Effectiveness of a Phonological Awareness Training Intervention on Word recognition ability of Children with Autism Spectrum Disorder

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Abstract

This study describes an action research project designed to improve word recognition ability of children with Autism Spectrum Disorder . Method. A total of 47 children diagnosed as having Autism Spectrum Disorder using Autism Spectrum Disorder Evaluation Inventory (Mohammed, 2006), participated in this study . The sample was randomly divided into two groups; experimental (n= 24; 16 M ,8 F) and control (n= 23; 18 M, 5 F). ANCOVA and Repeated Measures Analyses were employed for data analysis. Results. Findings from this study indicated the effectiveness of the program employed in word recognition ability in the target children . Discussion. On the basis of the findings, the study supports the idea of PA as a powerful intervention for children Autism Spectrum Disorder.

Keywords. Phonological awareness, word recognition ability , children with autism spectrum disorder.

Introduction

Phonological processing refers to various linguistic operations that make use of information about the sound (i.e. phonological) structure of language. It is a set of mental activities or skills that are required in reading or learning to read. Phonological processing involves accessing, storing ,or manipulating phonological information(Eissa, 2007) . Phonological processing involves a certain kind of knowledge about words- that they are made up of individual speech elements, which can be divided into segments of sounds smaller than a syllable. It is one aspect of the spoken language system which is important to early reading . Phonological processing is an insight about oral language, in terms of understanding that words are composed of sequences of small sounds called phonemes. In other words, phonological processing is a linguistic awareness that enables the individual to make use of information about speech and sound structure of the language (Eissa, 2007) .

Although Some studies have measured the remediation of phonological awareness skills in children with reading disabilities (Eissa, 2007), children with intellectual disability (Tofaha & Eissa, 2011), no studies have focused specifically on the effect of phonological awareness training on children with Autism Spectrum Disorder. So, the present study seeks to explore the effectiveness of a phonological awareness – based program in word recognition in children with Autism Spectrum Disorder. It addresses the following questions :

1- Are there statistically significant differences in post– test scores mean between control and experimental groups on Word Recognition Test ?

2- If the program is effective, is this effect still evident a month later ?

Literature review

Autism Spectrum Disorder

In 1943 Dr. Leo Kanner introduced the label early infantile autism. At the same time an Austrian scientist, Dr. Hans Asperger, described a milder form of autism that became known as Asperger syndrome (Bernad-Ripoll, 2007; Ledford & Gast, 2006). Despite the efforts of numerous researchers autism remains a unique and perplexing disability. The Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (Text Review) (DSM-IV TR) (APA 2000), defines autism as a pervasive developmental disorder marked by social and communication impairments along with a restricted repertoire of activities and interests.

Phonological Awareness

Definition of Phonological Awareness

Phonological awareness can be defined as the ability to define and manipulate the sound structure of oral language (Layton& Deeny,2002). Phonological awareness acquisition involves the learning of two things. First, it involves learning that words can be divided into segments of sound smaller than a syllable. Second, it involves learning about individual

phonemes themselves (Torgesen, 2000). The awareness of phonological structure of a word helps children to draw connections between the spoken form of a word and its written representation (Gillon, 2004).

Level of Phonological Awareness: Phonological awareness is a general ability that has multiple dimensions varying in difficulty (Smith, Simmons, & Kameenui, 1998). Gillon (2004) describes phonological awareness in terms of three different levels. They are onset-rime awareness, syllable awareness and phoneme awareness.

Onset-rime Awareness: Adams (1990) describes the rime as the obligatory part of the syllable consisting of its vowel and any consonant sounds that come after it, whereas onset consists of any consonant sounds that precede the vowel. Children are considered to have awareness of onset-rime if they can analyze syllables into onset and rime units in an oddity tasks (Treiman, 1992).

Syllable Awareness: Adams (1990) defines syllable awareness as the ability to detect the smallest unit of speech that can be produced in isolation. Some linguists suggest that children develop syllable awareness before the development of other phonological skills such as on-set rime and phonemic awareness (Adam, 1990; Tingley, Dore, Parsons, Campbell,& Bird 2004; Treiman,1992).

Phonemic Awareness: Gillon (2004) defines phoneme as the smallest unit of sound that influences the meaning of a word. Adams (1990) states that the awareness of phonemes includes the abilities to segment, rearrange, and substitute them one for the other. Many researchers claim that awareness of phonemes is critical for learning an alphabetic writing system (Sawyer & Fox 1991; Treiman, 1992; Adams, 1990; Cook & Bassetti 2005).In addition, Torgesen (2000) suggests that although phonemic decoding skills should never be considered the end goal of reading, research now shows that, for most children, these skills are a critical step along the way toward effective reading skills.Share & Stanovich (1995) point out that phoneme awareness performance is a strong predictor of long-term reading and spelling success and can predict literacy performance more accurately than variables such as intelligence, vocabulary knowledge, and socioeconomic status.

Phonological Awareness Training

According to Oktay & Aktan (2002),phonological ability is not accompanied by an innate ability, which allows children to manipulate phonological elements intentionally. In addition, Cassady and Smith (2004) suggest that children should be trained to blend body-codas first,then to progress to more phonologically difficult blending tasks such as onset-rimes and phonemes. Study by Cheung et al. (2001) also suggests the important role of phonological training in reading acquisition. They point out that bilingual children develop phonological awareness earlier, but in the end, monolingual children reach the same level once they receive phonological skill training in reading development. However, Durguno lu (2002) argues that children can gain insight into phonological skills if they have had exposure in their L1.

Assessment of Phonological Awareness: Treiman (1992) states that onset/rime tasks are easier than other kinds of phonological awareness tasks. On the other hand, onset clusters cause substantial difficulty in the phoneme deletion task. Moreover, the analysis of syllables into phonemes is also difficult. Daly et al. (2005) arrange phonological awareness skills according to their level of difficulty. Skill with rhyming or identifying similar word beginnings or endings is much easier than the skill that requires greater, or more explicit, manipulation of sounds such as segmenting, blending and deleting sounds. Torgesen (2000) suggests three different tasks for assessing phonological awareness. They are sound comparison tasks, phoneme segmentation tasks and phoneme blending tasks. Sound comparison measures are easier and are sensitive to emergent levels of phonological awareness, whereas segmentation

and blending measures are sensitive to differences among children during later stages of development involving refinements in explicit levels of awareness. Measures of sensitivity to rhyme are less predictive of reading disabilities than those measures that ask children to attend to individual phonemes.

Phonological Awareness in children with Autism Spectrum Disorder

Children with Autism Spectrum Disorder show delays in Phonological awareness. To date , however, no research, except for Heimann et al.'s study(1995) , has explored the effectiveness of Phonological Awareness intervention for children with Autism Spectrum Disorder. In Heimann et al.'s study(1995), 11 children with Autism Spectrum Disorder, 9 children with cognitive development , and 10 typically developing children showed an increase in vocabulary skills and word reading after participating in an interactive computer program aimed at teaching basic reading and writing vocabulary . Phonological awareness scores also improved , as measured by a Swedish standardized test that assesses phoneme segmentation , synthesis , and deletion .

Method

Participants

Children participants were diagnosed using Autism Spectrum Disorder Evaluation Inventory (Mohammed, 2006), were invited to participate. The sample was randomly divided into two groups; experimental (n= 24; 16 M, 8 F) and control (n= 23; 18 M, 5 F). The two groups were matched on age, IQ ,and word recognition ability . Table 1. shows means, standard deviations ,t- value , and significance level for experimental and control groups on age (by month) , IQ , and word recognition ability test scores (pre-test).

Table 1. *pre-test Means, standard deviations , t- value , and significance level for experimental and control groups on age (by month) , IQ, and word recognition ability test scores.*

Variable	Group	N	M	SD	T	Sig.
Age	Experimental	24	108.1	2.96	-.189	-
	Control	23	111.26	3.01		
IQ	Experimental	24	18.34	4.45	-.221	-
	Control	23	18.89	4.24		
word recognition ability	Experimental	24	6.82	2.65	-.539	-
	Control	23	6.54	2.32		

Table 1. shows that al t- values did not reach significance level . This indicated that the two groups did not differ in age , IQ , and word recognition ability (pre-test) .

Measure

Word Recognition Ability Test . This test was specifically developed for this study. The test has three sub-tests ; namely recognizing word meaning test , where students are asked to match the word with its meaning(8 Items) , recognizing the opposite meaning test , where students are to match the word with its opposite(8 items) , and recognizing the correct word test , where students are asked to choose from a number of words in each row the correct word(8 items) .

Test reliability

The first issue of reliability was ensuring that The scale total score was a reasonable assessment of one broad construct of pre- reading skills despite the use of six subtests. To test this , Cronbach's alpha statistics was first employed . The result demonstrated the scale produced patterns of responses that were highly consistent, $\alpha = 0.90$.

Test validity

Ten professors of psychology were given the scale to rate the items. Agreement proportions were ranging from 90% to 100% .

Test scoring

The score on each item ranging from 0 to 1 score , and the total score on the scale ranging from 0 to 24 scores .

Procedure

Participants were selected, then pretest data were collected using the Word Recognition Ability Test. The classroom PA training program was conducted by the author with the experimental class in one large group for 5 weeks with 20 minute sessions conducted three times a week. A variety of fun, play-based phonological activities were used with the class that incorporated the spectrum of PA skills (e.g. rhyming, sound/syllable matching, sound/syllable isolation, sound/syllable blending, sound/syllable addition or substitution, and sound/syllable segmentation).

The children participated by singing, listening, answering questions, and following directions. The following is a list of the PA activities addressed during training:

1. Sound Matching/Sound Identification
2. Rhyming Activities
3. Sound Addition or Substitution Activities
4. Sound/Syllable Blending Activities
5. Sound/Syllable Segmentation Activities.

The first author started with the earlier developing PA skills, such as matching and rhyming, and moved throughout the continuum of PA skills. These activities were rotated from easiest to hardest throughout the 5 week training period. At the end of the study, the posttest data were collected again   using the same measure to determine the effectiveness of the PA training.

Experimental Design

An experimental Pretest-Posttest Control-Group design was used in this study. In this mixed design, two groups are formed by assigning half of the participants to the experimental group and half to the control group. Both groups were pretested and posttested in the same manner and at the same time in the study. The bivalent independent variable was the PA training and it assumed two values: presence versus absence of PA training. The dependent variables were the gains in scores on Word Recognition Ability test.

Results

Table 2. shows data on ANCOVA analysis for the differences in post- test mean scores between experimental and control groups in Word Recognition test scores. The table shows that the (F) value was (285.166) and it was significant value at the level (0.01).

Table 2. *ANCOVA analysis for the differences in post- test mean scores between experimental and control groups in Word Recognition Ability test scores*

Source	Type 111 sum of squares	df	Mean square	F	Sig.
Pre	5.814	1	5.814		
Group	1123.316	1	1123.316	285.166	0.01
Error	173.323	44	3.939		
Total	1297.277	46			

Table 3. shows T. test results for the differences in post- test mean scores between experimental and control groups in Word Recognition test scores . The table shows that (t) vale was (16.75). This value is significant at the level (0.01) in the favor of experimental group. The table also shows that there are differences in post- test mean scores between experimental and control groups in Word Recognition test scores in the favor of experimental group.

Table 3. *T. test results for the differences in post- test mean scores between experimental and control groups in Word Recognition Ability test scores.*

Group	N	Mean	Std. deviation	T	Sig.
Experimental	24	16.583	2.44	16.75	0.01
Control	23	6.826	1.37		

Table 4. shows data on repeated measures analysis for Word Recognition Ability test. The table shows that there are statistical differences between measures (pre- post- Follow – up) at the level (0.01).

Table 4. *Repeated measures analysis for Word Recognition Ability test.*

Source	Type 111 sum of squares	df	Mean square	F	Sig.
Between groups	1351.970	1	1351.970	643.039	0.01
Error 1	94.611	45	2.102		
Between Measures	955.545	2	477.772	136.724	0.01
Measures x Groups	647.176	2	323.588	92.601	0.01
Error 2	314.498	90	3.494		

Table 5. shows data on Scheffe test for multi-comparisons in Word Recognition Ability test . The table shows that there are statistical differences between pre and post measures in favor of post test, and between pre and follow –up measures in favor of follow – up testing, but no statistical differences between post and follow – up testing.

Table 5. *Scheffe test for multi-comparisons in Word Recognition Ability test*

Measure	Pre M= 6.82	Post M= 16.58	Sequential M= 6.48
Pre	--	--	--
Post	10.41*	--	--
Sequential	966*	0.75	--

Discussion

The main objective of the present study was to explore whether there were differences in post – test scores mean between control and experimental groups on Word Recognition Ability . The study also examined If the program was effective, if this effect was still evident a month later . The results of this study as revealed in tables 3 and 5 show that the phonological awareness program was effective in improving the Word Recognition Ability of children in experimental group, compared to the control group whose subjects did not receive such an intervention .

The present study comes to try to resolve the conflict. Many researchers are still trying to answer the "chicken and egg" question of which came first. Is PA a prerequisite for learning to read or does PA develop as a consequence of being exposed to reading instruction (Yopp, 1992)? A great majority of research conducted supports the idea of PA as a powerful predictor of early reading achievement.

The effects of phonological awareness instruction have been addressed in previous research; however, this study contributed to the literature in several significant ways. First, it extended the participants to children as young as preschool and had implications that phonological awareness was teachable to younger children. Second, the results of this study indicated that children with autism Spectrum Disorder and had not received any formal reading instruction are capable of improving their Word Recognition Ability in preparation for their future reading. Finally, it is significant for educators to work to improve in Word Recognition Ability in children with autism Spectrum Disorder. This study demonstrated that phonological awareness skills can be effectively instructed to children with autism Spectrum Disorder better positioning them for reading success.

Worth mentioning is that students in the experimental group retained the learnt information for a long time even after the period of the program finished, and this indicates the training effect.

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