



## Accessibility effects on production vary cross-linguistically: Evidence from English and Korean



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### ABSTRACT

Previous work on English suggests that accessibility of individual lexical items plays an important role in shaping speakers' choice of sentence structure, providing evidence for lexically incremental production. In order to investigate the role of accessibility in cross-linguistic production, we manipulated accessibility in English and Korean via semantic priming in Experiment 1 and visual cueing in Experiment 2. We recorded English and Korean speakers' speech and eye movements as they described pictured events. The production results show that English speakers' choice of sentence structure was significantly affected by semantic priming or visual cueing, consistent with the findings of prior research: Priming the patient entity significantly increased the production of passive sentences. In contrast, Korean speakers' choice of sentence structure was not influenced by accessibility of lexical items. Analyses of participants' eye-movements are consistent with the production results. In Experiment 1, English speakers fixated the semantically primed entity in the visual scene, whereas Korean speakers did not. Even when the visual cueing manipulation drew Korean speakers' focus of attention toward the cued entity in Experiment 2, Korean speakers' choice of the first referent was not influenced by the lexical accessibility. These findings strongly suggest that lexically incremental production is not a universal production mechanism. In light of the typological differences between English and Korean, we suggest that the relative contributions of accessibility during language production are mediated by the grammatical constraints of a language.

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### Introduction

A considerable body of psycholinguistic research on language production focuses on the production of single words. The production processes that underlie word production are fundamental to the understanding of the production architecture, as words are the building blocks of language. Yet, words rarely occur alone. In order to convey a complete thought, speakers often need to put more than one word together into a sentence. The process of

retrieving and assembling words into sentences is commonly referred to as grammatical encoding.

One of the central issues in grammatical encoding is how speakers decide which word to put first in a sentence (e.g. Bock, Irwin, & Davidson, 2004). One of the proposed key factors is accessibility, i.e. how accessible words are in the speaker's mind. Previous studies showed that speakers tend to produce accessible words sooner, assigning them to earlier sentential positions; given a choice between semantically equivalent structures, speakers tend to produce the structure that enables earlier accommodation of the more accessible lexical item (see Ferreira & Slevc, 2007; Jaeger & Norcliff, 2009 for reviews).

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Two factors that are widely attested to increase accessibility are animacy and givenness. For example, when the patient noun is more accessible than the agent noun due to animacy or discourse salience (givenness), speakers are more likely to produce a passive sentence, mentioning the patient noun first (see e.g. Bock, Loebell, & Morey, 1992; Ferreira, 1994; Gennari, Mirkovic, & MacDonald, 2012; Prat-Sala, 1997; Tanaka, Branigan, McLean, & Pickering, 2011; Van Nice & Dietrich, 2003 for animacy; see e.g. Bock & Irwin, 1980; Christianson & Ferreira, 2005; Ferreira & Yoshita, 2003; Prat-Sala & Branigan, 2000 for givenness).

Accessibility can be also manipulated by means of semantic priming (Bock, 1986) or visual cueing (Gleitman, January, Nappa, & Trueswell, 2007). For example, if speakers whose task was to describe Fig. 1 were primed with the word *criminal*, a semantic associate of *policeman*, they were more likely to produce a patient-initial passive sentence such as *a policeman is being bitten by a dog*. Similarly, when speakers were presented with a subliminal visual attention-capturing flash that cued the location where the policeman would appear immediately afterwards, they were more likely to utter a passive sentence than mentions the policeman first than when the flash cued the location of the dog. Gleitman et al. suggest that – despite their non-linguistic nature – visual cues affect the choice of sentence forms by increasing the accessibility of the cued entity, akin to the process triggered by semantic primes: By drawing initial attention and looks to the cued scene entity, a visual cue immediately (even when subliminal) increases the accessibility of the corresponding lemma (semantic and syntactic representation of a word) and lexeme (phonological word-form) of the cued entity.

The immediate influence of accessibility on sentence structure provides support for the idea that sentence production is an incremental process, in which speakers create structures piecemeal, processing the more accessible items sooner (Ferreira & Slevc, 2007; *principle of immediate mention*, Ferreira & Dell, 2000). Lexical incrementality is suggested to be an important production mechanism because it allows grammatical encoding to proceed more efficiently (Ferreira & Slevc, 2007). By putting an accessible lexical item in an earlier sentence position, the production system can minimize disfluencies or errors, and thus production can proceed more smoothly (Bock & Ferreira, 2014). Consistent with this possibility, Ferreira (1996) found that English speakers produced utterances faster and with fewer errors when they had an opportunity to accommodate lexical variability by assigning accessible words to early sentence positions and prominent grammatical functions.

Note, however, that animacy and givenness effects may not provide the strongest evidence for *lexically* incremental production. This is because their effects can potentially be construed as stemming from the relational structure among event entities such as figure-ground assignment, rather than the accessibility of individual lexical items *per se*. For example, animate entities are more likely to be interpreted as agents, and construed as ‘figure’, which are subsequently more likely to be mentioned early and to occur in subject position than inanimate, backgrounded



Fig. 1. A scene depicting a biting event.

entities (e.g. Bock et al., 2004; Gleitman, Gleitman, Miller, & Ostrin, 1996; Jackendoff, 1987; Talmy, 1978). Similarly, entities that have been mentioned in prior discourse are foregrounded in the discourse context (e.g. Firbas, 1971) and are more likely to be assigned to an earlier sentence position or to the subject function than entities being mentioned for the first time (e.g. Clark & Clark, 1977; Clark & Haviland, 1977; Halliday, 1967). As animacy and givenness influence not only the accessibility of an entity but also reflect the relationship between event elements as a whole, they do not necessarily provide direct evidence for lexically incremental production.

Critical evidence for lexical incrementality rather comes from semantic priming (Bock, 1986) and visual cueing (Gleitman et al., 2007). When an entity is made accessible by a semantic prime or a visual cue, it is more likely to be mentioned first in the sentence and to be realized as the grammatical subject. These manipulations boost the accessibility of entities independently of givenness and animacy. Thus, semantic priming and visual cueing provide persuasive evidence that English speakers tend to produce accessible lexical items sooner, assigning them to earlier sentential positions (Bock & Ferreira, 2014).

Although semantic priming and visual cueing suggest that individual lexical items exert a strong influence on the formulation of sentence structures in English (and presumably other typologically similar languages), it is not clear whether lexically incremental production is a cross-linguistically universal production mechanism – that is, whether speakers of typologically different languages also build sentences starting with the more accessible lexical items, with the syntactic structure guided by accessibility.

Cross-linguistic research suggests that in flexible word order languages like Finnish and Russian, accessibility effects might be manifested in terms of word order (positional processing) rather than grammatical function assignment (functional processing). That is, when the patient entity is more accessible than the agent entity, speakers of Finnish and Russian may realize the patient entity as the sentence-initial object with non-canonical word order such as OVS and OSV. For example, Myachykov and Tomlin (2008) found effects of accessibility on word order in Russian with an explicit

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