Expecting the Unexpected: How discourse expectations can reverse predictability effects in reading time

Richard Futrell[a] & Hannah Rohde[b]
Stanford University[a], University of Edinburgh[b]
contact: futrell@stanford.edu

THE PROBLEM

Sentences are easiest to process when words that listeners encounter are **frequent or predictable given surrounding linguistic context** (Kliegl et al., 2004; Levy, 2008; among many others). However, hearers also expect discourse to convey **informative**, and therefore **unpredictable**, information (Grice, 1975; Shannon, 1948).

We investigate whether the **expectation of informativity** can:
(1) Make unpredictable words easier to process,
(2) Make **highly predictable words hard to process**, because they are **anomalously underinformative**.

THE EXPERIMENT

In a self-paced reading time study, we modulate readers' expectations about the surprisingness of upcoming material in a discourse.

- We describe an individual as either **boring** or **surprising**.
- Then we describe them using **predictable** or **unpredictable** instruments for some task (Brown & Dell, 1987).

Condition	Predicted reading times
Don't expect surprise	Predictable < Unpredictable
Expect surprise	Unpredictable < Predictable

Stimuli were presented using **Ibex** over **Mechanical Turk**. 110 subjects saw 4 target sentences each. Words were centered on the screen.

We did not analyze data from subjects who:
(1) Were not located in the United States,
(2) Did not answer every comprehension question correctly, or
(3) Had a mean reading time greater than 2 s.d. above or below the overall mean.

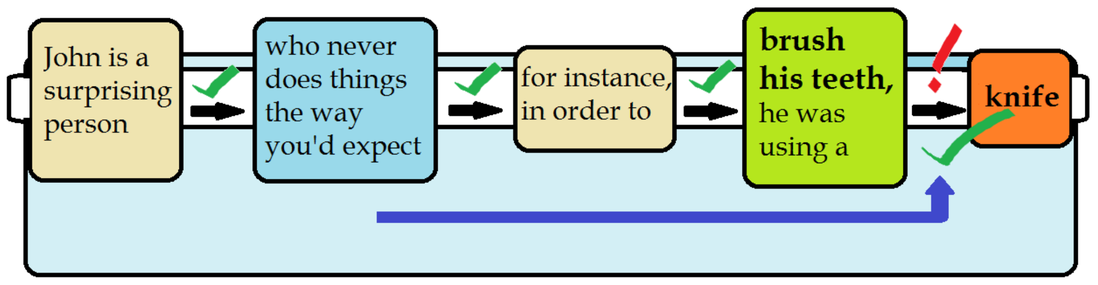

Figure 1: Expecting surprise. The word *knife* is unpredictable from previous context, but it is in line with the expectation of surprise.

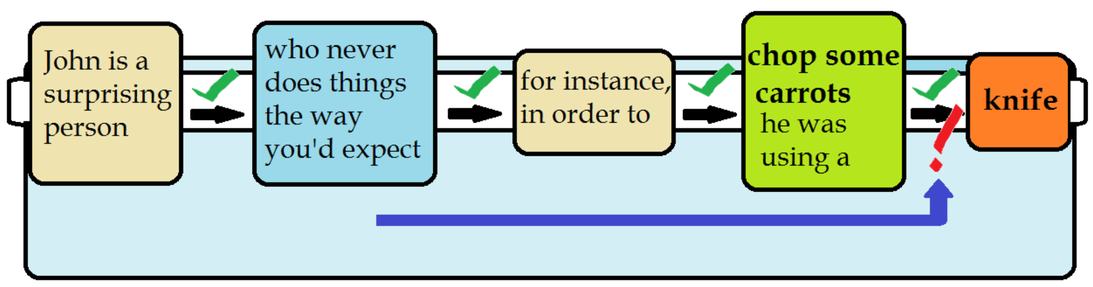

Figure 2: Anomalous underinformativity. The word *knife* is highly predictable from previous context—which conflicts with the discourse expectation.

Low-informativity expectation:
My classmate John is a boring person who always does things the way you'd expect.
a. locally predictable instrument ["don't expect surprise, don't get surprise"]
For instance, in order to chop some carrots, he was using a knife yesterday in the afternoon.
b. locally unpredictable instrument ["don't expect surprise but get surprise"]
For instance, in order to brush his teeth, he was using a knife yesterday in the afternoon.

THE RESULTS

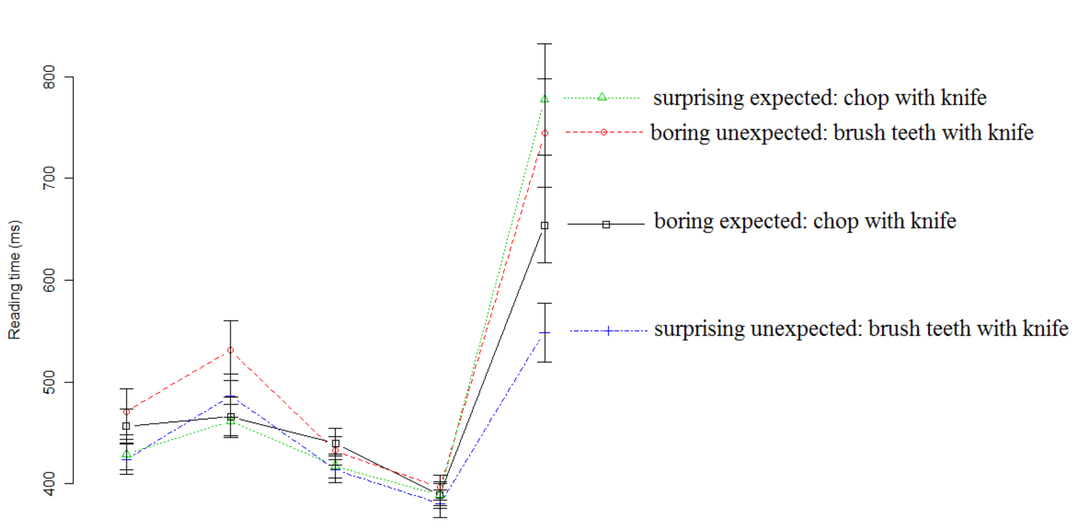

Figure 3. Reading times at the critical instrument and following words.

For reading times at **the final word**, we find the expected effect. When readers expect surprise, the **expected instrument** is **slower** than the **unexpected instrument**.

The interaction of local predictability and discourse expectation is significant by ANOVA ($F1(1,102) = 11.286$, $p = 0.001$; $F2(1,12) = 7.535$, $p = 0.018$) and in a mixed-effects model with subject and item as random intercepts ($p < 0.001$).

CONCLUSIONS

- To our knowledge these new findings are the first evidence of comprehension difficulty for material that is overly predictable from local cues.
- The results point to the importance of modeling comprehenders' pragmatic expectations about upcoming material—namely, their expectations about relevance and informativity.
- We are currently examining whether the same effects hold using **conventional linguistic markers of informativity**, such as **clefts**, and using adjuncts other than instruments.

THANKS & WORKS CITED

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