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Aviah Gvion, Hadar Saadya and Naama Friedmann

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Aviah Gvion[1,2,3*], Hadar Saadya[1], and Naama Friedmann[1]

[1] Language and Brain Lab, Tel Aviv University, Tel Aviv, Israel
[2] Speech and Language Department, Reuth Rehabilitation Center, Tel Aviv, Israel
[3] Communication Sciences Disorders Department, Faculty of Health Professions, Ono Academic College, Kiryat ono, Israel

***corresponding author: aviah.g@ono.ac.il**

Introduction

Phonological output buffer (POB) deficit and apraxia of speech (AOS) are similar: both result in phoneme errors in speech production. This makes the differential diagnosis between these disorders difficult (Haley et al., 2013).

Previous studies (Dotan & Friedmann, 2015) have shown that the POB holds phonological units of different sizes: beyond phonemes, it also holds pre-assembled phonological units such as whole morphological affixes, whole number words, and function words. This is based on the finding that individuals with POB deficits produce words (and nonwords) with phoneme errors (e.g., parrot→carrot/larrot/parro) but substitute/omit/add morphological affixes, number words, and function words, so that they may substitute a whole unit with another whole unit of the same kind (faster→fastly/fast; nine→seven; on→at). We examined whether this phenomenon could serve as a basis for a differential diagnosis between POB deficits and AOS. We surmised that in affixes, number words, and function words, individuals with POB will mainly make errors at the whole unit level (seven→four), whereas individuals with AOS will produce phoneme errors that affect a phoneme within the unit, and may not create another existing unit (seven→sevel). The POB immediately follows the phonological output lexicon in the lexical processing, so it may still enjoy lexical feedback, whereas AOS affects later stages. We therefore examined whether individuals with POB deficits show advantage for the production of existing words in comparison to nonwords whereas individuals with AOS show similar production of words and pseudowords.

Methods

The participants were 7 individuals who produced phonological errors in spontaneous speech, repetition, naming, and reading aloud: 4 with POB-deficit and 3 with AOS. Three of these individuals were diagnosed by experienced SLTs as having AOS, mostly based on the manifestation of dysprosody, distortion of sounds, effortful speech. Five others were suspected to have POB deficits. Their production of nonwords, morphologically simple and complex words, number and function words was tested in tasks of repetition, oral reading, and naming. Types of errors were analyzed for each individual and for each group.

Results

POB-impairment and AOS indeed caused different types of errors (see Figure1). Individuals with POB-impairment produced significantly more substitutions, omissions, and additions of whole morphological affixes, whole number words, and function words, whereas they

produced phonological errors in the root phonemes. In contrast, individuals with AOS made mainly phoneme substitutions, omissions, and additions even within affixes and number words, and even when these phonemic errors did not create other existing affixes/number words. Another difference between the groups was that individuals with POB deficit showed a significant lexicality effect, with better production of words compared to pseudowords, whereas individuals with AOS showed no lexicality effect (Table1).

Figure 1. Whole morphological affix errors compared to phoneme errors within affixes for each individual in the two groups.

Table 1. % correct performance in word production compared to pseudo-word production

		Word production	Pseudoword production
POB	P1	71	31
	P2	75	60
	P3	61	38
	P4	79	58
AOS	A1	46	45
	A2	43	36
	A3	57	27

Conclusions

Clinically, it is challenging to decide whether phoneme errors result from AOS or from a POB-deficit. The results of this study offer a novel way to distinguish between the two, which is also simple to administer: individuals with POB-deficits substitute or omit whole morphological affixes, number words, and function words; individuals with AOS produce mainly phoneme errors regardless of the type of unit, so they substitute or omit phonemes even when they are parts of affixes and number words.

References

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