

## Effects of animacy and unaccusative verb type on “transitivity bias”

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Many studies have found that sentence processing is uniquely affected by noun animacy, which provides bases for predictions about thematic role assignment in conjunction with particular verbs<sup>1,2</sup>. For example, animate subject nouns are one cue that allow predictions to be made concerning the sense and argument structure of upcoming verbs, as both animacy and subjecthood are associated with an Agent thematic role. Research with garden-path sentences suggests that people tend to initially interpret sentences as having a transitive construction even when the verb is necessarily intransitive<sup>3</sup> (non-alternating unaccusative (NU) verbs, e.g., *arrive*, *die*). However, no existing research has investigated whether inanimate subject nouns modulate this *transitivity bias*, in particular with NU verbs, which assign a non-agentive Theme/Patient role to the subject.

Previous research with garden-path sentences using verbs that alternate between transitive and intransitive readings (i.e., alternating unaccusative (AU) verbs, e.g., *freeze*, *stop*), shows that reading time increases at a later disambiguating verb for animate subjects even when the potential object noun is implausible (e.g., as the chef froze the meal *arrived...*), but that this effect was highly reduced when the subject was inanimate (e.g., as the wine froze the meal *arrived...*)<sup>4</sup>. However, inanimate subjects did lead to a post-verbal increase in reading time, occurring at the same point in the sentence as the above transitivity bias effect. We carried out two self-paced reading studies to examine how subject and object animacy and verb type influence sentence processing. Each experiment tested both animate and inanimate subject nouns with AU and NU verbs in early-closure garden-path sentences. In Experiment 1, the post-verbal noun was inanimate and thus a bad candidate for a new clause subject and a good candidate for a dependent clause object; in Experiment 2, the second noun was always animate. True transitivity bias effects should appear at the post-verbal noun (e.g., *the meal* below) in NU sentences regardless of animacy; however, we asked whether animacy influences this effect. If inanimate-subject AU and NU sentences have lower reading times than animate-subject NU sentences, it would suggest that inanimate subject nouns are taken as thematic Patients early on, influencing predictions about upcoming clausal structure. If so, animate AU sentences should be the only stimuli showing garden-path effects at the disambiguating regions.

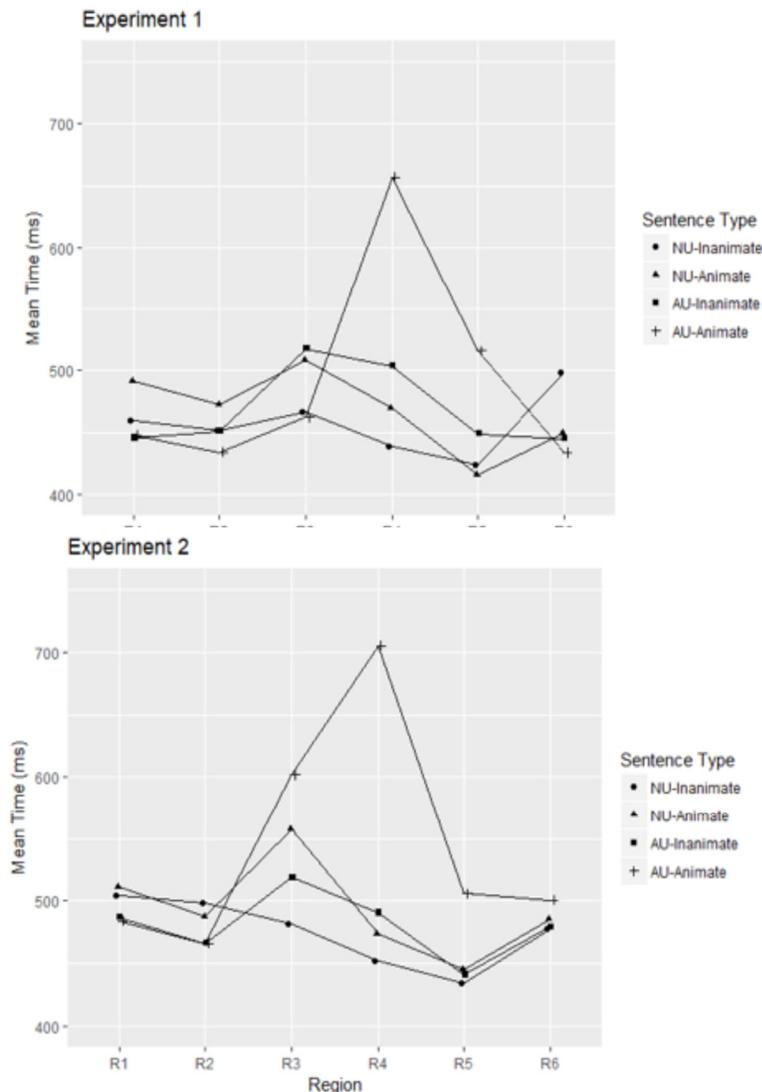
14 AU and 14 NU verbs with 28 animate and inanimate subjects were selected and combined into 28 stimuli matched in all but the initial noun. Between experiments the second noun and disambiguating verb differed. 14 distractor and 42 filler sentences were created and employed. Six main regions were of interest: an initial verb (R1), a determiner and post-verbal noun object (R2, R3), an initial disambiguating region (R4, R5), and a final disambiguating verb (R6) – these were followed by a prepositional phrase in order to avoid wrap-up effects. Reading times at R2 and R3 combined found results in support of N1 animacy influencing transitivity bias effects: mixed effects regression analyses found a main effect of animacy ( $p = 0.036$ ) and an interaction between verb type and animacy ( $p < 0.001$ ), in Exp. 1, and a main effect of animacy ( $p = 0.022$ ) in Exp. 2. In neither experiment did inanimate NU and AU verbs differ significantly. Animate AU sentences alone led to garden-path effects in both experiments. Analysis of individual regions found a main effect of animacy at R3 for NU verbs in Exp. 2, but not in Exp. 1.

The results support a view of sentence processing in which sentential structure is updated incrementally. After an animate subject noun, readers show difficulty assigning a Patient role to the post-verbal noun phrase with NU and AU verbs; with inanimate nouns this difficulty is mitigated. That NU verbs are sensitive to subject animacy is a novel finding, and suggests that (in)animacy influences expectations about thematic-argument structure. Further research should be done with eye-tracking measures and control for individual verb preferences.

## Sample Stimuli

	A) Non-Alternating Unaccusative	B) Alternating Unaccusative
1) Experiment 1: <i>Animate-Inanimate</i>	As the chef [arrived] <sub>R1</sub> [the] <sub>R2</sub> [meal] <sub>R3</sub> [was] <sub>R4</sub> [being] <sub>R5</sub> [served] <sub>R6</sub> at the restaurant.	As the chef [froze] <sub>R1</sub> [the] <sub>R2</sub> [meal] <sub>R3</sub> [was] <sub>R4</sub> [being] <sub>R5</sub> [served] <sub>R5</sub> at the restaurant.
2) Experiment 1: <i>Inanimate-Inanimate</i>	As the wine [arrived] <sub>R1</sub> [the] <sub>R2</sub> [meal] <sub>R3</sub> [was] <sub>R4</sub> [being] <sub>R5</sub> [served] <sub>R6</sub> at the restaurant.	As the wine [froze] <sub>R1</sub> [the] <sub>R2</sub> [meal] <sub>R3</sub> [was] <sub>R4</sub> [being] <sub>R5</sub> [served] <sub>R5</sub> at the restaurant.
3) Experiment 2: <i>Animate-Animate</i>	As the chef [arrived] <sub>R1</sub> [the] <sub>R2</sub> [guest] <sub>R3</sub> [was] <sub>R4</sub> [being] <sub>R5</sub> [served] <sub>R6</sub> at the restaurant.	As the chef [froze] <sub>R1</sub> [the] <sub>R2</sub> [guest] <sub>R3</sub> [was] <sub>R4</sub> [being] <sub>R5</sub> [served] <sub>R5</sub> at the restaurant.
4) Experiment 2: <i>Inanimate-Animate</i>	As the wine [arrived] <sub>R1</sub> [the] <sub>R2</sub> [guest] <sub>R3</sub> [was] <sub>R4</sub> [being] <sub>R5</sub> [served] <sub>R6</sub> at the restaurant.	As the wine [froze] <sub>R1</sub> [the] <sub>R2</sub> [guest] <sub>R3</sub> [was] <sub>R4</sub> [being] <sub>R5</sub> [served] <sub>R5</sub> at the restaurant.

## Figures



## References

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