

The study of AAC services to improve language abilities for a student with childhood apraxia of speech

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Abstract

Childhood apraxia of speech (CAS), also called suspected Childhood Apraxia of Speech or Developmental Apraxia of Speech (DAS), which is a subset of Developmental Language Disorder, has a very low prevalence rate (Shriberg, Aram & Kwiatoukri, 1997). CAS is also rare in speech therapy services, this article using a case study to discovering how to make a differential diagnosis and what are the emphases focusing on treatment during the practicing for children with CAS

1. Introduction

In Language Disorder, the prevalence is estimated at 1–2 children per 1,000 (Shriberg, Aram, & Kwiatowksi, 1997), although no sound epidemiological data are available (American Speech-Language-Hearing Association [ASHA], 2007). The behavioral features of CAS are difficult to identify on the basis of existing research, and deficits may occur in any or all of the following: non-speech motor behaviors, motor speech behaviors, speech sounds and structures (i.e., word and syllable shapes), prosody, language, metalinguistic/phonemic awareness, and literacy. With regard to motor speech behaviors, there is some consensus on the validity of three features: 1. inconsistent errors on consonants and vowels in repeated productions of syllables or words, 2. lengthened and disrupted coarticulatory transitions between sounds and syllables, and 3) inappropriate prosody, especially in the realization of lexical or

phrasal stress (ASHA, 2007).

CAS is a congenital, neurological speech sound disorder “in which the precision and consistency of movements underlying speech are impaired in the absence of neuromuscular deficits (e.g., abnormal reflexes, abnormal tone)” (ASHA,2007). Due to CAS can occur as result of either a known or an unidentified neurological impairment, it’s also called “Developmental Apraxia of Speech, DAS” or “Developmental Verbal Dyspraxia, DVD”. Individuals with suspected CAS can occur as result of either a known or an unidentified neurological impairment, but not every child with CAS is cause by it, and certain proportion of them have the occurrence of language delayed. Because there is no clear consensus about the criteria for diagnosis, ASHA (2007) recommended that the term suspected CAS be used to describe these children. (Beukelman & Mirenda, 2005)

The ability of language comprehension played a key role in both the development and advancement of language development. Most treatment for CAS are focusing on the speech production, like phonation, breathing, articulation and resonance, not including the ability of language comprehension and cognition. This article is exploring the AAC strategy and focusing on treatment for more than one aspect of language development for a child with CAS.

2. Objective

This study aimed to examine the effectiveness of improving the ability of speech production , language comprehension and cognitive ability, like the mathematics reasoning skills through activity- based augmentative and alternative communication (AAC) intervention plan for a 9 years old elementary school child with CAS.

3. The Methods and Producer

The participant was a 9 years old preschool child CAS. Chen, a female participant who was born in 2008 Aug was diagnosed as suspected PDD-NOS when she was two years and three months old. According to the result of this time, her speech development, fine motor and social emotions were evaluated as borderline delayed. The second evaluation for Chen was conducted at four years and one-month old. It was diagnosed as PDD-NOS again, and development delay also. Her third evaluation took place because of her SLP's advice who is the first author of this article and was done in Puli Christianity Hospital at five years and eight months old. This time, it was diagnosed as verbal motor apraxia. The fourth evaluation were done at six years and three months old, diagnosis as the same as third time, but plus written dyspraxia.

Although speech development delayed was found, Chen was primarily treated as autism since she got her first diagnosis. However, when Chen first introduced to SLP in 2014, the SLP made the following clinical observations: 1) Participant has good eye contact and highly motivated in social mutual interaction; 2) Participant is able to understand social semantics meaning and able to react appropriately according to others tone of voice. For instance, when SLP voice a tone, Chen's attention would follow the tone pro-actively. When SLP express funny body language, participant would smile without any help from others. Chen has active attention on people surrounding her. 3) When Chen was requested to imitate verbal sounds, she has obvious slurred speech. Chen's speech was only about one to three word- length each time. The more she echo, the more obvious acting like grouping articulation movement occurred. Furthermore, participant was unwilling to further echo because

she found out that her echo was incorrect. However, with appropriate encouragement, participant would reduce her frustration and willing to try again.

According to the evaluation at the first time, we preliminary exclude the participant as an ASD. But, according to the above clinical observation , author observed articulation and phonetic error of the participant during the “echo evaluation”, articulation groping behavior was found obviously. And non-verbal social interaction among Chen, SLP and Chen’s parents are properly, no autistic behavior showing up during the speech evaluation. Therefore, SLP recommended the participant parents to seek for further medical evaluation. As a result, the participant was referred to Puli Christianity Hospital at five years and eight months old. Later, it was correctly diagnosed as verbal dyspraxia.

In short, this CAS diagnose experience could act as a reminder for future professional to consider every facet of possibility instead of lumping all kinds of participants into the umbrella of ASD. This might improve the accuracy of diagnostics in the future.

During the treatment, SLP adopted visual cue procedure as an AAC intervention method. Section below was the introduction of visual cue AAC intervention method and procedure. The detailed of the procedure was written in Appendix 1.

Material using during the session are: A4 papers, 20 one centimeter yellow cubic building blocks, pencil and red ball pen and Chinese phonic board.

Without auditory hint like verbal sound or speech, SLP try to make participant focus only on non-verbal actions. First, SLP divided A4 paper into four sections as shown in steps 01 to 02 (see appendix 1) using the pencil. Later, using the red pen, wrote “Chicken Egg” in top left section, “duck egg” in upper right section, “bird egg”

in bottom left section, and “preserved egg” in bottom right section (see steps 03 to 06). Thirdly, put cubic sequentially in four sections (see steps 07 to 10). This is first round of action cue. There will be five round of action cues, the first was without verbal cue but with visualized action demonstration. Continue to demonstrate until the fifth round. For every round, cubic in each section would add one more cubic. After five rounds, there would be five cubics in each section (see steps 11 to 14).

During steps 11 to 14, when SLP put the first cubic into the section of “chicken egg”, the SLP would accompany with short sentence “There is one chicken egg”. When the SLP put the second cubic into the section of “duck egg”, the SLP would accompany with short sentence “There is one duck egg”. Similarly, for third and fourth cubics, the sentence would be “There is one bird egg” and “There is one preserved egg”. The SLP would demonstrate the procedure with verbal sentence until second round. On the third round, the SLP would let the participant put the cubics herself and request the participant to utter her own sentence. In this case, the participant can sequentially utter “There are three chicken eggs”, “There are three duck eggs”, “There are three bird eggs” and “There are three preserved eggs” (steps 15 to 18). On the fourth round, the participant would sequentially place the cubics and utter “There are four chicken eggs”, “There are four duck eggs”, “There are four bird eggs” and “There are four preserved eggs”. (See steps 19 to 22) The fifth and fourth round are similar, only switching “four” to “five” (Steps 23 to 26).

From steps 15 to 26, one could deduce the participant’s utterance performance. With the assistance of visual cue and short verbal cue, the participant could utter the correct sentence with respect to the quantity of the increment of the cubics. The participant could observe the quantity increment of the cubics and change the verbal content accordingly. It was not pure echo speech. It proved that the participant has the

ability of inner thought. The core essence of this ACC method, is to use the newly observed visual cue and quantity variation of cubic as a framework for participant to automatically form her inner verbal speech after frequent training.

Furthermore, with the assistance of the visual cue in steps 27 to 30, the participant was able to follow her understanding from the previous steps to provide an appropriate response. At this moment, the participant did not show up any misunderstanding of the questions being asked by the SLP. Contrary, she become very confidence. The symptoms of frustration and regression to answer a question in the beginning of the treatment disappeared. This kind of confidence and positive social response were vastly different from the conventional “imitation treatment” or “virtual storing telling treatment”.

In addition, the researcher asked the question in step 31: “How many eggs in total?” without any visual cue. The participant echoed immediately “How many eggs in total?”. This kind of echolalia was her regressed social reaction because of her inability to comprehend the question. In response to such behavior, the researcher immediately provide visual cue in step 32 to assist the participant understanding of others question. As a result, the participant utters immediately the correct answer. With the AAC visual cue assistance of steps 33 to 36, the participant can answer all the random questions correctly. From this result, we could conclude that the flexible usage of visual AAC cue could successfully assist the participant in understanding others utterance. The AAC visual cue intervention not only could assist verbal output but also able to improve comprehend ability.

The usage of language are usually dynamics and flexible according to communication situation. Step 37 was designed to provide participant using her newly

formed experience/understanding to response others questions. Sometimes, the participant might still unable to comprehend the question being asked. However, with the visual cue, the participant can again answer the question in step 37 correctly.

Lastly, steps 38 to 41 were designed to include reading and writing abilities together with the previous listening, utterance and calculation abilities in a single therapy. In this case, the participant could successfully apply the previous verbal learning abilities in her writing ability. During the process, researcher also asked participant to write Chinese phonic or word as a self-helping strategy to reminding or helping herself what is she trying or struggling to speak to researcher.

Based on the above intervention, it is obvious that visual cue not only could assist the improvement of verbal comprehend and expression, it could also assist written ability for student with verbal apraxia. Visual cue could be an ongoing and changing process while conversation or dialogue is happening.

4. Results and Discussions

The findings of the study were as follows:

(1). An appropriate CAS differential diagnosis required intelligent clinical observation of Speech language pathologist (SLP) and also multi-disciplined professional cooperation. After patient received diagnosis and before starting the initial speech therapy program, the SLP should re-measure the speech pathology clinical behavior of the patient in order to provide appropriate therapy program. If there is any disconnect between the diagnosis and SLP, the patient should be referred to another hospital for another in-depth diagnosis.

(2). Speech therapy is a continuous process. The application of visual cue should be a dynamic process. During the speech therapy training program, sentence used

might be limited and confined to in certain pattern. However, in day-to-day real-life communication, speech comprehension and expression are a dynamic and gradual evolving process. Therefore, body language, visual cue, speech and facial expression used during speech therapy training program should be mixed randomly in a virtual diverse situation. The timing of applying visual cue should accompanied with speech comprehension to mimic the fluidity nature of language communication. The SLP should build up a swift observation ability to differentiate the patient's language comprehension ability. Also, the SLP should employ the strategy of visual cue dynamically with fluidit

(3). The therapy program of CAS should be multi-facets and be executed concurrently. The content of the therapy program could include the following: speech action training (articulation, phoneme and speech clarity), improvement of speech comprehension. Visual cue strategy should also be accompanied in the program.

(4). The learning process of auditory comprehension, speech production and the mathematics reasoning of the participant were improved after the AAC intervention took place.

(5). The participant not only learned how to use Chinese phonic board to spell out the sound of Chinese word, but also gained more confident when she tried to talk someone.

(6). The visual cue that used in the AAC intervention could help the participant to understand how to form a sentence. And this visual cue strategy is a ongoing process itself, should be a changing process when using it not prepared.

(7).Not only the speech production is improved but learn more auditory and visual comprehension of language during communication.

(8).Treatment should be holistic about every aspects of language and communication.

5. Conclusion

In addition, according to the results of the study, it shown that the participant had not only learned the components of the language, but also gained more confident when she tried to talk . The most important issues for this study was the early intervention and the assistive technology team that could be a key to success the intervention.

Reference

American Speech-Language-Hearing Association. (2007). *Childhood apraxia of speech* [Technical report]. Retrieved from <http://www.asha.org/policy>

Beukelman, D., & Mirenda, P. (2004). *Augmentative and alternative communication: management of severe communication disorders in children and adults*.

Baltimore,MD: Paul H Brookes.

Shriberg, L., Aram, D., & Kwiatowski, J. (1997). Developmental apraxia of speech: I. Descriptive and theoretical perspectives. *Journal of Speech, Language, and Hearing Research, 40*, 273–285.

Appendix1

01.

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06.

CHICKEN EGG	DUCK EGG
BIRD EGG	PRESERVED EGG

02.

07.

CHICKEN EGG ■	DUCK EGG
BIRD EGG	PRESERVED EGG

03.

CHICKEN EGG	

08.

CHICKEN EGG ■	DUCK EGG ■
BIRD EGG	PRESERVED EGG

04.

CHICKEN EGG	DUCK EGG

09.

CHICKEN EGG ■	DUCK EGG ■
BIRD EGG ■	PRESERVED EGG

05.

CHICKEN EGG	DUCK EGG
BIRD EGG	

10.

CHICKEN EGG ■	DUCK EGG ■
BIRD EGG ■	PRESERVED EGG ■

11.

CHICKEN EGG ■ ■	DUCK EGG ■
BIRD EGG ■	PRESERVED EGG ■

12.

CHICKEN EGG ■ ■	DUCK EGG ■ ■
BIRD EGG ■	PRESERVED EGG ■

13.

CHICKEN EGG ■ ■	DUCK EGG ■ ■
BIRD EGG ■ ■	PRESERVED EGG ■

14.

CHICKEN EGG ■ ■	DUCK EGG ■ ■
BIRD EGG ■ ■	PRESERVED EGG ■ ■

15.

CHICKEN EGG ■ ■ ■	DUCK EGG ■ ■
BIRD EGG ■ ■	PRESERVED EGG ■ ■

16.

CHICKEN EGG ■ ■ ■	DUCK EGG ■ ■ ■
BIRD EGG ■ ■	PRESERVED EGG ■ ■

17.

CHICKEN EGG ■ ■ ■	DUCK EGG ■ ■ ■
BIRD EGG ■ ■ ■	PRESERVED EGG ■ ■

18.

CHICKEN EGG ■ ■ ■	DUCK EGG ■ ■ ■
BIRD EGG ■ ■ ■	PRESERVED EGG ■ ■ ■

19.

CHICKEN EGG ■ ■ ■ ■	DUCK EGG ■ ■ ■
BIRD EGG ■ ■ ■	PRESERVED EGG ■ ■ ■

20.

CHICKEN EGG ■ ■ ■ ■	DUCK EGG ■ ■ ■ ■
BIRD EGG ■ ■ ■	PRESERVED EGG ■ ■ ■

21.

CHICKEN EGG ■ ■ ■ ■	DUCK EGG ■ ■ ■ ■
BIRD EGG ■ ■ ■ ■	PRESERVED EGG ■ ■ ■

22.

CHICKEN EGG ■ ■ ■ ■	DUCK EGG ■ ■ ■ ■
BIRD EGG ■ ■ ■ ■	PRESERVED EGG ■ ■ ■ ■

23.

CHICKEN EGG ■ ■ ■ ■ ■	DUCK EGG ■ ■ ■ ■
BIRD EGG ■ ■ ■ ■	PRESERVED EGG ■ ■ ■ ■

24.

CHICKEN EGG ■ ■ ■ ■ ■	DUCK EGG ■ ■ ■ ■ ■
BIRD EGG ■ ■ ■ ■	PRESERVED EGG ■ ■ ■ ■

25.

CHICKEN EGG ■ ■ ■ ■ ■	DUCK EGG ■ ■ ■ ■ ■
BIRD EGG ■ ■ ■ ■ ■	PRESERVED EGG ■ ■ ■ ■

26.

CHICKEN EGG ■ ■ ■ ■ ■	DUCK EGG ■ ■ ■ ■ ■
BIRD EGG ■ ■ ■ ■ ■	PRESERVED EGG ■ ■ ■ ■ ■

27.

SLP: How many chicken eggs
(SPL point at the chicken egg area)
Chen: There are five chicken eggs

28.

SLP: How many duck eggs
(SPL point at the duck egg area)
Chen: There are five duck eggs

29.

SLP: How many bird eggs
(SPL point at the bird egg area)
Chen: There are five bird eggs

30.

SLP: How many preserved eggs
(SPL point at the preserved egg area)
Chen: There are five preserved eggs

31.

SLP: How many eggs in total
(SPL point at A4paper)
Chen: How many eggs in total

32.

SLP: How many eggs "in total"
(SPL point at the all area and use pencil
to paint on the every area)
Chen: 20eggs

33.

CHICKEN EGG ■■■■■	DUCK EGG ■■■■■
BIRD EGG ■■■■■	PRESERVED EGG ■■■■■

SLP: How many chicken eggs plus duck eggs

(SPL use pencil to paint these two areas)

Chen: 10eggs

34.

CHICKEN EGG ■■■■■	DUCK EGG ■■■■■
BIRD EGG ■■■■■	PRESERVED EGG ■■■■■

SLP: How many bird eggs plus preserved eggs

(SPL use pencil to paint these two areas)

Chen: 10eggs

35.

CHICKEN EGG ■■■■■	DUCK EGG ■■■■■
BIRD EGG ■■■■■	PRESERVED EGG ■■■■■

SLP: How many chicken eggs plus bird eggs

(SPL use pencil to paint these two areas)

Chen: 10eggs

36.

CHICKEN EGG ■■■■■	DUCK EGG ■■■■■
BIRD EGG ■■■■■	PRESERVED EGG ■■■■■

SLP: How many duck eggs plus preserved eggs

(SPL use pencil to paint these two areas)

Chen: 10eggs

37.

CHICKEN EGG ■■■■■	DUCK EGG ■■■■■
BIRD EGG ■■■■■	PRESERVED EGG ■■■■■

SLP: How many chicken eggs plus duck eggs and plus preserved eggs

(SPL speaking only without any cue)

Chen: 15eggs

(Client using her own hand to point these three areas)

38.

CHICKEN EGG ■■■■■■■■	DUCK EGG ■■■■■■■■
BIRD EGG ■	PRESERVED EGG ■

SLP: How many chicken eggs, duck eggs, bird egg and preserved eggs?

(SLP moving cubic When SPL is speaking)

Chen: 9 chicken eggs, 9 duck eggs
1 bird egg, 1preserved egg

39.

CHICKEN EGG ■ ■ ■	DUCK EGG ■ ■ ■
BIRD EGG ■ ■ ■	PRESERVED EGG ■ ■ ■

SLP changing the number of cubic and wrote 3 each

40.

CHICKEN EGG ■ ■ ■ ■ ■	DUCK EGG ■ ■ ■ ■ ■
BIRD EGG ■ ■ ■ ■ ■	PRESERVED EGG ■ ■ ■ ■ ■

SLP changing the number of cubic and wrote 5 each

41.

CHICKEN EGG ■ ■ ■ ■ ■	DUCK EGG ■ ■ ■ ■ ■
BIRD EGG ■ ■ ■ ■ ■	PRESERVED EGG ■ ■ ■ ■ ■

SLP changing the number of cubic and wrote

Chicken egg + duck egg + bird egg + preserved egg

Chicken egg plus duck egg plus bird egg plus preserved egg

And let client to fill this blank

All are _____

After Chen seen this process, she pointed all cubic then wrote "20"