Distributed cognition and the humanities

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Consider counting on your fingers; or solving a challenging mathematical problem using pen and paper (or Napier's bones, or a slide-rule); or the way in which we routinely offload the psychological task of remembering phone numbers onto our ubiquitous mobile phones; or a brainstorming scenario in which new creative ideas emerge from a process of collective group interaction; or the manner in which the intelligent feat of ship navigation is realized through a pattern of embodied, information communicating social exchanges between crew members who, individually, perform purely local information processing tasks (such as bearing taking) using specialized technology. All of these examples of brain-body-world collaboration are, potentially at least, instances of the phenomenon that, illuminated from a historical perspective, is the topic of this volume. That phenomenon is *distributed cognition*.

So what, precisely, is distributed cognition? The term itself is standardly traced to the pioneering work of the cognitive anthropologist Edwin Hutchins (see, canonically, Hutchins 1995, from where the example of ship navigation is taken). However, in using this introduction to sketch the conceptual background for the chapters that follow, we shall adopt an understanding of distributed cognition that arguably diverges somewhat from Hutchins' own (for one thing, we make no demand that the target elements, whether located inside or outside the brain, should be understood as representational media; see e.g. Hutchins 1995, 373). Here we are aiming for a general and inclusive notion of cognition alongside a general and inclusive notion of what it means for cognition to be distributed. Thus the term 'cognition' should be understood liberally, as it routinely is in the day-to-day business of cognitive science, as picking out the domain of the psychological, where that domain encompasses phenomena that we often identify using terms such as mind, thought, reasoning, perception, imagination, intelligence, emotion, and experience (this list is not exhaustive), and includes various conscious, unconscious-but-potentially-conscious, and strictly non-conscious states and processes. Given this broad conception of what cognition is, cognition may be said to be distributed when it is, in some way, *spread out* over the brain, the non-neural body and (in many paradigm cases) an environment consisting of objects, tools, other artefacts, texts, individuals, groups and/or social/institutional structures. Advocates of distributed cognition argue that at least a great many examples of the kinds of cognitive phenomena identified above (reasoning, perception, emotion, etc.) are spread out in this way.

To see why the notion of distributed cognition has attracted so much attention, here's a way of thinking about how the contemporary discourses stationed in and around cognitive science arrived at what might justifiably, in the present context, be called the received (non-distributed) view of mind. Although the very brief history lesson that follows involves the odd caricature, it is surely broadly accurate. According to the much-maligned substance dualists (the most famous of whom is arguably Descartes), mind is a non-physical entity that is metaphysically distinct from the material world. Here the material world includes not only the external tools and artefacts that human beings design, build and use, but also the thinker's own organic body. On this model, the minds

of other people become peculiarly inaccessible, and indeed one's indirect knowledge of those minds, such as it is, seems to result from a precarious analogy with the correlations between thought and action in one's own case. For this, plus a whole battery of other reasons – some scientific, some philosophical – substance dualism is now officially unpopular in most of the relevant academic circles. Indeed, in the twentieth and twenty-first centuries, mind has been placed firmly back in the material and social world. Or rather, it has been placed firmly in a particular segment of that world, namely the brain.

As apparently demonstrated by all those 'pictures of the brain thinking' that we regularly receive from functional magnetic resonance imaging (fMRI) scans and the like, the received view is now that the brain is where the cognitive action is. This neuro-centric orthodoxy is not an irrational position. Indeed, there is no doubt that many a good thing has come out of research programmes in psychology, neuroscience and elsewhere which embrace it. Nevertheless, the contemporary distributed cognition perspective is usefully depicted as a reaction against neuro-centrism's (allegedly) distorting influence. To be clear, no advocate of distributed cognition believes that the brain is somehow unimportant. Rather, (part of) the proposal is that to understand properly what the brain does, we need to take proper account of the subtle, complex and often surprising ways in which that venerable organ is enmeshed with, and often depends on, non-neural bodily and environmental factors, in what is the co-generation of thought and experience.

One consequence of adopting a general and inclusive notion of distributed cognition is that there turns out to be more than one version of the idea from which to choose when developing the view. How, then, may we articulate the notion further? One taxonomic move that is increasingly popular in the literature is to unpack distributed cognition in terms of *4E cognition*, where the four Es in question are *embodied*, *embedded*, *extended* and *enactive*. In other words, it is possible to provide a more detailed picture of distributed cognition by thinking in terms of the four Es and the pattern of symbiotic and sometimes not-so-symbiotic relationships between them. That's what we shall now do, starting with the notion of *embodied* cognition.

According to the hypothesis of embodied cognition, psychological states and processes are routinely shaped, in fundamental ways, by non-neural bodily factors. In a full treatment of this idea, *much* more would need to be said about what the terms 'shaped' and 'fundamental' mean, but for present purposes the motivating thought will do: in order to understand cognition, the structures and forms of the non-neural body need to be foregrounded in ways that are absent from the neuro-centric orthodoxy. From this shared point of departure, the embodied cognition community has become home to a diverse kaleidoscope of projects. Thus embodiment is said to determine or condition the nature of concepts (e.g. Lakoff and Johnson 1980), the character of perceptual experience (e.g. Noë 2004), various factors such as orientation and posture that do not themselves enter into the content of experience, but which preconceptually structure that experience (e.g. Gallagher 2005), and the architectures, assemblages and processing mechanisms that enable intelligent action (in the philosophical literature, see e.g. Clark 1997, 2008b, Haugeland 1998, Wheeler 2005).

As just one example of embodied cognition research, consider ground-breaking work in cognitive semantics on the role of embodiment in human sense-making (how we experience the world to be meaningful). Johnson (1987) argues that we experience our

bodies fundamentally as three-dimensional containers into which we put things (e.g. food) and out of which things come (e.g. blood). The result is that the metaphor of containment becomes a preconceptual cognitive schema that heavily constrains other contexts of meaning. Thus, building on Johnson's idea, Lakoff (1987) argues that the containment schema, as determined by our human experience of embodiment, even underlies abstract logical structures such as 'P or not P' (inside the container or outside of it). One apparent implication of this approach is that creatures with different experiences of embodiment will possess different preconceptual schemata and thus will inhabit different semantic landscapes.

To the extent that embodiment is grounded in bodily acts, such as, say, the physical manipulations of instruments or tools, embodiment naturally encompasses a rich mode of environmental interaction, which is just to say that there is a natural route from embodied cognition to the second of the four Es, namely *embedded* cognition. According to the embedded view, the distinctive adaptive richness and/or flexibility of intelligent thought and action is regularly, and perhaps sometimes necessarily, causally dependent on the bodily exploitation of certain environmental props or scaffolds. As an illustration, consider the phenomenon that Andy Clark has dubbed *cognitive niche construction* (e.g. Clark 2008b; see also Wheeler and Clark 2008). This occurs when human beings build external structures that, often in combination with culturally transmitted practices, transform problem spaces in ways that promote, or sometimes obstruct, thinking and reasoning. A compelling example, which Clark sources from Beach (1988), is the way in which a skilled bartender may achieve the successful delivery of a large and complex order of cocktails (a relatively daunting memory task) by exploiting the fact that different kinds of cocktail often come in differently shaped glasses. Bartenders learn to retrieve the correct glass for each drink as it is requested, and to arrange the differently shaped glasses in a spatial sequence that tracks the temporal sequence of the drinks order, thus transforming a highly challenging memory task into a simpler (roughly) perception and association task. This reduces the burden on inner processing by exploiting a self-created environmental structure according to a culturally inherited social practice.

Of course, as indicated in the definition given of cognitive niche construction, not all cases of the environmental scaffolding of cognition will result in enhanced performance. The background picture here is of 'our distinctive universal human nature, insofar as it exists at all, [as] a nature of biologically determined openness to deep, learning- and development-mediated, change' (Wheeler and Clark 2008, 3572) and thus, given a technologically saturated environment, of human organisms as what Clark (2003) calls *natural born cyborgs*, creatures who are naturally evolved to seek out intimate unions with non-biological resources. Overall, the ongoing operation of this evolved tendency has yielded myriad adaptive benefits, but sometimes the couplings that result will be adaptively neutral, inappropriate or dysfunctional. This observation points to an important vein of research on how ideas that are central to distributed cognition can contribute to areas such as psychopathology (e.g. Gallagher 2004, Fuchs 2005, Drayson 2009, Sprevak 2011).

Despite the fact that the embedded theorist seeks to register the routinely performance-boosting, often transformative, sometimes necessary, but occasionally obstructive, causal contributions made by environmental elements (paradigmatically, external technology) to many cognitive outcomes, she continues to hold that the actual thinking going on in

such cases remains a resolutely skin-side phenomenon, being either brain-bound or (on a less common, more radical iteration of the view) distributed through the brain and the non-neural body. By contrast, according to the advocate of *extended* cognition, it is literally true that the physical machinery of mind itself sometimes extends beyond the skull and skin (see, canonically, Clark and Chalmers 1998; for a collection that places the original Clark and Chalmers paper alongside a series of criticisms, defences and developments, see Menary 2010). More precisely, according to the hypothesis of extended cognition, there are actual (in this world) cases of intelligent thought and action, in which the material vehicles that realize the thinking and thoughts concerned are spatially distributed over brain, body and world, in such a way that certain external factors are rightly accorded fundamentally the same cognitive status as would ordinarily be accorded to a subset of your neurons. Thus, under the right circumstances, your mobile phone *literally* counts as part of your mnemonic machinery, alongside some of your neurons.

To bring home the distinction between embedded and extended cognition, as we have just introduced it, consider the example of a mathematical calculation achieved, in part, through the bodily manipulation of pen and paper. For both the embedded view and ExC, what we have here is a brain-body-pen-and-paper system involving a beyond-the-skin element that, perhaps among other things, helps to transform a difficult cognitive problem into a set of simpler ones (e.g. by acting as storage for intermediate calculations). For the embedded theorist, however, even if it is true that the overall mathematical problem could not have been solved, at least by some particular mathematician, without the use of pen and paper, nevertheless the external resource in play retains the status of a noncognitive aid to some internally located thinking system. By contrast, for the advocate of ExC, the coupled system of pen-and-paper resource, appropriate bodily manipulations, and in-the-head processing may itself count as a cognitive architecture, even though it is a dynamically assembled (rather than hard-wired) and essentially temporary (rather than persisting) coalition of elements. In other words, each of the differently located components of this distributed (over brain, body and world) multi-factor system enjoys cognitive status, where the term 'cognitive status' should be understood as indicating whatever status it is that we ordinarily grant the brain.

Here it is worth pausing to note that, in the distributed cognition literature, one can certainly find the term 'extended cognition' being given a less specific reading than we have just suggested, a reading which is tantamount to the interpretation we have adopted here of the term 'distributed cognition', and which thus encompasses embedded cognition and (at least many forms of) embodied cognition. This liberal usage is not negligent. For one thing, the boundary between internal and external is, in some contexts, fixed by the skin – in which case gross bodily forms count as internal – while in others it is fixed by the limits of the brain or central nervous system – in which case gross bodily forms count as external. On the latter view, at least some forms of embodied cognition would count as cases of extended cognition. For another thing, given certain projects and purposes, the distinction between being a non-cognitive but performance-boosting scaffold and being a genuine part of one's mental machinery may be a distraction, even if it is metaphysically legitimate. Nevertheless, it does seem clear that if one uses the term 'extended cognition' in the more inclusive way, one will need to find a different term for the case of what we might identify as metaphysical or constitutive extension ('strictly extended' maybe). Otherwise one will risk succumbing to what extended cognition

theorists call cognitive bloat, a to-be-avoided outcome in which one is forced to concede all sorts of mundane and unexciting cases of causal coupling between inner and external elements to be cases of extended cognition, thus generating a wildly counter-intuitive position. It looks, then, as if there is a genuine argument to be had over whether it is possible to make the transition from embodied-embedded cognition to extended cognition. And, indeed, this is a complicated and contested area (to sample just a small sub-set of views and the sometimes ill-tempered debate, see e.g. Adams and Aizawa 2008, Rupert 2009, Clark 2008b, Menary 2007, 2010, Rowlands 1999, 2010, Sprevak 2009, Sutton 2010, Wheeler 2010). And it is possible that there won't be a universal resolution. That is, it may be that while some cognitive phenomena reward an extended treatment (leading candidates might include memory, reasoning and problem-solving), others will not. There is, for example, an ongoing debate over the credentials of extended consciousness (Hurley and Noë 2003, Noë 2004, Clark 2009, Hurley 2010, Ward 2012, Wheeler 2015).

Our final 'E' is *enactive*. In the most general terms, a position is enactivist if it pursues some version of the claim that cognition unfolds (is enacted) in looping sensorimotor interactions between an active embodied organism and its environment. For the enactivist, then, cognition depends on a tight and dynamic relationship between perception and action. Enactivism also tends to foreground the disciplined examination of lived experience as a methodological tool in cognitive theory. This leads many enactivists to draw on the phenomenological philosophical tradition, as represented centrally by thinkers such as Husserl, Heidegger and Merleau-Ponty, a tradition which concentrates on the structures of, and the conditions for, lived experience. This productive engagement with phenomenology is especially prominent in relation to the enactivist understanding of the body as not simply a physical mechanism, but as a lived experiential structure though which the world is experienced. (Although enactivism foregrounds phenomenology more so than the other branches of distributed cognition, that is not to say that it has a monopoly on phenomenology's insights and conceptual machinery; see e.g. Gallagher 2005, Wheeler 2005 and Zahavi 2014 for essentially non-enactivist yet systematic appeals to phenomenology, in and around the distributed cognition literature.)

The two most common forms of enactivism are sensorimotor enactivism (e.g. O'Regan and Noë 2001, Noë 2004) and autopoietic enactivism (e.g. Varela et al. 1991, Di Paolo 2005, Thompson 2007), although another recent, and increasingly important, variant that we shall not discuss here is the so-called radical enactivism of Hutto and Myin (2012). Sensorimotor enactivism is rooted in the thought that perceptual experience is constituted by implicit knowledge of so-called sensorimotor contingencies – the law-like effects that either my movement or the movements of objects in my sensory field have on the sensory input that I receive – where the implicit knowledge in question is to be understood in terms of the possession and exercise of certain bodily skills. Thus consider my visual perception of a tomato. Although my visual access to that entity is aspectual (there is an obvious sense in which, given my embodied spatial perspective, I have visual access only to certain portions of it), my ordinary experience is nevertheless of the tomato as an intact, solid, three-dimensional object. As one might put it, the tomato's hidden-from-perspectival-view aspects are nevertheless experientially present to me. According to the sensorimotor enactivist, this is explained by my implicit mastery of the relevant sensorimotor contingencies – very roughly, the visual inputs my eyes would

receive if I moved around the tomato, or if I turned it, or if it span round. This implicit sensorimotor knowledge is constitutive of my perceptual experience.

Autopoietic enactivism (e.g. Varela et al. 1991, Di Paolo 2005, Thompson 2007) is based on the idea that cognition is a process of sense-making by adaptively autonomous systems, where an autonomous system is a network of interdependent processes whose recurrent activity (a) produces and maintains the very boundary that determines the identity of that network as a unitary system, and concurrently (b) defines the ways in which that system may encounter perturbations from what is outside it while maintaining its organization. A system is adaptively autonomous when it is able to alter its behaviour in response to changes in its environment in order to improve its situation, for example by sensorimotor activity. To illustrate this with an example that the autopoietic enactivists themselves often use, bacteria sense and swim towards the environmental area containing the greatest concentration of glucose molecules. Thus, as a consequence of the specific metabolically realized autonomy of the bacteria, glucose emerges as – is brought forth as – significant for those organisms as food. As this example nicely illustrates, autopoietic enactivism is distinctive in forging a close connection between life and mind (cognition). As Thompson (2007, 128) puts it: 'life and mind share a set of basic organizational principles, and the organizational properties distinctive of mind are an enriched version of those fundamental to life. Mind is life-like and life is mind-like'.

One effect of enactive life-mind continuity is to place affective phenomena such as emotions and moods at the very centre of the cognitive stage. As the glucose example highlights, enacted significance is fundamentally a matter of valence, that is, of being appropriately attracted and repelled by environmental factors that might improve or diminish organizational integrity. In this way, these factors are things that the organism *cares* about. This is the enactive root of affectivity. (For a developed enactive account of emotional episodes as self-organizing patterns of the whole embodied organism, see Colombetti 2014.) More generally, a 4E-friendly treatment of affective phenomena will tend to reject a commonly held view in the psychology of emotions according to which there is a neat distinction between the cognitive components of emotions (e.g. the appraisal of a situation in relation to one's well-being) and their bodily components (e.g. arousal and facial expressions). For the advocate of embodied emotions, appraisal is itself a phenomenon that is spread out over both neural and non-neural bodily factors (see, again, Colombetti 2014). In the background here is Damasio's (e.g. 1999) influential notion of somatic markers, i.e., specific feelings in the body that accompany specific emotions (e.g. nausea with disgust) and which strongly shape subsequent decision-making. A more controversial application of 4E thinking in the vicinity of affective phenomena is the claim that such phenomena may be extended beyond the skin of an individual, either over artefacts such as musical instruments (see e.g. Colombetti and Roberts 2015) or over other people (see e.g. Krueger and Szanto 2016, Slaby 2014).

This final point brings us neatly to the issue of the social dimension of the 4E mind. Consider three possible ways in which cognition might be socially distributed:

(1) I think some of the thoughts I think because, or perhaps only because, I am part of a particular social group.

(2) My cognitive states or processes are socially as well as technologically extended, such that some of my cognitive machinery is located partly in the brains of other people

(3) Groups may have minds in much the same way that individuals have minds.

Option (1) Is perhaps most naturally understood as an embedded view according to which some psychological capacities realized wholly by neural states and processes are nevertheless manifested only in certain kinds of social circumstances, because they are socially scaffolded by those circumstances. Option (2) is the social version of the hypothesis of extended cognition. Consider Tom and Mary, a couple with a long and interdependent relationship. Perhaps Tom might come to trust, rely on and routinely access information stored in Mary's brain, in such a way that, in certain contexts, her brain comes to play essentially the same role as his own neural resources, and thus constitute a repository of his memories (cf. Clark and Chalmers 1998). Both option (1) and option (2) may count as versions of what Wilson (2005) calls the social manifestation hypothesis, which maintains that cognition remains a 'property of individuals, but only insofar as those individuals are situated or embedded in certain physical environments and social milieus'. By contrast, option (3) shifts the ownership of the relevant psychological states and processes from the individual to the group. According to (3), the group mind hypothesis, we should take at face value statements such as 'the team desires a victory' and 'the crowd thinks the game is over'. Whole groups, and not merely the individuals out of which those groups are constructed, may non-metaphorically be attributed with beliefs, desires, other psychological states and processes of reasoning (for versions of this view, see e.g. Huebner 2014, Tollefsen 2006). As one might imagine, much of the philosophical debate in this area concerns the conditions and circumstances under which it would be correct to adopt either option (2) or option (3), both of which might, to our modern thinking at least, seem counter-intuitive or, from a theoretical perspective, metaphysically profligate (for an argument for the latter conclusion, see e.g. Rupert 2014). But even the seemingly less radical option (1) constitutes a prompt for a careful examination of the distributed causal mechanisms and social contexts that drive the processes concerned.

Two further modulations of social cognition, when developed in a 4E register, bring out a final way in which the distributed perspective changes the shape of the received theoretical terrain. It has become a commonplace view in the psychology of social cognition that we navigate our social spaces either by predicting and explaining one another's observable behaviour using what is tantamount to a commonsense theory of the hidden inner causes of that behaviour – the beliefs, desires and other mental states inside other people's heads – or by predicting and explaining that behaviour by internally simulating what we ourselves would think and experience in the same circumstances, in order to produce the same behaviour. On either of these models, and partially echoing the Cartesian dualism of days gone by (see above), our access to the mental states of the other person is fundamentally *indirect*, involving inference or simulation. However, some distributed cognition theorists (e.g. Gallagher 2008), drawing centrally on phenomenology, argue that our grasp of the mental states of another person with whom we are in perceptual contact is ordinarily *direct*, in that, rather than, for example, inferring another person's joy from some of her facial movements, we see that joy directly, in her laughter. Relatedly, but moving away even further from the conventional assumption that a theory of social cognition should begin with a conception of people as isolated

spectators, a distinctively enactive account of social cognition has emerged in the form of the *participatory sense-making* approach (De Jaegher and Di Paolo 2007). This approach begins with a conception of people not as spectators, but as engaged participants, and focusses on the ways in which individuals interactively coordinate their movements and utterances in social situations. For participatory sense-making theorists, the interaction process itself can come to exhibit an enactive form of autonomy (see above), one that is generated by, but also constrains and scaffolds, the activity of the interacting individuals. The alleged directness of social cognition is grounded in the fact that we are so proficient at social interaction that the interactive process becomes transparent to us (De Jaegher 2009).

This section has surveyed views that fall under the general heading of 'distributed cognition'. What these views have in common is that they accord some kind of special role to the environment (perhaps including the bodily environment or social environment) that is missing in the traditional Cartesian or in more recent neuro-centric cognitive theories. More to the fore in this introduction, however, is the *diversity* of views within the distributed cognition camp. We have seen that distributed cognition can roughly be split into 4 Es (embodied, embedded, extended and enactive) with each 'E' admitting of further, sometime competing, articulations in the hands of different philosophers and cognitive scientists (we have already met two kinds of enactivism). Philosophers and cognitive scientists who work in this area often adopt what might appear to be a mix-and-match approach: they accept some 'distributed' claims but reject others. Moreover, they may accept a different combination of distributed (or non-distributed) claims about different parts of human mental life: some aspects of our mental life (perhaps our feelings of joy and pain) may be treated as purely internal while others (perhaps some of our memories and decision making) are distributed. A further complication is that, even if attention is restricted to a single aspect of human mental life, a distributed theorist may give a different distributed/non-distributed answer for different human subjects in different environmental contexts at different times (some humans are more inclined than others to distribute their memory onto external devices).

How should researchers in the humanities make sense of all this disagreement and diversity within the distributed cognition camp? We suggest that they cut through philosophical disagreements and explore the specific combination of distributed views that suits their interests. An application of distributed cognition in the humanities should be assessed on its own merits. A specific combination of 'distributed' views may prove more or less fruitful to understanding a particular historical episode. And different combinations of 'distributed' views may prove suited to different historical episodes. There is no reason why a single, one-size-fits-all approach should be adopted. The merits of a particular combination of distributed views, in a particular historical setting, should be based on its pay-off for our understanding in the humanities. We hope that the essays in the volume demonstrate both the value and diversity of conceptual tools offered by a distributed cognition approach.

Distributed Cognition and the Cognitive Turn

The question of how new insights into the nature of the mind illuminate our understanding of being human and our engagement with the world is one of the greatest issues facing the current generation of humanities scholars. Knowledge that is emerging from cognitive science and neuroscience, along with related research in disciplines such

as philosophy, psychology and linguistics, casts a new light on issues that are central to the humanities, and enables us to better explain the nature of forms of human culture and how and why they emerge and evolve. Knowledge from the sciences can help to make a case for culture's significance to being human, a significance which emerges in part from culture's contribution to our sense of being-in-the-world. In turn, the humanities provide an archive of examples concerning how humans develop in a range of environments and evidence diverse ways in which we use and create resources as means to extend our capacities. The importance of the cognitive humanities as a methodological approach grows out of its rootedness in bodies of knowledge from across the disciplinary spectrum, which together are reflective of the full scope of human nature. This section provides a general overview of the emergence of the cognitive humanities and considers how distributed cognition interrogates and supplements existing humanities methodologies.

In spite of the humanities' increasing interdisciplinarity since the late 1950s, the longstanding disciplinary antagonism between the arts and sciences continues (see, for example, Ortolano 2005). This tension is now further exacerbated by wider movements towards education's commodification, quantification and rebranding as merely employment-based training, with accompanying questions about the relevance and value of the arts and humanities. The defensive response by many in the humanities has been to fall back on claims about the qualitative and irreducible nature of aesthetic values in the humanities and to view humanities scholars who draw on scientific knowledge as reductionists. The presumption is that scientific knowledge entails a constraint on, and a diminution of the value of, their own complex matter and methodologies, rather than adding a further perspective. Yet, even for the hard problem of consciousness – that is, the way it feels to be me or you – philosophers draw on insights from neuroscience. There is no reason why questions about the qualitative nature of our experience of cultural artefacts cannot be addressed, even if not solved outright, by neuroscientific insights. Moreover, a broad-based approach that draws not just on the mind's neural basis but on the whole range of the human mind as evidenced in cultural texts and practices in concert with other disciplines, including cognitive science, seems likely to provide us with the fullest insights into these enduring questions.

Phenomenology has influenced both philosophers focusing on culture (such as Foucault) and models (in particular enactivism) that attempt to conceptualise scientific evidence of distributed cognition. However, in cultural studies phenomenological ideas became entangled with a tendency towards relativism, partly as a backlash against earlier humanist or structuralist notions of culture as revealing universal human attributes and values. Throughout history oscillating drives towards universalism and relativism often culminate in polarised models, or one extreme sets the pendulum swinging back to the other extreme. In recent decades literary, historical and cultural criticism have focused on various kinds of postmodern relativism and social constructivism which resist anything interpretable as 'facts', 'truth' or 'reality' and in which human bodies are presented as merely cultural constructs (the tendency is notable in new historicism, cultural materialism and feminist, queer and globalisation studies). From classical antiquity onwards, there have been those who have questioned the extent of our access to a mind-independent world: from Plato's shadow-watchers in the cave, to Descartes' sceptical *cogito ergo sum*, to more recent thought experiments suggesting that our experience might be the same were we brains in a vat, to Bayesian predictive coding models, which some internalist-minded philosophers argue are a basis for assuming that

cognition is skull-bound, so that 'conscious experience is like a fantasy or virtual reality' (Hohwy 2013: 137).

Early Artificial Intelligence and Cybernetics has influenced cognitive scientists and the continental philosophers who in turn informed cultural theory. Lacan, for instance, discussed the influence that cybernetics had on him, though in his dark version of cybernetics, humans become the processed rather than the processor: 'It is the world of words which creates the world of things … Man speaks therefore, but it is because the symbol has made him man' (Lacan 1981: 39). Higher-level shifts in norms of understanding and focus cascade down, and so shape and are reshaped by disciplines into idiosyncratic manifestations of the higher-level propensities into which (along with many other factors) they feedback. The linguistic turn in the humanities in the 1970s and 1980s argued that language consisted of a system of codes, with words caught up primarily in their relation to other words, with a consequent endless deferral of meaning and a disconnectedness to referents in the world. At the same time, classical cognitive science described cognition as occurring through computational manipulation of internal symbols. Such theories emphasised the role of arbitrary, abstract syntactic structures, at the expense of attention to the emergence of meaning through our engagement in the world.

More recently, Daniel Dennett suggested that 'A scholar is just a library's way of making another library.' (1991: 202) This may seem to relate straightforwardly to Lacanian-type claims. Dennett himself has commented on the correspondences between these ideas and postmodern deconstructionism (410). However, Dennett reaches his suppositions through biologically grounded or organically inspired notions, such as memes, a term originally coined by Richard Dawkins to describe units of cultural transmission akin to genes as units of biological transmission (202-3). In contrast to such biologically grounded accounts, prevailing postmodern methodologies have argued that sociocultural forces are entirely responsible for human concepts and behavior. For example, the elision of the physical body is evident in Judith Butler's claim that 'gender is a performance that produces the illusion of an inner sex' (Butler 2000: 728). Whilst such accounts make visible sociocultural influences on biological categories, their rebuttal of the hegemony of the natural world and of the fixed nature of biological categories is problematic to the extent that it simply inverts the relationship and asserts the dominance of sociocultural forces over the realm of the natural and physical. The significant difference between a postmodern stance and Dennett's viewpoint is highlighted by his concluding comment that: 'I wouldn't say there is nothing outside the text. There are for instance all the bookcases, buildings, bodies, bacteria….' (1991: 411)

Embodied cognition – that is, the notion that our physical bodies enable and constitute cognitive processes – presents a greater challenge to postmodern accounts than do claims about its extended nature. Furthermore, distributed cognitive models make evident that the mind's embedded or extended nature is not simply a matter of unconstrained cultural determinism. The elision of the physical body and world in postmodern accounts helps to perpetuate an apparent conflict between the arts and sciences that risks miring notions of being human (and the humanities) in isolated idealism. The recent rise of digital

humanities, despite its use of distant reading and quantitative analyses,[1] might be explained in part by technological advancements which massively increase the ways in which we can creatively use programs and technologies to reflect and inform our interaction with texts and artefacts, but also by a theoretical tendency towards the virtual and virtualisation, with an over-emphasis on the distinctiveness of human nature as due to meta- or trans-physical capacities, a tendency which has been evident throughout history in idealist accounts of human nature (Hayles 1999; Nusselder 2009). As part of a counter movement in the humanities today, there is a shift towards the study of material culture: focus on the specific physical objects, physical environments and ecological contexts in which we live.

We also find elision, if not of the physical body as a whole, then at least of the significance of the specifics of it, in more some functionalist accounts of the extended mind. Andy Clark accuses thinkers such as Damasio of biochauvinism because of the essential role they ascribe to the body in cognition. Instead, Clark argues, 'the perceptual experience of differently embodied animals could in principle be identical, not merely similar to our own' (Clark 2008b: 193). Clark's functionalist approach allows for the possibility that a non-biological resource can play the same role as a biological one. Yet, elsewhere, Clark emphasises that external resources need not be functionally identical to internal ones to qualify as extended: a laptop does not store or compute information in the same way as a brain, and it can, for that reason, be useful in supplementing our neural capacities. On Clark's view, there is a question about how much the material nature of a resource matters to how it fulfils its function, and this is important for how we evaluate the significance of different resources – neural, bodily and non-biological ones – in different historical contexts. Our view is that in certain contexts, or while performing certain functions, a difference between human bodies or physical resources may matter; in other cases, it may not be significant. The richer idea that emerges from this perspective is that through differences, as well as similarities, various forms of representational, computational and mnemonic resources can supplement our biological limitations.

We have seen that distributed cognition presents an array of competing and sometimes conflicting theories. This may appear a sign of fragility, but this diversity can be seen as reflecting the ways in which different cognitive models come to the fore in relation to the different mental capacities or contexts. Shifting trends and debates about cognitive hierarchies, such as an emphasis on the role of embodiment or on particular methods or resources as extending representational or phenomenological possibilities, can be seen to emerge in relation to the development of, or reaction against, new genres, cultural modes and technological, scientific and sociocultural changes. Therefore, the multifaceted nature of distributed cognition as a theory is, in our view, a strength that reflects the operation of different cognitive norms and modes in the world.

From the late 1980s and 1990s onwards a few 'first-wave' thinkers in the cognitive humanities, primarily based in the US, adopted notions from evolutionary psychology or from cognitive linguistics that emphasized the universal aspects of humans' cognitive and physical characteristics. A particularly influential idea was that humans tend to

[1] Franco Moretti coined the term 'distant reading', to describe the need for a world-scale study of literature, which drew on other researchers' scholarship, in contrast to the traditional focus on the close reading of a small number of canonical or national texts (Moretti 2000). In his later work, and more generally, the term is now used to describe digital analyses of large scale corpora (Moretti 2013).

conceptualise non-physical domains in terms of physical ones, and in contrast to postmodern deconstructionism, this suggested a specific way in which language is embodied. Engagement with these ideas in the humanities challenged existing disciplinary divisions and opened up new ways to think about what human beings have in common and how humans from diverse cultures can have some understanding of one another. Yet both evolutionary-psychological and cognitive-linguistic humanities approaches tend to operate without due attention to the many historical (and geographical) variables involved in cultural, linguistic and literary constructions. Such early cognitive humanities scholars therefore tended to set postmodern and cognitive approaches in irreconcilable opposition to one another. This risked simply repeating within the humanities the persisting methodological tensions between the arts and sciences through the siding of critics with oppositional explanatory paradigms. Yet these first-wave thinkers have remained largely on the peripheries of mainstream literary and cultural methodologies, against which some of them tend to situate themselves.

Yet even from the early stages, cognitive humanities scholars drew attention to the benefits of engaging with scientific work on the mind, and not all their efforts were so oppositional. One of the first scholars to adopt a cognitive approach, which he argued was compatible with more conventional approaches he was already using, was the psychoanalytical literary critic, Norman Holland (1988). Most other early adopters of scientific work, models and metaphors as a means to inform our reading of texts in the emerging field of 'cognitive poetics' were influenced by and developed cognitive linguistics' notion of the conceptual schema and argued for the everyday nature of figurative thought and language (such as, Tsur 1992; Gibbs 1994; Turner 1991, 1996). Though, there were already outliers such as Ellen Spolsky, who was instead focused on reapplying the then fashionable theory of the modular mind to her analysis of literary texts as a means of engaging with poststructuralism (1993).

Distributed cognition suggests another perspective to universalising models, one that takes account of the way in which embodiment is a crucial aspect of our extendedness, since it is our biological nature that enables us to incorporate sociocultural and technological resources into our cognitive systems. The significance of the human body arises also from its capacity for engagement and interaction. The dynamic cognitive roles of linguistic, sociocultural and technological resources are made possible by neurological plasticity. This raises the possibility that social constructivist models may have a neurological basis, as our ability to be (at times transparently) constructed by sociocultural forces relates to the adaptability of the human brain. At the same time, human adaptability and extendedness temper any notion of universal communal features shared across all humans that could be based on embodiment. While humans exhibit certain enduring biological characteristics, these characteristics dynamically interact with our sociocultural and environmental contexts. Together these lead to the manifestation of different kinds of minds and to the expression or suppression of particular forms of cognitive paradigms. This perception enables a reassessment of polar representations of the mind as either fixed and universal or as socially constructed and culturally relative – two models which have constrained understandings of historical, as well as modern, concepts of the mind. Humans are particularly talented not just at evolutionarily adapting to niches, but also at adapting our niches to supplement our cognitive and other needs (Wheeler and Clark 2008). While humans' capacity to exist within cognitive niches, with on-going reciprocal interactions between niches and

organism, is shared across generations, these niches also reflect technological and sociocultural developments; ultimately, rather than either universalism or relativism, this implies that we shall find a rich combination of shared features and particular divergences across history and cultures.

The paradigm of distributed cognition provides a middle way between relativism and universalism by highlighting the vital roles played by both physical and cultural resources in cognition. As a methodology, this provides a potential strategy for making headway in the science wars. In the conflict between radical postmodern relativism and science-based realism, the question is whether facts about the world are merely culturally determined or whether those facts are grounded in some mind-independent reality. Analysis of cognition needs to take into account not only the findings of current cognitive science, but also the imagery and narratives used in scientific, cultural and literary discourses. Cultural factors play an essential role in shaping the world, and acknowledging this should not require rejecting or devaluing the role of science. The influence of culture and its role in cognitive niche construction shapes even our disciplinary taxonomies – constantly evolving scaffolds that accrete knowledge about specific domains. A combination of scientific and cultural knowledge is necessary to understand the nature of cognition and of being human in the world. Distributed cognition is a theoretical framework that enables one to grasp the mutual entanglement of science and culture.

During the period in which our project has taken place, second-wave thinkers in the cognitive humanities have begun to consider a more diverse range of approaches to the mind, and the expansion of recent work in the field is discussed in each of the period introductions to the volumes. Our project aimed to reflect, and help to stimulate, an increased interest in distributed cognition or 4E theories of cognition. The current book series aims to provide a rigorous and systematic engagement with these ideas by humanities scholars that demonstrate that notions of distributed cognition can illuminate cultural studies. Our aim is to inspire a broader re-evaluation in the humanities of what is understood to count as cognition and to suggest a new way of doing intellectual history. The four current volumes examine the practices and the explicit and implicit conceptual models that were in use from antiquity to the early twentieth century. The essays trace across Western European history the developments and divergences among the various concepts of distributed cognition that were circulating. The essays engage with recent debates about the various models of distributed cognition and bring these into discourse with research in the humanities though examination of the parallels to (and divergences from) these models in cultural, philosophical, and scientific works. The essays make evident some of the explicit and implicit grounds on which our present suppositions about cognition stand and also some of the knowledge and insights, as well as superstitions and ungrounded beliefs, that have been lost and obscured along the way. The reiterations and diversity in expressions and practices enrich and enlighten our understanding of wider forces and rhythms in the history of cognition. One important point that emerges is that notions of cognition can be shown to be fundamental to how we conceptualise debates in every discipline – the study of cognitive phenomena cannot be considered a specialist niche, but is rather a necessary underpinning of any study of humans in the world. This bears out the premise that 'current philosophical notions [of distributed cognition] are simply the most recent manifestation of an enduring paradigm

that reflects the non-trivial participation of the body and world in cognition' (Anderson 2015: xi).

In return for providing a scientific basis to our understanding of the mind in the humanities, historical studies have the potential to feedback and interrogate our current philosophical and scientific understanding of how cognition may be distributed across the body and the world. The historical lineage of non-brain-bound concepts of cognition demonstrates that such ideas are not merely a product of our own age. Cultural beliefs and philosophical interpretations map onto underlying physical features and processes in ways that function practically within a society. The volume introductions provide detailed overviews of the development of the cognitive humanities in relation to the periods they cover, but to briefly outline how distributed cognition can illuminate cultural interpretation by challenging models that view the body or the environment as peripheral to understanding the nature of cognition, we shall present a few instances that arise from our collaboration with the National Museum of Scotland.

Distributed Cognition raises questions about the nature and role of galleries and museums, demonstrating ways in which many of the artefacts either extend human cognitive or other physical capacities. There are some (perhaps obvious) examples of distributed cognition, such as the tally stick, which was a piece of bone or wood scored across with notches that was used, from around 30,000 years ago, to record numbers or messages. This was an ancient memory aid. Like the oft-cited modern example of an iPhone, it remembers, so you need not. Basic tools controlled by bodily action give way to mechanised tools that outsourced mechanical processes through devices such as steam engines, and to automated and programmable agents, such as the Jacquard Loom. The Jacquard Loom not only moved faster and more reliably than any human weaver, it took over the weaver's cognitive load and allowed greater design complexity than would ordinarily be available from the average human weaver's brain alone. In a trajectory familiar to those who work on the history of the book, a museum also makes evident the shift from oral traditions to literacy through the preservation of early memorial stones carved first with only images, then manuscripts which enabled more detailed storage, manipulation and communication of information, then printed books and presses that enabled the sharing of information on a larger scale, and finally we emerge into the modern world of computers and the internet.

Encounters with museum artefacts involve both a conceptual encounter with an object's caption and an experiential encounter with the object itself – a metal helmet may automatically trigger a sense of weightiness (Bolens 2017). Yet, in some instances the contingent nature of one's tacit knowledge may affect the extent to which artefacts prompt a kinesic or kinaesthetic response, with the cognitive capacity to simulate holding, wearing or interacting with an object relating partly to prior embodied and cultural experience, with more conceptual scaffolding (for example, via illustrations of past uses) needed for more obscure artefacts. Similarly, devices that may seem intuitive in one period often require significant amounts of culturally embedded knowledge that belie their apparent simplicity (Phillipson 2017). Distributed cognition invites a broad spectrum of multidisciplinary approaches, enabling a richly diverse appreciation of the reciprocal ways in which artefacts and humans have shaped each other.

Distributed cognition creates a scientific basis for understanding the fundamental significance of culture to humans and the humanities. Describing perception, Alva Noë says, 'We continuously move about and squint and adjust ourselves to … bring and maintain the world in focus' (2015: 9). When we read literature, view art or engage with historical artefacts in a museum, we remain linked to our own particular ever-shifting perspective and yet these cultural resources allow us to experience the world beyond our usual cognitive range. Each genre, each author or artist, and each work provides distinct forms of cognitive mediation. It does this in a way that reflects back on ourselves and the world around us, at the same time as it recalibrates and adds to the numerous virtual coordinates through which we more generally orient ourselves and enact our worlds. Texts, artworks and other cultural artefacts are imbued with mind, the mind of their creator and their context, and that of the spectator, reader or interactor. Objects, images and language, particularly those in consciously crafted literary and art works, provide catalytic scaffolding for perceptual flights into and beyond the usual constraints of our own imaginations, and can trigger a rich array of responses that are grounded in and recalibrate our emotional, physical and cultural natures, extending and revitalising our mental panoramas.

Our series questions assumptions that have been made about historical notions of the mind, begins to trace the lineages of ideas about the mind across periods and cultures, and highlights the ways in which certain aspects of the mind come to the fore in certain contexts and traditions. The realisation of the distributed nature of cognition, which can induce both mind-forged manacles and mind-extending marvels, upholds the role of the humanities in wider society and more broadly challenges humans' ways of being in the world. The extent of our capacity to extend our minds, across our current sociocultural panorama and physical world, and via the cognitive scaffolding provided by earlier generations, places in question the relatively short-term individualistic ends that are currently being prioritised and endorsed in most modern societies. The value of the humanities in concert with the sciences is their capacity to extend our cognitive range beyond everyday constraints, by scaffolding critical thinking and enabling our minds to soar to the heights needed to tackle world-sized and epic-scale issues, as well as to supplement our ability to grasp more fully the diversity of other minds. Distributed cognition invites a more inclusive approach, which acknowledges that experience and understanding of the world and of the humanities, is multifaceted and involves biological and sociocultural dimensions. Distributed cognition offers a reconsideration of the nature of the human mind, and so of being human and in turn, the humanities.