

## **Phonological skills in Down Syndrome (DS): Experimental findings from a Greek sample**

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### **Abstract**

This paper presents an experiment we carried out in order to investigate phonology in Down Syndrome (DS). Research has shown that during pre-school and school years, children with DS use phonological processes and sound patterns that are similar to those used by typically developing children but at a slower rate. In view of the above and given the paucity of research in the Greek language in children with DS, we conducted an experiment so as to investigate phonological skills in ten children with DS. We examined articulation, phonetic analysis, phonemic completion and phonemic distinction. Our results showed that children with DS present a phonological impairment in the Greek language.

Key words: phonology, Down Syndrome, language impairments, mental retardation

### **Introduction**

Down Syndrome (DS) is caused by triplication of the 21<sup>st</sup> chromosome and is associated with particular deficits in the phonological field. DS is the leading genetic cause of intellectual disability accounting for 25%-30% of people with mental retardation (Nadel 1999). The degree of intellectual disability varies widely from close to normal intelligence to severe mental retardation, with 80% of individuals showing moderate retardation (Roizen 2002). Despite considerable variability, individuals with DS have been described as having phenotypically distinct behavioral patterns in language and cognition, following a consistent profile in their linguistic development (Chapman et al. 2002). Children with DS often show delay in the onset of babbling (Stoel Gammon 2001) and they produce the first words at a much older age than typically developing children (Bergland et al. 2001). Typically developing children produce their first words in their first year, but children with DS do not produce their first words until much later, even until 3 years of age (Yoder and Warren 2004).

The phonological factors described above, contribute to poor speech intelligibility on the part of DS individuals together with other factors associated with DS, such as apraxia of speech, dysarthria and voice quality. Typically developing children are often fully intelligible at about 48 months of age, while producing intelligible speech is a lifelong challenge for DS individuals, affecting their productive language performance (Martin et al. 2009). Moreover, researches

that were conducted with word and non word repetition tasks have proven the existence of phonological impairments. It has been proven that phonology in children with DS is a linguistic section that is severely affected (Nash and Snowling 2008). This pilot experiment examined the phonological skills of ten children with DS in the Greek language.

### **Experimental Procedure**

We used a standardized test of phonology (Tzouriadou et al. 2008) which examines articulation, phonetic analysis, phonemic completion and phonemic distinction. Articulation was examined in two different ways. In the first task, consisting of 13 items, we asked the children to complete a sentence by showing them a picture, such as /ta malia ehun poles..../ (hair have too many...) and the children had to give the correct answer /trihes/ (hairs). In the second task, consisting of 16 items, we asked them to complete the sentence correctly, for example / I Maria ine gineka. O Θomas ine..../ (Mary is a woman. Tom is a ....) and the children had to give the correct answer /andras / (man).

Phonetic analysis was examined by asking the children to pronounce 29 words letter by letter correctly. Phonemic completion was examined by using a task of 30 words and non words, in which DS children were asked to match the picture with the word spelled phonemically such as /γ/ a/ t/a/ (cat). Phonemic distinction was separated in four different tasks. In the first task we said two words that were heard similarly for example /hortari/ and /moshari/ (grass and veil) and then we said a sentence and we asked the children to choose which word fits the example /fitroni sti γi/ (grows on the ground). This task consisted of 14 items. In the second task we said the first syllable of a word, for example /fi/ and we expected the child to find out which of the following two words started with the syllable /fi/, for example /fili/ or /hili/. The same task was repeated with syllables in the end and in the middle of the word.

10 children (6 boys and 4 girls) with DS, mild mental retardation and Greek origin were examined in the four tasks. Their age varied from 4 years to 8 years old and had no other language impairments or health problems that could affect the results of this research.

### **Results**

The data analysis showed that children with DS have serious impairments in the phonological area, where most affected seemed to be the expressive language. In articulation only 33.1 % of the total answers given were correct, in phonetic analysis this percentage was 34.48%, in phonemic completion 35% and only in phonemic distinction this percentage rose to 70.28%.

**Discussion**

Our findings confirm the deficits in phonology associated with DS, and show that the phonological errors made by these children are combined with difficulties in expressive language. This is proved by the low percentage of correct answers given by children with DS in all phonological tasks with the exception of phonemic distinction which does not involve so much expressive language. It is clear that the relationship between phonology and expressive language is not straightforward but it is important that future research should investigate its nature. If phonological problems constitute the primary deficit, then finding a way to improve them could potentially lead to better expressive language skills on the part of individuals with DS. The findings of this study point towards the notion that phonological development in DS does not end at the same age as in typically developing children but continues to grow making expressive and receptive phonology a fertile area for intervention. However, these results must be treated with caution since it was only a small-scale investigation and children with DS who consisted our sample were not followed longitudinally. Therefore, more longitudinal research studies on DS phonology are needed with large samples which will be followed from childhood right through adolescence and adulthood. Thus, safe results will be reached and perhaps the exact age of “turning off” of the neural mechanisms for phonological development in DS will be found (Abbeduto et al. 2007).

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