

# Behavioral Evaluation of Preference for Game-Based Teaching Procedures

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## ABSTRACT

Recent research has evaluated the motivational functions of educational games and its potential role for the teaching of reading skills. Educational games must maintain their educational function retaining clear definitions of the teaching objectives and instructional methods. Reading skills can be broken down into more basic behavioral units. Each relation between spoken words and written words can be evaluated and taught separately. This paper evaluated the impact of a game on a reading instructional procedure that has been successfully applied in Brazil. Two matching-to-sample teaching tasks were tested on 15 children in literacy ages. In the condition of standard teaching, only the matching-to-sample tasks were presented. In the game-based condition, the same matching-to-sample tasks were interspaced with game challenges. A behavioral choice procedure indicated the participant's condition choice. After learning 15 words, the participants responded a computerized version of the Learning Motivational Scale of Basic Education, which identified the intrinsic and extrinsic motivational factors. Results show no motivation and reading scores correlation and validate the choice procedure as reliable predictor of preference.

*Keywords:* Education Games, Game-Based Learning, Literacy, Motivation, Preference Assessment

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## INTRODUCTION

In developing countries there is a gap in children's literacy, creating an urgent demand for pedagogical materials that increase their engagement in reading learning. Games could help this engagement process, allowing the pro-

gramming of additional rewards for the acquisition of each component of reading (i.e., phase advancement) (Boyle, Connolly, Hainey, & Boyle, 2012; Przybylski, Rigby, & Ryan, 2010; Turgut & Irgin, 2009). However, it is necessary to evaluate if the educational games maintain their educational function and also add the expected motivational factor (Deen & Schouten, 2011; Hainey *et al.*, 2011). After an extensive

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review on engagement on video-games, Boyle *et al.* (2012) indicated how difficult is to determine non-game-based conditions to act as a control condition in motivational research. The aim of this paper is to add game component to an already tested teaching program as a form to evaluate game impact on motivation. Reading teaching programs already tested can be a basis for the evaluation of educational games, since changes in baseline performance in these programs can indicate the motivational influences of the educational games.

## Learning Measures

Seeking to advance at basic scientific understanding of verbal relations Skinner proposed a novel taxonomy of verbal relations, articulated by in the book *Verbal Behavior* (1957). This new taxonomy re-defined many of the relevant environment-behavior relationships in terms of their functional antecedent and consequential controlling relations. Also, his functional approach stood as a complementary alternative to the structural analyses emphasized in information-processing approaches. Some of the environment-behavior relations articulated by Skinner's functional analysis of verbal behavior mapped directly onto the tasks that are the major challenges in reading instruction. Textual behavior, for instance, is demonstrated by the ability to discriminate and produce (i.e. name) printed words that the learner had not encountered before, including words that merely resemble structurally those defined as meaningful by a given verbal community. (Matos, Avanzi, & McIlvane, 2006).

A teaching procedure based in Experimental Behavior Analysis (EBA) has obtained positive results in reading teaching in Brazil. Two types of matching-to-sample procedures were used: (1) standard matching to sample (MTS) and (2) constructed response matching to sample (CRMTS) (Axe & Sainato, 2010; de Souza *et al.*, 2009). In these procedures, a screen presents the sample stimulus (a model) and a group of comparison stimuli. The sample stimulus can be a printed/spoken word, syllable

or letter, or a figure. The comparisons could be printed words, syllables or letters and a picture. In each exposure of this screen (trial), only one comparison stimulus was correct in the standard MTS or the response can be composed by selecting the letters/syllables available in the CRMTS. Correct responses were rewarded (reinforcement) with a sound and the transition to the next trial. Following the reinforcement, a new trial begins. Wrong choices were followed by a corrective sentence ("not, it is not"), and by the repetition of the trial.

Each correct trial taught a conditional discrimination, where two stimulus needed to be matched to be reinforced (e.g. the dictated word and their correspondent written word). For EBA the reading, as all operant behaviors, is learned by means of reinforcement contingencies. In this case, the programmed consequences (e.g. verbal feedback and trial-by-trial advance) were combined by the non-programmed (e.g. child value to learn to read) consequences to guarantee the acquisition of reading skills.

Reading skills can be broken down into more basic behavioral units. Each relation between spoken words and written words can be evaluated and taught separately. The same can be done for other reading components, for instance the relation between written word and pictures – that represents these words - and their symmetric relations (i.e. pictures-written words). Furthermore, just stimulus selection behavior (e.g. select dictated words or pictures) can be taught in separate from active response behaviors. Teach reading by MTS and CRMTS:

*procedures took advantage of a useful characteristic of Portuguese - many words are comprised of two consonant-vowel combinations (e.g., BO+CA=BOCA [mouth])- minimal units that might be spontaneously recombined into other meaningful combinations (e.g., CA+BO=CABO [handle]). We sought to encourage such behavior also teaching the children to match printed to dictate syllables and to construct words with syllables - thereby establishing/verifying the necessary discrimina-*

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