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## Animacy and competition in relative clause production: A cross-linguistic investigation

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### ABSTRACT

This work investigates production preferences in different languages. Specifically, it examines how animacy, competition processes, and language-specific constraints shape speakers' choices of structure. English, Spanish and Serbian speakers were presented with depicted events in which either an animate or inanimate entity was acted upon by an agent. Questions about the affected participant in these events prompted the production of relative clauses identifying these entities (e.g., *the bag the woman is punching*). Results indicated that in English, animacy plays a strong role in determining the choice of passive structures. In contrast, it plays a less prominent role in Spanish and Serbian structure choices, where more active structures were produced to varying degrees. Critically, the semantic similarity between the agent and the patient of the event correlated with the omission of the agent in all languages, indicating that competition resulted in the agent's inhibition. Similarity also correlated with different functional choices in Spanish. The results suggest that similarity-based competition may influence various stages of production planning but its manifestations are constrained by language-specific grammatical options. Implications for models of sentence production and the relationship between production and comprehension are discussed.

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## 1. Introduction

Most thoughts that people express in language can be produced in several different ways, varying in sentence structure, lexical choices, and other dimensions. For example, when asked which book one

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is reading, one may reasonably answer *the book that was recently banned by the Saudi government*, or *the book that the Saudi government recently banned*. A blend of these two, such as *the book that was recently the Saudi government banned*, does not provide a grammatical answer, however. Together, these facts present some of the key challenges in language production—various options exist for a speaker to convey a thought, but a single one of these options must be rapidly and uniquely adopted in order to produce coherent utterances. Research in sentence production seeks to explain how speakers and writers converge on a single produced form over other alternatives, because producers' utterance choices across varying environments should be informative about the underlying production mechanisms.

Production planning, including converging on utterance forms, is thought to be governed by production efficiency (Bock & Levelt, 1994; Ferreira, 1996; Ferreira & Swets, 2002; Smith & Wheeldon, 1999). By uttering more readily produced or *accessible* portions of an utterance early, additional time is gained to plan less accessible components, thus maximizing fluent incremental production (De Smedt & Kempen, 1987; Kempen & Hoenkamp, 1987; Levelt, 1989). Very often, placing some element early in the utterance plan has the effect of constraining the form of the rest of the sentence, so that syntactic structure emerges not from deliberate choices of the production system but as a consequence of accessibility-based entrance of words into the utterance plan (Bock, 1987). Accessibility is understood as the ease with which a word, phrase or concept is retrieved from memory: some elements, by virtue of being short, frequent or conceptually salient, require less retrieval effort and thus tend to be uttered early in the sentence (Bock, 1987; Bock & Irwin, 1980; Bock & Warren, 1985; McDonald, Bock, & Kelly, 1993). Animate nouns in particular have been shown to be more accessible than inanimate nouns, due to their conceptual salience. Animates' heightened accessibility thus influences choices of active vs. passive structures or double object vs. prepositional dative forms (McDonald et al., 1993). English speakers, for example, have a tendency to locate animate concepts in early sentence positions, even when they are not agents: the passive *The boy was hit by the truck* is preferred over the active *The truck hit the boy* (Bock, Loebell, & Morey, 1992; Clark, 1965). This tendency has often been cast in terms of subject function because in English, first-mentioned words are strongly correlated with syntactic subjects, although in other languages, animacy (and other factors) may also influence word order (i.e., early mention) in addition to syntactic function (Branigan, Pickering, & Tanaka, 2008; Prat-Sala & Branigan, 2000; Tanaka, Branigan, McLean, & Pickering, 2011; Yamashita & Chang, 2001).

In contrast to these effects of animacy on the structure of simple sentences, less is known about the role of animacy in the production of more complex structures such as relative clauses (see Gennari & MacDonald, 2009). Relative clauses are thought to function like predicates or modifiers of a head noun, e.g., in *the book that I bought*, the relative clause *that I bought* modifies the noun *book* (Chierchia & McConnell-Ginet, 1990). According to some descriptions based on corpus studies, the discourse function of relative clauses is either to ground the head entity with respect to given information in the discourse or to provide a characterization of it (Fox & Thompson, 1990). Relative clauses are an excellent domain in which to investigate how producers converge on utterance choices, for several reasons. First, unlike main clauses in which passives and actives have different noun orders, the head of the relative clause in English invariably takes the initial position in the structure by virtue of discourse considerations and language-specific constraints (e.g., English is a head-first language, meaning that the head of the relative clause precedes the relative clause). In examples (1)–(4), for instance, the head noun *man/bag* must occur at the start of the clause, and only the subsequent noun–verb order in the relative clause differs in active and passive structures. Thus, factors other than those operating in simple sentences may play a role in relative clause production.

- (1) *Animate Head, Passive*: The man (who's) being punched (by the woman).
- (2) *Animate Head, Active*: The man (who, that) the woman is punching.
- (3) *Inanimate Head, Passive*: The sand bag (that's) being punched by the woman.
- (4) *Inanimate Head, Active*: The sand bag (that) the woman is punching.

Second, both passive and active relative clauses are relatively common in English, and their production frequency has been shown to vary as a function of head-noun animacy (Gennari & MacDonald,

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