

Motion
with



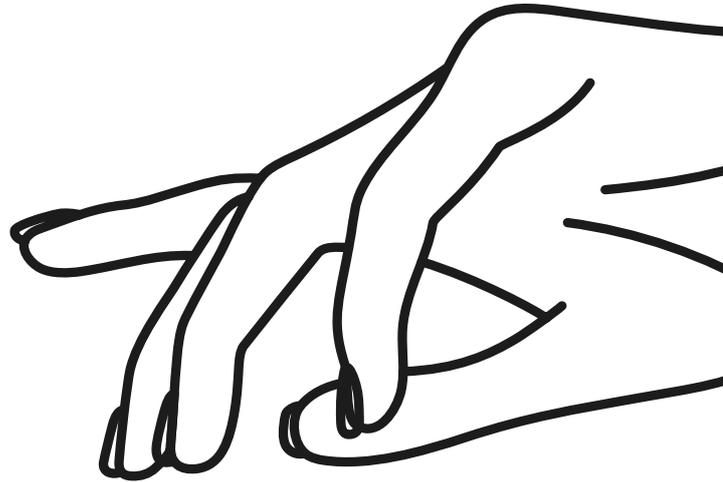
MEANING



Speaking with our hands

How gestures and facial expressions can underline, supplement and modify the meaning of words

By Anke Sauter



To communicate, we need not only our mouth, vocal cords and breath. Our hands and our face muscles also make a major contribution to making ourselves understood or giving what we say a certain focus. But how does the interaction between spoken language and hand motions actually work? A new Priority Programme aims to investigate the semantics of facial and manual gestures in spoken and sign languages. The individual projects will start in the course of 2022.

Turn right at the next crossroads (points to the right), then take the third left (points to the left) until you come to a roundabout (draws a circle in the air). On the right-hand side you'll see an entrance (draws an archway in the air) that leads to the museum." Imagine these directions with and without the gestures. It soon becomes apparent that gestures are part of everyday communication, they make it easier to transmit information by adding a visual channel to the acoustic element. The person getting the directions can visualise more in their mind's eye and will probably reach their destination more easily.

Toolkit for theoretical linguistics

Yet how does the communication level of gestures work? Where and when did we learn this "language"? How do we decide whether, when and how to gesticulate? And how can the semantics of gestures be arranged in a general system? Until recently, visual contributions to meaning were mainly treated in communication studies rather than in formal branches of linguistics. Gestures have also long been a part of rhetoric, semiotics and psychology. Not to

mention the many years of research on sign language.

Theoretical linguistics, however, has so far scarcely explored the form and function of gestures. All that is about to change: a Priority Programme of the German Research Foundation, headed by Goethe University, wants to bring together existing findings from various disciplines and link them with linguistics – although it is concerned not only with gestures but also other visual forms of conveying meaning. "I'm pleased to say that the topic is now gathering pace in my subject area too," says Cornelia Ebert, semantics professor at Goethe University, who applied for the Priority Programme together with Professor Markus Steinbach, sign language researcher from the University of Göttingen, and is responsible for its coordination.

Gestures deliver hard facts

Apart from gestures, the visual forms of communication on which the Priority Programme will focus are sign languages, animal communication, educational and clinical aspects, human-machine interaction and visual studies, that is, communication via pictures and films. Applica-



tions for exciting projects on each subtopic were submitted, including three from Goethe University. A committee of the German Research Foundation will decide in March 2022 which of the 46 applications will be funded. The overall funding period will last six years, and €12 million are available.

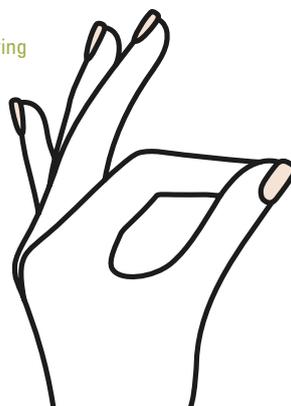
As a semanticist coming from computer linguistics, Cornelia Ebert is above all interested in how the meaning of gesture and of speech combine and work together and how this interplay can be formally modelled. With the help of already existing expertise, which the Priority Programme brings together, theoretical linguistics is to “take a big step forwards”. The goal is a toolkit for theoretical linguistics that helps to better capture the gesture phenomenon and to derive a theory from it. To date, there simply hasn’t been any “formal instrument”.

At the Institute of Cognitive Science in Osnabrück, Ebert studied how the temporal sequence of gestures and speech – Ebert calls it alignment – affects meaning. “We’ve known since the 1960s that gestures and speech are temporally aligned,” says Ebert. She by no means sees gestures in the first instance as an expression of emotions, as they often transport “hard facts” – like in the above-mentioned example of giving directions.

Gestures structure and accentuate

Giving directions is also a good example of how gestures can be of very different types: some are deictic, that is, pointing; this category evolves very early in children’s language learning. “As soon as a child points to something and says ‘There!’, things really take off,” says Ebert. Adults also use this type of gesture in an abstract sense and point to an object or in a direction that is still unspecific at that particular moment. Gestures, by contrast, that are firmly anchored in their meaning like a lexeme are known as conventionalised gestures. This category includes insulting gestures such as the “middle finger” or the rubbing together of index and middle fingers and thumb to mean “money”. When we speak of “iconic gestures”, on the other hand, these are ones that mimic an action or an object – in the above-mentioned example of giving directions, these are the roundabout and the archway. And finally, there are gestures

What difference does it make whether the gesturing narrator assumes the role of spectator or actor? With the help of actress Magdalena Schmitz, students are asked to gauge the effect of visual communication.



with metaphorical meaning and ones intended to rhythmise spoken language or highlight certain elements. All types of gesture have in common that they can accentuate, modify and structure spoken utterances; some also add new information. They direct our attention to certain parts of the utterance and can sometimes make it more precise – as in the example of giving directions, where we learn that the entrance is evidently an archway. It is, however, impossible to negate an utterance purely by means of a gesture. The structuring function of gestures can probably best be compared to the prosodic possibilities of spoken language, such as speed, duration or voice pitch.

IN A NUTSHELL

- Communication is composed not only of spoken or written language. Facial and manual gestures also play an important role in transmitting information.
- Gestures that accompany speech accentuate, modify or structure the meaning of the spoken word and thus make an important contribution to understanding.
- Theoretical linguistics has so far scarcely explored the form and function of gestures. A Priority Programme of the German Research Foundation, led by Goethe University, will help close this research gap.

When gestures and words send different messages

Cornelia Ebert’s own Priority Programme project, which she applied for together with Dr Stefan Hinterwimmer from the University of Wuppertal, is concerned with the narrative perspective that introduces gestures into communication: How do gestures make it clear whether the person speaking occupies the observer viewpoint or the character viewpoint? If a person tells of an event without their own participation, the space in front of their body becomes the stage, their hands are the actors.

If the narrator themselves is the actor, their hands play their hands, and the narrator slips pantomimically into the role of the actor. “The gestural perspective does not always coincide with that of the linguistic narrative. We want to find out how this affects the listener and why it doesn’t necessarily have to be congruent,” says Ebert, describing her project. In one experiment, an actress performed various alternatives.

GESTURE RESEARCH AT GOETHE UNIVERSITY

How do we communicate with our eyebrows? What role do gestures play in lies and deception? And how do children use gestures to help them convince their peers? Almost 50 project proposals were submitted for the “Visual Communication” Priority Programme. A wide variety of disciplines at Goethe University are also conducting research into visual communication.

Together with a colleague from Barcelona, linguist Professor Frank Kügler is looking at the interaction of intonation and gestures: in spoken language, the transmission of information is accompanied by melodic (prosodic) elements, closely interlinked with gestures that accompany speech. But how are such melodic and gestural elements coordinated in the transmission of information? And how does this contribute to (successful) communication?

Dr Andy Lücking and Professor Alexander Mehler from the Institute of Computer Science, on the other hand, want to capture the meaning of gestures with the help of artificial intelligence. They are using virtual reality tools to create a corpus of multimodal dialogues. By means of computational linguistic methods taken from distributional semantics and deep learning,

associations and semantisations of visual means of communication, both between them as well as in relation to their linguistic context, will be obtained on this empirical basis. This would make it possible to analyse dialogues more holistically in future and to translate them, for example in a multimodal way.

The role of multimodal utterances in mathematics teaching at primary school level is at the focus of research conducted by Rose Vogel, professor for mathematics education and computer science, and her colleagues Melanie Huth and Lara Billion. Gestures as well as handling of the material make mathematics learning a visible activity. The researchers are especially interested in the interfaces and interaction of different modes – also with regard to digital media.

Can children remember words better if they carry out iconic gestures when learning them, that is, gestures that depict the corresponding word? This is what developmental psychologist and neuroscientist Dr Elena Galeano-Keiner is investigating at the Leibniz Institute for Research and Information in Education (DIPF). The project follows on from previous work by Professor Cornelia Ebert and Professor Garvin Brod.

“What was surprising was the fact that the test subjects were not bothered when linguistic and gestural perspectives deviated from each other,” reports Ebert. The project aims to answer why this is.

The Priority Programmes of the German Research Foundation are designed to explore the scientific foundations of particularly topical or emerging fields of research, whereby interdisciplinarity plays an important role. In the “Visual Communication” Priority Programme, disciplines as wide and varied as neurology, education, computer science and, of course, linguistics have joined forces. This facilitates the exchange and use of existing findings – such as knowledge about how speech and gestures change after brain damage: some people whose speech is impaired can nonetheless master iconic gestures like they did before – and vice versa. As a rule, however, our perception of speech and gestures occurs via similar mechanisms, which means that people often cannot remember whether they received the information via gestures or via the spoken word. Interestingly, blind children also communicate via

certain gestures, regardless of whether their counterpart can see or not.

It is often said that above all southerners speak “with their hands and feet”, but this is in any case quite clearly a stereotype. Although there are indeed differences between language communities as to what certain gestures mean, and sometimes even families have an intra-family repertoire. A dissertation evidenced this scientifically as long ago as 1998: southerners do not communicate *more* with their hands than people from the North. Their gestures are, however, *more flamboyant*. ●

Literature

Ebert, Cornelia, Hinterwimmer, Stefan: Free Indirect Discourse Meets Character Viewpoint Gestures: A Reconstruction of Davidson’s Demonstration Account with Gesture Semantics, in: Proceedings of Linguistic Evidence 2020 (in press).

Ebert, Cornelia, Evert, Stefan, Wilmes, Katharina: Focus marking via gestures, in: Reich, Ingo, Horch, Eva & Pauly, Dennis (eds.): Proceedings of Sinn und Bedeutung 15, universaar, Saarbrücken 2011, 193–208.

Fricke, Ellen: Grammatik multimodal: Wie Wörter und Gesten zusammenwirken, de Gruyter, Berlin & Boston 2012.

Kendon, Adam: Gesticulation and speech: Two aspects of the process of utterance, in: The relationship of verbal and nonverbal communication, de Gruyter Mouton, The Hague 1980, 207–227.

McNeill, David: Hand and mind: What gestures reveal about thought, Chicago University Press, Chicago 1992.

Müller, Cornelia: Redebegleitende Gesten: Kulturgeschichte – Theorie – Sprachvergleich, Berlin Verlag, Berlin 1998.

Goldin-Meadow, S. & Brentari, D.: Gesture, sign, and language. The coming of age of sign language linguistics and gesture studies, Behavioral and Brain Sciences 40, 2017, 1–59.



The author

Dr Anke Sauter, 53, is editor of Goethe University Science Magazine (Forschung Frankfurt) and likes to use her eyebrows when she talks.

sauter@pww.uni-frankfurt.de