

## The impact of resolved filler-gap dependencies on later dependency formation

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Although the time course and licensing conditions for filler-gap dependency (FG-D) formation have been characterized in detail, less well understood are the underlying operations and representations. Filler access time at the foot of a dependency is known to be invariant across dependency lengths [1]. But direct access of this sort is contended not to stem from a distinguished representational state for the filler [cf.2], but instead an architecture where syntactic context is accessed via cue-directed retrieval [1,3]. Recent results consistent with this view indicate dependency resolution is liable to interference effects from (syntactically un-integrated) words in a memory task [4]. Here we consider a novel question: whether an intervening but already satisfied filler can interfere with dependency resolution. We present evidence that completing a filler-gap dependency is not harder when a resolved filler-gap dependency intervenes. These results restrict the role of interference in dependency resolution, since a highly similar candidate filler can be disregarded.

To test whether an intervening FG-D could cause interference in later dependency resolution, we used the self-paced reading task. Target items were embedded questions in which a subject-attached clause intervened between the embedded clause edge and verb. In a 2x2 design, we manipulated whether the embedded question constituted a FG-D [+FG] or an if-clause [-FG]; and whether the head of the subject-attached clause was a potential interfering distractor. In [+INTERFERENCE] conditions, a relative clause intervened, thus interposing another FG-D (Ex.A). The head of this dependency should be an especially strong interferer, since it occupies a structurally-similar position and potentially shares syntactic features with the target filler. In [-INTERFERENCE] conditions, a noun complement clause intervened, whose head has none of those properties (Ex.B).

If intervening but syntactically irrelevant fillers cause interference in dependency resolution, we predict increased reading times for verbs in FG-Ds [+FG], in [+INTERFERENCE] conditions compared to [-INTERFERENCE] conditions. Contrary to this prediction, verbs in embedded questions are actually read faster when a relative clause intervenes, rather than more slowly, regardless of the presence of a FG-D (INTERFERENCE  $F_1:4.68, p<0.05$ ; FG  $F_1<1$ ). A slight INTERFERENCExFG interaction is suggested, but opposite the predicted direction ( $F_1:2.57, p\sim0.11$ )\*.

A second notable effect occurs at the subject-attached clause verb position. For [+FG] sentences, reading times were reliably slower here, regardless of whether the clause disambiguated as a relative clause or a noun complement. A slight clause type effect may be present (slower for RC), but there is no interaction (FG  $F_1:5.89, p<0.02$ ; INTERFERENCE  $F_1:2.70, p\sim0.10$ ; INTERFERENCExFG  $F_1<<1$ ).

Resolving FG-Ds is evidently not harder if a completed dependency intervenes. We argue that either retrieval of candidate fillers must be structure-sensitive, or that completed dependencies are so re-encoded as to render fillers inaccessible qua fillers. However, if the difficulty observed in the subject-attached clause is taken to reflect internal FG-D resolution, then filler retrieval may not be fully accurate when multiple dependencies are open. Additionally, if FG-D formation does proceed before RC/NC ambiguity resolution, then we corroborate an earlier finding that RC analyses are computed despite any noun complement preference [5].

## SUPPORTING MATERIAL

### (Ex. A) +INTERFERENCE x FG: { + what / - if }

The thief questioned { what / if } the rumor that [RC his accomplice foolishly spread \_\_\_\_ about his technique ]  
inadvertently revealed { \_\_\_\_ / anything } to the police.

### (Ex. B) -INTERFERENCE x FG: { + what / - if }

The thief questioned { what / if } the rumor that [NC his accomplice foolishly joked about his technique ]  
inadvertently revealed { \_\_\_\_ / anything } to the police.

\*By linear mixed-effects model: INTERFERENCE, FG, and INTERFERENCExFG are fixed effects and nested under subjects (N=31) as random factors. Word length included as a covariate. Estimated statistical power (1- $\beta$ ) for this dataset: 0.98 for 30 ms mean offsets; 0.79 for 20 ms.

## REFERENCES

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- [5] Pearlmutter N & A Mendelsohn. Serial v. parallel sentence comprehension. Ms.