



wh-phrases in (c) do not share Case-features because the adjunct “where” is never Case-marked. That is, the degree of syntactic similarity in (e) is higher than in (c). According to Chomsky (1982, 1986, 1995) and subsequent work, even in (d) and (f), the relative pronoun “whom<sub>2</sub>” exists but bears no phonological features (the null operator analysis). Therefore, the degree of syntactic similarity between (d) and (f) is the same as the one between (c) and (e) while the degree of phonological similarity between (c) and (e) is higher than the one between (d) and (f). The (d)/(f) paradigm is for testing whether syntactic similarity effects are observed with phonologically null elements in the same manner as their overt counterparts.

To summarize the predictions: If reading times on “saved” in (e) are longer than in (c), this would suggest that accusative Case of “whom<sub>1</sub>” stored in memory interferes with the object retrieval at “saved”. If the same contrast between (c) and (e) is also observed between (d) and (f), this would suggest that phonological features do not interfere with the retrieval procedure and imply that the interference effect in (c) and (e) is not due to phonological overlap.

**3. Method & Results** 61 undergraduates from University of Michigan participated in a word-by-word self-paced non-cumulative moving-window reading task. 24 versions of each of the experimental items were prepared; thus each subject saw 4 versions of each condition. Presentation was randomized with about 2/3 of the trials being unrelated filler sentences. Each sentence was followed by a comprehension question. Six subjects were eliminated because their accuracies were lower than 70 percent. One subject was eliminated because his/her reading times were extremely fast and low-variance, indicating a uniform tapping strategy to advance the moving window. Data from the remaining 54 subjects were analyzed. We report here analysis from trials on which subjects responded correctly to comprehension questions, although the conclusions do not differ if all trials are included. Reading times smaller/greater than 4 standard deviations from the mean were excluded; this affected 1.5% of the data. We focus here on reading times at the critical verb, which is the same lexical item (e.g., *saved*) across conditions. The following are the empirical means of reading times (RT) at this verb:

<i>Condition</i>	a	b	c	d	e	f
<i>Mean RT (ms)</i>	438	449	460	447	509	490

The estimates of reading times between conditions were derived from linear mixed effects models with both subject and item entered simultaneously as random effects. The derived estimates, 95% highest posterior density intervals, and corresponding observed p-values were as follows:

<i>Contrast</i>	<i>Empirical RT difference</i>	<i>model estimate</i>	<i>95% HPD interval</i>	<i>p-value</i>
e vs. c	49 ms	45ms	[ -6ms, 96ms ]	0.08
f vs. d	43 ms	45ms	[ -6ms, 93ms ]	0.07
e/f vs. c/d	46 ms	45ms	[10ms, 80ms ]	<b>0.01</b>

The [e vs. c] and [f vs. d] contrasts are marginally significant, and the overall interference effect is highly significant. There was not a significant effect of relative pronoun reduction ( $p > 0.6$ ), either in pairwise contrasts (a vs. b, c vs. d, and e vs. f) or overall (a/c/e vs. b/d/f).

**4. Discussion** The predicted online interference effects were obtained. “whom<sub>1</sub>” creates proactive interference when the object (“whom<sub>2</sub>”) is retrieval at the verb (*saved*) (the (c) vs. (e) contrast). Interference effects were also observed in effect in the reduced relative pronoun counterparts (d)&(f), and there is no evidence for a difference in the size of this effect. That is, phonological features do not induce further interference here. (Although we do not present the details here, the accuracy data from comprehension questions show the same pattern, though the differences do not reach significance.) These results provide further evidence for the general view of similarity-based retrieval interference outlined above, but also lend support for two additional and more specific claims. First, not all features are equal with respect to causing similarity-based interference in parsing. More specifically, these results lend support to the hypothesis that Case or structural position features—syntactic features—play a clear functional role in parsing, while phonological features do not. Second, this result, combined with the retrieval interference interpretation, provides online evidence for the hypothesis that (d)&(f) contain (phonologically-null) relative pronouns marked by accusative Case, as in Chomsky’s (1982, 1986,1995) null operator analysis, which suggests that only phonological features of relative pronouns are missing but other features including Case-features still exist.