Childhood Apraxia of Speech

Checklist:
A Series of Characteristics to Facilitate Diagnosis

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General Definition:
1. Previously known as:
   - Developmental/Verbal Apraxia, verbal dyspraxia, etc. ASHA and CASANA now use Childhood Apraxia of Speech (CAS)
   - common among all titles is the word “praxis”.
2. Motor Speech disorder:
   - a disruption in motor planning and/or programming

What is Praxis?:
- Praxis – planned movement
- neurological process by which cognition directs motor action…ability to formulate or plan different actions…before the actual motor execution” (Ayres, 1985)
- Apraxia – lack of praxis

What is Motor Planning?
- The execution of a motor plan is the result of praxis
- the visible result of a successful invisible process
- Not simply a series of postures, must include information about the sequencing of these postures;
- In regards to speech, how the articulators will transition from one posture to the next. (Velleman, 2003)

More specific definition of CAS
“Symptom complex”/syndrome
- No one feature is adequate for diagnosis
- Each child has a different combination of speech errors—thus the need for a checklist of CAS characteristics.

Top 3 Features from ASHA
1. Inconsistent errors on consonants and vowels in repeated productions of syllables or words
2. Lengthened and disrupted co-articulatory transitions between sounds and syllables
3. Inappropriate prosody
   In addition, ASHA lists 18 other speech features that might be present.
CAS Assessment Protocol

Traditional assessment which includes:
- Case History
- Hearing – Pure Tone and Tympanometry
- Developmentally appropriate exp. and rec. language measurement (if possible)
- Language Sample – calculate MLU, examine morphology and intelligibility
- Oral Mechanism Exam
- Oral Motor Screening Test

Speech:
- Single word articulation test (if possible); child may have to imitate items after examiner
- Formal or informal phonological analysis, including syllable and word shapes
- Consonant inventory – isolation and stimulability
- Vowel/diphthong inventory – isolation and syllables
- Prosodic analysis
- CAS Checklist

CAS Checklist Items

1. Severely delayed speech development (Jaffe, 1984; Watkins, 1992) *Persistent speech sound disorder; ASHA Ad hoc-CAS, 2007*
2. Language comprehension superior to language production (Jaffe, 1984; Watkins, 1992; Velleman, 2003)
3. Slow or minimal improvement despite intervention (Hall, Jordan, & Robin, 1993; Velleman & Strand, 1994; Shriberg et al., 1997; ASHA Ad hoc-CAS, 2007) **delayed progress may be due to inappropriate intervention**
4. Single words more intelligible than conversation (Crary, 1993; Hall et al., 1993) *Reduced Intelligibility; ASHA Ad hoc-CAS, 2007*

CAS Checklist Items, cont.

5. Strong occurrence of phonological processes (Crary, 1993)
6. Omission errors are the most prominent (Crary, 1993; Hall et al., 1993)
7. Initial consonants tend to be more misarticulated than final (Kamen, 1995) **Initial consonants may be as affected as final consonants in the case of severe speech disorders**
8. Difficulties in sound sequencing (Crary, 1993; Hall et al., 1993) *Syllable sequencing, ASHA Ad hoc-CAS, 2007*

CAS Checklist Items, cont.

9. Isolated movements better than sequenced movements (Hall et al., 1993; Kamen, 1996)
10. Errors increase as word length or performance load increases (Crary, 1993; Edwards, 1973; Velleman & Strand, 1994)
11. Probable differences between repetition and conversation (Crary, 1993)
12. Prosodic aspects of speech are abnormal (Crary, 1993; Hall et al., 1993; Rosenbek & Wertz, 1972; Yoss & Darley, 1974; Top 3, ASHA Ad hoc-CAS, 2007)

Childhood Apraxia of Speech Checklist

- Developed by Kay Giesecke in 1996
- Used in her private practice to facilitate diagnosis of CAS
- Based on previous research in the area of apraxia
- One of the tools used in the diagnostic process
CAS Checklist Items, cont.

13. Presence of groping behaviors or salient posturing of articulators (Hall et al., 1993; Jaffe, 1984; Kamen, 1996)
*Effortful productions; ASHA Ad hoc-CAS, 2007*

14. Inconsistency of errors-misarticulate a word one time, then say it correctly another time (Hall et al., 1993; Kamen, 1996; Rosenbek & Wertz, 1972; Top 3, ASHA Ad hoc-CAS, 2007)

15. Variability of errors-different errors in the same word and word position during repeated trials (Hall et al., 1993; Kamen, 1996; Top 3, ASHA Ad hoc-CAS, 2007)

16. Problems with nasality (Hall et al., 1993; Jaffe, 1984)

17. Voicing errors (Hall et al., 1993; Jaffe, 1984; Yoss & Darley, 1974; ASHA Ad hoc-CAS, 2007)

18. Vowel and diphthong errors (Hall et al., 1993; Watkins, 1992; ASHA Ad hoc-CAS, 2007)

19. Most difficulty with fricatives, affricates, and consonant blends; least difficulty with bilabials and nasals (Jaffe, 1984; Kamen, 1996; Dean, 2008)

20. Epenthesis-addition of schwa in consonant clusters (Hall et al., 1993; Dean, 2008)

**Difficult to assess if the child is not producing consonant clusters**

Administration of the checklist

- Information obtained from observations, formal testing, and parent report.
- If the child demonstrates the listed characteristic = 1 point
- If the child does not demonstrate the characteristic = 0 points
- If the child does not produce sufficient spontaneous speech to determine the presence/absence of the characteristic and/or the errors are so severe the characteristic does not apply = 1 point under “N/A”
- Add the total “N/A” items to the total characteristics exhibited to obtain the severity rating

Interpreting the Results

Based on a review of 80 different case studies the following guidelines were developed for interpreting the results from the CAS checklist…

Diagnostic Categories

**Speech delay/disorder, not CAS**

**Group 1**

- Score = 0 to 12 (out of 20) - 26 cases
- Demonstrated 5 to 12 of the characteristics listed on the checklist.
- Features not sufficient for diagnosis of CAS
- Prognosis same as type and severity of disorder diagnosed.

Severe Speech delay, not CAS Case History #1

- Jacob, 3;8 (at initiation of therapy)
- Was previously in speech therapy with no progress
- Previous therapist did not encourage parent involvement
- Enrolled in intensive speech therapy and was dismissed in 14 months
Pre-test  
3/19/1998  
53 errors  
PR= -1%  

Post-test  
5/13/1999  
4 errors  
PR= 71%  

Severe Speech delay, not CAS  
Case History #2  
Michelle, 2;6  
Previously enrolled in individual and group therapy, strong parent involvement  
Previous SLP diagnosed her with CAS  
Received a brief assessment and scored a “6” on the CAS checklist  
Parent sent a tape to Kaufman to confirm diagnosis of apraxia→Kaufman stated that this child may have been apraxic but was not any longer  

Assessment Results  
43 errors  
PR= 8%  

CAS Characteristics  
Demonstrated:  
- Severely delayed speech  
- Lang comp superior to Lang exp  
- Single words more intelligible than conversation  
- Isolated movements better than sequenced movements  
- Differences between repetition and conversation  
- Most difficulty with affricates, fricatives and blends (age appropriate)  

Group 2  
Severe Articulation & Phonological Disorder with Apraxia Components  
Score: 13 to 15 (out of 20)  
16 cases  
Presented with severe speech sound errors, expressive language delays, and groping, but exhibited:  
- No problems with vowel production  
- No difficulties with prosody (a differential diagnostic characteristic according to research by Shriberg et al, 1997)  
- No initial consonant omissions  
- No variability in errors in the same word during repeated trials  

Group 2  
Severe Articulation & Phonological Disorder with Apraxia Components  
Case History  
Carl, 3;11 (at initiation of therapy)  
Demonstrated 15 out of 20 characteristics on checklist.  
Did NOT demonstrate vowel errors, abnormal prosody, problems with nasality.  
Demonstrated final consonant deletion, fronting, syllable reduction, deaffrication  
Dismissed from therapy in 22 months  

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Group 3
Moderate to Severe CAS
w/out Major Concomitant Disorders

Prognostic Implications
- Two out of nine of these students were able to have speech that sounded normal after 2 to 4 years of intense individual apraxia therapy with extensive parental involvement.
- The other 7 are still in therapy.

Case Study
- At initiation of therapy at Apraxia Dallas, Andrew was unable to complete an Articulation Test but on 16 imitative productions he said:
  - tuh/tub dada/pajamas nah/knife pu/spoon
  - guh/girl muhtimuhti/monkey wa/watch kah/car
  - bu/blue ka/carrot buh/brush teh/chair
Group 4
Severe Childhood Apraxia of Speech with Major Concomitant Disorders
Score = 16 to 20 (out of 20)  18 cases
- Demonstrated all 3 top features from ASHA
- The presence of other complicating issues, such as cognitive delays, medical conditions, and disorders/syndromes will effect the child’s progress in therapy.
- Prognostic implications - unlikely to be dismissed from therapy as within normal limits but can usually improve speech.

Severe Childhood Apraxia of Speech Case History
Joseph, 7;6 (at initiation of therapy)
Diagnosed with hypoplasia and MR
Previously enrolled in therapy for 6 years, pursuing augmentative communication
Demonstrated 20 out of 20 items on the checklist (didn’t demonstrate initial or final consonants worse than final or epenthesis)
Discontinued private therapy after 7 years

Pre-test:
4/15/2002
66 errors*
PR = -1%
*all items were imitated

After 6 months of therapy:
11/4/2002
33 errors
PR = -1%

After 1 year of therapy:
5/2003
27 errors
PR = -1%

After 3 years of therapy:
3/9/2005
14 errors
PR = 3

After 7 years of therapy:
3/27/2009
10 errors
PR = 3

Group 5
Unable to complete checklist
Score = N/A  7 cases
- There will be a group of children for which a clinician may not be able to complete this checklist, due to limited expressive language and phonemic repertoire.
- In these cases it is recommended that the child enroll in trial therapy to obtain additional information regarding the possible presence of apraxia or be referred to an appropriate specialist.
“Unable to complete checklist”

Case History

- Hannah, 3:8
- Diagnosed with Prader-Willi Syndrome
- Only produced /n, m/ and a few vowels at the evaluation
- Could not complete formal speech/language testing or the CAS checklist
- Received additional therapy at school, where they diagnosed her with a severe receptive and expressive speech disorder, severe speech disorder, moderate oral-motor impairment, and hypernasal vocal quality.