

ADVANCED REVIEW

The study of gesture in cognitive linguistics: How it could inform and inspire other research in cognitive science

Alan Cienki 

Language, Literature and
Communication, Faculty of Humanities,
Vrije Universiteit Amsterdam,
Amsterdam, The Netherlands

Correspondence

Alan Cienki, Language, Literature and
Communication, Faculty of Humanities,
Vrije Universiteit Amsterdam, Box 4.14,
De Boelelaan 1105, 1081 HV, Amsterdam,
Noord-Holland, The Netherlands.
Email: a.cienki@vu.nl

Funding information

Russian Science Foundation,
Grant/Award Number: 19-18-00357

Edited by: Geert Brône, Editor

Abstract

Cognitive linguists are increasingly extending their paradigm to include the study of gestures. The bottom-up, usage-based approach in cognitive linguistics has advanced the methods for identifying gesture functions, starting from a detailed analysis of gesture forms. Theoretical notions from cognitive linguistics also help explain the means by which the forms of gestures can be interpreted as meaningful functions. Principles of conceptual metonymy explain how gestures indicate referents through the partial representation of their features that are relevant in the context of use. Conceptual metaphor theory sheds light on how abstract notions can be represented in gesture via comparison with physical source domains. Furthermore, every gestural representation inherently requires the gesturing speaker to employ a specific viewpoint for their depiction—something which is normally not expressed verbally. These aspects of gesture provide insights into processes of thinking for speaking that can be exploited in various fields of cognitive science research. Referential gestures also normally combine pragmatic and interactive functions (showing stance-taking, for example) with representational or deictic functions. The multiple functions of gesture combined with those of speech raise questions for further research about how viewing-listeners interpret and combine information from the multiple semiotic systems employed by gesturing-speakers. Finally, gesture use has been shown to correlate not only with lexical concepts but also in some ways with grammatical constructions. This gives rise to fundamental questions about what constitutes the grammar of a language. Gesture analysis thus raises issues for consideration in any research in cognitive science that concerns spoken language.

This article is categorized under:

Linguistics > Cognitive

Linguistics > Linguistic Theory

Psychology > Language

KEYWORDS

gesture, grammar, metaphor, metonymy, pragmatics

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2022 The Author. *WIREs Cognitive Science* published by Wiley Periodicals LLC.

1 | INTRODUCTION

Gestures have been a source of academic curiosity for centuries. The first studies on this topic go back to ancient Greece and Rome, where rhetoric was one of the main scientific fields of study (e.g., see Quintilianus, 1922). Such works were primarily prescriptive in nature, advising speakers on how to accompany their public speaking with bodily movement more effectively for persuasive effects (Hall, 2004; Kendon, 2004, pp. 17–19; see also Kendon, 2004, chapter 3–5 for a concise history of gesture research). However, modern gesture studies as it developed in the 20th century have focused more on descriptive (rather than prescriptive) characterizations and analysis of people's movements when engaged in speaking, with particular attention to how such movements relate to speakers' processes of conceptualization.

Gestures have thus been analyzed in various contexts and types of communication, something which has influenced the definition of "gesture" itself. For present purposes, the focus will be on gestures made by people engaged in speaking. Kendon (2016, p. 44) takes a broad characterization of gesture as "utterance dedicated visible bodily action". With this, he is pointing out that rather than gesture simply being an add-on to speech, both speaking and gesturing comprise a higher level category of communication, that of what Kendon calls the utterance. Drawing upon Goffman's (1963, pp. 13–14) distinction between "giving information" and merely inadvertently "giving off information," Kendon (2004, p. 7) uses the term "utterance" "to refer to any ensemble of action that counts for others as an attempt by the actor to 'give' information of some sort." He adds (ibid.) that, "Such units of activity may be constructed from speech or from visible bodily action or from combinations of these two".

While the range of behaviors that can fall under the label of "gesture" is wide, this review will concentrate on manual gestures, encompassing movements of the hands and forearms. There are several reasons for this. One is that compared to other parts of the body, the hands afford a tremendous variety of possibilities for movement and the creation of different forms (see Streeck, 2009, chapter 3, on the anatomy of the hands). The location of the hands and their potential range of movement also allow them to be seen easily by an interlocutor, even if only in peripheral vision. Another reason is simply that most existing research on gestures has concerned manual gesture.

While we will focus on speakers' gestures, it is important to point out that the role of gesture in the use of signed languages has also been a subject of research and debate. That is, the issue of to what degree and when manual, facial, and bodily actions are used by signers in ways that most would not strictly consider as constituting signs in the given language is a subject that comprises its own field of research, leading to theoretical questions about the boundary of what constitute linguistic elements (see Wilcox, 2004).

2 | A NOTE ON RESEARCH METHODS: GESTURE CLASSIFICATIONS

We will begin with a methodological note on how gestures have been categorized in past research. This is important to be aware of because it will make clear in what ways the units of analysis are, and are not, clearly established in gesture research. This lays the foundation for what is possible in future cognitive scientific research on gestures. Several studies in the mid-twentieth century stand out as having proposed categories for analysis that many scholars following them have made reference to.

The first detailed classification in the 20th century was presented by Efron (1972), who outlined the category of emblems—conventionalized body movements, which have fixed meanings in the culture they are used in—and five types of what Ekman and Friesen (1969) called illustrators. They characterized them as: ideographs, used to express abstract concepts and mental activity; spatial movements depicting spatial notions, such as size or length; deictics, which refer to objects in space by pointing at them; kinetographs, representing bodily actions; and batons, which are used to highlight rhythm in speech. Ekman and Friesen's (1969) classification added pictographs to Efron's typology as a type of illustrator that "draw[s] a picture of their referent" (p. 68), as well as the category of adapters, which regulate the self or one's interaction with an interlocutor or an object. In particular, self-adapters were then of particular interest for what they could reveal of use in the field of clinical psychology (e.g., Freedman, 1972, 1977; Kendon, 1970) during sessions of talk therapy.

It was not until 1992 that the cognitive psychologist and linguist David McNeill greatly popularized gesture studies with the publication of his book *Hand and mind*. The research paradigm adopted by McNeill in his lab, of having participants retell a cartoon they had watched, led to a system distinguishing several gesture "types" that were deemed useful for analysis in their research. Four of the types which have since become widely applied by others are iconic

gestures (which “bear a close formal relationship to the semantic content of the speech”, a category which includes the spatial movements and kinetographs, mentioned above), metaphoric gestures (in which “the pictorial content presents an abstract idea rather than a concrete object or event”, including the ideographs described above), deictic gestures (which McNeill limits to pointing gestures), and beats (in which “[t]he hand moves along with the rhythmical pulsation of speech”—named a “baton” above) (McNeill, 1992, pp. 12–18, building on McNeill, 1985, and McNeill & Levy, 1982). Here we see that self-adapters have been purposely not included in different classifications. This is a tendency which has predominated in gesture research ever since, given that the focus is usually on gestures oriented outwards, expressing ideas, rather than on manual actions related to adapting speakers’ own feelings or mental states.

As McNeill’s former PhD students went on to set up their own research labs at other universities in the US and in Europe, this system became entrenched in much research on gesture conducted by cognitive psychologists (see Box 1). However, as Müller (1998b) points out, one problem inherent in the system is that the set of categories conflates form and function. For example, metaphoric gestures are iconic (for the source domains they depict). Deictic gestures are predominantly determined based upon particular form criteria (namely, that they are pointing gestures), whereas iconic and metaphoric gestures are determined based on their functions, rather than on formal criteria. In addition, pointing gestures can also be metaphoric (when abstract deixis is involved, pointing to ideas as if they were located in space; see Cienki, 1998). Beats are a type acknowledged by McNeill as one that can actually overlay other gesture types (i.e., one can find iconic, metaphoric, or deictic gestures produced along with beats); and the category of pragmatic functions is missing in McNeill’s system (as it was in the earlier typologies), since his research paradigm focused on narratives of action-packed cartoons, as opposed to conversations more prominently involving interpersonal functions, such as stance-taking.

As a solution to this, researchers from the project Towards a Grammar of Gesture (www.togog.org) designed a system distinguishing the analysis of gesture forms from that of gesture functions. First presented at a series of workshops on Methods of Gesture Analysis, the Linguistic Annotation System for Gestures (LASG) has been described in several publications (e.g., Bressemer, 2013; Bressemer et al., 2013; Mittelberg, 2007; Müller et al., 2013). This approach has been adopted by many in cognitive linguistics who are researching gestures (including adaptations as necessary for the particular goals of individual projects). The logic of the system is that the focus on form as a starting point ensures observable criteria for deriving one’s interpretations of function in the context of the speech being used with (and around) any given gesture. Gesture forms can be determined with the sound from the video being turned off, making the analysis of form independent from the subsequent analysis of gesture function.

The analysis of gesture form begins with analyzing structures of hand movements, using a system devised by Kendon (1980) and adapted in McNeill’s work (e.g., McNeill, 1992). The basic movement phases are preparation, the

BOX 1 A note on approaches to gesture research

Of the many kinds of research on gesture, two approaches stand out as dominant, namely experimental research and naturalistic studies. Experimental research has largely been conducted by those in cognitive psychology, analyzing gestures used in the controlled setting of the laboratory, usually involving prompting people to speak about particular stimuli. Naturalistic research on gesture, however, is more characteristic of those in the fields of linguistics, conversation analysis or interaction analysis, and anthropology. Such studies are generally exploratory in nature, typically taking a bottom-up approach that, among other things, seeks to identify and define categories of gesture forms and functions. In addition, some research that could be characterized as semi-naturalistic involves providing participants with prompts that allow for more open-ended, more spontaneous, and self-driven kinds of interaction.

Historically speaking, one might reason that it might have made sense for there to have been a basis of years of naturalistic, exploratory research on gesture before experimental paradigms were established, for example, in order to build on the categories discovered through exploratory research. However, since the beginning of the rapid rise of the field of gesture studies in the 1990s, the impression of the current author is that experimental studies have predominated. Indeed, much of this research has focused on gesture use among speakers of European languages, meaning that we still do not have much systematic research on how gesture is used in most parts of the world other than in (mostly western) Europe and North America.

gesture stroke (the main movement phase), a possible post-stroke hold, and an eventual retraction of the hand(s). While a gesture phrase necessarily entails a stroke phase, the other phases are optional (one larger gesture unit may consist of several strokes, any of which may have its own preparation and/or post-stroke hold; Kendon, 2004, chapter 7; McNeill, 1992, chapter 3).

The form analysis of gesture strokes is based on four parameters which were first identified for research on signed languages (Stokoe, 1960). They concern the hand shape, the orientation of the palm of the hand (with some additionally specifying the direction that the fingers are pointed in), the movement of the hand (which can be further subdivided into movement quality and movement path), and the location of the hand, for which the spatial grid presented in McNeill (1992, p. 378) is often used, marking more central and more peripheral gesture spaces. (See Bressemer, 2013, for details.) Two-handed gestures can be distinguished according to whether the hands are doing the same thing (as when both hands, open with palms facing down, move downward in sync with each other), mirroring each other in form and movement (as with the two hands positioned as if holding an object between them), or doing different things from each other (e.g., the left-hand open, palm-up, and the right hand as if drawing on the open left hand).

Gesture functions can be characterized using a system that derives from Müller (1998b), Kendon (2004), the LASG (Bressemer et al., 2013), Cienki (2013), and others. The basic categories will be characterized here as involving referential and pragmatic functions. Referring via gesture can be subdivided into deixis and representation (with the latter term sometimes being called “depiction”). While deixis in gesture is commonly thought of just in terms of pointing (especially with the index finger or open hand in many cultures; e.g., Kendon, 2004, chapter 11), the notion is technically more abstract (Fricke, 2007); see, for example, the following dictionary definition of “deictic” as used in a grammatical sense (Dictionary.com, 2021): “specifying identity or temporal location from the perspective of one or more participants in an act of speech or writing, in the context of either an external situation or the surrounding discourse”. Some extend this to include placing objects for someone else’s attention (Clark, 2003), while most others limit the scope of their research on gesture to “free-handed” movement, not involving object manipulation. Representation with gesture involves iconic depiction of some relevant (in the given context) features of the referent concept (a notion characterized in Section 3). Pragmatic functions have to do with, for example, one’s attitude or stance towards what is being talked about. They are gestures “by which aspects of the communicative interaction are displayed” (Streeck, 2005, p. 73) that “are not part of [an utterance’s] referential meaning or propositional content” (Kendon, 2004, p. 158). Just as speech acts have been studied as “how to do things with words” (Austin, 1962), pragmatic use of gestures can be seen in part as how one does things with gestures—although the range of pragmatic functions in gestures does extend beyond the realm of speech acts proper, as discussed in Section 4.

3 | REFERENCE AND REPRESENTATION IN GESTURE

It is worth noting that, from the perspective of cognitive linguistics, reference is not a matter of direct mapping between an expression (verbal or gestural) and the physical world, but rather it is a matter of an expression mapping onto our conceptualization of the world (Lakoff, 1988). Langacker (1987, 2008) discusses how our conceptualization of any scene is shaped by our “construal” of it: he notes (Langacker, 2008, chapter 3) that construal is a factor of specificity (the level of granularity or resolution one takes on a scene); focusing (foregrounding or backgrounding, the composition of the scene, and whether it is viewed with a maximal or minimal scope); prominence (a matter of salience), and perspective (the viewing arrangement of the scene). Thus, not only our linguistic choices but also the kinds of gestures we produce when referring to concepts, are filtered through the lens of construal. We can refer to physical entities, qualities, or processes as well as abstract ones. Note that while it might be common to use the term “abstract concepts”, it is interesting that it seems less common to discuss references to the physical world in terms of “physical concepts”; this masks the fact that we only know about the physical world through the filter of our senses, through percepts, which form the basis of our concepts. See Barsalou (1999), for example, on his theory of perceptual symbol systems.

When we point or depict in reference to something physical, the iconic connection between the location and/or the form of the thing represented gesturally can make the gesture seem to be directly connected to the physical place or form being referenced. But it is important to realize that the process of reference is being filtered by our construal of the referent. When making reference to abstract concepts, it is easier to be aware of this filtering: after all, time periods (e.g. yesterday, next year) and notions such as “justice” or “logical deduction” do not have physical forms, so gesturing about them clearly (inherently) involves metaphor, as the abstract notion is being rendered via comparison with a physical location and/or form, as discussed in Section 3.2. This way of analyzing gestural reference in terms of forms of deixis or

representation for concepts of the physical or of the abstract thus teases apart the connections between form and function in a way that is confused in the “traditional” categories of gesture types, such as in McNeill’s four types, as noted above.

3.1 | Modes of gestural representation and metonymy

The next step in analyzing the link between a gesture’s form and the concept(s) that it might represent is to consider the means by which the representation is being accomplished. This reveals what features of the referent concept are being foregrounded in the given context of use. Here we see that the principles of figure versus ground in perception and conceptualization, first analyzed in the field of Gestalt Psychology, are fundamental not only in the theoretical underpinnings of cognitive linguistics (Talmy, 1983; see Sinha, 2007, for an overview), but also in much research on gesture relating to cognitive linguistics.

While a number of works describe different ways in which gestures are used to depict various referents (Efron, 1972; Ekman & Friesen, 1969; Streeck, 2008, 2009, chapter 6), Müller (1998a, 1998b, 2014) claims that ultimately these different techniques rely on a limited set of modes of representation. The ways the modes have been named have varied over time and across authors, but they will be characterized here as enacting, holding, molding, tracing, and embodying.¹ Enacting involves the hand engaging in an action to show the action rather than to actually do the action. Examples include the hand in an appropriate handshape and moving as if it were writing with a pen, opening a container, or pushing something aside; in each case, the relevant object is not present, and the handshape and movement are probably a schematized version (more relaxed) than would be used to actually perform the action. The other modes involve the hand(s) being shaped and/or moving so as to show the form of something else. This can be done by having the two open hands facing each other—or one or both open hands facing palm up—as if holding an object. The open hand or hands can move as if touching an imagined flat or rounded surface with the palm (known as “molding”). One or more extended fingers may trace a path as if drawing the outside of a form or as if writing with the fingertip. Furthermore, the fingers and/or hand itself might be used to embody an object, possibly showing its action, as when a flat hand, palm up, might represent a piece of paper, or one’s extended forefinger and middle finger might be stretched out, then separated from each other, and then brought together to imitate a pair of scissors. The modes are not completely mutually exclusive: a flat hand moving as if touching a surface of a round object might be seen as embodying that very surface; through the hand’s movement, it might also be seen as tracing a round object in three dimensions, as opposed to tracing it in two dimensions with an extended fingertip (Cienki, 2013).

Müller (1998b, §2.3.2.5) notes how each mode entails a form of abstraction that isolates certain features of what is being referred to and leaves others out. The features isolated by representation might be, for example, the important elements of the action schema that the hand is engaged in with the mode of enactment (with an imaginary object as a missing element); the contextually significant aspects of the shape or size of the referent with holding and molding; the outline of the form with tracing; or the characteristic form or movement of the referent with embodying. From a cognitive linguistic point of view, representation in gesture, via whichever mode, inherently involves metonymy (Mittelberg & Waugh, 2014), with metonymy being defined here as “a cognitive process in which one conceptual entity, the vehicle, provides mental access to another conceptual entity, the target, within the same cognitive model” (Radden & Kövecses, 1999, p. 21). This definition was inspired by Langacker (1993), which takes metonymy as one kind of reference-point phenomenon. In terms of gesture, part of the referent that is relevantly salient in the given context of talk is brought to the fore for “mention” via a gestural form. Technically speaking, it is primarily synecdoche that is involved, in part-for-whole relations, but following Jakobson (1990) and others, we will use “metonymy” as a cover term, additionally encompassing part-for-part relations.

The metonymy involved is not a simple matter of exactly replicating parts of the whole referents being shown, but of adapting those details in some way for their rendition in gesture. This can involve enlarging them or reducing them so that they fit the human scale of the hands. (See Fauconnier & Turner, 2002, on scaling up and scaling down as means of fitting concepts—and representations of them—to human scale to make them understandable and communicable.) The representational scaling for gesture could also involve simplification of some features to afford easier production via the physical form of the hand and reduction of manual exertion (as in enacting writing with a pen by simply moving one’s pursed fingers laterally back and forth in the air, rather than moving in the more detailed way that would actually be needed to write words). In light of this, Müller (In press) has become more inclined to call the process that is involved “depiction” rather than “representation,” in order to highlight the selective nature of the image creation

that is involved; this avoids the possible inference that some pre-existing reality is simply being “re-presented” [see also the choice of the term “depiction” in the work of Clark (2016), Hsu et al. (2021), and Streeck (2008, 2009, chapter 6)].

3.2 | Metaphor

While all representational gestures inherently entail metonymy in how they depict a referent, from a cognitive linguistic point of view, such gestures may also involve metaphor (Mittelberg & Waugh, 2009). This occurs whenever an abstract concept is expressed with a gesture, given that the abstraction does not itself have a form that can be spatially represented. Some physical domain must be drawn upon to symbolize the concept, and this source domain provides the basis for the iconic representation in the gesture. Metaphoric use of gesture to characterize a physical target domain is possible (see Fricke's, 2007, p. 180, example of a gesture of putting one's fingers up next to one's ears, imitating a donkey, when calling someone a jackass), but such metaphors of the physical for the physical are rare, judging from the empirical studies to date.

McNeill's (1985, 1992) original discussion of metaphoric gestures referred primarily to instances of speakers using gesture when talking about a genre of communication (mentioning that they were going to describe a cartoon), or an element in the story they were telling (a given episode); usually, the gesture involved holding one's open hands apart and facing each other, or holding a single open hand, palm up. Such gestures, McNeill argued, reflect the objectification of an idea as if it were something that could be held in one's hand(s). See also Lapaire (2016) on this use of an ontological metaphor, as Lakoff and Johnson (1980) called it, in gesture, whereby the fact that an abstract idea is being thought of as a physical object is revealed in the form and position of the hands as if holding something. However, subsequent research [starting with Calbris (1990), Cienki (1998), and Sweetser (1998)] demonstrated that the range of types of metaphor that are possible in gesture is much broader. For example, the chapters in Cienki and Müller (2008) indicate some of the different possibilities, such as linguistic concepts being held or embodied by a professor lecturing about them (Mittelberg, 2008), mathematical concepts being traced gesturally (Núñez, 2008), and contrasts between concepts being designated by differential use of gesture space (Calbris, 2008).

Some research on verbal metaphor has argued that metaphoricity should be recognized as a gradient phenomenon, whereby metaphoric mappings should be seen as potentially being more rich and elaborate or impoverished, more salient or more backgrounded, more active and awake or more dormant and frozen (Goatly, 1997; Kyratzis, 1997; Stibbe, 1996). Similarly, metaphor in gesture has been argued to range along a gradient of salience and activeness of metaphoricity (Müller, 2008a; Müller & Tag, 2010). For example, the palm-up open hand gesture, used as if metaphorically holding an idea, constitutes a more minimal form of representation, in which the idea is referred to must be imagined on the empty palm of the held-out hand (Müller, 2004). Other cases involve much greater salience of metaphoricity, in which there is more effortful gestural expression, taking up more of the space available to the speaker or involving more energetic production in the movement of the gesture (Cienki & Mittelberg, 2013). Such more effortful and more saliently visible use of gesture may increase the speaker's, and other interlocutors', awareness of the fact that a metaphor is being invoked (Cienki, 2020; Müller, 2008b).

These findings have implications for cognitive science research on how people are conceptualizing abstract concepts while speaking about them. Based on conceptual metaphor theory (Lakoff & Johnson, 1980, 1999), one might predict that if metaphoric thought involves conceptual activation of a source domain (call it X) in order to understand some target domain (call it Y), and if that source domain is a physical one, then one's gesturing depicting physical X to express abstract Y should be similar in form and movement to one's gesturing about physical X when actually talking about physical X. Empirical research (Tong, In press) suggests that, in fact, speakers often use gestures that are more schematic in form and less elaborate and effortful in movement when gesturing metaphorically than when gesturing about physical referents. The basis for this can be posited in terms of the relevant mental simulations (Marghetis & Bergen, 2014) involved for X as a metaphoric source domain and X as a physical referent in its own right: the latter has actual physical properties of form, size, action, and location which can be mentally simulated and thus depicted, whereas for the former, these must be imagined and perhaps are not often “fleshed out” in the fast-paced context of thinking for speaking in a conversation. More elaborate simulation of the source domain, and consequently more detailed gesturing about it, may be involved in contexts involving greater reflection on characteristics of the source domain, for example, as in when more aesthetic reflection is involved, and in more performative contexts; see, for example, Cienki and Müller's (2014) analysis of metaphor in speech and gesture used in a ballet dance class, and Opazo Reyes' (2018) study of orchestra conductors' metaphorical presentation of musical dynamics.

3.3 | Viewpoint

An important aspect of representation via gesture, whether for a physical or abstract (metaphoric) referent/concept, is that the way in which the gesture is produced inherently involves presenting a particular viewpoint on what is being gestured (Parrill, 2012). As noted above, viewpoint is a facet of construal: the speaker's construal of an event, as revealed through the viewpoint through which it was shown gesturally, may not have been expressed in their speech. In fact, there might not be a way to explicitly differentiate verbally the viewpoint that the speaker is taking, but this may be seen in their gestures. This is another facet of gesture use which is worthy of further cognitive scientific investigation in relation to, for example, processes of mental simulation which may be reflected in gesture.

The basic principle is that the entity, relation, or action that is depicted gesturally is facing a certain direction and is located in a particular space in front of the person gesturing. This affords viewing the gestured referent from a particular angle, just as would occur if you were to hold a sculpture in your hands: you can view the sculpture from a particular vantage point, and others' view of the sculpture in your hands is dependent on how you hold up the sculpture. This differs from simply naming the same referent by mentioning it with a word: if the sculpture is of a cat, and is at least somewhat realistic in form, the cat faces a particular direction; but if the speaker mentions a cat verbally, it is up to the listener to picture the cat facing whichever direction they please or whatever they think would make the most sense in the given context.

This facet of gesture use was explored from the beginning of the work in McNeill's lab. Their research paradigm was based on having participants retell an action-packed cartoon that they had just viewed. What McNeill (1992 and elsewhere) noted in their analysis was that there was a difference between two kinds of depiction. One involved what they called an observer viewpoint (O-VPT)—a third-person perspective on the entity or action referred to. In these cases, the speaker might trace a path of an action with their fingertip, hold or mold an imagined shape in the air to show the size or form of something, or embody the referent with their fingers or whole hand, as when one's flat hand can stand for a piece of paper. This was different from when the speaker enacted an action as if they themselves were doing it (e.g., pantomiming writing with one's hand, or momentarily pretending to be one of the animals in the cartoon they had viewed, holding their hands up in front of themselves like the animal's paws). This is what the McNeill lab group called character viewpoint (C-VPT), involving a first-person "actor's" perspective on what they were telling about.

The difference in gestural viewpoint has been found to correlate with informational and grammatical properties of the speech accompanying the gestures. McNeill (1992, pp. 120–121) notes that Church et al. (1989) found that C-VPT was used significantly more often for gestures in narrations about cartoons to retell actions central to the storyline (such as actions related to characters' goals) and O-VPT correlated more often with gestures when mentioning points more peripheral to the storyline (e.g., related to the setting or subordinate actions). Furthermore, McNeill (1992, p. 119) sums up their finding that "The C-VPT tends to appear with transitive verbs and single clause sentences; the O-VPT with intransitive or stative verbs and multi-clause sentences." These findings were confirmed and elaborated upon in Parrill (2010), which also pointed out that the correlation is partly a factor of the nature of certain events and of discourse structure. Wu (2018) also found that clauses with low transitivity verbs (expressing less action or even copula constructions, with the verb "to be") are less likely to be produced with representational gestures as compared with high transitivity clauses (expressing more dynamic, energetic action). Parrill (2010) added a third viewpoint, based on findings from her data, namely the narrator viewpoint. This is found when the role of the speaker as a narrator addressing the listener is highlighted, for example when holding out a palm-up open-hand when describing an action; the gesture does not relate to any qualities of the action itself, but rather to the very fact of mentioning the action.

Interestingly, speakers can combine viewpoints in their gestures, reflecting what McNeill (1992, pp. 122–125) calls a dual viewpoint. In one of his examples, the speaker's right-hand flexes in a grasping action when talking about one character in the cartoon grabbing the other one (using C-VPT) after which the clenched hand moves downward while describing how the two characters fell down together on the ground; the path of motion reflects an O-VPT on the two characters moving downward as one assembly. The two co-occurring parameters of gesture form, hand shape, and motion, incorporate the dual viewpoint. In another context, that of simultaneous interpreting, Cienki and Iriskhanova (2020) report on how interpreters working in an interpreting booth sometimes blend their own perspective as speakers talking to a listening audience with that of embodying the person whose speech they are interpreting. Ongoing analysis of data from that project,² which involves interpreters interpreting only an audio recording (not seeing the speaker), has revealed examples such as one rendering a statement about how the quantity being mentioned (of species that perished over time) is colossal, at which point the interpreter shakes his head and raises his shoulders in a shrug

(Debras, 2017). The interpreter performs on himself a pragmatic gesture that might plausibly be what the speaker of the source text might have done while uttering such a statement, enacting a stance that could be interpreted as that the number is so large as to be almost unbelievable (see, for comparison, Debras & Cienki, 2012, on the role of shoulder lifts in expressing epistemic stance).

The issue of viewpoint, perspective-taking, and construal as they are made visually perceptible in gesture brings us back to the issue of mental simulation, raised earlier above. The use of different viewpoints in depicting events can provide insights into the different ways in which speakers are mentally simulating the events that they are describing. In another example from the simultaneous interpreting data, an interpreter, who only hears the voice of the speaker to be interpreted and does not see him, renders an utterance about some quantities indicated in red on a bar chart; in that moment, the interpreter looks up and points to the upper right space in front of himself. Taking on an imagined C-VPT of the original speaker, it is as if he sees and indicates the red bars on an imaginary graph—a graph which is as if in front of him at the moment. As Parrill (2010) points out, the fact that speakers show the use of different viewpoints in gesture can be related theoretically to the proposal by Hostetter and Alibali (2008, 2019) that (at least some) uses of gesture could reflect gesturers' mental simulations of the actions being gestured (the Gesture for Simulated Action or GSA hypothesis). As they hypothesize, motor simulation might be more likely to prompt C-VPT gestures, whereas O-VPT gestures might rely more on simulation of visual imagery. However, the issue awaits further study, because as Parrill (2010, p. 656) notes, "The question of how mental images are converted into motor actions is not resolved within the GSA model."

Finally, while the expression of one's viewpoint on an event may be easy to understand as it relates to speaking and gesturing about physical states, qualities, or events, the phenomenon raises interesting questions with regard to our conceptualization of the abstract. Presumably, speakers may conceptualize abstract processes from an observer, character, or narrator's viewpoint, but how does this work in fact, and what can gesture use reveal about this? As yet, we know very little about this topic beyond the research on metaphor and gesture mentioned above.

The research on viewpoint in gesture, mental stimulation, and the GSA hypothesis have bearings upon another topic in cognitive linguistic research on gesture, namely that of thinking for speaking as constituting a special form of thought; this topic has been extended to the study of gesture, as discussed in the following section.

3.4 | Thinking for speaking and gesturing

Talmy's (1983, 1985, and elsewhere) analyses of the ways in which events are expressed grammatically in different languages, and his claims that the patterns that are found reflect different ways of conceptualizing events, proved inspirational for much subsequent research by both linguists and cognitive psychologists. In one strand of this work, Talmy (1991) argued that a syntactic typological difference can be distinguished between languages like English, which express what he called the "core schema" of a motion event (the path of motion) via a "satellite," such as a preposition (e.g., in English: *I rolled the keg out of the storeroom*), and languages like Spanish, which express this schema with the main verb (cf. Spanish: *Saqué el barril de la bodega rodandolo*, which Talmy [p. 489] glosses in English as "I extruded [MOVED-out] the keg from the storeroom rolling it"). Talmy (1983, p. 486) notes that the Romance languages, Semitic languages, and Japanese (among others) are verb-framed languages, while most Indo-European languages other than Romance ones and the Finno-Ugric languages (among others) are satellite-framed. Slobin incorporated this finding into his hypothesis concerning "thinking for speaking," that the particular lexical and grammatical forms available in any given language require one to mobilize particular forms of thinking to allow for the formulation of one's ideas for expression in that language (Slobin, 1987). He then supported the hypothesis by testing it with speakers of different languages in studies on the narration of events depicted in a picture book (Slobin, 1996, 2000).

This line of research on thinking for speaking fit well with, and was picked up by, the McNeill Lab for at least two reasons: for its consonance with one of McNeill's theoretical standpoints, and for its resonance with his methodological approach to gesture research. The theoretical connection concerns McNeill's theory of speech and gesture production. McNeill (1992) built on Vygotskij's (1934) proposals on how new ideas and utterances continuously arise against the background of recently uttered ideas, McNeill (1992) proposed that such idea units are formulated not only into the linguistic categories available in the language that the person is speaking, but also that there are imagistic elements of the idea which may appear in the speaker's gestures. McNeill claimed that the two sides—the linguistic-categorical and the imagistic-wholistic—interact with each other in the production of speech and gesture. The process of expression on the linguistic side can influence how one formulates one's co-speech gesture, and conversely, the formulation of the

gesture might influence in some ways one's verbal formulation. That is, there is a dialectic between the two sides. Note the compatibility of this in many ways with Kendon's (1980) earlier characterization of an "utterance" as a level of expression that can be verbal, gestural, or both—that speech and gesture are "two aspects of the process of utterance" (as the title of his 1980 paper indicates). McNeill (1992) called these idea units "growth points," which arise as complex wholes, but which become unpacked into speech and gestural expression, thereafter giving rise to new idea units as a conversation or narrative progresses (McNeill & Duncan, 2000).

The notion of thinking-for-speaking also connected to the kind of cross-linguistic research on gesture that was being conducted in the McNeill Lab in the 1990s, having participants tell the story of a cartoon they had just been shown that is full of various kinds of motion events. They found that speakers were not only formulating their verbalizations of events according to the lexical and grammatical categories available in the language they were speaking at the moment, but that they were also gesturing in ways that conform to the pattern of information packaging that the given language affords. Kita and Özyürek (2003), for example, analyzed how speakers of different languages described scenes from a cartoon, including one in which a character swung on a rope from one building to another. They found that speakers of English (a satellite-framed language) were more likely to represent the action by gesturally tracing an arc-shape (incorporating manner and path of motion), while speakers of Japanese and of Turkish (verb-framed languages) either used arc gestures as well as straight-line gestures or just traced a straight line, meaning that their gestural representation corresponded to the information presented in the main verb in each language (just the path between the two buildings). Interestingly, research on blind speakers also shows comparable results as with sighted-speakers in terms of how the linguistic framing of events in the language (as verb-framed or satellite-framed) relates to what features are more likely to be represented in co-speech gesture (Özçalışkan et al., 2018). This suggests that such patterns in the use of gesture are not purely a matter of having grown up seeing how speakers of the given language gesture when expressing spatial events, but are more integrally related to the kind of thinking involved in using the type of language one is speaking.

All of these points potentially have larger implications, given how the lexical and grammatical means of expressing spatial events have been shown to provide a backbone in many languages for how more abstract processes are expressed via metaphorical use of spatial terms, including such domains as time, possession, transfer of possession, and so forth. It was this finding that led Jackendoff (1983), following up on proposals in Gruber (1976), to propose the Thematic Relations Hypothesis in his theory of Conceptual Semantics, claiming that the organization of spatial concepts provides a ready framework not only for the understanding of how other conceptual domains are organized, but also for the expression of them in spatial terms. It is not by chance that Langacker's first name for his theory of Cognitive Grammar was "space grammar" (Langacker, 1982). Indeed, in some ways the idea that linguistic expressions for, and our ways of understanding, spatial relations lie at the core of our ways of thinking and communicating about more abstract domains goes back to German grammatical theories from the 19th century, concerning "localism" (Cienki, 1995).

4 | PRAGMATIC, INTERACTIVE, AND DISCOURSE-RELATED USE OF GESTURE

While the representational gestures discussed above are highly context-dependent, are often created spontaneously, and may be idiosyncratic in nature (McNeill, 1992, p. 36), not all gestures are like this. A large portion of gestures are not one-off creations but instead consist of forms that recur across different speakers and concern frequently occurring communicative and interactive functions. These include showing disagreement or doubt, showing one's stance toward what is being talked about, offering the turn to talk to someone else, and many others. Such functions of gesture fall into some overlapping groups and have been called pragmatic gestures (Kendon, 2004), speech-handling gestures (Streeck, 2009, chapter 8), and interactive gestures (Bavelas et al., 1992), among other terms (see Payrató & Teßendorf, 2014, for an overview). Just as these functions recur across different contexts of interaction, so too do the forms of these gestures tend to recur (within a given culture) with certain functions. This is one of the reasons that they have been called "recurrent gestures" (Bressem & Müller, 2014a; Ladewig, 2014). Examples from German speakers, presented in Bressem and Müller (2014a), include sweeping away gestures associated with negative meaning, formed with a flat hand, palm down, moving laterally in front of the speaker; a gesture associated with doubt or uncertainty, involving a wavering hand gesture, produced with an open hand held up, palm facing the center space in front of the speaker, the upper arm rotating back and forth; and a gesture used when speakers raise a point and wish attention to be paid to it, with an index finger extended and raised vertically while the remaining fingers of the hand are closed in a

fist. See also Müller's (2004) extensive discussion of the palm-up open hand, used variously in contexts of presenting a point, asking a question, offering a turn at talk to someone, and so forth.

In contrast with the large amount of research that has been conducted on representational gestures (often just called "iconic gestures" in such research) from the point of cognitive psychology and psycholinguistics, there are far fewer studies on gestures with pragmatic functions from these fields of study. There are several reasons for this, including that the research paradigm that has been used by so many in cognitive psychology follows from the McNeill Lab's use of a video stimulus to elicit narratives about actions observed, rather than having participants interact with each other regarding their attitudes or stances towards a topic. This could also be due to the difficulty of isolating pragmatic functions for analysis in controlled ways for experimental research. But it could also be that there is a general lack of theorizing about the cognitive role of functions such as stance-taking and performing speech acts in interaction that would motivate such research in cognitive science. This stands in contrast to hypotheses like that concerning gestures as simulated actions (Hostetter & Alibali, 2008), mentioned above. Such theories have focused on possible cognitive underpinnings of the production of primarily representational gestures. In this regard, research on gesture might prompt new theoretical questions for cognitive scientists. The mere frequency with which pragmatic gestures are used during talk—even monologic talk such as lectures, and in contexts where one does not see one's interlocutor (such as during audio-only phone calls)—raises questions about mental simulation of the interlocutor (even imagined ones) and how this is implicated in one's own formulation of ideas, speech, and gestures.

5 | THE MULTIFUNCTIONALITY OF GESTURES AND CONSEQUENCES THIS HAS FOR GESTURE ANALYSIS

Having considered some main functions of gestures above in terms of different categories, it is worth pointing out what many gesture researchers are aware of but perhaps would rather not admit. This is the fact that most gestures serve multiple functions at once (Kok et al., 2016). For example, in most uses of referential gestures, a pragmatic functional element also appears to play a role; for example, the size and level of energy used to produce a gesture can signal the gesturer's attitude toward what one is depicting. In turn, many of the recurrent gestures with pragmatic functions can be seen as being based on schematized representational gestures; witness the negation gestures with a flat hand moving laterally, as if clearing away something from in front of the speaker (Bressem & Müller, 2014b); or the wavering hand gesture (with the upper arm and hand rotating back and forth slightly) expressing uncertainty, much like an object which is not on solid ground might wobble from side to side.

Consequently, Müller (1998b) applies Bühler's (1982) Organon model of language to gesture, claiming that not only any use of verbal language, but also any use of gesture, involves three functions at once: the representation (*Darstellung*) of the referent, the speaker's form of expression (*Ausdruck*), and the appeal being made to the listener (*Appell*). Nevertheless, one function can normally be found (at least by researchers) as the most prominent one in any given context of gesture use; for research for which quantitative analysis of gesture use is important, decisions about the primary function of the gestures studied is usually deemed essential in order to be able to conduct the counting and comparison of functions. However, ignoring the fact that gestures are so often doing multiple things at once in an interaction can hide the complexity of the realities of gesture use. It is not yet clear what the cognitive implications might be of gestures apparently so often serving multiple functions at once. Efforts have been made to develop systems to annotate the multifunctionality, such as Iriskhanova and Cienki's (2018) multi-vector semiotic model. That reflects the multiple functions of any given gesture as spokes on a wheel, each of which has its own degree of manifestation in the use of a gesture. It remains to be seen how reliably such a coding system could be applied across multiple coders, and how the results could be employed in quantitative studies.

A further question about the cognitive role of gestures with regard to their multifunctionality arises if we look not just at the gesture producer, but also consider anyone who sees the gesture produced. Questions arise about the degree of intentionality in gesture production and about whether the function for which a gesture was produced (with conscious intent or not), and the function it is perceived as having by someone seeing it, are the same or not. The use of self-adaptor movements (such as scratching oneself or wringing one's hands) while talking deserves special mention in this regard. While the self-adaptor might be considered as having a pragmatic function for the producer him/herself, it could potentially have a different import for those observing the gesturer. For example, inadvertent movements by the speaker could be seen by the observer as "giving off" information (in Goffman's, 1963 terms), perhaps in ways unwanted by the gesturer (e.g., as a sign of insecurity, or as showing a lack of desire to communicate). There is also

little research to date on the cognitive implications of this two-sided nature (from the producer's and observer's sides) of gestures' multifunctionality.

6 | GESTURE AND GRAMMAR / MULTIMODAL APPROACHES TO GRAMMAR

Gestures with various functions have been considered in cognitive linguistics not just in terms of how they can express particular referents or serve pragmatic and interactive functions, but also as to whether they relate to core structures of language: grammatical structures. This issue raises interesting questions for cognitive science research if not only specific referents and stances are capable of being expressed via gesture, but even something as abstract as grammatical patterns. The fact that this is so, to some degree, as discussed in this section, provides further evidence that grammar (or at least some aspects of it) relates to ways of conceptualizing events in terms of imagery that can be rendered gesturally.

Both individual constructions and larger questions of grammatical theory have been explored. Studies have shown correlations between gesture use and particular verbal constructions, for example, in English, involving a verb of motion and the phrase *in circles*, or with “*all the way from X PREPosition Y*” (Zima, 2014), or in German, the phenomenon of modal particles being used regularly with certain gestures (Schoonjans, 2014). Other studies have concerned gesture use in connection with broader grammatical categories, such as transitivity in English (Wu, 2018), grammatical aspect in English (Hinnell, 2018) and in English and Mandarin Chinese (Duncan, 2002; Wang, 2017), and tense/aspect in French (Boutet et al., 2016). The findings show variable relations of gestures to constructions: it is not the case that each grammatical construction necessarily has its own gesture, or that a gesture found to correlate with a construction is always used with it. The degree of necessity of the gesture in relation to use of the construction varies widely. Indeed, one sometimes finds the reverse: a gesture in search of a construction. For example, the research on what is called a *shrug* in English reveals a range of functions loosely correlating with a range of form features, including tilting of the head, raising of one or both shoulders, and the turning upward of one or both hands, palm open (Debras, 2017). However, what constitutes what could be called a “shrug construction” in gesture does not correlate clearly with a particular verbal construction. At least for English speakers, the shrug can be used with verbalizations ranging from “I don't know” to “that's what I think” to “maybe”, and beyond.

However, taken together, these studies give rise to a bigger question about whether theories of grammar themselves need to be adjusted if gesture is taken into consideration. For example, the variation possible in the obligatoriness of most of the gestures with the constructions they have been studied in relation to raises theoretical questions about what is required in order to consider a formal (i.e., form-related) feature to be part of a construction. Some point out that the questions that arise concerning the status of gesture with verbal constructions—including whether frequency of occurrence is a relevant factor in deciding if a construction is “multimodal”, or whether infrequent but salient use of gesture may be sufficient—involve the same issues that are debated when deciding upon the status of verbal constructions, and thus are not necessarily problems inherent to whether constructions can be multimodal or not (Schoonjans, 2017; Zima & Bergs, 2017). One proposal is that we need to move one step up from the level of lexico-grammar and gesture in theorizing about constructions in order to follow Kendon's (1980, 2004) position that the level of “utterance” provides an overarching view of what might constitute a construction (Cienki, 2017).

In general, what these cognitive linguistic approaches share is the view that a bottom-up approach is the way to consider what constitutes constructions forming the grammar of a given language. Langacker (2008, p. 458) notes that what is necessary for any kind of form-meaning pairing to gain symbolic status is “sufficient reinforcement of recurring commonalities”. This rationale can be seen as rather different from the approach found in some generative and other formal linguistic theories, in which consideration is given to whether gesture might be included in the theory from more of a top-down approach, that is, the question being how gesture might be “plugged in” to the existing formal theory; see Lascarides and Stone (2009) or Schlenker (2018) for examples of this.

The fact that certain grammatical patterns correlate in certain ways with speakers' use of gesture—a spatial medium of expression—takes the spatialization hypotheses for nonspatial domains, discussed above (the Thematic Relations Hypothesis and the earlier localist hypothesis), and places them into a bigger context. It is one which not only concerns the origin of lexical and grammatical forms, but which also raises questions about the degree to which the spatial imagery that is claimed to be at the basis of grammatical relations is involved in the conceptualization of events. The research from gesture studies thus far provides partial evidence supporting the cognitive reality of at least some of these

spatial underpinnings. In addition, gestural data from studies cited earlier suggest that the core framework behind the conceptualization of events is not only spatial, but also involves dynamic properties (sustained velocity versus acceleration, torque, etc.) and qualities of felt experience and forces (think of some of the image schematic qualities discussed in Johnson, 1987, such as BALANCE, COMPULSION, ATTRACTION, etc.). In many respects, this is precisely what is entailed in a fundamental hypothesis of cognitive linguistics, which can be called the embodiment hypothesis. Rohrer (2007, p. 27) characterizes it as follows: “the *embodiment hypothesis* is the claim that *human physical, cognitive, and social embodiment ground our conceptual and linguistic systems*” (emphasis in original; see also Gibbs Jr., 2006, for an overview). The study of speakers’ gestures can contribute to testing this hypothesis in several ways, some of which are indicated in the following section.

7 | CONCLUSION: HOW COGNITIVE LINGUISTIC WORK ON GESTURE CAN INFORM AND INSPIRE OTHER COGNITIVE RESEARCH

The topics above offer a number of starting points for further empirical research in cognitive science and raise questions that could prompt new theoretical developments concerning the role of human embodiment in processes of cognizing. These include such issues as the connections between processes of conceptualization and idea formulation, the means by which such processes come to fruition in human communication, and the role played by the physical media we have at our disposal for such expression.

One point returned to several times above was the schematicity of gestural representation. The physical structure of the hands and their limited “degrees of freedom” of movement (Boutet, 2010; Boutet et al., 2018) afford only partial representation of any idea. More detailed forms of representation can be produced if one exerts more effort to do so (in terms of the kinds of handshapes that are used or the movements that are made)—but in everyday conversations, speakers often do not take such effort, and frequently produce minimal, relaxed forms (see, e.g., Cienki, 2021). It could be that the reason we often produce simple gestural movements that only schematically relate to the topics we are speaking about is that the mental simulations of the ideas involved are not detailed, but are themselves schematic. The fact that speakers gesture about both physical and abstract referents with different degrees of detail in different contexts raises many questions not only for future neuroscientific research but also for investigation in cognitive anthropology, in terms of how such practices differ per culture and according to the context of use. The points raised above about the inherent viewpoint and perspective-taking involved in gestural depiction add another layer of complexity, and of potential inquiry, for such investigations.

The fact that gestures can so often be seen as involving multiple functions raises other interesting issues for further study. One is that speakers who gesture, and those seeing and hearing them, do not appear to have a problem with this multifunctionality; judging from existing research and from personal experience, addressees rarely ask speakers what they meant with their gestures (e.g., “was that gesture supposed to be referring to the topic or showing your attitude towards it?”). Further, addressees seldom, if ever, appear to be confused by a speaker making reference to an idea in speech while using a gesture primarily for a different function, such as a pragmatic one. This highlights how adept interactants in conversation are at processing multiple functions at once. Indeed, as mentioned above, spoken language alone is normally serving multiple purposes at once—and taking gesture into account in one’s research highlights this even further. While so much psycholinguistic research focuses on the referential function of language (and also of gesture), broadening the scope of the investigation to include the various functions that interlocutors are engaging with at once could help increase the validity of the findings as they relate to the actual use of multiple semiotic systems in communication—what Zlatev (2019) calls polysemiotic communication.

The research on gesture stemming from theories under the broad umbrella of cognitive linguistics includes work on processes of the production of spoken language and gesture, as seen in particular in the work on thinking for speaking and gesturing. This can provide concrete starting points for further inquiry both in terms of the empirical bases for the relevant studies (e.g., often based on describing motion events) and in the theoretical bases of this work in the study of syntactic typological differences. In addition, since gesture is an inherently spatial medium of expression, it can allow future empirical research in cognitive science to test some of these hypotheses concerning spatial cognition as being a fundamental basis for how we conceptualize more abstract domains. In short, gesture research based on these findings from (cognitive) linguistics can offer a wealth of new directions for research in cognitive science, as it can provide insights into aspects of spatial thinking as it relates to the conceptualization and expression of events of various kinds.

Given that there has been no culture reported so far in which speakers never gesture, and that gestures bear various relations in their form and function to speech (more so than other embodied activities, like walking or twiddling one's thumbs, do in relation to speech, for example), this should encourage cognitive scientific research on language production to consider a broader scope, namely not only an audio perspective but also a visual one. This is a move that has begun in some ways, but which has much potential for further growth. First language acquisition is one domain, in particular, in which it is increasingly being seen as necessary to take the rich complexity of interaction between behaviors (spoken and gestural) into account in order to better understand cognitive developmental processes that relate to communication; data collection in linguistic fieldwork of previously undocumented (or barely documented) languages is another area which is increasingly employing video data collection, rather than just audio, given the technological ease with which this can now be done.

Finally, researching gesture raises questions about the nature of the symbolic structures that we researchers wish to call “linguistic.” As groupings of particular kinds of symbolic structures, what is the nature of linguistic categories? Previous research in cognitive linguistics already suggested that linguists need to rethink how linguistic categories themselves are constituted. This led to the proposal that such categories be thought of more in terms of having a prototype structure with fuzzy boundaries (Lakoff, 1987; Taylor, 1995). Ultimately, one's position on the ontological nature of linguistic categories needs to be taken into account in cognitive science research on, or involving, language.

AUTHOR CONTRIBUTIONS

Alan Cienki: Conceptualization (lead); funding acquisition (supporting); investigation (lead); methodology (lead); project administration (lead); writing – original draft (lead); writing – review and editing (lead).

FUNDING INFORMATION

The research was supported by Russian Science Foundation grant No. 19-18-00357, awarded to Moscow State Linguistic University.

CONFLICT OF INTEREST

The author has no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

ORCID

Alan Cienki  <https://orcid.org/0000-0003-2951-9722>

RELATED WIREs ARTICLES

[Embodied cognition](#)

[How thought is mapped into words](#)

[Spatial language and abstract concepts](#)

[Learning through gesture](#)

ENDNOTES

¹ Müller (1998a, 1998b) originally listed them as four categories, with the names in English (1998a) and German (1998b) actually being verbs describing what the gesturing hand is doing: the hand imitates/*die Hand agiert* (called “enacting” above), the hand molds/*die Hand modelliert* (combining “holding” and “molding” above), the hand draws/*die Hand zeichnet* (tracing), the hand portrays/*die Hand repräsentiert* (embodying).

² “Verbal and co-verbal behavior under cognitive pressure: Analyses of speech, gesture, and eye gaze”, being conducted by the Polimod Lab at Moscow State Linguistic University.

REFERENCES

Austin, J. (1962). *How to do things with words*. Oxford University Press.

Barsalou, L. W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences*, 22(4), 577–609. <https://doi.org/10.1017/S0140525X99002149>

- Bavelas, J. B., Chovil, N., Lawrie, D. A., & Wade, A. (1992). Interactive gestures. *Discourse Processes*, 15, 469–489. <https://doi.org/10.1080/01638539209544823>
- Boutet, D. (2010). Structuration physiologique de la gestuelle: Modèle et tests. *Lidil*, 42, 77–96. <https://doi.org/10.4000/lidil.3070>
- Boutet, D., Morgenstern, A., & Cienki, A. (2016). Grammatical aspect and gesture in French: A kinesiological approach. *Russian Journal of Linguistics*, 20(3), 132–151. <https://doi.org/10.22363/2687-0088-14745>
- Boutet, D., Morgenstern, A., & Cienki, A. (2018). Looking ahead: Kinesiological analysis. In A. Cienki & O. K. Iriskhanova (Eds.), *Aspectuality across languages* (pp. 143–159). John Benjamins.
- Bressemer, J. (2013). A linguistic perspective on the notation of form features in gestures. In C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & S. Teßendorf (Eds.), *Body–language–communication: An international handbook on multimodality in human interaction* (Vol. 1, pp. 1079–1098). De Gruyter Mouton.
- Bressemer, J., Ladewig, S. H., & Müller, C. (2013). Linguistic annotation system for gestures. In C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & S. Teßendorf (Eds.), *Body–language–communication: An international handbook on multimodality in human interaction* (Vol. 1, pp. 1098–1124). De Gruyter Mouton.
- Bressemer, J., & Müller, C. (2014a). A repertoire of German recurrent gestures with pragmatic functions. In C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & J. Bressemer (Eds.), *Body–Language–Communication: An international handbook on multimodality in human interaction* (Vol. 2, pp. 1575–1591). De Gruyter Mouton.
- Bressemer, J., & Müller, C. (2014b). The family of away gestures: Negation, refusal, and negative assessment. In C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & J. Bressemer (Eds.), *Body–language–communication: An international handbook on multimodality in human interaction* (Vol. 2, pp. 1592–1604). De Gruyter Mouton.
- Bühler, K. (1982). *Sprachtheorie: Die Darstellungsfunktion der Sprache*. Fischer (Original work published 1934).
- Calbris, G. (1990). *The semiotics of French gestures*. Indiana University Press.
- Calbris, G. (2008). From left to right...: Coverbal gestures and their symbolic use of space. In A. Cienki & C. Müller (Eds.), *Metaphor and gesture* (pp. 27–53). John Benjamins.
- Church, R. B., Baker, D., Bunnag, D., & Whitmore, C. (1989). The development of the role of speech and gesture in story narration [conference presentation]. In *Proceedings of the Biennial Meeting of the Society for Research in Child Development, Kansas City, MO*.
- Cienki, A. (1995). 19th and 20th century theories of case: A comparison of localist and cognitive approaches. *Historiographia Linguistica*, 22, 123–162. <https://doi.org/10.1075/hl.22.1-2.06cie>
- Cienki, A. (1998). Metaphoric gestures and some of their relations to verbal metaphoric expressions. In J.-P. Koenig (Ed.), *Discourse and cognition: Bridging the gap* (pp. 189–204). Center for the Study of Language and Information.
- Cienki, A. (2013). Gesture, space, grammar, and cognition. In P. Auer, M. Hilpert, A. Stukenbrock, & B. Szmrecsanyi (Eds.), *Space in language and linguistics: Geographical, interactional, and cognitive perspectives* (pp. 667–686). Walter de Gruyter.
- Cienki, A. (2017). Utterance construction grammar (UCxG) and the variable multimodality of constructions. *Linguistics Vanguard*, 3(s1), 20160048. <https://doi.org/10.1515/lingvan-2016-0048>
- Cienki, A. (2020). A multimodal perspective on MCA: Cues of (possible) metacommunicative awareness. In C. di Biase-Dyson & M. Egg (Eds.), *Drawing attention to metaphor: Case studies across time periods, cultures and modalities* (pp. 63–91). Benjamins.
- Cienki, A. (2021). From the finger lift to the palm-up open hand when presenting a point: A methodological exploration of forms and functions. *Languages and Modalities*, 1(1), 17–30. <https://doi.org/10.3897/lamo.1.68914>
- Cienki, A., & Iriskhanova, O. K. (2020). Patterns of multimodal behavior under cognitive load: An analysis of simultaneous interpretation from L2 to L1. *Voprosy Kognitivnoy Lingvistiki*, 1, 5–11. <https://doi.org/10.20916/1812-3228-2020-1-5-11>
- Cienki, A., & Mittelberg, I. (2013). Creativity in the forms and functions of spontaneous gesture with speech. In T. Veale, K. Feyaerts, & C. Forceville (Eds.), *Creativity and the agile mind: A multi-disciplinary study of a multi-faceted phenomenon* (pp. 231–252). De Gruyter Mouton.
- Cienki, A., & Müller, C. (Eds.). (2008). *Metaphor and gesture*. John Benjamins.
- Cienki, A., & Müller, C. (2014). Ways of viewing metaphor in gesture. In C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & J. Bressemer (Eds.), *Body–language–communication: An international handbook on multimodality in human interaction* (Vol. 2, pp. 1766–1781). De Gruyter Mouton.
- Clark, H. H. (2003). Pointing and placing. In S. Kita (Ed.), *Pointing: Where language, culture, and cognition meet* (pp. 243–268). Lawrence Erlbaum Associates.
- Clark, H. H. (2016). Depicting as a method of communication. *Psychological Review*, 123, 324–347. <https://doi.org/10.1037/rev0000026>
- Debras, C. (2017). The shrug: Forms and meanings of a compound enactment. *Gesture*, 16(1), 1–34. <https://doi.org/10.1075/gest.16.1.01deb>
- Debras, C., & Cienki, A. (2012). Some uses of head tilts and shoulder shrugs during human interaction, and their relation to stancetaking. In *International Proceedings of the ASE 2012 International Conference of Social Computing*, Amsterdam, Netherlands, 3–5 September 2012. <https://doi.org/10.1109/SocialCom-PASSAT.2012.136>
- Dictionary.com. (2021). Deictic. In Dictionary.com. Retrieved from <https://www.dictionary.com/browse/deictic>.
- Duncan, S. (2002). Gesture, verb aspect, and the nature of iconic imagery in natural discourse. *Gesture*, 2(2), 183–206. <https://doi.org/10.1075/gest.2.2.04dun>
- Efron, D. (1972). *Gesture, race and culture*. Mouton. (Original work published in 1941 as *Gesture and environment*. King's Crown Press).
- Ekman, P., & Friesen, W. V. (1969). The repertoire of nonverbal behavior: Categories, origins, usage, and coding. *Semiotica*, 1(1), 49–98. <https://doi.org/10.1515/9783110880021.57>

- Fauconnier, G., & Turner, M. (2002). *The way we think: Conceptual blending and the mind's hidden complexities*. Basic Books.
- Freedman, N. (1972). The analysis of movement behavior during the clinical interview. In A. W. Siegman & B. Pope (Eds.), *Studies in dyadic communication* (pp. 153–175). Pergamon Press.
- Freedman, N. (1977). Hands, words, and mind: On the structuralization of body movements during discourse and the capacity for verbal representation. In N. Freedman & S. Grand (Eds.), *Communicative structures and psychic structures* (pp. 109–132). Springer.
- Fricke, E. (2007). *Origo, Geste und Raum: Lokaldeixis im Deutschen*. De Gruyter Mouton.
- Gibbs, R. W., Jr. (2006). *Embodiment and cognitive science*. Cambridge University Press.
- Goatly, A. (1997). *The language of metaphors*. Routledge.
- Goffman, E. (1963). *Behavior in public places*. Free Press.
- Gruber, J. S. (1976). *Lexical structures in syntax and semantics*. North-Holland Publishing company (Original work from 1965, *Studies in lexical relations* [Doctoral dissertation], MIT, USA).
- Hall, J. (2004). Cicero and Quintilian on the oratorical use of hand gestures. *The Classical Quarterly*, 54(1), 143–160. <https://doi.org/10.1093/cq/54.1.143>
- Hinnell, J. (2018). The multimodal marking of aspect: The case of five periphrastic auxiliary constructions in north American English. *Cognitive Linguistics*, 29(4), 773–806. <https://doi.org/10.1515/cog-2017-0009>
- Hostetter, A. B., & Alibali, M. W. (2008). Visible embodiment: Gestures as simulated action. *Psychonomic Bulletin & Review*, 15(3), 495–514. <https://doi.org/10.3758/PBR.15.3.495>
- Hostetter, A. B., & Alibali, M. W. (2019). Gesture as simulated action: Revisiting the framework. *Psychonomic Bulletin & Review*, 26(3), 721–752. <https://doi.org/10.3758/s13423-018-1548-0>
- Hsu, H.-C., Brône, G., & Feyaerts, K. (2021). When gesture “takes over”: Speech-embedded nonverbal depictions in multimodal interaction. *Frontiers in Psychology*, 11, 552533. <https://doi.org/10.3389/fpsyg.2020.552533>
- Iriskhanova, O. K., & Cienki, A. (2018). The semiotics of gestures in cognitive linguistics: Contribution and challenges. *Voprosy Kognitivnoy Lingvistiki*, 4, 25–36. <https://doi.org/10.20916/1812-3228-2018-4-25-36>
- Jackendoff, R. (1983). *Semantics and cognition*. MIT Press.
- Jakobson, R. (1990). Two aspects of language and two types of aphasic disturbances. In L. R. Waugh & M. Monville-Burston (Eds.), *On language: Roman Jakobson* (pp. 115–133). Harvard University Press (Original work published in 1956 in R. Jakobson & M. Halle, *Fundamentals of language*, Mouton).
- Johnson, M. (1987). *The body in the mind: The bodily basis of meaning, imagination, and reason*. University of Chicago Press.
- Kendon, A. (1970). Movement coordination in social interaction: Some examples described. *Acta Psychologica*, 32, 100–125. [https://doi.org/10.1016/0001-6918\(70\)90094-6](https://doi.org/10.1016/0001-6918(70)90094-6)
- Kendon, A. (1980). Gesticulation and speech: Two aspects of the process of utterance. In M. Ritchie Key (Ed.), *Nonverbal communication and language* (pp. 207–227). Mouton.
- Kendon, A. (2004). *Gesture: Visible action as utterance*. Cambridge University Press.
- Kendon, A. (2016). Gesture and sign: Utterance uses of visible bodily action. In K. Allan (Ed.), *The Routledge handbook of linguistics* (pp. 49–62). Routledge.
- Kita, S., & Özyürek, A. (2003). What does cross-linguistic variation in semantic coordination of speech and gesture reveal?: Evidence for an interface representation of spatial thinking and speaking. *Journal of Memory and Language*, 48, 16–32. [https://doi.org/10.1016/S0749-596X\(02\)00505-3](https://doi.org/10.1016/S0749-596X(02)00505-3)
- Kok, K., Bergmann, K., Cienki, A., & Kopp, S. (2016). Mapping out the multifunctionality of speakers' gestures. *Gesture*, 15(1), 37–59. <https://doi.org/10.1075/gest.15.1.02kok>
- Kyrtziz, A. (1997). *Metaphorically speaking: Sex, politics, and the Greeks* [Unpublished doctoral dissertation]. Lancaster University, UK. Retrieved from <http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.246124>
- Ladewig, S. H. (2014). Recurrent gestures. In C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & J. Bressemer (Eds.), *Body–language–communication: An international handbook on multimodality in human interaction* (Vol. 2v, pp. 1558–1574). De Gruyter Mouton.
- Lakoff, G. (1987). *Women, fire, and dangerous things: What categories reveal about the mind*. University of Chicago Press.
- Lakoff, G. (1988). Cognitive semantics. In U. Eco, M. Santambrogio, & P. Violi (Eds.), *Meaning and mental representations* (pp. 119–154). Indiana University Press.
- Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. University of Chicago Press.
- Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to Western thought*. Basic Books.
- Langacker, R. W. (1982). Space grammar, analysability, and the English passive. *Language*, 58(1), 22–80. <https://doi.org/10.2307/413531>
- Langacker, R. W. (1987). *Foundations of cognitive grammar, volume I: Theoretical prerequisites*. Stanford University Press.
- Langacker, R. W. (1993). Reference-point constructions. *Cognitive Linguistics*, 4, 1–38. <https://doi.org/10.1515/cogl.1993.4.1.1>
- Langacker, R. W. (2008). *Cognitive grammar: A basic introduction*. Oxford University Press.
- Lapaire, J.-R. (2016). From ontological metaphor to semiotic make-believe: Giving shape and substance to fictive objects of conception with the “globe gesture”. *Signo*, 41(70), 29–44. <https://doi.org/10.17058/signo.v41i70.6413>
- Lascarides, A., & Stone, M. (2009). A formal semantic analysis of gesture. *Journal of Semantics*, 26, 393–449. <https://doi.org/10.1093/jos/ffp004>
- Marghetis, T., & Bergen, B. K. (2014). Embodied meaning, inside and out: The coupling of gesture and mental simulation. In C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & J. Bressemer (Eds.), *Body–language–communication: An international handbook on multimodality in human interaction* (Vol. 2, pp. 2000–2007). De Gruyter Mouton.

- McNeill, D. (1985). So you think gestures are nonverbal? *Psychological Review*, 92(3), 350–371. <https://doi.org/10.1037/0033-295X.92.3.350>
- McNeill, D. (1992). *Hand and mind: What gestures reveal about thought*. University of Chicago Press.
- McNeill, D., & Duncan, S. (2000). Growth points in thinking-for-speaking. In D. McNeill (Ed.), *Language and gesture* (pp. 141–161). Cambridge University Press.
- McNeill, D., & Levy, E. (1982). Conceptual representations in language activity and gesture. In R. J. Jarvella & W. Klein (Eds.), *Speech, place, and action* (pp. 271–295). Wiley & Sons.
- Mittelberg, I. (2007). Methodology for multimodality: One way of working with speech and gesture data. In M. Gonzalez-Marquez, I. Mittelberg, S. Coulson, & M. J. Spivey (Eds.), *Methods in cognitive linguistics* (pp. 225–248). John Benjamins.
- Mittelberg, I. (2008). Peircean semiotics meets conceptual metaphor: Iconic modes in gestural representations of grammar. In A. Cienki & C. Müller (Eds.), *Metaphor and gesture* (pp. 115–154). John Benjamins.
- Mittelberg, I., & Waugh, L. (2014). Gestures and metonymy. In C. Müller, A. Cienki, E. Fricke, S. L. Ladewig, D. McNeill, & J. Bressemer (Eds.), *Body–language–communication. An international handbook on multimodality in human interaction* (pp. 1747–1766). De Gruyter Mouton.
- Mittelberg, I., & Waugh, L. R. (2009). Metonymy first, metaphor second: A cognitive-semiotic approach to multimodal figures of thought in co-speech gesture. In C. Forceville & E. Urios-Aparisi (Eds.), *Multimodal metaphor* (pp. 329–356). Mouton de Gruyter.
- Müller, C. (1998a). Iconicity and gesture. In S. Santi, I. Guaïtella, C. Cavé, & G. Konopczynski (Eds.), *Oralité et gestualité: Communication multimodale, interaction* (pp. 321–328). L'Harmattan.
- Müller, C. (1998b). *Redebegleitende Gesten: Kulturgeschichte—Theorie—Sprachvergleich*. Berlin Verlag Arno Spitz.
- Müller, C. (2004). Forms and uses of the palm up open hand: A case of a gesture family? In C. Müller & R. Posner (Eds.), *The semantics and pragmatics of everyday gestures: The Berlin conference* (pp. 233–256). Weidler.
- Müller, C. (2008a). *Metaphors dead and alive, sleeping and waking: A dynamic view*. University of Chicago Press.
- Müller, C. (2008b). What gestures reveal about the nature of metaphor. In A. Cienki & C. Müller (Eds.), *Metaphor and gesture* (pp. 219–245). John Benjamins.
- Müller, C. (2014). Gestural modes of representation as techniques of depiction. In C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & J. Bressemer (Eds.), *Body–language–communication: An international handbook on multimodality in human interaction* (Vol. 2, pp. 1687–1702). De Gruyter Mouton.
- Müller, C. (In press). A toolbox of methods for gesture analysis. In A. Cienki (Ed.), *The Cambridge handbook of gesture studies*. Cambridge University Press.
- Müller, C., Ladewig, S. H., & Bressemer, J. (2013). Gestures and speech from a linguistic perspective: A new field and its history. In C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeill, & S. Teßendorf (Eds.), *Body–language–communication: An international handbook on multimodality in human interaction* (Vol. 1, pp. 55–81). De Gruyter Mouton.
- Müller, C., & Tag, S. (2010). The dynamics of metaphor: Foregrounding and activating metaphoricity in conversational interaction. *Cognitive Semiotics*, 6, 85–120. <https://doi.org/10.1515/cogsem.2010.6.spring2010.85>
- Núñez, R. (2008). A fresh look at the foundations of mathematics: Gesture and the psychological reality of conceptual metaphor. In A. Cienki & C. Müller (Eds.), *Metaphor and gesture* (pp. 93–114). John Benjamins.
- Opazo Reyes, P. (2018). *The moving and expressive body: A study on the semiotic resources used by classical orchestra conductors and their metaphorical associations in the presentation of musical dynamics* (Unpublished master's thesis). Vrije Universiteit Amsterdam, Netherlands. Retrieved from www.uvu.vu.nl/pub/index_oclc.cfm?SearchObjectId=8&objectid=109&ordering=1&openitem=189026
- Özçalışkan, Ş., Lucero, C., & Goldin-Meadow, S. (2018). Blind speakers show language-specific patterns in co-speech gesture but *not* silent gesture. *Cognitive Science*, 42, 1001–1014. <https://doi.org/10.1111/cogs.12502>
- Parrill, F. (2010). Viewpoint in speech–gesture integration: Linguistic structure, discourse structure, and event structure. *Language & Cognitive Processes*, 25(5), 650–668. <https://doi.org/10.1080/01690960903424248>
- Parrill, F. (2012). Interactions between discourse status and viewpoint in co-speech gesture. In B. Dancygier & E. Sweetser (Eds.), *Viewpoint in language: A multimodal perspective* (pp. 97–112). Cambridge University Press.
- Payrató, L., & Teßendorf, S. (2014). Pragmatic gestures. In C. Müller, A. Cienki, E. Fricke, S. H. Ladewig, D. McNeill, & J. Bressemer (Eds.), *Body–language–communication: An international handbook on multimodality in human interaction* (pp. 1531–1539). De Gruyter Mouton.
- Quintilianus, M. F. (1922). *The institution Oratoria of Quintilian with an English translation by H. E. Butler*. G. P. Putnam and Sons.
- Radden, G., & Kövecses, Z. (1999). Towards a theory of metonymy. In K.-U. Panther & G. Radden (Eds.), *Metonymy in language and thought* (pp. 17–59). John Benjamins.
- Rohrer, T. (2007). Embodiment and experientialism. In D. Geeraerts & H. Cuyckens (Eds.), *The Oxford handbook of cognitive linguistics* (pp. 25–47). Oxford University Press.
- Schlenker, P. (2018). Gesture projection and cosupposition. *Linguistics and Philosophy*, 41, 295–365. <https://doi.org/10.1007/s10988-017-9225-8>
- Schoonjans, S. (2014). *Modalpartikeln als multimodale Konstruktionen. Eine korpusbasierte Kookkurrenzanalyse von Modalpartikeln und Gestik im Deutschen* [Unpublished doctoral dissertation]. KU Leuven, Belgium.
- Schoonjans, S. (2017). Multimodal construction grammar issues are construction grammar issues. *Linguistics Vanguard*, 3(s1), 20160050. <https://doi.org/10.1515/lingvan-2016-0050>
- Sinha, S. (2007). Cognitive linguistics, psychology, and cognitive science. In D. Geeraerts & H. Cuyckens (Eds.), *The Oxford handbook of cognitive linguistics* (pp. 1266–1294). Oxford University Press.

- Slobin, D. (1987). Thinking for speaking. In J. Aske, N. Beery, L. Michaelis, & H. Filip (Eds.), *Proceedings of the 13th Annual Meeting of the Berkeley Linguistics Society* (pp. 435–445). Berkeley Linguistics Society.
- Slobin, D. I. (1996). From ‘thought and language’ to ‘thinking for speaking’. In J. Gumperz & S. C. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 70–96). Cambridge University Press.
- Slobin, D. I. (2000). Verbalized events: A dynamic approach to linguistic relativity and determinism. In S. Niemeier & R. Dirven (Eds.), *Evidence for linguistic relativity* (pp. 107–138). John Benjamins.
- Stibbe, A. (1996). *Metaphor and alternative conceptions of illness* [Unpublished doctoral dissertation]. Lancaster University, UK.
- Stokoe, W. (1960). *Sign language structure: An outline of the visual communications systems of American deaf. Studies in linguistics occasional papers, No. 8*. Dept. of Anthropology and Linguistics, University of Buffalo.
- Streeck, J. (2005). Pragmatic aspects of gesture. In K. Brown (Ed.), *The encyclopedia of language and linguistics, Vol. 5, pragmatics* (pp. 71–76). Elsevier.
- Streeck, J. (2008). Depicting by gesture. *Gesture*, 8(3), 285–301. <https://doi.org/10.1075/gest.8.3.02str>
- Streeck, J. (2009). *Gesturecraft: The manu-facture of meaning*. John Benjamins.
- Talmy, L. (1983). How language structures space. In H. L. Pick, Jr. & L. Acredolo (Eds.), *Spatial orientation: Theory, research, and application* (pp. 225–282). Plenum Press.
- Talmy, L. (1985). Force dynamics in language and thought. In W. H. Eilfort, P. D. Kroeber, & K. L. Peterson (Eds.), *Papers from the parasession on causatives and agentivity at the twenty-first regional meeting* (pp. 293–337). Chicago Linguistic Society.
- Talmy, L. (1991). Path to realization: A typology of event conflation. In L. A. Sutton, C. Johnson, & R. Shields (Eds.), *Proceedings of the seventeenth annual meeting of the Berkeley linguistics society: General session and parasession on the grammar of event structure* (Vol. 17, pp. 480–519). Berkeley Linguistic Society.
- Taylor, J. R. (1995). *Linguistic categorization: Prototypes in linguistic theory*. Oxford University Press (Original work published 1989).
- Tong, Y. (In press). *Embodiment of concrete and abstract concepts: The role of gesture* [Unpublished doctoral dissertation]. Vrije Universiteit, Amsterdam, Netherlands.
- Vygotskij, L. S. (1934). *Myshlenie i rech'* [Thinking and speech]. Sozkgiz.
- Wang, R. (2017). *Thinking, speaking and gesturing: Grammatical aspect in spoken Chinese and English from the perspective of multimodal communication*. [Unpublished doctoral dissertation]. Vrije Universiteit, Amsterdam, Netherlands.
- Wilcox, S. (2004). Gesture and language: Cross-linguistic and historical data from signed languages. *Gesture*, 4, 43–75.
- Wu, S. (2018). *Multimodality of constructions in construction grammars: Transitivity, transitivity alternations, and the dative alternation*. [Unpublished doctoral dissertation]. Vrije Universiteit, Amsterdam, Netherlands.
- Zima, E. (2014). English multimodal motion constructions. A construction grammar perspective. *Papers of the Linguistic Society of Belgium*, 8, 14–29. Retrieved from <http://uahost.uantwerpen.be/linguist/SBKL/sbkl2013/Zim2013.pdf>
- Zima, E., & Bergs, A. (2017). Multimodality and construction grammar. *Linguistics Vanguard*, 3(s1), 20161006. <https://doi.org/10.1515/lingvan-2016-1006>
- Zlatev, J. (2019). Mimesis theory, learning, and polysemiotic communication. In M. A. Peters (Ed.), *Encyclopedia of educational philosophy and theory* (pp. 1–6). Springer. https://doi.org/10.1007/978-981-287-532-7_672-1

How to cite this article: Cienki, A. (2022). The study of gesture in cognitive linguistics: How it could inform and inspire other research in cognitive science. *WIREs Cognitive Science*, 13(6), e1623. <https://doi.org/10.1002/wcs.1623>