Does language shape silent gesture? ☆

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A B S T R A C T

Languages differ in how they organize events, particularly in the types of semantic elements they express and the arrangement of those elements within a sentence. Here we ask whether these cross-linguistic differences have an impact on how events are represented nonverbally; more specifically, on how events are represented in gestures produced without speech (silent gesture), compared to gestures produced with speech (co-speech gesture). We observed speech and gesture in 40 adult native speakers of English and Turkish ($N = 20$/per language) asked to describe physical motion events (e.g., running down a path)—a domain known to elicit distinct patterns of speech and co-speech gesture in English- and Turkish-speakers. Replicating previous work (Kita & Özyürek, 2003), we found an effect of language on gesture when it was produced with speech—co-speech gestures produced by English-speakers differed from co-speech gestures produced by Turkish-speakers. However, we found no effect of language on gesture when it was produced on its own—silent gestures produced by English-speakers were identical in how motion elements were packaged and ordered to silent gestures produced by Turkish-speakers. The findings provide evidence for a natural semantic organization that humans impose on motion events when they convey those events without language.

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1. Introduction

Languages differ in how they organize the semantic components of an event, and these organizational preferences influence both the types and the arrangement of semantic elements conveyed in speech and co-speech gesture. Here we ask whether language-specific differences observed in speech have an effect beyond online production[1]—in particular, we ask whether language-specific differences influence nonverbal representation of events in gesture when those gestures are produced without speech, that is, in silent gesture. If the semantic organization of events in a particular language can influence offline nonverbal representations, the arrangement of semantic elements in silent gesture should be similar to the arrangement of semantic elements in speech and co-speech gesture. If, however, the semantic organization of events in

a particular language is *not* easily mapped onto offline nonverbal representations of events, the arrangement of semantic elements in silent gesture may differ from the arrangement in speech and co-speech gesture, and perhaps be similar across speakers of different languages. We study this question by observing the gestures speakers produce when describing motion events, a domain characterized by strong cross-linguistic differences in types of semantic elements expressed and how those semantic elements are arranged within a sentence. We ask whether gestures that *do* and *do not* accompany speech display these cross-linguistic differences.

Spatial motion, a domain that displays wide variation as well as patterned regularities across the world's languages in how it is expressed, offers a unique arena in which to examine cross-linguistic variability in gesture. Previous work (Talmy, 1985, 2000) identified the 'motion event' as a basic building block of language and cognition, and proposed a set of motion elements that appear to be universal. Take, for example, a simple motion scene, such as a *baby crawling into a room*. Many languages make it possible to refer to the *figure* (baby) separately from the *ground* she traverses (room), to trace its *path* (into), or to comment on the *manner* with which she moves (crawling). However, languages also vary systematically in how they express each element type, displaying for the most part a binary split across the world's languages (Talmy, 2000). Speakers of English—a satellite-framed language—use a *conflated strategy* in speech; they typically express

[1] We borrowed the term 'online' from Slobin's (1996) thinking-for-speaking hypothesis, and coined the term 'offline' to highlight the contrast between gestures produced when speaking (*online*) and gestures produced when not speaking (*offline*).

manner and path components in a compact description with manner in the verb (*crawl*) and path outside the verb (*into*), both expressed within a single clause, as in 'baby <u>crawls into</u> the house.' In contrast, speakers of Turkish—a verb-framed language—use a *separated strategy* in speech, with path in the verb in one clause ('girer' = enter), and manner outside of the verb and, importantly, in a subordinate separate clause ('sürünerek' = crawl), as in 'bebek eve <u>girer sürünerek</u>' = baby house-to enters by crawling; Turkish-speakers often express only the path, omitting manner entirely (Allen et al., 2007; Özçalışkan, 2009; Özçalışkan & Slobin, 1999). In addition to these differences in type and packaging of motion elements, the two languages also differ in where the primary motion element (i.e., the main verb, be it manner or path) is placed within a sentence; the motion verb is typically situated at the end of a sentence in Turkish ('Bebek ev-e GÍRER' = baby house-to ENTERS; Figure-Ground-MOTION), but in the middle of the sentence in English (Figure-MOTION-Ground, 'Baby CRAWLS into house'). Turkish and English thus provide a strong contrast in how motion events are described, allowing us to examine the effects of language on thinking.

The thinking-for-speaking hypothesis proposed by Slobin (1996) postulates that speakers' conceptualization of an event is influenced by the categorical distinctions available in their language, but only during online production of the language. Recent work examining the effects of language on perceiving and remembering motion events across structurally different languages suggests an effect of language on thinking when the cognitive tasks are accompanied by verbalization of the event, but no effect of language on thinking when verbalization was not allowed. For example, when participants were asked to compare an original event to a new event that differed either in manner or path of motion, they showed a bias for manner or path (depending upon their language) when the task involved verbal description of the event (either describing the event in their native language, or inferring the meaning of novel motion verbs), but did not show the bias when the task was nonverbal and thus did not involve language (Gennari, Sloman, Malt, & Fitch, 2002; Hohenstein, 2005; Naigles & Terrazas, 1998; see Özçalışkan, Lucero, & Goldin-Meadow, under review; Özçalışkan, Stites, & Emerson, in press, for a review).

Our focus here is on gesture, which is, by definition, nonverbal. However, it is now well known that the gestures speakers produce along with their speech (i.e., co-speech gestures) often mirror patterns found in speech (Gullberg, Hendricks, & Hickmann, 2008; Kita & Özyürek, 2003). In terms of the motion events that are our focus here, English- and Turkish-speakers produce co-speech gestures that mirror the patterns in their speech and thus differ from one another. More specifically, English-speakers display the *conflated* pattern characteristic of spoken English in their co-speech gestures, synthesizing manner and path components into a single gesture (e.g., wiggle fingers while moving the hand from left to right to convey running along a left-to-right path; Fig. 1B₁). In contrast, Turkish-speakers display the *separated* pattern characteristic of spoken Turkish in their co-speech gestures, producing one gesture for manner (e.g., wiggle fingers in one spot to convey running) and another for path (move hand left to right to convey moving along a left-to-right path; Kita & Özyürek, 2003), and often express only path of motion in gesture (Fig. 1A₁; Özçalışkan, in press).

Our question is whether the effect that language has on co-speech gesture––an online effect of language on thinking––can also be found offline, that is, when speakers are asked to abandon speech and use only gesture to describe a motion event. In other words, does language have an effect on silent gesture? Previous work on the impact of cross-linguistic differences in word order
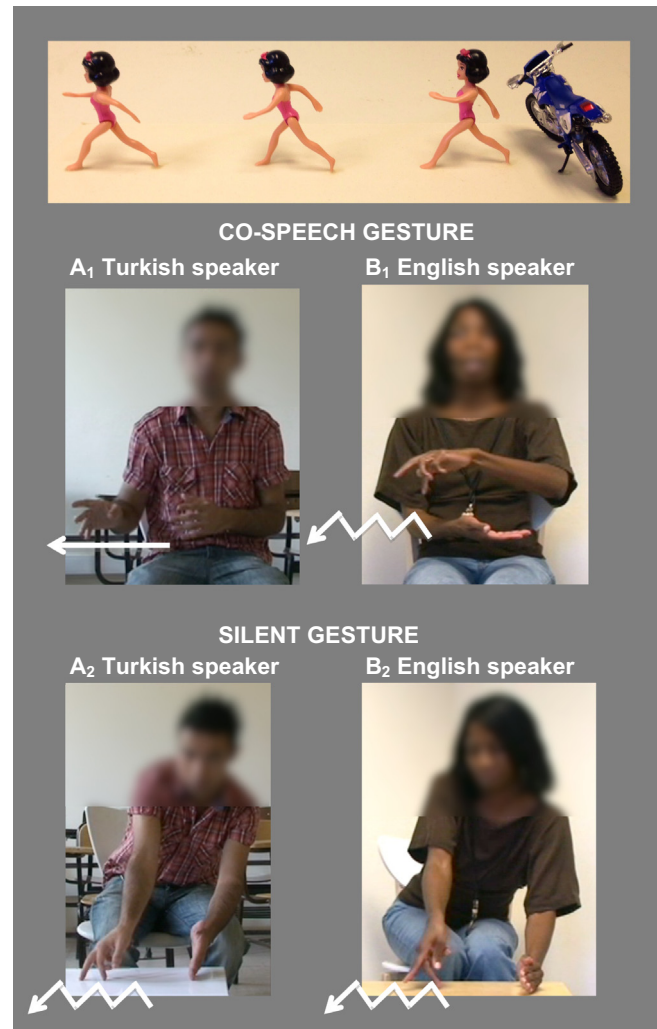

Fig. 1. Example stimulus scene of a girl running away from a motorcycle (top) and its description in co-speech gesture (A₁, B₁) and silent gesture (A₂, B₂) by speakers of Turkish (A pictures on left) and English (B pictures on right). In **co-speech gesture**, English speakers preferred to express manner (walking fingers) and path (trajectory away from speaker) simultaneously within a single gesture (B₁), and Turkish speakers preferred to express path (trajectory towards speaker's right with both hands) by itself, omitting manner entirely (A₁). In **silent gesture**, English and Turkish speakers both preferred to express manner and path simultaneously within a single gesture (A₂, B₂); the upward facing right palm in B₁ and the sideways facing left palm in A₂ and in B₂ represent the ground (i.e., the motorcycle); the participant did not produce a gesture for the ground in A₁.

on silent gesture has found no evidence for an offline effect of language. For example, speakers of English, Turkish, Spanish, and Chinese displayed the word order patterns characteristic of their respective languages (either subject-verb-object, SVO, or subject-object-verb, SOV) when speaking, but when asked to produce gestures without speech, their gestures did not display the same cross-linguistic differences and, in fact, all followed the same order, SOV (Goldin-Meadow, So, Ozyurek, & Mylander, 2008; see also Gibson et al., 2013; Hall, Mayberry, & Ferreira, 2013; Langus & Nespor, 2010; Meir, Lifshitz, Ilkbasaran, & Padden, 2010; Schouwstra & de Swart, 2014). We explore the generality of this finding by extending the work to a second set of cross-linguistic differences––how manner and path are organized within a sentence. In addition, unlike previous studies, we include analyses of co-speech gesture vs. silent gesture, allowing a within-modality contrast of online vs. offline effects of language on thinking.