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The Hand, an Organ of the Mind: What the Manual Tells the Mental. Edited by Zdravko Radman. The MIT Press, 2013, 433pp, Hardcover, \$50.00, ISBN: 9780262018845

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Hands undoubtedly matter. Few, I suspect, would disagree. Yet *The Hand, an Organ of the Mind* uses this commonplace to dispel what is termed the “intellectualist illusion” (p370), the illusion that the things we do with our hands are always and everywhere guided by an in-the-head centralised planner. Radman’s spirited collection of essays makes the point that we are not the sort of “centralised knowers” (p369) that the history of cognitive science might have us believe. Rather the manual is primary: it not only structures our encounters with the world; it is also constitutive of those encounters. We are in fact manual beings (p389).

In support of this proposal, Radman has marshaled a wealth of research from a wide range of philosophers, scientists and even artists. In particular, this collection brings

to the fore how past and present phenomenological research and 4e paradigms in cognitive science (embodied mind, embedded mind, enacted mind and extended mind) all have important lessons to teach us about the hand. This book is thus decidedly current, and so is an important (though by no means exhaustive) resource when it comes to determining what research is presently being done on the hand.

The collection is divided into six sections, each comprising between two and four essays, with a foreword by Jesse Prinz, and an introduction by Radman. In the rest of this short review, I will briefly summarise each of the essays, drawing out what I take to be the main points, and adding, where I think necessary, how they contribute to the overall theme.

The first section, "Hand Centeredness", consists in a series of essays by Cole, Bremner and Cowie, Holmes, and Baccharini and Maravita, who all explore the role that the hand can play in our behaviour.

Cole, for example, shows that the ability to gesture can be retained despite severe neurological impairments. He recounts the famous case of Ian Waterman. Illness left Waterman unable to feel touch, movement and position of his body. Yet through visual feedback, Waterman re-learned how to coordinate his movements and so perform certain actions. Interestingly, Cole describes how even when deprived of visual feedback, Waterman still gestures. Cole (and McNeill) utilise this finding to argue that gesture is no mere accompaniment to language, but rather co-existent with it; perhaps even dependent on specific pathways in the brain.

Bremner and Cowie point out that, although vision is the dominant sense when you or I reach for an object, the same is not true for young infants. Developmental data instead indicates that infants are just as reliant on information about their bodies to control their reaching behaviours. Bremner and Cowie argue that the beginnings of visually directed reaching only emerge in the second half of the first year of an infant's life. As such an infant's ability to utilise multisensory information to guide

their reaching undergoes significant changes, not only throughout infancy, but also into early childhood.

Holmes presents empirical studies that demonstrate how crucial it is to see our hands and the position of our hands when we are performing movements. For example, he cites experiments, which show that if subjects receive incorrect visual information about their hands (e.g. they see their hands reflected in a mirror, or receive incongruent visual and tactile information), then this severely impacts on their ability to make targeted hand movements. Holmes uses these experiments to claim that vision is in fact hand centered.

Baccarini and Maravita explore how tool use affects mental representations in the brain. For example, they discuss single-cell recordings of neural activity in the brains of primates, which reveals that tool use can induce a spatial re-mapping in the response of visuotactile neurons. They also discuss how tool use can modify the spatial mental representations of both unilateral neglect patients and healthy subjects. Finally, they show how a subject's mental representations of their arm can be extended following tool use.

Section two, "Togetherness in Touch", collects essays by Farmer and Tsakiris, Ratcliffe, Mattens, and Depraz, which all focus on the empirical and phenomenological importance of touch.

Farmer and Tsakiris show how gender, age, setting, culture, location and type of touch can all modify our understanding of intersubjective touch. They also discuss empirical findings about the importance of touch in infant development, arguing that tactile contact between infant and caregiver may lay the basis for future social interaction. Finally, they show how perception and experience of touch on one's own body can be linked to observation of touch on someone else's body.

Ratcliffe argues that touch has what he terms "phenomenological primacy" (p132) and remains "indispensable to a sense of reality and belonging" (p148). Accordingly,

while loss of some, or all, of the other senses would undoubtedly radically alter an individual's experience of the world, loss of touch, insists Ratcliffe, would strip such an individual of having a world at all.

Mattens claims that our unique handing abilities have caused us to overlook important differences between touch and vision. So, for example, we erroneously think that whenever we tactually perceive spatial properties, our perception is the same as whenever we visually perceive spatial properties. Using a discussion of manual shaping (e.g. where we represent the shape of an object using our hands), Mattens argues that there are important disparities between feeling a shape and seeing a shape. If so, then the hand is not an "organ of compensation" (p183) for vision. Rather the hand can have its own "unique take" (ibid) on the world.

Depraz, in the final essay in this section, points out that the ancient Greeks were divided on how to understand the role of the hand, with some, such as Anaxogoras, claiming that we are intelligent because we have hands, and others, such as Aristotle, claiming we have hands because we are intelligent. Drawing on and challenging themes in Husserl, Merleau-Ponty, Levinas, Sartre, Henry and Ricoeur, Depraz explores the ethical, erotic and therapeutic aspects of our handing abilities, making it clear that we do much more with our hands than simply grasp or touch objects. Hands have, claims Depraz, "original expressivity" (p201) and this expressivity must be a key component in any account of lived experience.

To briefly sum up so far, the first and second sections of this collection succeed in showing that viewing our behaviour as hand centered has important medical, developmental, psychological and neurological support. These sections also reveal the empirical and phenomenological importance of touch. As such they offer weight to the claim what we do with our hands can be constitutive of what we think and experience. This challenges the idea that all our manual actions require a centralised knower.

Such a theme bears important parallels with one of the 4e paradigms in cognitive science, namely enacted mind, the view, according to Gallagher, that “[o]ur ability to make sense of the world comes from active and pragmatic engagement with the world, along with our capacities to interact with other people” (p209). Enacted mind provides the focal point for the third section in this collection, “Manual Enaction”, and contains essays by two of the leading advocates of this approach, namely Shaun Gallagher, and Daniel Hutto.

Gallagher argues that our reasoning abilities are realized by our actions and interactions with our local environments. Hands, and brains, need to be understood as part and parcel of larger dynamic systems that reach out into the world. Moreover, hands matter, not just because they facilitate gestural communication, but also because they enable us to make sense of the intentions of others.

Hutto uses his essay to argue for radically enactive or embodied cognition (or REC for short). Briefly, REC denies that all forms of human mentality must involve internal, semantic representational states (Hutto and Myin, 2013). Hutto takes a RECian view of manual activity. He reviews standard representationalist accounts of the hand and finds them wanting, arguing instead that our handing abilities should be understood as constituted by temporally extended dynamic interactions between the subject and the environment. Yet, as Hutto notes, even if REC does offer the best account of some forms of cognition, one could still defend a conservative embodied or enactive cognition (or CEC). CEC argues that the most important forms of cognition need a representationalist style account. Hutto counters, however, that CEC accounts confront the problem of reconciling naturalistic accounts of information with the sort of contentful, semantically loaded accounts that are at the basis of representationalism (Hutto, this volume, pp241-248). One the key merits of the REC approach, argues Hutto, is that it avoids this difficulty.

Hutto’s essay is an important contribution to this volume. However, some of the essays in this collection (e.g. those in the first section, and those in the fourth section (see below)) seemingly endorse the sort of CEC view he sets out to challenge. For

despite recognizing the pivotal role of manual activity, and so challenging the intellectualist illusion, these essays nonetheless remain committed to talk of semantic representational states. Yet if Hutto is right, then such views must confront the problem he lays at CEC's door. This reveals just how radical Hutto (and Myin's) style of enactivism is, and the far-reaching implications it has for our understanding of mentality. Hutto's contribution suggests then that not all the views outlined in this volume may be compatible.

A case in point comes in the fourth section, "The Gist of Gestures", which continues to focus upon 4e paradigms in cognitive science, this time concentrating on what is called extended mind and embedded mind. Extended mind is the claim that environmental objects or processes can, on occasion, be understood to be partially constitutive of the minds of subjects (see Clark and Chalmers, 1998). Embedded mind argues, contrarily, that environmental objects or processes can only play a (perhaps essential) causal role in the realization of certain cognitive processes (see Rowlands, 2010). Both extended and embedded retain the sort of CEC framework that Hutto attacks. For both remain committed to understanding mind and cognition in terms of representational vehicles and their attendant informational contents. Where extended and embedded differ is over the extent of such vehicles: extended claims that such vehicles can include environmental objects or processes; embedded denies that such vehicles extend outside the skull. Depending on one's sympathies then, Hutto's critique may cast a certain spin on the essays put forward in this section. Of course, this needn't detract from these essays (or the merit of this collection). Instead, the take home message may simply be that 4e is not a homogenous field.

"Gist of Gestures" contains essays from two of the leading players in 4e, Andy Clark and Mike Wheeler, as well as a companion piece from Cappuccio and Shepherd.

Clark uses empirical data to support the extended mind claim that gestures are more than just aids to thought but rather can, under the right circumstances, be understood as partially constitutive of thought. Clark claims that gestures are often

part of self-stimulating loops, where the gesture is both an output and input, and as such propels (akin to a turbo-driven engine) the subject's thought processes forward. On such occasions, argues Clark, the self-stimulating loop, of which the gestures are a part, is "as much an aspect of..thinking as its result" (p263).

Wheeler however challenges the Clarkian account, arguing instead that gestures only support embedded mind. In other words, gesturing only reveals the essential causal dependence between the subject and their environment for certain cognitive processes. It does not support the stronger constitutive claim. To make this further claim, insists Wheeler, gestures would need to fulfill a mark of the cognitive i.e. a set of criteria that can determine whether or not any material object or process has fully paid up cognitive status. This is something, according to Wheeler, that Clark fails to provide.

In the final contribution to this section, Cappuccio and Shepherd examine cases of what is called declarative pointing. They contend that such pointing should not be understood as an embodied dispositional skill or as depending on a preexisting system of mindreading. Rather it should be understood as an externalized minimal representation (thus defending the extended mind view – see Cappuccio and Shepherd, this volume, p 316) that can cue shared knowledge and intentions and thus act as the scaffold upon which more sophisticated forms of cognition can be built. Such "open knowledge", according to Cappuccio and Shepherd, is what enables us humans to move from basic joint attention, a skill we share with many animals, to symbolic joint attention, a skill perhaps unique to ourselves.

The fifth section, "Manipulation And The Mundane", broadens the scope beyond 4e to consider a range of phenomenological, cultural and intellectualist understandings of the hand, bringing together essays by Stuart, Menary and the editor of this collection, Radman.

Stuart offers a phenomenological account of how our hands help constitute our experiential world and how this reveals us to be creatures whose physical

embodiment unites prehension, apprehension (knowing that we know) and comprehension in, what Stuart terms, “enkinesthesia”, by which she means the numerous ways in which we move, touch and change one another. In support of this, Stuart offers Kant’s enantiomorphs argument for absolute space, that is, his view that our qualitatively identical but topographically non-identical hands both establish an external world and orient us in space. She also shows how Kant understood the phenomenal subject as a “sensuous entity” (p338) and hence how parallels can be drawn between Kant and phenomenological discussions of the hand and the body (as given by Henry, Merleau-Ponty and Bourdieu).

Defending what he calls his Cognitive Integrationist view (Menary, 2007), Menary uses his essay to consider how our culturally laden environment and its history scaffold our cognitive abilities. Key to this is the hand, which Menary claims, “is complicit in enculturating the brain” (Menary, this volume, p355). He argues that our manual abilities transform our natural, evolutionary endowments (and the cortical circuits that underpin them) into the full gamut of culturally specific abilities that us modern humans display. In particular, our hands enable us to engage in cognitive practices that involve the bodily manipulation of informational structures in public space. For example, Menary considers our abilities with numbers, and argues that it is because we can bodily manipulate inscriptions on a page (or screen) that we are then able to display mathematical competence. Such competence has, according to Menary, rewired our neural circuitry.

In an essay that arguably sets the theme for this collection (see the introduction to this review), Radman challenges the intellectualist view that all our actions require previous mental activity with propositional content (thus echoing earlier enactivist proposals). Radman discusses manual perception, “the ability to discriminate objects in the world according to modes of possible actions upon them” (p376), and argues (agreeing with previous authors) that manual activities play a significant (and often neglected) role in vision. Radman also discusses what he calls manual intelligence, the idea that our hands possess their own form of bodily know-how such that our “handing” is not always under the control of our conscious selves. A key

consequence of this is that agency can be displaced, that is, “an agent is capable of competently coping with the world before or apart from conscious intervention in it” (p388). Thus, contrary to the intellectualist credo, we can act intelligently in the world without having had to first cognise or reason about that world.

The sixth and final section, “Tomorrow’s Hands”, examines developments in robotics, with an essay by Roesch, and includes what is termed a “postscript” from the sculptor Rosalyn Driscoll.

Roesch offers his take on why building a robotic hand that can mimic the flexibility and dynamism of the human hand still remains some way off. He argues that robotics remains committed to modelling robot behaviour in terms of sequences of exact movements in known and static environments. Contrast this with, for example, the common cockroach, whose antennas simply initiate a bending reflex in its body whenever it encounters an obstacle that it needs to climb over (p410). Roesch argues that this sort of “outsourcing” of intelligence i.e. using the body to resolve runaway computational complexity, is the way forward for robotic projects. In other words, robotics needs to recognise the importance of embodiment. Roesch contends that building an “enactively” embodied robotic hand (which at present doesn’t exist) may be the only true way to mimic the human hand. If correct, then the dismissal of the “centralised knower” may be needed if new possibilities in robotics are to be realised.

In the final essay in this collection, Driscoll describes how an injury to her left hand altered her sense of self and bodily ownership. She also describes how therapy of her hand ultimately lead her to reconsider her understanding of the world around her and how this impacted on her art. According to Driscoll, hands are not “peripheral at all”, but rather “the channels through which [the] body sees and acts – a medium between self and world that participates in both” (p426).

In summation, Radman’s collection is a comprehensive, incisive and rewarding read, which brings together a host of diverse research about the hand. While there may be

important conceptual divisions among the essays in this collection, these essays nonetheless demonstrate that what we do with our hands shapes in powerful and sometimes unexpected ways our thoughts and experiences. Hands matter and much more than one might think.

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