GESTURES

APPROACHES, USES, AND DEVELOPMENTS

Edited by Giovanni Maddalena, Fabio Ferrucci,
Michela Bella, and Matteo Santarelli

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ITALIAN SMART ART EXPERIENCE

VASARI

Contents

Part III: **Gestures in Psychology and the Cognitive Sciences**

Laura Sparaci and Shaun Gallagher

Chapter 15
Continuity through Change: How Gestures Inform Current Debates on the Ontogeny of Embodied Narrative

Abstract: Embodied approaches to cognitive development underscore the relevance of narrative in lieu of mentalistic explanations of social cognition. In particular, embodied cognition revises the concept of narrative as an abstract fictional exercise and considers it instead an embodied practice, anchored in early social experiences, perceptions, and emotions, providing children the means to understand how others act according to reasons. Relevance given to embodied narrative in developing social cognition has led researchers to explore its ontogeny, often resulting in contrasting theories. Some studies take a nativist approach and define narrative as an invariant generative process. This view argues for the continuity of narrative structure from fetal and neonatal movement, through infant pre-verbal communication, and into linguistic meaning-making in childhood and adulthood. Other studies, while upholding that narrative is anchored in pre-verbal actions, suggest that it must be kept distinct from actions to avoid pan-narrativism and the overlooking of a significant status change in the nature of content (from non-representational to representational). These contrasting views on embodied narrative raise relevant questions about the relation between actions and language: the former suggesting an identity in structure, the latter suggesting a developmental derivation from action structure to narrative structure. In this chapter, we will offer an analysis of the pivotal role of gestures as communicative forms that join action to language. Close analyses of the emergence of communicative gestures in childhood as well as of the recent literature on aproprioception in adults, will allow us to map the path from actions to narrative through gestures. This path shows structural continuity, but a consistent shift from non-representational to representational processes, moving from functional or instrumental acts to communicative ones, suggesting continuity through change in the passage from action to narrative.

Laura Sparaci, Institute of Cognitive Sciences and Technologies (ISTC), CNR, Italy,
e-mail: laura.sparaci@istc.cnr.it
Shaun Gallagher, University of Memphis, US, e-mail: s.gallagher@memphis.edu

1 Embodied Narrative as an Alternative to Theory of Mind

Cognitivist approaches consider others' observed behaviors as mere clues to a mental life enclosed within skin and skull, and social understanding as the product of high-level or meta-cognitive abilities aimed at interpreting others. These approaches search for intellectual processes that could explain *how* we ascribe or infer reasons, intentions, and desires to others, and attempt to corroborate the existence of a set of folk-psychological laws regulating such inferential processes. These approaches contend that we understand others by relying on a Theory of Mind (ToM), involving a modular structure that computes second-order or meta-representational understanding (Baron-Cohen 1995, and Gopnik and Meltzoff 1998). In this view, ToM allows us to mindread, i.e., to ascribe mental states (intentions, belief, desires) to others in order to explain and predict their actions, so that the impairment of ToM mechanisms leads to important impairments in social cognition, such as observed in children with autism (Baron-Cohen, Leslie, and Frith 1985 and Baron-Cohen 2000).

Embodied approaches have challenged this view in an attempt to de-intellectualize explanations of how we understand others' behaviors as guided by reasons (Gallagher 2005). In contrast to the cognitivist stance, embodied approaches hold that explaining others' behaviors through explicit meta-cognitive, observational or spectatorial, theorizing does not capture the true nature of our daily encounters with others (Hutto 2004; Gallagher 2001 and 2004; Sparaci 2008). If ever we resort to such intellectual knowledge, this happens rarely and mostly when things do not go as expected. According to this view, others are not foreign objects calling for theoretical interpretation; moreover, as living organisms immersed in social contexts, we are not self-enclosed or theoretically removed from others. To the contrary the self-other relation starts *in utero,* and the other is, from the start, a necessary counterpart, which stands out among a multitude of inanimate objects (Zahavi and Parnas 2003; Ammaniti and Ferrari 2020). From neonatal life throughout development children learn through social practices and embodied skills to interact with others and to understand their behaviors (Gallagher and Hutto 2008). Among these practices and skills narrative plays an important role in building social understanding.

Jerome Bruner was one of the first authors to highlight how human narrative focuses for the most part on people as acting in specific settings (Bruner 1991).

Even when animals or objects are cast as protagonists they are endowed with intentional states. Therefore, in such narratives agency is always present and what narrative accounts supply is the basis for *interpreting* why other people act as they do, rather than simply descriptions of the physical world (Bruner 1991, 7). The importance of narratives in building interpretations concerned with reasons for things happening also suggests that origins of impairments in intentional understanding (such as observed, for example, in children with autism), should be traced back to inabilities to engage in appropriate transactional (intersubjective) processes early in life, which have cascading effects on narrative skills, rather than to the ability or lack of ability to build an efficient ToM (Bruner and Feldman 1993; Loveland, McEvoy and Tunali 1990; Losh and Capps 2003).

Kerstin Dautenhahn, building on this peculiar capacity of human narrative to focus on people and intentions, proposed the Narrative Intelligence Hypothesis (NIH), suggesting that the ability to communicate in stories co-evolved with increased social dynamics in our human ancestors (Dautenhahn 1999 and 2002). According to the NIH, narrative, with its focus on people and, in particular, third-party relationships, is well suited to encode and transmit meaningful and socially relevant information, which allows agents to deal with large and complex social groups, supporting social-bonding (Dautenhahn 2002). This ability is rooted in preverbal precursors of narrative in the developing child and is importantly based on dynamic formats of early interactions such as imitative games (Dautenhahn 2002).

Daniel Hutto, supporting an embodied-enactive approach, in contrast to ToM accounts, described how narrative plays a pivotal role in learning to understand others' behaviors as guided by reasons, intentions and desires. In his Narrative Practice Hypothesis (NPH) Hutto states that folk-psychological narratives and daily encounters with stories about reasons for acting, are essential for the construction of the ability to interact socially in an effective way (Gallagher and Hutto 2006; Hutto 2008). Folk-psychological narratives in this view are accounts that explain, expose or articulate the reason *why* a person acted on a particular occasion. In other words, they are explanations of actions in terms of *reasons* (Hutto 2008, 4). According to the NPH, encounters with folk psychological narrative in childhood and throughout life, rather than ToM modules, are at the basis of our intentional understanding.

Richard Menary (2008) helps to clarify the connection between actions and narrative by distinguishing "embodied narrative" from more traditional abstract narrative accounts. He underscores how our everyday embodied experiences (bodily actions, experiences and perceptions) are ready to be exploited in a narra-

tive form. Such sensorimotor experiences allow for the emergence of a subject of experiences, which involves a "minimal, embodied, feeling and perceiving of self," different from an abstract narrator (a bare linguistic "I"), such that narrative is anchored in the unfolding embodied flow of experiences (Menary 2008, 76).

Such views suggest that embodied narrative provides a way to explain social understanding without appealing to theory-laden, mentalistic approaches. This motivates many authors to ask how narrative competencies first appear or how they are first acquired in human development. The ontogeny of narrative has often been entangled with questions on phylogeny of narrative (Cobley 2013, 21–28). However, for the purpose of the present study, we will focus on the ontogeny of narrative and its psychological roots. In this respect, we find that two recent contrasting approaches have surfaced in the literature on ontogeny of embodied narrative. In the following section, we will start out by outlining these two contrasting theories, before proceeding to consider some pivotal studies on gestures which may provide a new perspective on this debate.

2 Ontogeny of Embodied Narrative: Two Contrasting Views

Bruner suggested that there may be an innate human propensity towards narrative, upholding the existence of "a 'protolinguistic' readiness for narrative organization and discourse" (Bruner 1990, 80). He suggested that narrative structure is inherent in the praxis of social interaction even before this achieves linguistic expression and that the *push* towards constructing narratives determines the order in which grammatical forms are mastered in childhood (Bruner 1990, 77). In Bruner, this *push* consists of and depends on some core features that define what a narrative *is*. These include: (a) agentivity, or a means for emphasizing human agency or action; (b) linearization, the idea that a sequential order of some sort be established and maintained; (c) canonicity and breach, i.e., an understanding of what is canonical, traditional or permitted in human interaction as well as a sensitivity to what violates canonicality; and (d) a narrator's perspective, as a narrative cannot be "voiceless" (Bruner 1990, 77).[1]

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1 In a subsequent work, Bruner provides a broader list of the main characteristics of narratives, including 10 items, but the four aspects listed in this first work are contained in the broader list (see Bruner 1991).

In Bruner's view structured caregiver-child transactions may be referred to as "formats" the shape of which is narratival in nature following a specific four-phase structure: a canonical steady state is followed by some precipitating event, followed by a restoration, followed by a coda ending (Bruner and Feldman 1993, 272). Such transactional formats progress from simple pre-verbal joint attention interaction, to mutual imitation and games such as peekaboo (Bruner and Feldman 1993, 271). For example, in a simple peek-a-boo game between infant and caregiver the four-phase transactional structure may be thus described: (1) mutual gaze sharing is established between child and caregiver (canonical steady state); (2) the caretaker hides her face behind her hands (precipitating event); (3) hands are removed revealing the face (restoration); and (4) "Boo" marks the end of the game (coda ending) (Dautenhahn 2002, 110).

The presence of a human *propensity* towards narrative as well as the idea that narrative is the "appropriate folk description of human action" (Nelson 2006, 76) has led multiple authors to investigate the grounding of human narrative capacities in pre-verbal transactions in infancy (Dautenhahn 2002). However, an important distinction needs to be made. It is one thing to claim the existence of a human *propensity* or *push* towards narrative formats and to suggest that these formats may be *rooted in* early pre-verbal infant communication. It is a completely different argument to consider early pre-verbal forms *as* forms of narrative. Let us clarify the importance of these contrasting views and their implications.

Delafield-Butt and Trevarthen, in their 2015 paper on the pre-verbal ontogeny of narrative, underscore how proto-conversations and baby songs in many different languages and cultures show a four-phase organization in verses or stanzas. These verses are usually between 20 and 50 seconds in length and display a modulation of bodily, vocal or hand movements that compose an introduction, development, climax and resolution (Delafield-Butt and Trevarthen 2015, 7). This four-phase organization corresponds, for the authors, to a narrative structure that characterizes human social communication within communities, and shapes how caregivers interact dynamically with their newborns. For Delafield-Butt and Trevarthen the four-phase structure is grounded on an "innate micro-kinesis of communication" which is acquired even before birth while the child is *in utero* through the exercise of structured movements (Delafield-Butt and Trevarthen 2015, 4).

This is an example of how some authors, taking up Bruner's perspective, have traced the four-phase narrative structures back to the earliest action sequences, suggesting an innate ability for narrative in humans. However, this view, which we will call the *innate narrative approach* (INA), also contains a subtle theoretical shift. For Bruner, what really mattered was to show that this narrativization of early social interactions allowed the child to build canonical representations of how "the

world of people-and-things works or should work" (Bruner and Feldman 1993, 272). In other terms, narrative, according to this view, is essential as a way of learning to interpret others' actions in terms of reasons. Whether narrative structuring in infancy was driven by some innate *push* to narrativity, by an innate recognition of others as intentional agents, or by a universal cultural form of narrativizing, remained an open question (Bruner and Feldman 1993, 272). On the other hand, according to the INA, early pre-verbal actions and interactions are not simply the testimony of a *push* towards narrative, or a pre-figuring of narrative, they are, *per se,* embodied narratives themselves (Delafield-Butt and Trevarthen 2015). This has important implications for the definition of narrative.

First of all, for the INA narrative does not have to be linguistic, even while its essentially pre-verbal origin is considered "fundamental for understanding human cognition and culture, and demands multidisciplinary investigation" (Delafield-Butt and Trevarthen 2015, 9). Secondly, for the INA, detection of the four-phase structure, which proponents of INA consider to be a narrative structure, is a sufficient condition for the ascription of narrative content. We observe narrative when we are able to detect in the earliest interactions of infant-caregiver a sequence of acts that express an exchange of awareness and feelings through actions, gestures and vocalizations. These early structures are *per se* described as semiotic events structured around the four-phase structure which supports proto-conversation and meaning making. Thirdly, while Delafield-Butt and Trevarthen's account includes a sequential structure organized in time, *contra* Bruner it does not seem to include a narrator. For the INA, narrative structures emerge through shared infant-caregiver experiences heavily grounded on emotional engagement and turn taking between infant and caregiver, but there is no need of a narrator for a narrative to take place.

Some authors have cautioned that these changes in the definition of narrative endorsed by the INA can easily lead to pan-narrativism (Gallagher and Hutto 2019; Gallagher 2020). Galen Strawson first suggested that if every sequence of actions, such as the simple acts involved in making coffee in the morning, are labelled narrative, the notion becomes trivial (Strawson 2004). Similarly, Menary suggested that although some actions have a structure that is ripe for narrative, some actions constitute a rather fluid experience that does not conform to "a detailed description of a sequence of actions" (Menary 2008, 70). For example, in the act of driving a car,

> I enact the skills without thinking about them, the fluid and flexible sequence of perceptions, actions and manipulations of steering wheel, gear stick, pedals, etc. is open ended and not easily captured as a narrative sequence. (Menary 2008, 70)

According to this view narrative "requires the capacity for language use and, therefore, the capacity to narrate is based on more fundamental linguistic capacities such as the capacity to converse" (Menary 2008, 65). One important question is how precisely narrative structure is generated. Menary's (2008) definition of embodied narrative stresses the importance of a sequential structure with a discursive organization, but also, similarly to what we have seen above in Bruner, the need for a narrator, who recounts, or gives shape, to what would otherwise be only sequences of actions (Menary 2008). On this view, and in contrast to INA, narrative structure is imposed on action. Similarly, Paul Cobley states that the ability of narrative to "give shape" to events also entails the need for *selective* arrangement and ordering (Cobley 2013). Accordingly, the narrator plays an active role in selecting, structuring and recounting the narrative, suggesting a sort of narrator stance.

Some may argue that a narrative may not need to be narrated, but may exist *per se* as an emergent phenomenon whether in thought or in social interaction. For example, Peter Goldie's narrative thinking does not involve text or discourse, but is purely thought-based (Goldie 2012). But even Goldie stresses that a narrative must be kept distinct from *what* it is a narrative *of*, drawing a line between narrative and actions, and most importantly between structure and content. Similarly, Hutto, in his formulation, suggests that folk-psychological narratives may vary greatly among cultures. As testified by differences in storytelling practices around the world, different ways of conveying content can lead to important cultural differences in ways of dealing with reasons or their relevance in childrearing (Hutto 2008, 189). By outlining these cultural differences, Hutto indicates that the distinction between *what* is being told and *how* it is being told is an important aspect when speaking of narrative.

Accordingly, multiple authors suggest that a distinction should be made between narrative structure and narrative content. For example, Bruner refers to how the Russian formalists distinguished the narrative plot (or *fabula*) from its mode of telling (or *syuzhet*) (Bruner 1991). On one interpretation, if the content consists, primarily, of the actions that are narrated, the structure is bestowed on those actions by the narrative (linguistic) process. The latter requires, if not a full-blown narrator, some descriptive or selective process, involving, perhaps, Menary's concept of a minimal subject, that allows one to distinguish or parse out specific aspects of everyday experiences from their continuous flow, and organize them according to a structure with a beginning and an end.

On an alternative interpretation, Gallagher and Hutto (2019) suggest that embodied narratives emerge from interactions with others and are shaped by the structures of actions and events which they recount. That is, actions themselves may have the intrinsic structure that Delafield-Butt and Trevarthen describe, but,

in contrast to INA, this is *action* structure rather than narrative structure. Rather than action having a structure that is intrinsically narratival, or taking on a structure imposed by narrative, narrative derives its structure from action structure (Gallagher and Hutto 2019; Gallagher 2020). Delafield-Butt and Trevarthen take early movements, actions, and interactions to be forms of narrative because "the contours of our narratives usually conform to the structures of actions and events they narrate" (Gallagher and Hutto 2019).

Narrative may well present the four-phase structure derived from action, or from early infant-caregiver interactions (games of peek-a-boo, etc.), but its semantic status is different. To better explain this difference, Gallagher and Hutto report the following interaction:

> The mother takes the toy car and says "Zoom, zoom, zoom." She is not providing a narrative about the car, she is playing with the car. The child then takes a turn. The vocalization, and gradually the words, become part of the narrative structure that captures the pretend action. The mother says, "The car goes zoom." She is now on the way to giving a narrative about the car. Later she says, addressing the child, "You played so nicely with the car this afternoon, didn't you?." The mother is leading the child into a kind of narrative. Later the child says, "I play with car." The child is beginning to narrate his action. (Gallagher and Hutto 2019, 31)

As we can see in this sample of caregiver-child interaction the mother shifts from a performative vocalization, which accompanies ostensive acts, to a narrative structure which may integrate these acts (Gallagher 2020). In this sense the narrative is *anchored* in a pre-narratival event or action structure. While the mother's initial acts are purely performative, the later narrative implies selecting this content from the continuous flow of everyday interactions, parsing it out and structuring it in time and space.

Summing up, we find two contrasting views on the ontogeny of narrative. The INA, which considers embodied narrative an innate human skill, defined by its structure and present in pre-linguistic action-based interactions. The second view, which we may call the *narrative anchoring approach* (NAA), while still accepting a continuity between action (and pre-verbal communicative events) and narrative, suggests that narrative generates a change in semantics, specifically, the introduction of representational content where there was none. To put it succinctly, although perhaps too broadly, narrative represents action; action does not represent itself. In particular, even if narrative structure derives from action structure, narrative requires more than a performative act; it requires a selective process.

3 Clarifying Contrasts: Some Considerations on Embodied Language and Gesture

By considering the notion of embodied language we want to suggest that while the INA and NAA seem to contrast on whether narrative requires language or not, this contrast hides a subtler distinction. The INA clearly states that narrative does not need language but is already present within pre-verbal social practices. On the other hand, we have seen how some authors upholding the NAA approach suggest the need for some linguistic exchange for narrative to emerge. However, these same authors also champion an embodied approach to language. In fact, the first step in speaking of embodied narrative, is to accept that human expression possesses a multi-modal structure that includes not only speech and vocal outputs, but also gestures, that is, body postures and hand, arm and head movements, which emerge well before words (speech) and display communicative contents (Volterra, Capirci, Caselli, Rinaldi, and Sparaci 2017). As humans we are equipped with a language-ready brain, but the acquisition and development of language relies heavily on sensory-motor skills (Arbib 2016 and 2018). This has led to multiple theories of how and to what extent language may be considered embodied (Arbib, Gasser, and Barres 2014; Meteyard, Cuadrado, Bahrami, and Vigliocco 2012). A full explanation of why and how language is embodied extends well beyond the purpose of the present chapter, but it is relevant to underscore that authors upholding the NAA agree on the fact that human language extends well beyond speech. This means that while the INA states that pre-verbal social practices such as actions *are* narratives, the NAA suggests that although early actions may be ripe for narrative, narrative as it emerges in communicative acts, is *anchored*, not just in speech, but also in non-verbal bodily movements.

This preliminary consideration leads us to focus on the boundary between functional movements and expressive and communicative ones, a boundary consistently inhabited by gestures, both in childhood and in adulthood as we shall see in the following sections. In the next sections, we will attempt to envision how, by considering gestures as transitional forms between action and language, we may allow for a continuity in structure but also shed some light on distinguishing action from narrative in terms of the latter's representational function. In particular, we will outline how considering the emergence and the underlying mechanisms of gestures in development as well as in a case of adult aproprioception may help us to better understand the complex relation between embodied actions and language, which is at the core of the debate on the ontogeny of narrative.

4 Continuity through Change: Gestures in Development

If we wish to conduct an adequate analysis of the ontogeny of narrative in infancy our focus must not be limited to verbal skill alone. Esther Thelen and Linda Smith (1994) once suggested that the grand sweep of development may seem neatly rule-driven; in detail, however, development is messy and narrative development is no exception. If we broaden our perspective, we soon find that narrative development is not the product of domain-specific processes and abilities, but rather stretches into neighboring skills. This complexity is given by "multiple, parallel, and continuously dynamic interplay of perception and action, and a system that, by its thermodynamic nature, seeks certain stable solutions" which emerge from relations between skills, not from design (Thelen and Smith 1994, xix).

We have seen above that both the INA and the NAA can agree on searching for the ontogeny of narrative before the emergence of speech. Therefore, to trace the origins of narrative we can once again follow Bruner's footprints and move beyond grammar to begin "well before language begins," concentrating on sensory, motor, conceptual and social prerequisites that make language possible (Bruner 1975, 257). The same year in which Bruner made this proposal, Elizabeth Bates and colleagues (1975) began analyzing prerequisites to spoken language in a longitudinal study of three infant girls observed at two-week intervals over an eight-month period (Bates, Camaioni, and Volterra 1975). This study led to distinguishing three "pre-speech" stages of behavior, respectively named the perlocutionary, illocutionary and locutionary stages. In the first, perlocutionary stage (2- to 9-months) infants' actions were characterized by active object exploration (handling, mouthing, banging, etc.), often interpreted by caregivers alongside emotional displays (smiling, crying, etc.) as early means-end relationships, even if they lacked the structure of intentional communication. As Bates clearly stated in the subsequent theoretical elaboration of these data:

> The infant cries, or reaches towards his goal, and the adult interprets the child's desires and intervenes to meet them. But does the child realize as he emits his signal that they will serve a communicative purpose? Are the cries and reaches aimed at the adult listener, or the goal itself? Obviously from a phylogenetic perspective the infant's cry was selected for its communicative value. Ask any parent who has tried to ignore that cry at 3 o'clock in the morning. But we have reason to believe that in the first 9 months of life this behavior, is from the infant's point of view, merely a built-in reaction to a particular internal state. In other words, prior to 9 months we suggest that communication is efficiently caused, but not finally caused. (Bates 1979, 34)

In the second illocutionary stage (10- to 13-months) Bates and colleagues observed the emergence of what they later termed "performative structures," as concrete actions originally aimed at a goal (orienting, reaching, grasping) gradually became separated from the concrete attempts to reach objects, and became instead signals which may then be modulated in accordance with adult behavior (Bates, Camaioni, and Volterra 1975, 219). For example, after 9 months, the child may augment, add, or substitute signals contingent upon changes in adult behavior towards the goal, as in the following example:

> Marta is unable to open a small purse, and places it in front of her father's hand (which is resting on the floor). F does nothing, so M puts the purse in his hand and utters a series of small sounds, looking at F. F still does not react, and M insists, pointing to the purse, looks at F, and makes a series of small sounds. Finally, F touches the purse clasp and simultaneously says: "Should I open it?" Marta nods sharply. (Bates, Camaioni, and Volterra 1975, 219)

Marta's behavior shows a case of multimodal communication (involving actions, vocalizations and even head gestures) at a developmental stage in which actions and embodied language interlace and often overlap. Marta's action of placing the purse close to her father or the later action of putting the purse on the father's hand are occurrences of what Bates and colleagues defined as "performative structures," in which an action (placing, putting, etc.) is used by the child not only with its original function of moving an object, but to further *show* to the adult a state of affairs (in this case the fact that the purse is closed). It is important to note that this state of affairs is imbued for the child with meaning (in this case the intention to open the purse). However, the same cannot be said for the adult. In fact, unless the caregiver has observed (as in this case) the object-placing act as part of a structured sequence of actions (the child's previous attempts at opening the purse) or has a general knowledge of the child's interests (for example, knowledge that M likes to open the purse or things in general), it would be hard to disambiguate the meaning of the child's action. In other words, the ability of performative acts to convey meaning requires the presence of contextual or contingent background knowledge. The father's question at the end of the interaction is also evidence of this. In fact, caregivers often use these kinds of statements not only when a child's performative behavior is overtly hard to interpret, but also when they are clearly understandable, often to suggest or probe further communicative acts from the child (in this case Martha's head nod).

At this stage while we can say that some communicative or performative structure is being enacted between child and caregiver and even if in this basic exchange, we could trace the four-phase structure suggested above, we cannot imply presence of a narrative content. The act of placing is *selected* among other acts as able to convey meaning, but it has not been organized or re-structured by

either the child or the parent so as to be understood in the absence of context and/or background knowledge. In other words: the soon-to-be-narrating child is learning *how* meaning can be conveyed, but she still does not behave in a way that distinguishes between this structure and *what* is being communicated.

Bates and colleagues provide a list of performative structures and describe their progression in time, from early forms of showing off, to showing, to pointing to self, to giving, to pointing to others (see Sparaci and Volterra 2017, Table 1, 39 for a full summary and description). Performatives, in this sense, stand at the crossroads between action sequences and gestures as early communicative forms. Gradually and through repeated social interactions with caregivers, infants learn that specific acts (e.g., showing) may have an effect on others and when they display, in their behavior, knowledge of this effect, for example by persisting in a specific behavior until that effect is obtained, intentional communication is born and preverbal language starts. But in order to state appropriately that an action has become communicative, we must also observe some change in the form of the action, for example an abbreviated or exaggerated pattern that is appropriate *only* for achieving a communicative goal (Bates 1979, 36). In other terms performatives are a good way of showing that while the pattern may stay the same, its content and the intentions behind its production have radically changed. For example, the original placing action in Marta's example above, and a showing performative may have the same kinematic characteristics and structure, but while placing is a functional act, showing sets the emergence of intentional communication. However, this type of communication is not *yet* symbolic. For symbols to emerge we need something else to happen: in this case, Marta must realize that a specific act, which is already within her repertoire, with functional purposes (e.g., placing), may also achieve a communicative function (e.g., showing). Furthermore, she must realize that the communicative act of showing, contrary to the functional act of placing, works well in multiple contexts extending beyond the immediate here and now. A similar process is observed for vocal gestures or words:

> Carlotta used the word *bam* while knocking over toys, but in no other context [. . .] Carlotta's *bam* [. . .] existed for weeks only as a procedure during a game, at fixed points of occurrence. These word-like sounds were not used to describe ongoing sequences by other participants, to demand the initiation of a *bam* [. . .] game. [. . .] to the extent that these uses are context-bound, they seem to belong to the context as a whole rather than to the referent in the peculiar way the names can be said to "belong to" or identify referents. In Carlotta, a subtle change took place in *bam* around 12–13 months of age. In one observation, she sat among her toys unoccupied for a brief moment, said the word *bam*, and then turned to bang her toy piano. The temporal separation of the vocal gesture from its proper point in the activity with which it was linked gives the first clue that *bam* signifies or stands for the act of banging [. . .] such behavior is truly symbolic activity, wherein the vehicle is different

from its referent though simultaneously standing for, suggesting, or evoking its referent. (Bates 1979, 39–40)

In other words, symbols emerge only through a slow process of decontextualization (spatial and/or temporal), in which a gesture or a word is used not in a single multi-faceted game, but in a variety of contexts linked by the presence or involvement of a particular referent for that gesture or word (Bates 1979, 40). In this process, children gradually learn to detach specific acts from their immediate surroundings and then to reshape them for the benefit of communication, distinguishing content or plot from the way in which it is conveyed. For example, two-year-olds have been shown to rely on different representational techniques in producing their gestures depending on the communicative context (Marentette, Pettenati, Bello, and Volterra 2016). For example, producing more representational gestures using a hand-as-hand technique (i.e., in which the hands portray how an object is held or manipulated) for large objects or actions (e.g., driving), and a hand-as-object technique (i.e., gestures in which the hands are used to represent an object's salient features) for small objects (e.g., comb) (Marentette, Pettenati, Bello, and Volterra 2016).

This brief description of the emergence of symbols in infancy shows that while repeated interactions with caregivers are essential to the formation of pre-verbal communication, they are not linguistic in themselves in regard to their *content* or representational function. A significant *change* occurs in the way in which infants use actions, transitioning from performative structures to symbolic ones. We have seen above that for a narrative to occur we may not need to assume a strong narrator-stance, but we still need to be able to distinguish the narrative from *what* it is about. This requires a transition that is well exemplified in the passage from performatives to full-blown gestures.

If we take a closer look at this passage from action to language in development, we find that multiple authors have highlighted a continuity in the underlying structures or patterns. For example, language onset in reduplicative babbling (i.e., vocalizations in which well-formed syllables are organized into a regularly timed, rhythmically organized sequence, e.g., bababa) is related to onset and production of repetitive and rhythmic arm and hand banging movements which accompany and entrain the production of early vocalizations (Iverson, Hall, Nickel, and Wozniak 2007; Locke, Bekken, McMinn-Larson, and Wein 1995).

Continuity in structure stretches far beyond infancy and allows us not only to observe the four-phase structure of actions in narratives (as described above), but also to analyze actions using structures usually applied to the analysis of gestures. For example, in a recent study by Sparaci and colleagues (Sparaci, Formica, Lasorsa, Raiano, Venuti, and Capirci 2022) demonstrated, for the first time, that features and kinematics of functional actions with objects may be analyzed using

the same three-phase structure commonly used to analyze representational gestures. Gestures are usually parsed into three-phases: preparation, stroke and return (McNeill, Pedelty, and Levy 1990; McNeill 1992).[2] The stroke is part of the child's movement which conveys meaning (e.g., for the gesture "brushing hair": child's hand moves repeatedly downwards and upwards next to the head with a closed fist), while the preparation and the return phases are used respectively to achieve a starting position for the stroke and to return to a resting position (see also Sparaci, Formica, Lasorsa, Raiano, Venuti, and Capirci 2022 for a more detailed description). This study shows that a similar three-phase structure as the one detected in representational gestures may be traced also in actions with objects, but, more importantly, it also highlights some significant differences in relation to content. In fact, the stroke phase in the case of actions conveys the functional part of the act, rather than its communicative content expressed as representational significance. Furthermore, fine-grained analysis of action vs. gesture stroke kinematics shows some significant differences as the presence of objects in the action condition affects continuous variables, such as speed (Sparaci, Formica, Lasorsa, Raiano, Venuti, and Capirci 2022).

Summing up, considering the passage from actions to performative structure and finally to gestures in early infancy, we are able to detect significant changes in contentful processes (changes from non-representational to representational processes) that highlight the need to distinguish actions from narrative as suggested by the NAA. However, if we observe action and gesture structure we can more easily understand the continuity that runs from action to gestures to narrative.

5 Continuity through Change: Gesture in Aproprioception

The relation between action and language as modulated by bodily gestures in adults has been explored in a series of studies considering the important and unusual case of a patient (IW) with aproprioception below the neckline (Cole, Gallagher, and McNeill 2002). After suffering an acute sensory neuropathy at the age of nineteen, IW lost proprioception of his self-relative body position in space and touch below the neck (Cole and Katifi 1991). Possibly this was due to an auto-

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2 We suggest that this three-phase structure combines the dynamics of two phases of the four-phase structure previously discussed. "Preparation" is equivalent to "introduction"; "stroke" includes both "development" and "climax"; and "resolution" is equivalent to "return."

destructive immune reaction, resulting in damage to myelination of sensory fibers, specifically the destruction of fast-conducting highly myelinated fibers dedicated to proprioception and spatial position, in contrast to unaffected slow-conducting low myelinated sensory fibers concerned with pain, temperature and muscle fatigue as well as motor nerve fibers. IW was not paralyzed but lost all motor control that involved proprioception, while speech and other cognitive functions were left intact (McNeill 2005). With time and intensive therapy, IW learned to move using cognition and visual feedback as substitutes for proprioception and kinaesthesia. This means that IW is now able to walk and grasp things, he is unable to control his movements without vision and cognitive effort. In other words,

> He has to think through every move. When he reaches to lift a glass, he has to consider the shape made by his fingers, the strength of his grip, and the movement of his arm, and he has to keep the target in sight until he grasps it. No matter how many times he practices a movement, it never becomes completely automatic for him, although, with practice his movements can become smoother and easier to make—but always in need of conscious effort, and almost always in need of visual guidance. (Cole, Gallagher, and McNeill 2002, 52)

If gestures were equivalent to instrumental action, we should find that IW's gestures also require visual feedback and therefore that IW would be unable to gesture when visual feedback is absent. Surprisingly, this is not the case.

In 1998, the BBC Horizon Series produced a short film entitled *The Man Who Lost His Body* dedicated to IW's case. On this and other occasions, researchers from different fields (medicine, philosophy, and gesture studies) were brought together to devise a variety of experiments and observe IW's behavior. Jonathan Cole, Shaun Gallagher, and David McNeill filmed IW in 1998 and in 2002 at age 46 and 50 as he was narrating (retelling), in conversation, different animated Tweety and Sylvester cartoons. The narrative retelling was done by IW in a seated position in two different conditions: one in which he could see his hands (with visual feedback, VF) and another in which a tray-like blind pulled down in front of him blocked his vision of his hands (no visual feedback, NVF) (McNeill 2005). The two conditions surprisingly showed that IW produced co-speech gestures in both situations (VF and NVF). In other words, while IW needs visual feedback to control his actions, he is able to produce some gestures without visual feedback. Researchers interpreted this as evidence of differences in the mechanisms used for action and gesture control.

IW's gestures while retelling the Sylvester stories were mostly beats (co-speech gestures usually employed to "beat" time along with the rhythm of speech or to highlight contents of relevance within the speech flow) and representational gestures (gestures representing an object or an event occurring in the world).

Computer assisted analysis of the videos, based on McNeill's gesture phases (described above), allowed the experimenters to analyze gesture timing (gesture-speech synchrony) as well as specific gesture features. The latter included: (A) gesture morphokinesis, i.e., the shape of hand movements used in communicating meaning (e.g., a bowling ball is represented by a spherical movement of hands); (B) gesture topokinesis, or location of the hands relative to each other and to one's body in space; (C) presence/absence of character view-point gestures (gestures in which the speaker is enacting the point of view of the character, CVPT); and (D) presence/absence of observer-view point gestures (gestures in which the speaker acts as a narrator or observer, OVPT) (McNeill 2005; Cole, Gallagher, and McNeill 2002; Quaeghebeur, Duncan, Gallagher, Cole, and McNeill 2014).

Results showed that IW's gestures in the VF condition were appropriate for both timing and gesture features, with the main differences being that IW produced fewer gestures compared to controls with typical proprioception intact; that he looked at his hands during strokes; and that his gestures tended to be discrete rather than showing a flowing rhythm (McNeill 2005). In the NVF condition, timing was maintained and differences in gesture features were limited to loss of control of topokinetic aspects and reduced production of CVPT gestures. CVPT gestures are closely tied to movements that replicate aspects of instrumental actions that are being represented in gesture. These data were initially interpreted as supporting a communicative theory of gestures rather than a motor one.

> On the communicative theory of gesture the reason gesture can be re-established with such proficiency is that gesture, as a movement concerned with the construction of *significance* rather than with *doing* something, is organized primarily by the linguistic-communicative context. (Cole, Gallagher, and McNeill 2002, 61)

According to this view, gesture and speech entertain a close relationship that originates in early development and hand-mouth sensorimotor linkages which are later maintained and strengthened (Iverson and Thelen 1999). In other terms, overall, for IW, the gesture data demonstrated some difference between the know-how of gesture and the know-how of instrumental movement (McNeill 2005 Cole, Gallagher, and McNeill 2002). In particular, the fact that morphokinetic gesture features were spared in the NVF condition, while topokinetic features were impaired, was taken to indicate that while gestures are still constrained at the mechanical end by motor programs responsible for controlled movement, the semantic and communicative (pragmatic) aspects of gesture extend beyond pure motor acts. In this sense "gesture is never a mere motor phenomenon; it draws the body into a communicative order defined by its own pragmatic rules" (Cole, Gallagher, and McNeill 2002, 65).

More recently, collaboration between researchers in the USA and Netherlands has led to a re-analysis of IW's gesture data originally collected in 1998 and 2002. By using time-linked gesture annotation software (ELAN), 2D videography motion-tracking (OpenPose) for motion analysis and dedicated software for acoustic analysis (PRAAT), a group of researchers produced finer-grained analyses of gesture-speech synchrony (Pouw, Harrison, and Dixon 2022). Use of this new technology showed that, while IW's gesture timing in the NVF condition may appear unaltered on a macro-scale level, some differences emerge on a micro-scale. First, gesture timing is tightly coupled to peak gesture speed in the VF condition, but not in the NVF condition (2 times greater variability was found in the NVF condition). Furthermore, in the NVF condition IW's gestures were more forceful (as shown by higher deceleration peaks) than in the VF (as shown by the recruitment of more peaks in speed) (Pouw, Harrison, and Dixon 2022, 12).

These data are interpreted as evidence of a change in the way in which IW obtains gesture-speech synchrony in the two conditions: when vision is present it appears to support speed timing with prosodic markers, but when it is absent prosodic markers are timed with physical impulses through the mechanical loading of high-impulse gestures onto the upper trunk musculo-skeletal system which increases lung pressure (Pouw, Harrison, Esteve-Gibert, and Dixon 2020). In other words, in the NVF condition, the patient may be relying on body biomechanics and sensorimotor loops that involve multiple bodily processes (head placements, muscle perturbations in the upper trunk musculo-skeletal system and lung tension). Given that the upper body is perturbed by gesturing, these perturbations may "provide a resource for IW given intact vestibular sensations and proprioception above the neck" (Pouw, Harrison, and Dixon 2022, 13). These data suggest that gestures are even more embodied than previously thought (Pouw, De Nooijer, Van Gog, Zwaan, and Paas 2014).

Overall, this recent data analysis of IW's case shows that bodily resources for a type of motor control completely different from the one commonly enrolled by object-directed actions may play a role in the timing of gesture execution. However, given that the authors were considering only continuous variables (gesture-speech timing) and not gesture features (including morphokinesis, which is closely tied to the meaning being expressed), there is still some structural overlap between motor actions and gestures, while consistent differences remain in terms of what action accomplishes and how its meaning comes to be represented.

We mentioned above that analyses of gesture vs. action kinematics in young children have shown significant differences in continuous variables (speed) due to the presence of objects, but also that both gestures and actions may be analyzed using a three-phase structure (Sparaci et al. 2022). Taken together, data from child studies as well as data on gesture timing in adult aproprioception sug-

gest that gestures can really be considered as standing between actions and language. On one side, we find consistent structural similarities in gestures and actions, but on the other, we have also highlighted how there is a consistent shift towards representational content when communicative gestures emerge as compared to functional acts.

6 Conclusions and Implications for Embodied Narrative Competency

Considering the role of narrative competency in childhood has allowed us to move beyond traditional ToM accounts of social understanding. Furthermore, the theoretical shift towards embodied narrative suggests that narrative may not require speech but is rather grounded in non-verbal bodily communicative acts. Gestures are only one example of such communicative acts, future studies may consider, for example, the role of sign language in disentangling issues concerning embodied narrative.

Current views on the ontogeny of embodied narrative present a contrast between the INA and the NAA approaches. The former suggesting that early actions are narrative, the latter holding the need for communicative acts to be in place for narrative to emerge. This contrast is just a reflection of broader questions on the relation between actions and language and by considering gestures as communicative acts standing between the two we have attempted to gain better insight on this topic.

In particular, an analysis of gestures allowed us to show that similarity in structure is not sufficient for narrative events to take place. What is needed is the presence of specific representational processes that involve, if not a narrator stance (OVPT in gestures), at least the selection and organization of action elements that shape the meaning (in gestures, for example, the specific morphokinetic aspects) and that allow for an extension of semantic content beyond the here and now. If there is a shared structure between action, gesture and narrative, gesture and narrative share something else: a type of expressive and communicative function that requires representational processes that are missing in action.

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