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abstract

I argue that different types of movement—gesture, marking, blocking, dancing, and whole-body engagements—can contribute to (or scaffold, or enable) thinking or can even constitute thinking in various forms of problem solving, memory, and reasoning ability. But I also argue that not all movement is thinking; specifically, resisting the threat of pan-narrativism, movement does not constitute narrative, although narrative reflects the structure of action.

introduction

In this article, I consider different types of movement that either contribute to thinking or that constitute a form of thinking. Obvious candidates include gesture and sign language, which have been considered instances of extended mind.[01] I'll also argue that in some epistemic situations, whole-body movement (e.g., running and jumping) can scaffold learning and problem solving. There are also different forms of movement connected with the performing arts of dancing and theatrical acting that are clearly forms of thinking. These include the practise of 'marking,' where abbreviated body and/or hand movements used in rehearsals are a form of thinking through a choreographed performance. Also, another kind of movement that goes along with the theatrical conception of 'blocking' in the rehearsal and performance of on-stage acting fits this category. Finally, a number of philosophers have argued that dancing itself can be considered a form of thinking—specifically, a form of exploring a world of affordances.[02]

I conclude, however, by arguing that there are certain limits to this idea, and that not all movement is thinking. Specifically, there is some ambiguity about how narrative is connected with movement. I argue for some subtle distinctions between movement and narrative thinking. Although a subject's movement may allow them to find a new way to think about their life circumstances, that movement per se is not necessarily a form of narrative.

moving that constitutes thinking: some examples

Gestures

Susan Goldin-Meadow et al., in a set of well-known experiments on the role of gestures in math, demonstrate that gesture doesn't simply scaffold cognition or 'lighten the cognitive load' (as Goldin-Meadow herself suggests).[03] Rather, gesture contributes to the constitution of mathematical reasoning. David McNeill argues that gesture is part of language and (as Merleau-Ponty put it), language (speech) accomplishes thought.[04] At the temporal point where gesture couples with utterance, which McNeill calls the 'growth-point,' gesture is shown to anticipate the utterance. The gesture starts just prior to the relevant speech-act. In this respect, gesture, as a form of expressive movement, is not the expression of a pre-formed thought; it is integrated with the movement of speech in a way that initiates extra-verbal (visual and motoric) meaning. It has been experimentally shown that in some cases gesture outruns verbal report, contradicting it, but pre-figuring what the speaker ultimately says. Accordingly, gesture is a form of cognition, not just a means of communication.[05] This is consistent with both Andy Clark's concept of the extended mind and with enactivist conceptions of sense-making.[06]

Full-body enactive engagement

Just as gesture helps to constitute mathematical reasoning, whole-body, situated movement can contribute to the learning of scientific reasoning, as evidenced in experiments using simulated environments. Rob Lindgren led a team of researchers to design a

simulated space environment where middle-school children could interact with virtual planetary bodies. The children controlled the movements (of a meteor) using their own bodily movements—running and jumping.[07] The project, called MEteor (Metaphor-based Learning of Physics Concepts Through Whole-body Interaction in a Mixed Reality Science Center Program), involved more than a metaphorical identification with the meteor. The MEteor simulation used wall- and floor-projected dynamic imagery to create a realistic and immersive environment of planetary astronomy (including planets with gravitational properties). For example, children interacted with MEteor using their bodily movement to launch a meteor with a certain velocity (Figure 01). They then predicted where it would move based on the presence of planets and other associated forces. Children were able to build their understandings around the movements of their own bodies, supported by external visualisations built into the environment in a way that scaffolded learning.

This simulation was used in controlled studies of 312 middle school students that tested two conditions:[08]

01. Weak embodiment condition: students used a desktop version of MEteor controlled by hand/mouse movements;

02. Strong embodiment condition: students engaged in full-body/full-immersion mode with the simulation—entering into the projected simulation, and moving around in it by running, jumping, etc.

The strong embodiment condition resulted in better understanding of astronomy concepts, demonstrated by the production of more dynamic diagrams, less reliance on surface/background features of the simulation, improved scientific reasoning on tests, and dispositional learning effects.[09]

Figure 01:
A participant enacting an asteroid trajectory in MEteor. From Gallagher and Lindgren, 'Enactive metaphors,' 2015.

Marking

Marking is a form of abbreviated movement or gesturing used in dance rehearsal. In its most abbreviated form, it involves only hand gestures that constitute a kind of imagining of the performance. 'When marking, the dancer often does not leave the floor, and may even substitute hand gestures for movements. One common example is using a finger rotation to represent a turn while not actually turning the whole body.'[10]

Marking improves memory, performance technique and timing, more so than does full-out dance practise, or 'in the head' simulation without explicit movement.[11] Edward Warburton and David Kirsch think of marking as movement in the abstract. But marking is not entirely abstract, since the gestures meet constraints of the physical environment—one imagines the dance, not in thin air, but anchored (staged) in specific contexts that define specific affordances. This is clear if we consider another technique, one that is also used in theatrical acting; namely, blocking.

Blocking

Blocking is a practise started by Sir William Gilbert (of Gilbert and Sullivan) to facilitate planning and rehearsal. He used scale models of the stage and blocks to represent actors. In contemporary practise, blocking includes the design of the performance space, the placing and movement of objects or props, and especially the positioning of actors for a particular scene. Its major function is to ensure that things and actors are positioned properly *from the audience's perspective* so they can see what's going on. *From the director's perspective*, blocking can affect the specific meaning of a scene. *From the actor's perspective*, blocking not only puts the actors in the right place at the right time, it facilitates the acting process, and scaffolds the actor's cognitive and pragmatic performance.[12] Specifically, it facilitates the memorisation of lines. Being put in the right place at the right time means that she is put in front of another person, or next to a significant object, or within reaching distance of a particular prop, etc. This lets her know what needs to be done and what needs to be said then and there.

Blocking also includes normative structure: there are directions/rules, that can be followed or broken in ways that allow improvisation in performance. Thus, blocking is continuous with and supports activities of planning and imaginative rehearsal. It constrains movement, imposing a type of syntax that constitutes meaning on stage. It's an arranging or re-arranging of affordances with a particular goal in mind. In the kind of marking that a dancer might do in rehearsal, the blocking arrangements will be doing some of the work, grounding intelligent movement in a specific situation, and defining the affordances that will guide the motoric and affective processes involved in performance. In the extended mind view, much like gesture, the movement accomplishes thought, and taking up of positions in blocking is just a process of remembering one's lines.

One can generalise these processes of marking and blocking. 'All the world's a stage,' as Shakespeare tells us, and the architectural structures, spatial arrangements,

and normative structures of everyday or specialised practises and institutions operate like blocking to make us move and make us think in certain ways. In everyday life, things are 'staged' to get us to act and to think in a specific way. Consider, for example, the arrangements of museums, classrooms, supermarkets, courtrooms, and so forth.

Dance
Perhaps with the concepts of marking and blocking, it may be easier to see why some dancers and dance theorists claim that dancing itself can be a form of thinking. Maxine Sheets-Johnstone calls it a form of 'exploring the world.'[13] Michelle Merritt argues that the dancer does not think first, and then move, but that 'Movement just is thought, and thought, in the case of improvisational dance, consists in the movement.'[14] Movement in this regard is a form of sense-making.

Numerous studies suggest that 'dance enables ... embodied thinking, playful, imaginative problem solving and aesthetic decision making.'[15] One way to account for this is to think of dance (especially improvised dance) as a form of affordance exploration.[16] Dance allows us to experiment with affordances and bodily possibilities—it offers new possibilities for action by heightening kinaesthetic, proprioceptive, haptic, auditory, and other forms of perception. It trains attention towards the environment, towards the body, and towards others. This may help to explain what it means to claim that improvisational dance is an active exploration of one's own possibilities within the environment.

[Dance movement] is dynamic, ever-shifting, and responsive to context. This dynamism—because it is so intelligent in its responsiveness—seems to require some sort of agent to whom the movement means something. In other words, it would seem wrong to insist that the movement is nonconscious or merely a biological maintaining of the organism below the conscious radar. The movement means something to the persons enacting it.[17]

The dancer actively creates meaning in shape, form, and force, which involves, simultaneously, perceiving and investigating those shapes, forms, and forces. Improvisation requires engagement with affordances offered by the music, the environment, and the ever-changing form of one's own body.

not all movement is thinking
We should not move too quickly. We should not think that all movement is thinking. We can understand narrative to be a reflective form of thinking (Peter Goldie calls it 'narrative thinking'[18])—a thinking about events and actions, and about other people and ourselves, involving a kind of self-reflection. Some theorists have made strong claims that bodily movement is itself a kind of narrative, and therefore a kind of thinking or cognition.

For example, in the area of body psychotherapy, the idea that bodily movement generates narrative leads Christine Caldwell to define such movements as 'nonverbal narratives ... the body telling its stories on its own nonlinear and nonverbal terms.'[19]

She explains, 'conscious body movements generate a fluid, nonverbal narration of self and identity no less important than the verbal stories we may tell.'[20] Richard Erskine describes therapy as 'focusing on the body and the unconscious stories requiring resolution.'[21] He understands the body as keeping

> unconscious 'score' of emotional and physiological memories, and as storing experiences of a pre-symbolic, implicit, and relational kind that have never been narrated by conventional means but for which there is, nevertheless, 'an emotionally laden story waiting to be told.'[22]

Likewise, in developmental studies, Delafield-Butt and Trevarthen contend that embodied narratives are part of our lives from very early on and are even implicit in neonatal movement.[23] On this account, embodied activity has its own inherent narrative structure. According to Delafield-Butt and Trevarthen, the origins of narrative are to be found in 'the innate sensorimotor intelligence of a hypermobile human body'—in the intentional movements of the midterm foetus, movement that is continuous with postnatal, structured movement in which we can identify distal goals and social meaning. Such movements are thus shaped further in 'early proto-conversations and collaborative play of infants and talk of children and adults.'[24]

These movements reflect a fourfold and temporal structure, involving introduction, development, climax and resolution, similar to that found in semiotic accounts of narrative (contract, competence, performance, and sanction), which are said to constitute the canonical structure of all narratives in semiotics (Figure 02).[25] Accordingly, the serial 'organisation of single, non-verbal actions into complex projects of expressive and explorative sense-making become conventional meanings and explanations with propositional narrative power.'[26]
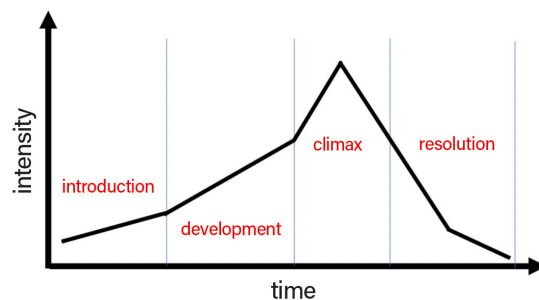

Figure 2:
Four phases of narrative. Author created, based on Colwyn Trevarthen and Jonathan Delafield-Butt, 'Biology of Shared Experience and Language Development: Regulations for the Intersubjective Life of Narratives,' in *The Infant Mind: Origins of the Social Brain*, eds. M. Legerstee, D. Haley, and M. Bornstein (New York: Guildford Press, 2013), 167–199.

The problem with conceiving of this very basic movement as a form of narrative thinking, in the contexts of either psychotherapy or development, is that it leads directly to a form of pan-narrativism where everything seems to be narrative. Galen Strawson, for example, worries about the claim that all of our structured actions have a narrative character.[27] If making coffee in the morning, for example, is a narrative because there is a structure or order to it, then narrativity is trivial—an

unhelpful and uninformative stipulation. Goldie contends that it is always the case that 'a narrative is distinct from what it is a narrative of.'[28] To avoid the problem of pan-narrativism, we need to say that narrative may indeed be a form of thinking about one's actions; but those actions are not themselves narrative. It seems right for narrative theorists to safeguard the concept of narrative in this way.

> [We need] a principled account of what makes a text, discourse, film, or other artifact a narrative. Such an account would help clarify what distinguishes a narrative from an exchange of greetings, a recipe for salad dressing, or a railway timetable.[29]

Getting the order of things right is important. The developmentalists are correct to contend that we learn to form linguistic narratives through interactions with others—specifically, when caregivers elicit accounts of just-past actions or events, and when, as young children around two to three years of age, we appropriate the narratives of others for our own stories.[30] The contours of our narratives are shaped by the structures of our actions and by the events themselves. Developmental studies show that narrative starts to emerge in pretend play, typically when engaging with others, where the creation of such narratives is 'accompanied by—rather than [achieved] solely through—language.'[31] In early pretend play, however, we find performative vocalisation rather than narrative. In Gallagher and Hutto,[32] we give the following example: 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. Performative vocalisations may then get integrated in a narrative 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.

The argument, then, is that *narrative derives its structure from action*. Actions take time to unfold; they have a beginning, they develop, they accomplish a goal, and they conclude. That's a structure that narratives must reflect if they are going to capture what Bruner calls the landscape of action.[33] But that does not mean that actions have a narrative structure; rather, the derivation goes the other way. Narrative thinking is anchored in a pre-narratival event or action structure.[34]

It may still be possible that narratives loop around and start to shape our actions.[35] Explicitly, this can happen in mime, in acting, in therapeutic re-enactments, where an agent enacts a narrative through movement. It can also happen implicitly, which is what makes our actions, in some cases, reflective of narrative thinking.

conclusion

I've argued that movement itself may be a mode of thinking. This is meant to challenge overly-intellectualist accounts of cognition. There are clear examples in everyday life where sensory-motor engagement assists in problem solving, and where gesture contributes in a constitutive way to the thinking process. I have also pointed to examples in the performing arts—marking, blocking, dancing—that contribute to,

or scaffold, or enable thinking, which
is understood in an extended sense as
processes of problem solving, memory and
reasoning. I have also argued, however, that
we should not take this too far and see every
kind of movement, or every kind of complex
action, as equivalent to forms of thinking.
Specifically, I've pointed out the danger—
the threat of pannarrativism—if we try to treat
movement or action as a form of narrative
thinking. Action clearly has a structure, and
although we can think of narrative deriving
its structure from action, we should not
think of the structure of action as an original
narrative structure.

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