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The facilitatory role of regressions in recovery from processing difficulty: an application of the reverse boundary-change technique



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Background

What is the purpose of regressions?

- ▶ To re-sample previous input?
- ▶ To buy extra time? ("The function of the system is nothing more than that of postponing new input", Mitchell et al, 2008, JML)
 - ▶ n.b. *Time Out Hypothesis*, Mitchell et al (2008)

Ways to study regressions

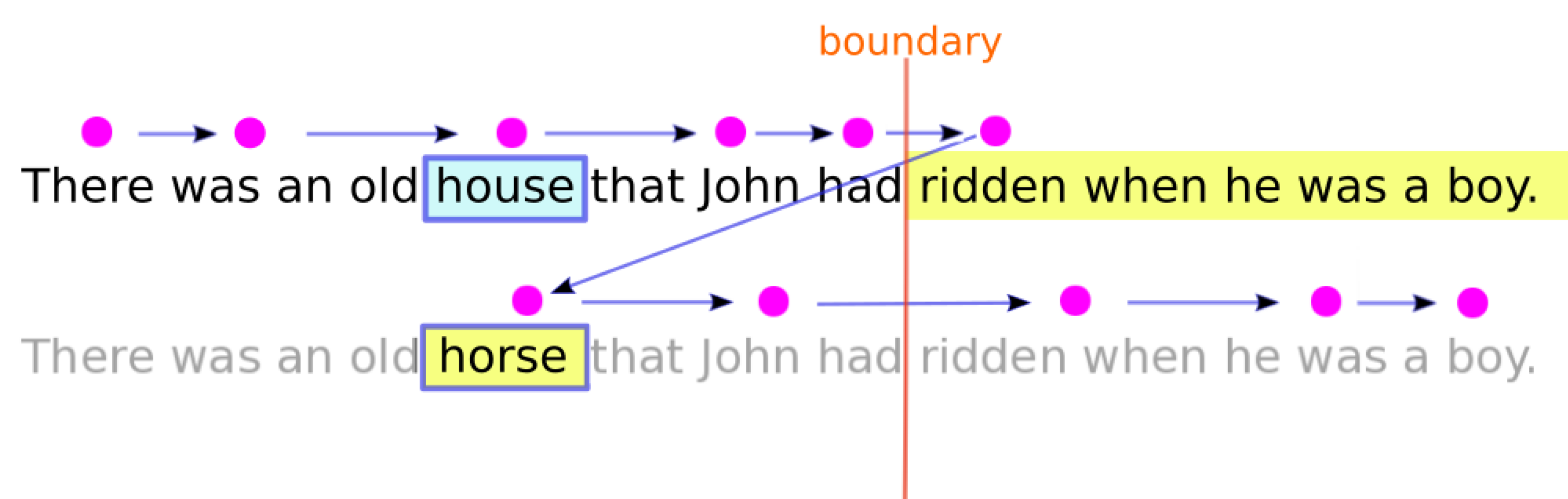
- ▶ Examine scan paths (eye-movement control point of view):
 - ▶ e.g. Mitchell et al (2008, JML); von der Marlsberg & Vasishth (2013, LCP)
- ▶ Examine the information that is processed during regressions:
 - ▶ e.g. Shotter et al (2014, Psych Science); Booth & Weger (2013, Memory & Cognition)

The current study

- ▶ We examine the information that is used during regressions, using the *reverse boundary change* technique
 - ▶ Is lexical information processed during regressions?
 - ▶ and is this information used to aid recovery from processing difficulty?
- ▶ Main aim is to test feasibility of using the technique.

The reverse boundary change technique

A word to the left of fixation is changed when the reader's gaze crosses an invisible boundary



Experiment

1a. Change condition

There was an old house > horse that John had ridden when he was a boy.
It couldn't run fast any more.

1b. Implausible condition (no change)

There was an old house that John had ridden when he was a boy.
It couldn't run fast any more.

1c. Plausible condition (no change)

There was an old horse that John had ridden when he was a boy.
It couldn't run fast any more.

Experimental setup

- ▶ Context word always used a lexical neighbour for change condition (e.g. house/horse)
- ▶ Pre-change word was higher frequency than post-change word (freq(house) > freq(horse)).
- ▶ In change and implausible conditions, sentence became implausible on critical post-boundary word (e.g. "ridden")
- ▶ In change condition, post-change context word ("horse") rendered the sentence plausible
- ▶ Items adapted from Slattery et al, 2009, JEP
- ▶ 48 items (i.e. 16 per condition per participant)
- ▶ 60 participants

Data analysis

Trial removal criteria

Trials were removed if BOTH (a) and (b) occurred before the reader crossed the boundary (< 1% of trials affected):

- (a) The change was triggered ("hook" saccade)
- (b) The reader fixated the changed word

Measures (analysed using (G)LMER)

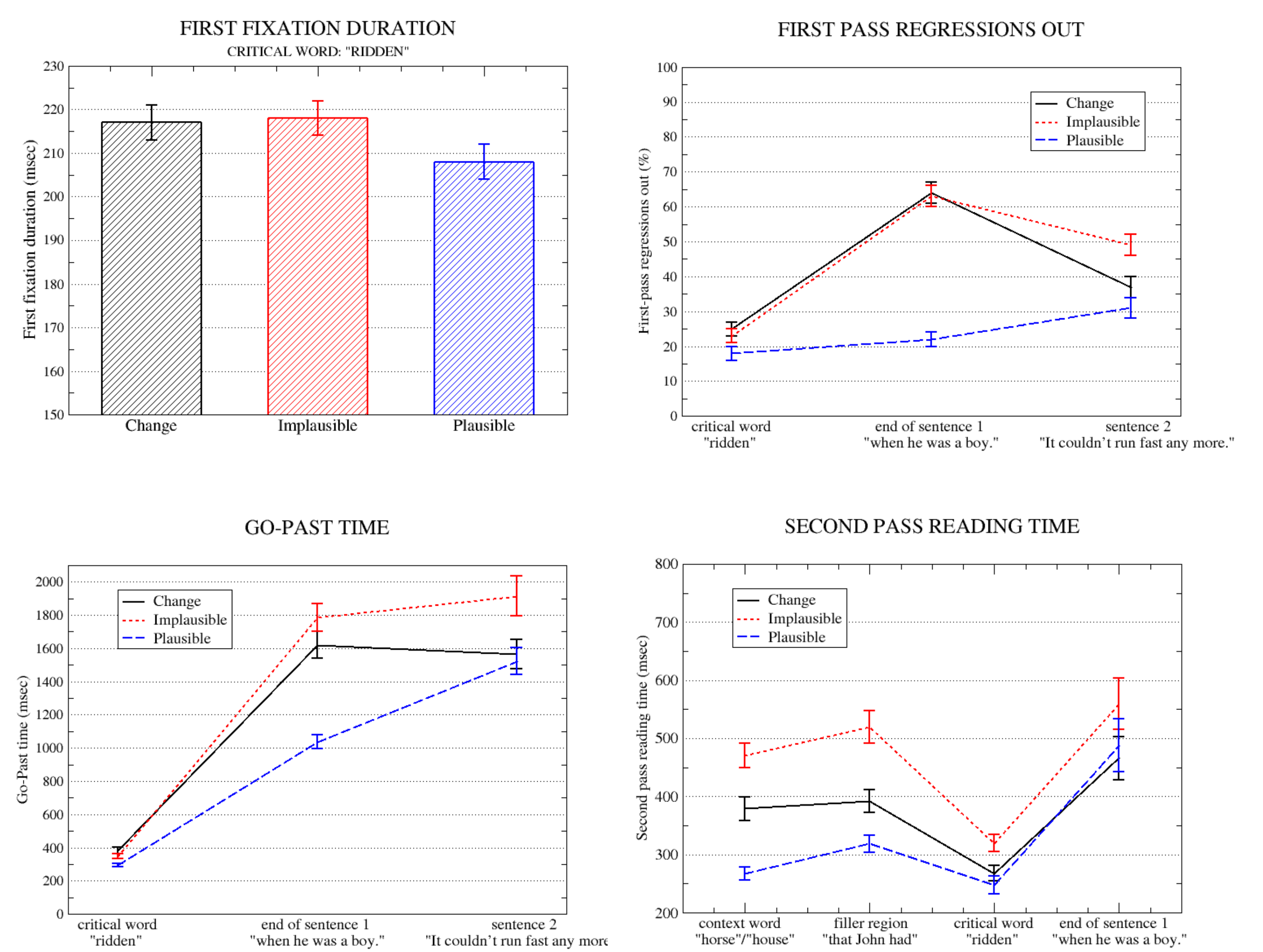
- ▶ First fixation (critical word only)
- ▶ First pass regressions
- ▶ Go-past
- ▶ Second pass

Analysis regions

There was an old house that John had ridden when he was a boy.

It couldn't run fast any more.

Results



Debriefing/Awareness of change

- ▶ Nearly all participants had a feeling that word changed in some trials
- ▶ Mostly, participants believed that they had initially mis-read the word
- ▶ (Possible worry of strategic processing; however, effect of condition did not interact with trial order)

Conclusions

- ▶ Lexical information is used during regressions, and can aid recovery.
- ▶ Regressions might serve to probe potential mis-perception of previous input (see also Levy et al, 2009)
- ▶ Reverse boundary change may be a useful technique for studying regressions.

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