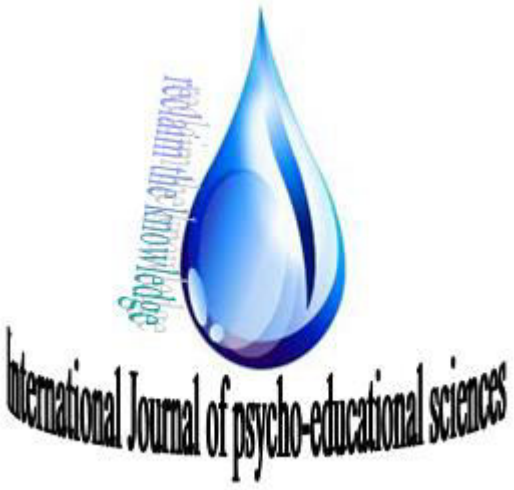

Effectiveness of a Phonological Awareness Training Intervention on Word recognition ability of Children with Autism Spectrum Disorder

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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. 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 is concerned with different operations in language that use information about the sound (i.e. phonological) structure of language. It can be regarded as a set of mental activities or skills that are perquisites in reading or learning to read. It involves accessing, storing ,or manipulating phonological information(Eissa, 2007) . It also involves a certain type of knowing 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- Is there a significant difference between the posttest word recognition scores of the children in the experiment group and those in the experiment group ?
2- In case of the program effectiveness, is this effect still evident a period after the intervention?

Literature review

Autism Spectrum Disorder

Leo Kanner , in 1943 , introduced the label early infantile autism. About the same time , 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. Autism Disorder ,in the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (Text Review) (DSM-IV TR) (APA 2000), is defined 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

Layton and Deeny(2002) define phonological awareness as children's ability to define and manipulate the sound structure of oral language. In order to acquire phonological awareness children have to learn two things. First, words can be divided into segments of sound

smaller than a syllable. Second, they should learn about individual phonemes themselves (Torgesen, 2000). Children's awareness of phonological structure of a word helps them to connect between the spoken form of a word and its written representation (Gillon, 2004).

Levels of Phonological Awareness. It can be confirmed that phonological awareness is a general ability that has multiple dimensions all of which vary in difficulty (Smith, Simmons, & Kameenui, 1998). It can be described in terms of three different levels which are onset-rime awareness, syllable awareness and phoneme awareness (Gillon ,2004).

Onset-rime Awareness. The rime , according to Adams (1990) is 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. It can be said that children are considered to have awareness of onset-rime in case of they are able to analyze syllables into onset and rime units in an oddity tasks (Treiman, 1992).

Syllable Awareness. Syllable awareness , according to Adams (1990) is children's ability to detect the smallest unit of speech that can be produced in isolation. It is suggested by some linguistics awareness (e.g. Adam, 1990; Tingley, Dore, Parsons, Campbell,& Bird 2004; Treiman,1992) that children develop syllable awareness before the development of other phonological skills such as on-set rime and phonemic.

Phonemic Awareness. Phoneme ,according to Gillon (2004) is the smallest unit of sound that influences the meaning of a word. As it is stated by Adams (1990), the awareness of phonemes includes the abilities to segment, rearrange, and substitute them one for the other. Some pioneers in the field (e.g.Sawyer & Fox 1991; Treiman, 1992; Adams, 1990; Cook & Bassetti 2005) claim that awareness of phonemes is critical for learning an alphabetic writing system .Moreover, 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. It was pointed out by Share and Stanovich (1995) 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

phonological ability is something that has an innate ability, which allows children to manipulate phonological elements intentionally (Oktay and Aktan ,2002).Additionally, it was suggested by Cassady and Smith (2004) 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. Reading can be acquired , as claimed by some authors (Cheung et al. ,2001) by children getting phonological training. Those authors claim 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. Nevertheless, children can gain phonological skills if they have had exposure in their mother tongue language (Durguno lu ,2002) .

Assessment of Phonological Awareness. Some Phonological tasks are easy to be acquired than others. For example onset/rime tasks are easier than other phonological awareness tasks (Treiman ,1992). On the other hand, onset clusters can be very difficult in the task of phoneme deletion. Additionally, the analysis of syllables into phonemes is also difficult. Some researchers (Daly et al. ,2005) sought to arrange phonological awareness skills in the light of their difficulty level . Those authors found that children's skill to rhyme or identify words that are similar in beginnings or endings are much easier than their skill in requiring greater, or more explicit, manipulation of sounds such as segmenting, blending and deleting sounds. Another author(Torgesen,2000) proposed other three tasks for assessing phonological awareness. They are sound comparison tasks, phoneme segmentation tasks and phoneme blending tasks. He

regarded sound comparison measures to be easier and are sensitive to phonological awareness emergence, whereas segmentation and blending measures are sensitive to differences among children during later stages of development involving refinements in explicit levels of awareness. He also confirmed that 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	109.32	1.96	-.103	-
	Control	23	110.01	3.01		
IQ	Experimental	24	18.34	5.58	-.511	-
	Control	23	18.89	5.04		
word	Experimental	24	6.36	2.03	-.321	-
recognition	Control	23	6.82	2.71		
ability						

As indicated in Table 1. ,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

Cronbach's alpha statistics was first employed . The result demonstrated the scale produced patterns of responses that were highly consistent, $\alpha = 0.87$.

Test validity

The scale was given to 10 professors of psychology 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

Children were selected, then pretest data were collected using the Word Recognition Ability Test. The classroom phonological awareness intervention was conducted with the experimental group for 5 weeks with 20 minute sessions conducted three times a week. The authors used a lot of phonological activities with experimental group , including phonological awareness skills (e.g. rhyming, sound/syllable matching, sound/syllable isolation, sound/syllable blending, sound/syllable addition or substitution, and sound/syllable segmentation).

The children were active participants as they sang , listened to, answered questions, and followed the author's directions. Phonological awareness activities included:

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 phonological awareness skills, such as matching and rhyming, and moved throughout the continuum of phonological awareness 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 phonological awareness intervention.

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 phonological awareness training and it assumed two values: presence versus absence of phonological awareness 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 (581.203) (**P < 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	.169	1	. 169		
Group	963.853	1	963.853	581.203	0.01
Error	72.969	44	1.685		
Total	1043.702	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 (28.54). (**P < 0.01**) 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	16.333	1.46	28.54	0.01
Control	23	6.831	1.65		

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) (**P < 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	1326.521	1	1326.521	1.302	0.01
Error 1	45.846	45	1.019		
Between Measures	758.100	2	379.050	374.273	0.01
Measures x Groups	643.717	2	321.858	317.803	0.01
Error 2	91.149	90	45.000		

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**	**Post**	**Follow up**
	M= 6.82	**M= 16.33**	**M= 15.70**
Pre	--	--	--
Post	9.75*	--	--
Sequential	9.12*	0.62	--

***. The mean difference is significant at the 0.05 level.**

Discussion

The present study aimed to find out if there was a significant difference between the posttest word recognition scores of the children in the experiment group and those in the experiment group . It also investigated If the program was effective, if this effect still evident a period after the intervention. Findings from this study showed that the phonological awareness activities were of great effect as they improved the Word Recognition Ability of children in treatment group,while it the mean score of the control group whose subjects did not receive such an intervention remained to great extent the same.

It can concluded from the findings of this study that phonological awareness is a powerful predictor of early reading achievement , so it goes in the same line with Yopp(1992)who indicated that phonological awareness is a prerequisite for learning to read ..

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 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.

Children in the treatment group retained the learnt information for a long time even after the period of the intervention finished, and this indicates the training effect.

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