such as biting or banging one’s head against the victim, suggests an even more primitive level of aggression. Continuing to attack nonvictim entities (e.g., banging the walls) suggests further loss of behavioral self-control.

The accused’s flexibility of response and method of attack should also be considered. The use of multiple weapons or shifting back and forth from one method of attack to another suggests that different executive functions were utilized. Such findings would suggest the presence of self-control, even in methamphetamine-intoxicated persons.

As an illustration, in Young, indicia of self-control and choice were testified to by witnesses and investigators. These included but were not limited to (1) the lack of erratic or dangerous behavior while in police custody for abuse of a household member 2 days before the homicide and at other times, in contrast to his claim that he was out of control for weeks prior to the killing; (2) just prior to the hammer attack on the victim, showing the ability to drive a truck, asking a third party for the time and attempting to panhandle some money from him, pulling a hammer from a position of concealment and striking the victim with it, and monitoring the effect of his blows. The damning observation from a self-control perspective was a witness’s testimony that “after each blow, the defendant would look at Paul’s injuries, as if to survey the damage”; and (3) after the fatal attack, showing the ability to threaten but not follow through on another attack on a worker, leaping a wall and running to the truck, driving away, and exhibiting clear and nonerratic cognition and
behavior a day after the killing when he was arrested for stealing a boat from Kaneohe Bay.

Defense attorneys should again note the strong association of substance abuse with ADHD. Recognition of this comorbidity is essential to proper diagnosis and treatment. ADHD is a serious impairment of self-regulation. Because the medical form of methamphetamine—Desoxyn—is effective for the treatment of ADHD, it may be possible that a significant percentage of methamphetamine abusers are self-medicating their ADHD. An individual analysis of self-regulation may reveal whether or not the methamphetamine abuse impairs choice and self-control.

The last step of the heuristic model for criminal responsibility (Hall, 1987) comprises the functional components of the American Law Institute’s three-part test, which calls for a connection in the nature of cause and effect between diagnosis and impairment. The evaluator must now compare crime-specific behaviors with the retrospective mental conditions proffered by the experts. A link must be demonstrated between the deficiencies of the defendant (i.e., mental condition) and the criminal behavior (i.e., substantial impairment).

If substantial impairment is found in either cognition or volition, that impairment must result from the proffered mental conditions. All jurisdictions require that there be a demonstrated link between substantial impairments and the accused’s diagnosed conditions. Further, the cause must be direct, and not secondary. In most but not all cases, self-induced alcohol or drug intoxication at the time of the crime may have contributed to the offense but is considered an invalid argument for escaping criminal responsibility. This further decreases the range of behaviors that can be used as the basis for exculpation. The symptom pool is restricted even more by the exclusion of all disorders that were operating at the time of the crime but had little to do with mental capacity interference.

Brain damage, by itself, for example, does not automatically lead to violence. Hall and Sbordone (1993), in an exhaustive review of the literature on brain injury in humans, found that no lesion in any neurological site or system automatically leads to violence. Even with epilepsy, the aggression that has been observed is primitive and defensive in nature, with no intention of inflicting harm on others demonstrated in empirical investigations.

Generally, competent executive behavior is incompatible with loss of self-control due to extreme emotion. “Executive” behavior is a neuropsychological term referring to motor output, self-monitoring, and judgment after sensory and processing functions have been initiated. Skilled executive behavior occurs in a situation where the accused observes and changes his or her behavior simultaneously in response to a fluctuating environment, all in accordance with the goal or desired object of the action sequence. Hypothesis testing is the highest form of effective performance, as when the accused changes his or her own behavior (e.g., threatens the
victim, puts a key in a lock) to see the reaction or outcome (e.g., victim acquiescence, the door unlocking) and then changes his or her own behavior accordingly (e.g., proceeds to assault the victim, proceeds through the door into the bedroom). In essence, this skill taps the defendant’s ability to show a concordance between intentions/plans and actions. It is measurable, objective, observable, and incompatible with both extreme emotion and emotional disturbance.

Executive behaviors that tend to rule out extreme mental or emotional disturbance for the time of the instant offense include, but are not limited to, the following:

- Motor or mental rehearsal of the crime sequence.
- Demonstration of a variety of violent acts (flexible behavior as with several weapons).
- Ability to orchestrate a multistep or multitask scheme (e.g., long, connected chains of behaviors).
- Ability to show change in principle (e.g., from raping the victim to killing her to eliminate her as a witness).
- Ability to delay violent responses.
- Nonstimulus boundedness (acts independent of environmental influences).
- Ability to regulate tempo, intensity, and duration of violent behaviors.
- Ability to avoid nonerratic behavior during violence unless that was the planned effect (e.g., deliberately becoming substance intoxicated prior to the instant offense).

The above considerations apply in methamphetamine-related extreme emotion cases. The self-control analysis can benefit the defense or the prosecution, depending on findings. In *State v. Raquepo* (1988), a methamphetamine-intoxicated defendant was charged with attempted murder in the second degree, kidnapping in the first degree, terroristic threatening in the first degree, license to carry firearm, and place to keep firearm in an incident in which the defendant shot a rifle at a roommate/friend. Before trial commenced, the state offered the defendant probation on the basis of a loss of self-control and his disorganization at the time of the offenses. The senior author noted the following deficiencies before, during, and after the offenses:

- The defendant asked for help prior to the offenses. He called for an ambulance, informed his roommate that he could not wait for the ambulance, that he felt dizzy, and that he wanted to go to the hospital immediately. Amnesia commenced from this temporal point with no later data suggesting that he was faking the loss of memory.
The defendant’s behaviors were preceded by strange and perseverative behaviors, such as pacing the floor with a rifle and talking to himself, interspersed with frequent apologies to his friend.

He shot the rifle in the direction of his friend; this shooting was not in the context of an impaired relationship with the victim.

A detailed analysis of his background revealed no history of violence toward the victim or anyone else.

The defendant engaged in disorganized behavior prior to the shooting. He saw the ambulance he was waiting for but failed to signal the ambulance to stop, provided misdirections when riding in the truck to get help, and other behaviors.

Delusional thinking, including the thought that he was dying (e.g., he said to his friend, “If you want to save your life, you going to have to save mine because I’m dying, so take me to the hospital.”). He wanted to drop off his weapon at the police station prior to proceeding to the hospital. Shooting at his friend may have reflected his fear of abandonment more than intent to kill.

The defendant showed bizarre behaviors after the offenses. He shot at his friend from the hip in front of others, with no suggestion of secondary gain. There was no chance of escaping detection. After he had left the victim’s truck with the keys in it, he asked a stranger to help him by giving him the keys to her truck. He also told this stranger that he had been poisoned and for her to hide his rifle, then threw the firearm onto her lawn. He then proceeded to flag down a police car (with a loaded .45-caliber pistol in his belt) and asked for help, stating that someone was trying to kill him. The bizarreness of his behavior was reflected in the police officers’ initial belief that he was the victim of a crime, not the possible perpetrator. The defendant forgot that he had “speed” in his clothes, which was discovered at the police station.

The reader may rightfully question whether or not Raqepo constituted a case of voluntary intoxication. Again, the perception of the court and the state or defense in pursuing its case strategy is more critical than actual events.

In State v. Paned (1997), the defendant, who had killed an acquaintance with a shotgun, claimed self-defense, but was found guilty of murder in the second degree. A history of methamphetamine-related violence was uncovered, including threatening his grandmother by shoving a gun in her mouth, assaulting various friends, assaulting his wife and striking her with a gun because he suspected her of infidelity, and discharging his shotgun in a reckless manner by shooting at his house. A clear pattern of methamphetamine abuse was shown by bleeding ulcers, paranoia, observations of his behaviors by his family members, and other symptoms. He denied being methamphetamine intoxicated at the time of the killing.
On the night of the murder, the defendant had volunteered to take the victim, a distant relative living at his residence that he suspected of “fooling around” with his wife, to the airport. His behaviors were replete with indicia of choice and self-control, including driving around with the victim, talking to peers and drinking whiskey with them, and calling his mother and instructing her what to tell others if they should call for him. At the scene—a secluded spot in a residential neighborhood—the defendant was in close proximity to the victim when he fired the shotgun twice, fatally shooting the victim in the chest and the right forearm. The defendant sped off in his car and disposed of the shotgun, which was never found. He then drove to his friends’ house and instructed them to remove the 12-gauge shotgun shells from the trunk of his car. He then attempted to borrow another car to establish an alibi and eventually went to a hotel to hide out. Despite an initial claim of amnesia for the crime events and for disposing of the shotgun, he presented information suggestive of recall. In sum, there were multiple indications of self-control for the time before, during, or after the violence. These included alibi behavior, ability to delay and execute the killing, and indicia of planning and preparation.

The Unsettled Issue of Settled Insanity

Another issue that has emerged in the area of criminal responsibility and ingestion of drugs involves the concept of “settled insanity.” While it has been generally true that voluntary intoxication has been rejected as exculpatory and quite limited in many respects as mitigatory, questions have been legitimately raised regarding the individual, who by virtue of his drug use, has developed an ongoing mental illness that is now independently “residing” in the person, in effect a permanent or semipermanent side effect of use.

It has been noted that across most states, the voluntary ingestion of substances that lead to a condition of mental disarray and thereby contribute to dyscontrolled behavior and criminal acts, does not constitute the affirmative defense of not guilty by reason of insanity. However, a peculiar exception exists that has been accepted in some states and has been the subject of some discourse. That exception is known as settled insanity and it refers to an instance wherein the voluntary use of substances has created a condition in which the individual is mentally ill. That condition then proceeds to have “settled” or become a more or less permanent part of the individual’s functioning. The difference between settled insanity and temporary insanity is that the condition is apparently a permanent, or at least prolonged, condition that continues long past the actual use of the substances that contributed to its emergence.
This area is complex not only legally but also clinically. In effect, the use of a substance has either itself created a condition or in some way liberated a preexisting potential. The individual is then diagnostically mentally ill and acts committed in consequence of that mental illness would seem to fall under a not guilty by reason of insanity exculpation. Accordingly, the courts of the District of Columbia and 29 states have considered the issue. One state limited the doctrine. One state high court and two state legislatures have acted to reject settled insanity as a defense, but eighteen states have not considered the issue (Carter-Yamauchi, 1998).

The entire area of the relationship between substance abuse and mental illness is itself highly complex. Many persons turn to substance abuse in order to alleviate the underlying symptomology they are experiencing as a result of an emerging mental illness state. At what point does the use of that substance become the originator of the state or simply an inappropriately selected palliative? The law, on the other hand, needs to treat differently people who either involuntarily ingest substances and are affected by them or are forced into use versus those who seek to use drugs as a recreational option and then cause problems to society. In effect, this is an area of complexity and grayness in which finding the boundaries between one group of reasonably held culpable individuals from another group of reasonably exculpated individuals is not an easy task, either from a psychological or a legal perspective.

Two Supreme Court cases have some bearing on this issue. In *U.S. v. Wattleton* (2002), the trial court was upheld on the usual basis that voluntary ingestion of substances is not a basis for exculpation. In this particular case, the issue became one of dangerousness and Wattleton protested his commitment, to no avail.

Not dissimilarly, in *U.S. v. Peterson* (2002), the appeal to apply downward departure in sentencing allowed for mental health purposes was rejected on the basis that “temporary insanity” is not a basis for such a departure when the crime is violent. These cases basically illustrate the need in the legal system to act in ways that protect the society and reduce perceived risk. Even though they are not settled insanity cases, they reflect a point of view that is not likely to be in favor of any degree of reduced criminal responsibility for such a condition. Consistently, when Carter-Yamauchi (1998) completed her legal review and made recommendations to the Hawaii legislature, the following was the case:

1. Hawaii should enact a statute rejecting settled insanity as Colorado has done.
2. Hawaii’s then current provision regarding pathological intoxication should be limited to alcohol and legal drugs and should have excluded any ingestion of illegal drugs.
3. Postacquittal laws in Hawaii should be reviewed to determine whether they adequately protect from dangerous persons.

From the standpoint of expert testimony, the situation where this defense is allowed is not dissimilar from any other not guilty by reason of insanity (NGRI) case. One has to establish from multiple sources the presence of a mental illness at the time of the act and has to further meet the criteria of the controlling statutory definitions for NGRI; thus, in a M’Naghten state or jurisdiction, only inability to know the wrongfulness of the act will be involved; in an ALI jurisdiction, the inability to refrain is a second prong for which the data can be assessed. The further issues with regard to settled insanity would also include a development of data that indicate the use of substances prior to the emergence of mental illness symptoms and the presence of mental illness in an ongoing fashion after the use of substances. In the case of methamphetamine, it has been demonstrated that the drug can cause significant ongoing deterioration at the neurological level and, thus, methamphetamine-induced settled mental illness is clearly a possibility.

The Self-Medication Hypothesis

Where settled insanity, however, is not permitted, which is clearly the majority of jurisdictions, another complex issue for assessment may be raised. The forensic practitioner assessing an NGRI case may be faced with the very difficult task of ruling out settled insanity versus the emergence of a “true” mental illness, defined to be one that was not a function of the ingestion of illegal substances. Because it is well documented that mentally ill people are prone to substance abuse, often as self-medication, determining on a scientific basis the chicken and egg issue implicit in this situation could be faced by practitioners.

In one study of the self-medication by mentally ill persons, dual diagnosed schizophrenics were found to evidence a variety of reasons for use of substances including decreasing hallucinations (42%) and counteracting unwanted side effects of medication (12%). Alcohol was more commonly used than other substances and the overall conclusion was that some patients, some of the time, for differing symptomatic reasons, use different substances (Goswami et al., 2004)

Summary

Although few cases involve a successful plea of not guilty by reason of insanity, and even fewer attempt a variety of other affirmative defenses available
for partial or complete exculpation in the context of admission to a criminal act, the area remains one of legal definition and redefinition, much of the time on the basis of perceptions and politics rather than scientific foundation or social need. The result of the proliferation of categories and definitions requires that forensic experts operate with careful attention to the controlling statutes and case law, as well as following carefully the usual requirements of good forensic practice. What can be additionally noted, however, is that at no time in modern Western legal systems has it been viewed as fair or just to punish without regard for context. Furthermore, current definitions of exceptions to full criminal responsibility mirror those that can be found throughout the annals of recorded responsibility legal systems.

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Criminal Responsibility Evaluation in a Methamphetamine-Murder Case

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Case Information

Defendant John Smith is a 38-year-old, right-handed, single, construction supervisor who was charged with three counts of first-degree murder, attempted first-degree murder, burglary, kidnapping, and sexual assault, in addition to other charges, after an alleged home invasion and subsequent acts. He was referred by his court-appointed defense attorneys for a forensic evaluation of methamphetamine-related state of mind issues. In recounting the incident, he stated that he had a few beers at his job site with his boss after work. He and a friend then drove to a secluded spot and together smoked over 1 gram of methamphetamine (“ice”). After dropping off his friend, Defendant Smith went to his sister’s home where he was staying. He found a syringe belonging to another family member and injected methamphetamine into his left arm. He then lay down in his room, feeling more intoxicated and thinking that he needed some fast money to buy more of the drug. He had $400 in his wallet at the time and the next day was payday. However, he had earmarked those funds for home improvements and automobile repairs. He then remembered an apparently vacant house on the route to work that would be a likely prospect to burglarize. He considered several options of places to rob such as a bank, store, or business, but decided to burglarize this particular house because it overall presented a low risk for apprehension.

* The material for this chapter is selected and adapted from the first chapter by the same name and written by the first four authors in Harold Hall’s (Ed.) Forensic Psychology and Neuropsychology for Criminal and Civil Cases [2007]. The reader is directed to that volume for a much more complete discussion of the forensic context and other detail that is available.
He reported that after a few minutes, he felt energetic and had the need to act. He then drove straight to the victims’ residence and parked outside the gate. (He estimated that the gate was 20 yards from the house, when measurements during the investigation revealed it was closer to 200 yards away.) After circling the periphery of the house three times to ensure that no one was present, he approached the house. On the second go around, he tripped on a “big log.” He felt the ground and picked up a “stick” that he could use as a club in case a watchdog appeared. The “stick” was approximately 3 feet long and a few inches wide, with the hardness and general form of a baseball bat. He stated that he used his Phillips screwdriver to remove four screws in the frame of the window screen. He entered an unlit room, then proceeded into a lighted hall where, to his surprise, he encountered the parents of the victim family. He claimed that upon seeing them, he lost control and started swinging wildly with his “stick,” repeatedly striking the man and the woman until they fell unconscious to the floor. He stated that at that time, he felt he was coming down from the methamphetamine and was “tweaking real bad,” with intense fear and paranoia. He opined that he went into the “tweaking” stage immediately after sighting the victims. He then walked to the master bedroom and opened drawers looking for anything valuable to steal. He grabbed bedsheets, a comforter, blankets, and a pillow to cover the bodies and the blood on the floor. He stated that he wished to cover the blood because it was “making [him] sick.” As he exited the master bedroom, he saw the woman lying on her back facing him, opening her eyes, and the man trying to sit up. This “freaked [him] out,” and he clubbed them several more times on the head. He stated that he turned the woman on her left side (toward the eastern side of the house) and removed her short pants, thought of raping her, but then changed his mind.

Defendant Smith then returned to the master bedroom, thinking of removing computer equipment for resale. He then saw a young girl, the 9-year-old daughter of the family, standing in the hallway, staring at him. He thought of hitting her with the “stick,” but could not because she was looking directly at him. Instead, he took her by the hand and led her out of the house. She followed obediently, and he then drove her to his residence for the purpose of having sex with her. He settled into his room, no one else being home. He stated that he first tried to get her to give him a “blow job,” but the girl seemed in a daze and was not responsive. He set her face down on the bed because he did not want to look at her face and masturbated while feeling her buttocks. As he was masturbating, he inserted his right middle finger into her anus. He ejaculated on her back, then wiped his penis of semen, and dressed for work. He thought of killing her, but changed his mind. In the morning, he threatened to kill her if she left his room, locked the door, and left for work. He returned home that afternoon, picked up the girl, and drove
to an isolated area. He again thought of killing her, but released her when she “kept looking” at him. Defendant Smith was arrested the next day.

Defendant Smith was found guilty of all charges and sentenced to multiple life terms of imprisonments without the possibility of parole. Through her extended family and attorneys, the daughter constructed a Web site to gather more information that was officially available and successfully litigated in civil court against various parties, including Defendant Smith, his ex-boss, and the owners of the house. Defendant Smith agreed to a (undisclosed) sizable settlement just before the civil trial was due to commence, rumored to be more than $6,000,000.

**Introduction**

This case illustrates many of the considerations regarding forensic assessment in the context of methamphetamine abuse. The legal framework derives from Hawaiian law, but the general approach can be a model for other jurisdictions as well.

**Competency to Stand Trial (CST)**

Although frequently ordered in tandem with a request for sanity evaluation, the current practice standards require entirely separate reportage. That bifurcation is seen as legally necessary to preserve the rights of defendants and as forensically wise due to the varying focus. CST requires an investigation of present status, whereas a sanity evaluation looks at a past state. CST, in most settings, follows *Dusky v. U.S.* (1960), and asks the following questions: Can the defendant understand rationally and factually the legal proceedings and can he or she cooperate with the attorney in proffering a defense? In Hawaii, these questions have been further elaborated following *State of Hawaii v. Silverio Soares* (1996). It is of some importance to note that regardless of the cause of a mental condition that leads to negative answers to these questions, the matter of competency rests on those answers and not on the origins of the state that produced them.

In the instant case of Mr. Smith, there was an evaluation under Dusky and the more local Soares criteria; he was found fit to proceed under those standards and, in addition, showed adequate intellectual, attentional, recall, and executive skills during the evaluation. He exhibited deception, which implies awareness regarding what is actually true, along with the implementation of a method to conceal the truth, and did not have any severely incapacitating conditions at the time he was evaluated.
Criminal Responsibility (CR)

A substantial literature exists which tracks the evolution of the not guilty by reason of insanity (NGRI) category. (See, for example, Goldstein, 2003; Heilbrun, Marczyk, and Dematteo, 2002; Melton et al., 1997; Rogers, 1984; Rogers and Shuman, 2000.) Because standards that substantially inform forensic assessment vary by jurisdiction, the evaluator must be familiar with the state or federal requirements pertaining to the case at hand. With regard to Smith, not a federal case, the Hawaiian case law applied.

Although the general trend in recent U.S. mental health law has been toward restriction of scope of insanity statutes, Hawaii continues to reference the American Law Institute standard. Thus, the questions in the Smith evaluation became the following: (1) Was there a sufficiently severe mental disorder present at the time of the act? (2) Was there a substantial impairment in the capacity of the accused to appreciate the wrongfulness of the acts or in the ability to conform conduct to the requirements of the law? (3) Is there a demonstrated link between that condition and the impairment?

Further, as part of doing a CR evaluation, the expert should be aware of data that may apply to mitigating defenses where such exists (as is true in the case of Hawaii). Thus, even though “heat of passion” or “emotional insanity” will not meet the requirement for a “mental disease or defect,” it is possible that such mental states may be elements of a mitigation defense or at least applicable to a mitigation in sentencing presentation. Hawaii has an extreme mental or emotional disturbance (EMED) category, which can mitigate murder to manslaughter (Hall, Mee, and Bresciani, 2001).

Another aspect that can be present in methamphetamine cases is that of pathological intoxication: intoxication that is grossly excessive in degree, given the amount of the intoxicant, to which the defendant does not know he or she is susceptible, and which results from a physical abnormality of the defendant. Pathological intoxication may act as an exculpating disorder to relieve criminal responsibility and hence must be addressed by the forensic expert where it may apply. Moreover, even ordinary (that is, nonpathological) intoxication does not automatically inculpate the defendant, if coupled with sufficiently severe mental conditions, as shown by case law in most jurisdictions (see Chapter 9 for a discussion of settled insanity).

[Another exception would be involuntary ingestion of substances. In a tragic set of circumstances that created legal consternation, McPherson provided input in a case where the following took place. The defendant went to a party and had some alcohol that had been laced with phencyclidine (PCP). He was found by his family wandering the streets, floridly paranoid. The family took him to the hospital where he was admitted on an emergency basis and placed in a hospital room alone. (Protocol for an acute PCP management is similar to that for acute methamphetamine intoxication and
includes isolation, low lights, low auditory stimulation, and careful monitoring. Somewhat later, the hospital staff placed another man in the next bed in the same room. This patient was brought by the police, high on PCP, and after threatening others with a knife. Some time during the hours that followed, the second patient attacked the defendant from behind as he lay sleeping off the drug. The defendant, unknown to any of the staff, had a history of anal rape and was a highly trained karate expert. When the first real monitoring check took place, several hours after placing these men together, the defendant lay sleeping and the second man lay dead on the floor. In the legal processing and forensic evaluations that followed, an affirmative defense of NGRI was raised. Because of the involvement of the drug, the judge was reluctant to accept the defense, but the prosecution was unable to disprove the assertion that the defendant had not known nor contracted to take the drug, but only to drink the legal substance of alcohol. In the meantime, the forensic evaluation was faced with the issues of the potential for malingering, for assessment of a state that no longer existed but was present on a relatively fleeting basis at the time of the act, where no direct observation had taken place of the act itself. Furthermore, the defendant reported only the vaguest of memories of being under attack, of an unclear flashback to his rape experience, and then having no further recall. Thus, the defendant’s memory systems were potentially disrupted by either or both traumatic or chemical factors. The hospital was sued in civil court by both the defendant and the victim’s family.

As is detailed in the original chapter from which this material is adapted, there are both ethical and procedural issues in evaluations of this type where the use of drugs combined with substantial self-interest factors, as well as the pressures brought to bear by the competing interests of the state and defense make development of defensible data and conclusions difficult. The clinician must exercise significant cautions in managing these kinds of troubled waters.

Utilizing the Empirical Literature

Elsewhere in this volume there is a discussion of the importance of doing a Daubert (1995) based analysis in forensic work. In both proceeding and in preparation for any testimony required in a case, it is necessary to be aware of and able to present the relevant scientific basis for procedure and conclusions that pertain in an instant situation. In the case of methamphetamine, findings such as the neuroimaging data that documented continued brain deterioration postabstinence and other findings regarding the effects of methamphetamine on behavior both immediately and long-term become important. However, it is equally important that any applications to an instant case are well founded because the current state of information on methamphetamine,
as documented throughout this book, shows a range of variable responding and impacts.

Some important and well-documented impacts of the drug, such as high-dose symptoms of disorganized physical activity, muscle spasms, slurred speech, restlessness, panic, rage, and hallucinations, would be important to note in a case where recent ingestion was followed by out-of-control behavior. More chronic symptoms may also play a part in a particular situation and may lead psychologically to a state of mind that results in criminal acts. In such a case, there is as much, if not more, of the psychological as the chemical in the explanation of the behavior that occurred. The degree to which those explanations fit within the available law then must be considered.

The Expert’s Decision Path

A decision path emerges regarding criminal responsibility evaluations. As we have seen, a simple three-part decision sequence is inherent in the ALI test of insanity: (1) a mental condition must be proffered; (2) a determination must be made as to whether a substantial impairment existed at the time of the alleged offense; and (3) to assert lack of criminal responsibility, a link must be established between the mental condition and any substantial impairment.

The Rogers Criminal Responsibility Assessment Scales (R-CRAS; Rogers, 1984; see also Rogers and Shuman, 2000), the first of which addresses ALI and M’Naghten (1843) standards, presents an explicit decision path to include a determination as to whether malingering was present (if “yes,” then a conclusion must be proffered that the accused was criminally responsible). Using the R-CRAS, a determination can be made as to whether the accused suffered from cerebral injury as differentiated from a nonorganic mental disorder, but both of these constitute a mental disorder. Likewise, a cognitive and volitional impairment can be differentiated from each other, but both are subsumed under the category of substantial impairment. Rogers showed correlational data indicating a 90% agreement between trial verdicts and outcomes from his empirically based decision tree with the recommended guidelines.

Rogers and his colleagues’ retrospective decision path can be expanded to reflect forensic realities (Hall, 1985; Hall and Hall, 1987; Hall and Spohn, 1993; Yudko, Hall, and McPherson, 2003). Put in the form of eight basic questions by the authors, these steps demand yes/no answers to the following:

1. Has an adequate forensic database been obtained?
2. Have unintentional distortion and deliberate deception been examined?
3. Was the defendant personally evaluated and able to reconstruct the incident?
4. Has long-term (i.e., historical) versus instant crime behavior been compared?
5. Has a sufficiently severe *Diagnostic and Statistical Manual, Fourth Edition, Text Revision* (DSM-IV-TR) mental disorder(s) been diagnosed?
6. Were self-determination and choice of crime-related behaviors present?
7. Has a link between mental condition(s) and self-determination been established?
8. Are the proffered conclusions capable of replication by independent examiners?

The first recommended step involves the creation of a reliable and valid database, multisourced and interdisciplinary in nature, which forms the basis for all conclusions. Forensic examiners are limiting their database and therefore the soundness of their conclusions as well as their credibility if they ignore relevant information. A comprehensive database is obtained by examining the perpetrator, victim, and context of the alleged offense(s). As investigation reports are never perfect, it is highly recommended that experts examine the scene of the incident and personally inspect the evidence in the police property room.*

Concerning methamphetamine issues, it is especially important to gather data from sources which the defendant may wish to conceal because of the likelihood of uncovering unfavorable information (for example, juvenile records; “expunged” records, which are usually available in most jurisdictions in unredacted form at government archive centers and which experts are entitled to review; interviews with peers, ex-spouses, and mates; disciplinary actions in the military; information from other states or countries).

For Defendant Smith, the following significant/knowledgeable others were interviewed:

1. His mother
2. His maternal aunt
3. His maternal uncle
4. A friend of the victim’s family

*Although obtaining such data is highly desirable, jurisdictions and prosecutors are highly variable in how much information will be permitted to the forensic evaluator. In fact, in Ohio, some counties severely limit discovery evidence and others follow open discovery procedures. Recently, a Cuyahoga County judge ordered discovery on behalf of a defense request and the prosecutor responded by asking the state’s Supreme Court to nullify the order (Nichols, 2007). McPherson has had both very limited to no access even with a court order and very open access in different case contexts and different counties.*
5. His work supervisor
6. His previous probation officer
7. His girlfriend
8. His sister

In addition to inspecting the scene of the incident, Defendant Smith was examined four times with the following measures for a total of approximately 15 hours of direct contact:

1. Clinical Interviews and Mental Status Evaluation
2. Minnesota Multiphasic Personality Inventory-2 (MMPI-2)
3. Millon Clinical Multiaxial Inventory-III (MCMI-III)
4. Multiphasic Sex Inventory
5. Stroop Color and Word Test
6. Standard Progressive Matrices (Ravens)
7. California Memory Test
8. Clock Draw
9. CEP Aphasia Screening
10. Wahler Physical Symptoms Inventory (twice for present and 1 week before the alleged offenses)
11. Sensory Perceptual Examination (Vision, Audition)
12. Wechsler Memory Test—Revised (Digit Span, Mental Control, Logical Memory I and II, and Recognition Testing)
13. Incomplete Sentence Blank (Rotter)
15. Tactile Performance Test
16. Cancellation Test
17. Psychopathy Checklist—Revised (PCL-R)
18. Shipley Institute of Living Scale
19. Suicide Probability Scale
20. Visual Organization Test (Hooper)
21. Wechsler Adult Intelligence Scale-III (WAIS-III)
22. California Verbal Learning Test (CVLT)
23. Cognitive Estimation Test
24. HCL-20 (Historical, Clinical, Risk Management)
26. Hare Psychopathy Checklist—Revised
27. Stress Audit (completed as homework)
28. Mooney Problem Checklist (completed as homework)
29. Personal Problems Checklist for Adults (completed as homework)
The second step in the retrospective decision process in criminal responsibility evaluations consists of ruling out or accounting for unintentional distortion within (a) the evaluator, (b) the reporting person, and (c) the reported event. Unintentional distortion due to anxiety, fatigue, cerebral injury, psychosis, or other factors may largely explain both evaluation and crime behavior and is therefore considered before deliberate deception is analyzed. Nondeliberate distortion for the methamphetamine user at the time of the instant offense may consist of several simultaneously operating factors. As examples, time perception tends to speed up, resulting in unreliable estimates of time; short-term memory problems, including encoding and retrieval difficulties (Yudko et al., 2003) may be experienced. If distortion is suspected, observations should be cross-validated with other information. Data derived from the input of significant or knowledgeable others which indicate bias or a given motivational set (for example, fear, desire for revenge, and desire to be reunited with the defendant) should be reported but likewise compared with other known facts.

Possible deception by the defendant is extraordinarily important in determining the accuracy of database information. There are two basic types of deception—malingering (“faking bad”) and denial/minimizing (“faking good”)—from which all other response styles stem, and literally dozens of methods to detect faking. Failure to perform a deception analysis may, in our opinion, fatally flaw an expert’s opinions. To meet the demands of our decision path, a finding of deliberate deception should be ruled in by a positive and replicable demonstration of misrepresentation.

The evaluation of the defendant’s self-reports in methamphetamine cases should be scrutinized for misrepresentation by examining third-party reports and material evidence of the crime. Psychometric testing of the accused by objective measures, such as the MMPI-2, California Personality Inventory (CPI), 16-PF, and the MCMI-III, are appropriate for assessing deception due to the embedded scales that measure response set. Clinical behavior, forced choice testing, arousal methods, and others can also be utilized. There are compelling reasons to suggest that the incidence of malingering may be high in methamphetamine cases. First, the chances of malingering increase with genuine deficiencies (Hall and Pritchard, 1996), and methamphetamine use creates significant cognitive and psychological deficiencies in many abusers. Second, it is our impression that most defendants know by the time they appear in court that substance intoxication or abuse will not remove penal responsibility. Thus, it is not in the best interests of most defendants to admit to substance intoxication or abuse at the time of the alleged offense. Instead, the defendant may, as seen by the authors in a number of cases, deliberately minimize methamphetamine use and exaggerate or fabricate psychotic features of his or her behavior.
In the Smith case, the defendant was oriented to time, place, person, and circumstance and exhibited a logical and coherent stream of thought during the four examination periods. He was focused and persistent on all tasks. Overall results indicated deception. Results on the validity scale on the Wahler Physical Symptoms Inventory suggested that he likely embellished his symptoms. There was no indication of malingering memory problems on the California Memory Test. On the Multiphasic Sex Inventory, he showed substantial deception in the areas of child molestation, rape, and exhibitionism, similar to testees who were “frankly dishonest.” On the MMPI-2 validity indicia, he showed faking bad as the dominant response set. On the MCMI-III validity indicia, he scored in a similar manner, essentially endorsing items reflecting psychopathology that could not possibly be true (for example, he endorsed “I hear voices 24 hours a day, even when I am asleep”; “I can run a mile in less than 3 minutes”). The clinical and historical information he presented on when the auditory hallucinations started appeared to have been fabricated. Importantly, he did not claim psychotic signs for the time of the alleged offenses.

As a third step in evaluating for criminal responsibility, contact with and knowledge of a defendant’s recollection of an alleged crime is essential in inferring his or her state of mind. Although state of mind can often be inferred from eyewitness accounts, material evidence, and reports of third parties, the defendant’s own description of events is critical in establishing mental condition, awareness of wrongdoing, and ability to conform his or her conduct to the requirements of the law. To diagnose an accused with a mental disorder, it is assumed in all versions of the Diagnostic and Statistical Manual that interviewing and testing by an expert has been conducted; otherwise, in our opinion it would fatally compromise the credibility of the expert who diagnosed a mental disorder without first-hand contact with the accused. Reviews of the literature reveal that faked memories or loss of memories is common in homicide cases, especially when substance use or severe psychiatric conditions are involved, ranging up to 60% of the murder defendants (Hall and Poirier, 2002; Hall and Pritchard, 1996). A deception analysis should focus on suspected memory loss; for example, the test protocol and notes of the opposing expert can be obtained (by subpoena) and reexamined for the defendant’s reconstruction of events.

The expert should be aware of whether, in the jurisdiction in which the case is tried, a defendant’s statements can be admitted only as evidence of state of mind, or, in addition, as evidence that the accused committed the crime. The accused should be informed of the purpose of the evaluation. If the accused declines to be evaluated by an expert, that professional must refrain from proffering conclusions relevant to criminal responsibility. The expert may, however, comment on the methodology of the other examiners.
and present information to the court from the literature on issues germane to the case at hand.

The fourth step involves conducting a historical analysis of relevant past behavior and comparing it with that shown by the accused during the instant offense. The goal is to determine whether the instant offense is typical or atypical of the defendant. Rare events are most likely triggered by high stress or an unusual combination of environmental or internal events. Frequent bad acts, especially those that are predatory or proactive in nature, suggest a habitual pattern—as in psychopathy—and are considered more inculpatory. For methamphetamine case, a key question is whether basal violence associated with the use of the drug, especially when that violence is similar to the instant offense, was a typical result of the use of methamphetamine or an isolated event under poor control. A difficulty emerges when the judge rules against bringing in prior bad acts. If such is the case, the expert must determine whether the same conclusions can be proffered, absent the disallowed history.

Defendant Smith’s methamphetamine use started in 1984 and continued until 1996, during which period he estimated that he used methamphetamine a phenomenal 1800 times. He recalled injecting, smoking, inhaling, or drinking methamphetamine in juice almost every day when given the opportunity. He twice overdosed on methamphetamine and lost consciousness. When methamphetamine was not available, he drank coffee in prodigious amounts. Smith once left home because he was wanted by the police for drug-related activities. According to the defendant’s mother, when he returned to his home state in approximately 1994, he lived at her house. She reported several instances where Smith threw objects at the wall (he once threw the telephone when she was talking to a friend), but stated that the defendant would never hurt her. She reported that he once punched his sister in the face. In 1995, Smith began serving 6 1/2 years in prison for raping his “niece.” His mother reported that he had threatened the victim’s life if she told anyone of the sexual assault. When questioned about this incident, Smith stated that he was smoking “ice” with the victim (his adopted sister) and that he had indeed threatened her, stating, “Be quiet, or I’ll kill you.” The victim became isolatory and depressed and confined herself to her bedroom, which then alerted Smith’s mother that something was wrong. Defendant Smith’s mother also reported that she called the police on occasion due to her fear of her son. She stated that his ongoing substance abuse was a contributory factor to his going to prison. According to Defendant Smith, while in prison, he was involved in two “big” fights. During one of the fights, he was knocked unconscious and was choked.

As a fifth step, and the most straightforward and comfortable for the forensic evaluator, a diagnosis of the defendant for the time of the crime usually requires evidence in support of a DSM-IV mental condition. It is our
impression that defense experts commonly offer dual or multiple diagnoses to the court, and that a diagnosis such as methamphetamine intoxication or abuse is rarely offered alone because the examiner (along with the accused) may have a vested interest in finding a lack of criminal responsibility and knows that voluntary substance abuse is not effective in achieving a favorable outcome. The possibilities for methamphetamine-related diagnoses in *DSM-IV-TR* (American Psychiatric Association, 2000) are listed under amphetamine or amphetamine-like disorders because of common properties and general arousal effects.

An expert’s diagnosis of methamphetamine abuse or dependence for the time of an alleged offense does not imply that the affected person was under the influence of that drug during the commission of the alleged crime. A *DSM* diagnosis of methamphetamine intoxication for a particular time requires that the substance cause an altered state of consciousness, clinically significant maladaptive behavioral or psychological changes, and two or more focal signs (e.g., tachycardia or bradycardia, pupillary dilation, motor agitation, or retardation). Finally, the symptoms are demonstrated not to be due to a general medical condition and to not be better accounted for by another mental disorder. The diagnosis should specify whether delusions or perceptual disturbances (e.g., hallucinations and sensory illusions) occurred.

A diagnosis proffered for the time of the incident operates independently of whether or not it also existed prior to or after the crime. Evidence of a chronic mental disorder (e.g., schizophrenia, mental retardation, or cognitive disorder) in existence before the instant offense increases the likelihood that the disorder also existed at the time of the crime, but is not sufficient by itself to establish that it was present in its disabling forms during the incident. Some chronic mental disorders can be in remission or can be controlled with psychotropic medications. Evidence of a mental disorder (e.g., depression and anxiety disorder) that arose after the instant crime is irrelevant to a diagnosis at the time of the offense.

For Defendant Smith, the following mental conditions from the *DSM-IV-TR* (2000) were operative at the time of the evaluation (in *DSM-IV-TR*, methamphetamine disorders are listed as amphetamine-related conditions):

<table>
<thead>
<tr>
<th>Axis I</th>
<th>Amphetamine Abuse, in institutional remission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cognitive Disorder NOS</td>
</tr>
<tr>
<td></td>
<td>(Rule out) Pedophilia</td>
</tr>
<tr>
<td></td>
<td>Depressive Disorder NOS</td>
</tr>
<tr>
<td>Axis II</td>
<td>Personality Disorder NOS, with psychopathic traits</td>
</tr>
<tr>
<td>Axis III</td>
<td>Status postcerebral injuries over the years from severe polysubstance abuse and closed head trauma from fighting/accidents</td>
</tr>
<tr>
<td>Axis IV</td>
<td>Severity of stressors: Extreme problems in general ability to function, financial, legal, and social problems</td>
</tr>
</tbody>
</table>
Criminal Responsibility Evaluation

Axis V  Current Global Assessment of Functioning (GAF) = 20 (danger of hurting self inadvertently through accident proneness or deliberate injury)
Highest GAF level over past year = 20

The diagnoses for the time of the alleged offenses were the same. In addition, Defendant Smith was retrospectively diagnosed as methamphetamine intoxicated, having smoked a considerable amount of ice for a prolonged period of time. At the time of the alleged offenses, he may have been mildly alcohol intoxicated.

Defendant Smith likely had some form of mild cerebral injury. His scores indicated borderline intelligence on the nonverbal, cross-culturally derived Ravens Test which presents different visual patterns of increasing difficulty (37R, seventh percentile). The Ravens is generally a good measure of intellectual functioning as well as a measure of visual organization. On the Shipley Institute of Living Scale, which correlates quite closely with overall WAIS-R results, he obtained an Estimated Full Scale WAIS-R IQ of 103. His Abstraction Score was above average (60T, 84th percentile), but his Vocabulary Score on this test was substantially lower (46T, 30th to 35th percentile). On the Halstead-Reitan Neuropsychological Test Battery (HRNTB), he obtained an impairment index of 0.6, meaning that approximately 60% of the test results were in the brain-damaged range. The premorbid indicators on the WAIS-R and other tests showed some scatter but were overall in the average or above-average range. Together with his impairment index, a mild, static, probably diffuse brain injury in a person who has a significant history of cerebral insult was suggested. Findings from the evaluation included (1) overall average verbal intelligence but borderline nonverbal intelligence; (2) adequate attention and concentration but with deterioration under increased complexity; (3) adequate and in fact above-average verbal memory skills with particular problem in proactive inhibition; (4) average nonverbal memory for both simple and complex designs; (5) some deficiencies in his sensory-perceptual and motor abilities, for example, on the TPT, his total time in placing blocks in a form board and his left-handed performance, the mild impairment on this latter test suggesting right hemisphere involvement; (6) essentially sparse speech and language skills, but his fund of information and knowledge of word meaning, probably a function of his impoverished education, were below expectation given his overall average intelligence. Verbal memory and nonverbal memory skills were also sparse; mild impersistence in verbal fluency (i.e., word list generation), along with difficulty alternating between numbers and letters on a visual-spatial sequencing task; and (7) borderline/low average abstraction skills. His cognitive estimation ability for numbers was mildly impaired. His Digit Symbol score was low average; and (8) maladjusted personality disorder along with current depression and
stress were demonstrated. He was considered a moderate suicide risk, and antidepressant medication and supportive counseling were recommended.

The above patterns of strengths and deficiencies for Defendant Smith were consistent with the long-term effects of cerebral insult due to fighting and accidents, as well as from severe and chronic polysubstance abuse. Given these historical factors and his frequent use of a substance known to cause cognitive deficiencies, it would be surprising if he had shown no indicia of cerebral injury during testing. Overall, his brain impairment was considered to be mild on a scale of negligible, minimal, mild, moderate, and severe, but was at least moderately deficient in terms of judgment and adaptive level of functioning. The expert should note that the existence of a mental disorder at the time of the alleged offense may or may not shed any light on the defendant’s (legal) blameworthiness. The severity of the disorder and its impairment of critical faculties at the time of the offense mediate its exculpatory effect.

Defendant Smith was diagnosed on Axis II with Personality Disorder NOS with psychopathic features. On the Hare Psychopathy Checklist—Revised, he showed historical and behavioral tendencies for the following:

1. Need for stimulation/proneness to boredom (likes risky activities, may discontinue routine tasks)
2. Poor behavioral controls, short-temperedness, hypersensitivity
3. Early behavior problems as a child or young adolescent
4. Lack of realistic long-term goals (in the past, not overly concerned about the future, and living day-by-day)
5. Impulsivity, acting before thinking because he felt like it, unreflecting
6. Irresponsibility (fails to honor obligations, commitments, problems with loyalty)
7. Criminal versatility (applies to entire life pattern of law-breaking)
8. Promiscuous sexual behavior, part and parcel of his previous lifestyle, along with several short-term relationships
9. Glibness, superficial charm along with low anxiety for this trait in mild amounts
10. Lying and prevarication, with minimal embarrassment when caught
11. Conning/manipulative behavior in many areas (drugs, sex, money, etc.)
12. Some indications of lack of guilt or remorse (He experiences remorse but he has a tendency to project blame)
13. Callous/lack of empathy for others, including victims, disregarding the feelings, thoughts or welfare of others
14. Failure to accept true responsibility for his own actions. He used excuses or denied or minimized faults.

His score of 28 placed him in the moderately elevated level of psychopathology.
As a sixth step, the analysis of self-control and choice exhibited by the accused is central to the determination of criminal responsibility. Intact self-regulation for the time of the alleged crime, which can exist along with delusional or hallucinatory behavior, often leads to a finding of criminal responsibility. When complex self-regulation is uncovered by the expert, the trier of fact is likely to ask: “How can the accused claim substantial impairment when there was a demonstrated ability to plan and orchestrate the incident?” Conversely, impaired self-control frequently results in exculpation or mitigation of responsibility for the instant offense. The evaluator should analyze the instant offense for the defendant’s abilities and deficits in areas relevant to behavioral self-regulation, keeping in mind that a sole focus on a defendant’s limitations and deficiencies is a fundamental mistake by limiting information in a case.

The alleged offenses can be analyzed for the defendant’s abilities and deficits in areas relevant to behavioral self-regulation. For many of these self-regulatory parameters, statistically derived scores on an empirically validated, Likert-scale format can be obtained from the Rogers Criminal Responsibility Scale (R-CRAS) (Rogers, 1984). Using the R-CRAS variables, the following parameters were considered and results found for Defendant Smith:

1. **Reliability of defendant’s self-report under his voluntary control.** This was rated a reliable self-report; Defendant Smith reported information in a factual, sincere manner. He also volunteered potentially self-damaging information but glossed over a few details. Within a reliable self-report, however, there were a few instances of suspected malingering. For example, his presentation of hearing “voices” did not conform to what is known about auditory hallucinations, and his offering that he “tweaked” just prior to attacking the victims was convenient but not congruent with his degree of reported consumption (i.e., it was too soon to “tweak,” given the usual pattern).

2. **Involuntary interference with defendant’s self-report.** This was rated a minimal involuntary interference, slight or suspected organic interference of doubtful clinical significance, to mild involuntary interference in terms of clear evidence of peripheral impairment. Even here, Defendant Smith answered most questions with a fair degree of accuracy. There was difficulty with details, especially with times and dates, and there were distortions in a few specific areas.

3. **Level of intoxication at the time of the alleged crimes.** This was rated severe in that there was a major impairment in reasoning and actions due to methamphetamine intoxication.

4. **Evidence of brain damage or disease.** This was rated between suspected brain damage where there is fairly reliable evidence based on observation or marginal evidence from neuropsychological testing to definite
brain damage of a mild degree, based on the neuropsychological test findings, history, and clinical presentation in its entirety.

5. **Relationship of brain damage to the commission of the alleged crimes.**
   The mild brain damage, if cross-validated, was not seen as having a relationship to the commission of the alleged offenses.

6. **Mental retardation.** No mental retardation.

7. **Relationship of mental retardation to the commission of the alleged crimes.** No mental retardation.

8. **Observable bizarre behavior of the time of the alleged crimes.** No bizarre behavior other than the alleged crimes themselves.

9. **General level of anxiety of the time of the alleged crimes.** Mild-to-moderate anxiety secondary to the effects of methamphetamine as well as the circumstances of the alleged offenses was indicated.

10. **Amnesia for the alleged crimes.** None. Defendant Smith recalled the entire incident in considerable detail.

11. **Delusions at the time of the alleged crimes.** Absent.

12. **Hallucinations at the time of the alleged crimes.** Absent.

13. **Depressed mood at the time of the alleged crimes.** Absent. He was intoxicated, not depressed.

14. **Elevated or expansive mood at the time of the alleged crimes.** Absent.

15. **Defendant’s level of verbal coherence at the time of the alleged crimes.** No impairment in speech.

16. **Intensity and appropriateness of affect during the commission of the alleged crimes.** Strong-to-extreme expression of emotion, appropriate to the effects of methamphetamine.

17. **Evidence of formal thought disorder at the time of the alleged crimes.** None. However, symptoms associated with methamphetamine use often mimic paranoid schizophrenia.

18. **Planning and preparation for the alleged crimes.** Some planning that lacked specific details and timetables, little or no preparation.

19. **Awareness of criminality during the commission of the alleged crimes.** Relatively complete awareness of the criminality of the alleged offenses with a general understanding of the possible penalties. Defendant Smith made concerted efforts to avoid discovery and showed other indicia of awareness.

20. **Focus of the alleged crimes in terms of how intentional the defendant was in choosing and selecting the purpose and situation of the alleged crimes.** Markedly specific; Defendant Smith’s actions were highly focused toward time, persons, and situation.

21. **Level of activity in commission of the alleged crime.** Moderate to marked. Required a concerted and high sustained level of activity.

22. **Responsible social behavior during the week prior to the commission of the alleged crime.** Average functioning at work and with friends, but with some physical problems and stresses as discussed below.
For the week before the incident, Defendant Smith worked a heavy load, resided with his sister, and continued to abstain from methamphetamine use. He reported the following symptoms occurring nearly every day or at least twice weekly (see Wahler Physical Symptoms Inventory): (1) trouble with ears or hearing; (2) arm or leg aches or pains; (3) shakiness; (4) stuttering or stammering; (5) backaches; (6) aches or pains in the hands or feet; (7) excessive perspiration; (8) burning, tingling, or crawling feelings in the skin; (9) feeling tired; and (10) excessive gas. Interestingly, he did not report hearing voices or seeing visions, which he had previously stated was an almost daily occurrence.

23. **Defendant’s reported self-control over the alleged criminal behaviors.** Severe impairment; Defendant Smith described himself as having lost control of his behavior when he was attacked by the victims in this case after choosing to initiate behavior with criminal intent.

24. **Examiner’s assessment of defendant’s self-control over criminal behavior.** This concerns Defendant Smith’s deliberateness and self-control, regardless of the presence of other factors, such as stress. Defendant Smith was mildly impaired. He chose to commit the alleged offenses, although they were committed in an impulsive manner.

25. **Was loss of control the result of a psychosis?** Definitely not. Psychotic signs such as hearing voices or seeing visions, although affirmed in his history, were not presented or discussed at any time by Defendant Smith as he went through his version of the alleged offenses.

The last step calls for determining whether a link exists between mental condition and self-regulation at the time of the alleged offense. If substantial impairment is found in either cognition or volition, that impairment must result from the proffered mental conditions. All jurisdictions require that there be a demonstrated link between substantial impairments and the accused’s diagnosed condition(s). Further, the cause must be direct, and not secondary.

For Defendant Smith, in spite of his mental conditions, there was no substantial impairment in his (cognitive) capacity to appreciate the wrongfulness of his acts or in his (volitional) capacity to conform his conduct to the requirements of the law.

The R-CRAS decision model for the ALI standard concludes on whether a link exists and is presented as follows for the instant case:

<table>
<thead>
<tr>
<th>Psycholegal Criteria</th>
<th>Expert’s Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>Does the defendant have definite malingering, in terms of intentionally fabricating symptomatology?</td>
</tr>
<tr>
<td>A-2</td>
<td>Does the defendant have definite organicity?</td>
</tr>
</tbody>
</table>
Defendant Smith failed to meet the ALI standard for the insanity defense under the R-CRAS decision model because he showed no loss of cognitive or behavioral control. Therefore, there was no direct relationship or linkage between the diagnosed mental disorders and the cognitive or volitional control.

In CR evaluations, regardless of the formal steps taken to arrive at conclusions, there is a need to emphasize multiple sources of information representing multiple possible interests. The Rogers scheme allows an ordering of the information, but the conclusions are those of the clinician and are only as good as the adequacy of the underlying data.

In the sample case, Defendant Smith presented a full account of the incident, and therefore, there is no question of amnesia or loss of memory for the alleged crimes. Overall, indicia of choice, self-control, and awareness were present for the times before, during, and after the alleged offenses.

Defendant Smith showed a considerable amount of self-control, choice, and awareness for the time prior to the alleged violence against the victims. He generally planned the alleged burglary and showed other kinds of preparation for this event. During the commission of the killings of the three victims at their house, Defendant Smith showed choice, self-control, and awareness by retrieving the stick or club and aiming for the victim’s heads. Although Defendant Smith claimed that he lost control just before the moment when the victims attacked and cornered him, his goal of striking them in the head with the stick is inconsistent with blind fear or emotion associated with simply trying to get out of the situation. He continued to strike the victims after they stopped resisting. The choice, awareness, and self-control for the time during the alleged sexual assault, kidnapping, and
other acts toward the daughter were exceptionally strong and varied and continued over a prolonged period of time, thus removing any doubt as to whether Defendant Smith was aware of what he was doing or his ability to control his behavior. Moreover, in the alleged offenses toward the daughter, he embedded those events within the context of routine activities, such as going to work, eating, dressing, driving his vehicle, and so forth. For the time after the alleged offenses, he again showed considerable self-control. He told his work supervisor what he had done in considerable detail, thus displaying memory for the events. The remorse and guilt he expressed were predicated on awareness and his memory of what transpired. The detailed description of the alleged offenses he gave to police stood unchallenged.

Considerable choice, self-control, and awareness were suggested for the times before, during, and after the alleged offenses. Although indicia of deception and malingering did occur, as discussed previously, Defendant Smith did not claim a psychosis for the time of the alleged offenses. He offered stress and intoxication from methamphetamine to explain his behaviors.

A defense psychiatrist testified that Defendant Smith was not criminally responsible. Analyzing his deficiencies, not his strengths, she opined that there was a substantial impairment in both his cognitive and volitional competencies. A third expert, a licensed clinical psychologist, was unable to determine criminal responsibility for Defendant Smith. He opined that although Defendant Smith showed obvious deficiencies, they appeared to be the result of voluntary substance intoxication. Neither of these experts used standardized testing or a deception analysis in arriving at their opinions.

Based on the above analysis, the following conclusions were proffered for Defendant Smith with Daubert considerations in mind:

1. In my opinion, the forensic database was sufficient to draw relevant conclusions to a reasonable degree of psychological probability. All conclusions were rendered independent of consultation with other experts in this case. (The database is deliberately kept all inclusive and is linked to the degree of overall accuracy mandated by the court in the jurisdiction in which the case is tried; the second sentence affirms the independence of the expert in formulating conclusions. Experts are under no obligation to qualitatively or quantitatively assign relative weights to database sources; and it is not recommended that they do so. On cross-examination, attorneys may attempt, through hypothetical questions, to have the expert engage in such a weighting to show flawed reasoning and priorities.)

2. In my opinion, an analysis of nondeliberate and deliberate distortion suggests that the evaluation is an accurate representation of Defendant Smith for the time of the alleged offenses. The mental condition of Defendant Smith for the time of the evaluation included Amphetamine Abuse,
in institutional remission, a mild Cognitive Disorder, NOS; (Rule Out) Pedophilia; Depressive Disorder, NOS, and Personality Disorder, NOS, with psychotic features. The mental conditions of Defendant Smith for the time of the alleged offenses in addition to the above include Amphetamine Intoxication. He has a number of Axis III physical problems secondary to multiple previous injuries and prolonged polysubstance abuse. The severity of psychosocial stressors (Axis IV) for the year before the alleged offenses is seen as moderate, using DSM criteria as shown manifested by his readjustment efforts upon returning to his home state, his lack of a social life, his poor living conditions, and other factors. The highest level of adaptive functioning was poor (Axis V GAF—20 to 30 for both present and over the past years), which for Defendant Smith means that he has a serious impairment in his judgment, is episodically dangerous to self and others, and has exhibited major problems across several dimensions of behavior during the last year.

3. In my opinion, the extent to which the above-diagnosed conditions impaired Defendant Smith’s cognitive ability to appreciate the wrongfulness of his acts was mild on a scale of negligible, minimal, mild, moderate, considerable, and substantial. (The expert should be prepared to show the court how the expert derived these labels, and that the conclusions were not based on any particular theory.) He knew that he was doing wrong at the time of the alleged offenses and had full recall for events.

4. In my opinion, and on the same scale as above, the extent to which the above-diagnosed conditions impaired Defendant Smith’s volitional capacity to conform this conduct to the requirements of the law was mild. This rating was based on the interactive effects of demonstrated and intact choice and self-control for the times before, during, and after the alleged offenses.

It may be questioned whether methamphetamine intoxication by itself substantially impaired Defendant Smith in terms of his choice and self-control. Defendant Smith showed ample choice and self-control for the times before, during, and after the alleged offenses, despite claiming to have ingested a considerable amount of methamphetamine. He even decided not to kill the victim-daughter just a few moments after the violence against the other family members, and later decided to release her. Such an ability to stop and decide not to kill suggests that he possessed the ability to choose and self-regulate his behavior.

5. Risk/benefits/side-effects of danger to self, other, and property and proposed intervention are usually offered only if an exculpating mental condition is proffered. In this case, the defense attorneys agreed to have the results of the violence risk/benefits/side-effects analysis discussed in this report. The violence potential of Defendant Smith toward oth-
criminal responsibility evaluation

ers, as shown on the VRAG, is a mild–moderate 0.58 over a 10-year period. This score is founded on the base rate for dangerousness for the sample which is approximately 33%. His score on the HCR also suggested a moderate risk of dangerousness toward others.

Conclusions

This chapter presented a methamphetamine-murder insanity evaluation that illustrated salient forensic issues and particularly highlighted some of the complexities in methamphetamine-related cases.

References

In the eyes of many, substance abuse is a matter of personal poor judgment in decision making. In spite of significant popular and scientific literature suggesting that addiction is a condition that has at least some organic and genetic inputs, having a drug or alcohol problem still equates with having a character deficiency. The law reflects this not uncommon perspective in that “being under the influence” of mind-altering substances is not exculpatory unless involuntary ingestion is involved. Furthermore, as is seen below, substance abuse may lead to enhancement of sentence severity. However, substance abuse has also been mitigating for sentencing purposes, ranging from an explicit affirmative defense in California of “diminished actuality” to nebulous “wastebasket” mitigation clauses that permit the defendant to raise any factors of possible consequence. Forensic evaluation focused on the sentencing phase thus takes place in a complex and often uncertain legal context.

Statutory and Case Law Relative to Substance Abuse and Mitigation in Sentencing

Two major levels of consideration pertain when it comes to sentencing schemes. One involves state codes and the case law that defines and guides their implementation by judges. The second is the federal law and a very special ongoing approach that created a complex but not particularly flexible decision-making process.* Aspects of how these levels operate with respect to substance abuse, particularly methamphetamine (meth) abuse, and sentencing are detailed below.

* The Federal Sentencing Guidelines in effect at the time of the first edition severely limited judicial discretion. However, the Supreme Court in U.S. v. Booker (2005) returned somewhat greater decision-making power to the trial courts.
State Codes and Cases

In the state sentencing processes, somewhat greater potentials for mitigatory findings are evident. Cases in Ohio from 1996 to 2002 that have had appellate review were accessed for the first edition. Table 11.1 provides information regarding the types of cases, issues involved, and outcomes.

As the table reflects, a significant emphasis involved issues of search and seizure with defendants attempting to obtain reversals or remands based on the illegal gathering of evidence against them. In one of the more innovative of such defenses, the defendant indicated he had been high on methamphetamine at the time of his arrest and therefore had not been competent to agree to the search of the premises that ultimately resulted in the evidence against him. The Court of Appeals was unimpressed and affirmed the judgment against him.

Some of the issues of these cases involve difficult legal concepts. The notion of conspiracy requires that the state prove an agreement existed to achieve a specific illicit goal, that the parties knew of that agreement and the goal, and that at least one of them committed an overt act in the furthering of the agreement (Davis and Vitullo, 2001). Prosecutors have been accused of padding charges by adding conspiracy when evidence constituting proof of these elements was lacking and unlikely to be found. However, juries have not necessarily been able to deal adequately with the legally complex conspiracy arguments. In State v. Callahan (2001), the appeals court found in favor of the defendant on the basis that the conspiracy element was not adequately founded. However, the rest of the case stood.*

In United States v. Thomas Conne James (2001), a defendant alleged that there was differential selection of persons for federal- versus state-level charges, the impact of which was to create an arbitrary and discriminatory application of the law. Although the defendant was not upheld in his petition, it is true that state sentencing schemes are more flexible and less likely to result in the degree of severity that the federal guidelines have imposed.

*Conspiracy has been viewed by the government as a difficult charge to prove in part because of the limitations imposed by the Cruz ruling [U.S. v. Cruz, 12cr7 F3d 791, 795, 1997]. On January 21, 2003, the Supreme Court reviewed a conspiracy case and reversed Cruz. Up until January 21, for example, defendants could be found guilty of conspiracy [which is an important component in drug cases for obvious reasons] only if they believed they were in the conspiracy before it was ended by police action. In United States of America v. Francisco Jiminez Recio and Adrian Lopez-Meza, the Ninth Circuit ruled that Cruz pertained; even though the judges expressed repugnance for the Cruz ruling [270 F.3d 845, 2001, U.S. App LEXIS 23404, 2001], they followed it. However, in the ruling on the 21st, the Supreme Court reversed Cruz on the point of whether the conspiracy had to be ongoing and not stopped by police for defendants enrolled in actions pursuant to the crime to be charged as coconspirators [the police had spotted the vehicles, arrested the initiators, and set up a sting to catch the two people the initiators called to pick up the truck].
Table 11.1  Methamphetamine and Sentencing: Ohio Appeals 1996–2002 Cases

<table>
<thead>
<tr>
<th>Citation</th>
<th>Type</th>
<th>Major Issue</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>State ex rel Wright v. Ohio Adult Parole Authority 75 0s3d 82 661 N.E. 2d728, 1996</td>
<td>Revocation of conditional release</td>
<td>Restrictions in search and seizure; under prior precedent unreasonably obtained evidence not admissible</td>
<td>Evidence obtained unreasonably is admissible</td>
</tr>
<tr>
<td>State v. Cossin 110 Ohio App. 3d79673 N.E. 2d 647, 1996</td>
<td>Revocation of conditional release</td>
<td>Use of probationer’s statements as evidence</td>
<td>Miranda not required; statements admissible</td>
</tr>
<tr>
<td>State v. Hawkins 120 Ohio App. 3d277 697 N.E. 2d 1045, 1997</td>
<td>Suppression of evidence</td>
<td>Appellant claimed search warrant not adequate</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td>State v. Perry 1997 Ohio App. LEXIS 4309, 9/15/97</td>
<td>Suppression of search evidence</td>
<td>Defendant claimed he had ingested meth and was therefore incompetent to permit the search</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td>In re Wilds 997 Ohio App. LEXIS 4934, 10/24/97</td>
<td>Custody case</td>
<td>Appellant felt he should have been able to extend hearing and given custody in spite of his drug convictions</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td>In re Josslin 1998 Ohio App LEXIS 2008, 5/4/98</td>
<td>Custody case</td>
<td>Appellant wanted custody that had been given to her sister and husband due to neglect and violence with meth use</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td>State v. Robinette 80 Ohio St. 3d 234 685 N.2d 762, 5/13/98</td>
<td>Possession of meth</td>
<td>Defendant consented to car search; meth found; defendant claimed lack of knowledge and therefore invalid consent</td>
<td>Trial court upheld</td>
</tr>
</tbody>
</table>

(Continued)
### Table 11.1 Methamphetamine and Sentencing: Ohio Appeals 1996–2002 Cases (Continued)

<table>
<thead>
<tr>
<th>Citation</th>
<th>Type</th>
<th>Major Issue</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>State v. Trumbull</em> 1998 <em>Ohio App.</em> LEXIS 4268, 9/17/98</td>
<td>Possession of meth</td>
<td>Defendant agreed to search then later said he didn’t know he had a choice; meth found</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td><em>State v. Wise</em> 1998 <em>Ohio App.</em> LEXIS 5121, 10/1/98</td>
<td>Possession of meth</td>
<td>Defendant stated search exceeded scope of warrant; meth found</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td><em>State v. Signs</em> 1998 <em>Ohio App.</em> LEXIS 5468, 11/20/98</td>
<td>Possession and trafficking in meth</td>
<td>Defendant originally pled no contest; possessed and transported meth</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td><em>State v. Lewis</em> 1999 <em>Ohio App.</em> LEXIS 5485, 11/19/99</td>
<td>Meth sale</td>
<td>Defendant wanted to suppress statements of witness to meth sales</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td><em>State v. Hughbanks</em> 1999 <em>Ohio App.</em> LEXIS 5789, 12/3/99</td>
<td>Death penalty homicide; multiple issues meth involved</td>
<td>(See discussion below)</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td><em>State v. McNamee</em> 139 <em>Ohio App.</em> 3d875745.n.2.d 1147, 11/9/00</td>
<td>Possession</td>
<td>Appeal warranted search; “Ecstasy” obtained</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td><em>State v. Cates</em> 2000 <em>Ohio App.</em> LEXIS 5387, 11/21/00</td>
<td>Meth sale</td>
<td>Defendant sold meth near a school; appealed sentence</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td><em>Saterfield v. Saterfield</em> 2001 <em>Ohio App.</em> LEXIS 2592, 6/13/01</td>
<td>Custody</td>
<td>Appellate contested custody to stepmother; biological mother disqualified due to meth use</td>
<td>Trial court upheld</td>
</tr>
<tr>
<td><em>State v. Gough</em> 2001 <em>Ohio App.</em> LEXIS 3331, 7/23/01</td>
<td>Drug trafficking</td>
<td>Defendant sought suppression of evidence—primarily cocaine, some meth</td>
<td>Trial court upheld</td>
</tr>
</tbody>
</table>
in federal cases. Thus, for example, in Ohio, judges are explicitly given some discretion to raise or lower expected sentencing levels for crimes committed. There are a number of factors articulated in the law as suggesting greater or lesser seriousness and therefore meriting greater or lesser outcomes. Among the aggravating factors is a “pattern of drug or alcohol abuse that is related to the offense and the offender refuses to acknowledge that the offender has demonstrated that pattern, or the offender refuses treatment for the drug or alcohol abuse” (ORC 2929.12 (d)(4)).

Case law in Ohio, however, has given rise to some interesting and varied precedents. Thus, for example, in a 1984 case, State v. Burkholder, evidence obtained in an illegal search was allowed in a probation revocation proceeding. However, in 1996, under State ex rel, Wright v. Ohio Adult Parole Authority, the use of illegally obtained evidence was considered inadmissible. Interestingly, drug use may or may not be considered a probation violation depending on the conditions under which it occurred and the conditions that prior existed for the probation. However, the use of illicit drugs usually involves criminal charges, which then become the basis for revocation. In the case of the death penalty, aggravating and mitigating circumstances are articulated, as is usually the case across the country. Drug use is not an aggravating factor but statutory mitigating factors do not include it either. The statute, however, explicitly indicates that the defendant “shall be given great latitude in presence of evidence.” Case law, especially Lockett v. Ohio (1978), assures that in relevant situations drug use, abuse, and dependency may be presented as part of the mitigating picture.

As already seen in Table 11.1, the first survey of Ohio appeals cases (1996–2002) resulted in 18 identified as methamphetamine involved. A second survey of cases from 2002 to 2006 turned up 96 cases (which illustrates the

<table>
<thead>
<tr>
<th>Citation</th>
<th>Type</th>
<th>Major Issue</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>State v. Callahan 2001 Ohio App. LEXIS 4633, 10/17/01</td>
<td>Manslaughter; weapon under disability; conspiracy to manufacture meth</td>
<td>Defendant appealed the conviction based on what he felt was insufficient evidence; the materials involved were meth ingredients</td>
<td>Trial court upheld for all but conspiracy to manufacture</td>
</tr>
<tr>
<td>State v. Ridgeway 2001 Ohio App. 6057 LEXIS 6057, 11/21/01</td>
<td>Meth sale case</td>
<td>Law enforcement had informant</td>
<td>Trial court upheld</td>
</tr>
</tbody>
</table>
McPherson, Afsarifard, and Hall

increasing use problems). The pattern of appellate responding is fairly clear as Table 11.2 demonstrates. The vast majority of cases appealed by defendants resulted in the trial court being upheld. In a few cases there was some partial remand and in only five cases was there reversal. The remands generally involved sentencing errors or issues and the trial court was asked to readdress that aspect of the referenced cases. The state appealed far fewer times than defendants, as might be expected, but in those cases where there was such an appeal, it was more likely than not that the trial court would be reversed. In the child custody–related cases, a parent appeal generally was not successful, but in two cases there was reversal and the trial court was asked to readdress the issue. In most of the child cases, the situation involved the manufacture of methamphetamine in the house, along with associated drug-related activities and some neglect. In some cases, violence had occurred. Almost all of the criminal cases involved manufacture, possession of materials to manufacture, possession of the drug in high amounts, or drug trafficking. In many cases, there were associated charges of tampering with evidence, obstructing justice, resisting arrest, and receiving stolen property. In a few cases, methamphetamine was secondary; these cases involved primarily theft, domestic violence, and robbery. A common basis of appeal occurred when defendants appealed the denial of motions to suppress evidence against them.

In one recent case, *State v. Franchi* (2005), the charges involved the operation of a mobile meth lab. The creation of methamphetamine labs in vans, which then move through the environment, is increasing the hazard to others in expanded ways and also may have some legal implications. In a discussion with the presiding judge in a large but suburban Ohio county, it was explained that charges in such cases would depend on documentation of the lab being within proscribed distances of schools or other institutions designated in the laws. (Additionally, the jurist noted that Ohio and the rest of the middle of the country can generally expect that any drug usage problems that start on the west coast or on the east coast will move toward the opposite side of the country arriving midway about a year after they are documented; if they begin in Europe, the period is about 2 years. In his highly populated county and any metropolitan districts, drug use and drug involvement in

<table>
<thead>
<tr>
<th>Appellant</th>
<th>Trial Court Upheld</th>
<th>Trial Court Reversed</th>
<th>Trial Court Reversed in Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defendant</td>
<td>67</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>State</td>
<td>3</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Child Custody Parent Appealed</td>
<td>6</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 11.2 Appeals Outcomes in Ohio Cases, 2002–2006
(Number of Cases = 96)
crime form the primary sources of cases; most of the manufacture cases arise in the rural regions where the smell and activity of labs are not noticed by neighbors or law enforcement. Another more recent phenomenon involves transportation of drugs across the country in cars that are on trains.)

A review of some other state approaches is consistent with the situation in Ohio. In Hawaii, there are specific factors to be considered and the trial court is given significant and explicit discretion. With respect to probation, the court may require drug testing regardless of whether drugs were part of the offense. The court may consider the defendant’s past history of use and the possible contribution that drug use might make to recidivism in ordering the testing procedure.

The approach in California is consistent. It does, however, specifically mention heroin, cocaine, and “any analog of these substances” as meriting enhancement of sentence (Article 11353.1 California Health and Safety Code). The code section further specifies that if the offense involves the substances and takes place close to children’s facilities and certain other kinds of community settings, that enhancement is desirable. In that regard, the California code is somewhat similar to the federal sentencing guidelines. Interpretations of the California approach have suggested that the court must consider alcohol dependence as mitigatory and should not consider it as an aggravating aspect. On the other hand, the court does not have to consider drug use as having mitigation value where that use did not directly predispose to the commission of the crime.

During the 1990s at the state and federal levels, three strikes laws were passed. California’s three strikes law was particularly Draconian in drug-related cases, leading to life terms for minor possession convictions. Under the California statute, crimes usually considered misdemeanors could become felonies leading to long-term incarceration. The “upgrade” of misdemeanor to felony provision for sentencing purposes has been found unconstitutional by a circuit court of appeals, but the state appealed and the matter has been set for Supreme Court review (Gearan, 2002).*

**Federal Sentencing Scheme**

From the perspectives of sentencing in federal court, relatively recent socio-legal history has to be considered. In 1984, the Sentencing Reform Act set up the machinery for federal sentencing guidelines to be drafted and then subsequently amended by the U.S. Sentencing Commission. The interaction between Congress and its own creature (the commission) became an interesting process.

The overall purpose of the act and of the subsequent guidelines was stated to be an improvement in “honesty, uniformity, and proportionality” (Ruback and Wroblewski, 2001, p. 744). However, it can also be viewed as part of the trend toward a more conservative and punishment-oriented system of justice. Illustratively, the purposes of sentencing were articulated to be just punishment, deterrence, incapacitation, and rehabilitation, in that order. Even as Congress passed this act and then established the Sentencing Commission, Congress continued to amend the sentencing process with specifics that amounted to a “micromanaging” of the process. The Crime Control Act of 1990 included sentencing guidelines specific to methamphetamine offenses, and the Comprehensive Methamphetamine Control Act of 1996 increased those penalties.

Not surprisingly, the U.S. Sentencing Guidelines as they have developed out of this history fulfill the priority placed on punishment. The guidelines involve a highly complex system of levels with rules for enhancement or reduction (upward or downward adjustment). With respect to methamphetamine, the emphasis is quite clear. Methamphetamine leads to a vulnerability to enhancement of any penalty range that is mandated for given crimes. The guidelines are explicit in this regard, and methamphetamine has been singled out as a drug-among-drugs that can lead to upward adjustments. Special tables exist for amounts that are associated with such adjustments. The guidelines also reflect the current awareness that the production of methamphetamine is dangerous to nonparticipants and the environment generally (see Vogt, 2001). Thus, methamphetamine manufacturing leads to specific enhanced penalties with quantity, manner of disposition, including “likelihood of release into the environment of hazardous or toxic substances,” duration and extent of manufacturing, and location of the laboratory (enhancements are based on whether the facility is near children or other persons who are relatively defenseless) (U.S. Sentencing Commission, Guidelines Manual, 2001).

Thus, methamphetamine, rather than having mitigatory potential, can be an explicit basis for upward departure increasing sentence severity. Consistently, a diminished capacity plea at sentencing under the current guidelines is specifically disallowed if voluntary drug ingestion is involved.

There have been Supreme Court challenges to the validity of the sentencing commission. Initially, the functioning of this organ was upheld (Mistretta v. United States, 1989; Parker and Block, 2001). However, a recent case has made a substantive change in the way in which the guidelines operate. In U.S. v. Booker (2005), the Supreme Court made the decision that the federal guidelines shall be viewed as advisory rather than mandatory. Cases then began being presented for appellate review on the basis of what became known as Booker challenges. A recent review of appellate cases involving methamphetamine and referencing the years 2001 to 2006 (see Table 11.3)
resulted in ten cases, three of which were Booker Challenges (*United States v. Burns*, 2005; *United States v. Cantrell*, 2006; *United States v. Scofield*, 2006). The Cantrell decision nicely capsuled the way in which appeals deal with the current status. The Supreme Court created a mandate for appellate courts to review sentences for reasonableness. The idea behind this instruction was that if the guidelines were viewed as mandatory, there was an inappropriate incursion into the discretionary power of judges. Reviews, however, looked at first, whether the guidelines were applied accurately and, second, whether the decision was reasonable in light of the facts at hand. In other words, would a

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<td>00-1404</td>
<td>10/20/2000</td>
<td>8th Cir.</td>
<td>Defendant appealed conspiracy charged</td>
<td>TC upheld.</td>
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<td><em>U.S. v. Chavez</em></td>
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<td>00-1718,00-2098</td>
<td>1/5/2001</td>
<td>8th Cir.</td>
<td>Defendant appealed sentence</td>
<td>TC¹ = trial court</td>
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<tr>
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<td>05-50312</td>
<td>10/29/2005</td>
<td>5th Cir.</td>
<td>Defendant appealed on basis of denial of expert</td>
<td>Sentence vacated and case</td>
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<td>remanded</td>
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<td>05-1576,05-1577</td>
<td>1/4/2006</td>
<td>8th Cir.</td>
<td>Defendant appealed including Booker</td>
<td>Sentence vacated for Booker</td>
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<tr>
<td><em>U.S. v. Scofield</em></td>
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<td>defendant</td>
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<tr>
<td>05-2361</td>
<td>1/5/2006</td>
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<td>Defendant appealed sentence</td>
<td>Sentence upheld</td>
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<td><em>U.S. v. Dukes</em></td>
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<tr>
<td>05-1308</td>
<td>1/5/2006</td>
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<td>Defendant appealed conviction and sentencing</td>
<td>TC upheld</td>
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<td><em>U.S. v. Dieken</em></td>
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<tr>
<td>04-6268</td>
<td>1/6/2006</td>
<td>10th Cir.</td>
<td>Defendant appealed on basis of denial of new counsel</td>
<td>TC upheld</td>
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<tr>
<td><em>U.S. v. Lott</em></td>
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<tr>
<td>04-5834,046116</td>
<td>1/11/2006</td>
<td>6th Cir.</td>
<td>Defendant appealed sentencing</td>
<td>TC upheld</td>
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<tr>
<td><em>U.S. v. Miller</em></td>
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<tr>
<td>03-30562</td>
<td>1/13/2006</td>
<td>9th Cir.</td>
<td>Defender—Booker appeal plus other issues</td>
<td>Upheld in part and remanded for</td>
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<tr>
<td><em>U.S. v. Cantrell</em></td>
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<td>sentencing</td>
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judge have come to different conclusions than the sentencing that was made if the judge had understood that a discretionary option existed? Using that approach, the three cases already cited were reversed, in part or whole, as to the sentencing and were remanded for reconsideration.

Review of these cases suggests that while Booker appeals may be successful, if the cases met the accuracy and reasonableness criteria in general, trial courts were more likely than not to be upheld in sentencing decisions.*

**Evaluation of Defendants and Context**

**Purposes of Evaluation**

All forensic evaluation and analysis takes place within a legal context and properly focuses on the questions before the court. As the foregoing section illustrated, there are relevant precedents that constrain both questions and variables that may be entertained by the court. It is within that context that evaluation takes place.

Mitigation in sentencing involves the notion that some agreed-upon level of punishment for the crime committed can be adjusted in the direction of leniency if factors particular to the person and situation warrant such consideration. Mitigation is a basic part of all legal codes and has been present either in content (by defining offenses according to some set of standard factors to be greater or lesser) or by reference to modifying conditions (the Code of Hammurabi written about 1700 B.C. contained such specifics) (Danesh-Khoshboo, 1991).

More currently, the resurrection of capital punishment after Furman (1972) created sets of definitions of mitigatory factors and a body of case law further elaborating what could or should be brought to the attention of the jury or judge. Following Lockett v. United States (1978), inclusion of individually based information resulted in drug-related factors being placed in evidence at trial levels and subsequently becoming a focus in appeals.

In any mitigatory evaluation, forensic psychologists need to develop information on factors relevant to the likely outcomes of available sentencing alternatives. To provide the court with valid input, it is necessary to focus on both actuarial and individual case-related data. Risk analyses (see below)

* As the final manuscript preparations on this volume were being made, two decisions were handed down by the U.S. Supreme Court involving judicial discretion. Kimbrough v. United States involved a cocaine trafficking case wherein a lower sentence was levied on the basis of the existing sentencing disparity for crack versus powder cocaine. In Gall v. United States, the defendant was given probation in an ecstasy “enterprise” on the basis of his prior lack of record, voluntary withdrawal from criminal activity prior to being identified as a participant, and subsequent evidence of substantial personal rehabilitation and responsibility. Both decisions were finalized on December 10, 2007.
Mitigation in Sentencing

provide a valid basis for making predictions in instant cases. Such analyses are only as good as the large-scale studies on which they are based and on the degree to which the individual being evaluated is properly considered as a member of the reference group of those studies.

Substitution of clinical impressions for properly constructed actuarial predictions has been criticized on scientific grounds (Grove and Meehl, 1996; Meehl, 1996; Ruback and Wroblewski, 2001), but even statistically based techniques include measures of dynamic, or potentially changeable, factors. Furthermore, within the limits provided by statistical analyses, more detailed and individualized assessment allows insight into factors of relevance to the treatment process that therefore may have actuarial implications. For example, completion of sexual offender treatment has been shown in some but not all studies to reduce recidivism potential (Hanson and Bus-sière, 1998; McConaghy, 1999).

**Risk Analysis**

Even with a judge predisposed to consider sentencing from a rehabilitative justice perspective, there is a duty to engage in an assessment of the factors that are part of protecting society versus the factors that favor a less restrictive type of outcome. In those jurists who are not predisposed to consider rehabilitation as a primary purpose, administration of justice, the importance of victim impact, and the need to send a message of disapproval by way of punishment of offenders will outweigh offender potentials for rehabilitation. However, regardless of the underlying philosophy of justice that a court may hold, that part of the decision making based on an assessment of the needs of society for protection may be impacted by an appropriate risk/benefits/side-effects analysis.

Because that is true, most, if not all, presentence investigation reports include outright or implicit risk analyses. However, what can also be said is that presentence investigation reports do not reflect a high level of scientifically informed assessments and basically incorporate what have been statutorily or by regulation determined to be the relevant risk factors. Thus, in Ohio, the following areas are typically found in presentence reports: basic demographics, identifying information, family information, arrest history, gang affiliation, health (physical and mental) status, drug/alcohol use, military service, financial information, employment history, and defendant’s perspective on the instant offense.

By contrast, the current level of risk analysis is well past that point when Monahan (1981) was warning against psychologists’ involvement on the basis that the insecurity and unreliability of such analyses made that activity unethical. At this point, three generations of scientific work later, certain assertions can be stated with respect to risk analysis:
There are legitimate actuarially based approaches to risk analysis that provide valid information about low base-rate behavior and that have now been tested for long enough periods that reasonably informed decision making can take place on the basis of the data yielded in the individual cases. Further, there are refined statistical methods for dealing with that data (Hall, 2000).

Actuarial assessment alone, however, has been possibly misapplied in the criminal justice system depending on the level of sophistication of the examiner. Actuarially based instruments include both static and dynamic factors. To the extent that an instrument is based only on static (unchangeable) qualities, the implications are negative for rehabilitation—in effect, a self-fulfilling prophecy that will never change because the items upon which it is based are themselves immutable and the outcome has been fixed (McConaghy, 1999; Mulvey and Lidz, 1985, 1995; Quinsey et al., 1998; Rice, Quinsey, and Harris, 1991).

However, it is clear that tampering with an actuarial system on the basis of clinical intuition not only offends Daubert (1993), but has also been appropriately criticized because it does not show any reasonable promise of scientific adequacy (Grove and Meehl, 1996).

The current generation of statistically based risk analysis includes instruments (Table 11.4) that involve both static and dynamic aspects, which can be used not only to provide scientifically respectable predictions, but also to suggest appropriate intervention modes such that risk levels may be reduced, depending on subsequent behavior and outcome of intervention.

A review of the content of the instruments listed in Table 11.4 shows that drug abuse is only sometimes one of the factors used in prediction. It is, of course, considered a dynamic factor because it can be, at least theoretically, altered as a function of treatment or situational input. However, none of the instruments differentiates the use of amphetamine derivatives, including methamphetamine, from other drugs. Some instruments have isolated opiate and heroin use as specific predictors. In Hall’s approach (see Chapter 13), an effort has been made to isolate factors specific to this particular drug and their implications for risk analysis. It appears that methamphetamine operates to potentiate violence in persons with a history of violence.

A cyclic pattern is typical in chronic methamphetamine addiction and its action as a releaser for violence. General forensic principles with respect to violence prediction should be followed, along with an appreciation for specific mechanisms that can operate in the case of methamphetamine intoxication or a use history for that substance. An assessment of methamphetamine use and its relationship to offenses committed can be a basis for recommending treatment that may reduce violence potentials. However, the research is
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<tr>
<td>Client Management Classification System (CMC)</td>
<td>Developed in Wisconsin, involves semistructured interview, which explores specific “criminogenic” factors; allows a set of treatment specifications that has been associated with reduced risk in 18-month follow-up studies; follow-up research is quite insecure.</td>
<td>Dhaliwal, Porporino, and Ross (1994); Eisenberg and Markley (1987); McManuis, Stagg, and McDuffie (1988)</td>
</tr>
<tr>
<td>Hare Psychopathy Check List—Revised and Screening Version (PCL-R; PCL:SV)</td>
<td>Twenty items (PCL-R) or twelve (PCL:SV); static and dynamic factors involve significant experience and training needed to use adequately; substantial research backing as a general predictor of violence recidivism and also for sexual violence.</td>
<td>Hare et al. (1990); Hart, Cox, and Hare (1995); see also other publications</td>
</tr>
<tr>
<td>Level of Surfaces Inventory — Revised (LSI-R)</td>
<td>Fifty-four items, Yes/No format, static and dynamic variables; good support for prediction and monitoring of risk levels.</td>
<td>Andrews and Bonta (1998)</td>
</tr>
<tr>
<td>Minnesota Sex Offender’s Screening Tool — Revised (MnSOST-R)</td>
<td>Twelve items with associated scores, which reflect positive and negative correlations with recidivism and include both historical and static variables for use only with persons who have been incarcerated and are being considered for release.</td>
<td>Epperson, Kaul, and Hesselton (1999)</td>
</tr>
<tr>
<td>Offender Group Reconviction Scale (OGRS)</td>
<td>Developed in England and Wales, scale is rapidly being implemented in presentence investigation throughout those parts of the United Kingdom; consists of six items; has been shown to predict reconviction within 2 years in 83% of cases.</td>
<td>Cooke and Michie (1998); Copas and Marshall (1998)</td>
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<th>Instrument</th>
<th>Purpose/Limitations</th>
<th>References</th>
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<tbody>
<tr>
<td>Rapid Risk Assessment for Sexual Offense Recidivism (RRASOR)</td>
<td>Four items with liability and validity data; developed in Canada; static factors</td>
<td>Hanson (1997, 1998)</td>
</tr>
<tr>
<td>Risk of Reconviction Scale (ROR)</td>
<td>Developed in England and Wales to predict suitability for parole; six items with weighted positive and negative scores reflecting positive and negative correlations of the items, and differentiated for general reoffending and serious reoffending (see also OGRS)</td>
<td>Copas and Marshall (1998)</td>
</tr>
<tr>
<td>Salient Factor Scale (SFS)</td>
<td>Developed by U.S. Parole Commission; six items; static and dynamic factors, including specified heroin/opiate dependence</td>
<td>Gottfredson, Wilkins, and Hoffman (1978); Hoffman (1994)</td>
</tr>
<tr>
<td>Sexual Offender Risk Appraisal Guide (SORAG)</td>
<td>Developed out of the MacArthur studies and work on the VRAG; fourteen variables; not significantly better than the VRAG for prediction of violent recidivism in the sexual offender population</td>
<td>Quinsey et al. (1998)</td>
</tr>
<tr>
<td>Sexual Violence Risk–20 (SVR-20)</td>
<td>Twenty factors with static and dynamic aspects; evaluator determines risk level on the basis of experience with the population; factors are empirically valid, but instrument has not been statistically validated</td>
<td>Boer et al. (1997)</td>
</tr>
<tr>
<td>Static 99</td>
<td>Refinement of the RRASOR; ten items, all static, coded present or absent</td>
<td>Hanson and Thornton (2000)</td>
</tr>
<tr>
<td>Violence Risk Appraisal Guide (VRAG)</td>
<td>Twelve items; includes the PCLR score, thus reflecting all of those variables and implicitly counting certain items twice; empirically based, with ongoing research</td>
<td>Quinsey et al. (1998)</td>
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</table>
yet to be done that allows methamphetamine use per se to be treated as a statistically based predictor in the absence of other established indicators.

A specific pattern of lethal aggression involves homicide–suicide, the cooccurrence of aggression directed toward the self and others. Trained police officers know that dealing with persons who are actively threatening suicide can be dangerous because of the potential to redirect the aggression toward the officer. Specific studies of behavior involving acts of aggression against self and others have not included methamphetamine or other stimulants but have identified that opiates and alcohol may be predictors. Given the dynamics of methamphetamine and its potential for mood destabilization as well as reduced executive function, further research into all aspects of aggression directed both inward and outward needs to specify in more detail substance abuse patterns, including especially methamphetamine (Hillbrand, 2001).

**Malingering**

At all phases of the forensic evaluation, malingering is a significant issue because motivation to present in a fully disclosing and honest fashion is generally less likely than would be the case in other contexts. As indicated by Hall and Pritchard (1996), evaluation of malingering in methamphetamine cases is complicated because methamphetamine genuinely impacts cognitive function causing both short-term and more subtle or chronic long-term defects. Furthermore, acute and chronic impacts of methamphetamine can produce psychotic-like mentation. Finally, in individuals who are predisposed or have preexisting mental illness, the use of methamphetamine may worsen the symptom picture.

Legal context obviously has an impact on impression management approaches. Methamphetamine users commonly deny or minimize the part played by the drug in an instant case, because they usually know or are told by defense counsel that voluntary ingestion of substances is not exculpatory (Hall, Chapter 14, this volume). In the case of a postconviction evaluation, there is also likely to be significant interest in being seen in a sympathetic light. Therefore, the motivation to consciously emphasize psychopathology, and to attribute it to mental illness, is often present. From an affective standpoint, there may be depressive reactivity by virtue of the situational factors being faced (prospects of extended time in prison), and there may also be an underlying biochemical basis for depressive reactivity due to the extended withdrawal.

For the most part, psychological instrumentation is not at the level necessary to definitively evaluate the percentages to which given symptoms may reflect malingering. However, new tests and old tests with new research are more and more available (examples might include the Test of Memory Malingering [TOMM], Validity Indicator Profile [VIP], Multidimensional Investigation of Neuropsychological Dissimulation [MIND], Miller Forensic
Assessment of Symptoms Test [M-FAST]). It is also very difficult to determine, in the case of an actual psychotic-like presentation, whether the cognitive distortions are methamphetamine residua or symptoms of an underlying, preexisting, and ongoing mental illness of a schizophrenic or similar type. Differentiating “real” versus “manufactured” mental problems involving either cognitive or emotional illness can be problematic and certainly requires data beyond that of the presentation and products of the defendant.

Evaluation of malingering has been further complicated by case decisions that have defined conscious attempts at distortion in the course of such evaluations to be indicators for upward adjustment to sentencing guidelines (see, for example, United States v. Pineda, 1992). A double-edged scientific and legal dilemma presents. The responsible forensic practitioner is under an ethical obligation to acknowledge and investigate malingering potentials. However, the identification of malingering not only assists the psychologist and court in assigning weight to psychological findings, but also potentially affects the defendant harmfully. Malingering as a condition is hard to diagnose or “prove.” Therefore, the practitioner is under an obligation to come to this conclusion only by careful development of supportive data (Melton et al., 1997; Rogers, 1997).

Some approaches that can be helpful in dealing with this dilemma are the following:

- Repetition of cognitive assessment for comparison to that done closer to the time of the act, perhaps as a function of a defense expert’s evaluation or a court-ordered evaluation due to questions of reduced or exculpatory status.
- Review of historical data using records produced prior to the instant offense; prior records of mental illness.
- Interviews of family, employers, or school personnel. School records, especially from pupil personnel sources or from schools where actual narrative reports of behavior are maintained, may be of assistance.
- Defendant retrospective of the crime. A close to verbatim account of the criminal activity can be evaluated against independent evidence in the record and other interviews and interrogation to determine whether significant minimization or distortions can be identified. Patterns of distortion can be evaluated for known impacts of methamphetamine use on time perception and memory function.

**Procedures**

**Interview**

Interviewing allows a behavior sample that itself can be interpreted. It also provides information that a defendant is willing or able to share.
Methamphetamine is known to impact cognitive functioning in a variety of ways but is not determinative of either content or type of distortions that may occur in instant cases. As is always the case in interviewing individuals accused or found guilty of crimes, issues of malingering arise. However, in chronic methamphetamine users, organically based misrepresentation of facts also needs to be considered.

The interview needs to gather the usual materials in a clinical assessment (personal history, family history, health status and history, educational and vocational background, legal history, mental status functioning, and obviously a history of drug/alcohol abuse including onset and patterns of use). The specifics thus obtained can be evaluated against available third-party and record information, providing insight into the degree of consistency and possibly identifying patterns of dissimulation (self-aggrandizement, omissions, projection of responsibility). The use of some type of underlying structure at least for coverage of topics can be recommended.

A retrospective on the instant crime may or may not be obtained. Even after a finding of guilt, some defendants maintain innocence and look to the appeals process for vindication. Defendants may be instructed not to discuss the crime by counsel. On the other hand, in some cases, counsel will urge the clients to review in entirety and with honesty their memory of events as they transpired. This material may be of substantial value in the sentencing process (it may illustrate remorse and insight, for example) or it may significantly affect risk analyses (for example, the PCL-R). It allows specialized inquiries into unusual aspects including analysis of the relationship of the defendant to weapons—Meloy’s (1992) Weapons Assessment can be used where appropriate—or to distorted thinking, especially in sex crimes. It may provide examples of the impact of the drug on cognitive functioning, referencing a sense of rapidly occurring events that actually took far longer (time distortion) and problems around detail recovery (encoding and retrieval memory problems). See Chapter 14 for a fuller discussion of factors of cognitive distortion versus malingering.

In obtaining a retrospective from the defendant, the use of an inverted triangle model of interviewing, with an emphasis on the devices of the cognitive interview (Fisher and Geiselman, 1992; Milne and Bull, 1999), is recommended. Initial inquiry is open ended: “Tell me what happened. Begin at the beginning and give me as much detail as you can remember.” After the defendant provides an account (with nonspecific encouragement: “What happened next?” “Just tell me what you remember”), one can focus on specific aspects and ask for particular details of what was experienced (“Describe for me what it looked like when …” “I wonder exactly what you could see when …” “I wonder if you could hear anything going on when …”). Ask about how long sequences took where that information is not spontaneously provided.
This type of extended inquiry into the criminal behavior is not always either possible or desirable. However, when it is undertaken, using auditory taping can be of significant help in obtaining the kind of specific response information that lends itself to forensic analysis. In some jails, it is possible to arrange in advance permission to do such recording; many facilities will not allow it without such permission and it would be hazardous to attempt it without checking on local rules. Sometimes a court order is necessary for a recorded interview. Learning a highly adequate form of shorthand is a boon to any forensic evaluation.

Data obtained in the course of the interview may be applicable to an understanding of the offense and motivational state, which are clearly relevant to the sentencing process. It allows insight into characterologic features, which are often a focus at this stage of criminal justice. Treatment or other rehabilitation efforts may be enhanced by the findings.

**Psychometrics**

A review of current literature produced little in the way of specific patterns associated with methamphetamine abuse. Most research has been done on the impact of alcohol, cocaine, or polysubstance abuse. Research on stimulants as a class is also available for extrapolation.

In the area of neuropsychological functioning, there has been some attention paid to impacts on memory, attention, psychomotor measures, and processing variables. Common instruments used for investigations have included the Wechsler Adult Intelligence Scales (currently, the WAIS-III), the Wechsler Memory Scale (R or III), Trailmaking Test, Wisconsin Card Sort Test, and other instruments that reflect variables associated with cognitive deficits.

One recent study looked at memory deficits in MDMA (3,4-methylenedioxymethamphetamine) abusers with initial testing and follow-up 1 year later. Results were consistent with other sources of information, which suggest that ongoing methamphetamine use leads to progressively increasing neurocognitive deficits (Zakzanis and Young, 2001). McKetin (2000) documented poor performance on all indices of the Wechsler Memory Scale-Revised (WMS-R) for amphetamine-dependent persons versus impairment specific to visual memory tasks for heavy users but not those meeting dependency requirements. Other analyses indicated patterns on attentional tasks by those classified as dependent that were indistinguishable from psychotic and affective conditions. This study, however, may be suggestive only for methamphetamine abusers.

Attention deficit/hyperactivity disorder (ADHD) has been a focus of some investigations. Hypotheses that ADHD may be related to inability to profit from standard approaches in substance abuse treatment have been evaluated and only partially supported. Associations between ADHD and
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substance choice have been considered, especially referencing psychostimulants. However, such studies highlight the differential diagnostic dilemma: underlying and preexisting organic bases for neuropsychological divergence from normal exist along with those deficits produced by substance abuse. Similarly, studies of substance abuse and schizophrenia have shown overlaps in patterning on neuropsychological testing (Badgett, 1999; Snyder, 1998). As methamphetamine is known to have impacts on memory, perception, and executive control functioning, as well as presenting substantial issues for identifying and ruling out malingering (particularly of mental illness in order to be seen as less culpable), obtaining standardized data from the defendant, in addition to his or her reports, is an important component to the assessment process. However, it may or may not be possible to do extended neuropsychological screening at the presentence level in many cases. Where interview and other data strongly suggest an organic component, the expense in time and money can be justified. In some cases, neurological assessment (computerized tomography [CT] scan, magnetic resonance imaging [MRI]) may be possible but would be rarely approved in the vast majority of such cases.

Instrumentation that can be utilized at a screening level includes WAIS III; Wechsler Memory Scale III; Trailmaking; Rey Figure; Bender Gestalt (although much maligned, as a screening assessment of both gross perceptual motor functions and as an informal means of assessment of task management, it can be helpful). All these instruments would have some potential to map strengths and weaknesses of cognitive function that have relevance for capacity to benefit from treatment or the need for special supports in that process.

Personality assessment instruments have also been studied with regard to substance abuse, especially because differentiation of non-substance-related conditions from those produced by use becomes an important issue in recommending treatment interventions. The MMPI-2 contains a number of substance abuse scales (the MacAndrews, the Addiction Potential Scale, and the Addiction Admission Scale can be referenced). Additionally, clinicians know that the Harris and Lingoes subscale Bizarre Sensory Experiences (Sc6) and the Bizarre Mentation Subscales (BIZ1 and BIZ2) can register with substance abusers, especially those who have experienced hallucinatory phenomena.

The strength of the instrument, particularly for forensic purposes, lies in its statistical base and the ongoing production of substantial scientific literature. In regard to issues of malingering, the MMPI-2 has built-in validity indicators as well as studies of patterns associated with different impression management styles. In cases of individuals without the capacity to read at approximately a sixth- to eighth-grade level, it can be administered orally or by tape, but that procedure can be difficult to manage in many criminal justice settings, both for reasons of time and regulations. In general, however, most defendants are capable of taking the test—and most forensic
practitioners would have to justify not using it in preference to some other instrumentation, particularly more subjectively based approaches.

The Millon Clinical Multiaxial Inventory (MCMI-III) is newer than the MMPI tests but is an empirically sound self-report questionnaire. This test may be of some assistance in identifying specific Axis II configurations and can be helpful as part of the database on which differentiations between likely malingering versus honest responding have occurred. It is not a good instrument to use to replace the MMPI-2 for Axis I conditions, and it overdiagnoses personality disorders such that it should be used where there is reason to believe the individual reasonably has an Axis II condition and other data are available for comparison.

On the MCMI, there have been studies specific to cocaine and more generally to substance abuse that identify patterns of importance, including differentiation of antisocial personality disorder from other personality patterns within the population of substance abusers, the identification of patterns relevant to treatment issues, and the characteristic malingering response modes found in different diagnostic groups (Flynn and MacMahon, 1997; Flynn et al., 1997; Messina, 2000; Messina et al., 2001; Weiss, 1998).

The Personality Assessment Inventory (PAI) is a relative newcomer. It has a much less substantial scientific base than the MMPI tests, but the literature increasingly cites its usefulness. It requires less time to administer, has a lower reading level, and has a built-in method for looking more continuously than dichotomously at traits. (All tests that are completed by the defendant must be actively proctored by the forensic clinician or a qualified agent who can assure that the test was indeed the product of the defendant’s work.)

Projective techniques do have a place in forensic work (some forensic practitioners have subscribed to the contrary). However, their strength lies in the insight they provide into intrapersonal aspects of function. The Exner Rorschach has a substantial base of use in the court system and has been cited in numerous cases as meeting scientific requirements over a period of many years. Under certain specialized circumstances, as with death penalty mitigation, extended ways of dealing with content have some relevance for understanding crime and criminal. A forensic psychologist needs to prepare in advance for possible cross-examination about the reliability and validity of this (as of any) instrumentation used. One of the authors (McPherson) has testified in court about the Rorschach using a step-by-step but brief exposition: the test is made up of inkblots that can be seen as many things; the individual produces responses with an inquiry into why he or she said what was said; the responses including all the reasons used are categorized, and a count made of categories and numbers of times used; these numbers are then put into relationships with one another—often ratios—which allow patterns
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to emerge that are associated in the scientific literature with different personal characteristics. McPherson has never had to go any farther than that in explication.

Other projective techniques have less frequent application to forensic assessment at the presentence level, although any data regarding personality structure and functioning may be of interest and relevance to treatment that may be mandated. Thus, responses to sentence completion techniques or even versions of the Thematic Apperception Test may be included as supportive or illustrative, but not determinative, of the examinee’s characteristics.

Context

It is at the level of developing information regarding contextual factors that the most reliance on third-party information (TPI) is likely to occur. As with data produced by way of traditional individual assessment procedures, there is concern with issues of reliability and validity from a scientific standpoint further underscored by Daubert (1993) decisions and other rule of evidence precedents. Evaluation of TPI should consider the source of the product and should not presume accuracy due to status of the informant (see discussion in Melton et al., 1997). An attitude of objectivity and skepticism serves well in dealing with these kinds of data.

Categories of Third-Party Information (TPI)

Different data sources with associated concerns follow:

- **School Records**—Information is not likely to be contaminated by immediate case-related variables. Reliability for academic and intellectual function is high; bias can impact behavioral items, especially if the individual was disliked or identified as a “bad apple.”

- **Juvenile Records**—Information relative to offending is likely to be highly accurate; if anything, the degree of antisocial behavior will be understated because the data cover only those acts for which the defendant was apprehended.

- **Adult Criminal Records**—Same as above. However, it can be noted that minority and impoverished status predispose to criminal behavior and to winding up in the system to a greater degree than is true for those with higher status and wherewithal in the society. Therefore, the meaning of a significant “rap” sheet might be more indicative of psychopathic character referencing a middle- or upper-middle-class defendant, whereas it may reflect general antisocial behavior in the case of an inner-city gang member.

- **Prison Records**—Generally good sources for capacity to conform to highly structured environments, these records are a reasonable basis
for predicting adjustment to prison in the future. However, disciplinary incidents may or may not reflect potential and actual misbehavior of a defendant. There is corruption by virtue of the power imbalance (Zimbardo et al., 1972), racism, and other factors that can impact a prison record.

- **Treatment Records**—Records predating the offense may be viewed with confidence regarding mental status, diagnosis, and response to treatment, as well as possibly containing information important to background, family, and other history. Records from a treating professional that postdate the offense may be subject to unconscious bias of the treating therapist who is invested in his or her patient, as well as reflecting what the defendant may want to promote.

- **Reports from Family Sources**—Both positive and negative bias based on highly individual factors of relationship and history has to be considered.

- **Police Reports**—Generally viewed as highly reliable and valid by the court system, some skepticism is nonetheless warranted, particularly where racial factors may be involved, or where the police have felt themselves victimized by the defendant or associates. Police brutality is less common than many defendants may believe, but it is not unknown, and when it occurs there is motivation to cover it up by attributions of violence to the defendant in the course of confrontations.

- **Victim Statements**—Again, victim statements have high regard from the court system but cannot be accepted without some scrutiny. Particularly in cases of sexual offenses, context and motivation of the reporter have to be considered. That said, it must be noted that a false report of sexual abuse is a low base rate phenomenon.

- **Crime Scene Data**—Information from the investigation of the crime scene can be of particular importance in methamphetamine (or any) cases involving violence. The interest is often in whether the violence was spontaneous and not under good executive control. Crime scene pictures and descriptions can provide important input to that issue.

- **Medical Records and Medical Examiner Reports**—The information is usually of good quality. However, there have been instances of incompetent or corrupt medical examiners. Recently, in one jurisdiction in Ohio, it was identified that a given period of time involved an essentially automatic classification of questionable infant deaths as accidental rather than raising the possibility of homicide, leading to extended but belated investigations (Sangiacomo, 2002).

- **Interrogation Reports and Tapes**—Any taped interview or statement has a certain amount of face and real validity. When the entire interrogation is documented, issues of suggestion and coercion can be evaluated, but in the United States that is a rare occurrence.
Reporting to the Court

In general, forensic reports follow a format of identifying information, procedure, and results. In many teaching and clinical settings, there is a preference expressed for what is known as fully integrated reports where all data are combined into a description of the individual and referenced periodically throughout the body of the report, after which there are diagnostic and conclusion or treatment recommendation sections. The forensic report, however, must withstand the scrutiny of the legal system and there is an obligation to make the data reasonably accessible to the process of examination and cross-examination. Toward that end, the following format is recommended:

- **Identifying Information**—It is important to include birth date and any other specific identifiers that may be an ongoing basis for assuring that the report references the defendant. It is also important to include a description of the offense. All reports need to be identified as to the purpose of the evaluation.

- **Procedure**—Sources of information relied upon should be listed. It is particularly true in performing second opinions or assessments for defense counsel that some information available through the court system may not be made accessible to the psychologist. By listing those materials that are used, unnecessary challenges are avoided and necessary ones can be made.

- **Detailing Results**—This section contains results of interviews, including mental status examinations, history as obtained from the defendant, retrospectives, which may be reproduced verbatim at times, and other defendant-generated information. A separate section should be provided that details results from third-party information and provides specific sources for specific items and sections for cognitive and personality assessment, which detail the relevant results from test data. Scores should be included in these reports. It would be rare to include personality profiles with the report although they may be made available upon appropriate demand; however, computer-generated interpretations for personality assessment instruments should never be a part of the report to the court.

- **Diagnosis**—The DSM-IV system should be used, but modifiers that are significant in identifying defendant status can be inserted into the diagnostic presentation. It is desirable to include all five axes, but it is necessary to include Axes I through III.

- **Summary and Recommendations**—In this section, the foregoing data are integrated into a set of logically connected and scientifically founded conclusions and recommendations. A risk analysis may be part of this
section, in which case the particular instrumentation needs to be referenced with the specific outcomes. In methamphetamine-related cases, coverage for substance abuse in the course of the defendant’s narrative and any relevant commentary from third-party sources and in the diagnostic section need to appear. Treatment recommendations should be based on the data and should specify needs and parameters that will enhance the potential for treatment success. In most methamphetamine cases, particularly where use has been in any way extended, concern should be raised for neuropsychological functioning and a recommendation made for assessment as appropriate along with inclusion of compensatory work and education in the treatment plan. As is always the case, the forensic report addresses the particular legal questions that are present. Therefore, the instrumentation chosen, as well as the conclusions rendered, often need to speak to issues of recidivism and the factors that may serve to reduce that potential. Another area that needs to be covered in the final section and related where appropriate to recommendations is the role that methamphetamine and other substance abuse played in the instant offense. This connection is particularly relevant for recommendations that aim at reducing recidivism potentials.

- **Final Caveat**—A good psychological report describes an individual and is written in a way that compels attention. However, it is also well known that the part of the report that is most likely to be read, especially by persons such as probation officers writing presentence investigation reports (PSIs) and judges, who have asked for the information, is the last section. That section must embody all characteristics of good legal writing: clarity, logical structure, and linear reasoning.

Other detailed helpful information for approaching court-related evaluations can be found in Melton et al. (1997).

**Presentence Investigation Reports**

PSIs submitted by the probation department are of substantial importance to the sentencing process. However, there is significant variation in content and degree of independent judgment actually exercised by the writers. In some settings, there are guidelines for the collection of data with an expected, almost rote production of the report. In other places and sometimes within settings, there are expectations for individual initiative based on experience and training. Instructions to probation staff can exert a measurable impact on both the content and, ultimately, the outcome of the sentencing process. (In one case in our experience, a political agenda operated to support punishment; the PSI was replete with all the usual markers for probationary
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eligibility—first offense, restitution made, remorse evident, punishment from other sources already occurred, offender employed and had family responsibilities, support system existed, no personal risky habits—but the usually present recommendation section was not completed, increasing the ability of the prosecutor to obtain a higher severity than was objectively warranted.)

Psychological reports may or may not be referenced in a PSI. Sometimes, such evaluations may be submitted independently by defense counsel or requested by the court. Psychological reports tend to be most valued when they provide a rationale for what the court has determined will take place. To some degree, this is due to the view of clinicians as having an overly liberal bias and being more “soft-hearted” than defendants warrant (Melton et al., 1997).

As has already been documented in the legal literature, a factor of substantial importance in the sentencing process is drug use, particularly where that use may have precipitated aggression. The issue of drugs as precipitating uncharacteristic aggressive behavior may be raised as mitigating, but it is as likely as not that the voluntary use of methamphetamine in particular will have an opposite impact on sentencing outcomes. As was seen in Lopez v. Davis (2001), the inclination to classify drug use and trafficking as more aggravating than mitigatory extends to eligibility for early release consideration.

One of the authors (McPherson) was present at a sentencing hearing in which the presiding judge accepted a seriously mentally ill defendant’s guilty plea to bank robbery. The judge refused to hear any mitigatory testimony on behalf of the defendant and lectured him on his immorality and unworthiness for mental health treatment or other consideration by society. The foundation for the judge’s approach was that the defendant had a history of drug involvement and therefore his mental illness, if indeed he had such, was a function of his own doing (the defendant had a clear and independently documented family history of mental illness and exhibited classical symptoms of schizophrenia). A harsh sentence was levied; attempts then had to be initiated in the prison system to obtain the medication to which the defendant had been responding but which was not being prescribed due to the judge’s “diagnosis.”

Clearly, even with careful use of data and documentation of sources, psychological reports may have an impact different from that intended (or no impact at all). Clinicians who identify substance use as a mitigatory circumstance need to understand that from a legal perspective it is a double-edged sword. They are also providing evidence of a factor that may be seen as cautionary for rehabilitation and subsequent safe release (Melton et al., 1997).

Although a treatment approach for addiction is more likely than a retribution or punishment model to lower recidivism when successfully completed (see below for further notes on treatment characteristics and see also Chapter 17), that fact is little appreciated by many jurists. In a presentence evaluation, the forensic clinician must consider two major aspects:
To what degree was the crime a function of a correctable and diagnosable condition (for example, methamphetamine dependence), on the basis of which recommendations may be made for treatment? Such recommendations reflect a rehabilitative approach to criminal justice.

On the other hand, to what extent has an individual operated aggressively while under the influence of methamphetamine? In such cases, a known increased risk of recidivism is present, which may argue for a longer sentence and more caution regarding any conditional release (Melton et al., 1997; Miller and Potter-Efron, 1989).

The actual relationship between crime and drugs is complex and may involve a primary criminal motivation (i.e., money) or may reflect correlations with other factors (e.g., contaminated drugs, characterologic features of the offender, or psychosocial/environmental aspects). Some studies have demonstrated that intake of drugs predisposes individuals to reduce their sense of personal responsibility, to behave impulsively, and then to blame the outcome on the intoxicated state (Brochu, 1992; Fagan, 1990; Lang et al., 1976). Brochu's (1992) review of the literature for the period 1972 to 1992 did not support the conclusion, however, that amphetamine or other stimulants per se were major defining factors to account for violent crime. Rather, the consensus supported the relative importance of contextual factors and multicausal analysis. Similarly, the findings by these writers regarding cases evaluated at a court clinic and cases seen at a hospital (see below for details) supported a complex view of the causes and onset of aggressive behaviors. Thus, both criminological studies and clinical evidence support individual assessment in developing risk estimates (Hart, 2001).

Survey of Methamphetamine Cases Evaluated in a Court Clinic

A sample of current cases referred to an Ohio County Court Clinic on the basis of drug-related issues were available for review. Seven of the group referenced methamphetamine-related charges. Although assessment and treatment options in this county are better than is often found, they are generally provided only to defendants for whom a mandatory prison sentence is not involved. The general inclination of judges at this court is to refer whenever they perceive questions about treatment-related issues. It is the impression of the court psychologist that defendants referred for a pre-sentence psychological evaluation often are seen as having greater potential for treatment than incarceration.

The focus for psychological evaluations as the court psychologist reported it is to develop information relevant to the mitigation and sentencing issues
and to the risk of violation of probation where a treatment package is recommended. In his opinion, further evaluation of the substance-related and other treatment aspects of referred defendants should be a component of any ongoing treatment facility.

The major sources of referral were the judges on their own initiatives, motions by defense counsel, or the request of the probation department where initial psychosocial history suggested questions as to psychological status. The majority of referred persons with substance-related issues attend outpatient therapy for their drug-related problems, although some were in inpatient programs prior to outpatient phases. Two major treatment programs were typically used. In one setting, the treatment approach is based on the presence of an existing criminal lifestyle associated with the drug use. In the other, defendants referred did not have an established criminal lifestyle, but had had some drug treatment with relapse. Additionally, most defendants attended the jail treatment program prior to release.

The general procedure involves a screening assessment with an interview, Carlson Psychological Survey, MMPI-2, Substance Abuse Subtle Screening Inventory III (SASSI-III), a Presentence Questionnaire (filled out by the defendant), review of police and prosecutor file reports, and review of prior criminal history record. In some cases, the assessment was done by a substance abuse counselor, with review of the MMPI-2 by a psychologist but reportage only of substance-relevant data from that instrument.

In the first edition, the seven cases were detailed. Review of that information indicated certain commonalities but also illustrated the importance of individual factors in making recommendations or predictions. The sample included six Caucasian and one African American defendant. There was only one female. Of the seven, three were charged with manufacturing activities in addition to possession and in some cases other charges; five had prior criminal legal problems related to substance abuse. All but one indicated significant history of meth use, and that one presented with questionable denial. All used other drugs and six had alcohol abuse histories. Test results were significant for psychopathology in four cases.

The case of EF is reproduced below. This defendant’s behavior and history illustrate the neurological and behavioral potentials that can accompany meth abuse but also is a function of significant abuse and dependency on other substances, notably the legal one of alcohol.

**Case of “EF”**

EF was a 27-year-old white male arrested for a felony one kidnapping and felony four aggravated burglary.

On the mental status evaluation, there were no signs of any mental illness. The defendant was currently prescribed a selective serotonin reuptake
inhibitor (SSRI) antidepressant. Background history was instructive. He was born and raised in a rural setting, the youngest of five children. He indicated no abuse history. His biological parents had significant marital problems and instability. He reported no problems in school, indicated he had never been diagnosed with ADHD. He did not graduate but did obtain his general equivalency diploma (GED). He indicated he was married, but there were problems including a domestic violence conviction in a different state. He also indicated that he had been identified with minor self-mutilation practices at the age of 14. His domestic violence occurred when on drugs. Substance abuse-related information included that he began the use of alcohol at the age of 6. He stopped use of that substance at 18 but had restarted 3 years ago at the age of 24. At that point he began consuming half a gallon of whisky every 3 days, and he reported tolerance. He was using LSD (lysergic acid diethylamide) regularly, marijuana from the age of 13 to 22, cocaine daily from the ages of 16 to 18 with last use at age 22. His crystal methamphetamine use began at age 18 and continued daily until age 22.

His criminal record included domestic violence, rape of his spouse, four DUIs (driving under the influence), theft of a firearm, receiving stolen property, possession of methamphetamine, possession of a controlled substance, possession of drug paraphernalia, possession of narcotics, and possession of a stolen vehicle. The current crime involved a female victim and the sudden eruption of violence on his part. He was resistant at arrest and had to be forcibly controlled. His verbal behavior was replete with profanities. He was amnesic for the events at the time of the crime; he did recall drinking and getting into a verbal fight with his wife just before the incident, with profanities.

Comment: The above scenario is consistent with observed patterns for persons with heavy methamphetamine use history. The potential to return to extremely violent behavior exists over an extended period of time. The accuracy of his statement that he had not used methamphetamine since age 22 is questionable. If true, his behavior would be consistent with the action of a releaser substance (alcohol is a disinhibitor); predisposition due to methamphetamine impacts rises with the extent and recency of use of that substance.

Test results and other findings from the assessment process included a valid MMPI 2 with some minor elevation on Scales 4 and 6, a highly elevated MacAndrews, as well as subclinical elevation on the Addiction Potential Scale and high elevation on Addiction Admission Scale. The PCLR was at 23, which is moderate for psychopathic character traits, but the loading was on Factor Two, the primary predictor of violent criminal behavior.

Resulting diagnosis was Axis I—Major Depressive Disorder in remission and polysubstance abuse and Axis II—Antisocial Personality Disorder with histrionic and psychopathic features. History included treatment for his major depression. The recommendations were for an inpatient treatment
program and subsequent halfway house and ongoing aftercare, as well as for anger management.

This case clearly involved an individual who was biologically and psychosocially scripted for an addiction lifestyle and an ongoing lifelong vulnerability to substance abuse and dependency. Furthermore, his risk for violent behavior was substantial, particularly under any conditions where he has engaged in the use of substances that reduce executive control. Although he denied serious dysfunctional aspects of his family life, the early onset of substance abuse and the instability of the parental union, along with the noted self-mutilation habits at age 14, would all suggest borderline features to his personality integration with specific liabilities when it comes to relationships with women. Therefore, recommendations should have included further assessment of neuropsychological functioning and a specific emphasis on therapy focused on his relational capacity as part of the long-range treatment plans, but presuming an extended period of control over substance use.

Overall Impressions

In this particular court system, some psychological attention is provided for persons with drug-related issues. It is not uncommon, of course, for persons of means to obtain drug-related assessments and access treatment in lieu of incarceration, but routine forensic assessment of defendants with drug-related issues or crimes is not the usual practice across the country. However, even when psychological assessment is undertaken, procedures do not regularly address some of the issues that need to be a focus in addictions cases. If maximizing rehabilitation is the goal, which would have the benefit of reducing the cost to society of addictions-based behavior, the following recommendations can be supported:

- There is a need for neuropsychological assessment if not at the time that these screenings and initial assessments are being accomplished, certainly as part of the initial treatment process. Methamphetamine, in common with other abused substances, is known to produce ongoing deficits and disinhibitory potentials.
- There is a need for specific education of both defendants and court personnel about the unique impacts of methamphetamine.
- There is a need for an addictions model, which incorporates a biopsychosocial understanding, as the basis of treatment (see Chapter 14).

Application to the Extreme Emotion Defense

The Model Penal Code concept of extreme mental or emotional disturbance, commonly referred to as “extreme emotion,” is currently recognized in
Hawaii, New York, and Oregon, and to some extent in Pennsylvania, Illinois, New Mexico, and California. Under this schema, the accused can use extreme emotion as a mitigating factor to reduce a murder charge to manslaughter. Such a defense is partially exculpatory in that the punishment is lesser and is affirmative (must be proven by the defendant). Rather narrow parameters are involved.

Hawaii Revised Statute §707-702(2) which is representative, states the following:

In a prosecution for murder in the first and second degrees it is a defense, which reduces the offense to manslaughter, if the defendant was, at the time he caused the death of the other person, under the influence of extreme mental or emotional disturbance for which there is a reasonable explanation. The reasonableness of the explanation shall be determined from the viewpoint of a person in the defendant’s situation under the circumstances as he believed them to be.

The Hawaii Revised Statutes adopted the definition of extreme emotion as articulated in People v. Shelton (1976):

[Extreme emotional disturbance is the emotional state of an individual, who (a) has no mental disease or defect that rises to the level established by [Haw. Rev. Stat. §704-400 (1985)]; and (b) is exposed to an extremely unusual and over-whelming stress; and (c) has an extreme emotional reaction to it, as a result of which there is a loss of self-control and reason is overborne by intense feelings, such as passion, anger, distress, guilt, excessive agitation or other similar emotions.

Of some importance, a major mental illness of a type usually contemplated in asserting a not guilty by reason of insanity is not required. However, as the above definition clearly implies, both objective/external to the defendant and subjective/internal and reported by the defendant data are involved.

Extreme emotion involves a three-part test, each of which requires the development of information in a forensic assessment. Table 11.5 provides some guidance to the practitioner.

Methamphetamine can result over time in diminished control systems such that stimuli not necessarily associated with extraordinary reactivity will contribute to such a scenario due to the combination of potential for paranoid mentation, diminished control systems, and outright perceptual distortion of psychotic proportions. However, if the act and accompanying mental state are primarily a function of recent ingestion of the substance, the defense may not be available just as it is not possible to assert a sanity defense where the state was primarily one produced by voluntary ingestion
of substances. Careful evaluation of any records, detailed attention to drug use both chronic and specific, and high levels of criticality regarding bias (see section on third-party information) are necessary components to this type of evaluation.

### Special Case of Death Penalty Sentencing

As detailed in Chapter 11, sentencing implications exist when methamphetamine ingestion is involved in cases where sanity or diminished capacity issues have been raised. The same can be said for the case of capital sentencing. In all states with the death penalty, there is a bifurcated or two-phase trial process. This format grew out of the resumption of capital punishment that took place in the late 1970s and 1980s. Statutes were written to answer the Supreme Court decision in *Furman v. Georgia* (1972), where it was found that the penalty was levied in an unconstitutionally capricious fashion. Separation of the guilt phase from the sentencing phase was the remedy that developed to answer the questions that had been raised in *Furman* and that pertain to the arbitrary and/or discriminative imposition of justice.

The first phase involves a determination of whether the individual is guilty of an act that has resulted in homicide and whether that act meets certain criteria that define it to be deserving of an extreme punishment. If the jury or, in some cases, judge panel finds the aggravating specifications are supported by the evidence, a second trial takes place. That trial usually occurs a short period of time after the first trial, although it is not uncommon for there to be at least a brief hiatus to allow the defendant and the defense team some opportunity to prepare for the second phase.

Nonetheless, death penalty mitigation work cannot possibly be achieved during the time lapse between the ending of the case in chief and the

### Table 11.5 Procedures for Assessment in Extreme Emotion Cases with Special Consideration of Methamphetamine as a Factor

<table>
<thead>
<tr>
<th>Statutory-Based Test</th>
<th>Assessment Options</th>
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</thead>
<tbody>
<tr>
<td>1. External stressors have impacted the individual</td>
<td>Baseline behavior from prior records and observations of defendant; information regarding meth use, both chronic and during the period immediately prior to the offense; retrospective of the defendant as to perceived stress</td>
</tr>
<tr>
<td>2. Stressors cause cognitive (thinking) and affective (emotional) reactions</td>
<td>Retrospective of defendant—Meloy’s matrix recommended; observations of others including police reports, witness statements</td>
</tr>
<tr>
<td>3. Result of cognitive and affective state is loss of self-control</td>
<td>Witness/victim statements; retrospective of defendant</td>
</tr>
</tbody>
</table>
beginning of the sentencing trial. Therefore, most mitigation preparation takes place during the period before the case in chief is even heard and involves evaluation of the defendant and the gathering of information under the assumption that it may be necessary but with the knowledge that indeed it may not be.

Methamphetamine, which is known to cause psychotic behavior and also to create the potential for violence, can become a part of a capital case. The issues that have been discussed in other chapters present in full force when it comes to managing an evaluation and presentation to the courts in death penalty cases. In most states, the expert generally works as a member of the defense team. Results of the evaluation come to the attention of the court only with the agreement of the defendant and counsel. The entire process is protected and confidential, which differentiates it from the evaluation that takes place in the case of a sanity or diminished capacity forensic context. In some states, there is provision for an expert to function at the presentence level in a death penalty case and to be appointed by the court to respond to all parties, including both defense and prosecution. In states where there is that possibility, well-informed defense counsel will carefully motion for their own expert rather than accessing a court-appointed independent expert because of the liabilities involved. For the forensic practitioner, the issue is not one of whether it is appropriate to work for defense. It is the duty of the practitioner to represent fairly and honestly and in a scientifically valid way any data that are developed. Sometimes this can mean that the expert does not testify because the results will not be of assistance to counsel who is representing the defendant. Most of the time, however, even in the case of highly negative findings, an expert who explains the defendant and the crime provides some basis for a life as opposed to a death outcome.

Two cases illustrate the role that methamphetamine may play in this particular context. In the case of State of Ohio v. Gary Hughbanks (1999), an appeals court reviewed the case and upheld the death penalty. The fact picture involved the defendant fatally stabbing a married couple who came upon him as he was burglarizing their home.

Certain aspects of his fairly extended appeal related to the part played by methamphetamine. When Hughbanks was administered the first polygraph test, he produced rather unusual results. The officer asked him whether he had used drugs and he indicated he had been injecting crystal methamphetamine. The officer testified that the findings from the test were consistent with someone coming down from a methamphetamine high, but he also indicated that Hughbanks did not appear to be under the influence of drugs. Hughbanks informed the officer that he had been treated by a psychiatrist; the officer indicated he did not try to talk with that physician. A second polygraph was administered and results did not show any unusual deviations.
At issue in the appeal was the notion that results of the tests and the confession obtained should be suppressed because of duress and mental illness factors that affected Hughbanks’ capacity to be Mirandized. The officer testified that the defendant’s behavior did not show abnormality indicative of inability to understand and make the decision whether to cooperate. There was a family history for schizophrenia and there was mental illness history on the part of this defendant including auditory hallucinations, for which he had been admitted to the hospital and prescribed antipsychotic medication.

Hughbanks also appealed on the basis that he should have been provided a neuropharmacologist and substance abuse expert among other professionals to assist in his defense. Certain other objections on the basis of which the appeal was submitted did not relate so directly to mental state and the use of drugs. In the affirmation of his death sentence, the appeals court took the position that the alleged failure to provide necessary funds for experts was without merit because the defendant had made no request for additional assistance at the time. It was noted that he did ask and was granted support for a mitigation specialist and a neuropsychologist.

His lack of memory for aspects of the event may have been an artifact of his methamphetamine use and some of the atypical results of the polygraph would not be inconsistent with methamphetamine influence. However, it is just this kind of situation that raises serious problems around the question of malingering. In one of the errors that he raised, the defendant indicated that his motion to suppress the confession should not have been denied because he was under the influence of drugs when he signed his waiver of Miranda rights. He also claimed that he was mentally ill. However, the appeals court took the position that he had not presented any indications that he was functioning on an involuntary basis and that neither his drug use nor his mental state resulted in an inability to voluntarily waive rights. Therefore, his appeal on these bases, as well as others, was not upheld.

Although in the Hughbanks case apparently there was reasonable effort made to provide him with representation and with a mitigation defense, the same may not be true in many instances. In a 2002 case in Texas involving a man who went on a killing spree following the attack on the World Trade Center, the expeditious and cavalier way of dispensing capital justice seriously contrasts to that which was seen in Hughbanks. Stroman was an individual who was apparently in a psychotic state, which was either induced or exacerbated by methamphetamine use. He committed a series of murders based on his belief that foreigners such as his victims needed to die to avenge the 9/11 terrorist attacks. Stroman admitted to the acts and justified them on the basis of his delusional system. The course of the trial, however, is instructive. It took nearly 4 weeks to seat a jury but once that was accomplished, the case in chief began on one morning and was completed in 3 hours. Closing arguments were scheduled for the next day as defense counsel had no
witnesses and essentially no defense. The case went to the jury at 10:00 A.M. with a finding of guilty to all specifications by 11:00 A.M. on the same day. The mitigation was scheduled for the next day, including impact testimony to be presented by the state. The defense had retained a psychologist to provide mitigation evaluation and testimony and in addition had obtained a neuropsychologist as there was medical evidence of central nervous system damage and a long history of inappropriate behavior. The defendant, incidentally, insisted on coming to his trial dressed in a Harley T-shirt. He maintained his shaved head, which had been his custom for some years, and saw to it that all of his tattoos clearly showed. It was obvious from the outset that he would join the ranks of many others in Texas where the speedy administration of capital justice is the rule and the niceties of defendant rights may be observed in the breach. The jury returned in 5 hours with a recommendation of death (Mary Connell, Ph.D., personal communication, March 2002).

Summary

Substance abuse has become a complicating factor at all levels of the American criminal justice system. In the particular case of methamphetamine, use has generated a body of case law and led to specifications in the federal sentencing system. At the state level, it has been incorporated in various ways into sentencing considerations. Forensic assessment has proceeded from a psychological perspective of understanding behavior and designing interventions. The sometimes difficult interface between mental health and law is regularly evident in forensic assessment around methamphetamine cases and particularly in regard to the sentencing process. Issues of risk analysis with its inherent insecurities and yet its important place in supporting the protection of society as well as the rights of the individual have been a part of the processing of methamphetamine cases. Although some varieties of substance abuse affect primarily the individual insofar as negative outcomes are concerned, methamphetamine is a drug that is regularly associated with disinhibition and violence. The reduction of violent crime is of high concern to law enforcement and the overall operation of justice. As with all others who seek to serve the best interests of the system of criminal justice, it is necessary to walk a tightrope. This balancing act must take place within the scientific limitations of the data collected, further complexly constraining the practitioner.

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Mitigation in Sentencing


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*State ex rel, Wright v. Ohio Adult Parole Authority*, 75 OS3d 82 661 NE2d 728 (1996).


*United States v. Pineda*, 981 F.2d 569 (1st Cir. 1992), Honolulu, HI.


As reading of the below will illustrate, competency issues present in a variety of ways when dealing with methamphetamine cases. Specifically, although competency to stand trial is focused on the present condition of the individual and his or her ability to meet certain standards that have been at least to some extent articulated as necessary for participation in his or her defense, competency to confess and competency to proceed are also implicated where methamphetamine may have interfered with capacity to make decisions at the time of arrest or at some other identified points in processing.

**Miranda Rights and Methamphetamine**

Psychological and psychiatric experts are occasionally called upon to assess the status of the defendant who self-incriminates. The key *Miranda* (1966) question concerns whether a defendant can rationally and intelligently choose to waive or invoke rights to avoid self-incrimination.

Generally speaking, *Miranda v. Arizona* (1966) requires that any inculpatory statements that are to be introduced by the state at the defendant’s trial must have been made after a proper briefing and obtaining of a signed waiver. Even though there have been substantial changes in the degree to which pro law enforcement decisions have been made since the 1960s, the *Miranda* requirements tend to be upheld. Thus, in *Fellers v. United States* (2004), methamphetamine intoxication at the time of police questioning or interrogation, to the extent that it interferes with these cognitive capacities, raises the question of voluntariness.
Yet, voluntariness depends on the totality of the circumstances, not just the condition of the accused at the time of the questioning. It includes such factors as the context in which the questioning takes place, the officers’ conduct, and the extent to which the officers utilize prior incriminating statements to extract more information. Under this reasoning, it becomes highly relevant whether the questioning officers are aware that the accused is methamphetamine intoxicated.

In *State v. Samson Pebria, Jr.* (1997), a methamphetamine-intoxicated, recently released prison inmate was questioned at a hospital by the arresting officer, who asked, “Do you know why you are being detained?” The accused responded, “I went grab the girl” and later stated, “I like rape her.” One finding of fact from the Intermediate Court of Appeals (ICA, No. 19) was that the noted confusion on the part of the accused did not arise from the questioning by the officer. The confusion arose “because of [Pebria’s] inability to recall what had occurred previously because at the time of the incident he was under the influence of ice.” Other findings of fact (Nos. 20, 21, 22) included the knowledge on the part of the detective taking the formal statement of the alleged spontaneous statement, an attempt to lead the defendant into making those statements again and to admitting the motive for the alleged offense was to rape the victim. The ICA held that the original statements were obtained in violation of *Miranda* and that the later confession was inadmissible under the “fruit of the poisonous tree” doctrine.

What is missing from most interrogations involving methamphetamine intoxication, and what would be most convincing to the expert, is for the arresting officer or (later) a detective to obtain feedback from the defendant regarding whether or not the subject understood and remembered the *Miranda* rights or whether interfering factors substantially prevented competency to confess. The expert should make every attempt to answer these questions in cases in which methamphetamine use is an issue.

### Interrogation and Methamphetamine Use

Investigative interviewing takes place under conditions that vary widely in terms of procedure, experience and capacity of the interviewer, and environmental aspects. Studies of the interview procedure have shown considerable impact as a function of the use of leading questions and prebiased interviewer conditions (Loftus and Palmer, 1974; Loftus and Zanni, 1975; Memon and Kohnken, 1992; Mount and Perlini, 1995; Pirolli and Mitterer, 1984). False confessions occur with complex antecedents. They may be entirely voluntary, but some false confessions may reflect mental problems. False confessions may proceed in consequence of certain later-identified personality traits.
Specified pressures can lead to false confessions, which have been classified as “coerced–compliant” and “coerced–internalized.” In the former, a knowing incorrect admission is made to gain relief from interrogation pressure. In the latter, individuals predisposed to guilt come to falsely believe in and admit to an act they did not commit (Commonwealth v. Cosmello, 1993; Gudjonsson, 1992a, 1992b; Gudjonsson and Petursson, 1991; Kassin, 1997, 1998; McCann, 1998; Reitman, 1998).

Consistently, Gudjonsson (2003) noted that studies, including his own work using the suggestibility test he developed, have supported that both drug use and drug withdrawal can impair various aspects of cognitive function in ways that reduce the validity of statements obtained during interrogation. Thus, alcohol and tranquilizers increase suggestibility, reduce resistance to interrogation pressure, and reduce clarity and rationality of thought process. The benzodiazepines and other sedatives in high dosages in particular are associated with increased potential for false memory and have been associated with medical and dental female patients reporting with conviction instances of sexual assault that did not occur (Lader, 1999). Similarly, withdrawal with its disruption of comfort and increasing irritability, can lead to higher levels of suggestibility or other false responding, perhaps in part to escape from demands that questioning involves. There has been a study of MDMA, amphetamines, and controls using the Gudjonsson Suggestibility Test, with certain interesting findings. The Yield 1 score, which reflects response to pressure, was higher on day 1 after use than on day 5 for the Ecstasy over the amphetamine users (Brignall, 1998). Gudjonsson (2003) noted, however, that the samples were collected at nightclubs and that ingestion of alcohol and cannabis was common as well. The drug effects were not under control at a level desirable for solid conclusions as to differentials. He went on to cite various studies showing alcohol could impact both pressure and suggestibility factors, the former in the negative direction and the latter with enhancement. Withdrawal impacts in the case of alcohol seemed focused on reduced concentration, memory, and capacity to learn, with improvement occurring as time elapsed and withdrawal symptoms reduced.

In investigative interviews in the United States, certain deceptive procedures are often the rule, including the provision of misinformation in order to obtain confessions by trickery (Inbau, Reid, and Buckley, 1986). Although the Supreme Court has refused to find against such procedures (Frazier v. Cupp, 1969), there has been ample evidence from research and anecdotal data that coercive interviewing based on the communication of false incriminating facts has significant potential to produce false confessions (Kassin, 2005). In contrast, in the United Kingdom, police are not allowed to use deceptive methods. All interrogations are videotaped to reduce coercive and illegal methods as well as to secure good evidence when confessions do occur.
under questioning (Gudjonsson, 1992b).* Whether in the United Kingdom or the United States, the above studies have shown a limited impact of interview, content, and style of police interrogation on the production of false confessions. In general, although false confessions occur, no convincing data exist that show that innocent parties will confess falsely to crimes in greater numbers than would be expected by chance on the basis of most interview conditions. Other case factors have been found to be more important, including the evidence, the level of the offense, and the presence of legal advice (Moston, Stephenson, and Williamson, 1992). However, as is detailed in the most recent volume by Gudjonsson (2003), if confrontation, presumption of guilt, and extended and relentless questioning are involved, confessions can be extracted from innocent parties usually without physical coercion (see especially sections on the Russian and Chinese systems).

In a few criminal cases, substances have been used to assist in the recovery of details or repressed material, to reduce the capacity to cover up information that has been denied, or to expose false facts that were “admitted” on a malingered basis. However, in general, the use of drug-assisted interviews is not recommended. Subjects are able to continue to dissimulate when under the influence of various substances, including methamphetamines. However, with methamphetamines, there can be changes in perception. These changes involve reports of either positive or negative experiences and anxiety. There may be higher levels of attentiveness than are found among those who are given other substances, such as amobarbital. Suggestibility has not been demonstrated for amphetamines, whereas it has been shown with sedatives (Rogers and Wettstein, 1977). Furthermore, in the case of witnesses, as opposed to defendants, such interviews may result in rulings that eliminate their giving evidence at trial.

It should be known whether a suspect is methamphetamine intoxicated when he or she is interviewed. At relatively low doses, amphetamines improve one’s capacity to attend, cause an inflated sense of self-efficacy and invulnerability, and increase motor and speech activity and anxiety (Dodgen and Shea, 1997). At high doses, the individual becomes cognitively disorganized. Theoretically, vulnerability to coercion may increase. Certainly, a defense attorney should raise this issue. Further study is needed to determine the interaction of suggestibility, anxiety, attentional focus, and coercion. Given

* There is a relatively recent trend in the United States to tape at least some interrogations, particularly in serious cases, in order to reduce the number of false confessions and embarrassments to police departments. Thus, Peters [2006] indicated the Detroit Police Department, with a long history of abusive treatment of arrested persons, will now videotape in serious criminal contexts. The policy change was enacted as part of a settlement of a case wherein a mentally ill man was incarcerated for 17 years on a false confession and freed on DNA evidence with assistance of the Innocence Project. Peters also noted that 450 departments now tape interrogations.
the powerful impact of a confession as evidence, any increased potential for false statements poses a risk for miscarriage of justice.

Studies in many contexts have demonstrated that when learning occurs in a chemically altered state, it may not be possible to access that material unless the person is again under the influence of the drug. Methamphetamine has been used in studies of such state-dependent learning. In common with other chemicals, methamphetamine will produce state-dependent retrieval (SDR). However, careful evaluation of studies in this area has shown that SDR occurs on a free-recall basis but tends to disappear with cued or recognition-based recall regardless of the kind of substance involved (Brown, Schefflin, and Hammond, 1998). By extension, if questioning is managed correctly, the presence of methamphetamine in the system of a suspect or a witness may not necessarily damage that person’s capacity to describe accurately experienced criminal events. In such cases, the use of cued and recognition tasks, as well as other safeguards as discussed above, should be built into the interrogation strategies.

**Methamphetamine Abuse and Competency to Proceed**

Reviews of the forensic literature on competency to proceed are found in Blau (1984), Curran, McGarry, and Shah (1986), Ewing (1985), Gutheil and Appelbaum (1982), Melton et al. (1987), Shapiro (1984), Weiner and Hess (1987), and Ziskin and Faust (1988). Works devoted exclusively to competency to stand trial include those of Grisso (1986, 1988), McGarry (1973), and Roesch and Golding (1980). Although none of these sources deals primarily with methamphetamine abuse, their contents address means to assess and evaluate competency to stand trial based on behavior. As with most forensic work, issues of appropriate measurement and malingering present. With respect to the latter, the use of psychometrically respectable measures of malingering, such as both semistructured and structured approaches that allow evaluation of psychotic presentation, is encouraged. In many cases where doubt exists, the use of the Structured Inventory of Reported Symptoms (SIRS) provides a data-based technique (Rogers, Bagby, and Dickens, 1992). Identification of malingering has serious implications for a defendant, not only for the purpose of the evaluation, but also because this can impact how he or she is viewed in terms of credibility in other areas.*

The legal requirement of competency to stand trial is an extension of the general rule that no one should be tried for a crime in his or her absence. If a

* An invaluable reference for recent studies of a large variety of instruments and their potential to reflect malingering or other impression management can be found at www.kspope.com/assess/malinger.php.
defendant must be physically present to defend against criminal charges, that
defendant must also be “mentally present.” Disorders that interfere with the
psychological participation of a defendant at trial may render that defendant
incompetent to stand trial and require that the proceedings be postponed
until effective participation can be assured. Responding to *Jackson v. Indiana*
(1972), competency statutes specify that if an individual cannot be restored
within a specified period, usually a year, the individual is then evaluated
under existing civil commitment procedures and a determination made as
to disposition. However, and in spite of the *Jackson* mandates, the procedures
of many states continue to not specify release from criminal court control
and the potential for fairly indefinite incarceration can still present (Melton
et al., 1997; Stafford, 2003). There have been decisions favorable to limitation
on the state of this power, but specific national standards have yet to be set
(Stafford, 2003). A recent search of Supreme Court decisions indicated no
specifics beyond *Jackson* exist. Therefore, practitioners must review the case
law in their jurisdictions in order to know what, if any, limitations or expec-
tations may pertain.

Symptoms of methamphetamine use may compromise the defendant’s
competency to stand trial. As discussed above, chronic methamphetamine
abuse may cause severe confusion, apathy, short-term memory problems,
executive dysfunction, auditory hallucinations, and other significant prob-
lems that may persist for a considerable length of time after abstinence
commences.

Several instruments are available for use in evaluating trial competen-
cies: the Competency Assessment Instrument (Grisso, 1986, 1988), the Inter-
disciplinary Fitness Interview (Golding, Roesch, and Schreiber, 1984), the
Competency Screening Test (McGarry, 1973), Georgia Competency Test
(Gothard, Rogers, and Sewell, 1995), and MacArthur Competence Assess-
ment Tool—Criminal Adjudication (1996). A more recent and promising
approach with a normative base is the Evaluation of Competency to Stand
Trial-Revised (ECST-R) (Rogers, Tillbrook, and Sewell, 2004) that combines
inquiries into case-related specifics with a standardized format. The forensic
evaluator should utilize these methods within a broad-spectrum assessment
approach that also includes psychopathology, skills, and response styles.
Most jurisdictions use a variation of the rule to define competency to stand
trial outlined by the U.S. Supreme Court in *Dusky v. United States* (1960).
*Dusky* requires that defendants have the ability to (1) understand rationally
and factually the legal proceedings and (2) cooperate with their attorney in
their defense. A methamphetamine-induced disorder that interferes with
either of these capabilities is sufficient to render the defendant incompetent
to stand trial. However, incompetency to stand trial is not to be equated with
the mere presence of mental illness (*Feguer v. United States*, 1962; *United
States v. Adams*, 1969), or amnesia (*United States v. Wilson*, 1966), or of a
need for treatment. The claimed disorder must be of the kind and severity that impairs the functional capacities outlined in *Dusky*.

Usually, the question of competency to stand trial is raised by the defense attorney, who has the most frequent contact with the defendant and who has the professional and legal obligation to raise the question in appropriate cases. However, case law suggests that the question must be raised, even by the prosecution or the court itself, whenever a “bona fide doubt” exists regarding the defendant’s capacity to mount a defense (see *Drope v. Missouri*, 1975). The question of a defendant’s competency to proceed may be raised at any time from the defendant’s first appearance in court to the time of sentencing.

In actual practice, participants in the criminal process easily identify most mentally disturbed defendants. Actively psychotic, demented, and severely mentally retarded persons are usually recognized by arresting officers, jail personnel, and defense attorneys, and they may be transferred to treatment facilities prior to any court appearances. Clinically, the chronic methamphetamine abuser is the defendant who has lost weight; looks malnourished, disheveled, and unhealthy; is reticent or loose in verbal responses; appears aphasic or has word-finding problems; is generally confused; and shows impulsiveness with a low frustration tolerance. Often, the individual exhibits a blank stare. Such an abuser is often unable to answer simple questions that require orientation (to person, place, date, and circumstances of the evaluation), attention, and memory.

In *State v. Melvin Hashimoto* (1989), the 30-year-old defendant was charged with holding captive and robbing several people in Mililani. He had smoked ice for 5 1/2 years before, as well as during, the instant offenses. In his Hawaii Revised Statutes (HRS) §707-404 sanity report, the senior author stated:

The Defendant is presently unfit to proceed. [The Defendant was expressionless and not oriented to date, claiming that it was 2 months earlier.] He claims no recall of his attorney and has no stated idea of possible legal consequences if convicted of the charges. He stated that he is facing the charge of “running away” and [talked about seeing the devil laughing at him in the rearview mirror of the car as he approached the scene of the alleged crime]. He could not recall the function of the judge and the defense attorney, but stated the prosecutor was on his side. He claims no knowledge of the legal process, stating that he has never been to court previously. [Oahu Community Correctional Center] medical records revealed that he is partially stabilized on antidepressant and antipsychotic medication. These same records suggest (a) the reporting of visual and auditory hallucinations, noncommand in quality; (b) anhedonia and depression; (c) distractibility; (d) blank spells; and (e) other psychological symptoms.

The defendant was reexamined 1 year later. He showed a substantial improvement in the criteria for competency and was found to be fit to proceed.
Defendants who are heavy methamphetamine users or who decompensate while awaiting trial often require professional treatment before criminal proceedings can occur. From a fitness perspective, if a person is disorganized and psychotic, it does not matter if the psychosis is secondary to voluntary substance abuse or to some other condition. If the Dusky criteria are violated (or if relevant state cases suggest other competency criteria are violated), the expert should report that the defendant is incompetent to stand trial.

Defense attorneys sometimes raise questions of competency to stand trial for their apparently competent clients as a “fishing expedition” to secure a court-ordered professional evaluation of their clients which would otherwise be unavailable. (In retained cases, such a strategy is not likely to be needed because money is available for counsel to have private consultation; in assigned cases, the Court must be persuaded that either a competency issue may exist, or that avoidance of reversible challenge is involved, but the consult is then a nonconfidential one provided to defense, prosecution, and the Court. It is occasionally possible for defense counsel to successfully obtain Court support for private consultation.) These evaluations may produce data from the expert relevant to an insanity plea, to the question of mitigation, or to dangerousness factors that may be considered at the time of sentencing. Yet, the vast majority of defendants evaluated for competency to stand trial are found to be competent which reflects the very basic cognitive and behavioral skills required in Dusky. In addition, assuming that the clinical data obtained are valid and reliable, the fishing expedition may actually save the court time and money in determining whether or not to raise these other issues. Findings from a competency evaluation may also serve as a basis for a plea bargain as in the aforementioned State v. Hashimoto case.

In summary, the question of competency to stand trial in methamphetamine cases involves three separate questions: (1) Does the defendant exhibit methamphetamine symptoms sufficiently severe to justify a finding of incompetency (diagnosis)? (2) Is the defendant unable (a) to understand rationally and factually the legal proceedings, or (b) to assist counsel in defense (incapacity)? (3) Is this incapacity caused by the mental disorder (causation)? The answers to these three questions lead to several possible scenarios:

- Methamphetamine alone or in combination with another mental disorder causes a defendant to be incapacitated.
- Methamphetamine alone or with another mental disorder does not cause a defendant to be incapacitated.
- The defendant has a genuine (non-methamphetamine-related) mental disorder that causes an insufficient incapacity to stand trial (e.g., circumscribed delusions about the “facts” of the alleged crime, or other impairment in trial capacity).
The defendant has a genuine mental disorder but his or her apparently impaired capacity to stand trial is due to fabrication or exaggeration (e.g., malingering in the context of a genuine disorder), or the defendant may have a genuine mental disorder and present as apparently incapable of standing trial, but the mental disorder is not severe enough to justify a finding of incompetence (e.g., depressed defendant whose guilt over killing his wife leads to disinterest or lack of cooperation in putting on a defense).*

As already indicated, disposition in competency cases varies on a state-by-state basis. In some jurisdictions, a finding of incompetence to stand trial and not restorable can lead to continuing criminal court jurisdiction in the same way that not a “guilty by reason of insanity” finding allows (see Ohio Revised Code 2945.38). In Hawaii, competency to stand trial (that is, fitness) is covered in HRS §704-406. Fitness is not defined; in general, operational definitions are not found in statutes.

The Hawaii Intermediate Court of Appeals attempted to define, if not operationalize, competency to stand trial in State v. Silverio Soares (1996). A threefold test requires that the trial court determine whether or not the defendant (1) has sufficient mental ability to consult with his or her defense counsel with a reasonable degree of rational understanding; (2) has the capacity to assist in preparing a defense; and (3) has a rational, as well as factual, understanding of the proceedings against him or her.

Application of the above test appears to go beyond Dusky v. United States (1960), Drope v. Missouri (1975), and other cases pertinent to competency to proceed. Moreover, the test appears ripe for application of the empirical findings on methamphetamine as those findings apply to cases where the defendant abused methamphetamine, even a substantial period before the instant offense occurred. The test requires a functional ability to develop a working relationship with one’s defense counsel, provide information that can be used to present a coherent defense, and make fundamental defense decisions. These abilities rest on attentional, recall, executive, and other cognitive skills, which are commonly impaired in methamphetamine abusers. The paranoia that results from methamphetamine abuse may cause distrust and withholding of information. Recall of the alleged offense may be distorted and fragmentary. Making fundamental defense decisions requires the synthesis of multiple sources of information, as well as judgment and executive abilities to plan, monitor, and reevaluate legal positions and strategies.

The Soares test requires that the defendant have the ability to testify in court, if necessary. Methamphetamine abusers may have significant deficien-

* Perhaps especially in the context of the death penalty, a case such as the above calls for caution as it may involve a form of passive suicide wherein the defendant intends to be killed by the justice system.
cies in speech and language processing, as well as in other cognitive dimensions, that could lessen the positive impact of the testimony. The test also requires that the defendant be able to withstand the pressures of a trial. The data on brain deterioration in methamphetamine abusers suggest that, even after complete abstinence from the drug, the defendant’s ability to withstand the pressures of a trial (as well as other stressors) may suffer. This deterioration, if in fact does compromise the defendant’s ability to adapt, may likely affect a broad range of cognitive abilities and may necessitate fitness evaluations at various points in the legal process.

Finally, the Soares test requires that the evaluation of fitness to proceed be made with specific reference to the nature of the charge, the complexity of the case, and the gravity of the decisions with which the defendant is faced. Translated into the thinking of forensic mental health experts, these requirements mean that no longer can general fitness criteria or standards be applied to specific cases without taking the unique circumstances, strengths, and limitations of the defendant into consideration. This position suggests the factors including the gravity of the decisions with which the defendant is faced (as one example of required skills) be appraised by the evaluator from the viewpoint of the defendant as he or she perceived them to be. Thus, both norm-based and individual (that is, idiographic) measures may have to be utilized in future evaluations of competency to stand trial where methamphetamine is involved. The Soares test underlines the growing awareness in forensic work on competency cases of the real complexity of such evaluations. Cases involving substance issues will often require neuropsychological or neuropsychiatric evaluation with built-in measures to detect possible malingering and deception. Rather than reflecting easily measured traits/states of the defendant, methamphetamine cases need to at least approximate the “penetrating and comprehensive examination” of the defendant as required by State v. Kane (1971).

References

Miranda Rights, Interrogation, Competency to Confess/Stand Trial

Feguer v. United States, 302 F.2d 214 (1962).


When police chief Bobby Sauls in Sebree, Kentucky, was indicted on criminal conspiracy to tamper with anhydrous equipment to manufacture methamphetamine and related criminal conspiracy charges, his small community was considerably surprised. None would have predicted his involvement or his change in status from law enforcer to alleged law breaker (Chief’s Actions, 6/19/05). The case is perhaps illustrative of the difficulties with behavior-based prediction.

Predicting dangerousness involves a three-part process of analyzing the history, triggers, and opportunity to aggress that operate against inhibitions to inflict violence. The three main factors associated with violence, which are also commonly the targets of deception by suspects (Hall, 1982, 1984, 1987; Hall and Pritchard, 1996), including those in methamphetamine cases, are (1) a history of violence, (2) opportunities for violence, and (3) situational and dispositional triggers to violence. Any of these variables associated with violence may be targeted for denial or minimization.

Triggering stimuli, which are short term in duration, intense in impact, and set the violence into motion, are often distorted by offenders. The two most frequently mentioned triggering events, including short-term events, are substance abuse or intoxication and the breakup of a central love relationship (e.g., Bandura, 1973). Other examples are insults to self-esteem (Toch, 1969) and invasion of body space (Kinzel, 1970).

Methamphetamine operates as a powerful trigger to violence in those individuals with a history of violence toward others. When intoxicated, these individuals often lose all sense of empathy, experience a low frustration tolerance, and concomitantly experience a need to aggress upon minimal environmental provocation. Then, on later evaluation, the methamphetamine-intoxicated defendant typically tries to find legitimate reasons for his or her violence.
Opportunity factors, which allow the occurrence of violence or expand the various ways it can be expressed, may also be minimized or denied. Opportunity factors expand the possible severity of exhibited violence or allow its expression. Examples in the former category include availability of a firearm (Berkowitz and LePage, 1967), presence of a physically weaker potential victim (Bandura, 1973), and elevation to positions of authority where violence toward others is institutionally sanctioned (Fromm, 1973; Milgram, 1963). Variables that allow the expression of violence include release from incarceration into the community (Kelly, 1976) and cessation of taking tranquilizing medication (Stone, 1975).

Some associated features of violence are typically affirmed by offenders. These include easily verifiable associations of violence such as convictions, prison incarcerations, and body tattoos with violent themes. Other associations that are usually affirmed include a preference for violent films (TV, movies), books, games, and other media, release from incarceration, and physical prowess in relationship to the (potential) victim. Defendants may blame some factors on others or regard them as irrelevant to violence. The meaning of some features may escape the defendant and hence may not be denied. These include physical abuse as a child, praise or reward by parents for aggression, a violent model in the home, substance abuse by the same-sex parent, and a history of reinforcing outcomes for violence.

Inhibitory variables that lower the chances that violence will occur are typically affirmed by offenders. These variables fall into the lower range of frequency, intensity, severity, or duration of any quantifiable factor that is positively associated with violence. A minimal history of violence may be regarded by a client as a sign of dispositional nonviolence. Therefore, it should not be surprising that many subjects will claim a nonviolent basal history. Because stabilizing psychotropic medication generally acts as an inhibitor to violence, most defendants assert compliance with medication.

Dispositional factors associated with a lower propensity to aggress include high socioeconomic status and high educational level (Kelly, 1976; Monahan, 1981). Offenders may exaggerate their occupational and educational achievement. The opportunity for violence may eliminate or reduce the probability of aggression, and some offenders may claim a lack of transportation or a physical disability and therefore raise issues of an alibi and self-defense.

Contextual stimuli include such variables as location of the crime scene and the presence of third parties (Steadman, 1981) and environmental stimuli (Berkowitz, 1983; Horowitz and Willging, 1984). Some persons may therefore emphasize the improbability of violence given eyewitnesses, bright lighting, or other physical “barriers” to violence.

Common mispredictions involving defendants with a history of methamphetamine abuse involve errors in the assessment of dangerousness including the following (Hall, 1987):
Lack of an adequate forensic database
Failure to account for retrospective and current distortion
Prediction of dangerousness in the absence of previous dangerousness
Reliance on illusory correlations of dangerousness
Prediction of dangerousness solely from clinical diagnosis
Failure to consider triggering stimuli
Failure to take into account opportunity variables
Failure to evaluate inhibitory factors
Ignoring relevant base rates
Failure to formulate circumscribed conclusions

The disinhibiting effects of methamphetamine intoxication, whether through direct action or through brain damage, can trigger violence if they are coupled with a history of violence. Therefore, for all forensic cases involving violence prediction, the three-part analysis of dangerousness should be performed.

In State v. Sean Carvalho (1999), the defendant was convicted of manslaughter for killing his 71-year-old grandmother by striking her with a baseball bat after she refused to give him money for drugs. In offering a prediction of substantial dangerousness, the senior author noted that Carvalho had an extended history of violence before, during, and after the killing of his grandmother, with methamphetamine abuse or withdrawal a contributing factor. His inhibitions toward violence were weak even in the face of minimal environmental provocation. He had beaten a dog to death with a pipe, made death threats against his grandmother when she refused to comply with his demands, and was involved in three violent fights while in pretrial detention. One attack on another inmate occurred when the inmate informed Carvalho of his work responsibilities.

A critical factor was the severe and frequent methamphetamine abuse in which the defendant had engaged prior to the killing. In fact, he had abused methamphetamine so often that standard intelligence tests showed deterioration from an average to a borderline intellect, along with many neuropsychological signs. Although the senior author’s dangerousness predictions extend only a year or two into the future, indicia of longer-term potentials for violent recidivism in the case of Carvalho were suggested by the long-term effects of methamphetamine.

A special area of violence, which can become an arena within which methamphetamine plays a significant part involves sexual violence against others, particularly children. A couple of cases from recent Ohio Appeals Court reviews illustrated ways in which meth and sexual crime may interact. In the case of State v. Braxton (2005), the setting was a group of adolescent minors at the home of the defendant. The defendant had taken a prescribed medication, Zoloft, and also had been drinking a particularly high alcohol content beverage. Another adult male then induced her to add Ecstasy to the mix,
telling her that she would have an extreme visual experience. Subsequently, she also was given methamphetamine, as well as the Ecstasy derivative. Following ingestion of these substances, she went into her bedroom where she engaged in a variety of sexual activities with the two adults, but stated she did not know that there was a video tape-recording the activity. Subsequently, a minor, age 16, returned to the setting, came into the room, and joined in the sexual activity. That individual then went to her own home, claimed she had been forced to use drugs and had been raped, with the act being videotaped. As a result of this sequence of events, the appellant was charged with pandering sexually oriented matter involving a minor, a second-degree felony, and was found guilty. She was sentenced to 2 years in prison and was classified as a sexually oriented offender (this label is the lower classification, with sexual predator being the higher—both are registration laws). In this case, the appellant took the position that she did not know that the videotape was recording the act; however, other evidence, which was revealed at trial, showed that she set the tape up and that she later asked an officer during the course of investigation whether taping a minor in sexual activity was or was not illegal. Her appeal also focused on the sentencing, the likelihood of recidivism, and degree of harm. The appeals court found that the child victim did, in fact, suffer significant psychological harm and also came to the opinion that recidivism was more likely than not. The trial court had thus engaged in a risk analysis and was upheld in all respects on appeal.

In a second case, State v. Schaub (2006), methamphetamine played a much more ancillary role. However, the implications of its use in the course of doing forensic work are of significance. Schaub involved a rape of a prostitute. The victim had been willing to provide specific services for a fee but was overwhelmed, held at gunpoint, handcuffed, and then brutalized. The defendant appealed his sentence, which was the maximum allowable under the charges to which he had pled, and appealed his designation as a sexual predator. In both respects, the Appellate Court upheld the trial court. His background, as noted in the appellate review, was provided in the presentence investigation, and the psychological assessment that was done included an extensive history of drug and alcohol abuse, going back to his age 11 and including methamphetamine among the substances abused. The information presented at his sentencing hearing included his failure to obtain treatment or to accept that he needed any assistance with his drug/alcohol problems, and the court further noted that he had a significant anger potential, also unaddressed. The psychological report referenced included an actuarial risk analysis, placed the defendant at a low to moderate range, and offered an opinion that a more clinical or dynamic approach would place him at a moderate level given current expressed attitudes and behavior.

These cases illustrate that both forensic psychologists and the courts engage in risk analysis, often looking to similar factors, and their foci mirror
the three-point starting place of history, opportunity, and triggers. In the first case, a clear history of sexual violence was not part of the evidence against the defendant, but situational and dispositional triggers existed as well as opportunity, all of which could be recreated if Braxton continued her associations and use. In the second case, all three factors were documented and the more serious label applied and upheld.

In a sense, risk analysis can be viewed as both very simple and very complex. We are now into the third generation of approaches: clinical was the first; actuarial, the second; and what is being referred to as dynamic or stable is the third. The easiest part of violence prediction rests on the notion that prior behavior remains the best predictor for future behavior. In that simple construction are embedded numerous and often idiographic factors that account for the first time and are part of the future potentials—the triad of history, opportunity, and triggering variables. The interest in dynamic factors has returned the issue of clinical judgment to consideration, but the ongoing empirical results continue to support that actuarial schemes are best suited to accuracy of prediction insofar as it is possible to accomplish (Monahan, 2003). There are, however, emerging highly structured approaches to considering case-specific and dynamic factors, and there is ongoing research into the degree to which an alteration of initial actuarial prediction (as with STATIC 99) based on assessment of dynamic considerations can prove statistically robust. Instruments developed for prediction of sexual violence featuring dynamic factors are the STABLE 2000 and the ACUTE 2000 (Anderson, 2005). Content of these instruments includes inquiry into such variables as social influences, intimacy deficits, self-regulation, attitudes, cooperation with supervision, victim access, emotional collapse, substance abuse, and “unique factors.” The overall convergence of all these approaches is readily apparent. However, the sources of information about the factors include interviews of the defendant and reports of other people. Bias potentials are not eliminated; clearly, empirical findings will need to determine usefulness in the long run.

The reader is referred to Chapter 11 for other details on prediction schemes that can be part of forensic evaluation for a variety of purposes in methamphetamine-related cases.

Summary and Recommendations

Aside from the havoc wreaked by methamphetamine, quite possibly the most damaging type of substance abuse in recent memory, a crude phenomenological and epidemiological network of information has been formed that has relevance for experts in forensic settings and situations. Information on methamphetamine that stems from empirical investigation, the most valid
and reliable of this information network, needs to form the basis for experts’ contributions to the criminal courts and be articulated to triers of fact. At this rudimentary state of the art, the experts should be questioned closely on their knowledge about methamphetamine. The expert should know the methamphetamine abuse by defendants, victims, and witnesses (in some cases) at the time of the alleged crime. The effects of methamphetamine need to be factored in at every step of the judicial process from interrogation of the suspect to sentencing. Sound, rigorous decision paths for every criminal forensic issue the expert addresses need to be developed to reflect the thinking process of those professionals and to expose possible errors and biases.

References


Only one chapter composes this section, but it includes not only treatment in the clinical sense, but also some of the intervention strategies that derive from more legal perspectives. As has been true throughout the volume, the need for more explicit knowledge, the complexity of factors that are characteristic of human behavior, and the limitations of specified procedures make the area of treatment an arena of ongoing development.
Traditional treatment programs based on the Minnesota Model (28-day inpatient treatment) have been shown to be ineffective for the treatment of stimulant addiction. Indeed, the traditional 28-day program has all but disappeared in substance abuse approaches on the basis of both ineffectiveness (relapse rate) and costliness (insurance reluctance to underwrite the 28-day programs). In a context of cost-effectiveness, developing empirical bases for treatment programs assumes an even greater importance than might have been the case on the basis of purely scientific concerns. Both the National Institute on Drug Abuse (NIDA) and the Center for Substance Abuse Treatment (CSAT) have sponsored research into the efficacy of treatments for methamphetamine abuse. One program that is currently receiving the greatest national attention, the Matrix Model, has been shown to be promising, but none of the models has been effectively evaluated for its efficacy for the treatment of methamphetamine use per se. Meanwhile, the development of mental health and drug courts as an outgrowth of treatment in lieu of incarceration includes positive and negative aspects—legal and psychological—some of which are by-products of the level of treatment efficacy and availability.

Challenge and Findings of Treatment Research

Research into treatment programs is fraught with a fair amount of hazard when it comes to such niceties as controls and the ability to factor out of a complex mix of variables actual treatment effects. Nonetheless, work has been and continues to provide some insight into this area. Thus, as of the first edition of this volume, the Matrix Model was viewed as promising but in need of continued research inquiry. Only a few years later at the present time, its capacity to generate success has continued to be documented, especially in combination with contingency management (see page 263, this volume). In a slightly different approach to evaluating substance abuse treatments, Ritsher, Moos, and Finney (2002) reported on an extended evaluation of 2805 male patients in Veteran’s Affairs (VA) programs. Although a short-term study, the results pointed in directions already known for other forms
of psychotherapy. Specifically, analysis of the findings showed that 28% of the study participants remained in remission 2 years after discharge. The factors that seemed most predictive for remission included history of lower levels of use, absent or minimal psychiatric problems, lower disadvantages/costs to the individual of discontinuing substance use, and having abstinence as a treatment goal. There was no relationship between treatment orientation and outcomes. There was a positive effect if the individual remained in outpatient mental health care during the first follow-up year and also participated in self-help groups. Results of this study suggested the importance of long-term work and called into question notions that have been expressed in the literature that there is a cohort of people for whom controlled use is an option. At the very least, that group does not appear to be among those who receive intensive substance abuse intervention.

An indirect set of findings also may be important in developing programs for and working with methamphetamine-abusing patients. In Canada and in the United Kingdom, there has been significant interest in cognitive retraining as part of intervention into general criminal recidivism. In both countries, what has been found is that among the criminal population there are deficits of cognitive skills and these skills can be learned. What has not occurred, however, is a substantial difference in terms of reconviction rates between those who participate successfully in such programs and those who do not when the groups studied are well matched for risk levels. It has been noted on the basis of meta-analytic studies that some small reduction in recidivism occurred when offenders were given the opportunity to participate in cognitive behavioral approaches. However, when a study was done that carefully matched risk levels between groups, the treatment effectiveness variable did not survive. In discussing that finding, it was noted that matching was based on static risk variables that did not include drug abuse (Falshaw et al., 2004).

Currently, there is no accepted pharmacotherapy for psychostimulant addiction (Lile, 2006). Consistently, a 2005 NIDA report to Congress indicated that “There are … no specific medications that counteract the effects of … or … prolong abstinence from and reduce the abuse of methamphetamine.” The following are three programs established by NIDA:

1. The Medications Development Program. Begun in 1989, the program initially looked at pharmacotherapies for opiate and cocaine dependence and now also includes methamphetamine and cannabis.
2. The Methamphetamine Clinical Trials Group (MCTG). This program conducts clinical trials of medications that counter methamphetamine effects and addiction. Human trials have been established for high methamphetamine abuse areas, including San Diego, Kansas City, Des Moines, Costa Mesa, San Antonio, Los Angeles, and Honolulu.
3. The Methamphetamine Treatment Discovery Program. The focus of this program involves identification, evaluation, and recommendations of potential treatments using both “bottom up” (compounds are identified based on findings from animal studies) and “top down” (existing drugs are tested for their potential application to methamphetamine conditions) approaches. Substances under development include Buproprion, Sertraline, Lobeline, Aripiprazole, Carvediol, Clonidine, Atomoxetine, Prazosin, Modafinil, Perindopril, Rivastigmine, Topiramate, and Baclofen (NIDA, August 2005).

**Therapeutic Jurisprudence, Drug and Mental Health Courts, and Methamphetamine**

Developing out of the concept of therapeutic jurisprudence, that the justice system in its many aspects can function either to worsen or improve mental health, has been the establishment of mental health and drug courts. In these courts, an individual’s criminal act or acts are charged as such, but options exist in many cases not only for treatment in lieu of incarceration, but also for completely eliminating a criminal record if the individual acknowledges the problem and engages successfully in court-ordered treatment. The outcomes of these programs have been variable, as might be expected, and individual as well as social variables appear explanatory. First, there is the variable response to treatment which is generally found. Second, there are individual variables such as the degree of antisociality and level of interpersonal/relational support. Finally, there are purely socioeconomic factors involving the availability of adequate treatment programs and the ability of persons being processed through the criminal justice system to access and afford such programs.

Another area of concern when it comes to diversion programs is discussed in the December 2005 issue of *Psychology, Public Policy, and Law*, which was devoted to mental health courts but included factors relevant to drug courts. Problems noted included the possibility of inroads into due process and basic defendants’ rights. Furthermore, ineffective programs would not only lead to relapse and recidivism, but in so doing neither helped defendants nor protected society from deviancy. It was specifically noted that unless treatment programs become much more adequate across the board, diversion programs cannot by definition work at any level (Seltzer, 2005; Stefan and Winick, 2005).

Nonetheless, there is some reason for optimism. In an extended Report on Drug Courts of the National Institute of Justice (2006), completed and ongoing research into the workings of drug courts has allowed identification of some factors that are part of effectiveness. Various models have been
considered, including diversion, pretrial, postconviction, or conditional release approaches. The type of legal model does not seem as important as factors related to treatment programs: emphasis on cognitive skills, a basis in an empirically defensible theory of drug dependence, the maintenance of treatment over a period of a year or more, the availability of ancillary support services, and interestingly, the interaction between defendant and a particular judge. Being responded to and responsible to one judge increases compliance levels with treatment programming. In spite of earlier findings to the contrary, mandated treatment can be effective. Certain other factors raised interesting questions or commentary on variables relevant to treatment. Thus, it was found that when defendants had to plead guilty in order to participate, as opposed to avoiding a finding of guilt, the percentage choosing the drug court option increased, but the absolute number of enrollees reduced. It could be theorized that those simply seeking to avoid the record of a conviction but with little motivation for treatment opted out of the choice resulting in a smaller pool of more highly motivated participants. With regard to stimulant use, an ethnic difference was found: Caucasians were more likely to use methamphetamine and African Americans and Hispanics reported reliance on cocaine.

With respect to treatment programs that worked and those that did not, mixed theoretical approaches were significantly limited in effectiveness, especially when there was conflict between philosophies. Cognitive behavioral methods, recognized as the most effective treatment modality, have as their foundation the notion that people can learn to recognize faulty thinking and come to assert new levels of personal control; 12-step programs by contrast emphasize helplessness in the face of addiction. The two philosophies created conflict for the participants who could not succeed in either mode without failing the other.

Many other factors such as age at entrance, whether or not an individual was rearrested during the treatment period, adequacy of attendance, minority group membership, and gender all exercised important influences on success rates.

Nonetheless, and in spite of the complex interactions of many positive and negative factors, drug courts have shown themselves to be cost effective when contrasted with the expense of incarceration and the recidivism rates for untreated substance-abusing offenders (National Institute of Justice, 2006).

**Resources for the Sentencing Process**

The Substance Abuse and Mental Health Services Administration provides a directory with listings for type of services available at facilities across the country which is issued on a yearly basis. Identified service categories include
indication of those programs set up to provide for the criminal justice population. A brief phone survey of some of these facilities listed in the 2001 edition was initiated using a semistructured inquiry. Even given the very limited number of contacts with completed data (N = 20), there was geographic representation across the mainland. Assuming the sample to be somewhat representative of the national picture, it would appear that there is increasing use being made of cognitive behavioral approaches, often in combination with 12-step programs. Multiservice was the rule. Most had some psychiatric care and almost all indicated dual diagnosis treatment was offered including psychotropic medication. (However, one informant indicated dual-diagnosis patients were treated, but also stated no one was allowed to have prescribed medication once the individual entered the program.)

All facilities had social work coverage, and about half had psychologists. All either had detox units or could access the service. Almost all either had or accessed inpatient, partial hospitalization, or intensive outpatient programs. Almost half had a residential program in place. Ancillary programs, such as occupational and recreational therapy and vocational rehabilitation, were also seen as important components in treatment planning (N = 18, 90%). In a couple of contacts, there was unwillingness to respond to questions about the scope of services and underlying treatment philosophy, and there was one facility where no one claimed to know the answers to the questions. On the other hand, there were settings that included a specific methamphetamine focus, such as the University of California–Los Angeles (UCLA) Integrated Substance Abuse Program (Cunningham–Rathner, personal communication, June 2002). Clearly, it becomes important to engage in direct person-to-person contact in making referrals.

Contemporary Approaches to Treatment Theory

Treatment for chemical dependency in general and specifically for methamphetamine has not been uniform around the country. There have been a number of attempts through the National Institute on Drug Abuse (NIDA) and American Society for Addiction Medicine (ASAM) to develop standardized treatment protocols that would act as guidelines to programs that treat addiction. However, the penetration of these algorithms in the provider community has been at best sporadic and fragmented. Many providers continue to use a traditional approach to treatment that is primarily based on the disease concept and follows the Hazleton model. This approach, although effective for many, is more than 30 years old, and it has not integrated some of the more recent scientific understanding of addiction and addiction treatment. There continues to be a primary substance-based understanding of addiction as opposed to a more complex model.
A more modern, scientific approach considers addiction as a disorder of activation. Based on this model, there are genetic predispositions to addiction. Those who begin to use mood-altering substances activate the addictive tendencies. With frequent and chronic use, this pattern becomes solidified and can create major changes in the brain chemistry and the way in which the individual responds to nondrug-induced pleasurable stimuli. The addict will require mood-altering substances to activate certain processes in the brain in order to experience pleasure. With chronic use, there is a shift from attempting to create pleasure (the high), to avoidance of pain, which is caused by withdrawing from the substance. To avoid pain, the addict will use whatever means necessary to obtain drugs, and the compulsion to use will control multiple aspects of his or her life. Prolonged drug use will affect the physical, social, and psychological functioning of the addict and will result in a downward spiral. The addicted individual who is fortunate enough will “hit bottom” before causing permanent destruction in his or her life; compelled by a sense of desperation, along with external pressures (such as the carrot and stick of court-mandated treatment), the addict may then seek help.

There is a great deal of variability in addiction treatment around the country. If a treatment program is part of a larger behavioral health provider, it is highly likely that it provides a wider range of services than is found when it is part of a general hospital setting. Such multifactor programs include detoxification and some form of rehabilitation above and beyond simple discharge into a 12-step community-based program. Comprehensive addiction treatment needs to be multidimensional. Such approaches to treatment can be highly effective but tend to be more costly than the more traditional interventions. Because prolonged addiction can create problems in a number of areas, treatment planning needs to consider the various aspects of the individual’s adjustment that are affected. A multilayered approach, which allows intervention into physical, social, psychological, and psychiatric problem areas in individually tailored fashion, is necessary. At the same time, treatment programs must be coherent and not involve conflicting messages and activities.

In the ideal situation, the addict is followed through varying levels of care in the same organization and there is familiarity with the case. However, effective communication between agencies with a consistent treatment philosophy can achieve the same result.

The most acute level of care in addiction treatment is medical detoxification. During this phase, the addict is abstinent from drugs of dependency and a state of withdrawal will ensue that must be medically managed. Treatment during this phase often requires medication that reduces withdrawal symptoms by acting on the brain in similar ways as did the substance of abuse. These medications are generally slow-acting substances and do not result in drastic changes in mood.
For most substances, the acute phase of this process lasts less than 4 days. However, there are certain mood-altering substances that tend to have longer-lasting half-lives and can continue to create discomfort and problems associated with withdrawal. Heavy methamphetamine use can result in prolonged chronic withdrawal symptoms, which are physiologically based but psychologically expressed, including anxiety, irritability, and anhedonia (loss of pleasure in life). Sometimes, there is progression to a major depressive state.

Care during acute and early chronic withdrawal involves an extensive medical assessment as many addicts have a history of neglecting their health and often suffer from a variety of health-related problems secondary to their drug use and the lifestyle associated with a drug-abusing subculture. Often, addicts, particularly those with an extensive history of alcohol use (and most methamphetamine users are polysubstance abusers with alcohol a frequent component), suffer from malnutrition and medical problems related to vitamin and nutritional deficiency.

Shortly after the detoxification is completed, addiction treatment for most patients can be provided on an outpatient basis. Day treatment and intensive outpatient programs are options that are often used. A subpopulation of patients with coexisting mental health diagnoses may require a more structured treatment immediately after detoxification.

Complicating the diagnostic and treatment picture is the phenomenon of methamphetamine psychosis which apparently develops out of the brain injury that is a function of long-term use or shorter-term exposure by predisposed individuals. Current treatment has emphasized neuroleptics, often only requiring brief pharmacological intervention but sometimes a longer-term condition develops (Zorick, 2006). A large-scale internationally based study of specific interventions into methamphetamine-induced psychoses was reported to be in the process of development as of 2002. The researchers hoped to identify the best neuroleptic medications as well as other treatment and prevention components (J. Rathner, personal communication, June 2002).

An adequate treatment program needs to consider external problems in areas of work environment, neighborhood, and family that can create significant problems in recovery. Although dealing with relapse is part of a modern treatment program, with addicts who have had repeated relapses after detoxification, more structured and highly supervised modes are indicated. Where individuals have comorbid psychiatric diagnoses, high levels of family conflict, or have high levels of external cues that trigger addictive behavior, treatment-planning teams need to consider a clinically managed residential program with step down available to a more traditional residential program.

The clinically managed residential program is particularly effective with individuals who require psychotropic medications. Often, extensive
education and orientation are indicated to prevent dropout from treatment and early termination of medication use.

Long-term therapeutic communities that focus on providing structure, supervision, treatment, and resocialization can be effective in treatment of the more chronic group of individuals who have had a history of difficulties with issues other than addiction. Some communities have developed and implemented prerelease programs for addicts who have been incarcerated for nonviolent drug-related offenses. These programs are designed for those addicts who are highly vulnerable to relapse and require a high degree of external support and structure.

In these programs, the addict is usually provided with incrementally higher levels of responsibility and moves along the continuum of being closely monitored to rather independent living and working in the community. However, these programs usually have limited direct treatment modules such as group or individual therapy. They rely heavily on peer support and use other community resources for treatment of adjustment difficulties that are often present in addicts who are new in recovery. The length of stay in this type of program is relatively high and can range from 90 to 180 days. It is hoped that with the routines established during their stay in such programs, addicts will begin to internalize a more structured lifestyle that is conducive to staying sober. In most of these programs, there are daily requirements, and each resident is mandated to attend 12-step groups.

Short-term residential programs, on the other hand, are designed to integrate the addict into the recovering community (Hubbard et al., 1998). During their stay in these programs, clinical staff and peer support focus on helping addicts develop internal coping skills that enable them to live a sober lifestyle. Participants also are presented with alternative approaches in addition to peer support in 12-step recovery meetings and to expand their sober social support systems. Learning leisure activities that are conducive to staying sober is included to assist in prevention of relapse through avoidance of old “traps.”

Generally speaking, an essential aspect of recovery from addiction is active participation in 12-step recovery programs. This process, which includes extensive peer support with a 12-step recovery process, has proved to be relatively effective in promoting and maintaining abstinence in alcoholics and addicts. There is limited scientific scrutiny of the program, as it is, by nature, an anonymous group and it does not easily lend itself to empirical investigation. However, intuitively, the values of the 12-step programs are in the structure that they provide for the addict. This type of external sober support is instrumental in relapse prevention and takes the addict out of situations that contain cues that activate drug-seeking desires in the brain and subsequently lead to use.

Effective addiction treatment requires a multidisciplinary team. To be able to perform a comprehensive biopsychosocial assessment of the addict, the team needs to include a physician (an addictionologist or a psychiatrist
with addiction treatment specialization), a psychologist, and a chemical dependency counselor. Clinical social workers who provide family and social assessment are essential team members. For treatment to produce optimal results, these professionals must collect data and work together in treatment planning. An attitude of respect for the participant includes an understanding on the part of the treatment team that addicts, like all other patients, are interested in getting better (Demiff et al., 2000).

In order for a substance to affect an individual’s mood, it must be able to pass the blood–brain barrier and cause biochemical changes in the brain. The cognitive, emotional, and behavioral effects of these substances mimic those seen in other processes that result from changes in brain chemistry, such as mental illness. It is common that during the active phase of their use, methamphetamine addicts in particular may be diagnosed erroneously as suffering from mental illness. Evaluation must proceed with care or an individual who is abusing substances or addicted to them could be diagnosed with an illness that is chemically induced and may disappear when direct effects of the chemicals dissipate. Kono et al. (2001), in their comparison of individuals who abused nicotine, alcohol, methamphetamines, and inhalants, noted that those who abused methamphetamines displayed a significantly higher intensity of symptoms related to perceptual disturbances, thought disorder, mood disorder, and problems with acting out behaviors, which they categorized as volition disorder.

On the other hand, it is very important to note that there are those addicts or alcoholics who have a coexisting psychiatric condition (patients with dual diagnosis). For individuals who display psychiatric symptoms as a side effect of their substance abuse, there needs to be an active treatment plan for addiction treatment, and a “wait and see” approach toward the psychiatric symptoms. Those individuals who either have a preexisting psychiatric condition or who have developed psychiatric illness during the course of their use of mood-altering chemicals will require a treatment plan that includes psychiatric interventions. Unfortunately, many traditional addiction treatment programs around the country lack appropriate psychiatric services, and this aspect of treatment for those addicts who are most vulnerable is missing. The usual pattern noted in treatment of these individuals is characterized by repeated relapses with the psychiatric symptoms interfering with ability to benefit from the addiction recovery program. Also, shortly after discharge from these programs, the individual is likely to go back to using drugs in an attempt to self-medicate the psychiatric symptoms. Dual-diagnosis treatment needs to be provided by a team of professionals who have expertise for both addiction and psychiatric problems.

The opposite case can also occur. There are psychiatric programs that mistakenly attribute drug-related symptoms to psychiatric conditions and often attempt to medicate the addiction problems away. Ignoring addiction-related
issues not uncommonly can lead to prescription of addictive medications for what are withdrawal symptoms.

One of the main problems in the field of addiction treatment is blaming treatment failure on the patient with accusations of “poor motivation” and “being in denial.” In making these statements, the clinicians absolve themselves from any responsibility for providing the type of care that is a “good fit” for the patient and thus lose a chance to improve compliance levels. Also, in blaming the patient for treatment failure, a cyclical reward system is set up that promotes the sense of inadequacy and low self-esteem often associated with being an addict. The patient is invalidated and the problem is increased. In research with patients suffering from borderline personality disorder and other patient groups with multiple problems, Linehan (1993) has demonstrated that validation is an effective tool for engaging patients in treatment and therefore obtaining more positive outcomes. The tradition of pejorative labels for patients who have difficulties in navigating a course of treatment has been a significant factor in addiction treatment failures. (For example, a counselor dismissing a patient as a “frequent flyer” is not unknown in the case of “resistant” participants.) If the patient accepts the view of the counselor, then he or she has incorporated a concept of inability to benefit from treatment. If, on the other hand, the patient disagrees with the assumptions of the counselor, then there is demonstrated “noncompliance,” which can lead to termination of treatment (“therapeutic discharge”).

In treatment planning for addicts, it is important that those who provide the treatment take some responsibility for making sure that the addict is motivated to follow the treatment plan. There are certain commitment strategies that can be quite effective in raising levels of participation. Linehan and colleagues (Linehan, 1993) have demonstrated the effectiveness of these strategies in keeping patients with borderline personality disorder engaged in treatment. Treatment dropout can be reduced dramatically when commitment to therapy is defined as a major objective of therapeutic work rather than as a prerequisite on the part of the patient. Thinking about treatment in this way is especially necessary for individuals who have been referred into treatment by the legal system, rather than presenting themselves for assistance.

Completing a comprehensive program is enhanced through evaluation of prior treatment history. The addict must be asked to outline a history of addiction and psychiatric treatment including the reasons for admission to treatment, the center where treatment occurred, the length of treatment, how long sobriety lasted, and what caused the relapse. A great deal of insight can be obtained if further questions on the course of treatment and its completeness are assessed. As mentioned earlier, there is a great deal of variability in how addiction services are provided; however, there are types of treatment that tend to be offered by certain programs and attended by certain types of addicts in order to pacify certain individuals or institutions. For example, in
cases of driving under the influence, many individuals, especially first-time offenders, participate in a weekend program that takes place at a local hotel. Educational offerings are the main aspect of this intervention, along with the brief isolation. There are also many individuals who enter a treatment program and are in the process of withdrawal from drugs and alcohol. These individuals are usually detoxified medically, and are presented with certain educational modules regarding alcoholism and addiction. The assumption is made that these addicts can manage the cognitive tasks involved. After a few short days, they are discharged into the community with no meaningful follow-up treatment and are told that they are in a place where they can benefit from community-based 12-step programs.

Therefore, it is important that during the assessment period, questions regarding the extent and type of treatment are asked to determine whether or not the addict has had a true chance at recovery. Issues related to the type of professional involved in treatment and the programmatic aspect of treatment need to be addressed. This aspect of assessment is even more important in forensic situations, because addicts with legal involvement and criminal convictions tend to have fewer financial resources, and it is likely that their treatment was provided in community-based agencies that also have limited resources. It also allows some education of the court regarding those factors that were not under the control of the individual and that favor appropriate treatment options.

Given the extensive damage that can be caused by even short-term use of methamphetamines, the issue of deficits associated with brain injury needs to be addressed directly. Certain aspects of this type of deficit clearly interfere with the addict’s ability to learn and process information. A great deal of programming at most addiction recovery centers is based on a psychoeducation model. It would be safe to assume that chronic methamphetamine users may have a great deal more difficulty with the learning material presented to them than persons without the central nervous system damage. Given that impulse control and inhibition and management of feelings are difficult for these individuals, frustration enhances dropout potentials as well as leads to acting out in ways that disrupt treatment for themselves or others. If cognitive deficits that result in significant interference with learning are noted, appropriate assessment should be undertaken. It may be important to design treatment interventions that are behavioral in nature and do not involve higher-level cognitive work. At the same time, cognitive rehabilitation measures can be included in the treatment plan that will assist in later mastery of more traditional educative aspects. In fact, the 12-step recovery program has a strong behavioral component that is designed to engage participants in the process even if they do not cognitively appreciate more abstract principles.

Educating the addict’s support system can positively affect treatment outcome. Family members, sponsors from 12-step programs, probation officers, and case managers should be informed about the complexities related to how
the brain of the addict may be compromised. As a result, the addict’s support system is less likely to engage in blaming—and thus unwittingly contribute to treatment failure when cognitive interference leads into treatment lapse.

Individuals with dual diagnosis are significantly more difficult to treat and tend to have a higher rate of relapse in both their psychiatric condition and addiction. This phenomenon generally arises because one or the other aspect of their condition is not treated adequately. As mentioned above, there are major psychological issues and cognitive deficits associated with methamphetamine use. In addition, behavioral problems, often secondary to either premorbid personality or brain damage caused by the destructive force of the substance, make management of these individuals difficult in traditional treatment settings.

The dual-diagnosis problem should be assessed prior to making a referral for treatment. Individuals with a history of methamphetamine use and other coexisting conditions require an addiction treatment facility with significant capability to address psychological and psychiatric issues. This combination of expertise is rarely present in even fairly sophisticated treatment settings and is conspicuously absent in programs designed for “treatment” of addicts who have been adjudicated and have been mandated to receive addiction treatment programming as part of their sentencing.

Prerelease programs usually run between 90 and 180 days and are designed to assess the individual’s capabilities to live a sober life outside of the structure of a correctional facility. These programs are not designed to provide primary treatment of any type and are often managed by graduated peers. They are usually found in inner-city locations with access to drug-infested neighborhoods. Given the cognitive, emotional, and behavioral vulnerabilities of chronic methamphetamine users, these programs can represent a major risk for “treatment failure” with subsequent categorization as resistant or noncompliant.

Another aspect of treatment for methamphetamine users is related to how rapidly they become addicted to this drug and how quickly their use results in major impairment and subsequent need for treatment (Castro et al., 2000). Hartz, Fredrick-Osborne, and Galloway (2001) have reported extensively on the intensity of craving for this drug and the cues associated with relapse because of it. In the long run, the emphasis needs to be on prevention because the prognosis for methamphetamine-addicted individuals, given the brain impacts, can be bleak.

**Review of Treatment Center Cases**

Some of the above observations regarding treatment can be seen in the case characteristics found in a review of methamphetamine cases from a relatively small suburban multimodal psychiatric facility located in northeast Ohio.
Laurelwood was a private facility that was part of the larger community of health-care institutions known as University Hospitals. Laurelwood had a largely working- or middle-class patient population with insurance coverage or the capacity to pay for treatment, although *pro bono* service was offered when feasible. As such, the case sample is not representative of the nation at large insofar as drug abuse patterns and responses to treatment are concerned. Given the population skew, the following results from this case survey raised some red flags in spite of the small sample size.

**Procedure**

Cases admitted to the hospital during 2002 were reviewed to obtain a selection where methamphetamine abuse was present; 17 cases were identified (Table 14.1). Information collected included gender, marital status, age, other substances abused, criminal record including arrest, time served, and probation, chemical dependency treatment history, mental health treatment history, presence of agreement for treatment after release, Axis I diagnosis, Axis II diagnosis, Axis III diagnosis, and family history for chemical dependency or other mental health diagnoses. No identifying information was reported, and data have been grouped as indicated below.

**Results**

This small sample, heavily weighted with males over females, nonetheless has characteristics of significant interest. The age range includes persons who are into middle-life years. However, as Figure 14.1 shows, the period of most

<table>
<thead>
<tr>
<th>Gender</th>
<th>Mean Age</th>
<th>Age Range</th>
<th>Single</th>
<th>Married</th>
<th>Divorced</th>
<th>Separated</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (N = 13)</td>
<td>24.85</td>
<td>18 to 40</td>
<td>10 (77%)</td>
<td>1 (8%)</td>
<td>1 (8%)</td>
<td>1 (8%)</td>
<td>13</td>
</tr>
<tr>
<td>Female (N = 4)</td>
<td>26.75</td>
<td>16 to 39</td>
<td>2 (50%)</td>
<td>2 (50%)</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

*Figure 14.1* Onset of methamphetamine use.
likely initial use is in the twenties for the thirteen where information about
the initial use of methamphetamine was available.

Table 14.2 illustrates the not surprising finding that over half of the sam-
ple reported contact with the criminal justice system. Of the 11 patients for
whom there was a report of involvement with the criminal justice system,
several kinds of offenses were referenced. Of the 11, 9 had at least one charge
that involved substance-related activity (possession of drugs or parapherna-
lia, driving under the influence, underage consumption). Five had contact
with the criminal justice system secondary to aggressive behavior, includ-
ing domestic violence, disruptive behavior in school, assault charges, and
attempted murder.

Table 14.3 clearly illustrates the polysubstance use patterns of this sam-
ple, which are characteristic across the board in treatment centers such as
this. Alcohol, as might be expected, remains the most likely substance to be
abused in addition to other identified chemicals and was found in every one
of these methamphetamine users.

Table 14.4 illustrates another facet of the diagnosis and treatment of
chemical abuse. There are significant comorbid conditions; some are induced
by the substance abuse but others are preexisting or co-occurring and may
be underlying bases for drug/alcohol involvement. Given the short inpatient
treatment scope in this setting, most Axis II diagnoses were deferred with
only one person identified as having no Axis II vulnerability and only two
positively identified with a personality disorder.
## Table 14.4  Axis 1 Diagnostic Status (N, %)\(^a\)

<table>
<thead>
<tr>
<th>Sex</th>
<th>Nonsubstance-Induced Mood Disorders</th>
<th>Substance-Induced Mood Disorders</th>
<th>Nonsubstance-Induced Psychotic Disorders</th>
<th>Substance-Induced Psychotic Disorders</th>
<th>Adjustment Disorders</th>
<th>ADHD</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>2 (12%)</td>
<td>1 (8%)</td>
<td>2 (12%)</td>
<td>2 (12%)</td>
<td>2 (12%)</td>
<td>2 (12%)</td>
<td>Substance induced</td>
</tr>
<tr>
<td>F</td>
<td>3 (18%)</td>
<td>2 (12%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>(Oppositional defiance)</td>
</tr>
<tr>
<td>Total</td>
<td>5 (29%)</td>
<td>3 (18%)</td>
<td>2 (12%)</td>
<td>2 (12%)</td>
<td>2 (12%)</td>
<td>2 (12%)</td>
<td>(1) Anorexia nervosa</td>
</tr>
</tbody>
</table>

\(^a\)  Rule outs were assumed to be present, consistent with the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association, 1994) and were counted. They included one major depression, one substance-induced mood disorder, and one adjustment disorder.

\(^b\)  Patients had more than one Axis I condition; numbers do not sum to 17.

**Note:** ADHD, attention deficit/hyperactivity disorder.
Figure 14.2 illustrates the prominence of Ecstasy as one of the more important manifestations of methamphetamine abuse in this region. Other data collected on this sample included information on Axis III conditions: hypothermia, sexually transmitted diseases (STDs), possible lupus, chronic pain, chronic obstructive pulmonary disease, arthritis, possible malnutrition, and asthma. Family history was positive for significant mental health conditions in three records (bipolar affective disorder, schizophrenia, and Alzheimer’s) and was significant for alcohol abuse or dependency in 14 of the cases.

Discussion

The fact that methamphetamine cases were relatively uncommon for this population does not diminish the importance of the findings. In effect, there is an early indication of an increasing problem, which is seen in the small sample available for scrutiny. The characteristics of these individuals and their families were consistent with what is repeatedly found in all other areas of substance abuse. There is a family component. Involvement with illicit substances places one at risk for criminal justice contact, and there is a significant likelihood of mental health comorbidity of a type that requires that the treatment plan include appropriate components. Clearly, this is not a population that can be served by a one-size-fits-all treatment approach, nor is it a population that can be treated in any setting where all use of substances, including psychotropic medication, is not well tolerated. Media exposure at the time of the study had featured reports of Ecstasy abuse as one of the more common party drugs in the geographic area served by the hospital. At the time this second edition was written, the anticipated prominence of methamphetamine abuse throughout the region was clearly materializing.

Treatment Models

As was shown in research done on drug court effectiveness, treatment models make a difference, and a well-founded and articulated approach is
one of the characteristics of programs with some relative success in substance abuse therapy. Several models exist of relevance to methamphetamine abuse treatment.

National Institute on Drug Abuse (NIDA) Treatment Guidelines

NIDA has published treatment guidelines for stimulant abusers that have been empirically tested and their efficacy validated. However, these manuals were developed and tested on a population of cocaine users. One report (Rawson et al., 2000) identified a variety of differences between methamphetamine and cocaine users. Methamphetamine users reported more daily use of marijuana and hallucinogens, more headaches, depression, suicidal thoughts, and hallucinations than cocaine users. Further, methamphetamine users reported spending less money on stimulants, using less drugs, consuming less alcohol, needing less treatment for comorbid alcohol use, and perhaps most importantly, a “significantly shorter length of longest abstinence prior to treatment entry” than did cocaine users. Moreover, methamphetamine users indicated more family problems, more friends who used drugs, and more sex associated with drug use than did cocaine users. Because of these differences, we cannot assume that treatment strategies that work for cocaine users will also work to reduce or eliminate substance use in those who select methamphetamine. Empirical evaluation of the efficacy of models for the treatment of methamphetamine use continues to be needed.

Matrix Model of Outpatient Treatment

The Matrix Model of Outpatient Treatment is a 16-week manualized, intensive, nonresidential, directive, nonconfrontational, psychosocial approach that was originally developed in response to the cocaine outbreak of the 1980s. The foundation of the model comes from the cognitive behavioral principles and goals. The fundamentals of the model have been summarized as follows (Obert et al., 2000):

1. The goals of the treatment are to stop the drug use, to explore issues regarding addiction and relapse, to educate the family about addiction, to familiarize the individual with the self-help programs available, and to randomly monitor individuals weekly by urine analysis.

2. The fundamentals of effective treatment are engagement and retention, structure, information, relapse prevention, family involvement, self-help involvement, and urine tests. Engagement and retention are related to the success of the therapist in developing a positive, supportive nurturing relationship, which is fundamental to the success of the treatment. Such a warm environment keeps the patients engaged.
3. The structural component of the model is composed of time planning in the early stages of recovery. By helping the addict learn to plan and schedule, the therapist can reduce any open time where the patient could relapse. This activity can be performed individually or in a group setting and is taught as a skill.

4. Using standardized psychoeducational lectures, the Matrix Model imparts simple straightforward information about emotion in the early stages of treatment. This information becomes more complex and complete in later phases of treatment. The methamphetamine user frequently encounters a period of confused emotional affect. Uncontrolled emotions can include paranoid, psychosis, depression, anger, and fear. Information about the emotions and physical states the client experiences is helpful during the first stages of treatment.

5. Relapse prevention entails techniques that teach the individual to recognize situations that may lead to drug use, as well as the coping strategies to effectively deal with those situations. The Matrix Model utilizes the experiences of recovering coleaders to help patients “struggling with relapse issues.”

6. Families are involved in treatment. Family can both enhance and interfere with the treatment process (Kaufman and Kaufman, 1992). By teaching the family members about addiction and recovery, a practitioner can maximize the benefits that the family brings to treatment and minimize the negatives.

7. Topics designed to familiarize clients with the possible benefits of self-help involvement are part of treatment work. Patients are encouraged to utilize community-based programs, such as Narcotics Anonymous (NA) and Alcoholics Anonymous (AA) group meetings.

8. Weekly random urine analysis is important to provide proof of sobriety, and positive tests are viewed as indicators for altering the treatment plan.

Treatment components of the Matrix Model consist of individual sessions, early recovery groups, relapse prevention groups, family education sessions, twelve-step meetings, social support groups, relapse analysis, and urine testing. There are three 45-minute individual sessions with a therapist. These sessions are used to set goals and verify that they are being met. These sessions can also be combined with other activities such as the inclusion of a family member. Extra sessions can be provided if necessary to deal with crisis intervention or treatment planning.

To reduce expenses, small early recovery groups take the place of holding a significant number of individual counseling sessions. The early recovery groups take place in the first month of treatment. These groups are primarily educational and include the following topics: cognitive tools to reduce
craving, time scheduling, discontinuation of any secondary substances, and connecting patients with other community support groups.

Relapse prevention group meetings take place at the beginning and end of each week for the full 16-week program. The goal of these open sessions is to teach the recovering person how to maintain sobriety. These groups are topic centered and always positive. In addition, 12-week family education sessions are presented in a group setting and include slide presentations, videotapes, panels, and group discussion. Topics include neurobiology, conditioning, medical effects of stimulants, and how family relationships are affected by drugs. On-site 12-step meetings are used to ease clients into attending outside meetings on their own initiative.

During their last month of treatment, after completing the family education sessions, the patients attend social support groups. These groups are less structured than the other groups discussed above. They are designed to enable patients to establish relationships with nondrug users. Topics covered are tailored to the specific needs of the individuals in the groups. Urine tests are done randomly each week. Relapse analysis is provided to patients who have not maintained sobriety. This analysis is designed to evaluate the events that led up to the relapse.

As of the first edition of this volume, the Matrix Model had been evaluated in five studies over a 15-year period. That research continued and expanded with some focus on the specific population of methamphetamine abusers. The first of these evaluations (Rawson et al., 1986) was a quasi-experimental study performed on 83 cocaine abusers who self-selected one of three possible treatments (self-help groups, 28-day inpatient treatment, or the Matrix Model). Patients who selected the Matrix Model were significantly more likely, measured 8 months after treatment, to recover than the other two groups and significantly more likely to remain in treatment than those who chose the self-help group. Although supportive of the model, the research design did not allow definitive conclusions as to whether it was the treatment model or some factor in the self-selection process that would explain the outcomes. Other issues include that methamphetamine and cocaine cannot be treated as equivalent and the amount of time in treatment was longer than standard for the model. Similarly, a second study (Rawson, 1991) evaluated a larger group of cocaine users. This study was conducted on subjects who received 6 months of treatment, but no data were collected on methamphetamine addicts. A third study (Rawson et al., 1995) on 100 multiethnic cocaine-dependent subjects was appropriately controlled. These subjects were randomly assigned to either a 6-month Matrix Model group or an “other available community resource group.” In this study, the Matrix Model participants fared no better than their counterparts who entered a random treatment program. Both groups showed improvement. The authors concluded that the inability of the Matrix Model to yield sig-
significantly better results than other forms of treatment was the result of the highly variable treatment experiences of the control participants. However, from these data, it is just as viable to conclude that the Matrix Model is no better than other, traditional methods of treatment. A fourth study (Huber et al., 1997) used archival data to compare the treatment outcomes of patients who reported methamphetamine as their drug of choice with patients who reported cocaine as their drug of choice. All patients received treatment with the Matrix Model. There were no significant differences between methamphetamine using and cocaine-using patients. This finding suggested that the Matrix Model was just as good for treating methamphetamine abuse as it was for treating cocaine addiction. Rawson and colleagues, as well as others, have continued studies of the Matrix Model, including some that focused specifically on methamphetamine abuser response. Results have supported this model along with some other multimodal approaches; the model has shown itself to be substantially robust including in the specific area of methamphetamine use (Dingfelder, 2005; Galloway et al., 1995; Rawson, 1998, 2002a, 2002b, 2006; Rawson et al., 2000, 2002a, 2002b). (See also the California Department of Alcohol and Drug Programs’ Methamphetamine Treatment; A Practitioner’s Reference, 2007. This guide contains approaches that have been supported by the research of Rawson and others involved in the Methamphetamine Treatment Project at UCLA, as well as other information about the impact of methamphetamine in that state.)

**Haight Ashbury Outpatient Model**

The Haight Ashbury Model (Inaba and Cohen, 1990) was taken from the Haight Ashbury Drug Detoxification, Rehabilitation and Aftercare Project. This organization has been involved in psychoactive drug treatment and education since 1967. The model consists of four stages, each characterized by an assessment and plan to be developed for that stage. Although the components of this model are based on sound empirical evidence for the effective treatment of substance abuse, the model has not been evaluated for its efficacy in the treatment of methamphetamine abuse.

The first stage is detoxification, which lasts for the first 3 to 7 days. During stage 1, individuals are assessed to determine whether they need hospitalization, and to determine if they are at emotional risk of harming themselves or others. Further, a physical exam is used to identify any medical emergencies caused by the stimulant abuse. Finally, individuals are assessed for dual diagnosis, and to determine their social and environmental needs. The assessment is followed by a commitment from the client to remain abstinent. Daily outpatient interactions, either group or individual counseling, are scheduled.

The Haight Ashbury model relies heavily on pharmacological mechanisms. If psychosis or speed toxicity is present, then haloperidol or other
neuroleptic drugs may be used to block the excessive dopamine and catecholamine toxicity. Antidepressant drugs can be prescribed if depression is present. Desipramine (Norparamine), trazadone (Desyrel), and fluoxetine (Prozac) are all typically used as antidepressants. The initial craving is treated with bromocriptine and amantadine (dopamine agonists). Amino acid precursors (e.g., Renew or Tropamine) that can lead to increased levels of the neurotransmitters dopamine, serotonin, adrenalin, noradrenalin, and acetylcholine also may be prescribed.

The second stage of the model, initial abstinence, begins with the first week of the treatment episode and may continue for as long as 3 months. The patient is assessed for dual diagnosis, to fully evaluate any medical needs, to review social and environmental problems and needs, and to identify environmental triggers that may pose a problem for the client.

Abstinence is contracted for 3 months. During this time, the patient is required to go to 90 12-step meetings. A structured daily activity plan is developed. A life journal or log of events is maintained. A sober support network is developed. A recovery “sponsor” is found. A personal history of the client’s addiction is developed. The client begins this stage with daily meetings with his or her counselor. By the end of the period, the client is expected to meet with the counselor three times per week. The client with a dual diagnosis begins psychiatric intervention. The client is taught to identify and to avoid triggers. During this stage, a strategy is developed to address drug cravings. Activities to address this issue may include exercise, proper eating, 12-step meetings, working, meditation, hot or cold baths, or networking with other recovering addicts. Desensitization strategies or deconditioning techniques are used to dispel drug craving in response to triggers.

The third stage, sobriety, usually lasts 3 months to 18 months, and longer in some cases. At this stage, psychological and social variables are assessed. Vocational or educational needs of the client are established. The client’s recognition of the addiction and recovery processes is assessed. The client’s ability to accept the concept of lifelong abstinence from all drugs of abuse is also assessed. During stage three, clients are required to write a personal history that identifies the effect of drug abuse on their own life and the lives of others. This history includes a list of personal shortcomings, and a list of the people who have been hurt by the user’s addiction. The recovering person is instructed to think about how to make restitution to the people who have been hurt. This “history” is then reviewed by others, and input given. This exercise, which of course is recognizably part of the traditional 12-step program, is followed by the development of a list of all of the positive achievements that the individual has made during the recovery process. The completed story is then shared with support groups, counselors, friends, and relatives.

Issues from stage two are then revisited before the client moves on to stage four.
Stage four is recovery. This step lasts a lifetime. Continual self-assessments are performed. Plans for abstinence are made. Attendance in the program reduces from weekly to monthly while involvement in external programs (12-step groups) increases. The client must periodically reaffirm his or her decision for lifetime sobriety. The client must also reaffirm that he or she has no interest in drugs and is not questioning the decision to remain drug free. The client will eventually disengage with program services but will continue various recovery support groups.

Although this model, in common with most in substance abuse treatment, emphasizes the long-term nature of working through an addiction, current research has looked at more acutely focused and brief modes for establishing initial drug-free status. Thus, research at Haight Ashbury has included evaluation of the Motivational Interviewing component with findings that higher “doses” of psychotherapy have more success than moderate or low exposures (Polcin et al., 2004). In slight difference to Matrix, current perspectives of Haight Ashbury are to de-emphasize the brain damage aspect of methamphetamine use (while in Matrix programs, it seems important to assess and include the scope of brain dysfunction as a primary part of treatment planning; see, for example, Sommerfeld, 2006).

The Dialectical Behavior Therapy (DBT) Model

DBT was initially devised as a therapeutic intervention for patients with borderline personality disorder (Linehan, 1993). Many others have applied DBT principles in other settings and for treatment of other patient populations. Research with chemical dependency patients utilizing DBT has been limited to those individuals who have a diagnosis of borderline personality disorder and substance abuse/dependence. These studies have generally compared using a DBT approach versus a treatment as usual approach (TAU). TAU is usually a more instructional, somewhat confrontive-supportive intervention, combined with 12-step group and program participation. At times, there are some groups designed to help substance-abusing clients in development or enhancement of coping skills to maintain sobriety. The first study utilizing DBT for treatment of patients with combined borderline personality disorder and substance abuse was conducted by Linehan et al. (1999). A subsequent clinical case was reported by Demiff et al. (2000) and involved a study of a woman dependent on methamphetamine. Overall, the studies which have been done, though limited, have indicated efficacy in terms of duration of abstinence and harm reduction when relapses have occurred.

DBT assumes a dialectical approach to treatment in general and promotes clients to think and problem solve in this fashion. The core dialectic in DBT is accepting clients where they are and expecting them to change. Therapists with this frame of mind need to be able to simultaneously create an atmosphere
where the client feels acceptance and validation from the therapist and at the same time feels pressure to change his or her situation in order to move toward a life of recovery and effective functioning. These apparent opposites create a unique combination of the traditional approach that is more confrontational and a psychotherapeutic model that focuses on acceptance.

In treatment of substance abuse, Linehan and her colleagues (1999) introduced the concept of dialectical abstinence. In approaching the client, the DBT therapist enforces, as an absolute, that the client has to be abstinent from all mood-altering substances. However, in the event that the client relapses, the therapist switches to a harm reduction model and focuses on getting the client back on track. As soon as the client is “out of the woods” and back to working a recovery program, the treatment model shifts back to maintaining abstinence. DBT also puts a great deal of emphasis on motivational development, and specific commitment strategies are developed in order get the client to buy into treatment and follow up with his or her care (Linehan, 1993). It is only through getting treatment that the client is going to be able to develop the skills needed in order to live a more effective life. In traditional chemical dependency treatment, motivation and treatment compliance are primarily the responsibility of the client and the therapist’s role is to help the client become more motivated and actively participate in treatment. In DBT, the therapist is held much more accountable for motivational development. It is one of the main functions of the therapist to validate and accept the client’s experience, as well as motivate him or her to change. In fact when there is a “noncompliant” client, the therapist is also encouraged to look into the possibilities of “therapy interfering behaviors” on the part of the therapist. DBT is the only therapeutic approach that actually examines this process (outside of psychoanalytic model of looking at issues of countertransference) and certainly the only one where the concept is applied in addressing chemical dependency.

Chemical dependency treatment utilizing DBT also includes development of the four basic skill sets that are used in traditional DBT. It is clear that those who have been using drugs and alcohol extensively tend to have significant problems in coping in a number of areas. They often have difficulties with focus and are generally distractible. They tend to be emotionally reactive, particularly when they are dealing with the negative consequences of their actions. These processing problems are characteristic of the methamphetamine-abusing group. Therefore, in response to situations, they tend to use their “emotion minds” instead of approaching matters with their “wise minds.” Thus, mindfulness skills become extremely helpful in dealing with emotionally toned situations and also with working toward becoming a more centered individual approaching challenges of recovery.

Chronic drug and alcohol use is a way to deal with unwanted feelings for many individuals with addiction problems. In fact, there is anecdotal as
well as empirical research that suggests that a segment of individuals with chemical dependency problems are those who use drugs and alcohol, at least initially, to deal with unwanted and negative feelings. Such clients also tend to have difficulties managing their feelings in general. Before use, the physical and emotional discomforts of withdrawal and after use the biochemical changes in the brain combined with the emotional impact of guilt and shame associated with the negative consequences of their behaviors lead to a great deal of emotion disregulation. Even after the addicted individual has stopped using mood-altering substances, some of these patterns of responding to emotional situations continue mainly because he or she does not have a healthy repertoire of emotional responses to different situations. Teaching emotion regulation skills based on DBT provides a set of tools that can be used in identifying and expressing feelings appropriately.

Facing the negative consequence of an addiction lifestyle is highly stressful. There are often significant family, vocational, financial, legal, and emotional problems that arise as a result of chronic use and the decision making that goes with this type of lifestyle. The most difficult emotions to deal with are usually shame and guilt associated with what has occurred during periods of intoxication or the value compromises that are made while the addict is looking for drugs. Many suicidal gestures after drug binges are related to these experiences that result in high levels of guilt and shame. Distress tolerance skills are used in DBT to help addicted clients deal with the temporary but intense pangs of distress. These stressful events and their emotional sequelae are often triggers for subsequent relapses.

Linehan et al. (1999) utilized many of the strategies developed by Marlatt and Gordon (1985) in cognitive behavioral relapse prevention (RP). Thus, distress tolerance skills include Marlatt and Gordon’s concept of “urge surfing.” This exercise is designed to help the addicted individual to develop an awareness of urges in the moment and to learn to mentally “watch” them pass by, much as a surfer would ride a wave that has a peak and waning off segment.

As adolescents and young adults begin using mood-altering substances, their social and emotional development are affected. There is a great deal written in the literature on the “developmental arrests” associated with chronic and early substance abuse. The mechanisms of internal and external feedback required to develop adequate social skills are often impaired in those who use drugs and alcohol. When these individuals enter into relationships, they tend to have major problems in dealing with intimacy and often have chaotic romantic involvement. Interpersonal effectiveness skills taught by DBT can be instrumental in learning to deal with relationship problems as well as to assist with other developmental lag–based emotional limitations.

Finally, as with the Haight Ashbury Model, there is a place, albeit far more restricted, for the use of pharmacology to directly address the biological substrate in addicts where it is perceived as necessary. With selected patients
addicted to opiates or to stimulants, there can be 4 months of “transition maintenance” pharmacotherapy during which skills acquisition is emphasized in order to build a repertoire for abstinence (Linehan et al., 1999).

In summary, traditional chemical dependency treatment has relied heavily on confrontation of denial and has avoided an emphasis on emotional and psychological explanations as ways of supporting denial. The result is lack of opportunity to educate in some critical areas and the potential to create a counter-therapeutic result: the new person in recovery has to either assume a dependent submissive position to treatment that reduces personal efficacy or may drop out. DBT offers an alternative that incorporates the strength of traditional models with a modern biopsychosocial grounding that capitalizes on increasing the individual’s ability to control his or her life and move it in positive directions. Although initial empirical results are promising, however, much more needs to be done to evaluate usefulness and application of these techniques with the methamphetamine-abusing population.

Conclusions

A more optimistic stance may be warranted at this point over the prior edition. There has been ongoing recognition of the need to do research and to make recommendations based on outcomes rather than theory or personal anecdotal experiences. At the same time, the importance of building upon theoretical foundations with empirical support has been recognized as a positive marker for some success in substance abuse treatment generally and in programs involving diversion from a punitive approach by the courts. It appears fairly solidly founded that abstinence is the appropriate goal in addictions treatment. Relapse is part of treatment and its prevention is a therapeutic opportunity rather than an indication of treatment failure. Cognitive behavioral methodology is an important component to success. Duration is more important than frequency of sessions though both play a part, and multipronged programs that include attention to the individual and his or her environment and the development of support systems have better potentials than those that do not include outreach. In the particular case of methamphetamine abuse, treatment approaches have to be geared to the fact that participants have slowly recovering injured brains and therapeutic stages need to “track” with the evolution of individual biopsychological recovery patterns.

References


Epilogue:
Methamphetamine as Forensic Challenge

HAROLD HALL
SANDRA B. MCPHERSON

Forensic mental health professionals have certain duties to the court system, which are well articulated in the ethical standards that they must follow, as well as in their required commitment to present only that which is scientifically respectable as part of assisting in any case-related situation. At the beginning of this volume, a list of myths were presented (see Prologue), and some of the reasons why they were inadequate staples of the reality surrounding this drug were provided. The myths often contained some aspect of demonstrated scientific truth, but the uncritical adoption of any of them would lead to malpractice in the courtroom.

A story is illustrative.

In 1988, the height of the first wave of methamphetamine abuse in Hawaii was occurring. At that time, one of us (Hall) was asked to testify as an expert for the defense on the effects of methamphetamine. The case was in federal court and involved drug racketeering and drug distribution. Defendants were caught red-handed on videotape in a Federal Bureau of Investigation (FBI) sting operation that had extended over several months. The retaining attorney represented a defendant, who along with six others, were “the ice kingpins” in Hawaii. The defendants were members of the Filipino, Samoan, and other Asian American gangs; all were multimillionaires from their profitable sale of methamphetamine. All were highly paranoid, totally ruthless, and quite capable of killing others to maintain territory and trade. Their business was bolstered by the intrinsic pleasurable effects of methamphetamine—all of their customers wanted to “feel the high of 1,000 orgasms,” as it was then called.

At the time of this trial, no one knew how to test for the presence of methamphetamine other than from the user’s own statement, or using a very slow biochemical analysis. No one knew how to treat the specific effects of methamphetamine (which continues to be the case). Recidivism and relapse rates were nearly 100%, which ensured an ongoing market.

As Hall entered the court building, he was approached by two defense attorneys in expensive suits, who handed him their cards and implied that they would refer cases in the future if he testified in their favor. In the
meantime, the six defendants were seated in a row behind a long table, their backs to the left wall, and their faces staring into the jury on the opposite side—an arrangement that spoke to intimidation. Watching were family, girlfriends, and the press.

Testimony included the following points:

1. The primary motivation for taking methamphetamine and, for that matter, other drugs and alcohol, aside from peer pressure and other external reasons, was to feel good.
2. The first use of methamphetamine is often so incredibly pleasurable that there is an instant psychological addiction. Many methamphetamine users then keep trying to recapture this original feeling, but due to the nature of neurophysiological processes, they are unable to do so. (The prevailing theory is that the neurotransmitter dopamine is difficult to replenish after a methamphetamine intoxication-related depletion.)
3. Testimony was provided that individuals other than drug dealers also support and enable users’ habits, including peers and family who are substance addicted, employers who liked the level of activity and work performance that can occur during the first part of the methamphetamine cycle, and the host of enabling activities that can occur as a part of the interpersonal dynamics in an addict’s family.

After providing testimony elicited as part of direct testimony by the retaining attorney, another defense attorney took over the questioning. That counsel and others representing the remaining defendants used approaches aimed at calling into question what the expert was saying and attempting to turn the expert’s comments toward more helpfulness to their clients’ situation. Thus, one asked whether smoking just a couple hits of ice a day was really abusive or destructive if no maladaptive behavior occurred. His goal was to point out that the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, 4th ed., American Psychiatric Association, 1994) requirement of maladaptive behavior is necessary in order to reach a diagnosis of either abuse or dependence. Other questions pointed out that methamphetamine substances have been prescribed and also captured the expert’s own words: How can the effects be bad if my client did not experience them because he used a small amount of methamphetamine … isn’t he just trying to feel good taking methamphetamine in the first place?

In responding, the expert raised an eyebrow at the jury to nonverbally communicate the need for patience, repeated that although initial symptoms were positive, methamphetamine was quickly addictive and led to deterioration with repeated use. He also pointed out that even an initial use of methamphetamine, in some cases, can be disastrous.
When another defense attorney took over, Hall responded with a lecture on neuropsychology:

The brain is like a 3-pound bag, the consistency of jelly, and a very complex organ. There are between ten billion and a trillion neurons, or brain cells, no one has ever counted them, and up to sixty trillion synapses, or contact interconnections. Each neuron has a delicate cell body, an axon, and dendrites, and is surrounded by highly vulnerable plasma covering. Once a nerve cell is dead it is dead forever, as cells in the central nervous system do not divide or replenish themselves. There is a blood–brain barrier which is easily breached by internal intrusions, such as methamphetamine. Any disturbance can have profound effects ... on all aspects of feeling, thinking, and behavior.

The immediate response to that by one of the attorneys was to suggest that his client could not be blamed if his brain was damaged and, in fact, could not then undertake an intentional act. Hall understood at that point that the questions were not designed to elicit the truth of the matter, but to attempt to undermine the credibility of the expert by causing him to lose his cool. He looked at the jury and simply said, “Asking me the same questions will not change the answer.” Hall noted that damage has been repeatedly shown in both humans and animals in repeated studies, but that the power of choice was not completely removed. Both users and dealers make choices and show deliberation and self-control much of the time. The answer in an individual case is to look at other areas of control in the lives of the defendants.

Following this rather unusual form of direct examination, there were a few perfunctory cross-examination questions by the U.S attorney, who then wrote something on his pad to his cochair. As the expert walked by the table, he turned to see the message, which read, “He’s honest.” Subsequently, all of the defendants were found guilty and sentenced to federal penitentiary on the mainland.

Even if the expert was honest in this 1988 case, the question of his accuracy needs to be raised. A close reading of the transcripts of the trial revealed huge and foundational gaps in understanding about why people take methamphetamine and what to do about it, which remains true today, although the knowledge base has increased. Perhaps the defense attorneys had a handle on at least some part truths. Regardless, it was business as usual: the back of the ice trade was broken in Hawaii for a few years, organized crime went back to its usual pursuits, and the next ice outbreak simmered until the mid-1990s when it returned with a vengeance.

The story and hopefully this volume represent an opportunity to enhance knowledge. More importantly, we aimed to illustrate the need for forensic professionals to engage in systematic pursuit of as much scientifically responsible information as possible when they contribute to the legal system.
Methamphetamine cases also provide an arena within which all persons who are part of the legal system need to consider complexities rather than rest on simplistic constructions in day-to-day criminal justice operations.

Reference

Glossary

A

A Posteriori: “From the effect to the cause”; from what comes after. Denotes an argument based on experience or observation.

A Priori: “From the cause to the effect”; from what goes before. Denotes an argument that posits a general principle or admitted truth as a cause and deduces from it the effect that must necessarily follow.

Ab Initio: “From the first act”; from the beginning, referring to the validity of statutes and so forth. In contrast to ex post facto.

Abnormal: Maladaptive behavior detrimental to the individual or the group.

Abrogate: To cancel, annul, or destroy; to repeal a former law by a legislative act or by usage.

Absence Seizures: Petit mal seizures in children, shown by brief altered states of consciousness.

Absolute Refractory Phase: A period of complete unresponsiveness.

Acalculia: Impaired calculation abilities, more often associated with left parietal or occipital lesions.

Acapnia: A marked diminution in the amount of carbon dioxide in the blood.

Acceptance: An agreement to the act or proposal of another person.

Acetone Bodies: Acetoacetic acid, beta-hydroxybutyric acid, and acetone; found in blood and urine in increased amounts whenever too much fat in proportion to carbohydrate is being oxidized. Also called ketone bodies.

Acetylcholine (ACh): One of the best-known synaptic transmitters. Acetylcholine acts as an excitatory transmitter at synapses between motor nerves and skeletal muscles but as an inhibitory transmitter between vagus nerve and heart muscle.

Acetylcholinesterase (AChE): An enzyme that inactivates the neurotransmitter acetylcholine, thus halting its effects.
**Achromatopsia:** Impaired perception of colors due to cerebral dysfunction. Can be hemianopic or involve both entire visual fields.

**Acidosis:** Diminution in the reserve supply of fixed bases (especially sodium) in the blood.

**Acquit:** To set free or release from an obligation, burden, or accusation; to legally certify the innocence of a person charged with a crime.

**Action:** A formal proceeding or complaint brought within the jurisdiction of a court in order to enforce any right.

**Action Potential:** Nerve impulse that flows along the membrane of the neuron. The membrane is receptive to potassium ions in the resting state and sodium ions when excited. The reversal in permeability causes the impulse.

**Actuarial Approach:** Application of probability statistics to human behavior, as in insurance.

**Actus Reus:** “Guilty act”; a wrongful act. As opposed to guilty, “mens rea.”

**Acute Alcohol Hallucinosis:** State of alcoholic intoxication characterized by hallucinations.

**Acute Paranoid Disorder:** Psychoses characterized by transient and changeable paranoid delusions, usually related to an identifiable stressor and transient in nature.

**Acute Posttraumatic Stress Disorder:** Disorder in which symptoms develop within 6 months of an extremely traumatic experience instead of entering the recovery state.

**Ad Hoc:** “for this”; for a special purpose or particular action.

**Adaptation:** Adjustment to a stimulus; also used to denote changes in the retina on exposure to different intensities of light. A progressive loss of receptor sensitivity as stimulation is maintained.

**Adenohypophysis:** See also Anterior Pituitary.

**Adequate Stimulus:** The type of stimulus for which a given sense organ is particularly adapted (e.g., light energy for photoreceptors).

**Adhesion:** Abnormal union of two surfaces as a result of inflammation.

**Adipsia:** A condition in which an individual refuses to drink.

**Adjustment Disorder with Depressed Mood:** Moderately severe affective disorder behaviorally identical to a dysthymic disorder or depressed phase of a cyclothymic disorder but having an identifiable, though not severe, psychosocial stressor occurring within 3 months prior to the onset of depression.
**Admissible Evidence:** Evidence that can be received by the court or judge.

**Adventitia:** The outermost covering of a structure that does not form an integral part of it.

**Adversarial System:** A legal system in which opposing parties contend against each other by presenting arguments and information in the interest of their clients. The judge acts as a decision maker. In contrast to the inquisitorial system.

**Adversary Process:** Having two opposing parties. In contrast to an ex parte proceeding.

**Adverse Party:** A person whose interests are opposed to the interests of another party to an action.

**Adverse Witness:** A witness who gives evidence that is prejudicial to the party examining him at the time. Commonly refers to a witness whose testimony is prejudicial to the party by whom he was called.

**Afferent Fibers/Traits:** Data going toward the brain through neuronal pathways from the peripheral area of the central nervous system.

**Affidavit:** A written or printed statement of fact, made voluntarily, signed and sworn before a person having the authority to administer such an oath (e.g., a notary public).

**After Potentials:** Positive and negative changes of membrane potential that may follow a nerve impulse.

**Aggregation Theory:** Proposed by Halstead, this theory held that discrete sensory areas within the cortex were joined by a multitude of cortical connections. The aggregation produces an integration of cortical function.

**Aggression:** Behavior aimed at hurting or destroying someone or something.

**Agitation:** Marked restlessness and psychomotor excitement.

**Agnosia:** Defect in object recognition not due to primary sensory system dysfunction.

**Agrammatism:** Speech deficits characterized by language abbreviation such as omission of articles, prepositions, and inflectional forms. Language is essentially reduced to substantives.

**Agraphia:** Disturbances in writing skills (not motor execution). Usually seen with aphasia.

**Akathisia:** A general motor restlessness together with elevated inner tension, subjectively reported by the patient.
**Akinesia:** Inability to move due to brain dysfunction.

**Alarm and Mobilization Reaction:** First stage of the general-adaptation syndrome, characterized by the mobilization of defenses to cope with a stressful situation.

**Albuminuria:** Presence of albumin in the urine.

**Alcoholic Intoxication:** State reached when alcohol content of the blood reaches or exceeds a legally prescribed level (0.08% to 0.1% or above in many jurisdictions).

**Alcoholism:** Dependence on alcohol to the extent that it seriously interferes with life adjustment.

**Aldosterone:** A mineralocorticoid hormone that helps maintain homeostasis in the concentrations of ions in blood and extracellular fluid.

**Alexia:** Inability to read due to brain dysfunction. Refers to total loss of this ability due to a brain lesion, typically located in the posterior cerebral cortex.

**Alexia without Agraphia:** Inability to read in the absence of other language deficit.

**Alien Hand Syndrome:** Also termed the “Dr. Strangelove effect,” intermanual conflict between the two hands is seen, with patients learning to use their “obedient” hand to control the alien hand. Contralateral supplementary motor area (SMA) and corpus callosum lesions have been implicated.

**Alkalosis:** Increased bicarbonate content of the blood. It may be the result of ingesting large amounts of sodium bicarbonate, prolonged vomiting with loss of hydrochloric acid, or hyperventilation.

**All-or-None:** Refers to the fact that the amplitude of the nerve impulse is independent of stimulus magnitude. Stimuli above a certain threshold produce nerve impulses of identical magnitude (although they may vary in frequency); stimuli below this threshold do not produce nerve impulses.

**Alleethesia:** Sensation of being touched on the side ipsilateral to a lesion when contralateral stimulation was, in fact, presented.

**Alpha Motoneurons:** Motoneurons that control the main contractile fibers (extrafusal fibers) of a muscle.

**Alpha Rhythm:** A brain potential that occurs during relaxed wakefulness, especially at the back of the head; frequency 8 to 12 Hz.

**Alzheimer’s Disease (AD):** A degenerative disease characterized by the presence of neurofibrillary tangles and senile plaques. The disease is
progressive in that it starts with memory and affect problems, then goes on to speech and motor problems, and eventually to an immobile and confused bedridden status. The disease lasts from 1 to 15 years.

**Amblyopia:** Reduced visual acuity not caused by optical or retinal impairment.

**Amenorrhea:** The absence of the menses.

**Amicus Curiae:** “Friend of the court.” A person who petitions the court for permission to provide information to the court on a matter of law that is in doubt, or one who is not a party to a lawsuit but who is allowed to introduce evidence, argument, or authority to protect his interests.

**Amnestic Syndrome:** Inability to remember events more than a few minutes after they have occurred coupled with the ability to recall the recent and remote part.

**Amoeboid Movement:** Movement of a cell by extending from its surface processes of protoplasm (pseudopodia) toward which the rest of the cell flows.

**Amorphosynthesis:** Loss of ability to synthesize more than a few properties of a stimulus. Multiple sensory stimuli cannot be simultaneously processed. Ascribed to parietal lobe dysfunction. Damage to part of one sensory system causing an inequality in the overall cerebral system. The hemisphere receiving the decreased stimulation due to damage now needs increased input to balance the level of awareness.

**Amorphous:** Without definite shape or visible differentiation in structure; not crystalline.

**Ampulla:** A saccular dilation of a canal. An enlarged region of each semicircular canal that contains the receptor cells (hair cells) of the vestibular system.

**Amusia:** A temporal lobe deficit associated with inability or reduced skill in perception of tonal patterns, individual tones, singing or humming to a rhythmical pattern, or even enjoying music.

**Amygdala:** A structure of a limbic system associated with flight/fight and other primitive responses. Located at the base of the temporal lobe. A group of nuclei in the medial anterior part of the temporal lobe.

**Analgesia:** Loss of sensitivity to pain.

**Anaphylactic:** Increasing the susceptibility to the action of any foreign protein introduced into the body; decreasing immunity.

**Anarithmetria:** Impaired primary calculation skills due to brain damage. Left hemisphere lesions are implicated.
Anastomose: To open one into the other; used in connection with blood vessels, lymphatics, and nerves.

Anergia: Decreased or absent motivation or drive.

Anesthesia: Loss of sensation.

Aneurysm: A dilation or bulging of a blood vessel which fills with blood. A sac formed by the dilation of the walls of an artery and filled with blood.

Angiogram: A technique for examining brain structure in intact humans by taking X-rays after special dyes are injected into cerebral blood vessels. Inferences about adjacent tissue can be made by examining the outline of the principal blood vessels.

Angiography: X-rays of the head subsequent to injection of a radiopaque contrast into a major artery. Designed to enhance pictures of the cerebral vasculature.

Angiotensin II: A substance produced in the blood by the action of renin and which may be involved in control of thirst.

Angular Gyros: A cortical convolution on the parietal lobe, associated with speech functions.

Anions: Negatively charged ions, such as protein and chloride ions.

Anomia: Inability to name objects due to brain dysfunction.

Anomic Aphasia: A fluent aphasia characterized by difficulty in naming objects or words. Comprehension and articulation may be unimpaired.

Anorexic: Lacking in appetite for food.

Anosmia: Absence of the sense of smell.

Anosodiaphoria: Unconcern over, but admission of an actual neurological impairment. See also Anton’s Syndrome.

Anosognosia: Denial of those affected with neglect syndrome that their paretic extremity belongs to them.

Anterior Aphasias: Primarily indicating a left frontal lesion, these include Broca’s aphasia, transcortical motor aphasia and supplementary motor area (SMA) disturbance.

Anterior Cerebral Artery (ACA): One of the two major vascular networks of the frontal lobes, the ACA and its branches feed the medial aspects of the anterior portion of the brain.
Anterior Pituitary: The front lobe of the pituitary gland which secretes tropic hormones; also called adenohypophysis.

Anterograde Amnesia: Inability to recall life events from the time of a previous trauma or condition. Inability to learn and poor short-term memory are associated features.

Anterograde Degeneration: Loss of the distal portion of the axon resulting from injury to the axon; also called Wallerian degeneration.

Antidiuretic Hormone (ADH): A hormone from the posterior pituitary that controls the removal of water from blood by the kidneys. Also called vasopressin.

Antigen: Any substance that, when introduced into the blood or the tissues, incites the formation of antibodies, or reacts with them.

Anton's Syndrome: See also Anosognosia. Adamant denial of blindness, often associated with bilateral posterior CVA.

Antrom: A cavity, or chamber, especially one within a bone, such as a sinus; the pyloric end of the stomach.

Apathetico-Akinetico-Abulic Behavior: Produced by massive damage to the prefrontal areas, among others. This syndrome is characterized by low drive and reduced motor output. Ongoing behavior may be disorganized. The effector aspect of action seems to be impaired in what has been termed the “pathological inertia of existing stereotypes.”

Aperture: An opening, or orifice.

Aphagia: Refusal to eat, often related to damage to the lateral hypothalamus.

Aphasia: Impairment in language understanding and production due to brain injury.

Aphemia: A poorly articulated, slow, hypophonic, breathy speech with no syntax deficits. Usually follows initial mutism and is associated with Broca’s area lesions, or a subcortical undercutting of Area 44.

Apoplexy: A sudden loss of consciousness, followed by paralysis resulting from cerebral hemorrhage, or blocking of an artery of the brain by an embolus or a thrombus.

Appellant: The party who appeals a decision from one court or jurisdiction to another.

Appellate Court: A court having jurisdiction of appeal and review.
**Appellee:** The party against whom an appeal is taken in a cause; the party who has an interest opposed to the setting aside or reversing of a judgment.

**Apperceptive Visual Agnosia:** The inability to synthesize or integrate visual input. Awareness of discrete parts may be intact. Inability to perceive meaning in, or visually recognize objects, due to cerebral dysfunction, most likely in posterior areas. Patients act blind but can avoid obstacles, indicating preserved ability to see.

**Apraxia:** Refers to impaired, goal-directed, motor behavior in individuals with unimpaired comprehension and primary motor skills (e.g., coordination, strength).

**Apraxia of Speech:** Known also as verbal apraxia or Broca’s aphasia. Speech movement/articulation problems may include (1) articulation errors; (2) phoneme substitution; (3) greater latency of response; (4) greater trouble with initial than subsequent phonemes; (5) no major vocal musculature problems; (6) sparse output; (7) poor melody; and (8) articulation with much effort.

**Apraxic Agraphia:** Deficit in forming graphemes when writing to dictation or spontaneously. Lesions are in the parietal lobe contralateral to the dominant (writing) hand.

**Apraxic Agraphia without Apraxia:** Preserved oral spelling with illegible graphemes in spontaneous and dictated writing. Normal praxis is apparent to include ability to hold/use a writing instrument. Associated with perietal lobe lesions.

**Aprosodias:** Deficits in the comprehension and expression of affect and emotion, traditionally associated with right hemisphere dysfunction.

**Aqueduct:** A canal for the conduction of a liquid; the cerebral aqueduct of Sylvius connects the third and the fourth ventricles of the brain.

**Arachnoid Space:** Allows for cerebrospinal fluid to move about the cerebrum. Filled with fibroid matter and is considered one of the three layers of the meninges.

**Arbitration:** A method of resolving a dispute by using an impartial third party by whose decision both parties agree in advance to abide.

**Arteriovenous Malformation (AVM):** Involving the frontal lobe preferentially and focally, AVMs are usually unrecognized until one or more episodes have occurred. Subsequent attacks by AVM hemorrhage widen the area of deficit.

**Articulate:** To join together so as to permit motion between parts; enunciation in words and sentences. Divided into joints.
Asphyxia: Unconsciousness owing to interference with the oxygenation of the blood.

Assertiveness Training: A behavior therapy technique for helping individuals become more self-assertive in interpersonal relationships.

Association Areas: Part of the cortex next to the motor or sensory cortex, involving an overlap of functions. Allows for integration of data; damage causes patterned rather than specific deficits.

Associative Visual Agnosia: Inability to visually recognize objects with intact ability to copy, draw, or match to sample.

Astereognosis: Inability to identify objects placed by touch in spite of intact appreciation of tactile sensation. Also called tactile agnosia.

Asthenia: Weakness.

Astrocyte: A star-shaped glial cell with numerous processes or extensions that run in all directions. Their extensions provide structural support for the brain and may isolate receptive surfaces.

Astrocytoma: Neoplastic disease arising from the astrocyte cells. Usually unencapsulated, intracerebral, and fatal.

Ataxia: Muscular coordination and balance problems due to brain dysfunction. A loss of the power of muscular coordination. Impairment in the direction, extent, and rate of muscular movement; often due to cerebellar pathology.

Athetosis: Slow, involuntary, twisting movements of the arms and legs. May occur either during movement or when at rest. Associated with lesions of the cortex and subcortex (especially globus pallidus and thalamus).

Atresia: Congenital absence, or pathologic closure, of a normal opening or passage.

Atrophy: A wasting, or diminution, in the size of a part of the body or brain.

Atropine: An alkaloid obtained from atropa belladonna; it inhibits the action of the parasympathetic division of the autonomic system.

Attention Deficit Disorder: Maladaptive behavior in children characterized by impulsivity, excessive motor activity, and an ability to focus attention for appropriate periods of time; also called hyperactive syndrome or hyperkinetic reaction.

Attest: To bear witness to; to affirm as true or genuine.

Attribution Theory: The theory of social psychology in which people explain causes of the behavior of others based on unseen or unrecognized qualities in themselves.
**Auditory Affective Agnosia:** Impaired ability to recognize or comprehend affectively intoned speech due to a cerebral disorder.

**Auditory Agnosia:** Impaired hearing due to cerebral dysfunction with intact receptive abilities, as measured by audiometry or other means.

**Auditory Cortex:** A region of the temporal lobe that receives input from the medial geniculate nucleus.

**Auditory Sound Agnosia:** Impaired ability to recognize nonspeech sounds due to cerebral dysfunction.

**Auscultation:** The act of listening for sounds within the body; employed as a diagnostic method.

**Automated Assessment:** Psychological test interpretation by electronic or other mechanical means.

**Automatism:** Producing without effort or delay material learned by rote in childhood for a given temporal period (e.g., alphabet, number series). Errors reflect attention disturbances; nonacute condition-related errors may indicate significant memory dysfunction.

**Autonomic Nervous System:** Part of the peripheral nervous system that supplies neural connections to glands and to smooth muscles of internal organs. Composed of two divisions (sympathetic and parasympathetic) that act in opposite fashion.

**Autosome:** Any ordinary paired chromosome as distinguished from a sex chromosome.

**Autotopagnosia:** Disorientation of personal space. Associated with left frontal aphasic signs. The subject is typically assessed for ability to touch, name, or imitate the examiner in touching body parts. Associated with parietal lobe damage.

**Axon Hillock:** A cone-shaped area from which the axon originates out of the cell body. Depolarization must reach a critical threshold here for the neuron to transmit a nerve impulse.

**Axoplasmic Streaming:** The process that transports materials synthesized in the cell body to distant regions in the dendrites and axons.

**Azygos:** An unpaired anatomic structure; the azygos vein arises from the right ascending lumbar vein and empties into the superior vena cava.

**B**

**Bailiff:** An officer or attendant of the court who has charge of a court session in matters such as keeping order and having custody of the jury and of prisoners while in court.
**Balint’s Syndrome:** A syndrome consisting of (1) oculomotor apraxia, of focus from a near to a distant stimulus; (2) optic ataxia, shown by impaired visually guided movements; and (3) impaired visual attention in the absence of general attentional deficits, with initial random gaze until a stimulus is fixated upon.

**Ballism:** Uncontrollable violent tossing of the limbs due to basal ganglia dysfunction.

**Ballistic:** Classes of rapid muscular movements thought to be organized or programmed by the cerebellum. Contrast with ramp.

**Bar:** The entire body of attorneys, or the collective members of the legal profession.

**Basal Ganglia:** Forebrain nuclei including those in the amygdala, caudate nucleus, claustrum, globus pallidus, and putamen. A group of forebrain nuclei found deep within the cerebral hemispheres.

**Bases:** Components of a DNA or RNA molecule. DNA contains four bases (adenine, thymine, cytosine, and guanine), a pair of which forms each rung of the molecule. The order of these bases determines the genetic information of a DNA molecule.

**Basic Neuroglial Compartment:** A level of brain organization that includes a single nerve cell with all its synaptic endings, associated glial cells surrounding extracellular space, and vascular elements.

**Basilar Artery:** An artery formed by the fusion of the vertebral arteries; its branches supply blood to the brain stem and to posterior portions of the cerebral hemispheres.

**Basilar Membrane:** A membrane in the cochlea containing the principal structures involved in auditory transduction.

**Behavioral Teratology:** Impairments in behavior produced by early exposure to toxic substances.

**Bench:** A seat of judgment for the administration of justice; the seat occupied by the judge in court; the aggregate of the judges of which the court is composed.

**Berry Aneurysm:** A small sac formed by the dilation of the wall of a cerebral artery. The anterior portion of the circle of Willis is the site of about 90% of berry aneurysms.

**Bifurcated Trial:** A two-phase trial in which issues are tried separately—for example, guilt is determined in the first phase and punishment in the second, or in sanity cases, guilt is determined in the first phase and sanity in the second.
Bill of Particulars: A written statement setting forth the demands for which a legal action is brought. Designed to inform the defendant of the specific information regarding the cause of action stated in the complaint.

Binocular Disparity: The slight difference between the views from the two eyes, important in depth perception.

Bipolar Neurons: Nerve cells with a single dendrite at one end of the nerve cell and a single axon at the other end. Found in some vertebrate sensory system.

Bitemporal Hemianopsia: Optic chiasm damage resulting in visual field loss in both temporal (as opposed to nasal) areas.

Blind Spot: A place through which blood vessels enter the retina. Because there are no receptors in this region, light striking it cannot be seen.

Blindsight: Denial of recognition in the face of previous correct recognition and stimulus responses.

Blood–brain Barrier: The mechanisms that make the movement of substances from capillaries into brain cells more difficult than exchanges in other body organs, thus affording the brain a greater protection from exposure to some substances found in the blood.

Body Schema: Body image.

Bolus: A rounded mass of soft consistency.

Bona: Good or virtuous.

Bradycardia: Abnormal slowness of the heart or pulse.

Bradykinesia: Motor slowing.

Brain Stem: Thalamus, hypothalamus, ganglia, midbrain, hindbrain, and associated structures.

Brain Stem Reticular Formation: Part of the brain stem involved in arousal.

Brandeis Brief: A form of appellate brief that includes social science principles along with legal arguments. Takes its name from Supreme Court Associate Justice Louis D. Brandeis, who used such briefs.

Brief: A written statement prepared by the attorney arguing a case in court, including a table of relevant cases, a summary of issues and facts, and an argument of law as it supports a litigant’s position.

Broca’s Aphasia: An expressive speech disorder with relatively intact auditory comprehension. A nonfluent speech is noticed that is slow, labored,
dysarthric, incomplete, and concrete. Agrammatism consists of missing grammatical words and inflectional endings. Considered an anterior aphasia.

**Broca’s Area:** An area in the frontal region of the left hemisphere involved in the production of speech.

**Brown-Peterson Distractor Technique:** Counting backwards by twos or threes upon presentation of a verbal or nonverbal stimulus. Rehearsal is prevented by the counting.

**Bruit:** A sound or murmur heard in auscultation, especially an abnormal one.

**Buccolinguofacial Apraxia:** An oral apraxia affecting voluntary movements of the larynx, pharynx, tongue, lips, and related suborgans in which simple, automatic movements are intact. Commanded tasks may yield deficits (e.g., no swallowing, laughing) in the presence of noncommanded, contextual responses (e.g., swallowing food after eating, smiling).

Deficit in performing voluntary buccofacial motor activities (e.g., chewing, swallowing, raising eyebrows) with intact ability to perform reflexive movements with the same muscle groups.

**Buffer:** Any substance that tends to lessen the change in hydrogen ion concentration which otherwise would be produced by adding acids or bases.

**Burden of Proof:** In the law of evidence, the duty of a party to affirmatively prove a fact in dispute. The obligation of a party to convince the trier of fact as to the truth of a claim by establishing by evidence a required degree of belief concerning a fact. In civil cases, proof must be by a preponderance of the evidence. In criminal cases, all crime elements must be proved by the government beyond a reasonable doubt. In some equity issues and more recent decisions of the Supreme Court, the standard of proof is clear and convincing evidence.

**C**

**Calcitonin:** A hormone released by the thyroid gland.

**Calculus:** A stone formed in any portion of the body.

**Calorie:** A unit of heat. A small calorie (cal.) is the standard unit and is the amount of heat required to raise 1 gm of water from 15°C to 16°C. The large calorie (Cal.) is used in metabolism and is the amount of heat required to raise 1 kg of water from 15°C to 16°C.

**Canaliculus:** A small canal or channel; in bone, minute channels connect with each lacuna.
Capgras Syndrome: Involves the reduplication of relatives, friends, possessions, and the like, and is often viewed as a psychiatric, as opposed to neurological, problem. The target person, almost always a close relative, is considered an imposter.

Carcinoma: A malignant tumor or cancer; a new growth made up of epithelial cells, tending to infiltrate and give rise to metastases.

Case Law: The sum of reported cases forming a body of law. The law of a certain subject as evidenced or formed by the adjudged case, as opposed to statutes or other sources of law.

Catabolism: Reactions in a plant or animal that result in the degradation, or exudation, of molecules.

Catalysis: Change in the speed of a reaction produced by the presence of a substance that does not form part of the final product.

Catalyst: Any substance that brings about catalysis.

Cataract: A loss of transparency of the crystalline lens of the eye or of its capsule.

Catastrophic Reaction: Intensely negative but temporary emotion reaction, associated with left hemisphere lesions. Often occurs when subjects are informed of their limitations or shortcomings, in response to task demands. A heightened sensitivity to one’s limitations.

Caudal: An anatomical term meaning toward the tail end. Opposed to rostral.

Caudate Nucleus: One of the basal ganglia with long extension or tail.

Cell Differentiation: The prenatal stage in which neuroblasts acquire the distinctive appearance of cells characteristic of a region of the nervous system.

Cell Proliferation: The production of nerve cells.

Cellular Fluid: See also Intercellular Fluid.

Central Deafness: Hearing impairments related to lesions in auditory pathways or centers, including sites in the brain stem, thalamus, or cortex.

Central Nervous System (CNS): The portion of the nervous system that includes the brain and the spinal cord.

Central Sulcus: Known also as the Fissure of Rolando, this sulcus divides the anterior from the posterior areas of the brain (frontal from parietal).
Cephalic: An anatomical term referring to the head end. Also called rostral.

Cerebellar Cortex: The outer surface of the cerebellum.

Cerebellar Fits: Not really seizures, these movements consist of periods of decerebrate rigidity. Associated with large midline cerebellar lesions.

Cerebellar Syndrome: Due to a lesion in the cerebellum, ambulation is unsteady with side-to-side swaying. Equilibrium is adversely affected.

Cerebellum: A structure located at the back of the brain, dorsal to the pons; it is involved in the central regulation of movement.

Cerebral Contusion: A brain bruise. Refers to superficial damage to gyri or other crests of the cortical convolutions.

Cerebral Cortex: The outer bark or cortex of the cerebral hemispheres which consists largely of nerve cell bodies and their branches.

Cerebral Hemispheres: The right and left halves of the forebrain.

Cerebrospinal Fluid: The fluid filling the cerebral ventricles.

Certiorari: “To be informed of.” An action or writ issued by a superior court requiring an inferior court to produce a certified record of a particular case tried by the latter. The purpose of said action is to enable the higher court to inspect the proceedings to determine whether or not there were any irregularities. Most commonly used by the Supreme Court of the United States as a discretionary device to choose the cases it wishes to hear.

Cerveau Isole: An animal with the nervous system transected at the upper level of the midbrain (between the inferior and superior colliculus). Contrast with the encephale isole.

Cervical: Pertaining to the neck region.

Chalazion: A small tumor of the eyelid; formed by the distention of a meibomian gland with secretion.

Character Disorder: See also Personality Disorder.

Cheiro-Oral: Refers to the simultaneous twitching of the thumb and same-sided corner of the mouth. Occurs in epilepsy due to close proximity of motor execution zones for these body parts (i.e., the motor homonculus has its thumb in its mouth).

Chiasma: A crossing; specifically, the crossing of the optic nerve fibers from the medial halves of the retinæ.
**Child Abuse:**  The infliction of physical damage upon a child by parents or other adults.

**Child Advocacy:**  A movement concerned with protecting the rights and ensuring the well-being of children.

**Chlorpromazine:**  An antipsychotic drug, one of the class of phenothiazines.

**Cholinergic:**  Refers to cells that use acetylcholine as their synaptic transmitter.

**Chorda Tympani:** A portion of the facial nerve that serves as taste receptors in the anterior two-thirds of the tongue.

**Choreic Movements:** Uncontrollable, brief, and forceful muscular movements related to basal ganglia dysfunction.

**Chromidial Substance:** Pertaining to granules of extranuclear chromatin seen in the cytoplasm of a cell.

**Chromosome:** A body of chromatin in the cell nucleus that splits longitudinally as the cell divides, one half going to the nucleus of each of the daughter cells; the chromosomes transmit the hereditary characters.

**Ciliary:** Relating to (1) any hairlike process, (2) the eyelashes, or (3) certain structures of the eyeball.

**Cingulate Bodies:** Limbic system tissue above or superior to the corpus callosum.

**Cingulum:** A region of medial cerebral cortex lying dorsal to the corpus callosum. Also called cingulate cortex.

**Circadian Rhythms:** Behavioral, biochemical, and physiological fluctuations during a 24-hour period.

**Circle of Willis:** A structure at the base of the brain formed by the joining of the carotid and basilar arteries.

**Circulocution:** Often seen in fluent aphasia, the substitution of an incorrect word for another word. The substitution may itself demand a specific but unobtainable word, thus producing a convoluted output.

**Circumventricular Organs:** Organs lying in the walls of the cerebral ventricles. These organs contain receptor sites that can be affected by substances in the cerebrospinal fluid.

**Cistern:** A closed space serving as a reservoir for fluid.
Civil: Of or pertaining to the state of its citizenry. Relates to an individual’s private rights and remedies sought through civil action; in contrast to criminal proceedings.

Civil Commitment: Procedure whereby an individual certified as mentally disordered can be hospitalized, either voluntarily or against his will.

Civil Law: The body of law, concerned with civil or private rights and remedies, established by every particular municipality for itself; as opposed to the “law of nature.”

Civil Rights: The body of law pertaining to personal, natural rights that are guaranteed and protected by the Constitution, such as freedom of speech and press, freedom from discrimination.

Clarendon Jury: In a procedure established by Henry II of England, at least twelve “good and lawful” men, reporting to the king’s representative, were summoned as jurors to determine if a trial should be held and to decide actual innocence or guilt.

Clear and Convincing: A standard of proof greater than preponderance but less rigorous than reasonable doubt. Proof that should leave the trier of the facts with no reasonable doubt about the truth of the matters in issue.

Clear and Present Danger: A standard used to determine when one’s First Amendment rights to freedom of speech and press may be curtailed. Pursuant to a doctrine in constitutional law, if necessary, government restrictions will be upheld in order to prevent grave and immediate danger to interests that government may lawfully protect.

Clinical Neuropsychology: That which deals with the psychometric or other objective psychological methods in the assessment of higher cortical functions in humans (Meier).

Coactivation: A central nervous system control program that activates or inhibits the skeletal motoneurons at the same time as it alters the sensitivity of the muscle spindles.

Cochlea: A snail-shaped structure in the inner ear which contains the primary receptors for hearing.

Cochlear Duct: One of the three principal canals running along the length of the cochlea.

Cochlear Microphonic Potential: An electrical potential produced by hair cells that accurately copies the acoustic waveform of the stimulus.

Cochlear Nuclei: Brain-stem nuclei that receive input from auditory hair cells and send output to the superior olivary complex.
Coenzyme: A nonprotein substance required for activity of an enzyme.

Cognitive Dissonance: Condition existing when new information is contradictory to one’s assumptions.

Collateral: Accompanying; running by the side of; not direct; secondary or accessory; a small side branch of an axon.

Colliculus: One of two pairs of structures on the dorsal midbrain. See also Inferior Colliculus, Superior Colliculus.

Colloid: A state of subdivision of matter in which the individual particles are of submicroscopic size and consist either of large molecules, such as proteins, or aggregates of smaller molecules; the particles are not large enough to settle out under the influence of gravity.

Collusion: The making of an agreement between two or more persons with the purpose of defrauding another of his or her rights by the forms of law, or to obtain an object forbidden by law.

Coma: A state of profound unconsciousness from which one cannot be roused.

Coma Vigil: Immobility and unresponsiveness with eyes open and moving, associated with posteromedial-inferior frontal or hypothalamic damage.

Common Carotid Arteries: Arteries that ascend the left and right sides of the neck. The branch that enters the brain is called the internal carotid artery.


Complaint: The original or initial charge by which a legal action is begun, naming a person by whom the offense was committed. In criminal law, a written statement containing the essential facts and legal theory upon which the charge is based.

Complex Cortical Cells: Cells in the visual cortex that respond best to a bar of a particular width and direction anywhere within a particular area of the visual field.

Complex Partial Seizures: Epileptic seizures in which consciousness is altered (complex) and are restricted or at least arise from a circumscribed area of the brain (partial).

Compos Mentis: Being sound of mind; mentally competent.

Compulsion: An irrational and repetitive impulse to perform some act.
Compulsive Gambling:  See also Pathological Gambling.

Compulsive Personality:  A personality disorder characterized by excessive concern with rules, order, efficiency, and work.

Computer Assessment:  Use of computers to obtain or interpret assessment data.

Computer Axial Tomogram:  A technique for examining brain structure in intact humans through a computer analysis of X-ray absorption at several positions around the head. This technique affords a virtual direct view of the brain.

Computer Model:  Use of computers to simulate psychological functioning.

Conciliation:  The mode of adjusting and resolving a dispute through voluntary and unantagonistic settlement of the issues between opposing parties with a view toward avoiding litigation.

Concordance Rates:  Rates at which a diagnosis or a trait of one person is predictive of the same diagnosis or trait in relatives.

Conduct Disorders:  Childhood disorders marked by persistent acts of aggressive or antisocial behavior that may or may not be against the law.

Conduction Aphasia:  A constellation of behaviors produced by a lesion in the white matter fibers connecting the posterior/anterior portions of the brain (near the arcuate fasciculus). A severe repetition deficit is apparent relative to good auditory comprehension and expression of speech. A language disorder, involving intact comprehension but poor repetition of spoken language, related to damage of the pathways connecting Wernicke’s area and Broca’s area.

Cones:  Receptor cells in the retina which are responsible for color vision. The three types of cones have somewhat different sensitivities to light of different wavelengths.

Confabulation:  Production of bizarre, false, or unverifiable verbal/written responses, usually in association with amnesia. A close correlation exists between confabulatory tendencies and impairment in self-correction.

Congenital:  Born with a person; existing at or before birth.

Consideration:  The cause, price, or motivating factor that induces a party to enter into a contract.

Consolidation:  A state of memory formation in which information in short-term or intermediate-term memory is transferred to long-term memory.
Conspiracy: A combination of two or more persons who propose to commit an unlawful or criminal act, or to commit a lawful act by criminal means.

Constructional Disorders: Deficits in constructional tasks (e.g., drawing, assembling) in which the spatial form of the target object may be lost. Associated with pathology of the nondominant (nonspeech) hemisphere.

Contempt of Court: An act or an omission that is calculated to obstruct or interfere with the orderly administration of justice or that is calculated to lessen the authority or dignity of the court.

Contingent Negative Variation (CNV): A slow event-related potential recorded from the scalp. It arises in the interval between a warning signal and a signal that directs action.

Contract: A binding agreement between two or more competent parties, based on mutual assent and made for a lawful purpose, which creates an obligation to do or not to do a specified thing.

Contralateral: Situated on, or pertaining to, the opposite side.

Contrast Sensitivity Function (CSF): A psychophysical function determined by finding the contrast necessary for perceiving different spacings of dark and light bars. Used to measure spatial acuity of the visual system.

Contrecoup: Refers to the contusion (bruise) in the area opposite the point of impact (coup).

Conversion Disorders: Neurotic condition in which symptoms of organic illness appear in the absence of any related organic pathology; previously called hysteria.

Coronal (plane): The plane dividing the body or brain into front and back parts. Also called frontal or transverse. The band of axons that connects the two cerebral hemispheres.

Corpus Callosum: Intracerebral white matter connecting the right and left cerebral hemispheres.

Corpus Delecti: The body or material substance of a crime which provides objective proof that a crime has been committed.


Cortical Deafness: Difficulty recognizing both verbal and nonverbal stimuli due to cerebral dysfunction. Most often associated with cardiovascular accident.
Corticotropin-Releasing Hormone (CRH): A releasing hormone from the hypothalamus that controls the daily rhythm of adrenocorticotropic hormone (ACTH) release.

Cortisol: A glucocorticoid hormone of the adrenal cortex.

Court Martial: An ad hoc military court convened under the authority of government and the Uniform Code of Military Justice which has penal and disciplinary jurisdiction in trying and punishing offenses committed by members of the armed forces. The type (e.g., general, summary, special) and composition vary according to the seriousness of offenses.

Cranial Nerves: Originating from the brain, these are twelve pairs of nerves which transmit motor and sensory impulses to and from peripheral central nervous system sites.

One of the three main subdivisions of the peripheral nervous system, composed of a set of pathways mainly concerned with sensory and motor systems associated with the head.

Cretinism: Reduced stature and mental retardation caused by thyroid deficiency.

Creutzfeldt-Jakob Disease: A rare, transmittable (i.e., through virus which has a 2-year incubation) dementia with a relatively short clinical course (9-month average). Similar to “Mad Cow” disease. Ten percent of cases may be inherited. Anxiety and memory loss first appear. Myoclonic jerking appears in conjunction with motor neurocerebellar, basal ganglion, or pyramidal tract lesions. Dementia with progressive rigidity and mutism are end-stage symptoms.

Criminal Responsibility: Legal question of whether an individual should be permitted to use insanity as a defense after having committed some criminal act.

Cross Examination: The questioning of a witness during a trial, hearing, or deposition by the party opposing that which originally produced him to testify. Generally, the scope of cross examination is limited to matters addressed in direct examination.

Crossed Aphasia: Aphasic symptoms occurring, usually temporarily, in right-handed person with a right hemisphere lesion.

Cruel and Unusual Punishment: Punishment found to be unfair, shocking, or offensive to the ordinary person’s reasonable sensitivity. The Eighth Amendment states that “excessive bail shall not be required nor excessive fines imposed nor cruel and unusual punishment inflicted.”
Crystalloid: A body that, in solution, can pass through an animal membrane, as distinguished from a colloid, which does not have this property.

Culpable: Blamable; deserving of moral blame. Addresses fault rather than guilt.

Curare: A highly toxic extract that paralyzes muscle; it acts on the motor endplates.

Custody: The caring for, keeping, guarding, preserving of a thing or person. Implies responsibility for the protection and preservation of the thing or person in custody. When applied to a person, may mean lawfully authorized detention by means of restraint and physical control.

Cutaneous: Pertaining to the skin.

Cyanosis: A dark, purplish coloration of the skin and the mucous membrane caused by deficient oxygenation of the blood.

Cyclic Adenosine Monophosphate (Cyclic AMP or cAMP): A second messenger involved in the synaptic activities of dopamine, norepinephrine, and serotonin.

Cyclothymic Disorder: Mild affective disorder characterized by extreme mood swings of nonpsychotic intensity.

Cytoarchitectonics: The study of anatomical divisions of the brain based on the kinds of spacing of cells and distribution of axons.

D

Dacrystic Epilepsy: Seizures where crying is the predominant ictal event.

Damages: A monetary compensation that may be recovered in court by any party who has suffered a loss or injury to person, property, or rights as the result of an unlawful act, negligence, or omission of another.

Actual Damages: The amount awarded in compensation for a complainant’s actual and real losses or injury which can readily be proven to have been sustained.

Compensatory Damages: A monetary award to the injured party strictly for the loss of injury sustained.

Double (or Treble) Damages: An award for certain statutorily authorized kinds of injuries in an amount two to three times the damages normally awarded by a court or jury.
**Nominal Damages:** A trivial sum awarded to a plaintiff in an action where there is no substantial loss or injury for which to be compensated. Or, in a case where there has been real injury, but the plaintiff’s evidence fails to show its amount.

**Punitive (Exemplary) Damages:** Compensation in an amount greater than actual damages in cases where the wrong done to a plaintiff was aggravated by malice, violence, or fraud on the part of the defendant.

**Special (Consequential) Damages:** An award not arising directly or immediately from the act of a party, but only from the consequences or results of such an act.

**De Bene Esse:** Conditionally or provisionally; in anticipation of future need. Applies to proceedings taken provisionally and allowed to stand for the present but which may be subject to future challenges.

**De Facto:** In fact, actually, in reality. Characterizes an officer, government, past action, or state of affairs that is illegal or illegitimate but, for all practical purposes, must be accepted.

**De Novo Hearing:** A new hearing or a hearing for the second time in which the judgment of the trial court is usually suspended, with the reviewing court determining the case as though it originated in the latter court.

**Decerebrate (Rigidity):** Extension and rigidity of the limbs caused by brain-stem or cerebellar injury.

**Deep Dyslexia:** Deletion of grammatical morphemes with the presence of semantic paralexias, due to cerebral dysfunction. The loss of grapheme-to-phoneme processing is seen during reading.

**Default Judgment:** A decision of the court against a defendant because of his or her failure to respond to a plaintiff’s action.

**Defendant:** The person from whom relief or recovery is sought in an action or suit. In a criminal case, the accused.

**Defense:** That which is offered and alleged by the party against whom an action or suit is taken, such as the lawful or factual reasons against the plaintiff recovering or establishing that which he or she seeks.

**Delirium Tremens:** Acute delirium associated with prolonged alcoholism; characterized by intense anxiety, tremors, and hallucinations.

**Delirium:** State of mental confusion characterized by clouding of consciousness, disorientation, restlessness, excitement, and often hallucinations.
Delusion: Firm belief opposed to reality but maintained in spite of strong evidence to the contrary.

Delusion of Persecution: False belief that one is being mistreated or interfered with by one’s enemies. Often found in schizophrenia.

Delusion System: An internally coherent, systematized pattern of delusions.

Dementia Pugilistica: The “punch drunk” syndrome. Symptoms associated with repeated head trauma include dysarthria, tremor, seizures, and frontal signs. Memory and concentration problems are marked.

Dendrites: Receptor structures of a neuron that project out in branch-like fashion. Extensions of the cell body which are the receptive surfaces of the neuron.

Dendritic Branching: The pattern and quantity of branching of dendrites.

Dendritic Spines: Outgrowths along the dendrites of neurons.

Dendritic Tree: The full arrangement of a single cell’s dendrites.

Deoxyribonucleic Acid (DNA): A nucleic acid present in the chromosomes of cells; hereditary information.

Dependent Personality: A personality disorder marked by lack of self-confidence and feelings of acute panic or discomfort at having to be alone.

Dependent Variable: In an experiment, the behavior measured to determine whether changes in the independent variable affect the behavior being studied.

Depersonalization Disorder: A dissociative neurotic disorder, usually occurring in adolescence, in which individuals lose their sense of self and feel unreal or displaced to a different location.

Depolarization: A reduction in membrane potential (the inner membrane surface becomes less negative in relation to the outer surface); this is caused by excitatory neural messages.

Deponent: One who testifies to the truth of certain facts; one who gives a written state deposition; a witness.

Deposition: A witness’s testimony taken under oath outside of the courtroom in question-and-answer form, reduced to writing and authenticated. Intended to be used at a civil or criminal trial.

Depressive Disorder: Neurotic reaction characterized by persistent depression and discouragement.
Depressive Neurosis: Depression of intermediate severity with little or no evidence of personality breakdown or loss of contact with reality.

Depressive Stupor: Extreme degree of depression characterized by marked psychomotor underactivity.

Derepression: The mechanism through which regions of the DNA molecule that are repressed from transcription become unblocked. This process allows for the selection of genetic information that will be utilized by a particular cell.

Dermatome: A strip of skin innervated by a particular spinal root.

Desensitization: Therapeutic process by means of which reactions to traumatic experiences are reduced in intensity by repeatedly exposing the individual to them in mild form, either in reality or in fantasy.

Deterrence: The premise that punishment for criminal offenses will deter that criminal and others from future criminal acts.

Dexedrine: An amphetamine drug; a stimulant used to curb appetite or elevate mood.

Dextral: Refers to right-handedness. Opposed to sinstral, or left-handedness.

Dialysis Dementia: Chronic, degenerative intellectual problems (aphasia, memory difficulties), seizures, and motor signs (e.g., facial grimacing) seen occasionally as the result of long-term dialysis. The pathogenesis is unknown although the accumulation of aluminum in the brain has been implicated.

Dialysis Disequilibrium Syndrome: A consequence of the dialysis procedure itself, encephalopathy characterized by development of intermittent slowing speech, stuttering, and word finding problems. Progression of dyspraxia, memory loss, concentration problems, and (occasionally) psychosis. Shifts in sodium and potassium are associated with the disorder.

Diapedesis: The passage of blood cells through the unruptured walls of the blood vessels.

Diaschisis: Reduction of neuronal activity in brain sites outside the immediate perimeter of the lesion. Associated with acute, focal conditions.

Diastole: The rhythmic period of relaxation and dilatation of the heart, during which it fills with blood.

Diathesis: A predisposition or vulnerability toward developing a given disorder.

Diathesis-Stress Model: View of abnormal behavior as the result of stress operating on an individual with a biological, psychosocial, or sociocultural predisposition toward developing a specific disorder.
**Dichotic:** Refers to studies where different stimuli are simultaneously presented to both ears, eyes, or tactiley to the subject.

**Dictum (pi. dicta):** A statement, remark, or observation of the law made by the court, not necessarily relevant or essential to the outcome of a case.

**Diencephalon:** The central core of the brain, which together with the telencephalon, forms the cerebrum. Consists of the thalamus, subthalamus, hypothalamus, and epithalamus.

The posterior part of the forebrain; it includes the thalamus and hypothalamus.

**Differential Reinforcement of Other Behavior (DOR):** Behavior modification technique for extinguishing undesirable behavior by reinforcing incompatible behaviors.

**Digitalis:** The dried leaves of purple foxglove; it is used in the treatment of certain cardiac disorders.

**Dilantin:** An anticonvulsant medication often used in controlling epileptic seizures.

**Diopter:** The unit of refracting power of a lens; noting a lens whose principal focus is at a distance of 1 m.

**Diploid:** Having two sets of chromosomes, as normally found in the somatic cells of higher organisms.

**Diplopia:** Double vision, due to eye muscle imbalance, metabolic disturbances, or other causes.

**Direct Examination:** The initial questioning or examination of a witness by the party who originally called him or her to testify.

**Directed Verdict:** A verdict ordered by the judge when, as a matter of law, he or she rules that the party with the burden of proof has failed to present a prima facie case. The judge orders the jury to return a verdict for the opposing party.

**Disconnection Syndromes:** Disrupted neuronal transmission through the white matter that cut cortical pathways, thus disconnecting a cortical area from the rest of the brain. Corpus callosum disconnections are the most dramatic.

**Discovery:** A pretrial procedure by which one party can obtain vital facts and information material to the case in order to assist in preparation for the trial. The purpose of discovery being to make for a fair trial and to allow each party to know what documents and information the opponent has in his or her possession.
Disinhibition Syndrome:  Inability to stop actions or impulses once initiated. Often attributed to frontal system deficits in exerting an inhibitory effect on ongoing mental or behavioral processes.

Disintegration:  Loss of organization or integration in any organized system.

Disorganized Schizophrenia:  Subtype representing the most severe disintegration of personality and poor prognosis for recovery; characterized by marked incoherence, silly, or inappropriate responses.

Dissociation:  Separation or “isolation” of mental processes in such a way that they become split off from the main personality or lose their normal thought–affect relationships.

Dissociative Disorder:  Psychoneurotic disorder characterized by amnesia, fugue, somnambulism, or multiple personality.

Distal:  An anatomical term meaning toward the periphery or toward the end of a limb.

Diurnal:  Daily.

Divergence:  A system of neural connections that allows one cell to send signals to many other cells.

DNA:  See also Deoxyribonucleic Acid.

Docket Sounding:  A meeting between the judges and attorneys for the purpose of determining the schedule of cases for a specific period of time.

Dopamine (DA):  A neurotransmitter produced mainly in the basal forebrain and diencephalon that is active in the basal ganglia, the olfactory system, and limited parts of the cerebral cortex. For location of dopaminergic fibers.

Dopaminergic:  Refers to cells that use dopamine as their synaptic transmitter.

Dorsal:  An anatomical term meaning toward the back of the body or the top of the brain; opposite of ventral.

Dorsal Root:  Root at the back of the spinal cord.

Double-Dissociation:  Differential effects of lesions, allowing for comparison of both independent and dependent variables. Lesion x causes x but not y, whereas lesion y causes y but not x.

Double Tracking:  The simultaneous operation of two mental operations. Digits backward on the Wechsler Adult Intelligence Scale (WAIS), for example, calls for memory and reversing operations at the same time.
**Down’s Syndrome:** A form of mental retardation associated with an extra chromosome.

**Due Process of Law:** The regular course of law as administered through courts of justice. In each particular case, refers to the legal proceedings in accordance with the rules and principles established in our legal system to enforce and protect private rights.

**Duplex Theory:** A theory of pitch perception combining the place theory and volley theory. Volley theory operates for sounds from about 20 to 1,000 Hz, and place theory operates for sounds above 1,000 Hz.

**Duplication of DNA:** A process through which a cell duplicates (or replicates) its genetic information during mitosis.

**Dura:** First or outermost layer of the three layers of the meninges.

**Durham Rule:** The “irresistible impulse” test of criminal responsibility deriving from a 1954 decision of the United States Court of Appeals. States that a defendant is not criminally responsible if he or she suffered from a mental disease or defect at the time the unlawful act was committed if it is determined beyond a reasonable doubt that the act was a product of the mental disease or defect.

**Duty:** A legal or moral obligation or responsibility to perform an act or service.

**Dyad:** A two-person group.

**Dynamic Formation:** An integrated evaluation of a patient’s traits, attitudes, conflicts, and symptoms that attempts to explain the individual’s problem.

**Dysarthria:** Refers to speech disorders based on peripheral motor deficits. The quality of speech is affected, as in hypenasality, breathy phonation, and stridor (flaccid paretic dysarthria), slow, low pitch, harsh and difficult phonation (spastic paretic dysarthria), or explosive speech (ataxic or cerebellar dysarthria).

**Dysfluency:** Difficulty in generating words.

**Dysmetropia:** Defects in the visual appreciation of object size discrimination. Also called “past-pointing phenomenon” (i.e., in finger-to-nose exam). Associated with cerebellar lesions.

**Dysnomia:** Word-finding disability. Shown by failure to correctly name objects or by choosing words that are “off center.” Associated with temporal lobe dysfunction.

**Dysphagia:** Difficulty in swallowing.
Dysthymic Disorder: Moderately severe affective disorder characterized by extended periods of non-psychotic depression and brief periods of normal moods.

Dystonia: Prolonged abnormal posture as a consequence of involuntary muscle tension. Often a side effect of neuroleptic medication.

Echopraxia: The mimicking of other’s motor movements. Indicates that extant motor problems are not due to lack of inactivity.

Ectoderm: The outer cellular layer of the developing fetus; this layer gives rise to the skin and to the nervous system.

Ectopic: Out of the normal place.

Edema: An abnormal accumulation of clear, watery fluid in the lymph spaces of the tissues.

   The swelling of tissue, especially in the brain, in response to brain injury.

Effusion: The escape of fluid from the blood vessels or the lymphatics into the tissues or a cavity.

Ego-Dystonic Homosexuality: Category of “mental disorder” in which the individual wishes to change his or her homosexual orientation.

Ejaculatory Incompetence: A male’s inability to ejaculate.

Electric Synapse: Junctional region where the presynaptic and postsynaptic membranes approach so closely that the nerve impulse can jump to the postsynaptic membrane without being translated into a chemical message.

Electroencephalography (EEG): The recording and study of gross electrical activity of the brain recorded from large electrodes placed on the scalp.

Electrolyte: Any substance that, in solution, conducts an electric current.

Embolism: Obstruction, or occlusion, of a vessel by a transported clot, a mass of bacteria, or other foreign material.

Emotional Inoculation: Therapeutic procedures designed to prepare persons who face stressful situations, such as surgery, by providing the person with adaptive techniques.

Empiricism: The philosophical view based on the belief that knowledge is acquired through experience and observation.

Empyema: The presence of pus in any cavity.
**Encephale Isole:** An animal in which the brain stem is separated from the spinal cord by a cut below the medulla. Contrast with cerveau isole.

**Encephalitis:** A generalized viral infection of the brain’s neurons or glial cell bodies.

**Encephalomalcia:** Cerebral tissue softening.

**Encephalopathy:** Brain degeneration.

**Encoding:** A process of memory formation in which the information entering sensory channels is passed into short-term memory.

**Endocrine:** Refers to glands that secrete products into the bloodstream to act on distant targets; opposite of exocrine.

**Endorphins:** Neurotransmitters that have been called the body’s own narcotics.

**Endothelial cells:** The tightly fitting cells that make up the walls of the capillaries in the brain.

**Enhancement:** Independent of behavior, the increase in activity of some posterior parietal neurons by motivationally important visual stimuli. Responses to those stimuli are enhanced.

**Enjoin:** To command or require that a person perform or desist from a certain act.

**Enuresis:** Involuntary passage of urine after the age of 3 years.

**Enzyme:** A protein that catalyzes a biochemical reaction.

**Epicritic:** Sensory experiences that can be located on the body of the organism and are of brief duration (e.g., a sharp pain in the foot). Opposed to protocritic.

**Epinephrine:** A compound that acts both as a hormone (secreted by the adrenal medulla) and as a neurotransmitter; also called adrenaline.

**Episodic Dyscontrol Syndrome:** Totally unprovoked violence associated with an aura, consisting of rising anxiety, headaches, illusions, numbness, drowsiness, and hyperacusis. The attack lasts 15 minutes to 2 hours and is very violent, often directed toward property or persons. May be due to temporal-limbic structure dysfunction. Associated features include hypersensitivity to alcohol, multiple traffic accidents, and sexual impulsiveness, the last rising to the level of forensic concern.

**Episodic Memory:** Recall for events in one’s life and experiences. It is therefore unique and anchored to distinct points in time and space.
**Equilibrium Potential:** The state in which the tendency of ions to flow from regions of high concentration is exactly balanced by the opposing potential differences across the membrane.

**Equipotentiality:** Notion that a lesion anywhere on the cortex will produce equivalent deficits. This holistic approach was espoused by Lashley.

**Equity:** A system of law and courts administered according to fairness and justness. Based on a system that originated in England as an alternative to common law.

**Estrogen:** A hormone produced by female gonads.

**Estrus:** The period during which female animals are sexually receptive.

**Eustress:** Positive stress.

**Evagination:** A protrusion of some part of an organ.

**Event-Related Potentials:** Gross electrical potential changes in the brain that are elicited by discrete sensory or motor events.

**Excitatory Postsynaptic Potentials (EPSPs):** Depolarizing potentials in the postsynaptic neuron caused by excitatory presynaptic impulses. These potentials may summate to trigger a nerve impulse in the postsynaptic cell.

**Exclusionary Rule:** The rule that defines whether evidence is admissible in a trial. In cases where evidence has been illegally obtained, it must be removed from consideration by the fact finders.

**Exculpatory:** Clearing or excusing a party from alleged fault or guilt.

**Exemplary Damages:** A monetary award in an amount over and above what is required to compensate a plaintiff for a loss in a case where the wrong was aggravated by violence, malice, or fraud on the part of the defendant.

**Exhaustion and Disintegration:** The third and final phase in the general adaptation syndrome, in which the organism is no longer able to resist continuous stress; at the biological level, may result in death.

**Exner’s Area:** Formally seen as a “frontal writing center,” located at the base of the second frontal convolution. Lesions in this area produce agraphia.

**Exocrine:** Refers to glands that secrete their products through ducts to the site of action; opposite of endocrine.

**Exophthalmos:** A protrusion, or prominence, of the eyeball.

**Experimental Research:** A research approach in which the experimenter manipulates the independent variable, controls outside conditions, and determines the effect on a dependent variable to test for causal linkages.
Expert Witness: A witness who has special knowledge in a field, obtained from education or personal experience.

External Validity: The degree to which experimental findings can reasonably be generalized to nonlaboratory situations.

Extinction: One of a stimulus pair simultaneously presented to different parts of the body visual fields and is not perceived.

Extinction to Double Simultaneous Stimulation: Failure to report the stimulus presented to the contralateral side of a lesion upon bilateral simultaneous stimulation.

Extracerebral: Extrinsic or outside of the brain hemispheres, as, for example, between the skull and the brain on one of the three layers of meninges.

Extrapunitive: Characterized by a tendency to evaluate the source of frustrations as external and to direct hostility outward.

Extrapyramidal System: A motor system that includes the basal ganglia and some related brain-stem structures.

Extravasation: The act of escaping from a vessel into the tissues; said of blood, lymph, or serum.

Extrinsic: Originating outside of the part where it is found or upon which it acts.

F

5HT: See also Serotonin.

Fabrication: Relating imaginary events as if they were true without intent to deceive; confabulation.

Face–Hand Test: Touching the face simultaneously with another body part, particularly same-sided. Suppression or displacement of the more peripheral stimulus indicates possible parietal lobe dysfunction.

Facial Nerve: A cranial nerve that innervates facial musculature and some sensory receptors.

Fasciculation: Localized contraction of muscle fibers, or an incoordinated contraction of skeletal muscle in which the fibers of one motor unit contract.

Feature Detector Model: A model of visual pattern analysis in terms of linear and angular components of the stimulus array. Contrast with spatial frequency filter model.
Felony: A crime of a more serious or harmful nature than a misdemeanor. Under federal law and many state statutes, any offense punishable by imprisonment for a term of more than 1 year or by death.

Fetal Alcohol Syndrome: Observed pattern in infants of alcoholic mothers in which there is a characteristic facial or limb irregularity, low body weight, and behavioral abnormality.

Fiduciary: A person having the duty to act in a relationship of high trust and confidence for another's benefit in the capacity of trustee, executor, or administrator.

Field Properties: Characteristics of the environment surrounding a living system.

Finger Agnosia: Inability to identify the fingers of one’s own hand, or those of another person, due to brain damage.

Fistula: A pathologic, or abnormal, passage leading from an abscess cavity or a hollow organ to the surface, or from one organ to another.

Fixed Action Patterns: Complex preprogrammed species-specific behaviors triggered by particular stimuli and carried out without sensory feedback.

Flaccid: Relaxed, flabby, soft.

Flashback: The recurrence of a drug experience, usually in a negative manner, without further ingestion of the drug.

Flatus: Gas or air in the stomach or the intestine; commonly used to denote passage of gas by rectum.

Flexion Reflex: Abrupt withdrawal of a limb in response to intense stimulation of the foot.

Flooding: Anxiety-eliciting technique involving placing the client in a real-life, anxiety-arousing situation.

Fluent Aphasia: Speech difficulty with incomprehension, jargon speech, and other signs such as lack of awareness. Often associated with posterior lesions. Nonfluent aphasia is associated with anterior lesions and almost always involves expressive speech deficits.

Folia: Folds or convolutions of the cerebellar cortex.

Folie a Deux: A psychotic interpersonal relationship involving two people; for example, husband and wife both become psychotic with similar or complementary symptomatology.
Follicle-Stimulating Hormone (FSH): A tropic hormone released by the anterior pituitary that controls the production of estrogen and progesterone.

Forcible Rape: An act of violence in which sexual relations are forced upon an unwilling partner who is over the age of 18.

Forebrain: The frontal division of the neural tube that contains the cerebral hemispheres, the thalamus, and the hypothalamus. Also called the prosencephalon.

Forensic Psychiatry: Branch of psychiatry dealing with legal problems relating to mental disorders.

Fornix: A fiber tract that runs from the hippocampus to the mammillary body.

Fovea: A cup-shaped depression or pit.

Fovea Centralis: Small central pit in the retina, packed with cones, where vision is sharpest and color accuracy most developed.

Frontal Amnesia: Difficulty in switching from one set of memory traces to another in the face of intact operating memory. “Forgetting to recall,” as in disregarding instructions, is an illustration.

Frontal Gait Disturbance: See also Magnetic Apraxia and Utilization Behavior.

Frontal Inattention: A contralateral visual field defect caused by damage to particular frontal sites (arcuate sulcus in monkeys). Associated features may include conjugate deviation of the eyes, forced circling, the latter in the direction of the lesion.

Frontal Psychosurgery: Includes leukotomies aimed at severing frontal-thalamic connections, orbital undercutting, for example, by placement of radioactive yttrium pellets in the orbital tissues, cingulomotomy, stereotactic destruction of focal sites, and topectomy, ablation of selected frontal areas.

Frontal “Release” Signs: These are primitive reflexes that long have been considered frontal signs. The grasp reflex is associated with midline frontal pathology. Frontal system problems are indicated by rooting, sucking, and snout reflexes indicating a brain stem–diencephalic lesion.

Frye Test: A test emphasizing the subject of an expert witness’s testimony must conform to a generally accepted explanatory theory. Named after the case in which the determination was made.

Fugue: A neurotic dissociative disorder that entails a loss of memory accompanied by actual physical flight from one’s present life situation to a new environment or less threatening former one.
Glossary

**Functional Psychoses:** Severe mental disorders attributed primarily to psychological stress.

**Fundus:** The bottom of a sac or hollow organ; the farthest removed from the opening.

**Future Shock:** A condition brought about when social change proceeds so rapidly that the individual cannot cope with it adequately.

**G**

**Gambling:** Wagering on games or events in which chance largely determines the outcome.

**Gamma Efferents:** Motors neurons by means of which the central nervous system controls muscle spindle sensitivity.

**Ganglion:** A collection of nerve cell bodies. Also called a nucleus.

**Ganglion Cells:** Cells in the retina whose axons form the optic nerve.

**Gangrene:** A form of necrosis combined with putrefaction; death of the tissue.

**Gel:** A colloidal system composing a solid and a liquid phase that exists as a solid or semisolid mass; a jelly or solid or semisolid phase.

**Gelastic Epilepsy:** Seizures where laughter is the predominant ictal behavior.

**Gene:** An ultimate, ultramicroscopic, biologic unit of heredity; self-reproducing; located in a definite position on a particular chromosome.

**General Adaptation Syndrome:** Reaction of the individual to excessive stress; consists of the alarm reaction, the stage of resistance, and the stage of exhaustion.

**General Paresis:** A progressive mental deterioration due to syphilitic invasion of the central nervous system. Changes include deterioration of the entire range of mental ability.

**Gerstmann’s Syndrome:** The symptom cluster of ocalculia, agraphia, left–right spat disorientation, and finger agnosia. Traditionally considered to involve the parietoccipital region of the brain.

**Glabellar Tap Sign:** The subject is tapped lightly just above and between the eyebrows to see whether blinking will normally and quickly habituate. Parkinson’s patients will continue to blink with each tap.
Glioma: Nonneural brain cells that provide structural, nutritional, and other support to the brain. Also called glia or neuroglia.

Glioblastoma (Multiforma): A neoplasm arising from the glial cells, characterized by a high degree of lethality and malignancy.

Gliomas: Brain tumors resulting from the aberrant production of glial cells.

Global Alexia: Inability to read letters or words.

Global Aphasia: Severe comprehension and articulation deficits associated with a large lesion of the entire perisylvian area of the frontal, temporal, and parietal lobes. Prognosis is grim.

Global Stereopsis: Depth perception in the presence of ambiguous stimulus forms. Presumed to be mediated by right hemisphere and is differentiated from a stereoacuity.

Glossopharyngeal Nerve: A cranial nerve that serves taste receptors in the tongue.

Glucocorticoids: Hormones released by the adrenal cortex that affects carbohydrate metabolism.

Golgi Tendon Organs: Receptors located in tendons that send impulses to the central nervous system when a muscle contracts.

Gonadotropin-Releasing Hormone (GnRH): A hypothalamic hormone that controls release of luteinizing hormone (or interstitial-cell-stimulating hormone). Also called luteinizing-hormone-releasing hormone.

Graded Potentials: Potentials that can vary continuously in size; also called local potentials; contrast with all-or-none potentials.

Gradient: An ascending or descending slope. In the body, gradients are determined by the difference in concentration or electric charges across a semipermeable membrane.

Grand Mal Seizures: A type of generalized epileptic seizure that involves nerve cells firing in high-frequency bursts. These seizures cause loss of consciousness and sudden muscle contraction.

Grandfather Clause: Certain legal provisions permitting those engaged in a business or profession before the passage of an act regulating them to receive a license, power, or privilege without meeting the criteria established for those new to the field.

Grievance: A denial of legal right or an injury, injustice, or wrong which is grounds for a complaint due to being unjust, discriminatory, and oppressive.
**Growth Hormone:** A tropic hormone secreted by the anterior pituitary that influences the growth of cells and tissues. Also called somatotropic hormone (STH).

**Guardian Ad Litem:** A person appointed by the court to represent the interests of a minor or an incompetent in a litigation and to act on the person’s behalf until the conclusion of the case.

**Guilt:** Feelings of culpability arising from behavior or desires contrary to one’s ethical self-devaluation and apprehension growing out of fears of punishment.

**Gyri:** The ridged or raised portions of a convoluted brain surface. Contrast with sulci.

**H**

**Habeas Corpus:** “You have the body.” A writ or order commanding the authority who is detaining an individual to produce the body of the detainee before the court to determine whether the detainment is lawful.

**Health Psychology:** Subspecialty within the behavioral-medicine approach that deals with psychology’s contributions to diagnosis, treatment, and prevention of behaviorally caused physical illnesses.

**Hearsay:** A statement made during a trial or hearing that is not based on the personal, first-hand knowledge of the witness.

**Hearsay Rule:** The regulation making a witness’s statement inadmissible if it is not based on his or her personal knowledge.

**Heat of Vaporization:** The heat energy required to convert 1 gram of liquid into a vapor without a change in temperature of the substance being vaporized.

**Hebephrenic Schizophrenia:** Type of schizophrenia characterized by severe personality decompensation or disintegration.

**Hemiparesis:** Weakness on one side of the body.

**Hematoma:** An accumulation of blood within the meninges of the brain. Most often caused by head trauma.

**Hematosis:** The arrest of bleeding; the checking of the flow of blood through any part of a vessel.

**Hematuria:** The presence of blood in the urine.

**Hemiplegia:** Weakness or paralysis of one side of the body.
**Hemispatial Neglect:** Neglect of the hemisphere contralateral to a lesion. Also termed visuospatial agnosia or neglect, unilateral spatial neglect, or hemispatial agnosia.

**High-Risk:** Individuals showing great vulnerability to physical or mental disorders.

**Hilus:** A depression or pit at that part of an organ where the vessels and nerves enter or leave.

**Hippocampus:** Actively concerned with memory consolidation functions, located at anterior temporal lobe.

**Histrionic Personality:** Personality pattern characterized by excitability, emotional instability, and self-dramatization.

**Holistic:** A systematic approach to science involving the study of the whole or total configuration; the view of human beings as unified psychobiological organisms inextricably immersed in a physical and sociocultural environment.

**Homeostasis:** Tendency of organisms to maintain conditions making possible a constant level of physiological functioning.

**Homologous:** Corresponding; having similar relations.

**Homonymous Field Cuts:** Loss of vision in the same part of both visual fields.

**Homonymous Hemianopsia:** Loss of one-half of the visual field in each eye, right- or left-sided (e.g., right temporal/left nasal; right nasal/left temporal).

**Huntington’s Disease:** A progressive, hereditary, dementing condition that affects the basal ganglia with atrophy of the frontal lobes and corpus callosum. Involuntary and spasmodic movements are associated features, along with declining cognitive and personality/social skills.

**Hyaluronidase:** An enzyme causing breakdown of hyaluronic acid in protective polysaccharide barriers, promoting invasion of cells and tissues by the invading agent; it is a spreading factor.

**Hyperacusis:** The perception of sounds as abnormally loud.

**Hypergraphia:** Overwriting, as when too many words are written in response to task demands.

**Hyperplasia:** The abnormal multiplication, or increase, in the number of normal cells in normal arrangement in a tissue.

**Hypertrophy:** The morbid enlargement, or overgrowth, of an organ or part, resulting from an increase in size of its constituent cells.
Hypnosis: Trancelike mental state induced in a cooperative subject by suggestion.

Hypnotherapy: Use of hypnosis in psychotherapy.

Hypnotic Regression: Process by which a subject is brought to relive, under hypnosis, early forgotten or repressed experiences.

Hypochondriacal Delusions: Delusions concerning various horrible disease conditions, such as the belief that one’s brain is turning to dust.

Hypochondriasis: Condition dominated by preoccupation with bodily processes and fear of presumed diseases.

Hypophonia: Lowered voice volume. Contrasted to aphonia, or total lack of voice. The most common cause of both disorders is laryngitis.

Hypothalamus: Involved in homeostatic, motivational activities such as sexual activity, eating, drinking, and emotions, this structure is located in the limbic system, dorsal to the thalamus.

Hypothermia: Low temperature; especially a state of low body temperature induced for the purpose of decreasing metabolic activities and need for oxygen.

Hypotonia: The state of muscles tiring easily. Associated with cerebellar lesions.

Hypoxia: Refers to insufficient blood oxygen to the brain. Contrasted to anoxia which refers to a total lack of blood oxygen to brain structures.

Hysterical Amnesia: Loss of memory for emotional/psychological reasons without a known organic basis.

Hysterical Disorder: Disorder characterized by involuntary psychogenic dysfunction of motor, sensory, or visceral processes.

I

Iconic Memory: A very brief type of memory that stores the sensory impression of a scene.

Ideographic Methodology: A method of study emphasizing the individual case and the uniqueness of each personality.

Ideomotor Apraxia: Simple execution of motor responses (e.g., hitchhiking sign, salute, whistling) is impaired or absent in the presence of intact comprehension. Implies deficits in planning and initiation. Associated with left hemisphere lesions.
**Idiopathic Epilepsy:** A seizure disorder of unknown origin. Opposed to symptomatic epilepsy whose cause is known.

**Illusion:** Misinterpretation of sensory data; false perception.

**Impeachment:** A criminal proceeding against a public official before a quasi-political court. In regards to the testimony of a witness, to question the veracity of the evidence offered.

**In Bank (en banc):** “In the bench.” Refers to a court session in which the entire membership of the court participates in making a decision instead of the regular quorum or one judge and jury.

**In Camera:** In chambers; in private. The hearing of a case before a judge in his private chambers, when all spectators are excluded from the courtroom, or when the judge performs a judicial act while the court is not in session.

**In Loco Parentis:** In place of a parent. A party charged to legally act in behalf of the parents.

**In Re:** In the matter of; concerning or regarding. The usual method of assigning a title to a case in which there are no adversary parties.

**In Situ Research:** Research in which real-life social situations are the emphasis of study.

**In Vivo:** Taking place in a real-life situation as opposed to the therapeutic or laboratory setting.

**Inattention:** Decreased/absent awareness of events occurring on the side of the body contralateral to the hemispheric lesion.

**Incompetency:** Lacking the physical, intellectual, or moral capacity or qualification to perform a required duty.

**Independent Variable:** The variable in an experiment that is controlled or manipulated by the experimenter.

**Indifference Reaction:** Denial, unawareness, or minimizing psychological/neuropsychological deficits, traditionally associated with right hemisphere lesions. Inappropriate elevated affect may be present.

**Infarct:** Impoverished or dead brain tissue associated with vascular occlusions.

**Inferior Colliculus:** The auditory center in the midbrain; it receives input from the brain-stem auditory nuclei and sends output to the medial geniculate nucleus.

**Inflammation:** A series of reactions produced in the tissues by an irritant; it is marked by an afflux of blood with exudation of plasma and leukocytes.
Informed Consent: A person’s agreement to the occurrence of a specified event based on a full disclosure of facts needed to make an intelligent decision.

Infra: Below, under, following; the opposite of supra.

Infundibulum: A funnel-shaped structure or passage. The stalk of the pituitary gland.

Inhibitory Postsynaptic Potentials (IPSPs): Hyperpolarizing potentials in the postsynaptic neuron caused by inhibitory connections. These potentials decrease the probability that the postsynaptic neuron will fire a nerve impulse.

Innervation Ratio: The ratio expressing the number of muscle fibers innervated by a single motor axon. The fewer muscle fibers an axon innervates (the lower the ratio), the finer is the control of movement.

Inquisitorial System: A system in which the judge, as the primary figure in a trial, conducts his own investigation. The judge generally maintains more control over the proceedings than in the adversarial system.

Insanity: A social or legal term indicating a condition in which a person is unfit and lacks legal responsibility or capacity due to mental illness. As stated in the American Law Institute Penal Code, “A person is not responsible for criminal conduct if at the time of such conduct as a result of mental disease or defect he lacks substantial capacity either to appreciate the criminality or wrongfulness of his conduct or to conform his conduct to the requirements of the law.”

Insanity Defense: “Innocent by reason of insanity” plea used as a legal defense in criminal trials.

Instrumental Use of Empirical Data: The application of concrete social science information of concepts to a case.

Integration: Organization of parts (psychological, biological functions) to make a functional whole.

Intent: A state of mind (inferred from the facts or from a person’s actions) showing purpose, design, or resolve to act in a certain manner.

Intention Tremor: Also called kinetic tremor, this anomaly occurs at the end of a movement. Contrasted to “rest” tremor which occurs when no movement is present.

A tremor that occurs only during a voluntary movement (e.g., when the person reaches out to grasp an object).
**Interictal:** Refers to behaviors/events between the times seizures occur. Adverse personality traits (e.g., irritability, obsessional traits) are associated features.

**Intermediate Coup Lesions:** Scattered areas of focal tissue damage in line with the point of trauma impact (coup) and possible terminal point of the damage (contrecoup).

**Intermediate-Term Memory:** A form of memory lasting longer than short-term memory, and requiring no rehearsal, but not lasting as long as long-term memory.

**Internal Carotid Artery:** *See also* Common Carotid Arteries.

**Internal Validity:** A measure of the lack of confounding variables.

**Interstitial Policy Making:** Laws that may be “made” by judges when the issues in a case fall “between the gaps”—interstices—of previous decisions.

**Intracerebral:** Intrinsic or inside of the brain hemispheres, usually referring to brain dysfunction caused by neoplasms or cardiovascular accidents.

**Intracranial Steal:** Complicating the finding of an arteriovenous malformation (AVM) location, here blood is shunted away from normal brain tissue to the AVM site. Thus, the unaffected area may show evidence of neuropsychological deficit.

**Intravascular:** Within a vessel or vessels.

**Intropunitive:** Responding to frustration by tending to blame oneself.

**Invagination:** The pushing of the wall of a cavity into the cavity.

**Involution:** The return of an enlarged organ to normal size; retrograde changes.

**Ion:** An electrically charged atom or group of atoms formed by the loss or gain of electrons.

**Ipsilateral:** Same side; homolateral; opposed to contralateral (opposite side), bilateral (both sides), unilateral (one side).

**Ischemia:** Cut-off of blood flow to an area of the brain or body organ.

**Ischemic Infarction:** A disruption of blood flow (infarction) creating dead or damaged tissue (infarct), resulting more from impaired or absent blood flow rather than from insufficient nutrients in the blood.

**Isotope:** An element that has the same atomic number as another but a different atomic weight. Radioactive isotopes, used clinically, usually refer to elements rendered radioactive by artificial means.
Jargon Aphasia: A form of paraphasias that have no meaning to those who hear the sounds.

Judicial Notice: The act by which a court, during a trial or while framing its decision, recognizes the existence and truth of certain facts that judges and jurors may take into consideration and act upon without proof because the facts are already known to them.

Jurisdiction: The authority and power by which courts and judicial officers hear and decide cases; the geographic area in which a court has jurisdiction.

Just-World Hypothesis: The hypothesis stating that the world is fair and that victims deserve what happened to them and, therefore, do not deserve help.

Juvenile Courts: A court system, established in the late nineteenth century, having special jurisdiction over delinquent, dependent, and neglected minors. Set up to treat youthful offenders separately from adults. The court acts in a parental, protective role.

Juvenile Delinquency: Legally prohibited behavior, such as disobedient, indecent, or immoral conduct, committed by minors.

Ketosis: The condition marked by excessive production of ketone bodies in the body.

Kinesthetic: Pertaining to muscle sense, or to the sense by which muscular movement, weight, and position are perceived.

Kinesthetic Afferentiation: Gathering data concerning one’s own current muscle tone, body position, oral status, and so forth. Considered a function of the posterior association areas.

Kinetic Afferentiation: Integration of input from parietal-occipital tertiary zones, basal ganglia, and premotor areas producing sequential and integrated actions. Depends initially on kinesthetic afferentiation.

Kinetic Apraxia: Disorganized transition of single movements (see also Apraxia, Echopraxia, Apraxia of Speech). Associated with lesions in basal ganglia-premotor areas. Subordination of movements to intentions is impaired.

Kluver-Bucy Syndrome: A condition manifested by hyperorality, hypersexuality, labile emotions, and inability to form new memories. Associated with temporal lobe or limbic system lesions.
**Korsakoff’s Psychosis:** A progressive dementia considered subcortical in focus and associated with a nutritional deficiency of vitamin B<sub>1</sub> (thiamine). The condition is considered secondary to alcohol abuse. Memory impairments are paramount with associated confabulation, blandness, and passivity. Hippocampus lesions have been associated with this condition.

A memory disorder, related to a thiamine deficiency, generally associated with chronic alcoholism.

**Kuru:** A slow virus of the brain which produces trembling and, eventually, paralysis of the limbs.

**L**

**Labeled Lines:** A view of stimulus coding stating that particular nerve cells are intrinsically labeled for particular sensory experiences such as cold, touch, pain, and so forth.

**Labile Memory:** An early state of memory formation during which formation of a memory can be easily disrupted by conditions that influence brain activity.

**Lacunar State:** Multiple but small infarctions in the subcortical regions leaving lacunae. One of the end stages of hypertensive cerebrovascular conditions.

**Laminar (Form of Organization):** The horizontal layering of cells found in some brain regions.

**Lateral:** An anatomical term meaning toward the side; opposite of medial.

**Lateral Geniculate Nucleus:** Part of the thalamus which receives information from the optic tract and sends it to visual areas in the occipital cortex.

**Lateral Hypothalamus (LH):** A hypothalamic region involved in facilitating eating.

**Lateral Inhibition:** A phenomenon produced by interconnected neurons that inhibit their neighbors, producing contrast at the edges of the stimulus.

**Law of Effect:** Principle that responses that have rewarding consequences are strengthened, and those that have aversive consequences are weakened or eliminated.

**Leading Question:** A question posed by a trial lawyer which is improper because it suggests to a witness the desired answer.

**Lecithin:** A monoaminomonophosphatide found in animal tissues, especially nerve tissue, semen, egg yolk, and in smaller amounts in bile and blood.
**Legal Fiction:** An assumption of fact or a situation contrived by the law to decide a legal question.

**Lethality Scale:** Criteria used to assess the likelihood of an individual’s committing suicide.

**Leukemia:** A disease of the blood marked by persistent leukocytosis, associated with changes in the spleen and the bone marrow, or in the lymphatic nodes.

**Level of Aspiration:** Standard by which the individual judges success or failure of his or her behavior.

**Lexical Agraphia:** Impaired ability to spell irregular or unknown words with an intact ability to spell regular words. Associated with lesions in the parieto-occipital lobule.

**Limb-Kinetic Apraxia:** Complex/serial movement impairment in the presence of intact simple, repetitive movement. Brodman areas 4 and 6 are implicated in almost all cases.

**Limbic System:** Interconnected and primarily subcortial structures involved in emotional responses and memory.

**Literal Paraphasia:** Production of off-target sounds with effortless articulation. Associated with postrolandic lesions.

**Litigant:** One who is party to a lawsuit.

**Local Circuit Neurons:** Small neurons that make contact only with neurons within the same functional unit.

**Localization of Function:** The concept that specific brain regions are responsible for various types of experience, behavior, and psychological processes.

**Locked-in Syndrome:** Also known as de-efferentiation, this is due to bilateral pontine lesions and characterized by aphonia and quadriplegia. The patient is aware of his or her surroundings.

**Logical Positivism:** A philosophy that emphasizes the creation of knowledge and its verification through observation and experiment.

**Long-Term Memory:** An enduring form of memory lasting for weeks, months, or years.

**Lumbar:** Referring to the lower part of the spinal cord or back.

**Lumen:** The space in the interior of a tubular structure such as an artery or the intestine.
Luteinizing Hormone (LH): A tropic hormone released by the anterior pituitary that influences the hormonal activities of the gonads. In males, this hormone is called interstitial-cell-stimulating hormone (ICSH).

Luteinizing Hormone-Releasing Hormone: See also Gonadotropin-Releasing Hormone.

M

M’Naghten Rule: In most jurisdictions, the test applied for the defense of insanity. Under this test, an accused is not criminally responsible if he or she was suffering from a mental disease or defect at the time of committing the act and does not understand the nature and quality of his or her act or that what he or she was doing was wrong. In order to be considered “sane” and therefore legally responsible for the act committed, the defendant must know and understand the nature and quality of his or her act and be able to distinguish between right and wrong at the time the offense was committed.

Macula: A spot.

Magnetic Apraxia: Compulsive exploration of the immediate environment in the usual presence of intact comprehension skills. Forced hand grasping with difficulty “letting go” is an example. Prefrontal, mesial, and contralateral lesions are implicated.

Major Affective Disorders: Category of affective disorders in which a biological defect or other aberration renders a person liable to experience episodes of a more or less severe affective disorder.

Major Depression (unipolar disorder): A severe affective disorder in which only depressive episodes occur.

Malaise: A feeling of general discomfort or uneasiness; an out-of-sorts feeling, often the first indication of an infection.

Malfeasance: The commission of an unlawful, wrongful act; any wrongful conduct that affects, interrupts, or interferes with the performance of official duties.

Malleus Malleficarum: Infamous handbook prepared by two monks dealing with the “diagnosis” and “treatment” of witches and witchcraft.

Mammillary Bodies: Paired nuclei at the base of the brain slightly posterior to the pituitary stalk.

Mandamus: A writ or order issued from a superior Court to a lower Court or to a private or municipal corporation commanding that a specified act be performed. Used when other judicial remedies have failed.
Manic-Depressive Psychoses: Older term denoting a group of psychotic disorders characterized by prolonged periods of excitement and overactivity (mania) or by periods of depression and underactivity (depression) or by alternation of the two.

Masked Fascies: An unblinking, bland, expressionless stare.

Masochism: Sexual variant in which an individual obtains sexual gratification through infliction of pain.

Mass Action: Proposed by Lashley, this notion stated that the degree of deficit showed by a lesion was a function of how much cortical tissue was destroyed.

Meatus: A passage, or channel, especially the external opening of a canal.

Medial: An anatomical term meaning toward the middle; opposite of lateral.

Medial Geniculate Nucleus: A nucleus in the thalamus that receives input from the inferior colliculus and sends output to the auditory cortex.

Mediation: A way of resolving disputes by using a third party to intervene between contending parties to bring them to a satisfactory settlement without resorting to litigation.

Medulla: The lowest part of the brain, also called myelencephalon.

Melokinetic Apraxia: Deficit in speech, skill, and coordination of movement, usually confined to a small muscle group. Unilateral and contralateral to lesion in premotor area.

Memory Traces: Persistent changes in the brain which reflect the storage of memory.

Meninges: Thin membranes on the brain-dura mater, pia mater, and arachnoid, which provide a venous drainage system.

Meningioma: Neoplastic growth arising from the meninges.

Menningitis: Inflammatory disease of the meninges with associated signs of fever, headache, and stiff neck.

Mens Rea: A guilty mind; having a guilty or wrongful purpose or criminal intent.

Mental Anguish: A compensable injury including all forms of mental, as opposed to physical, injury. In connection with a physical injury, includes the mental sensation of pain and accompanying feelings of distress, grief, anxiety, or fright.
**Mesencephalon:** The midbrain.

**Mesmerism:** Theories of “animal magnetism” (hypnosis) formulated by Anton Mesmer.

**Messenger RNA (mRNA):** A strand of RNA that carries the code of a section of a strand of DNA to the cytoplasm.

**Metabolism:** The sum of the chemical changes whereby the function of nutrition is affected; it consists of anabolism or the constructive and assimilative changes and catabolism or the destructive and retrograde changes.

**Metamorphosias:** Visual illusions where objects are distorted in size, shape, distance, or color. May occur with lesions anywhere in visual system, with substance intoxication or in conjunction with psychological disorder.

**Metencephalon:** A subdivision of the hindbrain that includes the cerebellum and the pons.

**Meter:** A measure of length, 100 centimeters, the equivalent of 39.371 inches.

**Methadone:** An orally administered narcotic which replaces the craving for heroin and weans the individual from heroin addiction.

**Microglia:** Extremely small glial cells that remove cellular debris from injured or dead cells.

**Microgram:** One one-millionth of a gram, or 1/1,000 of a milligram.

**Micron:** One one-millionth of a meter or 1/1,000 of a millimeter.

**Microtubules:** Hollow cylindrical structures in axons that are involved in exoplasmic streaming.

**Midbrain:** The middle division of the brain. Also called mesencephalon.

**Middle Cerebral Artery (MCA):** The MCA and its branches are one of the two major vascular networks of the frontal lobes. The lateral convexity is fed by anterior branches of the MCA.

**Milieu:** The immediate environment, physical or social or both; sometimes used to include the internal state of an organism.

**Millimeter:** One one-thousandth of a meter; about 1/25 inch.

**Misdemeanor:** An offense less serious than a felony, typically punishable by a fine or short-term incarceration.

**Misfeasance:** The improper performance to an act a person has a right or duty to perform.
Misoplegia: A type of unilateral inattention where the lesioned individual, usually hemiplegic, exhibits a strong dislike for the affected limbs or portions of the body. Intense hatred resulting in self-mutilation may be expressed.

Mistrial: A trial terminated before its normal conclusion and declared invalid prior to the returning of a verdict. A judge may declare a mistrial due to an extraordinary event (e.g., death of a juror), for a fundamental, prejudicial error that cannot be corrected by instructions to the jury, or because of the jury’s inability to reach a verdict (hung jury). In a criminal case, may prevent a retrial under the doctrine of double jeopardy.

Mitochondria: Organelles in the cytoplasm of cells; contain enzymes that make possible the reactions whereby energy is liberated from food and stored temporarily in the chemical bonds of ATP.

Mitosis: The process of division of somatic cells that involves duplication of DNA.

Model Psychoses: Psychotic-like states produced by various hallucinogenic drugs such as LSD.

Modulation of Formation of Memory: Facilitation or inhibition of memory formation by factors other than those directly involved in memory formation. Also called modulation of memory storage processes.

Modus Operandi: Manner or mode of behavior; a criminal’s typical pattern of performing crimes.

Monopolar Neurons: Nerve cells with a single branch leaving the cell body which then extends in two directions—one end is the receptive pole, the other end the output zone.

Moot: A subject for debate; unsettled; undecided. A case is “moot” when a determination of a matter is sought which, when rendered, has no practical effect on the matter under dispute.

Moral Nihilism: Doctrine that denies any objective or real ground for moral beliefs, and holds that the individual is not bound by obligation to others or society.

Moral Therapy: Therapy based on provision of kindness, understanding, and favorable environment; prevalent during early part of the nineteenth century.

Motion: An application made to a court or judge, orally or in writing, requesting that a rule or order be given in favor of the applicant.

Motivational Selectivity: Influence of motives on perception and other cognitive processes.
**Motive Pattern:** Relatively consistent cluster of motives centered around particular strivings and goals.

**Motoneurons:** Nerve cells in the spinal cord that transmit motor messages from the spinal cord to muscles.

**Motor Aprosody:** Inability to sing or to change pitch or voice tempo with intact ability to recognize melodies.

**Motor Cortex:** A region of cerebral cortex that sends impulses to motoneurons.

**Motor Extinction:** Increased contralateral limb akinesia when simultaneously using ipsilateral extremities, due to cerebral dysfunction.

**Motor Impersistence:** Inability to maintain an initiated, voluntary (motor) behavior chain. Implies distraction due to interference factors. Common impersistences include lack of tongue protrusion, eyelid closure, mouth opening, breath holding, hand-grip pressure, and central gaze.

**Motor Neuron:** Spinal cord neurons involved in movement which extend to effector muscle sites.

**Motor Unit:** A single motor axon and all the muscle fibers it innervates.

**Multi-infarct Dementia:** A vascular disease that has a progressive, stepwise course caused by multiple strokes and arteriosclerosis. Cognitive symptoms usually precede personality problems. Motor anomalies are distinctive of this condition and reflect subcortical involvement.

**Multiple Personality:** Type of dissociative disorder characterized by the development of two or more relatively independent personality systems in the same individual.

**Multiple Sclerosis (MS):** A degenerative condition involving deterioration of the myelin sheath on nerve fibers. This disease therefore affects primarily the white matter. Multiple cognitive and emotional deficits are noted. The rate of progression of MS is extremely variable.

**Multipolar Neurons:** Nerve cells with many dendrites and a single axon.

**Muscarinic:** A cholinergic receptor (one responsive to acetylcholine) that mediates chiefly the inhibitory activities of acetylcholine.

**Myasthenia Gravis:** A neurological disease characterized by easy fatigability and weakness of muscles.

**Myelencephalon:** A subdivision of the hindbrain; the medulla.

**Myelin:** The fatty insulation around an axon, formed by accessory cells; this improves the speed of conduction of nerve impulses.
**Myelin Sheath:** A thin cover on the axons of many neurons.

**Myelinization:** The process of formation of myelin.

**N**

**Narcolepsy:** A disorder involving frequent, intense episodes of sleep, which last from 5 to 30 minutes, and can occur anytime during the usual waking hours.

**Narcosis:** Stupor, or unconsciousness, produced by some narcotic drug.

**Narcotherapy (narcoanalysis, narcosynthesis):** Psychotherapy carried on while the patient is in a sleep-like state of relaxation induced by a drug such as sodium pentothal.

**Narcotic Drug:** Drugs such as morphine which lead to physiological dependence and increased tolerance.

**Natural Law:** A philosophy that refers to a system of rules and principles for the guidance of human behavior which arise from the rational intelligence of man. These rules are apart from enacted laws and stem from and conform to man’s entire mental, moral, and physical constitution.

**Necker Cube:** An optical illusion using “rate of apparent change (RAC)” to differentiate normals from brain injured. Fewer and slower reversals are reported by brain injured, with damage associated with right hemisphere or frontal lobe lesions.

**Necrosis:** Local death of tissue.

**Negative Feedback System:** A regulatory system in which output is used to reduce the effect of input signals.

**Negativism:** Form of aggressive withdrawal that involves refusing to cooperate or obey commands, or doing the exact opposite of what has been requested.

**Negligence:** The failure to exercise the degree of care a reasonable person guided by ordinary considerations under similar circumstances would exercise.

**Neocortex:** The relatively recently evolved portions of the cerebral cortex.

**Nerve Growth Factor:** A substance that controls the growth of neurons of the spinal ganglia and the ganglia of the sympathetic nervous system.

**Nerve Impulses:** The propagated electrical messages of a neuron which travel down from the axon to adjacent neurons. Also called action potentials.
Neural Tube: A prenatal structure with subdivisions that correspond to the future forebrain, midbrain, and hindbrain. The cavity of this tube will include the cerebral ventricles and the passages that connect them.

Neurasthenic Neurosis: Neurotic disorder characterized by complaints of chronic weakness, easy fatigability, and lack of enthusiasm.

Neuroblasts: Early forms of cells during the stage of cell migration.

Neurofibrillary Tangles: Abnormal whorls of neurofilaments within nerve cells that are especially apparent in people suffering from dementia.

Neurofilaments: Small rod-like structures in axons that are involved in transport materials.

Neuroglia: “Nerve glue” or glia, these cells make up about half the volume of the central nervous system and provide structural and metabolic support to neurons. See also Glial Cells.

Neurohypophysis: See also Posterior Pituitary.

Neurological Examination: Examination to determine presence and extent of organ damage to the nervous system.

Neuromodulators: Substances that influence the activity of synaptic transmitters.

Neuron: The basic unit of the nervous system, composed of a cell body (aka, soma or perikaryon), receptive extension(s), and a transmitting extension (axon).
A cell of the brain or spinal cord (CNS) which is composed of a cell body, axon, and dendrites.

Neuron Doctrine: A hypothesis that states that the brain is composed of separate cells that are distinct structurally, metabolically, and functionally.

Neuropathies: Peripheral nerve destruction.

Neurosecretory Cells: Neurons that manufacture and secrete hormones.

Neurospecificity: A theory of nervous system development which states that each axon grows to a particular site.

Neurotic Nucleus: Basic personality characteristics underlying neurotic disorders.

Neurotic Paradox: Failure of neurotic patterns to extinguish despite their self-defeating nature.

Neurotic Style: A general personality disposition toward inhibiting certain anxiety-causing behaviors; distinguishable from anxiety, somatoform,
and dissociative disorders in that neurotic styles do not manifest themselves in specific, disabling neurotic symptoms.

**Neurotransmitter:** Biochemical substances that transmit information between neurons. See also Synaptic Transmitter.

**Nicotinic:** A cholinergic receptor that mediates chiefly the excitatory activities of acetylcholine.

**Night Hospital:** Mental hospital in which an individual may receive treatment during all or part of the night while carrying on his or her usual occupation in the daytime.

**Nigrostriatal Bundle (NSB):** A dopaminergic tract that runs from the substantia nigra of the midbrain to the lateral hypothalamus, the globus pallidus, and the caudateputamen.

**Nihilistic Delusion:** Fixed belief that everything is unreal.

**Nociceptors:** Receptors that respond to stimuli that produce tissue damage or pose the threat of damage.

**Node of Ranvier:** A gap between successive segments of the myelin sheath where the ax membrane is exposed.

**Nomadism:** Withdrawal reaction in which the individual continually attempts to escape frustration by moving from place to place or job to job.

**Nomothetic Methodology:** An approach in which the discovery of relationships between variables by studying large numbers of cases or events is emphasized.

**Non Compos Mentis:** Insane; not sound of mind. A very general term including all varieties of mental derangement.

**Norepinephrine (NE):** A neurotransmitter produced mainly in brainstem nuclei, also called noradrenalin.

**Normal Pressure Hydrocephalus (NPH):** A reversible condition involving obstruction of cerebral spinal fluid (CSF). Increased pressure leads to ventricle enlargement with the primary lesion in the midbrain reticular formation.

**Nosology:** The classification of diseases, including mental diseases.

**NSB:** See also Nigrostriatal Bundle.

**Nucleotide:** A portion of a DNA molecule composed of a single base and the adjoining sugar-phosphate unit of the strand.

**Nucleus:** An anatomical collection of neurons (e.g., caudate nucleus).
Nystagmus: Abnormal to and fro movements of the eye during attempts to fixate. Rhythmic oscillation of the eyeballs, either horizontal, rotary or vertical.

O

Occipital Cortex: The cortex of the occipital (posterior) lobe of the brain.

Ocular-Dominance Histogram: A graph that shows the strength of a neuron’s response stimuli presented to either the left or right eye. Used to determine the effects of depriving one eye of visual experience.

Ondine Curse: A type of sleep apnea where automatic breathing during sleep is disrupted. Lesions of the reticulospinal tract have been implicated in this condition.

Oneirism: Prolonged dream state despite wakefulness.

Optic Aphasia: Inability to name visually presented objects with intact recognition. Spared recognition is shown by demonstration of use or matching (pointing) to the object when named.

Optic Ataxia: Inability to localize objects in space by visual guidance. Difficulty in shifting (stimulus boundedness) is an associated feature.

Optic Chiasm: The site where optic neurons from the eye separate and cross over to the contralateral hemisphere. Located near the pituitary gland.

Optic Radiation: Axons of the lateral geniculate nucleus that terminate in the primary visual areas of the occipital cortex.

Optic Tract: The axons of the retinal ganglion cells after they have passed the optic chiasm.

Optokinetic System: A closed-loop system controlling eye movement and keeping the gaze on target.

Organ of Corti: A structure in the inner ear that lies on the basilar membrane. It contains the hair cells and the terminations of the auditory nerve.

Orifice: Any aperture or opening.

Osmoreceptors: Cells in the hypothalamus that were thought to respond to changes in osmotic pressure.

Osmotic Thirst: The response to increased osmotic pressure in brain cells.

Ostium: A small opening, especially one of entrance into a hollow organ or canal.
**Overutilization Anoxia:** Occurring during epileptic seizures, a lack of sufficient oxygen secondary to the abnormal electrical discharges. Seen as due to the high metabolic rates during seizures.

**Oxidation:** The combining of food and oxygen in the tissues; chemically, the increase in valence of an element.

**Oximeter:** An instrument for measuring the oxygen saturation of hemoglobin in the circulating blood.

**Oxytocin:** A hormone released by the posterior pituitary which triggers milk letdown in the nursing female.

**P**

**Pacchionian Bodies:** Small projections of the arachnoid tissue, chiefly into the venous sinuses of the dura mater.

**Pain Asymbolia:** Loss of appreciation for pain, associated with left parietal lesions.

**Pain Cocktail:** A concoction of all the medication a pain patient is taking in a single liquid that can be systematically controlled and reduced in strength.

**Paleocortex:** Evolutionary old cortex (e.g., the hippocampus).

**Palilalia:** Progressively more rapid and less loud speech productions, ending in an indistinguishable mutter. Associated with bilateral frontal lesions or with subcortical structures.

**Palpitation:** Forcible pulsation of the heart perceptible to the individual.

**Papilledema:** Edema of the optic disk, associated with increased intracranial pressure.

**Paradigmatic Change:** A new way of viewing the world.

**Paradoxical Sleep:** See also Rapid-Eye-Movement (REM) Sleep.

**Parallel Processing:** Using several different circuits at the same time to process the same stimuli.

**Paralysis:** A loss of power of voluntary movement in a muscle through injury or disease of its nerve supply.

**Paranoia:** Psychosis characterized by a systematized delusional system.

**Paranoid Personality:** Individual showing behavior characterized by projection (as a defense mechanism), suspiciousness, envy, extreme jealousy, and stubbornness.
Paranoid Schizophrenia: Subtype of schizophrenic disorder characterized by absurd, illogical, and changeable ideas of hallucinations of grandeur and persecution.

Paranoid State: Transient psychotic disorder in which the main element is a delusion, usually persecutory or grandiose in nature.

Paraphasias: Errors in word usage associated with aphasia. Substitutions for a correct word may occur (e.g., “I ate night”) or substitution for syllables (e.g., “I ate rupper”). Neologisms may occur (e.g., “I ate ronks”).

Parasympathetic Division: One of the two systems that compose the autonomic nervous system. The parasympathetic division arises from both the cranial and sacral parts of the spinal cord.

Paraventricular Nucleus: A nucleus of the hypothalamus.

Parenchyma: The essential elements of an organ; the functional elements of an organ, as distinguished from its framework, or stroma.

Parens Patriae: Literally, “parent of the country.” Refers to the role of the state as sovereign or guardian of disabled persons, such as minors and insane and incompetent persons.

Parkinson’s Disease: A degenerative neurological disorder involving dopaminergic neurons of the substantia nigra.

A subcortical, progressive dementia that is primarily caused by neuronal degeneration of the basal ganglia, particularly the substantia nigra. There may also be cortical impairment. The three primary symptoms are tremor, rigidity, and bradykinesia. Egocentricity, irritability, and suspiciousness are common.

Partial Seizures: Epileptic seizures arising from pathological foci that do not have widespread distribution. These include focal repetitive motor spasms and do not involve loss of consciousness.

Parturition: Giving birth to young.

Path Analysis: Statistical technique that takes into account how variables are related to one another through time and how they predict one another.

Pathological Gambling: Addictive disorder in which gambling behavior disrupts the individual’s life.

Pederasty: Sexual intercourse between males via the anus.

Perceptual Defense: A process in which threatening stimuli are filtered out and not perceived by the organism.
**Perceptual Filtering:** Processes involved in selective attention to aspects of the great mass of incoming stimuli which continually impinges on the organism.

**Perimeter:** An instrument delimiting the field of vision.

**Peripheral Nerves:** Neurons that lie outside the central nervous system.

**Peripheral Nervous System:** The portion of the nervous system that includes all the nerves outside the brain and spinal cord.

**Permanent Planning:** Placing children who are drifting through foster homes back into their original families.

**Perseveration:** Persistent continuation of a line of thought or activity once it is under way. Clinically inappropriate repetition.

**Perseveration-Consolidation Hypothesis:** A hypothesis stating that information passes through two stages in memory formation. During the first stage, the memory is held by perseveration of neural activity and is easily disrupted. During the second stage, the memory becomes fixed, or consolidated, and is no longer easily disrupted.

**Personality Disorder:** A group of maladaptive behavioral syndromes originating in the developmental years and not characterized by neurotic or psychotic symptoms.

**Perversion:** Deviation from normal.

**Petit Mal Seizures:** A type of generalized epileptic seizure characterized by a spike-and-wave electrical pattern. During these seizures, the person is unaware of the environment and later cannot recall what happened.

**pH:** The symbol commonly used in expressing hydrogen ion concentration. It signifies the logarithm of the reciprocal of the hydrogen ion concentration expressed as a power of 10.

**Phantom Limb:** The experience of sensory messages attributed to an amputated limb.

**Phasic Receptors:** Receptors that show a rapid fall in nerve impulse discharge as stimulation is maintained.

**Phlebothrombosis:** Thrombosis of a vein without inflammation of its walls.

**Phonological Agraphia:** Impaired ability to spell nonwords with intact ability for familiar words. Associated with lesions of the supermarginal gyrus or associated areas.
**Phosphemes:** Flashes of light caused by dysfunction of the auditory-visual association area. Visual hallucinations may also be produced, related or not to past experiences.

**Photopic System:** A system in the retina that operates at high levels of light, shows sensitivity to color, and involves the cones; contrast with scotopic system.

**Phrenology:** The belief that bumps on the skull reflect enlargements of brain regions responsible for certain behavioral faculties.

**Pick’s Disease:** Similar to Alzheimer’s disease, here neuronic damage is typically confined to the frontal and temporal lobes. Personality changes usually precede memory loss. Affects twice as many women as men.

**Pilocarpine:** An alkaloid that stimulates the parasympathetic division of the autonomic nervous system.

**Pitch:** A dimension of auditory experience in which sounds vary from low to high.

**Pituitary Gland:** A small complex endocrine gland located in a socket at the base of the skull. The anterior pituitary and posterior pituitary are separate in function.

**Place Theory:** A theory of frequency discrimination according to which pitch perception depends on the place of maximal displacement of the basilar membrane produced by a sound. Contrast with volley theory.

**Plaintiff:** A person who initiates an action or legal suit. In a civil suit, the party who complains or sues.

**Planum Temporale:** A region of superior temporal cortex adjacent to the primary auditory area.

**Plea:** In a legal action, the defendant’s answer to the plaintiff’s declaration.

**Plea Bargaining:** In a criminal case, the process in which the accused and the prosecutor negotiated a mutually satisfactory disposition of the case subject to the approval of the court. Usually involves the defendant pleading guilty to a reduced punishment or offense or to a lesser number of counts in a multicount indictment.

**Pleading:** The formal allegations made by the opposing parties of their respective claims and defenses.

**Pleasure Principle:** In psychoanalysis, the demand that an instinctual need be immediately gratified regardless of reality.
**Plexus:** A network, or tangle, of interweaving nerves, veins, or lymphatic vessels.

**Pneumoencephalogram:** A technique for examining brain structure in intact humans by taking X-rays after a gas is injected into the ventricles.

**Pons:** A portion of the metencephalon.

**Positive Law:** A system of rules and laws enacted or adopted by the government of an organized political community for the purpose of controlling the conduct of its people.

**Positron Emission Tomography (PET) Scan:** A technique for examining brain structure and function in intact humans by combining tomography with injections of radioactive substances used by the brain. An analysis of metabolism of these substances reflects regional differences in brain activity. Computer-assisted, X-ray procedure designed to analyze and track glucose utilization in the brain.

**Postcentral Gyrus:** Involved in sensory mediation, this cortical convolution is located just posterior to the Fissure of Rolando.

**Posterior Pituitary:** The rear division of the pituitary gland. Also called neurohypophysis.

**Posthypnotic Amnesia:** The subject’s lack of memory for the period during which he or she was hypnotized.

**Posthypnotic Suggestion:** Suggestion given during hypnosis to be carried out by the subject after he or she is brought out of hypnosis.

**Postpartum Disturbances:** Emotional disturbances associated with childbirth.

**Postsynaptic Potentials:** See also Graded Potentials.

**Posttraumatic Amnesia (PTA):** A form of anterograde amnesia seen as a postconcussional effect of head trauma. Correlates well with coma length and severity. Some retrograde amnesia may accompany PTA.

**Posttraumatic Stress Disorders:** Category of disorder in which the stressor is severe and residual symptoms occur following the traumatic experience.

**Postural Tremor:** A tremor that occurs when a person attempts to maintain a posture such as holding an arm or leg extended, resulting from pathology of the basal ganglia or cerebellum.

**Precedent:** A previous judgment or decision of a court considered as an authority for deciding later identical or similar cases. Under the doctrine of
stare decisis, cases that establish that a rule of law are authoritative and must be adhered to.

**Precentral Gyrus:** Involved in the mediation of motor activity, this cortical convolution is located just anterior to the Fissure of Rolando.

**Precipitating Cause:** The particular stress that triggers a disorder.

**Predisposing Cause:** The factor that lowers the individual’s stress tolerance and paves the way for the appearance of a disorder.

**Predisposition:** Likelihood that an individual will develop certain symptoms under given stress conditions.

**Pressor:** Excited vasoconstrictor activity, producing increased blood pressure; denoting afferent nerves that, when stimulated, excite the vasoconstrictor center.

**Presumption:** An inference resulting from a rule of law or the proven existence of a fact which requires such rule(s) or action(s) be established in the action. Presumption can be irrefutable, such as the presumption of incapacity in a person under 7 years to act, or rebuttable, in which case it can be disproved by evidence.

**Presumption of Innocence:** A principle of criminal law in which the government carries the burden of proof beyond a reasonable doubt for every element of a crime, with the defendant having no burden of proof to prove his or her innocence.

**Prima Facie Case:** A case in which there is sufficient evidence for the matter to proceed beyond a motion for a directed verdict in a jury case or a motion to dismiss in nonjury trial; it requires the defendant to proceed with his or her case.

**Prima Facie Evidence:** Evidence that, in the judgment of the law, is good and sufficient to establish a given fact or a chain of facts making up the party’s claim or defense. If such evidence is unexplained or uncontradicted, it is sufficient to sustain favorable judgment for the issue it supports; may be contradicted by other evidence.

**Primary Reaction Tendencies:** Constitutional tendencies apparent in infancy, such as sensitivity and activity level.

**Privilege:** A particular benefit or exemption enjoyed by a person, company, or class beyond the common ones held by other citizens.

**Privileged Communication:** Statements made in a setting of legal or other professional confidentiality. Applies to certain persons within a protected relationship, such as husband–wife, attorney–client, which are legally
protected from forced disclosure on the witness stand at the option of the witness.

**Pro Bono Publico:** For the welfare or good of the public, such as when an attorney or other professional handles a case without compensation to advance a social cause or represents a party who cannot afford to pay him or her.

**Problem Drinker:** Behavioral term referring to one who has serious problems associated with drinking alcohol. Term is currently preferable to alcoholic.

**Process (Poor, Premorbid, Chronic) Schizophrenia:** Schizophrenia pattern that develops gradually and tends to be long-lasting.

**Prodrome:** Behavioral/mood change preceding onset of a seizure. Prodromal signs may be apparent for several days before the seizure.

**Progressive Supranuclear Palsy:** An uncommon Parkinson-like condition that usually begins in the fifties with emotional lability, imbalance, and problems with downward gaze. A dementia develops with relative sparing of language and constructional abilities.

**Projection Neuron:** Large neurons that transmit messages to widely separated parts of the brain.

**Prosecution:** A criminal proceeding to determine the guilt or innocence of a person charged with a crime. Refers to the state or federal government as the party proceeding in a criminal action.

**Prosencephalon:** See also Forebrain.

**Prosody:** Rhythm, pitch, tempo, and like characteristics of speech. Important in communication of affective content. Typically seen as a right hemisphere activity.

**Prosopagnosia:** Inability to recognize faces of those with whom one was previously familiar. Loss of ability to recognize unfamiliar faces is a variant of this disorder. Usually associated with right lesions.

**Protocritic:** A diffuse type of sensory experience (e.g., temperature) common to all homeostatic internal mechanisms. Cognitive processing does not lead to identifying a discrete place or duration for the sensation. Opposed to epicritic.

**Proximal:** An anatomical directional term meaning near the trunk or center; opposite of distal.

**Proximate Cause:** An occurrence that, in a natural and unbroken chain of events, results in an injury and without which the injury would not have occurred. The event that is closest in the causal relationship to the effect.
**Pseudo-Community:** Delusional social environment developed by a paranoiac.

**Pseudobulbar State:** Strong affective expressions to include laughing and crying, often simultaneously but also incongruous to the stated feeling of the person. Associated with lesions of connecting pathways between the frontal lobes and lower brain structures.

**Pseudodementia:** A pattern of deficit behavior resembling organically produced dementia. Depression is the primary factor causing the intellectual suppression.

**Pseudodepression:** The major pathology involves the dorsal-lateral frontal convexity, severe bilateral frontal pathology, or severing of frontal-thalamic pathways. This is a pathology of reduced/absent motor responses (e.g., mutism, inactivity, helpless unconcern). The subject may be aware of his or her deficit.

**Pseudohemianopsia:** Lack of attention to visual stimulation from the contralateral side despite intact visual fields.

**Pseudopsychopathy:** The major pathology involves the orbital frontal areas and reflects motor excess (e.g., peurile acts, restlessness, bursting into motion, impulsive antisocial acts). The subject knows but cannot control the motor behavior.

**Psychic Cortex:** Anterior portion of the temporal lobe which when stimulated produces recollection of previous experience (e.g., music, visual scenes). Temporal lobe tumors may produce hallucinations involving previous experiences.

**Psychomotor Epilepsy:** State of disturbed consciousness in which the individual may perform various actions, sometimes of a homicidal nature, for which he or she is later amnesic.

**Psychosexual Dysfunction:** Inability or impaired ability to experience or give sexual gratification.

**Psychotogens:** Substances that generate psychotic behavior.

**Psychotropic Drugs:** Drugs whose main effects are mental or behavioral in nature.

**Pterygoid:** Shaped like a wing.

**Ptosis:** Drooping eyelid caused by a lesion to the oculomotor cranial nerve.

**Pure Agraphia:** Writing deficits caused by brain damage in the absence of other significant language disturbance.
**Pure Word Deafness:**  Inability to understand spoken words with an intact ability to read, write, and speak. Usually does not occur in isolation of other defects and is associated with cardiovascular accidents.

**Purkinje Cell:**  A type of large nerve cell in the cerebellar cortex.

**Putative:**  Reputed or supposed.

**Pyramidal Cell:**  A type of large nerve cell in the cerebral cortex.

**Pyramidal System:** A motor system including neurons within the cerebral cortex and the axons which form the pyramidal tract.

**Q**

**Quasi-Experimental Design:** A research study in which the experimenter has partial experimental control over the setting and variables.

**R**

**Ramp Movements:** Slow, sustained motions thought to be generated in the basal ganglia. Also called smooth movements. Contrast with ballistic.

**Ramus:** A branch; one of the primary divisions of a nerve or a blood vessel; a part of an irregularly shaped bone that forms an angle with the main body.

**Random Assignment:** An experimental method that ensures that every subject has an equal chance of being selected for the experimental or control group.

**Range Fractionation:** A hypothesis of stimulus intensity perception stating that a wide range of intensity values can be encoded by a group of cells, each of which is a specialist for a particular range of an intensity scale.

**Rape:** An act of violence in which sexual relations are forced upon another person.

**Raphe Nucleus:** A group of neurons in the midline of the brain stem which contains serotonin, involved in sleep mechanisms.

**Rapid-Eye-Movement (REM) Sleep:** A state of sleep characterized by small-amplitude, fast electroencephalograph (EEG) waves, no postural tension, and rapid eye movements. Also called paradoxical sleep.

**Ratio Decidendi:** The principal ground or reason for a court’s written decision. The point in a case which is essential to determining the court’s judgment.
**Reaction Formation:**  Ego-defense mechanism in which the individual’s conscious attitudes and overt behavior are opposite to repressed unconscious wishes.

**Readiness Potential:**  An electrical potential that occurs over widespread posterior regions of the scalp prior to the onset of a voluntary movement.

**Reality Assumptions:**  Assumptions that relate to the gratification of needs in the light of environmental possibilities, limitations, and dangers.

**Reality Principle:**  Awareness of the demands of the environment and adjustment of behavior to meet these demands.

**Reasonable Doubt:**  The degree of doubt required to justify an acquittal of a criminal defendant, based on reason and arising from evidence or lack of evidence.

**Reasonable Doubt Standard:**  A standard beyond which guilt must be shown.

**Receptive Field:**  The stimulus region and features that cause the maximal responses of a cell in a sensory system.

**Receptor:**  Nerve ending that receives a stimulus.

**Receptor Proteins:**  Substances at synaptic receptor sites whose reaction to certain transmitters causes a change in the postsynaptic membrane potential.

**Receptor Sites:**  Regions of specialized membrane containing receptor proteins located on the postsynaptic surface of a synapse; these sites receive and react with the chemical transmitter.

**Receptors:**  The initial elements in sensory systems, responsible for stimulus transduction (e.g., hair cells in the cochlea or rods and cones in the retina).

**Recess:**  A short interval during a trial or hearing when the court suspends business without adjournment.

**Reduplicative Paramnesia:**  Associated with right parietal or frontal damage of a coarse nature. Involves relocating a place (e.g., hospital) to another place (e.g., one’s hometown).

**Reflex:**  A simple, highly stereotyped, and unlearned response to a particular stimuli (i.e., an eyeblink in response to a puff of air).

**Refractory:**  A period during and after a nerve impulse in which the axon membrane’s responsiveness is reduced. A brief period of complete insensitivity to stimuli (absolute refractory phase) is followed by a longer period of reduced sensitivity (relative refractory phase) during which only strong stimulation produces a nerve impulse.
**Regression:** Ego-defense mechanism in which the individual retreats to the use of mature responses in attempting to cope with stress and maintain ego integrity.

**Remand:** To send a case back to the court from which it came to have further action taken on it there.

**Remedy:** The means by which a right is enforced or the violation of a right is prevented or compensated.

**Repression:** Ego-defense mechanism by means of which dangerous desires and intolerable memories are kept out of consciousness.

**Residual Schizophrenia:** Category used for persons regarded as recovered from schizophrenia but still manifesting some symptoms.

**Resistance:** Tendency to maintain symptoms and resist treatment or uncover repressed material.

**Resistance to Extinction:** Tendency of a conditioned response to persist despite lack of reinforcement.

**Resorption:** The loss of substance through physiologic or pathologic means.

**Respondent:** The party answering a charge or the party contending against an appeal.

**Resting Potential:** Potential differences across the membrane of nerve cells during inactive period. Also called membrane potential.

**Retainer:** A contract between an attorney and a client stating the nature of the services being rendered and the cost of such services. By employing an attorney to act on his or her behalf, a client prevents that attorney from acting for his or her adversary.

**Rete Mirabile:** A network of fine blood vessels located at the base of the brain in which blood coming from the periphery reduces the temperature of arterial blood before it enters the brain.

**Reticular:** Net-like.

**Reticular Activating System:** Brain-stem area that mediates level of arousal.

**Reticular Formation:** A region of the brain stem (extending from the medulla through the thalamus) which is involved in arousal.

**Retinaculum:** A special fascial thickening that holds back an organ or part; helps retain an organ or tissue in its place.
Retrieval: A process in memory during which a stored memory is utilized by an organism.

Retroactive Amnesia: A type of memory loss in which events just before a head injury are not recalled.

Retrograde Amnesia: Inability to recall events previous to the onset of a trauma; condition. Recovery of remote events usually occurs first.

Retrograde Degeneration: Destruction of the nerve cell body following injury.

Reuptake: A mechanism by which a synaptic transmitter released at a synapse is taken back into the presynaptic terminal, thus stopping synaptic activity.

Reverse Tolerance: Situation in which a decreased amount of some psychoactive drug brings about the effects formerly achieved by a larger dose.

Rh Antigen or Factor: An agglutinogen, or antigen, first found in the erythrocytes of rhesus monkey, hence the Rh, Rh-positive and Rh-negative terms, denoting presence or absence, respectively, of this antigen.

Rhodopsin: The photopigment in rods that responds to light.

Ribosomes: Organelles that appear as dots lining the endoplasmic reticulum; they are the protein factories of cells.

Right: A power or privilege, enforced legally, giving a person control over the actions of others.

Rigid Control: Coping patterns involving reliance upon inner restraints, such as inhibition, suppression, repression, and reaction formation.

Role Obsolescence: Condition occurring when the ascribed social role of a given individual is no longer of importance to the social group.

Roots: The two distinct branches of a spinal nerve, each of which serves a separate function. The dorsal root carries sensory information from the peripheral nervous system to the spinal cord. The ventral root carries motor messages from the spinal cord to the peripheral nervous system.

Rostral: An anatomical term meaning toward the head end; opposite of caudal.

S

Saccades: Rapid movements of the eyes which occur regularly during normal viewing.
**Saccadic Suppression:** The suppression of vision during saccades, which provides the viewer with perception free of these abrupt movements.

**Sacral:** Refers to the lower part of the back or spinal cord.

**Sadism:** Sexual variant in which sexual gratification is obtained by the infliction of pain upon others.

**Sagittal Plane:** The plane that bisects the body or brain into right and left halves.

**Saltatory Conduction:** The form of conduction seen in myelinated axons in which the nerve impulse jumps from one node of Ranvier to the next.

**Schizoaffective Psychosis:** Disorder characterized by schizophrenic symptoms in conjunction with pronounced depression or elation.

**Schizoid Personality:** Personality pattern characterized by shyness, oversensitivity, seclusiveness, and eccentricity.

**Schizophrenia:** Psychosis characterized by the breakdown of integrated personality functioning, withdrawal from reality, emotional blunting and distortion, and disturbances in thought and behavior.

**Schizophreniform Disorder:** Category of schizophrenic psychosis, usually in an undifferentiated form, of less than 6 months’ duration.

**Schizophrenogenic:** Qualities in parents that appear to be associated with the development of schizophrenia in offspring; often applied to rejecting, cold, domineering, overprotective mothers or passive, uninvolved fathers.

**Schwann Cell:** The kind of accessory cell that forms myelin in the peripheral nervous system.

**Scotoma:** A region of blindness caused by injury to the visual pathway.

**Scotopic System:** A system in the retina which responds to low levels of light.

**Second Messenger:** A relatively slow-acting substance in the postsynaptic cell which amplifies the effects of nerve impulses and can initiate processes that lead to changes in electrical potentials at the membrane.

**Selective Vigilance:** A tuning of attentional and perceptual processes toward stimuli relevant or central to goal-directed behavior, with decreased sensitivity to stimuli irrelevant or peripheral to this purpose.

**Sella Turcica:** A saddlelike depression on the upper surface of the sphenoid bone, in which the hypophysis lies.

**Semantic Agraphia:** Deficit or loss of ability to spell or write with meaning, produced by brain damage to various sites.
**Semantic Memory:**  Memory for what is learned as knowledge. This recall therefore is considered “timeless and spaceless” (e.g., a number system, a foreign language).

**Senile Dementia:** A neurological disorder of the aged involving progressive behavioral deterioration including personality change and profound intellectual decline.

**Senile Plaques:** Neuroanatomical changes correlated with senile dementia due to the buildup of Beta Amloid.

**Sensorineural Deafness:** A hearing impairment originating from cochlear or auditory nerve lesions.

**Sepsis:** A morbid condition resulting from the presence of pathogenic bacteria. From septic.

**Septo-Hypothalamo-Mesencephalic (SHM) Continuum:** One of three limbic mechanisms, the SHM continuum has distinct circuitry connecting the hypothalamus, the limbic midbrain area, and other sites. Only the prefrontal lobe has direct connections with the SHM continuum, out of the entire isocortex.

**Serial Lesion Effect:** The lessened severity of cerebral symptoms (e.g., due to diaschisis) when lesions are introduced in stages as opposed to all at once.

**Serotonergic:** Refers to neurons that use serotonin as their synaptic transmitter.

**Serotonin (5HT):** A neurotransmitter produced in the raphe nuclei and active in structures throughout the cerebral hemispheres. It plays a role in the systems that control memory, emotion, and perception.

A compound (5-hydroxytryptamine) found in the bloodstream; it has vasoconstrictive properties.

**Short-Term Memory:** Memory that usually lasts only for seconds or as long as rehearsal continues.

**Significant Others:** In interpersonal theory, parents or others on whom an infant is dependent for meeting all physical and psychological needs.

**Simple Cortical Cells:** Cells in the visual cortex that respond best to an edge or a bar of a particular width and with a particular direction and location in the visual field.

**Simulation:** An intentional imitation of the basic processes and outcomes of a real-life situation, carried out in order to better understand the basic mechanisms of the situation. In civil law, misrepresenting or concealing the
truth, as when parties pretend to perform an act different from that in which they really are engaged.

**Simultagnosia**: The perception of one stimulus when two objects are presented. Often associated with inertia of gaze.

**Sinus**: A channel for the passage of blood; hollow in a bone or other tissue; antrum; one of the cavities connecting with the nose; a suppurating cavity.

**Sinusoid**: A blood space in certain organs, as the brain.

**Situational Stress Reaction (acute)**: Superficial maladjustment to newly experienced life situations that are especially difficult or trying.

**Sleep Apnea**: A sleep disorder that involves slowing or cessation of respiration during sleep, which wakens the patient. Excessive daytime somnolence results from frequent nocturnal awakening.

**Slow-Wave Sleep**: Stages of sleep including stages 1 through 4, defined by presence of slow EEG activity.

**Socialized-Aggressive Disorder**: Pattern of childhood maladaptive behaviors involving social maladaptation, such as stealing, truancy, gang membership.

**Sodium Pentothal**: Barbiturate drug sometimes used in psychotherapy to produce a state of relaxation and suggestibility.

**Sodomy**: Sexual intercourse via the anus.

**Somatosensory Agnosia**: Loss of tactile recognition due to cerebral dysfunction in the presence of intact somatosensory receptive functions.

**Somatosensory Modalities**: Refers to different types of body sensation (e.g., touch, pain, pressure). Distinguished from auditory and visual senses.

**Somesthetic**: Pertaining to somasthesia, or the consciousness of having a body.

**Somnolent Mutism**: Immobility and unresponsiveness with eyes closed, associated with mesencephalic-diencephalic lesions. Intense stimulation yields minimal responses.

**Spasm**: An involuntary, convulsive, muscular contraction.

**Spatial Acalculia**: Spatial misarrangement of the numbers during arithmetic calculation with intact knowledge of correct principle. Associated with right hemisphere lesions.

**Spatial Agraphia**: Deficits in spatial-motor aspects of writing due to brain damage, located in the nondominant parietal lobe. Frequently associated with the neglect syndrome.
**Spatial Summation:** The summation of the axon hillock of postsynaptic potentials from across the cell body. If this summation reaches threshold, a nerve impulse will be triggered.

**Special Vulnerability:** Low tolerance for specific types of stress.

**Specific Heat:** The heat energy required to raise the temperature of 1 gram of a substance 1°C.

**Spectrally Opponent Cell:** A visual receptor cell with opposite firing responses to different regions of the spectrum.

**Spinal Nerves:** The thirty-one pairs of nerves that emerge from the spinal cord.

**Split-Brain:** Individuals who have had the corpus callosum severed, halting communication between the right and left hemispheres.

**Squamous:** Scale-like.

**Stage 1 Sleep:** The initial stage of slow-wave sleep involving small-amplitude EEG waves of irregular frequency, slow heart rate, and a reduction of muscle tension.

**Stage 2 Sleep:** A stage of slow-wave sleep defined by bursts of regular 14 to 18 Hz EEG waves that progressively increase and then decrease in amplitude (called spindles).

**Stage 3 Sleep:** A stage of slow-wave sleep defined by the spindles seen in stage 2 sleep mixed with larger-amplitude slow waves.

**Stage 4 Sleep:** A stage of slow-wave sleep defined by the presence of high-amplitude slow waves of 1 to 4 Hz.

**Star Chamber:** An ancient court of England which originally had jurisdiction in cases in which the ordinary course of justice was obstructed by one party to the extent that no inferior court would find its process obeyed. Abolished in modern jurisprudence.

**Stare Decisis:** The legal policy of courts stating that once a principle of law is laid down, it will be adhered to and applied to all future cases in which the facts are substantially the same. Serves to ensure security and certainty of legal principles.

**Static Phase of Weight Gain:** A later period following destruction of the ventromedial hypothalamus during which the animal’s weight stabilizes at an obese level and food intake is not much above normal.

**Statistical Test of Significance:** A standard of probability stating that an experimental finding is significant if, by chance alone, it could have occurred
fewer than one or five times in 100 occurrences. In the field of psychology, five times in 100 is usually the standard of acceptability for statistical significance.

**Statute:** An act of legislation by which a law is created, as opposed to unwritten or common law.

**Statutory Law:** The body of law created by the legislature.

**Statutory Rape:** Sexual intercourse with a minor.

**Stellate Cell:** A kind of small nerve cell with many branches.

**Stenosis:** Narrowing or contraction of a body passage or opening.

**Stereocuity:** The ability to discriminate small differences in visual depth by point-by-point matching in the retinas.

**Stereopsis:** The ability to perceive depth, utilizing the slight difference in visual information from the two eyes.

**Stimulus Enhancement:** The second stimulus in a pair adds rather than masks the neural effects of the first stimulus. Studies include those that present letters of one half of a word (first stimulus) and then letters of the remaining portion of the word (second stimulus).

**Stimulus Masking:** A second stimulus leads into or masks a first stimulus if the trace of the initial stimulus is long-lasting or otherwise sufficient. The target stimulus (e.g., letters of the alphabet) is interfered with by the masking stimulus (e.g., patterned line segments).

**Stimulus Persistence:** Effects of external stimulation are lasting in the central nervous system, dependent on many factors. Stimulus persistence acting as an interference to new stimuli has been advanced to account for deficit perception in the older person.

**Stipulation:** An agreement made between opposing parties that certain facts or principles of law are true and applicable and will not be contested.

**Stress-Decompensation Model:** View of abnormal behavior which emphasizes progressive disorganization of behavior under excessive stress.

**Striate Cortex:** A portion of the visual cortex with input from the lateral geniculate nucleus.

**Strict Liability:** Liability without a showing of fault, as when a person engages in a hazardous activity and is totally liable for injuries caused by the activity even without negligence being shown.

**Stricture:** A circumscribed narrowing of a tubular structure.
Stroma: The tissue that forms the ground substance, framework, or matrix of an organ, as distinguished from that constituting its functional element, or parenchyma.

Sub Nom: Under the name. In the name of. Often used when the original name of a case must be changed due to a change in parties.

Subpoena: A command for a witness to appear at a certain time and place to testify in court on a certain matter.

Subpoena Duces Tecum: A command that a witness produce a specified document or record.

Substance-Abuse Disorders: Pathological use of a substance for at least a month, resulting in self-injurious behavior and biological dependence on the substance.

Substance-Induced Organic Disorder: Category of disorders based on organic impairment resulting from toxicity or physiologic changes in the brain.

Substance-Use Disorder: Patterns of maladaptive behavior centered around regular use of substance involved.

Sulci: The furrows of convoluted brain surface. Contrast with gyri.

Superior Colliculus: A structure in the midbrain that receives information from the optic tract.

Superior Olivary Complex: A brain-stem structure that receives input from the left cochlear nuclei, providing the first binaural analysis of auditory information.

Supplementary Motor Area (SMA) Location: Areas 6 and partially 7, anterior to paracentral lobule. Function: Volitional (self-initiated) movements; perineal and leg movements are found in the medial extension of the motor homunculus. Considered also to be a secondary speech area.

Supra: Above, upon.

Supraoptic Nucleus: A nucleus of the hypothalamus.

Synapse: An area composed of the presynaptic (axonal) terminal, the postsynaptic (usually dendritic) membrane, and the space (or cleft) between them. This is the site at which neural messages travel from one neuron to another. Also called the synaptic region.

Synaptic Assembly: A level of brain organization which includes the total collection of all synapses on a single cell.
Synaptic Bouton:  The presynaptic swelling of the axon terminal from which neural messages travel across the synaptic cleft to other neurons.

Synaptic Cleft:  The space between the presynaptic and postsynaptic membranes.

Synaptic Region:  See also Synapse.

Synaptic Transmitter:  The chemical in the presynaptic bouton that serves as the basis for neural communication. It travels across the synaptic cleft and reacts with the postsynaptic membrane when triggered by a nerve impulse. Also called neurotransmitter.

Synaptic Vesicles:  The small, spherically shaped structures that contain molecules of synaptic transmitter.

T

Tactile:  Pertaining to the sense of touch.

Tactual Hallucinations:  Hallucinations involving the sense of touch, such as feeling cockroaches crawling over one’s body.

Tardive Dyskinesia:  Abnormal involuntary movements involving the extremities or facial area (e.g., tongue, jaw, facial surface). Results as a late side effect of neuroleptic drug treatment and in many cases is irreversible. Involuntary movements—especially those involving the face, mouth, lips, and tongue—related to prolonged use of antipsychotic drugs, such as chlorpromazine.

Telecephalon:  Consists of the cerebral cortex, corpus striatum, and medullary center. The frontal subdivision of the forebrain which includes the cerebral hemispheres when fully developed.

Temporal Summation:  The summation of postsynaptic potentials that reach the axon hillock at different times. The closer together they are, the more complete the summation.

Testosterone:  A hormone produced by male gonads which controls a variety of bodily changes that become visible at puberty.

Tetany:  Intermittent tonic muscular contractions of the extremities.

Thalamic Syndrome:  Disturbance of the senses with initial hemianesthesia, followed by a raised threshold to touch, pain, heat, and cold on the side opposite the lesion. The sensations may be extremely adersive when reached. Due primarily to a thalamic infarct.
Thalamus: The brain regions that surround the third ventricle.

Third-Party Beneficiary: A person who has enforceable rights created by a contract to which he or she is not party and for which he or she gives no consideration.

Thrombophlebitis: The condition in which inflammation of the vein wall has preceded the formation of a thrombus, or intravascular clot.

Thrombosis: The formation of a clot within a vessel during life.

Thrombotic Strokes: Results from blockage or occlusion by blood or tissue particles or overgrowth. Form most often where blood vessels branch.

Thrombus: A clot of blood formed within the heart of the blood vessels, usually caused by slowing of the circulation of the blood or by alteration of the blood or the vessel walls.

Thyroid-Stimulating Hormone (TSH): A tropic hormone released by the anterior pituitary gland which increases the release of thyroxin and the uptake of iodine by the thyroid gland.

Thyrotropin-Releasing Hormone (TRH): A hypothalamic hormone that regulates the release of thyroid-stimulating hormone.

Thyroxin: A hormone released by the thyroid gland.

Tinnitus: A ringing or singing sound in the ears.

Tolerance: Physiological condition in which increased dosage of an addictive drug is needed to obtain effects previously produced by smaller doses.

Tomogram: See also Computer Axial Tomogram.

Tonic Receptors: Receptors in which the frequency of nerve impulse discharge declines slowly or not at all as stimulation is maintained.

Tort: A private or civil wrong or injury, excluding a breach of contract, for which the court will provide a remedy in the form of an action for damages.

Toxicity: The poisonous nature of a substance.

Trabecula: A septum that extends from an envelope into the enclosed substance, forming an essential part of the stroma of the organ.

Transcortical Motor (TCM) Aphasia: Separation of general conceptual functions (posterior) from Broca motor output area (anterior). Lesions in the supplementary motor area (SMA) or in Broca’s area. The patient can repeat words but has difficulty with comprehension and speech.

Transient Global Amnesia: A relatively brief (several hours to several days) amnestic condition with few neurological sequelae. Associated features
include (1) a major symptom of anterograde amnesia, (2) some retrograde amnesia, (3) confusion and time/place disorientation, and (4) speech and orientation to person are unimpaired. There is usually a sudden onset and cessation with no prodromal symptoms or known cause.

**Transient Ischemic Attacks (TIAs):** Neurological deficits of sudden onset; less intense and temporary strokes that may precede thrombotic strokes. Last less than 24 hours by definition. About half of those who experience TIAs will have a major stroke.

**Transient Situational Disorder:** Temporary mental disorder developing under conditions of overwhelming stress, as in military combat or civilian catastrophes.

**Transmethylation Hypothesis:** A hypothesized explanation of schizophrenia suggesting that the addition of a methyl group to some naturally occurring brain compounds can convert some substances to hallucinogenic agents, or psychotogens.

**Transverse:** See also Coronal.

**Tremor-at-Rest:** A tremor that occurs when the affected region, such as a limb, is fully supported.

**Tremors:** Rhythmic repetitive movements caused by brain pathology.

**Trial:** A judicial examination or determination, either civil or criminal, of issues between parties to an action.

**Trigeminal Neuralgia:** Intense and sudden pain in area of a trigeminal nerve lesion. The episodic pain may be set off by light stimulation such as touching the skin.

**Tropic Hormones:** Anterior pituitary hormones that affect the secretion of other endocrine glands.

U

**Unconscious Motivation:** Motivation for an individual’s behavior of which he or she is unaware.

**Undifferentiated Schizophrenia:** Subtype in which the patient either has mixed symptoms or moves rapidly from one type to another.

**Undue Influence:** Any wrongful or improper persuasion whereby the person’s will is overpowered, thereby causing him or her to act in a way he or she would normally not have acted.
Uniform Laws: A body of written laws, in various subject areas, that are approved by the Commissioners on Uniform State Laws and are often adopted by individual states.

Unilateral Apraxia: Apraxia affecting one side of the body. Sympathetic and callosal types have been postulated. The sympathetic aspect occurs when other functions are likewise impaired (e.g., right hemiparesis, left-hand apraxia) and Broca aphasia produced by left motor association destruction of callosal fibers.

Unipolar Disorder: A severe affective disorder in which only depressive episodes occur, as opposed to bipolar disorders in which both manic and depressive processes are assumed to occur.

Unmyelinated: Refers to fine-diameter axons that lack a myelin sheath.

Unsocialized Disturbance of Conduct: Childhood disorder in which the child is disobedient, hostile, and highly aggressive.

Urticaria: Nettle-rash; hives; elevated, itching, white patches.

Utilization Behavior: Considered a type of magnetic apraxia, here the afflicted individual pursues a stimulus to grasp within a set of actively exploring the environment. Considered a strong frontal sign. Gegenhalten occurs when contact is made. Walking is then impaired when attempted, with leg stiffening and no movement.

V

Vaginismus: An involuntary muscle spasm at the entrance to the vagina that prevents penetration and sexual intercourse.

Vagus Nerve: One of the cranial nerves.

Variant Sexual Behavior: Behavior in which satisfaction is dependent on something other than a mutually desired sexual engagement with a sexually mature member of the opposite sex.

Ventral: An anatomical term meaning toward the belly or front of the body or the bottom of the brain; opposite of dorsal.

Ventricles: Cavities in the brain which contain cerebrospinal fluid.

Ventricular Layer: A layer of homogeneous cells in the neural tube of the developing organism which is the source of all neural and glial cells in the mature organism. Also called the ependymal layer.
Ventromedial Hypothalamus (VMH): A hypothalamic region involved in inhibiting eating, among other functions.

Venue: The particular geographic area in which a court with jurisdiction may hear and determine a case.

Verbal Adynamia: Diminished speech spontaneity. There is slow speech initiation and reluctance to continue verbal output. Usually accompanies general apathy.

Verdict: The formal decision or finding made by a judge or jury on the matters or questions submitted for their deliberation and determination.

Vertigo: Dizziness, giddiness.

Vesicle: A small bladder, or sac, containing liquid.

Vesicles (Synaptic): Small structures located at the end point (terminus) of the axon which are filled with neurotransmitter substances.

Vestibular: Pertaining to a vestibule; such as the inner ear, larynx, mouth, nose, vagina.

Vestibuloocular Reflex: A rapid response that adjusts the eye to a change in head position.

Viscosity: A condition of more or less adhesion of the molecules of a fluid to each other so that it flows with difficulty. A behavioral pattern characterized by stickiness in interactional contexts. Associated with frontal system damage.

Visual Anosognosia: Denial of blindness caused by brain lesions. The subject attempts to behave as if the deficit was not present. See also Anton’s Syndrome.

Voir Dire: To speak the truth. The preliminary examination made by the court or by attorneys of one presented as a prospective juror to determine his or her competence to serve, or as a witness to determine his or her competence to speak the truth.

W

Wada Technique: Designed to assess which hemisphere was language-dominant. Here, sodium amytal is injected into one carotid artery in order to deactivate an entire hemisphere. Changes in counting behaviors while the injection is in process indicate which hemisphere is dominant for speech and language.

Waive: To abandon, or give up a claim or right.
**Waiver:** An intentional and voluntary surrendering or giving up of a known right.

**Warrant:** A document directing a public official to perform a particular act.

**Weight of the Evidence:** The relative value of the credible evidence presented by one side balanced against the evidence presented by the other side. Indicates to the jury that the party having the burden of proof will be entitled to their verdict if the greater amount of evidence supports the issue before them.

**Wernicke’s Aphasia:** A fluent disorder with severe auditory comprehension and processing deficits. Empty speech, press for speech, and a moderate to substantial naming deficit are apparent. Considered a posterior aphasia.

**Wernicke’s Area:** A region of the left hemisphere involved in language comprehension.

**White Matter:** Consists of densely packed conduction fibers that transmit neural messages between the cortex and lower centers (projection fibers), between the hemispheres (commissural fibers), or within a hemisphere (association fibers).

A shiny layer underneath the cortex consisting largely of axons with white, myelin sheaths.

**Witness:** One who testifies, under oath, to what he has seen, heard, or otherwise observed.

**Word Deafness:** Also called pure word deafness. Here, nonspeech sounds are recognized but not spoken words. Usually produced by subcortical lesion disconnecting auditory input from auditory processing.

**Work Product:** Work done by an attorney while representing a client, such as writings, statements, or testimony as regards to his legal impressions, tactics, strategies, and opinions, which are ordinarily not subject to discovery. Discovery may be obtained only when the party seeking it has a substantial need for the material to prepare his or her case and is unable to obtain the substantial equivalent of the material by other means without undue hardship.

**Writ:** An order issued by a court mandating the performance of a specified act, or giving authority to have it done.

**X**

**X cells:** Retinal ganglion cells that continue to respond to maintained visual stimuli.
**Xanthrochromia:** Blood cells in the cerebrospinal fluid with discoloration due to an abnormal somatic condition.

**Y**

**Y cells:** Retinal ganglion cells that respond strongly initially but rapidly decrease the frequency of response to a visual stimulus.
Appendix I: Pacific Institute for the Study of Conflict and Aggression—Statement of Purpose

The Pacific Institute for the Study of Conflict and Aggression is a nonprofit scientific and educational organization that addresses domestic, acquaintance, stranger, and institutional violence. The Pacific Institute focuses its training, research, and publication activities on conduct disorders, compilation of measures of malingering, deception, and distortion, cross-cultural violence factors, and development of the Violence Prediction Scale (VPS) in the United States and the Pacific Basin. Consultation services provided by the Pacific Institute include police training, criminal personality profiling, detection of malingering and deception, eyewitness identification and distortion, and conflict resolution and mediation intervention.

Members of Pacific Institute’s Advisory Board include over several dozen distinguished professionals from all parts of the country and several foreign countries. Members represent many points of view in regard to etiology, evaluation, and intervention in violence and share the belief that increased knowledge of violence-related phenomena enhances understanding, contributes to effective intervention, and strengthens the relationship between professionals in this field and the public.

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Figure 3.1  Top left: Frontal view of brain of young adult male. Progressive damage 4 months post last methamphetamine use. Top right: Lateral view of same person. Middle: Normal brain of young adult male. Lower left: Lateral view of 44-year-old male posttraumatic brain injury. Lower right: Overhead view of brain of 61-year-old male with dementia. (Scans made at Queen’s Medical Center, Honolulu, Hawaii, and provided by the Pacific Institute for the Study of Conflict and Aggression, Kamuela, Hawaii.)
The first wave of methamphetamine use took place in the late 1980s and its prevalence has continued to rise across the United States and throughout the world. As with any harmful substance, its abuse has far-reaching ramifications that go beyond the destruction it causes to the human body. Written by a multidisciplinary team of experts, Methamphetamine Use: Clinical and Forensic Aspects, Second Edition examines meth use and abuse from clinical, forensic, and criminal justice perspectives. Updated and expanded to reflect changes in recent years, this volume covers virtually every aspect of this dangerous drug.

Features
- Includes new chapters on civil-forensic applications, criminal-forensic applications, and neuropsychological test applications
- Presents normative data on risk analysis and violence prediction
- Addresses the physiology of “tweaking,” the most dangerous stage of the meth cycle
- Reviews the efficacy and implementation of drug courts that have been recently formulated as an alternative to incarceration

As methamphetamine grows once again in popularity, it is crucial that those who deal with the effects of it be well-informed about the dangers it poses. This volume provides a comprehensive, critical survey of the current knowledge regarding the use and abuse of this dangerous and ubiquitous substance.