Impacts of Observed Iconic Gesture on Comprehension of Accented Spoken Narratives

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Introduction. The integrated systems hypothesis holds that gesture and speech interact, which affects language processing [1]. For instance, observing iconic gestures conveying events from first language (L1) narratives when listening to them enhances their comprehension, illustrating the impact of such gestures on sentence processing [2]. Moreover, observing such gestures aids comprehension of L1 accented speech for L2 listeners [3]. However, observing such iconic gestures enhances perception of degraded speech for L1 listeners to a greater degree than for L2 listeners, suggesting that L1 listeners may benefit from them more than L2 listeners [4]. At present, it is unclear whether observing iconic gestures benefits L1 listeners' comprehension of L2 accented narratives, and whether it does so to a different degree than it does for L1 accented narratives. This work seeks to expand the integrated systems hypothesis to accented speech processing by examining the effect of iconic gesture observation and its potential interaction with accenting on sentence processing within spoken narrative comprehension.

Methods. L1 American English speakers ($n = 64$) watched face-blurred videos of one talker producing a narrative about Pluto the Dog and another talker producing a narrative about Donald Duck [5-6]. One video of each talker included iconic gestures conveying key narrative events, and the other included no gestures. Videos were paired with audio tracks of two talkers producing each narrative, one of whom was an L1 speaker, and the other of whom was an L2 speaker whose L1 was French. Accent and gesture were manipulated within participants. Thus, all participants were presented with both narratives, one of which featured gesture and the other of which featured no gesture, and one of which featured L1 accenting and the other of which featured L2 accenting. Across participants, narrative presentation order and accent-gesture pairing were counterbalanced. Following presentation of each video, comprehension was tested via free recall of all and key events (see Fig. 1).

Results. Free recall of all and key events was modeled via linear mixed-effects regression using the maximal random effect structures justified. For all events, recall of L1 accented narratives was more accurate than recall of L2 accented narratives ($B = -0.08$, SE = 0.01, $t = -8.65$, $p < .001$). However, recall did not differ significantly by gesture ($B = -0.01$, SE = 0.01, $t = -0.32$, $p = .77$), and the gesture-accent interaction failed to reach significance ($B = 0.05$, SE = 0.07, $t = -0.82$, $p = .42$; Fig. 2A). For key events, recall of L1 accented narratives was also more accurate than recall of L2 accented narratives ($B = -0.11$, SE = 0.02, $t = -5.22$, $p < .001$). Moreover, recall of narratives with gesture was more accurate than recall of narratives with no gesture ($B = 0.07$, SE = 0.02, $t = 3.35$, p < .001). However, the interaction between gesture and accent again failed to reach significance ($B = -0.11$, SE = 0.09, $t = -1.15$, $p = .26$; Fig. 2B).

Discussion. The results suggest that although observing iconic gestures conveying key events from spoken narratives did not facilitate overall comprehension, it facilitated comprehension of the key events that these gestures conveyed. Although recall of key events conveyed by iconic gestures did not differ significantly by accenting, examination of cell means suggests that such gestures may have facilitated key event recall more for L1 than L2 accented narratives. This is in line with previous studies indicating that observing iconic gestures aids speech comprehension more for L1 than L2 listeners [4]. These findings show that accent may affect the relationship between gesture and recall, providing insight into how the integrated systems hypothesis applies to accented speech processing.

References. [1] Kelly, Özyürek, & Maris (2010). *Psych. Sci.* [2] Dargue & Sweller (2018). *J Nonverbal Behav.* [3] Sueyoshi & Hardison (2005). *Lang. Learn.* [4] Özyürek & Drijvers (2020). *Lang. & Speech.* [5] Bharadwaj, Dargue, & Sweller (2022). *Cog. Sci.* [6] Dargue & Sweller (2020). *Educ. Psychol. Rev.*

Figure 1. Examples of experimental stimuli, including screenshots of narrative videos and excerpts of narrative scripts. Both (A) gesture and (B) no gesture conditions are shown. Key narrative events accompanied by gesture in the gesture condition are underlined.

A.

"The water station began to **expand**."

B.

"The turtle then **dried off** Pluto's letters."

Figure 2. Free recall scores by gesture and accenting in Donald Duck and Pluto narratives. Black dots and values represent cell means. Free recall is shown for (A) all events and (B) key events conveyed via iconic gestures in the gesture condition.

A.

| Donald Duck | Pluto |

Score (0-1)

Donald Duck: Gesture, L1: 0.26; No gesture, L1: 0.28; Gesture, L2: 0.17; No gesture, L2: 0.25
Pluto: Gesture, L1: 0.33; No gesture, L1: 0.27; Gesture, L2: 0.22; No gesture, L2: 0.2

Gesture, Accent

B.

| Donald Duck | Pluto |

Score (0-1)

Donald Duck: Gesture, L1: 0.33; No gesture, L1: 0.23; Gesture, L2: 0.18; No gesture, L2: 0.19
Pluto: Gesture, L1: 0.56; No gesture, L1: 0.42; Gesture, L2: 0.39; No gesture, L2: 0.32

Gesture, Accent