

Dynamics and Dialectic

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> **Abstract** • The articles in this special issue cover a lot of ground, from very specific scientific questions about the nature of movement and development, to very large questions about ontological framing. My comments here are meant to highlight some important issues found in these articles and to offer some clarifications.

A balanced view about integrating the vestibular system

« 1 » **Marte Roel Lesur, Michael Gaebler, Philippe Bertrand and Bigna Lenggenhager** have contributed a wonderful theoretical article that addresses a supposition that is often ignored in experimental cognitive science, namely, that the organism or body is a holistic system. For example, experiments with the rubber-hand illusion (RHI) focus, quite naturally, on the processes that involve the proprioceptive, tactile and visual experience of the hand, and they do not necessarily look at what might happen when other parts of the body, such as the head, and correspondingly, the vestibular system are allowed to vary. In addition, first-person perspective full-body illusions (1PP-FBI) often control for head movements but fail to ask what might be different if the head were allowed to move. **Roel Lesur et al.** propose that *head-related* sensorimotor signals, which involve visuovestibular integration, contribute to the binding of sensorimotor integration during body-ownership illusions. This makes good sense, although as **Roel Lesur et al.** show, the interconnections that underpin sensorimotor-vestibular integration are quite complex. Things get even more complex when they propose to combine these details with the distinction between body image and body schema. I would like to add one minor clarification to their analysis, and suggest two other places to look for some insight into these complex relations.

« 2 » First, the minor clarification concerns the notion of body concept. The body concept, as part of the body image, is typically understood as one or more (conscious or non-conscious) conceptual beliefs that

a person might have about her body. **Roel Lesur et al.** (§18), citing my characterization of body concept (Gallagher 2005), suggest that “the seen body has to fit within certain boundaries of a *body concept* for the illusion to occur.” I want to suggest that it would be more correct to say that it has to fit within what Brian O’Shaughnessy (1995) calls the “long-term body image.” In contrast to the short-term, perceptual body image, which may change from moment to moment, and which may give me a sense of where my limbs are just now, the long-term body image is connected to a very general and relatively stable sense of how my body is configured – including the details of the size and reach of my arms, legs, etc. When, for example, Manos Tsakiris and Patrick Haggard (2005: 80) indicate that the RHI “is modulated by top-down influences originating from the representation of one’s own body,” this does not mean simply that a conceptual knowledge concerning one’s body influences or constrains the experience of one’s body. Rather, the constraint derives from one’s habitual body – including the body structure that consistently and over a relatively long-term period influences my sense of my body boundaries, the canonical positions/possibilities of my limbs, and my pragmatic sense of what I can do (how far I can reach, etc.).

« 3 » Second, **Roel Lesur et al.** point to the important role of head movement and head-related visuoproprioceptive coherence for the integration of sensorimotor signals, and the integration of body image and body schema. This seems right. I have argued that during everyday experience body image and body schema are both phenomenologically and neurophysiologically integrated, and that dissociations between body image and body schema can be evidenced only in spe-

cial experimental or pathological cases (Gallagher 2005). I have pointed to the case of Ian Waterman as one such case. At the age of 19 years IW lost proprioception and the sense of touch from the neck down. This is a very specific type of deafferentation. As a result, his relearned motor control is highly cognitive and visually governed, and lacks the close-to-automatic aspects that are provided by the body schema. Thus, Jonathan Cole and I have argued that IW is without essential parts of the body schema, and that to regain control of his movement he employs an enhanced body image that operates like a virtual body schema (Gallagher & Cole 1995). One interesting question, which I will not try to resolve, is whether IW’s experience of his body is in some way close to the illusory experience of the 1PP-FBI. To be clear, IW does not experience anything like a phantom body (see Cole 1995), but there has been some suggestion that in some respects his control of bodily movement is similar to the experience of controlling a robotic body (Cole, Sacks & Waterman 2000).

« 4 » A more interesting point in regard to **Roel Lesur et al.**’s claim about the importance of head movement is to note that IW does have full control of his head movement, in contrast to a similar deafferentation patient, GL, where the nerve damage starts slightly higher on the spinal cord, affecting her at chin level (Cole & Paillard 1995). Her lack of control of her head movement is one reason she is confined to a wheelchair, again in contrast to IW whose albeit unusual motor control processes allow him to walk and move around the world in what appears to be a close-to-typical way. It strikes me that the difference between IW and GL concerning control of head movements confirms the point made by **Roel Lesur et al.** IW, compared

to GL, is much better at instantiating a virtual body schema within his enhanced body image.

« 5 » Finally, **Roel Lesur et al.** suggest that manipulation of the body image can lead to body schema changes (§20). There may be some principles that govern the precision and timing of such changes. To use a metaphor from economics, prices tend to be “sticky” if they are going from high to low – the velocity of a price adjustment is slower than when prices are decreasing compared to when prices are increasing. Something similar may happen when there are changes that impact body image and body schema. More precisely, there may be lag times between these kinds of changes that run in both directions, and adjustments may involve a kind of dialectical process between image and schema. One good example of this is a subject’s experience after bariatric surgery. A significant amount of surgical weight reduction can change both body image and body schema (Natvik et al. 2018). This relates directly to the concept of the long-term body image. In the case of “Carl,” reported in this study, a lag in changes to the long-term body image has an effect on body schematic processes (i.e., because the subject continues to think of himself as obese, he continues to navigate his environment as if he were still obese). When the subject starts to become aware that he can fit into places where he could not previously fit, his movement and general behavior changes, although this still takes some time and effort.

The importance of process and path

« 6 » **Marc Ratcliff** (2018) offers some important and helpful clarifications about body, self, and imitation in Jean Piaget’s developmental psychology. The focus on process, paths, and genetic aspects of development are central to Piaget’s view. New light is thrown on these aspects by unpublished notebooks kept by Piaget and his wife Valentine Piaget, based on their careful observations of their own children. I appreciate the insights that may be found in these manuscripts and I agree with **Ratcliff**’s emphasis on process, paths and genesis, in spite of being framed as a critique of my

own work. In response to the latter, I would like to offer some further clarifications.

« 7 » First, and perhaps the easiest and least controversial point to make, is that by including in his critique phenomenology in general and Maurice Merleau-Ponty in particular (§29), **Ratcliff**’s target is wider than it should be. Although Merleau-Ponty was critical of Piaget on some issues, he was in general agreement with Piaget on many of the issues discussed by **Ratcliff**. In my 2005 book I was disagreeing on some specifics not only with Piaget (and other contemporaries of his) but also with Merleau-Ponty, who agreed with Piaget about the development of the body schema, intermodal perception, and the possibility of invisible imitation in young infants. Some of my disagreement may be due to my not having access to the Piagets’ unpublished notebooks, and obviously neither Piaget nor Merleau-Ponty foresaw later experiments.

« 8 » Second, **Ratcliff**’s critique concerns neonate imitation, a topic that remains controversial, as a recent issue of *Behavioral and Brain Sciences* makes clear (see Keven & Akins 2017 and accompanying commentaries). The controversies are both *conceptual* and *empirical*. One *conceptual* issue pertains to how imitation is defined. As **Ratcliff** rightly notes, I followed the precise operational definition of differential imitation used by Andrew Meltzoff and Keith Moore in their experiments, which defines imitation as “the greater frequency of a gesture in response to the same gesture than in response to other gestures” (Vincini et al. 2017). **Ratcliff** suggests that this definition is *ad hoc*. However, it is scientific practice to operationalize a concept and to be clear about what one’s experimentation is about. In contrast, according to **Ratcliff**, Piaget follows “the standard notion of imitation” (§17). **Ratcliff** does not define this standard notion, but he does say that it does not correspond to the operational one just stated, and in that case, as he rightly states, “[t]here lies the problem.” Indeed, part of the problem may be that we are not talking about the same thing. At the same time, however, there is one concept of imitation that seems to be held in common by Piaget and Meltzoff and Moore – the notion of invisible imitation, i.e., a child’s imitation of another person’s movements using parts of the

child’s body that are invisible to the child. **Ratcliff** rightly points out that neonate imitation is not simply equivalent to invisible imitation, but the issue raised by the Meltzoff and Moore experiments is whether the newborn infant is capable of invisible imitation – something that Piaget denied. Of course, this is precisely the empirical issue that continues to be debated.

« 9 » I confess that my own thinking on this issue has evolved, along with the science. To be clear about one small point, however, I did not (and still do not) claim that the body image is innate (as **Ratcliff** §21 suggests). Indeed, I stated that the infant’s proprioceptive (kinaesthetic) awareness “constitutes the very beginning of a primitive body image [...]. *The body image, then, is not innate*, although the capacity to develop a body image can be exercised from birth” (Gallagher 2005: 73, emphasis added). This is relevant to questions about how we define self-awareness. Much of **Ratcliff**’s argument is based on Piaget’s observations about the difference between the visual perception of one’s body and one’s kinaesthetic awareness. Although Piaget is happy to attribute kinaesthetic awareness to the infant, he thinks that the infant’s visual recognition of her own body takes some time to develop. Before that, as **Ratcliff** (§§2f) emphasizes, the visual body is part of the “non-I,” and therefore, “at the origin, the baby has no feeling of his I” (Piaget 1927: 101). That depends, however, on what we mean by ‘I’ or ‘self’ or self-awareness, and even the Piagets note the tension, since they state: “Perhaps [the kinaesthetic] impressions are already [at around 6 mos.] localized into an I” (cited in §23).¹ Perhaps they are already so at birth. In any case a sense of self is not reducible to a visual sense; it can be kinaesthetic.

« 10 » Although the Piagets were tracking development at specific ages in the notebooks, **Ratcliff** wants to bracket age questions in favor of process and path questions.

1 | This is precisely what Michele Di Francesco, Massimo Marraffa and Alfredo Paternoster (2016) would deny based on their definition of self-consciousness as an explicit objective recognition of the body as one’s own. What **Ratcliff** notes as my objection is that they would deny an “I” based on kinaesthetic organization – something that Piaget does not deny, “perhaps.”



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I take his point, and acknowledge that it is a good one. Still, part of the concern about the age of onset of some process is the question of whether we consider a process to be innate or acquired. Meltzoff and I (Gallagher & Meltzoff 1996) claim that the body schema is innate. By innate, however, we do not mean what Plato or Descartes or even (necessarily) what a geneticist might mean by innate; we mean simply something that has developed prenatally (Gallagher 2005: 73), e.g., through fetal movement. Moreover, we do not mean that the body schema is *fully* developed at birth. Continued development and improved coordination via experience, growth, acquisition of skill, etc., are not ruled out.

« 11 » I do not want to dodge the empirical issue concerning neonate imitation – as I indicated, my own thinking about this has evolved along with the science. Ratcliff indicates that Piaget would have no problem with the concept (§17), but much depends on how one defines the phenomenon (most developmental psychologists accept that there is a specific phenomenon to explain) – whether it is “standard” or differential imitation, contagion, perceptual priming, or mere arousal. My own interest in this phenomenon concerns its relevance for social cognition. In this respect, *whatever it is*, even if it is not imitation in some sense, it sparks a form of intersubjective interaction between infant and caregiver and starts them on a path to an important set of social cognitive processes.

The neurophenomenology of spirit

« 12 » Nicolas Zaslowski (2018) proposes to dig out the heavy-duty dialectical logic in the background of Francisco Varela’s neurophenomenology and enactivism. I note that Hegel is in the deep background of both pragmatism (especially John Dewey) and phenomenology (Merleau-Ponty), which, in turn, inform and already reflect enactivist ideas (see Gallagher 2017).

« 13 » It is possible to read neurophenomenology, as Michael Kirchhoff and Daniel Hutto (2016: 351) do, as explicating mere correlations; it is also possible to go “beyond mere correlation” as Zaslowski indicates. However, one could get beyond mere correlation by explicating a conception of constitution not unlike the one Kirchhoff himself pursues – a diachronic constitution of reciprocal (one might say, dialectical), non-linear causality (see Kirchhoff 2017 – that is, a dynamical constitution (Gallagher 2018). The model that I would argue for could be considered dialectical, but not necessarily Hegelian – rather, I would suggest, we should remain once removed from Hegelian dialectic – removed by a century, perhaps, or removed by turning to pragmatism (*à la* Dewey) or phenomenology (*à la* Merleau-Ponty). This is, of course, Hegel without synthesis, without progression, without totality – not one, not two, but certainly not a sublated third. Zaslowski (§28) is right not to settle for Malabou’s plasticity (“the neu-

rodialectical framework does not merely amount to ‘plasticity’”). Rather, the enactivist framework encompasses a more ambiguous and dynamical dialectic of the sort found within a dynamical gestalt that operates in a non-linear fashion over what Varela defines in terms of different incompressible timescales – the elementary/neurological, the integrative/phenomenological, and the narrative/cultural timescales (see Gallagher 2017; 2018). At the very least, this kind of gestalt involves *metaplasticity* – the dialectical and transformational changes that take place in brains, bodies and cultural practices. Neurophenomenology is one piece of a larger enactivist project that includes what Hegel called “Objective Spirit”: “Mind, or Spirit (*Geist*), [...] is dialectically propagated through historical forces” (to requote Zaslowski quoting Crisafi & Gallagher 2010: 123). This is an idea that Zaslowski rightly associates with Emmanuel Renault.

« 14 » This is Hegel again, of course, a sublated Hegel. A Hegel who can still address Bimbenet’s (2015: 215f) question of “how institutional facts can be both human creations [...] and appear to these very members as lingering independently from them.” My preferences are for the sublated Hegel. I must say that I continue to hesitate at the prospect of the “full-blooded” Hegel (but let me note that the late Anthony Crisafi would not share my hesitation, and in that respect would be fully in line with Zaslowski’s proposals). I endorse the idea that we need to rethink nature in a way that gets

us not only a “richer notion of nature” (as Zahavi 2010 suggests), but a *different* notion of nature (as Merleau-Ponty suggests) and a different naturalism (Gallagher, in press). It may be, however, that we need at least a sublated Hegel to help us think about the role of social institutions and cultural practices in this different conception of nature. Does science itself, as one such social institution, and as one set of cultural practices, remain the same within this different kind of naturalism? At least in one small, but important realm, Varela’s conception of neurophenomenology is an attempt to challenge science to come around to this new conception of nature.

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