

Productive Oral Vocabulary Knowledge and Word Recognition: An Intervention Study Using Cellphone Games in Rural India

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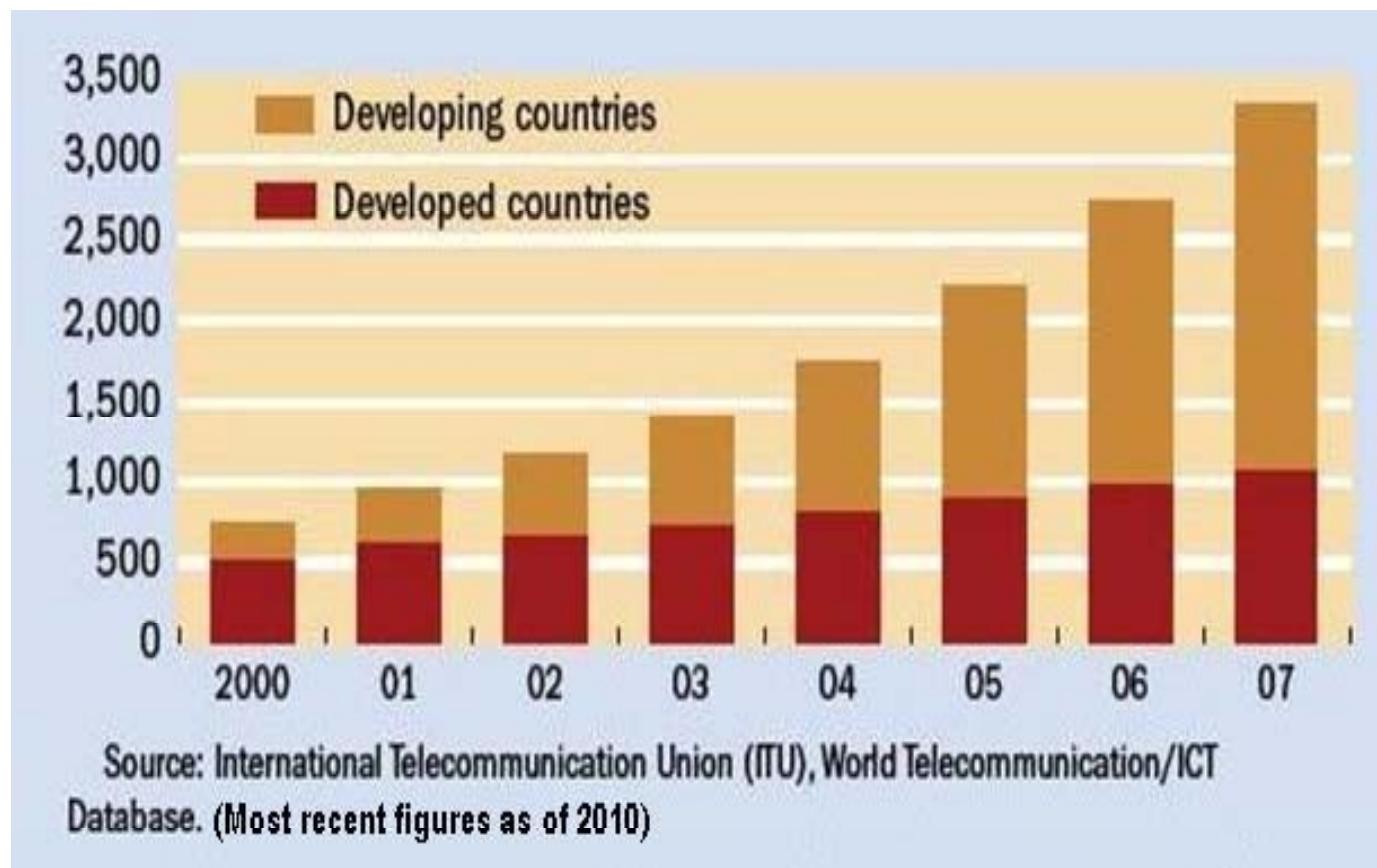
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Introduction

- India's Education Policy – The Three Language Formula
 - Regional language
 - English
 - Hindi
- Mastery of English is the “**single most influential factor** that determines access to ... important economic and social avenues” (Kishwar 2005)
- Schools in rural areas (Abadzi, 2006):
 - Lack of access to books
 - Large classrooms (1:75)
 - Few (if any) English teachers
 - 101 million children cannot/do not attend school (36 million in South Asia and 39 million in Sub-Saharan Africa) – UNESCO, 2009
- Our goal: to use mobile phones to increase English word reading

Mobile Learning as a Possible Solution

- Mobile phones are the fastest growing technology platform in the developing world



Mobile Learning as a Possible Solution

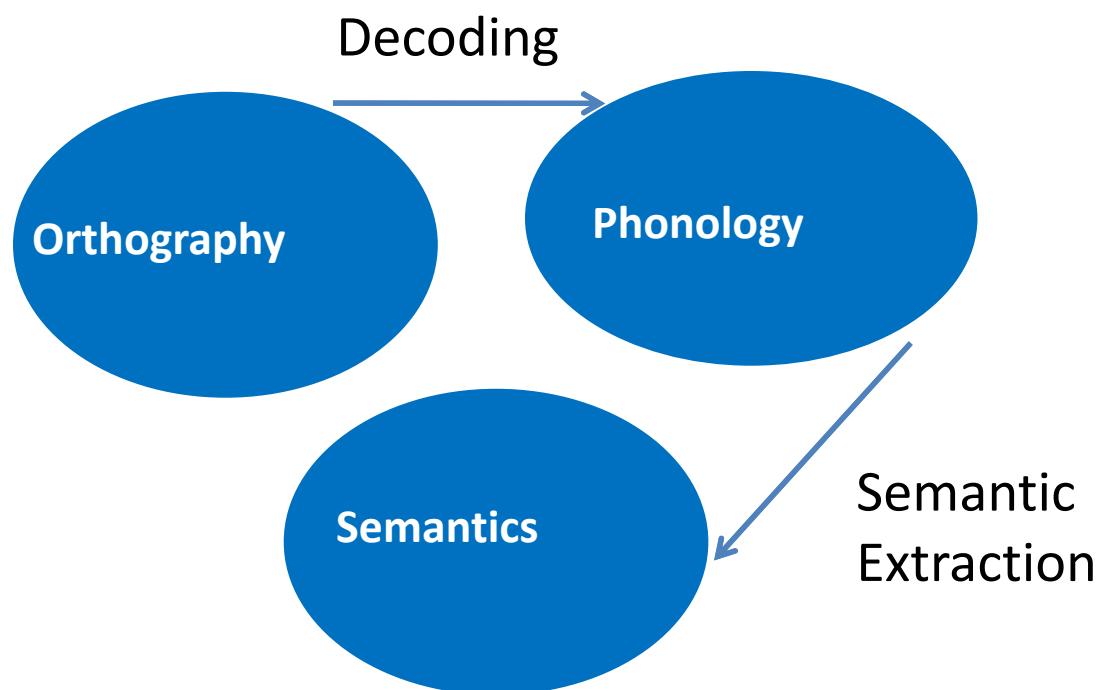
- Mobile educational games target **learning any time, any place**
- Make the learning process more enjoyable and thus more effective (Kam et al., 2008; 2009)
- Games allow for immersive, interactive, and digital environments, leading to more situated, contextualized learning (Gee, 2003)
- Thus, we use mobile technology to iteratively investigate and promote L2 word reading development in rural India

Importance of Word Recognition

- Word recognition is defined as the ability to decode and extract semantic information from a printed word
- Baseline studies with this group
 - Sufficient English decoding with little variance
- Need to recognize about 98% of words in a text to comprehend it (Hu & Nation, 2000)
- Word recognition is a critical stepping stone from “learning-to-read” to “reading-to-learn”(Carver 1990; Chall 1996)
- Vocabulary knowledge becomes a major bottleneck for L2 readers at the grade 4-5 level (Carlo et al., 2004; August et al., 2005)

Components of Word Recognition: Lexical Quality Hypothesis

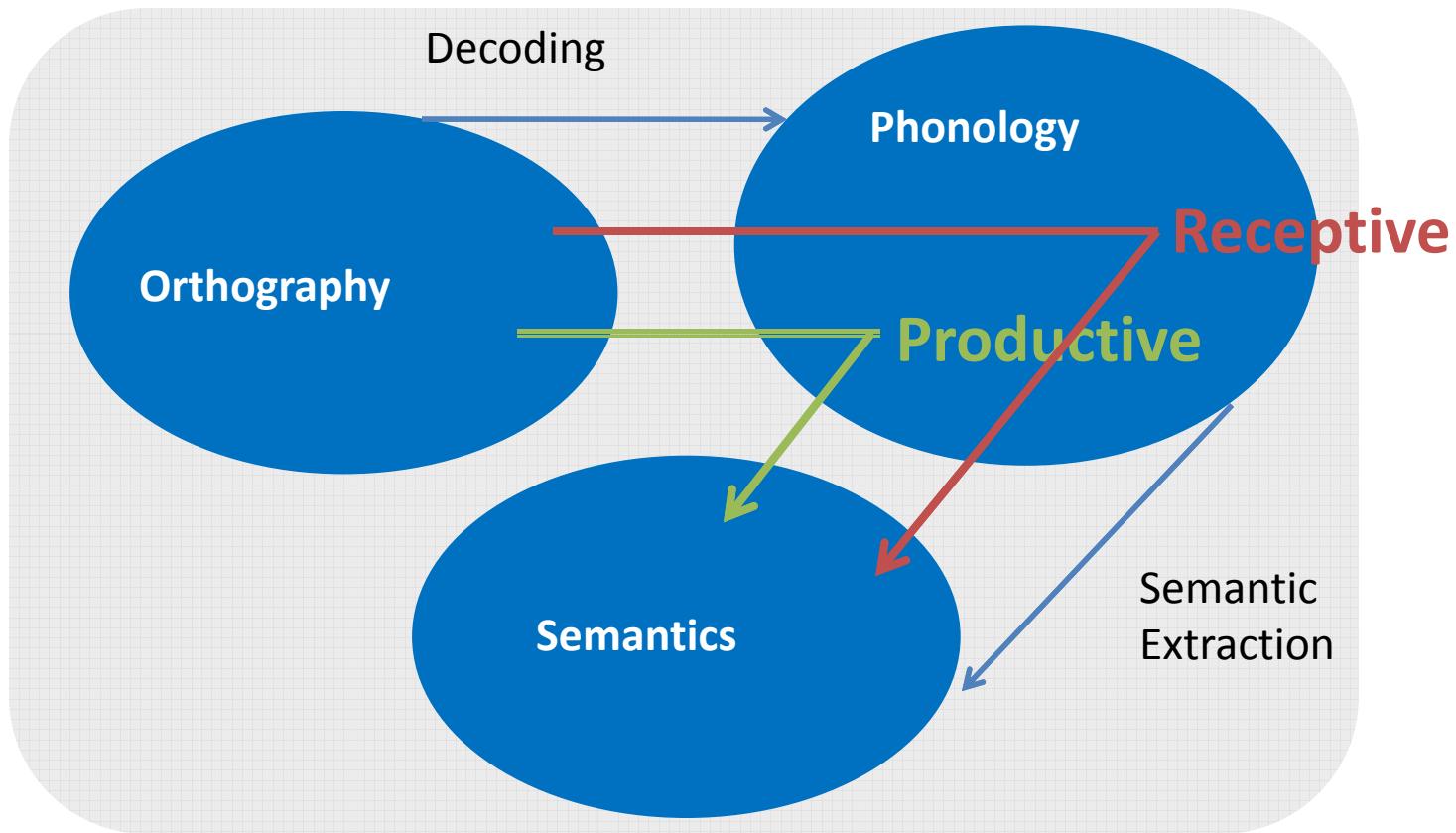
- Word recognition skills are contingent upon the quality of three representations: phonology, orthography, and semantics (Perfetti & Hart, 2001)
- Word recognition consists of decoding and semantic extraction
- Importance of phonological processes (Perfetti, 2003)



The Role of Production in Lexical Processing

- Production is considered important for several aspects of language learning
 - Drawing attention to one's linguistic abilities, which generates new knowledge or consolidates existing knowledge (Swain & Lapkin, 1995; Ellis & He, 1999)
 - Self-generated input back to your mind strengthens lexical representation (De Bot, 1996)
 - This feedback loop translates declarative knowledge into procedural knowledge (De Bot, 1996)
- Controlled vs. Free Productive Vocabulary Knowledge (Laufer & Nation, 1995; 1999)

Theoretical Framework



Does training receptive and productive lexical processing paths differentially impact word recognition?

Hypotheses

1. Training the productive processing path will improve word recognition scores more than training the receptive processing path
2. Productive processing with an orthographic hint will be even more beneficial for word recognition than just productive processing

Pr+Or Training > Pr training > Receptive Training

Method - Study Context

- N= 31 (18 boys)
- Age 9-13 (grade 4-5) equivalent
- L1's : Telugu or Kannada
- Public school in rural India
- English as a foreign language in the classroom
- Teacher had “difficulty” communicating in English
- Most of the participating households had at least one mobile phone



Experimental Design

- 2 Games – Farm and Market (all children played both games)
- 1 hour sessions after school hours
- Words were from the government-issued curriculum (grades 4-5)
- 27 concrete nouns (14 for market game and 14 for farm game)

	<i>Word Recognition Pre-Test</i>	<i>Word Recognition Pre-Test</i>
	Market Game	Farm Game
Productive Processing with Orthographic Hint	10 children	11 children
Productive Processing	10 children	10 children
Receptive Processing	11 children	10 children
	<i>Word Recognition Post-Test</i>	<i>Word Recognition Post-Test</i>

Game Designs

- Game designs were based on experiments exploring common practices and activities in rural India (Kumar et al., 2010)
- Actions in the games were taken from traditional village games, such as *catch* a player or *evade* him (Kam et al. 2009)

Market Game

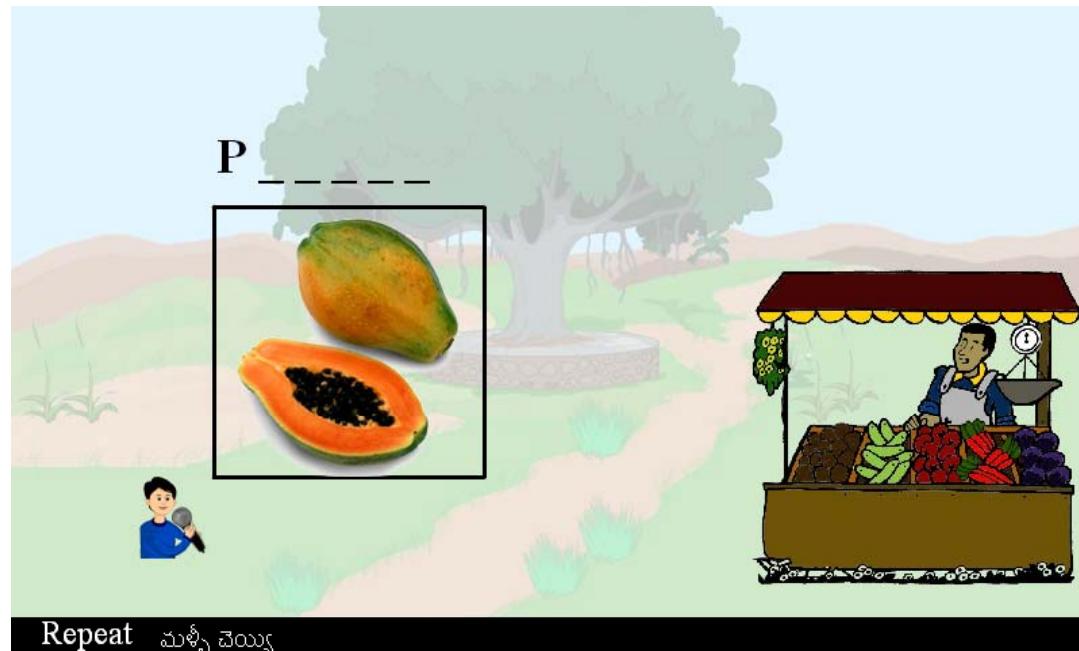


Farm Game



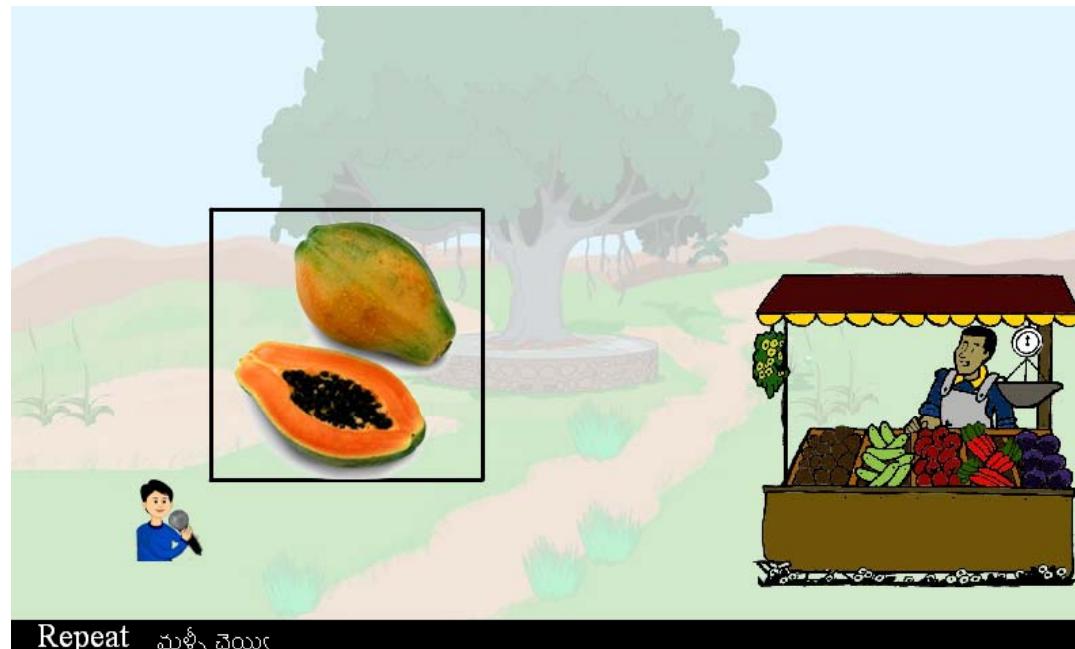
Condition 1: Productive Training + Orthographic Hint

- Productive + orthographic hint group was shown an image (one at a time) with the first letter of the word as a hint, and they had to recognize the image and say it aloud



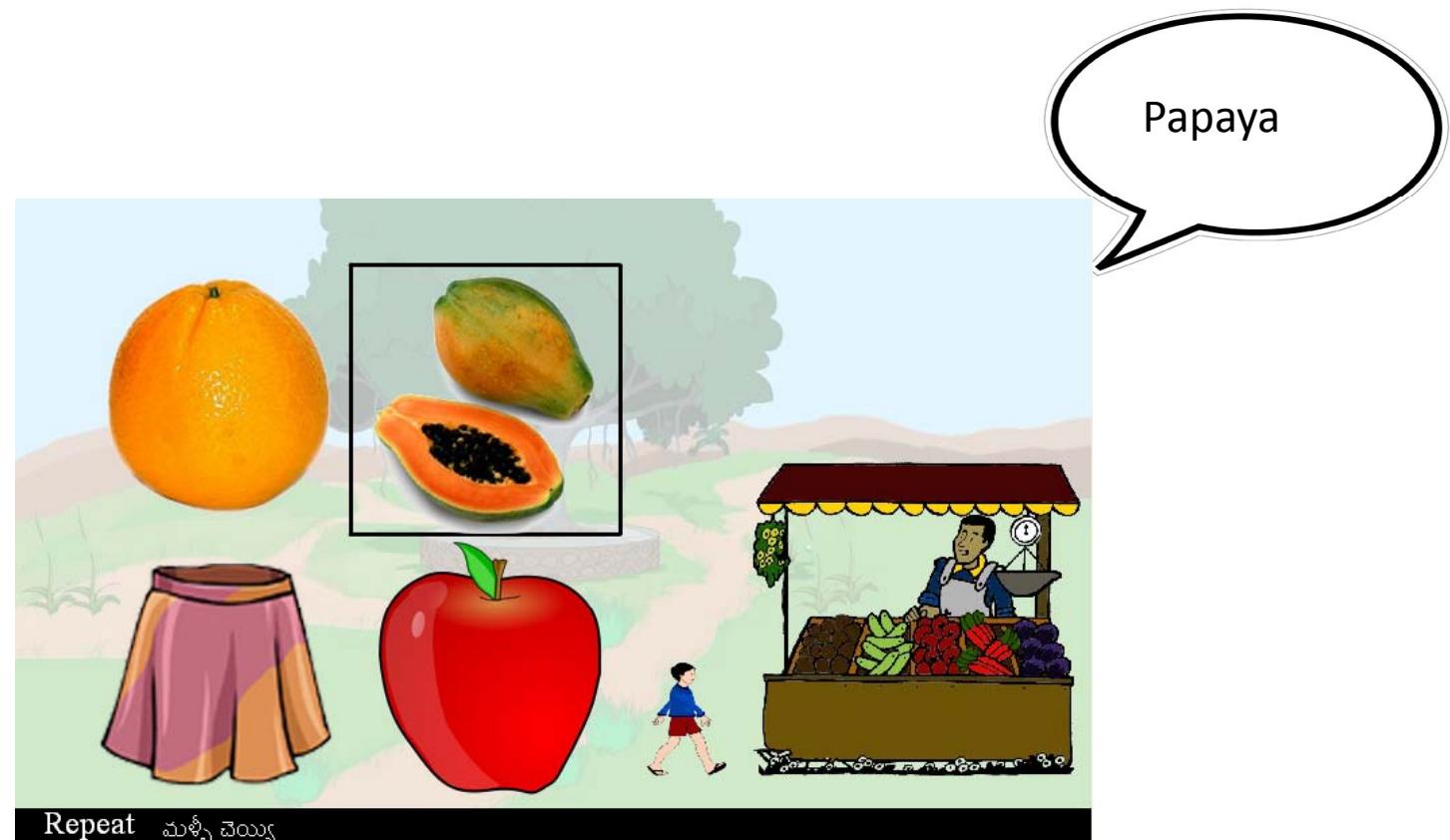
Condition 2: Productive Training

- Productive training group was shown an image (one at a time) that they had to recognize and say aloud



Condition 3: Receptive Training

- Receptive phonology group were shown four images, heard a word in English, and had to select the corresponding image



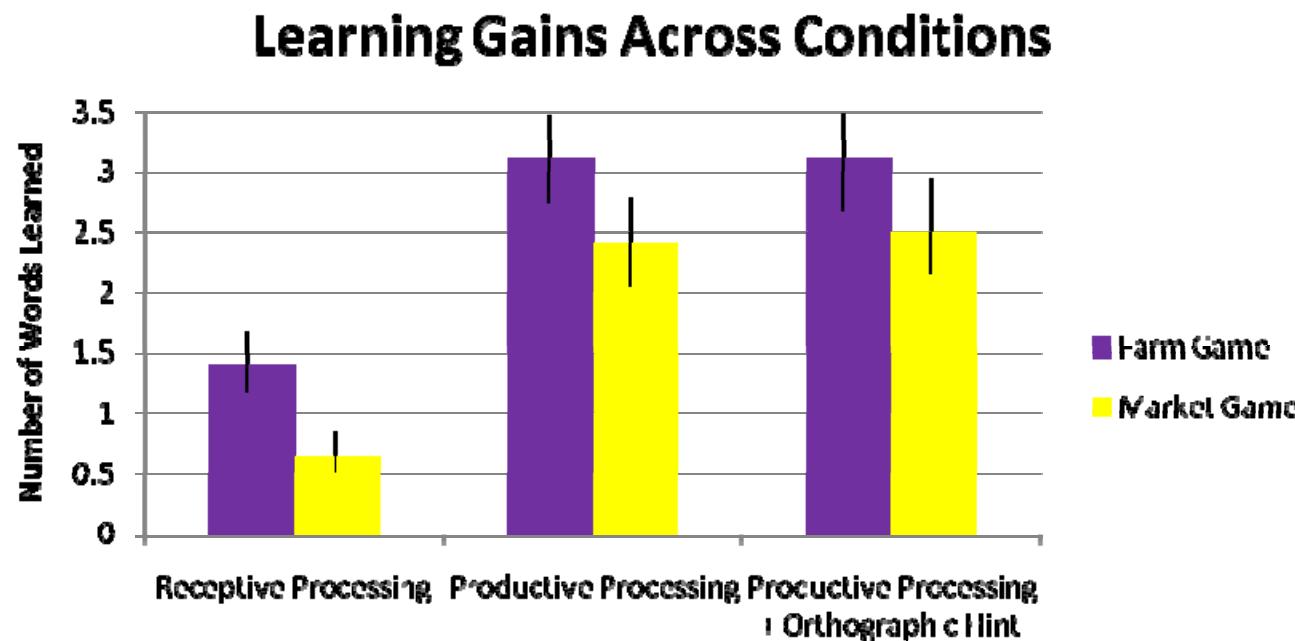
Outcome Variable: Word Recognition

- Word Recognition test



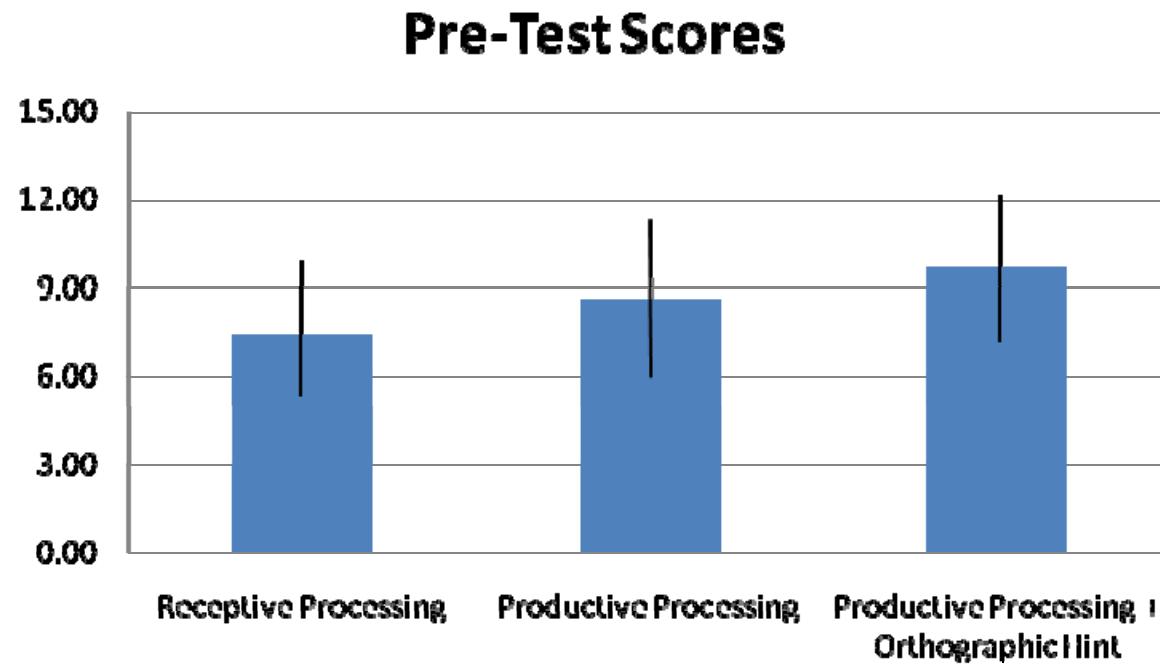
Data Collapsed across Games

- Combined scores across same conditions for both games because:
 - Similar data distribution
 - No significant difference in the gains across games for each condition



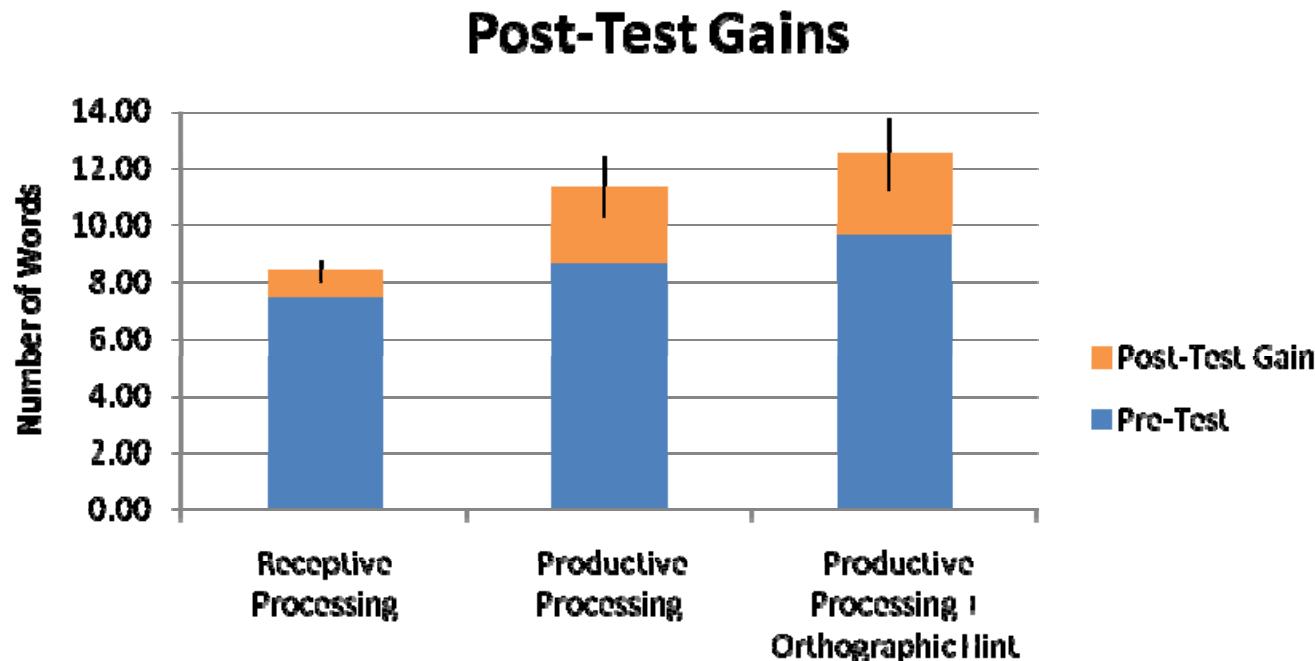
Pre-Test Scores

- Normal distribution of pre-test scores
- No significant difference between conditions



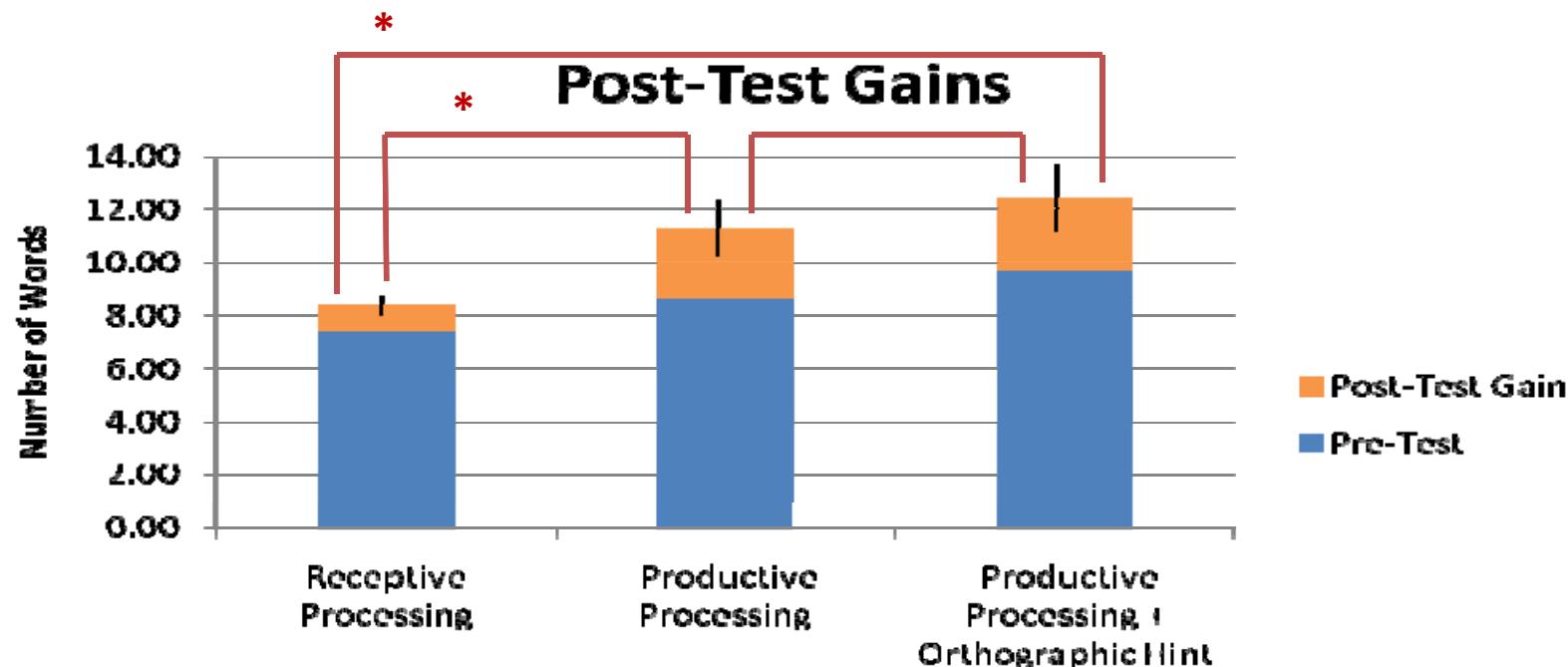
Learning Benefits

- After 30 minutes of game play there was
 - A gain of **1 new word** in the receptive condition ($p < .05$)
 - A gain of **2.7 new words** in the productive condition ($p < .01$)
 - A gain of **2.9 new words** in the productive + orthographic hint condition ($p=.01$)



Results – Gains Across Conditions

- Productive training led to significantly higher gains in word reading than receptive training ($p < 0.01$)
- Productive training with an orthographic hint lead to significantly higher gains than receptive training ($p < 0.01$)
- There was no significant difference between productive training and productive + orthographic hint training



Discussion

- *Hypothesis 1: Training the productive processing path will improve word recognition scores more than training the receptive processing path*
- Productive lexical processing training was better than receptive lexical processing training for word reading
- Voicing a word helps strengthen the link between the phonological and semantic representations
- Triggers a process that sends highly specified input back to your mind (De Bot, 1996)
- Highlights the role of training of productive skills even in receptive tasks (like reading)

Discussion

- *Hypothesis 2: productive + orthographic hint > productive > receptive*
- Training with the orthographic hint did not provide any additional benefit to word recognition
- Extra cognitive push that's needed without the orthography may help strengthen the lexical representation of the word
- Alternatively, the design of the game did not make orthographic hint salient enough (6 out of 21 said they did not notice the hint)

Implications and Future Work

- Theoretically, this study highlights the role of production in lexical processing for reading
- Further investigation of role of productive phonological awareness, grapho-phonological awareness in word reading
- Orthography component needs to be fine-tuned
- Need a delayed post-test
- Need larger sample size
- In the classroom, productive tasks take long and are individual-based; technology can help
- Case for mobile learning in the developing world



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