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Brief article

Cross-linguistic gestures reflect typological universals: A subject-initial, verb-final bias in speakers of diverse languages

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ABSTRACT

In communicating events by gesture, participants create codes that recapitulate the patterns of word order in the world's vocal languages (Gibson et al., 2013; Goldin-Meadow, So, Ozyurek, & Mylander, 2008; Hall, Mayberry, & Ferreria, 2013; Hall, Ferreira, & Mayberry, 2014; Langus & Nespor, 2010; and others). Participants most often convey simple transitive events using gestures in the order Subject–Object–Verb (SOV), the most common word order in human languages. When there is a possibility of confusion between subject and object, participants use the order Subject–Verb–Object (SVO). This overall pattern has been explained by positing an underlying cognitive preference for subject-initial, verb-final orders, with the verb-medial order SVO order emerging to facilitate robust communication in a noisy channel (Gibson et al., 2013). However, whether the subject-initial and verb-final biases are innate or the result of languages that the participants already know has been unclear, because participants in previous studies all spoke either SVO or SOV languages, which could induce a subject-initial, verb-late bias. Furthermore, the exact manner in which known languages influence gestural orders has been unclear. In this paper we demonstrate that there is a subject-initial and verb-final gesturing bias cross-linguistically by comparing gestures of speakers of SVO languages English and Russian to those of speakers of VSO languages Irish and Tagalog. The findings show that subject-initial and verb-final order emerges even in speakers of verb-initial languages, and that interference from these languages takes the form of occasionally gesturing in VSO order, without an additional bias toward other orders. The results provides further support for the idea that improvised gesture is a window into the pressures shaping language formation, independently of the languages that participants already know.

1. Introduction

Recent work on improvised communication by gesture has revealed that patterns in people's nonlinguistic communication can provide insight about the range of variation in human languages. Specifically, when using

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gestures to represent an event with an actor, a patient, and an action, in many cases people convey first the actor (the 'Subject'), then the patient (the 'Object'), then the action (the 'Verb'), even if this specific word order is not present in any language they know (Gibson et al., 2013; Goldin-Meadow, So, Ozyurek, & Mylander, 2008; Hall, Mayberry, & Ferreria, 2013; Hall, Ferreira, & Mayberry, 2014; Langus & Nespor, 2010; and others). Among languages with a dominant word order, about half have verb-final word order, and about, 90% have subject-initial order (Dryer, 2002, 2005). The emergence of a subject-initial, verb-final order in improvised gestural codes suggests that its cross-linguistic prevalence might arise because that order is the 'default' or most natural way for humans to convey information about events. This idea is bolstered by the presence of SOV word order in certain emerging linguistic systems, such as Nicaraguan Sign Language (Senghas, Coppola, Newport, & Supalla, 1997) and Al-Sayyid Bedouin Sign Language (Sandler, Meir, Padden, & Aronoff, 2005). For some possible reasons why SOV order is preferred, primarily based on information-structural concerns and the semantics of the verb, see Gibson et al. (2013) and Schouwstra, van Leeuwen, Marien, Smit, and de Swart (2011, 2014).

The findings from gesture studies also suggest a motivation for verb-medial word orders. The prevalence of SVO order (about 40% of languages) might arise because that order conveys the separate roles of the Subject and Object in a way that is more robust to noise (Gibson et al., 2013). Suppose Alice is trying to convey a meaning to Bob, and that Alice and Bob have agreed to use SOV order. Alice will send her message as Noun–Noun–Verb. If Bob fails to receive one of the nouns, then he has received the message Noun–Verb. If the entity represented by the received noun can be interpreted plausibly as either an actor or a patient, then Bob has no way of knowing whether the received noun is an the Subject or Object—he does not know if he has received SV or OV. However, if Alice and Bob agree to use SVO order, then their code is more robust to this kind of noise. If Alice uses SVO order, sending a message as Noun–Verb–Noun, but Bob misses one of the nouns, then the message he has received is either Noun–Verb or Verb–Noun. By observing on the position of the noun relative to the received verb, he can deduce whether it is the Subject or Object. In both SOV and SVO codes, it is word order which provides the signal about which noun is Subject and which is Object, with the rule that the Subject precedes the Object. The SVO code conveys this ordering information more robustly in the presence of noise.[1]

For this reason, messengers might prefer SVO order in circumstances where communicative robustness is important. Supporting evidence comes from the studies of Meir et al. (2010), Hall et al. (2013) and Gibson et al. (2013), who find that people gesture in SVO order more often when the agent and the patient of the action are both human and thus are both plausible as agents. We call these kinds of events *reversible* because the agent and the patient could be plausibly reversed. SVO order for complex reversible events emerges even in gestures of speakers of strict verb-final languages (e.g. Japanese and Korean), indicating that the use of SVO gestures cannot be explained solely by the influence of speakers' known language structures. The communicative robustness of SVO order might explain its status as the second most common word order. SOV languages might become SVO to increase signal robustness, or they might maintain SOV when there is sufficient case marking on noun phrases to distinguish between agents and patients.

The communication-by-gesture scenario differs subtly from the exposition about Alice and Bob above. In the exposition above, Alice and Bob agreed on a word order code before communicating. In the gesture scenario, Alice and Bob do not agree on a code beforehand. Rather, Alice must produce a message such that Bob can determine its meaning without knowing the code in advance. So Alice must adopt some strategy that will distinguish the Subject from the Object for Bob, even though Bob does not know what code Alice is using. In that case, Alice must rely on the assumption that Bob shares her own word order biases: i.e., she believes that if Bob receives a message Noun–Noun–Verb, he will conclude that the first noun is the Subject, since that is how *he* would have sent the message. Similarly, if Bob receives a noisy-channel-corrupted message Verb–Noun, he can conclude that the received noun is the Object by reasoning that if it were the Subject, then it would have been initial, due to a strong shared Subject-initial bias. Thus the use of SVO for robust communication depends on a strong bias for an initial Subject, and a weaker bias for a late verb.

The central role of the Subject-initial and Verb-final biases in these explanations raises the question of the source of those biases. An obvious source of bias could be from languages which experimental participants already know. To date, gesture experiments have only been conducted on speakers of SVO and SOV languages; the structures of these languages have been found to have strong effects on gesture order. For example, Gibson et al. (2013) find that SVO order is essentially absent in gestural descriptions of simple reversible actions by Japanese and Korean speakers, emerging only for reversible actions in embedded clauses. The effects of other language types on gestures are unknown. In this paper, we perform the gesture experiments with speakers of VSO languages, who might lack a Subject-initial bias, or for whom it might be weaker. If the bias is substantially weaker, we would not expect speakers of those languages to use SOV gestures; nor would we expect them to switch to SVO to communicate reversible events, since the SVO code is only robust to noise when decoded by a receiver with a subject-initial bias.

The existence of effects of known languages, coupled with the fact that experiments have only been conducted on speakers of SOV and SVO languages, raises the possibility that the striking observed subject-initial bias may be a

[1] The exposition here assumes that noise takes the form of a *deletion channel*, which deletes elements of the message without leaving a trace. It is possible to derive the same predictions using an alternative noise channel, a *transposition channel*, where adjacent symbols are swapped in order. Robustness against such a channel might also explain effects such as the avoidance of adjacent similar NPs in relative clauses (Gennari & MacDonald, 2009).