

Integration of Information from Different Modalities in Communication: Speech-Gesture Mismatches

Maria Minina (mariaminina.work@gmail.com)¹

¹School of Linguistics, Higher School of Economics

While gestures are known to facilitate speech production [1-3], their role in comprehension remains debated [4]. A prior study by McNeill et al. (1994) [5] demonstrated that gesture-speech mismatches impact event representation, with *manner* gestures (i.e., the depiction of how actions are performed) having particularly strong effects.

The present study extends my previous work, which contrasted *manner* gestures (verb-oriented, demonstrating the trajectory and/or manner of motion) with *shape* gestures (noun-oriented, describing object properties). Participants viewed a recorded narrative, retold it after the first viewing, and completed a comprehension questionnaire after the second one. The procedure was repeated with the second video containing only matching gestures. The order of presentation of the experimental and control videos was counterbalanced across participants. The videos contained equal numbers of gestures of each category (see Table 1). Apart from *shape* and *manner* gestures, already established in this paradigm, a third semantic category — *body-location* gestures (showing location on the body) — was introduced, as the behavioural results of the first experiment demonstrated that *body-location* gestures possess distinct priming strength. We analysed effects of congruency and gesture category on verbal recall and gesture reproduction.

All experimental materials were presented in Russian, and the sample consisted of 27 native Russian-speaking adults (with no self-reported neurological or psychiatric conditions, and with normal/corrected-to-normal vision; $N_{\text{women}} = 15$, aged 18-26 years ($M = 21.4$, $SD = 2.4$)). The statistical analysis was performed in RStudio [6]. It revealed that mismatching gestures enhanced free recall (Cohen's $d = 0.42$) but did not affect questionnaire accuracy. Gestures were overall rarely reproduced, with reproduction rates lower for mismatches than matches (7.2% vs. 8.4%, n.s.). As for mismatches, the *body location* category, the most frequently reproduced, was the only one that actively influenced participants' understanding of events, with 19 instances of questionnaire responses congruent with the gesture, not the speech. These results tentatively suggest that the direct spatial relationship to the speaker's body causes these mismatches to create a greater semantic anomaly. While trends in reproduction rates suggest a hierarchy that depends on congruency (*shape* > *manner* > *body location* for matches, and the reverse for mismatches), these patterns must be interpreted with caution due to the overall low base rates. Notably, when mismatches are reproduced by listeners, the reproduction appears to be a conscious and marked act (e.g., with sarcasm), suggesting it is more akin to imitation rather than automatic priming.

References

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Figures and Tables

Table 1: Gesture content of the stimulus videos

Gesture category	EC		CC
	Matches	Mismatches	Matches
<i>shape</i>	5	5	10
<i>manner</i>	5	5	10
<i>body location</i>	5	5	10
Total	15	15	30

Note: EC = experimental condition, CC = control condition

Table 2: Reproduction rates across the categories of gestures in the experimental condition

Category	Mismatching gestures		Matching gestures		Overall reproduction rate (matches + mismatches)
	N _{repeats}	Reproduction rate	N _{repeats}	Reproduction rate	
<i>body location</i>	6	4.4%	17	12.6%	17.0%
<i>manner</i>	1	0.7%	7	5.2%	5.9%
<i>shape</i>	0	0%	3	2.2%	2.2%
Overall total	7	5.1%	27	20.0%	25.1%