

Efficacy of Integral Stimulation Therapy in Childhood Apraxia of Speech.

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Introduction

Childhood Apraxia of Speech (CAS) is a disorder in which volitional movements for speech are impaired. Children with CAS have difficulty sequencing speech sounds into syllables, words, and phrases. Children with this disorder are lacking in any paralysis or weakness of the speech musculature (Caruso, & Strand, 1999.) The etiology, diagnosis, effective treatments, and even the existence of the disorder are all areas of uncertainty in our field.

The lack of empirical evidence to answer the questions surrounding CAS makes clinical decisions and planning of intervention difficult. There is no settled upon strategy for effective treatment of CAS (Velleman, 2003).

Numerous strategies have been identified for the treatment of CAS. The treatment strategies range in theoretical foundations including linguistic, phonological, and sensorimotor. Integral Stimulation Therapy (IST) is a treatment approach based on motor learning and sensory feedback. This technique emphasizes, “watch me (the clinician) and listen.” The treatment begins with smaller stimuli units and gradually increases in complexity. Visual, tactile, and auditory cues are given to the child to increase awareness of accurate target production (Strand & Skinner, 1999).

The purpose of this study was to test the efficacy of IST in a single case of CAS. A single case study design was used due to the difficulty with randomized control studies in this population. These types of studies are made difficult due to the large variation in children with CAS.

Methods

Participant

- A 5-year old male
- Hearing and receptive language skills within normal limits
- Diagnosed by a certified SLP with CAS at the UND Speech, Language, and Hearing Clinic
- Expressive language skills impaired
- Received speech intervention since the age of 22 months
- Client showed success previously with use of visual cues to improve speech sound production accuracy
- IST was chosen because it included a component (visual cues) that was previously successful for him in treating his CAS and combined that component with additional support and cues

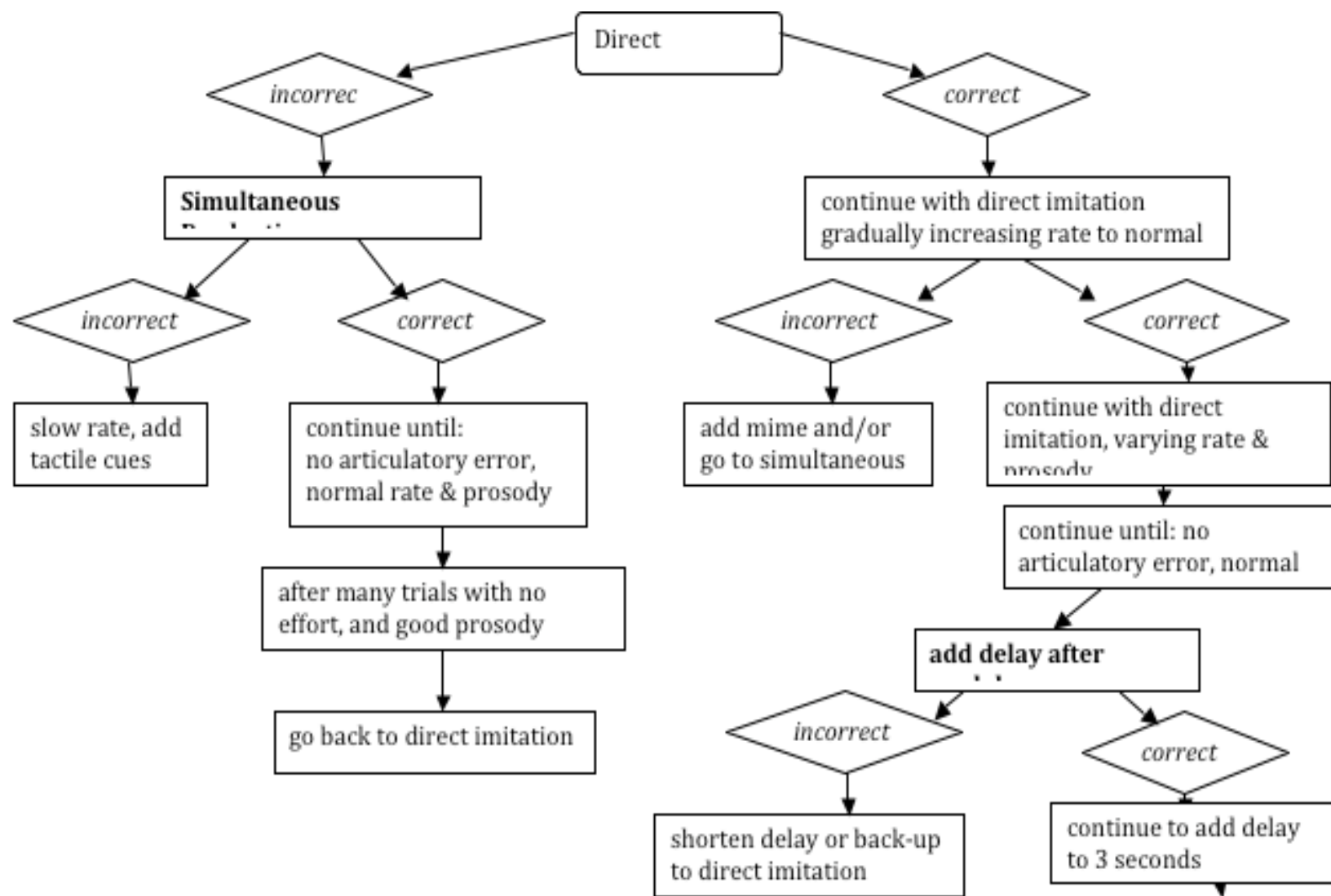
Equipment:

- Assessment and intervention sessions took place in a quiet therapy room at the UND Speech, Language and Hearing clinic
- All sessions were recorded with a video camera and an audio recorder
- Therapy sessions were play oriented and age appropriate toys and games were used throughout the assessment and intervention sessions
- Participant was provided with a tool that amplified his productions for himself, so he could hear them more clearly

Procedure:

- Consent form completed by parents
- Oral motor examination and diadochokinetic syllable rates completed
- Language sample collected to assess participant's current expressive language abilities

- Findings of language sample used to determine complexity of baseline targets and stimuli set used throughout the intervention period
- Baseline data collected on 25 items collected prior to beginning IST, percentage of accuracy was calculated
- Intensive therapy sessions, 4 days a week for 50 minutes each
- Probes presented throughout intervention period and the principal investigator judged participant's productions, as accurate or inaccurate immediately following his production
- The following flow-chart was used to determine the level of cueing that was provided with each stimuli item (Integral Stimulation Therapy Feedback Adapted from: Caruso, A., & Strand, E. (1999). *Clinical management of motor speech disorders in children*. New York, NY: Thieme (p.135)).
- Following the intervention sessions, the same 25 items from baseline data collection were re-tested. Percentage of accuracy was calculated and compared to his pre-test results. This comparison was used to establish if the IST was effective in improving CAS.



(Integral Stimulation Therapy Feedback Adapted from: Caruso, A., & Strand, E. (1999). *Clinical management of motor speech disorders in children*. New York, NY: Thieme (p.135)).

Results

On the surface, when looking at the results of pre-test and post-test data, it appears that integral stimulation was successful in treating CAS. The participant was able to increase the percentage correct in all syllable categories, suggesting IST improved his speech sound production. However, when looking at the data from the therapy sessions, the participant's level of accuracy on therapy targets was not as successful as his success with baseline targets. Consistent gains were not made on the 5 most frequent therapy targets.

The participant's oral-motor examination revealed some difficulty with volitional movements of the speech mechanism. Norms for diadochokinetic syllable rates for a child of his age could not be found in the literature, although norms for children just one year older were found. The available norms were not used, but were considered. His rate appeared to be somewhat slow, as compared to the average of children only one year older than him.

Twenty-five baseline items were tested before and after the intervention. These items were not used during the intervention sessions. The participant's percentage of accuracy on his production of the pre-test syllable categories was compared to his post-test results of the same syllable categories. The participant made progress in his production of these test items.

Looking at the baseline data, it appears that IST was successful in the treatment of CAS in this case study. Further examination of the data from the therapy sessions did not reveal promising results.

The participant's levels of accuracy on the 5 most frequent words targeted during the intervention are displayed in the figure below. His level of accuracy was inconsistent for the majority of the targets. This data shows *swim* was the only target in which he was able to make consistent gains in his level of accuracy in production. Although this gain was slight, it was an overall improvement. The remaining 4 targets did not show any consistent gains in levels of accuracy. He was observed to have inconsistent production of the targets.

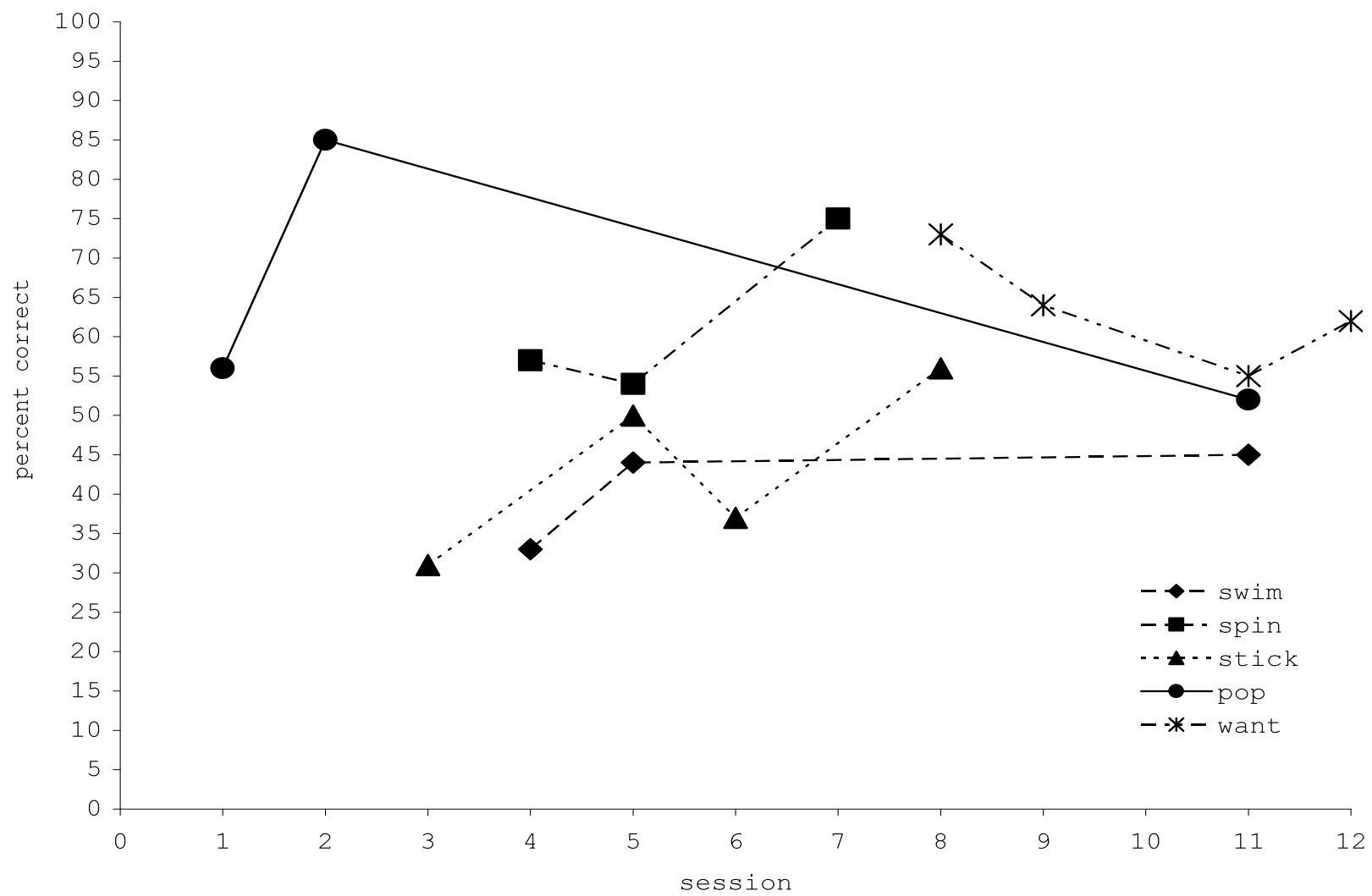
Diadochokinetic Syllable Rates

Task	Repetitions	TM's rate (in seconds)	6 year old norms (in seconds)
/pʌ/	20	8.2	4.8
/tʌ/	20	7.15	4.9
/kʌ/	20	8.16	5.5
pʌtʌkʌ/	10	11.58	10.3

Baseline data

Number of syllables	Percent correct (Trials)		Noted errors	Noted Errors
	pre-test	post-test	Pre-test	Post-test
1	70% (7/10)	90%(9/10)	In pre-test: omission of second part of diphthong /au/, omission of medial /k/, omission of /r/ in cluster.	In post-test: omission of /r/ in cluster.
2	20% (2/10)	50%(5/10)	In pre-test: substitutions; /m/--> /n/, /n/ --> /k/, /ə/ --> /r/ and /g/ --> /dʒ/, omission of medial; /p, k, t, k, s/ (all from clusters), omission of final; /n, t/.	In post-test: substitutions; /m/--> /n/, and /g/ --> /dʒ/, omission of medial; /p, k, t, s/ (all from clusters), and omission of final /t/.
3	0% (0/3)	33% (1/3)	In pre-test: substitutions; /i/ --> /o/, /d/ --> /l/, /o/ --> /ə/, /d/ -->/r/, /i/ -->/ə/, /f/--> /θ/, /d/ --> /v/, /o/ --> /ə/.	In post-test: substitutions; /d/ --> /l/, /v/ --> /r/, /f/ --> /θ/.
4	0% (0/1)	100%(1/1)	In pre-test: omission of final /v/ and /n/.	In post-test: no errors noted.

Accuracy during intervention



Conclusion

The purpose of this case study was to investigate the effectiveness of integral stimulation therapy (IST), in a 5 year old male with Childhood Apraxia of Speech (CAS). On the surface, this study appears to support IST in the treatment of CAS. The pre and post intervention data is very encouraging as the participant was able to increase his accuracy in all the syllable categories and decrease the occurrence of errors noted.

The data from the daily therapy sessions was not as supportive of IST. Over the course of the treatment sessions, the participant was not able to make consistent gains on the 5 most targeted treatment items. He was observed to delete the final consonant of these targets. This is a phonological process that is typically suppressed by the age of 3 years (Bauman-Waengler, 2004).

IST is based on the theory that CAS is a result of faulty motor planning. However, there are other theoretical considerations for the underlying causes of CAS in the literature. Due to the lack of consensus in the literature regarding the cause for CAS, selecting a therapy technique based solely on the motoric theory, may limit success by not targeting other underlying possibilities for the disorder. One suggested underlying etiology for CAS is phonological awareness. The presence of this phonological process brings forth the possibility of some underlying phonological issues in the participant's language, as suggested by Marquardt, Sussman, Snow, & Jacks, (2002).

The participant's limited progress in the current study indicates that IST alone was not very effective in improving his accuracy of articulation. Future larger scale studies may help to identify the strengths and weaknesses of this treatment approach for generalization purposes. There are many theories in the literature regarding the underlying causes of CAS; intervention focusing on only one theory may not be adequate to treat all characteristics of the disorder. Further research into the etiology of CAS may be helpful in achieving consensus about the nature of the disorder and effective treatment strategies.

References

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Acknowledgements

I would like to express sincere gratitude to Dr. Manish Rami, my thesis committee chair for his guidance, advice, and wisdom. I would also like to thank my participant and his family for attending all the intervention sessions and giving me the opportunity to work with such a fun and energetic participant.

For further Information

Please contact jillymoore@gmail.com for more information on this project.

