# The strong relevance of gestures for verbal language development in monolingual and bilingual children

*Letizia Volpin*[1]*, Robin Segerer*[2] *& Katrin Skoruppa*[1]

[1]University of Neuchâtel

[2]University of Basel

Letizia.volpin@unine.ch

Gestures are precursors of development in linguistic domains such as lexical (Rowe et al., 2008) and syntactic skills (Ramos-Cabo et al., 2019) and can predict vocabulary size in young children (Rowe et al., 2008). We know that bilingual children use gestures more often than monolinguals for communication in everyday life (Nicoladis et al., 2009), so gestures could be even more important predictors of bilingual verbal language development. Because gestural behavior is closely related to verbal development, its analysis provides early insights into communicative development and its potential disturbance. So far, research on the links between gesture and linguistic skills has focused on gestures use during the early stages of (mainly monolingual) acquisition. Here, we investigate the ability to process gestures later in life, both in monolingual and bilingual preschool children. Furthermore, little is known on whether the documented higher exposure to gestures in bilinguals and higher gesture production also leads to faster and better development of gesture comprehension, and how these gestures comprehension skills, in turn, are related to verbal comprehension skills in different linguistic areas. Moreover, many studies on gestures and bilingualism analyze only language combinations that include English, whereas our study will focus on different language combinations frequently encountered in continental Europe (German, French, Italian and Turkish).

For these reasons, our study aims to investigate how gesture skills, even in comprehension, remain a highly relevant link between verbal and non-verbal development. Given the importance of gestures in bilingual situations (Nicoladis et al., 2009), we expect better gesture recognition skills in dual language learners compared to single language learners, and also stronger associations with lexical and syntactical language skills.

As part of a larger study, 275 monolingual (German or French) and 143 bilingual (with German or French as society language and Italian or Turkish as home language) preschoolers (aged 3 to 5 years old) participated in a computer-based language game in Switzerland and Germany. In a language-fair gesture recognition task (adapted from Marentette & Nicoladis, 2011), they watched 18 videos of actors performing non-verbal conventional and non-conventional gestures (e.g. sleeping, walking the dog). After each video, they chose the pictures of object that was related to the action in the video (e.g. bed) among three distractors (e.g. spoon, paintbrush, hairdryer) (Figure 1). Children's language skills were assessed via two short computerized picture selection tasks (adaptative testing principle based on child's response accuracy), testing receptive vocabulary and sentence comprehension in the society and in the home language. In order to analyze our data, we used cross-sectional multiple regression and converted gesture and language scales to factor scores.

Our results firstly show that gesture comprehension is strongly linked to society language vocabulary skills ($b = .362$; $p < .001$) and sentence comprehension skills ($b = .328$, $p < .001$) for both monolingual and bilingual children when controlling for age, sex, IQ proxy, and parental education (see Figure 2). Secondly, there was no effect of language group on gesture recognition ($b = .098$; $p > .05$), suggesting that the abilities of both groups are similar, adding to current debate on this issue (see Wermelinger et al., 2020). Finally, our analysis shows an interaction between gesture scores and language status on society language receptive vocabulary ($b = -.156$, $p < .01$), suggesting that the association between gestures and vocabulary is stronger in monolinguals than in bilinguals. However, since results in one language do not correctly reflect bilingual children's language skills overall, we proceeded to calculate a composite score by combining the results in the two languages (society and home language), to better reflect the bilinguals' more complex situation. Indeed, the effect of gesture recognition scores on these composite scores for receptive vocabulary ($b = .244$; $p < .05$) and sentence comprehension ($b = .321$; $p < .05$) seems as strong as for monolingual children (see Figure 3).

Our results confirm the great relevance of gesture recognition for language development, and highlight the importance of our language-fair gesture task and our cross-linguistic assessment strategy. We will discuss our findings from a theoretical and methodological perspective, and comment on their impact for preschool language assessment and language support. Moreover, by the time of the conference, we will be able to analyze longitudinal data from two further testing waves, with the aim to study the evolution of the association between non-verbal and verbal skills in monolingual and bilingual children.

**Index Terms**: gesture recognition, language development, bilingualism, vocabulary, morphosyntax

Figure 1: *Picture of the task as presented in our gesture recognition computer-based task, item: sleeping*

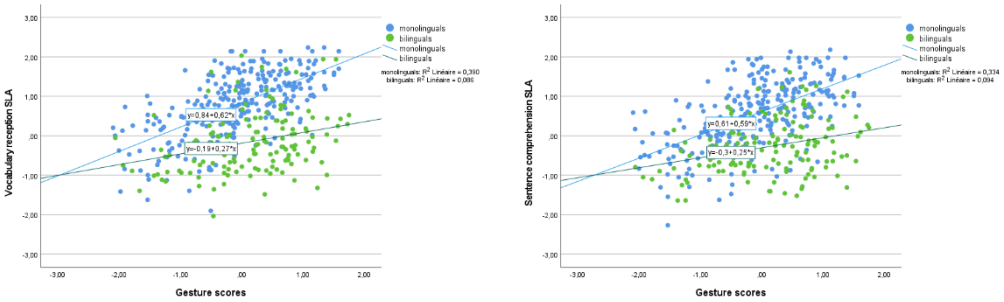


Figure 2: *Scatterplots showing the link between society language scores and gesture recognition skills for bilingual (green) and monolingual children (blue) for receptive vocabulary (left) and sentence comprehension (right)*

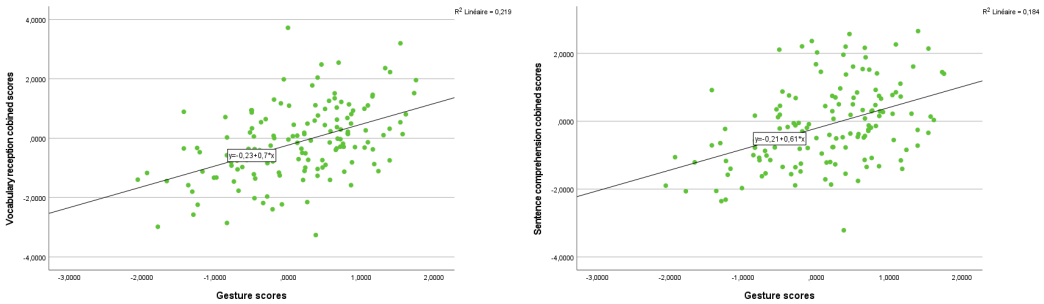


Figure 3: *Scatterplots showing the link between composite language scores and gesture recognition skills for bilingual children for receptive vocabulary (left) and sentence comprehension (right)*

# References


Marentette, P., and Nicoladis, E. (2011). Preschoolers' interpretations of gesture: Label or action associate? *Cognition, 121*(3), 386–399.

Nicoladis, E., Pika, S. & Marentette, P. (2009). Do French–English Bilingual Children Gesture More Than Monolingual Children?. *Journal of psycholinguistic research*, 38, 573-85.

Ramos-Cabo, S., Vulchanov, V. & Vulchanova, M. (2019). Gesture and Language Trajectories in Early Development: An Overview From the Autism Spectrum Disorder Perspective. *Frontiers in Psychology,* 10.

Rowe, M. L., Özçalışkan, Ş., & Goldin-Meadow, S. (2008). Learning words by hand: Gesture's role in predicting vocabulary development. *First Language, 28*(2), 182–199.

Wermelinger, S., Gampe, A., Helbling, N., & Daum, M. M. (2020). Do you understand what I want to tell you? Early sensitivity in bilinguals' iconic gesture perception and production. *Developmental science*, *23*(5), e12943.