

How do the cognitive requirements of phonological tasks affect the relationship between phonological processing and reading?

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Reading is a complex multifaceted process that critically relies on phonological processing (Ramus et al., 2013). The well-known theoretical model of phonological processing developed by Wagner and colleagues (Wagner et al., 1994) separates phonological skills into three main components: phonological awareness, phonological working memory, and rapid naming. Despite extensive research, it remains elusive which phonological tests are the most effective for studies of reading (Georgiou, Parrila & Papadopoulos, 2008). Even when they address the same component of phonological processing, some tests predict reading skills better than others. One of the most plausible explanations is that phonological tests may differ in their cognitive requirements (Vandervelden & Siegel, 1995; Yopp, 1988). However, the idea that the overall complexity of a phonological task affects its potential to predict reading skills has never been strictly tested. To fill the gap, we developed seven phonological tests varying in linguistic complexity, e.g. the number and type of involved linguistic processes, and examined the relations between the level of complexity in phonological tasks and reading.

The research was conducted in a group of typically developing Russian-speaking children (N=90, 7-to-11 years of age). Data were analyzed using (generalized) linear mixed models estimated in a Bayesian framework (Bürkner, 2017). For each child we extracted the individual estimate of decrease in accuracy associated with introducing one more linguistic process and assessed whether the cost of a linguistic process estimated for each child is associated with the child's reading fluency. We revealed, that greater individual cost of a linguistic process required for a phonological test was associated with a reliable decrease in reading fluency. These results suggest that phonological processing needs to be considered in models of reading not only in terms of traditional types, but also regarding the quantity and types of involved cognitive processes.