



interference effects). Meanwhile, Warren & Gibson (2002, 2005)'s complexity rating study, observed that the parser is sensitive to the gradient status of a distractor in discourse, following the Givenness Hierarchy ("GH": Ariel, 1990; Gundel, Hedberg, & Zacharski, 1993). For example, a distractor that is most central in the discourse (e.g. *pronoun*) causes the least processing cost, followed by less central NPs on the hierarchy (e.g. *definite, indefinite descriptions*) [pronouns > first names > full names > definites > indefinites] (Warren & Gibson, 2002: p.87). Gordon et al (2001)'s experiment therefore does not allow for teasing apart the givenness hierarchy effects from similarity-based effects. On this view, this paper explores whether the interference effect of a distractor is truly a similarity effect or is in fact a more fine-grained discourse-level of the semantic hierarchy, or both.

## Experiment 1

This experiment had a 2 x 3 design, crossing two NP types of the filler in the clefted (NP1) position and three NP types of a distractor in the embedded NP (NP2) position: [definite descriptions, indefinite descriptions] x [definite descriptions, indefinite descriptions, pronouns].

- (2) It was {the actor/an actor} who {we /the director/a director} graciously thanked before the show.

The similarity-based interference hypothesis predicts that matching NP2s which featurally match with NP1s should lead to increased processing difficulty, as reflected in longer reading times at the main verb (e.g. *thanked*). The discourse hierarchy, in contrast, predicts a main effect of NP2 type: the fastest reading times when NP2 is a pronoun (e.g. *we*) condition, longer when it is a definite description (e.g. *the director*), and longest when it is an indefinite description (e.g. *a director*).

Thirty-six native speakers of English were recruited using Amazon's Mechanical Turk. The task was a self-paced reading using a moving window display. Participants read items like (2), each of which was followed by a comprehension question. The experiment lasted approximately 25 min. Experimental materials consisted of 24 sets of 4 items in each of the 6 conditions, plus 26 filler sentences.

A linear mixed-effects model revealed no main effect of NP1 type ( $t=-0.62$ ,  $p=.54$ ) at the critical verb region (e.g., *thanked*). In terms of the NP2 type, the pronoun condition was approximately 60ms faster than the indefinite condition and 90ms faster than the definite condition. The model revealed a significant effect of NP2, in that the pronoun condition was read significantly faster than the averaged definite and indefinite conditions ( $t=-3.60$ ,  $p < .001$ ). Surprisingly, the overall reading times of definiteness conditions in NP2 type averaged 29ms faster than the overall reading times of indefiniteness conditions. A marginal

effect of definiteness was found between the definite and indefinite conditions ( $t=1.78, p=.07$ ).

These findings cannot be not fully accounted for either by the GH or the similarity-based interference effect. The GH predicted more processing difficulty of indefinite descriptions than definite descriptions. The similarity-based interference effect predicts higher reading times in the definite-definite condition and, the indefinite-indefinite condition, which we did not observe. We conclude that the difficulty of definiteness found by Gordon et al. is due *neither* to similarity *nor* givenness and hypothesize that it instead arises from the absence of a prior context which would provide a (unique) referent for a definite NP, thus making difficult to satisfy the uniqueness presupposition for the (English) definite determiner (Löbner, 1985). We test this in Experiment 2.

## Experiment 2

Experiment 2 focused exclusively on the definite-indefinite contrast, aiming to examine whether the difficulty of definiteness in Experiment 1 is attenuated with the right contextual support. We included contexts favoring either definite intervenors (unique referent) or indefinite intervenors (two possible referents) and crossed this with NP2 type (definite or indefinite), in a 2x2 design in which NP1 was always definite, as in Table 1.

Table 1. Sample item set for Experiment 2

	Indefinite NP2	Definite NP2
<u>Context favoring <b>DEF</b> NP2:</u> John, an actor, and Matt, <b>a director</b> , were at the coffee shop. They met Andy, <b>a writer</b> , who graciously thanked John for his incredible performance in the latest movie.	Target TRUE/FALSE sentence:  It is the actor [who <b>a</b> writer graciously thanked for the incredible performance].	Target TRUE/FALSE sentence:  It is the actor [who <b>the</b> writer graciously thanked for the incredible performance].
<u>Context favoring <b>INDEF</b> NP2:</u> John, an actor, and Matt, <b>a writer</b> , were at the coffee shop. They met Andy, <b>another writer</b> , who graciously thanked John for his incredible performance in the latest movie.		

We created 16 sets items, presented in 4 lists according to Latin square. Participants ( $n=33$ , recruited on Murk) read the context (as a whole) and then the target TRUE/FALSE sentence, (region-by-region). At the verb, there were no main effects either of context type or of NP2 (i.e., distractor) type on RTs ( $p_s > .25$ ), but the interaction was significant ( $t= -2.5; p= .013$ ), meaning that the

effect of definiteness of NP2 differed according to context type. Planned comparisons showed no effect of NP2 type in the contexts favoring **definites** ( $p = .4$ ) but in the contexts favoring **indefinites**, the indefinite distractor condition was read significantly faster than the definite intervenor condition (431ms vs 523ms,  $t=-2.5$ ,  $p=.007$ ). We interpret this finding to indicate that the processing difficulty of definite distractors, which need to accommodate the presupposition, arises from the absence of a unique referent (as in indefinite-favored contexts). This effect disappears when contextual support provides an appropriate referent (as in definite-favored contexts).

### General discussion

The overall findings show that NP types of distractors modulate the processing of filler-gap dependencies. However, neither (i) similarity nor (ii) givenness underlies the difficulty of processing definite distractor NPs. More fine-grained discourse of an intervenor, involving the accommodation of uniqueness presupposition, mediates filler-gap dependency formation of this type.

### References

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