Cross-linguistic differences in the use of iconicity as a communicative strategy

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There is a substantial amount of literature showing that speakers adapt their message to their communicative intent not only in speech, but in co-speech gestures as well. It has been shown, in fact, that gestures are sensitive to various contexts of interactions, from visibility to common ground (Holler & Stevens 2007; Peters et al. 2015, among many). Interestingly, this sensitivity concerns not only the number of gestures, but their kinematic features as well (Trujillo et al. 2018). A setting in which gesture may be deployed as a communicative strategy is child-directed communication. Unfortunately, while evidence suggest that adults use mostly pointing gestures with young children (Bekken, 1989), very little is known about older children. Some research indicates that when the child gets older, adults start to use more iconic gestures (Özçaliskan and Goldin-Meadow 2011). In fact, Campisi & Özyürek (2013) has shown that Italian adults produce more iconic gestures in talking to an imagined child (12 yrs) compared to another adult, and also that these gestures are considered bigger and more informative. Furthermore Grzyb et al. (2022) found that adults accompany less predictable words with an iconic gesture more for children (3-4 yrs) than for adults. However, to the best of our knowledge no study has investigated a) whether how child-directed iconic gestures are affected by the language of the speaker (i.e. lower vs higher gesture rate languages) and b). if the strategies involved concern not only the quantity of gestures or, rather, the qualitative aspects of those gestures as well. For example, speakers could increase the informativeness of their gestures using simultaneity, a strategy which has been described for sign languages (Slonimska et al. 2022), and that can be reflected in an increase in two-handed gestures for children. For this reason, the goal of this study is to compare the use of iconic gestures for adults and children between a usually considered high-gesture rate language, i.e., Italian (Graziano & Gullberg 2018) and a low gesture rate language, Dutch (as shown in Azar et al. 2019). Thus, we asked specifically if speakers of the two languages use more iconic gestures and more two-handed iconic gestures for children than for adults and whether these differed with differences in the rate of gesture in each language.

We asked 16 Dutch and 16 Italian adults to solve the Tower of Hanoi (Figure 1) and then to demonstrate how it works to two different addressees: another adult and a child (9-10 yrs) counterbalancing the order. The coding was carried out through ELAN (Sloetjes and Wittenburg, 2008). Speech was transcribed and the number of words was calculated. The gesture flow was segmented in *gesture phrases*, with the *stroke* as the meaningful part of the movement, and *holds* (both pre- and post-stroke, see Kita et al. 1998). Given the small number of gestures with a pragmatic or interactive function in this data set, for the analysis we focused on *iconic gestures*, namely gestures with a concrete relationship with the referential meaning of the accompanying speech (McNeill 1992). To determine if the kinematics of the gestures change across conditions, iconic gestures were further coded into one-handed, two-handed, and bracketed gestures (Kendon, personal communication). We considered a gesture as bracketed if one hand performs a stroke while the other hand stays on a post-stroke hold, as shown in Figure 2.

We used generalized mixed-effects models in R (*lme4* package) to test the effect of culture and addressee on the production of gestures (Figure 3). As both Italians and Dutch used more words in talking to the child compared to the adult, we measured gesture production in terms of proportions. The results showed that while Italian produced more iconic gestures than Dutch ($\beta = 0.41$, $SE = 0.09$, $z = 4.56$, $p < .0001$), there was no effect of addressee in either language, a finding that contradicts what was found in Campisi & Özyürek (2013). On the other hand, Italians, but not Dutch, increased the number of two-handed iconic gestures ($\beta = 1.57$, $SE = 0.2$, $z = 7.84$, $p < .0001$) for the child, while both groups increased the use of bracketed gestures for the child (Italians: $\beta = 1.23$, $SE = 0.22$, $z = 5.72$, $p < .0001$, Dutch: $\beta = 0.60$, $SE = 0.21$, $z = 2.85$, $p = .004$). This confirmed out previous study showing adults modulate the informativeness of their gestures for children but that this modulation can be higher for a high-rate gesture language than a low rate one. Surprisingly, Italians used less bracketed gestures with adults in comparison to Dutch participants ($\beta = 2.15$, $SE = 0.87$, $z = 3.13$. $p = .002$).

We believe that these results support the claim that iconicity is used as a communicative strategy for children but can be used differently by speakers of different languages. These differences can be not necessarily quantitative, but also qualitative, involving the degree of simultaneity and therefore of informativeness.

Index Terms: cross-linguistic differences in gesture; multimodal instructions; child-directed communication; iconicity

Figure 1：The Tower of Hanoi.

Figure 2: a Dutch participant performing a sequence of a. a two-handed gesture; b. a right-handed gesture with a left-handed hold; c. another right-handed gesture with a left-handed hold.

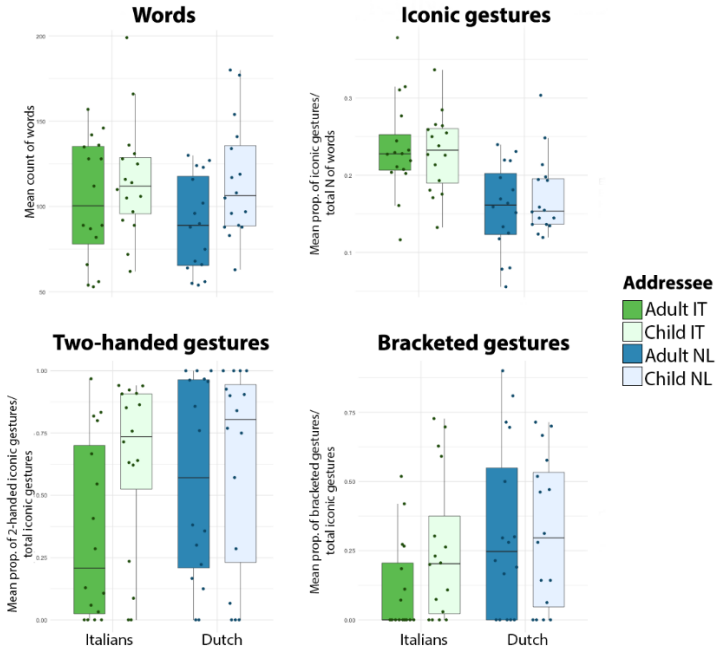

Figure 3. Total number of words, iconic gestures, two-handed gestures and bracketed gestures of Italian and Dutch participants per description to adult and child addressee.

References

Azar, Z., Backus, A., & Özyürek, A. (2020). Language contact does not drive gesture transfer: Heritage speakers maintain language specific gesture patterns in each language. *Bilingualism: Language and Cognition*, 23(2), 414-428.

Campisi, E., Özyürek, A. 2013. Iconicity as a communicative strategy: recipient design in multimodal communication for adults and children. *Journal of Pragmatics,* 47, 14-27.

Grzyb, B., Frank, S. L., Vigliocco, G. 2022. Communicative efficiency in multimodal language. *PsyArXiv*.

Iverson, J. M., Capirci, O., Caselli, M. C. 1999. Gesturing in mother-child interactions. *Cognitive Development*, 14. pp. 57 - 75.

Holler, J., Stevens, R. 2007. The effect of common ground on how speakers use gesture and speech to represent size information. *Journal of language and social psychology*, 26. pp. 4 - 27.

Kita, S., van Gijn, I., van der Hulst, H. 1998. Movement phases in signs and co-speech gestures, and their transcription by human coders. In: Wachsmuth, I., Fröhlich, M. (eds) Gesture and Sign Language in Human-Computer Interaction. GW 1997. Lecture Notes in Computer Science, vol 1371. Springer, Berlin, Heidelberg.

McNeill D. 1992. Hand and mind: what gestures reveal about thought. Chicago: University of Chicago Press.

Özçaliskan, Ş., Goldin-Meadow, S. 2011. Is there an iconic gesture spurt at 26 months?. Stam, G., Ishino, M. (Eds). *Integrating gestures: the interdisciplinary nature of gesture*. John Benjamins Publishing Company, Amsterdam.

Slonimska, A., Özyürek, A., Capirci, O. 2022. Simultaneity as an emergent property of efficient communication in language: a comparison of silent gesture and sign language. *Whiley Interidisciplinary reviews: Cognitive Science,* 46(5): 13133.

Sloetjes, H., Wittenburg, P. 2008. Annotation by Category: ELAN and ISO DCR. In *Proceedings of the Sixth International Conference on Language Resources and Evaluation (LREC'08)*, Marrakech, Morocco. European Language Resources Association (ELRA).

Trujillo, J. P., Simanova, I., Bekkering, H., Özyürek, A, 2018. Communicative intent modulates production and perception of actions and gestures: a Kinect study. *Cognition*, 180, 38-51.