

Early participant role commitments have their greatest impact on the integration of unpredictable role fillers

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Many types of contextual constraints might affect the integration of linguistic material. Using a visual world paradigm, Bienvenue et al. (2007) and Sussman (2006) found that listeners anticipated the mention of specific instruments when they encountered verbs that semantically required (or were strongly associated with) an instrument. In sentences containing optional instrument verbs that described actions that could be done without an instrument, looks to instruments did not occur until they were mentioned. Presumably encountering verbs that require an instrument increase the likelihood that readers will anticipate a specific instrument, and do so early on. This would account for Yun et al.'s finding that instrument PPs are integrated more easily following obligatory instrument verbs than following optional instrument verbs. An alternative explanation for this finding is suggested by Roland et al. (2012), who showed that instrument PPs are more easily integrated when they are more semantically similar to other possible instruments. Verbs describing actions requiring an instrument might tend to have a much smaller, more semantically similar set of possible instruments than actions that can be performed without an instrument, which was not controlled in Yun et al. We explored whether the integration of instruments into declarative sentences is influenced by whether the presence of an obligatory or optional instrument verb leads readers make an early or late commitment to a specific instrument, when predictability and semantic similarity is controlled.

We presented sentences like (1-2), in which verbs either semantically required (jab) or merely allowed (attack) an instrument. Instrument predictability was high (sword/knife), medium (spear/stick), or low (spike/club) for online reading. Data were analyzed using mixed-effect linear regression. The dependent variable was the reading time of instrument NPs; fixed factors were the predictability of instruments (log-cloze probability), LSA semantic similarity between the target filler and the other possible fillers, and the frequency and length of target instruments; participants and items were random factors.

In addition to replicating Roland et al., Table 1 reveals that whether readers made early commitments to specific instruments interacted with instrument predictability. Readers had more difficulty integrating semantically required instruments than semantically optional instruments only when they were unpredictable. Whether readers made early instrument commitments interacted with semantic similarity and predictability. Only highly predictable instruments that were more semantically similar to other instruments were read faster, regardless of whether readers made early instrument commitments. But, only unpredictable instruments to which readers had not made an early commitment were facilitated by semantic similarity.

While early commitment to specific instruments may provide little discernable benefit when they are already highly predictable and similar to other instruments, readers apparently do make early commitments when verbs semantically require instruments. Specifically, early commitments have deleterious effects when unexpected instruments are encountered (see also Schwanenflugel & LaCount, 1988). This finding, like Roland et al.'s finding that semantic similarity influences instrument filler integration, reveals the limitations of models that propose that the processing of words should be equally difficult if their probabilities are equivalent at the point when they occur (Levy, 2008).

(1) The gladiator | jabbed | the African tiger | with | a sword/spear/spike | in | the Colosseum.

(2) The aborigine | attacked | the angry lion | with | a knife/stick/club | in | the field.

Table 1. Summary of key results

	Coefficient	S.E.	t -value
Predictability	-63.66	10.97	-5.80
Similarity	-209.55	76.30	-2.75
Predictability x Verb Type	-46.84	20.01	-2.34
Predictability x Verb Type x Similarity	-867.76	212.85	-4.08