Innovative Gamified Interventions for Phonological Working Memory in Young Dutch Learners

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Abstract

Phonological working memory (PWM) is a core cognitive component underlying language development, as it supports the temporary storage, maintenance, and manipulation of speech- based information. These functions are essential for acquiring pronunciation, vocabulary, grammatical structures, and fluent communication. Evidence from both first- and second- language acquisition research highlights the importance of PWM for successful language learning. In addition, studies in developmental language pathology consistently report reduced PWM capacity in children with developmental language disorder (DLD) and dyslexia, underscoring the need for targeted intervention approaches that go beyond traditional language instruction.

Given the central role of PWM in language learning, interventions that directly train this cognitive mechanism may offer an effective and complementary pathway to improving language outcomes. Previous research has shown that PWM training can positively affect vocabulary acquisition and broader language skills (e.g. Karousou & Nerantzaki, 2020). Inspired by these findings, the present project aims to develop two innovative, gamified intervention activities specifically designed to strengthen PWM in young children acquiring Dutch. The target population includes children aged four to eight years who are learning Dutch as a second language, as well as native Dutch-speaking children with DLD or dyslexia.

To ensure high levels of engagement and practical applicability in both educational and therapeutic settings, the interventions are implemented as touchscreen-based digital games that are generated online during gameplay, contingent on internet availability. The game-based format is intended to provide repeated, motivating exposure to phonological material while systematically engaging the core components of the phonological loop.

This presentation details the full development process of the interventions. After a brief review of the relevant theoretical and empirical literature, we describe the rationale underlying the selection of specific game paradigms. We then outline the systematic, frequency-based procedure used to select phonological segments and construct phonotactically plausible Dutch nonwords. These procedures resulted in the automated generation of a large stimulus pool, from which a final set of nearly 2,000 nonwords was selected according to predefined linguistic and developmental criteria. Finally, we discuss the computational aspects in developing the games, including key aspects of the programming logic. The presentation concludes with a live demonstration of both intervention activities and a discussion of future research and clinical applications.