Neuroscience, Neurophilosophy and Pragmatism

Brains at Work with the World

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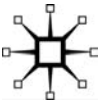

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Neuropragmatism and the Reconstruction of Scientific and Humanistic Worldviews[1]

John R. Shook and Tibor Solymosi

> The question of the integration of mind-body in action is the most practical of all questions we can ask of our civilization. It is not just a speculative question; it is a demand: a demand that the labor of multitudes now too predominantly physical in character be inspirited by purpose and emotion and informed by knowledge and understanding. It is a demand that what now pass for highly intellectual and spiritual functions shall be integrated with the ultimate conditions and means of all achievement, namely the physical, and thereby accomplish something beyond themselves. Until this integration is effected in the only place where it can be carried out, in action itself, we shall continue to live in a society in which a soulless and heartless materialism is compensated for by soulful but futile and unnatural idealism and spiritualism.
>
> John Dewey[2]

Neurophilosophical pragmatism, or *neuropragmatism*, is a scientifically informed treatment of cognition, knowledge, the body-mind relation, agency, socialization, and further issues predicated on sound judgments about these basic matters. Neuropragmatism is capable of grappling with philosophical questions arising at many levels, from synapse to society. There is much at stake, as the epigraph by Dewey states. With its firm grounding in science, neuropragmatism may be the philosophy best equipped to deal productively with the challenges facing our culture, as developments in neuroscience and neurotechnology bring about both

better means for dealing with old problems, and new ways of creating and dealing with the problems of today and tomorrow.

The amazing progress of the behavioral and brain sciences has confirmed many of pragmatism's core claims, culminating in a resurgence of neopragmatism, and then its fresh flowering in neuropragmatism. The recovery of the concept of dynamic embodied and embedded cognition, and the renewed appreciation for the brain's systems as evolved functions, have together carried many researchers toward the tenets of neuropragmatism. Scholars bold enough to draw conclusions about the nature of mind, the dynamic nature of human knowledge, and the practical criteria for judging epistemic success unite the cognitive strands of neuropragmatism. Searching for such a comprehensive reunion of science and philosophy should not be disdained. In the words of the editors of a recent book on embodied cognitive science,

> We need to put together conceptual analyses of the notions of representation, computation, emergence, embodiment, and the like, with empirical work that allows us to bring together ecological, dynamic, interactive, situated, and embodied approaches to the scientific study of cognition.[3]

Neuropragmatism offers a philosophical intersection for coordinating this pluralistic effort. The prefix 'neuro' portends no reductionist agenda. Quite the opposite: the anti-reductionist, pluralistic, and interdisciplinary tradition of pragmatism remains securely at the heart of neuropragmatism. All the same, a philosophical position on cognition and mind must cohere with the best neuroscience available.

We begin with a brief history of pragmatism and the sciences of life and mind. From this history, we update pragmatism in this neurophilosophical form by introducing twelve theses of neuropragmatism. These theses emphasize the connections between pragmatism and the sciences of life and mind, and experimentally propose research programs for engaging scientific researchers as well as for navigating the consequences of research for the larger public.

Classical pragmatism and neuropragmatism

Pragmatism has from its origins formulated philosophical theories about culture, intelligence, and knowledge in ways that respect biology, anthropology, and cognitive science. Classical pragmatism was the original American cognitive science and neurophilosophy. Charles Peirce,

William James, John Dewey, and George Mead were all experimental psychologists who tried to reform philosophy in light of evolutionary biology, experimental psychology, and brain science. Indeed, most of the early American psychologists and sociologists had strong pragmatist leanings. Essentially, pragmatism is vitally interested in entirely naturalistic accounts of intelligence and agency, so that all other fields of philosophy – from epistemology to ethics – can be reformed in turn. By integrating science and philosophy, pragmatism attempts to prevent both scientism and speculation from inflating debilitating dualisms.

Pragmatism has always viewed itself as essential to a complete and consistent naturalistic worldview. Any naturalism has to explain how rationality, intelligence, and science are possible within the natural world. Pragmatism has serious opponents not interested in advancing naturalism. At the turn of the 20th century, major philosophical options were few: common sense empiricisms, neo-Kantian rationalisms, phenomenologies, and neo-Hegelian idealisms. Common sense empiricism sought pure sensory impressions or sense data ideas that carry information about nature untainted by any thought, so that cognition simply combines and rearranges that original information into knowledge systems. Neo-Kantian rationalisms, noticing empiricism's deep problems, postulated non-empirical rational principles to account for scientific knowledge. However, such rationalism fed into anti-naturalism and dualism, as did the phenomenologies that prioritized qualitative experience over nature or biology. Reconciling empiricism and rationalism by adding historicism, neo-Hegelian cultural psychologies stumbled onto the way that knowledge gradually grows from the interfusion of evidence and reasoning in social contexts. John Dewey and George Mead further naturalized this cultural historicism by incorporating Darwinian evolution and experimental psychology.[4] They proposed a pragmatic naturalism in opposition to naïve empiricism, static representationalism, reductive materialism, methodological individualism, and animal behaviorism. To accomplish this pragmatic naturalism, pragmatists explored more metaphysical issues such as radical empiricism and direct perception, teleological accounts of living systems, non-reductive emergent naturalisms, and perspectival and process ontologies. Not surprisingly, neurophilosophers, and especially neuropragmatists, have been gradually re-engaging these wider issues.

Pragmatism went into eclipse in philosophy departments by the 1930s, due to the ascendency of analytic and linguistic philosophy, along with imports from European positivism. Yet pragmatic ideas continued to flourish in the social sciences from psychology and linguistics to sociology and anthropology. The neopragmatism of the 1970s and 80s, especially in

the hands of Richard Rorty, was well known for its linguistic and epistemic conventionalism, but not for its congruence with the latest brain science. Hilary Putnam's meaning externalism and pragmatic realism[5] also helped to make actual human cognition relevant to philosophical debates. Some philosophers, inspired by W. V. Quine's kind of naturalism (which sustained the Deweyan point that cognitions and knowings must be natural events amenable to scientific study), demanded continuities between science and philosophy and pulled analytic philosophy back from pure rationalism.[6] As the new cognitive and brain sciences emerged in the 1980s and 1990s, they had grown many of the seeds of pragmatism, and when analytic philosophy began to take the brain seriously once again, it encountered these pragmatic ideas. Rationalist analytic philosophers, strong AI proponents, and excessively cognitivist researchers rebelled against such pragmatism; for example, Jerry Fodor has called pragmatism 'the defining catastrophe of analytic philosophy of language and philosophy of mind.'[7] However, some analytic philosophers have been returning to parts of pragmatism in various ways, driven by respect for science and its discoveries.

Scholars such as Mark Johnson and the late Francisco Varela recognized in the 1990s that pragmatism was receiving much reconfirmation in the brain sciences. A younger generation, such as Anthony Chemero, W. Teed Rockwell, and Tibor Solymosi – fluent in both classical pragmatism and the latest neuroscience – was in the best position to take stock of matters. Solymosi recently coined the term 'neuropragmatism.'[8] From its grounding in the current behavioral and brain sciences, neuropragmatism confirms many core views of traditional pragmatism. Neuropragmatism continues to reform philosophical views about such things as the mind-body relation, the function of intelligence, the nature of knowledge and truth, the nature of voluntary agency and responsibility, the function of social morality, and the ethical ways for dealing with new technologies. Along the way, it distinguishes itself from other neuroscience-based philosophical outlooks.

Twelve theses of neuropragmatism

This section offers 12 theses of an ambitious neuropragmatism that deals with core philosophical issues. The first three are grounded in biology and anthropology. Many theoretical views across cognitive science and neuroscience regard these theses as foundational.

1. Animals are goal-oriented organisms, and their nervous systems function to sustain life in various practical ways.

2. Cognition in all its manifestations (intelligence/mind/consciousness) is embodied and not explicable apart from that bodily context.
3. Human cognition in all its modes should primarily be studied and comprehended in terms of its practical service for the ways that humans live.

Neuropragmatism emphasizes four additional theses, supported by behavioral and brain sciences, which enlarge the significance of the first three.

4. Cognitive systems are dynamically adaptive to organism-environment interactions, to deal with shifting conditions of situations as practical goals are pursued.
5. Under pressures from dealing with the environment, the brain modifies its neural connections to improve practical performance. The measure of this neural learning is improved habitual efficiency at specific routine tasks.
6. Complex cognitive processes are the brain's work of effectively coordinating behavior for reliably achieving variable goals in a changing environment.
7. Human intelligence has so many cultural features for facilitating cooperative aims that it should primarily be studied and evaluated largely in terms of its service for social goals.

Five more theses of neuropragmatism remain to be mentioned, but we pause here for some elaboration of the first seven.

Neuropragmatism is tightly allied with theories of neuroplasticity, the vast unconscious, reason-emotion-volition integration, embodied cognition, and the extended mind. All these theories have prototypes in the works of classical pragmatists. Combating any philosophy of mind that depicts it as fundamentally passive, receptive, representational, cognitivist, or mechanistic, the classical pragmatists sought to understand the mind in its biological medium. All of the brain in all of its functioning for life must be taken into account. William James lent scientific respectability to the notion that the fringes and margins of consciousness extend deep down into entirely unconscious emotional and intuitive cognition. The pragmatists affirmed that cognition is basically about applying learned habits to ongoing situations demanding immediate active responses from the organism. Since the environment is never the same, cognition therefore depends on continuous learning, which is the dynamic development of specific habits through the brain's

modifications, as the brain's neurons grow or modify their interconnections, as the organism perceptually manages its situated experiences of interacting with its world.[9] Also recognizing how centers of the brain are typically involved in many kinds of coordinated tasks, the classical pragmatists resisted the notion that each part of the brain deals only with narrow tasks or specific sorts of representations. As integrated phases within the continuity of brain processes, the traditional schema of perception, reasoning, emotion, and will cannot be mechanically separate and only temporally related in a series leading to action. Sensation, thought, feeling, and volition are interfused; they are discriminable but not separable aspects of the continuous flow of neural activity.[10]

Neuropragmatism continues pragmatism's emphasis on the way that human cognition is not just geared with the external world but tightly interwoven into the organism's interactions with the environment, forming an organic whole. This fusion makes it impossible to draw a thin clear line where the external world stops and cognition begins. Although the brain is obviously the locus of cognition, it does not necessarily follow that only brain events suffice to account for all the functions and features of cognition. William James's notion of radical empiricism depends on treating mind and world holistically, and John Dewey's empirical naturalism finds mind embodied and embedded in organism-environment transactions. In a chapter of Dewey's 1925 *Experience and Nature*, entitled 'Nature, Life and Body-Mind,' he writes,

> Every 'mind' that we are empirically acquainted with is found in connection with some organized body. Every such body exists in a natural medium to which it sustains some adaptive connection ... The natural medium is thus one which contains similar and conjunctive forms. At every point and stage, accordingly, a living organism and its life processes involve a world or nature temporally and spatially 'external' to itself but 'internal' to its functions.[11]

The organism's effective coordination of modifying its environment (natural and social) exemplifies cognition. Pragmatism has always refused to treat neurons (or any other brain cells such as glia that may modulate brain activity) as the exclusive place where cognitive meaning is enacted; neurons are essential to, but not entirely constitutive of, cognition. Neuroscience properly studies the interrelated processes of brain activity, but cognitive neuroscience cannot help explain the processes of learning and knowing by referencing brain activity alone in isolation from any context. Philosophy, for its part, will be unable to

show how to integrate body and mind if knowledge is examined quite apart from any bodily context. Pragmatism's resistance to atomistic and reductivist naturalisms is nowhere more evident than in its treatment of experience and mind as dynamic, systemic, contextual, ecological, and social.

Biology cannot study life with utter disregard for the environment; nervous systems qua biological systems must not be studied any differently. The same goes doubly for the functions in which such systems take part, such as cognition. Cognition, therefore, is not to be solely done within the head in the end but is rather understood in terms of life and living within environments. Grounding mind in biology takes life seriously. What are the existential truths of life? As Michael Schwartz and Osborne Wiggins describe life, there cannot be any firm or fixed divisions between organic bodies and their environment. Schwartz and Wiggins offer the following existential truths about life:

1) Being vs. non-being: Always threatened by non-being, the organism must constantly re-assert its being through its own activity.
2) World-relatedness vs. self-enclosure: Living beings are both enclosed with themselves, defined by the boundaries that separate them from their environment, while they are also ceaselessly reaching out to their environment and engaging in transactions with it.
3) Dependence vs. independence: Living beings are both dependent on the material components that constitute them at any given moment and independent of any particular groupings of these components over time.[12]

What is true of life is also true of mind: Mind cannot be comprehended except through what it does, and what mind does is transcend itself by ceaselessly modifying its lived environment. By studying those modes of modification, the mind is studied and nowhere else. At no time do an organism's activities or cognition deal with some 'external world' that can be specified independently from the organism. An organism can neither perceive nor interact with 'the world at large,' but only confront its own 'life-world' that it can experience and modify. There is no point in first specifying what the external world is like and then asking how an organism cognizes that world. Neuropragmatism, like classical pragmatism before it, studies cognition as it actually transforms the lived environment. The organism's environment is not the same as the external world. Jacob von Uexküll used the term *Umwelt* for the 'life-world' that a species tries to grapple with. Dewey's conception of 'experience' as

doing-undergoing, Heidegger's use of *Erlebnis*, and Richard Lewontin's environmental constructivism similarly point to this conception of the available life-world within which cognition does its work.[13]

In a basic sense, the sciences all realize how cognition is localizable to organic bodies dealing with their environments, and that cognition cannot be spiritually or Platonically independent from organic matter. Pragmatism and neuropragmatism tend to agree with recent theories about 'embodied cognition' that offer more specific implications of this organic embodiment for humanity. As Wilson expresses embodied cognition's claims, cognition is situated by taking place in the context of a real-world environment and inherently involves perception and action.[14] Wilson recounts the ways that cognition is for action. The function of the mind is to guide action and things such as perception and memory, which must be understood in terms of their contribution to situation-appropriate behavior. Cognition must be understood in terms of how it functions under the pressure of real-time interaction with the environment.

The invention of symbolic representation and written language takes advantage of the way that cognition specializes in dealing with transactions with deliberately modified aspects of the environment. Human cognition can off-load cognitive work onto the symbolic environment so that it holds or even manipulates information for us, and we harvest that information on a need-to-know basis. That makes the environment part of the cognitive system; the information flow between mind/brain and world is so dense and continuous that, for scientists studying the nature of cognitive activity, the mind/brain alone is not a sufficiently meaningful unit of analysis. This statement means that the production of cognitive activity does not come from mind/brain alone but rather is a mixture of the mind/brain and the environmental situation that we are in. These interactions become part of our cognitive systems. Our thinking, decision-making, and future are all impacted by our environmental situations.

These core views of neuropragmatism and (non-representational) embodied cognitive science can be extended to form judgments on classical philosophical problems about the mind-body relation, the natural basis for the highest cognitive functions, and the cultural origin of creative reasoning. For human cognition, the most important part of the lived environment to manage is society: the other humans that one must constantly deal with. Distinctively human cognition is from birth (and perhaps before birth) a matter of brains cognizing in concert. For humans, experience is culture – cognizing the environment is thoroughly

shaped by the transmitted modes of cultural activities engaging human brains.

Additional theses of neuropragmatism, together distinguishing it from most other neurophilosophies, suggest ways to handle these issues.

8. Cartesian materialism still pervades too much psychology and philosophy of mind by demanding strict localization of rationality, prioritization of self-consciousness's powers, and the quest for perfect representational knowledge of a fixed external world. The brain exhibits much dedicated modular architecture, but massive parallel and networked processing is dominant. The brain is not hierarchical, but more democratic. Nerve centers across the brains are intricately interconnected with each other, so most any part of the brain has some direct or indirect systemic link to every other part of the brain. There is no inner Cartesian theater where all information is gathered and simultaneously experienced; experience at best displays rough continuities. There is no executive command center giving orders to the rest of the brain; deliberation at best guides habitual motor action. Ordinary cognition does not primarily aim at static representation in general but dynamic adequacy in specific situations.
9. The most sophisticated modes of human cognition are developments and assemblages of lower-level cognitive processes. These complex modes of thought, seemingly far from mere matter or biology, remain embodied and functional for practical success. Higher self-conscious cognitive processes (reflection, inference, hypothesis testing) are socially invented and taught capacities to attentively focus on ways to generalize practical habits for flexible use. These higher social capacities serve to coordinate group cooperative practices where some creativity is needed to maintain efficiency in the face of unstable conditions. Among these social practices are linguistic communication, symbolic representation, and logical inference. As our notion of the 'self' is bound up with these capacities, the self must be another socially constructed artifact of culture.
10. Imagination and deep memory add a contemplative 'space' where techniques can be experimentally attempted on related new problems. Even pure imagination, conceptual play, and aesthetic contemplation are creative capacities existing to refine practice, even though we can also do them in isolation from practical concerns. These creative modes permitted, among other things, the fixation of concepts and select relations among concepts, leading to reasoning. The most

complex modes of rational thinking (i.e., logic, scientific method) are refined developments from integrating component cognitive processes. Such things as logic, science, and all sophisticated modes of creative intelligence are culturally designed and educationally transmitted technologies.

11. Knowledge is the result of experimental problem solving, and the epistemic criteria for knowledge is the technological test of practicality. Scientific knowledge is continuous with technology and ordinary practical skill. Much of human experience, most of morality, and all of knowledge is an emergent feature of social epistemic practices. All *a priori*, conceptual, and linguistic truths are internal to one or another social epistemic practice, and cannot be directly used to criticize some other practice. Because no *a priori* conceptual rigidity can dictate terms of empirical adequacy, only the practical adequacy of a knowledge system is relevant to its validity. For example, no folk belief system rules over any scientific field, and scientific fields should respect pluralism and seek coherence, not unity. By avoiding epistemic dualism and reductivist monism, both epistemology and ethics can be naturalized, by showing how they fit in the natural world of encultured humans.
12. What seem to be '*a priori*' and necessary truths are only habits of cognition so habitually ingrained that our brains either use them unconsciously or our thinking relies on them so thoroughly. Evolution produced the infant human brain capable of speedily acquiring crucial functional habits because all humans need them, and additional functional habits are acquired when culture indoctrinates them into children. Habits are not unyielding reflexes; advanced learning is capable of questioning and amending any *a priori* truth through empirical inquiry and science. Because the *a priori* does not float freely from actual brain development, learning, and language, there is no logic-practice gap. Reason can be naturalized, because its processes and results can be shown to fit in the natural world of embodied and encultured humans. Everything that naturalism requires for justification is entirely natural, including the cultural technologies of intelligence that perform the justifications, so this pragmatic naturalism is an internally coherent, complete, and self-sufficient worldview.

These twelve theses of neuropragmatism permit it to offer an ambitious neurophilosophy. Having stated core theses of neuropragmatism, we may step back and survey wider intersections of neuroscience and

philosophy. To establish itself as a fully legitimate neurophilosophy with a claim to some leadership role, neuropragmatism's mode of dealing with the mind must be scrutinized.

Neuropragmatism and mind

Leaving behind reductionism and eliminativism, pragmatism has always sought ways to show how to avoid dualism and representationalism. The Cartesian claim that mind and body have entirely different properties is demonstrably false. Lingering claims that consciousness has unnatural properties similarly rest on philosophical confusions and ignorance of brain science. The vast similarities between the twin functionalities of mind and brain indicate their interdependence and perhaps identity.

Neurophilosophy and neuropragmatism can show how to coordinate the functionalities of thought with the functionalities of nervous systems. For example, thinking and nerve activity both have temporal durations; they are both found in localized living centers rather than diffused through all of nature; they both consist of relational continuities rather than atomic accumulations; they are both dynamic rather than static; they both display growth and decay; they both function in attending to practical dealings with the environment; they both primarily aim at maintaining the organism's well-being. Even the most 'subjective' parts of consciousness, such as the feelings and qualia noticeable in self-consciousness, are aspects of the dynamically functional flow of thought. No pragmatism would seek to 'reduce' felt qualia to nervous activity or anything else to prove that they are natural. The old metaphysical formula demanding identity of all properties for genuine identity was rejected early on by pragmatism and is no longer taken seriously beyond armchair philosophy. For science, functional identity is quite sufficient: where two phenomena are perfectly correlated and display the same functionalities, the two phenomena are rightly regarded as the same natural process observed from different perspectives. Qualitative feelings happen where nervous systems achieve certain degrees of complexity. Subjectivity need not be treated as anything spookily 'unnatural.' The mysteriousness of subjectivity quite vanishes. Subjectivity and perspective is precisely what would be naturally expected when discrete brains generate discrete experience. You have a very different perspective on your brain than anyone else, since you are directly experiencing what it is like to be a brain of a certain complexity.

The lived experience supplied by cognition reflects its neurological basis. Unscientific philosophies point to features of experience or thought allegedly lacking dynamic functionality or integration with

action. Worse, anti-naturalistic philosophies further claim that scientific naturalism can never integrate them with energetic matter. However, neurological investigations (much less any sound phenomenology, such as that of pragmatists) have not been able to confirm such static and aloof features of consciousness. Interestingly, such supposedly 'pure' or 'inert' parts of experience (sense data, intense qualia, and the like) are actually detectable by those seeking them only after the most intense cognitive effort to distill them from the ordinary flow of active experience. There simply is no avoiding dynamic and creative cognition. Consciousness is intensely qualitative, to be sure, precisely because the brain puts so much work into that phase of experience. Theories of mind comfortable with taking purity, passivity, receptivity, or representation as basic modes of cognition must be rejected as incompatible with neuroscience. All the same, neuroscience is at liberty to develop specialized theories about micro and macro brain systems, borrowing and modifying terms as it may require. No folk psychology or linguistic conventionalism can dictate terms of scientific inquiry into the brain-mind. The dream of the unity of science having dissipated, teleological and intentional terms can be legitimate features of successful empirical studies at every level from the social to the synaptic, although mechanistic causality dominates at molecular levels. Indeed, the choice between teleological and mechanistic modes of explanation may not be forced. Some varieties of naturalism, like Dewey's, propose that mechanism is visible in teleological systems when analyzed closely enough, but that only means that teleology requires mechanistic parts even while no mechanistic explanation could ever suffice for the whole. After all, wholes typically have genuine powers and properties that no aggregate of parts could have. This is not duplication of causal powers, as reductionists fret, but only the recognition of compatible kinds of causal powers at different scales and systems of nature. The pluralistic stance of pragmatism and neuropragmatism is hospitable to continuities of terminology and causality at multiple levels of brain science.

Higher human cognition can occasionally achieve sustained reflective passivity, open receptivity to experience, and sophisticated representations of the so-called external world. Neuropragmatism cannot deny that humans can do these things. Yet it must undertake explanations for their existence without permitting them to assume any fundamental role in ordinary cognition. Neuropragmatism tends to favor the idea that sophisticated symbolic capacities of human intelligence are scaffolded on the extended mind of linguistic sociality. Basic cognition is not symbolic or representational, but human societies design their

environments in ways that offload cognitive work onto the manipulation of external symbols. Rationalism in general makes it difficult to account for cognition and knowledge in any natural terms. Cartesianism was the height of presumptive rationalism by taking our most sophisticated forms of communication (replete with analytic meanings and necessary truths) as essential to all consciousness and cognition. Later representationalisms sustained this obsession with static symbols, rendering it difficult to naturalistically explain even how children acquire linguistic competence.

Neither static nor computational representation characterizes ordinary cognition. Reliance on representation leads to a postulation of foundational perceptions. However, experience is not 'built up' from purer building blocks of direct information from nature. Connectionism comes closer to dynamical and distributed cognition but may still contain aspects or elements of representationalism. Neuropragmatism, like other neurophilosophies, takes close notice of the way that the brain rapidly merges diverse streams of stimuli from all sources in order to guide effective action in the lived moment. All cognitive processes (and hence all conscious experiences too) fuse information about about external sensations, motor control processes, and internal feedback from the body. There is no pure sensation, no pure will, and no pure feeling. There are no dichotomies between sensation, emotion, and reason – these aspects of cognition work together as they guide behavior. Even in the simplest case of behavior, these fusions are evident. Simplistic associations are inadequate because organic circuits create new wholes that are not merely sums or sequences of their parts. In a genuine organic circuit of perception, action, and consequence, the meaning of the perception includes the prior action done to gain that perception (the turning of the gaze toward an object); the meaning of the action includes both a desire (to touch that object) and more perception (to guide the reaching); and the meaning of the consequences of the touching includes the guided action of touching (the felt pain is not just felt pain, but the pain of touching that object). The next time the child sees the flame, he sees a *hot* flame, and when he reaches for that flame, he *reaches for a painful touch*. From now on, for that child, an idea of touching that flame simultaneously contains the idea of pain.[15]

In general, most of the meaning in perceiving things consists of anticipations of potential reactions upon dealing with those things. Organic circuits result in holistic organic wholes of experience. Experience is thoroughly imbued with prospective values of action. That is why we directly experience meanings and values in the world around us.

If meanings or values were only interior mental states, then our experience of an external object would be stereoscopic, a sort of double perception. We would observe the external object as a meaningless material thing, and simultaneously observe it as a useful object to be employed, as if one 'eye' saw the world as it is in itself, while the other 'eye' saw objects as meaningful and valuable. Does lived experience ever seem like this? Hardly – we immediately and directly observe significant, meaningful, and valuable objects without any double 'vision' or contrast between an external world and an internal world. Meanings and values are where they appear to be: embodied in the things that we know how to use. Meanings and values are instances of achieved practical knowledge through learning. Knowledge is built up from our experimental attempts to productively manage our deliberate modifications to the environment. Static representationalism, correspondence theories of knowledge, and Cartesian materialism are not viable theories of the mind and intelligence. Neuropragmatism allies easily with theories of active perception;[16] somaesthetics;[17] naturalizing intention;[18] ecological psychology;[19] ecological cybernetics;[20] social cognition and social epistemology;[21] neurosociology;[22] extended mind;[23] neurophenomenology;[24] and radical embodied cognitive science.[25] Even aspects of connectionism and dynamic systems theory may contribute to the proper synthesis of these positions if excessive representationalism is avoided.[26]

To ask, 'Is mind just in the brain?' is problematic. 'Mind' is ambiguous: it can refer to the localized centers of cognitive processing, or it can refer to the networked channels of meaningful information. Localized mind is where brains are; philosophical options are common substantial cause, or dual aspect monism, or outright ontological identity. Networked mind is wherever brains are coordinating action through communication, and therefore much of intelligence is an emergent feature of human communities modifying environments. Mind is dependent on brains, and cognitive functions are brain functions, either of single or multiple brains. Neurons are all about systemic communication, across synapses and across the room. Many cognitive functions (and all higher cognitive functions) only operate through brains in communication with each other about the common environment. Human psychology must be social and ecological. The 'theory of mind' ways of trying to explain how humans try to understand each other's beliefs and motivations take matters exactly backwards. We do not really start from our own concepts of what constitutes the mental life and tentatively test them against the empirical data of others' behaviors.[27]

Individuality, like mentality, is an emergent social category, not a biological or metaphysical category – no one is born as an individual self. Like every other role, one learns how to be an individual only within a community (and that is why different cultures apply differing notions of individuality). The way that even babies have personalities is not a refutation, but a confirmation of this social theory of the self, since the growing infant learns how to be treated as an individual by being treated in ways particular to her personality (and only later on will she realize that she has a personality). Although there are numerous broad continuities between animal and human cognition, as would be expected given evolution, human cognition displays some notable discontinuities from animal mind because we are now such intensely cultured animals.[28] By taking higher cognition and self-consciousness, like all human communication, as fundamentally social, neuropragmatism is aligned with Peircean semiotics,[29] the social mind,[30] symbolic interactionism,[31] developmental consciousness,[32] and biosemiotics.[33]

Cognition and culture are thoroughly natural. The biological evolution of the human species, and the cultural evolution of complex human associations, suffice to explain all features of cognition. The two modes of evolution are not disjunctive – no form of cognition is independent from either mode, although most complex forms of human cognition are primarily cultural in origin and function. Nothing spiritual or supernatural is needed to account for mind. The highest modes of human cognition aim at social competence, technological expertise, and knowledge of reality. Culture educates members of society into various forms of responsible intelligence, and expects their satisfactory use for group goals. These cognitive modes amount to technological skill and ultimately answer to pragmatic criteria of success set by societies. Essentially, culture is technology; social learning and teaching was the first technology, and all else followed.[34] All epistemology must be social and technological; no philosophical theory of reason, knowledge, or truth can float freely apart from learning's origins in education and experimentation, or avoid answerability to practical social justification within cultural contexts.

Cognition, deliberation, and the role of system three

Reflective deliberation is no illusion or irrelevant luxury. It is a useful imaginative function for specialized human cognition for problem solving. Responsibility in turn is the degree to which one can successfully use reflective deliberation to guide conduct in socially appropriate ways.

Recent work in psychology by Daniel Kahneman on system 1 and system 2, recent interest in revitalizing representationalism in cognitive science, and recent use of the concept of information in the science of consciousness all suffer from a creeping Cartesianism that blocks the road to inquiry. Neuropragmatism offers a way through this hurdle by emphasizing the contextual situation in which inquiry develops. The neuropragmatic sketch of experience, habit, mind, consciousness, and inquiry provided here is used as a framework to reconstruct the important data we consider from psychology, cognitive science, and the science of consciousness. The shortcomings of these empirical studies are overcome by system 3, which is the dual-process of enculturation that situates systems 1 and 2 and provides the means of their further transformation through the work of creative intellectuals, whose task is to imagine and discover new possibilities for lived experience. The introduction of system 3 by neuropragmatism is a philosophical hypothesis intended to effect further philosophical discussion and scientific consideration.

Our hypothesis is that once the Cartesianism underlying the psychological constructs of systems 1 and 2 (as recently popularized by Daniel Kahneman),[35] the debate over what to do about so-called 'mental representations,' and the import of the nebulous concept of information is eradicated, we contend that a reconstruction of the two systems, of representations, and of information yields a third system that resolves the difficulties faced by cognitive scientists suffering from creeping Cartesianism. System 3 is chronologically the most recent of the systems, the most fragile, and the most important for understanding the mental life of the individual yet social human animal. The stereotypical Cartesian and Humean concerns over intentionality and the 'external' world are shown to be more properly conceived as sociocultural events and not strictly (neuro)biological 'things' of individual brains (or minds). So conceived system 3 is cultural insofar as it produces the means by which the first two systems are capable of doing their work in a *specific situation*. System 3 as a cultural mode is also experiential: it draws its power from the long evolutionary history of the experience of *Homo sapiens*.

For pragmatism and science alike, experience is a prominent concept that carries considerable authority. *Prima facie*, the appeal to experience may not seem problematic in itself. However, when it comes to the science of the mind, experience is both that which is to be explained and the means by which an explanation gains some authority. This circularity is even more troubling when we consider that the conception

of experience at hand is vague and often an equivocation between what the Germans refer to as *Erfahrung* and *Erlebnis*.[36] The latter refers to the sensationalistic empiricism of David Hume and, subsequently, the logical positivists and empiricists. On this conception of experience, there are mental or experiential *states*, each of which is easily discernible from another. The philosophical and the scientific literature abounds with talk of states of blue or cold, red or hot, etc. This classical view of experience is faced with the problem of *representing* the world external to the experiencing mind. This view relies on an ancient distinction between sensation and perception. Briefly, sensation consists in the bodily sense organs (i.e., eyes, ears, nose, tongue, skin) sensing the external world and transmitting its data about the world to the mind, where it is then perceived.

Dewey called this view the 'spectator theory of knowledge,'[37] and Daniel Dennett has christened it as 'the Cartesian Theater.'[38] The central epistemological and metaphysical issue here is that the mind *is* a thing that passively receives sense data about the world, and that this is how the mind *knows* about that world. Among the several problems with this conception of experience is what is known as 'the veil of ideas or appearances.' This veil divides the world in two, into the mental and inner world and the physical and external world. Somehow these sense data of which the veil is made connect with the external world and thereby represent that world to the inner world. This indirectness of experience presents the problem of knowing *anything* with certainty about the world, which raises further questions about how scientific knowledge is reliable enough for human action to depend upon.[39]

In light of Darwinism, the classical pragmatists found good reasons for rejecting this duality between mind and world. Instead of conceiving of experience as *Erlebnis* (i.e., sensationalistic), they promoted the conception of experience as *Erfahrung*. Experience of this variety is at play when someone asks if you have experience with a skill, like skiing. It is another way of asking if you have *familiarity*. And just as the etymology suggests, there is no real divide – mind and world are of the same source, just as siblings are of the same parents. This intimacy of experience also provides the means of knowing about the world. Instead of experience being a sequence of atomistic states, the pragmatists considered it a continual process of learning. Education occurs through a familiarization – an ongoing transaction between the learner and that which is learned. There are differences but not divides. Of the experiences had, *the differences that prove to make a difference* in future experience are particularly important.

The phase of experience we know as 'inquiry' is able to make the *functional* distinction between organism and environment. This distinction between organism and environment – while often made at the skin – must be functional and not ontological because the two are inseparable: if there is an organism, then there is an environment; if an environment, then an organism. Consider the etymology of 'environment': it is that which 'environs,' *surrounds*, something – in this case, the organism. Recent work in evolutionary biology and developmental systems bears this out. Griffiths and Grey have argued that this coupling of organism and environment is so tight that the proper unit for evolution is the single unit of *organism–environment*, or as Griffiths and Grey suggest, the symbol *Œ*.[40] From here, Dewey's conception of experience as organism–environment transaction can be restated as Œ-transaction. This conception implies that experience is old: it has a long evolutionary history, most of which is a series of events that are simply had – experiences that are known is a much more recent affair.[41]

Experience as Œ-transaction implies that any attempt to localize experience in any part of the transaction is doomed to failure. Furthermore, experiencing and the products of experience are not exclusively found inside the organism. This transactionalism requires that experience modify both the organism and the environment. Dewey referred to this joint modification as *adjustment*. This is a *dual process* of the organism's *adapting* to the environment and the organism's *alteration* of the environment.[42] Among the consequences of these adjustments are the development of *habits*, the dependable and regular behavioral dispositions to act without foresight or deliberation. Given the time pressures within Œ-transactions, the development of habits comes as no surprise. Some habits become so good at keeping life and limb together they become generic traits in a species. One such trait is plasticity, an individual organism's ability to learn new habits through its interaction with its environment.

Another kind of flexible habit is the active organization of one's environment so that one's firm habits are more effective. For Dewey, this ecological niche construction develops a niche filled not just with transient and fleeting gestures and sounds that communicate the here and now but also with signs and symbols that persist beyond the momentary use. This phase of experience Dewey conceived as mind*ing*. Instead of mind being some sort of individual ephemeral thing that somehow interacts with a physical body, the body *minds* its environment. Minding, on this view, is the dynamic organization of habits of the organism and of its environment that afford meaningful behavior. While dynamic, this scaffolding has far greater stability than does conscious activity, which

occurs when the regular flow of habitual activity becomes disturbed and thereby uncertain.

A minding organism goes about its environment with expectations of how this transaction will go. For this reason, pragmatists conceive of belief as a *habit of action* – not a representation or reflection of how the world is independently of human activity, viz., of a reality behind the veil of appearances. When an organism's habits are conducive to activity that maintains life and limb, there is no need for adjustment of the organism nor of its environment. However, when this dynamic equilibrium of Œ-transaction is disrupted, some adjustment is necessary.

In light of recent advances in our understanding of non-human animal life, especially in its continuity with human life, we reserve experience as a larger category than culture. Experience as Œ-transaction is deep, going back millions of years. Culture refers to the idiosyncratic Œ-transactions that define symbolic and sapient – which is to say human – life. Some species are communicative and have just those sorts of experiences, but they do not know it. Others communicate through symbols and signs and not just gestures and sounds, but they are not aware of their semiotics, nor can they inquire into them. Culture grows out of such populations when its instrumentation becomes deliberatively innovative and thus consciously selective.

Recall that adjustment is a dual process that modifies organism and environment alike. This general phase of Œ-transaction develops into a powerful process with the evolution of culture. The introduction of cultural artifacts affords humans the means of deliberate innovation, specifically in using them to discover new strategies for getting about the natural and cultural environment *and* for transmitting the successful strategies to the rest of the culture, thereby reforming it. This process of discovery is undertaken by a small number of inquirers. These researchers have a greater disposition toward fallibilism and stronger attention spans. They have developed a set of habits that are conducive to performing cutting-edge inquiry. The projects taken up by artists and scientists alike – the creative intellectuals – demand an openness and willingness to be self-critical, not only to develop new solutions to problems but to reconsider both the solutions proposed and the articulation of the problems addressed. This degree of critical reflection not only requires above-average conscious attention to the complex situation but also a community that encourages and effects this highly sophisticated sort of inquiry.[43] Culture in a community is a dual-process system that actively promotes discovery via experimentation and deliberately modifies the cultural environment in light of these discoveries.[44]

In his recent book, Kahneman elaborates a dual-process theory of human cognition. He takes up the nomenclature of Stanovich and West that distinguishes between a fast response, system 1, and a slow one, system 2.[45] Even though Kahneman is careful to note that systems 1 and 2 are umbrella terms covering several different subsystems, he nevertheless sets them in nearly perfect dichotomous opposition. Where 1 is fast, automatic, effortless, and always operating, 2 is slow, lazy, and rarely operating. Plus, system 1 is metabolically efficient, whereas system 2 drains energy. The metabolic contrast is well illustrated by the commonsensical descriptions of each system. System 1 is the set of habits or intuitions or instincts that quickly respond to immediate problems a person may face. Usually, the system does a good enough job at reacting, but mistakes are made regularly enough that a fail-safe is beneficial. System 2 evolved to be what Kahneman describes as the conscious self that is, on occasion, capable of pushing back against habit or instinct. This tension is perhaps better assuaged when a person is not in a situation that demands immediate response. That is, system 2 is capable of modifying system 1 through the deliberate intervention into one's lived experience that is intended to change a person's habits. As some recent research suggests, it could be as many as three years of diligence before system 2's efforts to adjust system 1 take hold, rendering moot the need for the conscious self to intervene.[46]

There is a need for system 3 to orient the processes of not just the two systems but of the Œ-transaction as well. System 1 operates often in tension with system 2; the immediate and habitual responses often conflict with the interests of the conscious self. Yet Kahneman's account finds this self to be lazy and often blind to what is really going on, making mistakes of its own. His illustrations of this laziness and blindness are not default traits of system 2 but products of its conflict with another system, the cultural situation. In these experimental illustrations of laziness and blindness, however, the culture is artificially constructed for the purpose of effecting what Kahneman finds to be absurd responses. Yet if the cultural situation changes, the results are likely to be different; the absurdity, in other words, is not a result of system 2 but of system 3 in tension with system 2 (especially when we consider that the particular test subjects' system 2 developed within a different system 3 than the artificially constructed one of the experimental model). The parameters of system 3 shape the nature of the Œ-transaction. This shaping of the trajectory helps elucidate how Œ-dynamic systems anticipate without relying on representations within the brain/mind, as the *Erlebnis* conception of experience requires.

Kahneman admits that he focuses more on system 1 than on system 2. What is even more lacking is how system 2 can anticipate the future. Indeed it is unclear whether such a task is in the purview of system 2. Though it seems reasonable enough, at least to our commonsensical view, the conscious self is capable of anticipation. Many cognitive scientists take it as a matter of commonsense that our mental activity is representational, and that if there is any doubt about this, the clear fact that we anticipate future events requires that we presently represent that future.

How is 'coordinating with the future' handled from a pragmatist perspective? If we are to continue to use the word *representation* with regard to *Erfahrung*, it makes little sense to talk about representational states qua *Erlebnis*. For this conception of experience (as *Erfahrung*) is not one in which states have a role. The best way of using this word then, is as a *re-presentation* of the world, in that the present world is presented anew for the precise purpose of effecting such a world out of the present world – a 'taking aim at' a new world. In order to anticipate, an organism needs information about the world's regularities, patterns of change, etc., so that appropriate action may be taken to bring about the *re-presented* – or, better still, *imagined* – world.

Conscious intervention in the habits of Œ-transaction is integral to this sort of anticipatory adjustment of body and world. However, we still lack an account of how or why representations as ideals (or ends-in-view) could help guide system 2's operations. Kahneman does not recognize (at least in print) the need for this; representationalist cognitive scientists vary on the need as well as the account.[47] We believe this is due to the creeping Cartesianism at play, in at least two ways here. First, modeling cognitive anticipation without drawing on representations presumes that representations are to be found strictly internally to the organism or mind; whereas the pragmatist emphasis on the dynamic transaction of organism and environment considers representations qua ideals (or ends-in-view) as being neither internal nor external but transactional. This transactional conception of experience implies that all inquiry must take place within a situation, within a cultural context. Thus we see the second way in which Cartesianism creeps its way in. The Cartesian ideal of pure inquiry outside of a cultural context is not only impossible to attain, it also blocks the road to inquiry – a cardinal sin, if there ever was one, for pragmatism.[48] This blockage can be overcome by recognizing the need for system 3 as that which provides symbolic affordances, shared aims in action and in inquiry, and, in short, the creative means for anticipating novel ways of living.

The reduction of uncertainty through the cultivation of information is what conscious activity (system 2) strives toward. System 1 lacks the information required for resolving new problems that arise in unorthodox situations. The means by which information is cultivated is not a strictly or exclusively individual act as the Cartesian conceives it. The cultivation of information – what Dewey called *education* – is a social activity that aims at the production of healthy inquirers. System 2, on its own accord, cannot resolve problematic situations. Guidance is required and is provided by the larger system 3, the cultural landscape that provides the values and ideals that orient an individual to the world such that one's interactions with one's environment can be more meaningful than the experiences that have come before – experiences that are not simply unique to the individual but are shared through tradition and education as well.[49]

Kahneman fails to see that his examples situate or frame the inquiries he asks of his subjects in such a way that they are simply not ready for doing awkward financial arithmetic or for anticipating something absurd to happen while focusing on a very specific task. Change the conditions, and the experience will change. How then are we to understand the role of information with regard to systems 1 and 2, and representations and intentionality? We propose that a third system, culture, is the best way to orient ourselves.

System 3 concerns the situational context through which a dynamic system, such as a conscious human, can anticipate by using previously learned skills, previously learned data (from facts to tropes), and previously learned methods of inquiry, to create novel ways of living and doing. These ways, of course, do not appear *ex nihilo*. They grow out of and are thus continuous with the previous ways. Such ways, however, are not so clearly available to a researcher who seeks to strip away culture and context.

Kim Sterelny has done valuable work in the philosophy of nature[50] that argues that humans are unique among primates because we have evolved to be learners, specifically apprentices to each other.[51] Our sociocultural organizations, our scientific and religious institutions – even neonate curiosity – reflect this uniquely human feature. Sterelny has much to say from the perspectives of evolutionary biology and anthropology, specifically about our development of tool use and innovation. But where his account is lacking is in the neural means of apprenticeship (to be clear, this is not the only means, either). Bill Bywater has started this work, from an explicitly neuropragmatist standpoint.[52] He situates recent work on mirror neuron systems with Sterelny's conception of apprenticeship. Take this view with similar work by neurosociologist

David Franks (2010) (who is working from the pragmatist perspective of George Herbert Mead),[53] and we have the basic tools and methods for bridging the work of Kahneman with anthropology.[54]

With the pragmatist sketch of experience introduced here, we hypothesize that system 3 is the means by which human experience qua Œ-transaction becomes oriented to the world and thereby appropriates information in a plurality of ways. From the general traits of systems 1 and 2 as components of the human dynamic system of Œ-transaction, we believe further research along these lines can help elucidate questions about how different cultures learn, how information is selected and passed down through various traditions, and how to resolve tensions between the three systems. Just as system 1 can conflict with system 2, system 3 conflicts with system 2. Consider an example of a dieter. His system 1 wants pie, but his system 2 says spinach is better. In his case, his culture may be one in which delicious but calorie-laden food is everywhere to be had, making the goal of spinach eating quite difficult, if not impossible. But system 3 could also be one in which spinach is easily available, but the cultural ideals – the guiding parameters – emphasize an extremely thin body type that is physiologically and psychologically unhealthy.

Our hope is that by investigating the import of culture in this fashion, we not only resolve or evade theoretical difficulties in the cognitive sciences, but that we also offer a way for utilizing the results of these sciences, along with other inquiries, especially the arts, to address practical concerns for achieving the ever tenuous democratic culture, so well imagined by James, Dewey, and Rorty.

Neuropragmatism and conflict over image

As philosophers from John Locke to John Dewey and Daniel Dennett have argued, our capacities for practical deliberation, normative conduct, and degrees of moral freedom naturally grow together and remain culturally fused together. The intense degree of human sociality accounts for the way our species encourages normative conduct using normative moral responsibility in addition to the older primate emotional motivations of love, kindness, and charity. However, the intense sociality of human life requires the thoughtful management and adjustment of multiple social roles and responsibilities, in turn requiring dynamic moral problem-solving about what to do from situation to situation. Moral concepts such as responsibility, freedom, autonomy, and blame have distinctive functional roles in creatively sustaining the community life of human societies.

Can philosophy reconcile the two opposed 'images' of humanity – the scientific on the one hand and the humanistic on the other? While there is some disagreement on the nature of this reconciliation – generally understood as the conflict between eliminativism and constructivism – the neuropragmatist solution to the conflict is to reconstruct the philosophical notion of science's aims and results that leads to competition between the two images in the first place. This conflict, however, is not merely a theoretical problem for philosophers. It has manifested itself socially in the academy as the two cultures described by C. P. Snow.[55] There is a desperate need for reconciliation of some sort, as there are real life consequences across the life sciences and out beyond the ivory tower into areas like public policy.

Despite great similarities between mainstream neurophilosophy and neuropragmatism, there is a crucial difference between them. This difference resides in contrasting conceptions of experience; it subsequently sets up distinct conceptions of science, and therefore various resolutions to the conflict between the scientific image and the humanistic or manifest image.

The philosophical project of *rapprochement* is taken up in various ways by the many philosophical traditions. The specific differences between mainstream neurophilosophy and neuropragmatism come down to how the problem is articulated, and thus, how it is solved in light of that articulation. Generally speaking, however, the conflict is a genuine one felt by most parties. The concern is that the scientific image ultimately shows the humanistic one to be illusory, thereby bringing into serious doubt genuinely human concerns about dignity, freedom, responsibility, and living a good and meaningful life. Science, it is feared, will rob us of our humanity.

For mainstream neurophilosophers, like Paul and Patricia Churchland, Owen Flanagan, and Daniel Dennett, the conception of science differs in significant respects from the neuropragmatists' view. Moreover, the conception of cultural tradition, what Wilfrid Sellars influentially called 'the manifest image,' similarly differs between the two camps. The main distinction is in how each camp conceives of experience, and subsequently of science. Patricia Churchland articulates the problem in terms of scientific theory versus folk theory, and then, as she often does in the latter work, refers to Quine and his pragmatism.[56] The neuropragmatism we advance here is similar to this branch of neopragmatism but, as will become clearer, stands in stark contrast to the conception of science based on an inadequate conception of experience. The Churchlands continue this discussion in terms of folk psychology versus scientific

psychology, and mention the origins of these ideas in Sellars.[57] Paul Churchland further distances himself from pragmatism in his recent book.[58] Flanagan's recent statement of his philosophical project is in these terms but with a greater pluralism, extending the Sellarsian dyad to a sextet.[59] Dennett also makes a clear and accessible statement of the problem, even as he has affirmed most of the neuropragmatist materials for its solution.[60]

While both camps see the manifest or humanist image developing first and providing the framework out of which science and its image develop, mainstream neurophilosophers see the two images as competing with each other for the truth. The truth of science is taken as value-free and objective, whereas the truth of the manifest image is value-laden and subjective. Notice that this conflict is yet another version of mind-body dualism, in which the properties of each – science and culture – are mutually exclusive. Sellars articulates the question that philosophy faces as, 'How, then, are we to evaluate the conflicting claims of the manifest image and the scientific image, thus provisionally interpreted to constitute *the* true and, in principle, *complete* account of man-in-the-world?'[61]

This conflict is generated for mainstream neurophilosophy largely due to residues of logical positivism, which is based on a Humean conception of experience. Like Descartes's rationalistic view of the soul, Hume's empiricism fits the model of the spectator theory of mind that Dewey criticized. Today we recognize such a view as Cartesian materialism. While neurophilosophers like the Churchlands, Dennett, and Flanagan would balk at being called Cartesian materialists, they succumb to the modified account of it (as described by Rockwell).[62] There may not be one specific place in the brain where experience all comes together, but they suppose that there is a specific space delimiting experience: the brain itself. The neuropragmatist denies this limited range of experience or mentality. Mentation goes beyond the cranium, suspended in a cultural medium of communicating humans. Neuropragmatism would not achieve the naturalization of consciousness and mentality by limiting it to a single brain, ignoring how human brains become distinctively human only when wired together. If other neurophilosophers cannot see the 'wires' of sight and sound, a too-narrow scientism has already rendered those into meaningless physical entities. One might as well do that to all the signaling wires of the nervous system and be done with meaning altogether. Avoiding that eliminative dead end, the only alternative is to take seriously the way that both the phenomenology of lived human experience and the physicality of brains interacting with each other and the environment exist in natural spaces much larger than

the confines of any cranium taken singly. It seems like we are directly experiencing the external world *because we really are*. The unsurprising fact that complex natural systems of brains and environments can be distorted and deceived into illusions and hallucinations no more proves that consciousness is all in one's head than hacking a computer network proves that the world wide web is all in one's computer.

Even where some mainstream neurophilosophers would not deny that experience and intelligence is partially social, they have not dealt with the full implications of viewing humans and all their cognitive products as encultured. Another problematic residual aspect of Humean experience in logical positivism is the maintenance of the fact/value dichotomy.[63] This issue, too, is complex, as each of the aforementioned neurophilosophers has held varying views throughout his/her career. Regardless, this dichotomy fits the general pattern that neuropragmatism seeks to eliminate. Among the reasons mainstream neurophilosophers have such difficulty in their efforts to reconcile the manifest image with the scientific image is the question of what to do with value (or mentality) in an ontology of value-free facts (or bodies)? Eliminativism is one strategy; constructivism is another. The former fails to keep the sacred aspect of the manifest image, which many find a dissatisfying, if not a terrifying proposal. The latter is left making qualification upon qualification about what is meant by manifest terms like 'consciousness' in ways that end up making their readers wonder whether consciousness is real or illusory. This, too, is unsatisfying. The residues of ordinary language philosophy and the 'linguistic turn,' which is based on a neo-Kantian view of cultural mind, have not helped matters. By encouraging some philosophers to suppose that they have privileged access to analytic truths grounded in enlanguaged culture, a battle arose between linguistic a priorists and neurophilosophers over who had the right to dictate the nature of the self. This battle only sustained the dualistic terms of the debate into the late 20th century, as neurophilosophers felt pushed into viewing culture as a competitor to the scientific image of humanity. Ironically, humanists fearful of scientism have only perpetuated the worry over an inhuman theory of self that an improved cognitive neuroscience would prevent.

Neuropragmatism evades these problems of dualism by integrating science and culture. Neuropragmatism conceives of science (like all modes of intelligence) as an inherently evaluative and thus value-laden method that provides provisional instrumental truths as guides to practical action in the world – not a method of justifying static propositions that objectively mirror or correspondingly represent the non-human

external world. In his articulation of the conflict between science and common sense (i.e., the humanist or manifest image), Dewey argues that the subject matter of both science and common sense is one and the same experience, conceived as the dynamic interaction of organism and environment: 'Things interacting in certain ways *are* experience';[64] experience is 'the manifestation of the interaction of organism and environment' or simply 'an interaction of organism and environment.'[65] What distinguishes science from common sense is the mode of inquiry, specifically the experimental method developed into the sophisticated technological and industrial affair that produces the most secure knowledge humanity has about the world to date.

Dewey argues that the humanities or common sense is concerned first and foremost with 'practical uses and enjoyments' of our existential situation, 'with "the ordinary affairs of life", in the broad sense of life.'[66] Another important point Dewey makes about common sense is that it is not static and fixed but always changing in response to the dynamic environment. We see this progression in the history of the humanities, broadly speaking, from myth to mythology to dogma and scripture to Chaucer and Shakespeare through to contemporary poetry, novels, films, and so forth. In one way or another, these affairs are concerned with our everyday lives, not as isolated events but as living experiences, as social interactions with each other in a world, actual and imagined. Through them we see how life could be lived and could be experienced. They not only affect our consciousnesses but bring about qualities in both familiar and novel ways so as to encourage or admonish specific ways of life. They are at the heart of our moral lives. In abstracting beyond the particulars of common sense, Sellars and others end up stopping or freezing a dynamic, living process. Snapshots have their place, surely, but to take the snapshot for the whole is to lose out on the entirety and the richness of life.

Science develops out of the same subject matter as common sense, with a concern for practical affairs of ordinary everyday life. When wholly successful, the results and the methods developed by science feed back into the commonsense world 'in a way that enormously refines, expands and liberates the contents and agencies at the disposal of common sense.'[67] Unfortunately, Dewey notes, this feedback has not been nearly as successful as it needs to be, never amounting to more than providing new tools for upholding tradition, and never fully critiquing tradition. This is due in part to the tendency of the practitioners and outside observers of science to finalize the results and methods of science. Sellars does this in setting up the opposition between the

manifest and scientific images as though they both could be *the* complete and *the* final word on matters. Dewey describes the dissolution of the problem of reconciliation when we see that '[s]cientific subject-matter is intermediate, not final and complete in itself.'[68] Science is a provisional and ongoing cultural technology, one of the most humanistic endeavors humans undertake.

Taken and frozen at any intermediate stage, however, the products of scientific inquiry seem to be isolated objects, set apart from the situations in which they were originally encountered. As science progresses, it becomes increasingly removed from practical affairs as its proximate goal is to develop knowledge for its own sake – not to develop within the lived-in environment of ordinary life. This is not its only goal: the products of science are empowering when properly integrated into the humanities and ongoing cultural life. Science, when seen as just a phase within the interaction of organisms with their environments in the process of life, has consequences and applications outside of itself, in the commonsensical world, with which the humanities are primarily concerned. The neuropragmatist conception of experience thus seeks to establish and cultivate the continuities between science and the humanities, between the scientific image and the manifest image, to improve the richness of living experience in a never-ending process of growth.

Pragmatism started off at a time of significant scientific and technological change. The industrial and Darwinian revolutions, as well as the American Civil War, brought about both a sense of crisis and a vision of hope for what humans could do should they work together toward a common goal. Today we are still wrestling with the consequences of Darwinism and industrialization. Yet we have further difficulties with which to wrestle than the classical pragmatists. For among the consequences of Darwinism and industrialization is a globalized information society that has the means to yield life-saving, life-improving medical care *and* the willful creation of biological warfare *as well as* the inadvertent diseases effected by industrial life and life in an information society. The successful scientific models that inspired the classical pragmatists were those of physics, chemistry, and early biology. Neo-Darwinian models of life and the impressive rise of the cognitive and behavioral neurosciences[69] provide new inspiration, new tools, new hopes – and new challenges.

The consequences of these new sciences for our understanding of our world and ourselves are not only undeniable and promising, they are also more threatening. Physics provided a cultural transformation in how we alter our environments and generate energy. But it did not

seem to threaten our moral, spiritual, and intellectual lives with any significant conceptual change. Indeed, the changes were seen initially as liberating, until much more recently. With physics, the moral threats came from increased pollution of our environment, and, with the bomb, the very real possibility of mutually assured destruction. Chemistry likewise gave us new materials and fuels as well as chemical warfare and new means of substance abuse. Biology similarly brought benefits and dangers, from longer life spans to biological warfare. But biology brought with it a renewed sense of crisis for the human self-conception. Physics may have displaced the center of the universe from the Earth, but the belief in Cartesian dualism left the human soul seemingly intact. Biology, especially after Darwin, opened 'the gates of the garden of life' to experimental methods.[70] Now opened, the challenge to pragmatism is the threat science, especially the neurosciences, poses to our cherished ideals. For the challenge is not only to bring the products of neuroscientific inquiry to bear on morals and politics, as so many researches are eager to do today, but to use such data in order to bring the experimental method and attitude to morals and politics as well.

Notes

1. The following is a synthesis of parts, drawn from and modified, of two separate articles: Tibor Solymosi and John Shook, 'Neuropragmatism: A Neurophilosophical Manifesto,' *European Journal of Pragmatism and American Philosophy*, 5(1) (2013): 212–234; and Tibor Solymosi and John Shook, 'Neuropragmatism and the Culture of Inquiry: Moving Beyond Creeping Cartesianism,' *Intellectica* 60(2) (2013): 137–159.
2. John Dewey, 'Body and Mind' in *The Later Works of John Dewey,* Vol. 3, ed. Jo Ann Bodyston (Carbondale: Southern Illinois University Press, 1927/1984), pp. 25–40.
3. Paco Calvo, and Antoni Gomila, eds. *Handbook of Cognitive Science: An Embodied Approach* (Amsterdam: Elsevier, 2008), p. 15.
4. Gary A. Cook, *George Herbert Mead: The Making of a Social Pragmatist* (Urbana: University of Illinois Press, 1993) and Jerome A. Popp, *Evolution's First Philosopher: John Dewey and the Continuity of Nature* (Albany: State University of New York Press, 2007).
5. Hilary Putnam, *The Threefold Cord: Mind, Body, and World* (New York: Columbia University Press, 1999).
6. For example, Daniel C. Dennett, *Consciousness Explained* (Boston: Little, Brown & Company, 1991).
7. Jerry Fodor, *Hume Variations* (Oxford: Oxford University Press, 2003).
8. Solymosi, 'Neuropragmatism, Old and New,' *Phenomenology and the Cognitive Sciences*, 10(3) (2011): 347–368.
9. See James's statement of the brain's plasticity in William James, *The Principles of Psychology*, 2 vols. (New York: Henry Holt, 1890), Chapter 4.

10. Michael S. Gazzaniga, *Nature's Mind: The Biological Roots of Thinking, Emotion, Sexuality, Language, and Intelligence* (New York: Basic Books, 1992); Antonio Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York: Avon Books, 1994); and Damasio, *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* (New York: Harcourt Brace, 1999).
11. Dewey, *Experience and Nature,* in *The Later Works of John Dewey*, Vol. 1, ed. Jo Ann Bodyston (Carbondale: Southern Illinois University Press, 1925/1981), p. 212.
12. Michael A. Schwartz, and Osborne P. Wiggins, 'Psychosomatic Medicine and the Philosophy of Life,' *Philosophy, Ethics, and Humanities in Medicine* 5(2) (21 January 2010) at http://www.peh-med.com/content/5/1/2.
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15. This sort of example is discussed in James, *The Principles of Psychology*, and Dewey, 'The Reflex Arc Concept in Psychology,' in *The Early Works of John Dewey,* Vol. 5, ed. Jo Ann Boydston (Carbondale: Southern Illinois University Press, 1896/1972), 96–109.
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22. David D. Franks, *Neurosociology* (New York: Springer, 2010).
23. Andy Clark, *Being There: Putting Brain, Body, and World Together Again* (Cambridge, MA: MIT Press, 1997); Clark, *Supersizing the Mind: Embodiment, Action, and Cognitive Extension* (New York: Oxford University Press, 2008);

Alva Noë,. *Out of Our Heads: Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness* (New York: Hill and Wang, 2009); Richard Menary, ed. *The Extended Mind* (Cambridge, MA: MIT Press, 2010).

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25. Anthony Chemero, *Radical Embodied Cognitive Science* (Cambridge, MA: MIT Press, 2009).
26. William Bechtel, and Adele Abrahamsen, *Connectionism and the Mind: Parallel Processing, Dynamics, and Evolution in Networks*, 2nd ed. (Malden, MA: Blackwell, 2002); Walter J. Freeman, *How Brains Make Up Their Minds* (New York: Columbia University Press, 2001); W. Teed Rockwell, *Neither Brain Nor Ghost: A Nondualist Alternative to the Mind-Brain Identity Theory* (Cambridge, MA: MIT Press, 2005).
27. John R. Shook, 'Social Cognition and the Problem of Other Minds,' in *Handbook of Neurosociology*, ed. David D. Franks and Jonathan H. Turner (New York: Springer, 2012), pp. 33–46.
28. James H. Fetzer, *The Evolution of Intelligence: Are Humans the Only Animals with Minds?* (Chicago: Open Court, 2005); Jesper Hoffmeyer, *Biosemiotics: An Examination into the Signs of Life and the Life of Signs* (Scranton: University of Scranton Press, 2008).
29. Charles S. Peirce, *Peirce on Signs: Writings on Semiotic*, ed. James Hoopes (Chapel Hill: University of North Carolina Press, 1991); Thomas Sebeok, *Signs: An Introduction to Semiotics*, 2nd edition (Toronto: University of Toronto Press, 2001).
30. Jaan Valsiner, and René van der Veer, *The Social Mind: Construction of the Idea* (Cambridge, UK: Cambridge University Press, 2000).
31. Harold Blumer, *Symbolic Interactionism* (Englewood Cliffs, NJ: Prentice-Hall, 1969).
32. Radu Bogdan, *Grounds for Cognition: How Goal-Guided Behavior Shapes the Mind* (Hillsdale, NJ: Lawrence Erlbaum, 1994).
33. Marcello Barbieri, ed. *Introduction to Biosemiotics: The New Biological Synthesis* (Dordrecht: Springer, 2008).
34. See Kim Sterelny, *The Evolved Apprentice: How Evolution Made Humans Unique* (Cambridge, MA: MIT Press, 2012).
35. Kahneman has given a forceful presentation of these so-called systems of cognition in his recent work, *Thinking, Fast and Slow* (New York: Farrar, Straus and Giroux, 2011). System 1 is characterized as the automatic, quick response – habits, instincts, etc. – that humans have that allows them to act without deliberation in time-sensitive situations. System 2 is the slow, deliberative, and conscious attention humans sometimes engage in to override the impulsiveness of system 1.
36. Here we follow the useful distinction made by neopragmatist Robert Brandom, 'The Pragmatist Enlightenment (and its Problematic Semantics),' *European Journal of Philosophy*, 12(1) (2004): 1–16. Despite the utility of the description of classical pragmatism in the first part of Brandom's article, the second part on semantics is extremely problematic, as Larry Hickman has critically addressed (see his 'Some Strange Things They Say About Pragmatism: Robert Brandom on the Pragmatists' "Semantic Mistake",' *Cognitio* 8(1) (2007): 105–113).

37. Dewey, *The Quest for Certainty* in *The Later Works of John Dewey*, Vol. 4, ed. Jo Ann Boydston (Carbondale, IL: Southern Illinois University Press, 1984).
38. Dennett, *Consciousness Explained*.
39. Indeed, by the time of Kant, the problem of knowledge had become how knowledge was even possible in the first place.
40. P. E. Griffiths, and R. D. Gray, 'Darwinism and Developmental Systems,' in *Cycles of Contingency: Developmental Systems and Evolution*, ed. S. Oyama, P. E. Griffiths, and R. D. Gray (Cambridge, MA: MIT Press, 2001), pp. 195–218.
41. To be clear, this recognition does not imply that only cognitive experience is of value; rather, that there are far more varieties of experience than those which are known, that such experiences are often significant, and that without them there can be no cognitive experience in the first place. On this point, specifically within Dewey's thought, see Larry A. Hickman, *Philosophical Tools for Technological Culture: Putting Pragmatism to Work* (Bloomington and Indianapolis: Indiana University Press, 2001), pp. 17–20. A reader may further retort that putting experience in phylogenetic terms is unorthodox because it leaves no obvious space for the subject of experience: it seems odd, if not absurd, to place the subject in the species and not in its members. Yet this way of talking about experience, as though there must first be a subject who is capable of undergoing experience in the first place, prior to any experience whatsoever, is a non-starter. Pragmatists from James and Dewey to Rorty and Dennett reject this conception of experience that presupposes a subject. Rather, the individual subject or self develops out of experience as Œ-transaction. Integral to this achievement of being able to talk to oneself without others' hearing it is an ecological niche in which others talk to each other first and foremost. For more on this point, see Dewey *Experience and Nature*, p. 135, and Dennett, *Consciousness Explained*, p. 195. Lastly, it would behoove the reader to remember that for Cartesians, consciousness, mind, self, and subject are conceived as one and the same thing. We deny such equivocation and consider each of these terms as specific phases within the process of experience.
42. Hickman, *Philosophical Tools for Technological Culture*, p. 21.
43. To appreciate the disproportionality, consider that all humans are familiar with the problem of thirst and its easy resolution. But most humans lack the unique traits required for experimental inquiry performed by a research team in a laboratory.
44. This feedback serves to modify the upbringing of the next generation of creative intellectuals, for the problems and the resources available for inquiry will have been modified and expanded as well.
45. Daniel Kahneman, and Shane Frederick, 'A Model of Heuristic Judgment,' in *The Cambridge Handbook of Thinking and Reasoning*, ed. Keith J. Holyoak and Robert G. Morrison (Cambridge and New York: Cambridge University Press, 2005), pp. 267–293; K. E. Stanovich, and R. West, 'Individual Differences in Reasoning: Implications for the Rationality Debate?' in *Heuristics & Biases: The Psychology of Intuitive Judgment*, ed. T. Gilovich, D. Griffin, and D. Kahneman (New York: Cambridge University Press, 2002), pp. 421–440.
46. Claudia Dreifus, 'A Mathematical Challenge to Obesity: A Conversation with Carson Chow,' *New York Times*, May 15, 2012, D2, available online at:

http://www.nytimes.com/2012/05/15/science/a-mathematical-challenge-to-obesity.html.

47. For an excellent survey of how the term 'representation' is used within cognitive science, see Giovanni Pezzulo, 'Coordinating with the Future: The Anticipatory Nature of Representation,' *Minds & Machines*, 18 (2008): 179–225. See our examination of Pezzulo's conclusions in Solymosi and Shook, 'Neuropragmatism and the Culture of Inquiry.'
48. See Charles Sanders Peirce, 'The First Rule of Logic,' in *The Essential Peirce: Selected Philosophical Writings,* Volume 2 (*1893–1913*), ed. The Peirce Edition Project (Bloomington and Indianapolis: Indiana University Press, 1898/1998), pp. 42–56.
49. This guidance occurs both in the process of discovery (namely through the paradigm and specific research program), and in the process of transmission and reformation (in the forms of educational practices and institutions).
50. Sterelny draws on Peter Godfrey-Smith's 'helpful distinction between philosophy of science and philosophy of nature. The intellectual target of philosophy of science is science itself… The intellectual target of philosophy of nature is nature itself; the world in which we live (which, of course, includes humans and their practices, including science)' (*The Evolved Apprentice*, p. xi). Godfrey-Smith writes, 'When we export a picture of the world from the immediate context of science into a broader discussion, the features of scientific description that have their origin in these practicalities become potentially misleading… Work of this sort will also often aim at synthesizing the results of a number of different scientific fields, working out how they fit together – or fail to fit – into a coherent package,' before concluding 'So philosophy of nature refines, clarifies, and makes explicit the picture that science is giving us of the natural world and our place in it. Calling it "philosophy" does not mean that only philosophers can do it. Many scientists… undertake this kind of work. But it is a different kind of activity from science itself.' (*Darwinian Populations and Natural Selection*. New York: Oxford University Press, 2009, p. 3). He also notes that the philosophy of nature is 'an old term' – indeed, it was just what pragmatists like Dewey were doing (Dewey's influence here on Godfrey-Smith should not be underestimated as many of the latter's writings make use of the former's ideas).
51. Sterelny, *The Evolved Apprentice*.
52. Bill Bywater, 'Neuropragmatism's Pedagogy,' Presentation at the Annual Meeting of the Society for the Advancement of American Philosophy, March 15–17, 2012, Fordham University, New York City. See also Bywater and Piso's chapter in this volume for further elaboration along these lines, using Sterelny and data regarding mirror neuron systems to critique Kahneman's dual system approach.
53. See Franks, *Neurosociology*, as well as his chapter in this volume that elaborates further the contribution of the Chicago Pragmatists to neurosociology.
54. See also the new field of neuroanthropology: Daniel H. Lende and Greg Downey, *The Encultured Brain: An Introduction to Neuroanthropology* (Cambridge, MA: MIT Press, 2012).
55. C. P. Snow, *The Two Cultures* (New York: Cambridge University Press, 1959/1993).

56. Patricia S. Churchland, *Neurophilosophy: Toward a Unified Science of the Mind/Brain* (Cambridge, MA: MIT Press, 1986), pp. 302–303; and *Brain-Wise: Studies in Neurophilosophy* (Cambridge, MA: MIT Press, 2002), pp. 107–112.
57. Paul M. Churchland, and Patricia S. Churchland, *On the Contrary: Critical Essays, 1987–1997* (Cambridge, MA: MIT Press, 1998), pp. 25ff, and 4ff.
58. See Paul M. Churchland, *Plato's Camera: How the Physical Brain Captures a Landscape of Abstract Universals* (Cambridge, MA: MIT Press, 2012), pp. 128ff; see W. Teed Rockwell, 'Beyond Eliminative Materialism: Some Unnoticed Implications of Churchland's Pragmatic Pluralism,' in *Contemporary Pragmatism*, 8(1) (2011): 173–190, for a strong treatment of Churchland's previous pragmatist leanings. See also Rockwell's chapter in this volume, which continues this line of thought.
59. Owen Flanagan, *The Really Hard Problem: Meaning in a Material World* (Cambridge, MA: MIT Press, 2007), pp. 5ff.
60. See Dennett, 'How to Protect Human Dignity from Science,' in *Human Dignity and Bioethics: Essays Commissioned by the President's Council on Bioethics*, 2008, available at: http://bioethicsprint.bioethics.gove/reports/human_dignity/chapter3.html. Last accessed 21 May 2008. See also Dennett's 'Manifest Image and Scientific Image' in *Intuition Pumps and Other Tools for Thinking* (New York: W.W. Norton, 2013), pp. 69–72; and his 'Aching Voids and Making Voids: A Review of *Incomplete Nature: How Mind Emerged from Matter* by Terrence W. Deacon,' *The Quarterly Review of Biology* 88(4) (2013): 321–324.
61. Wilfrid Sellars, *Science, Perception and Reality* (London: Routledge and Kegan Paul, 1963), p. 25.
62. Rockwell, *Neither Brain Nor Ghost*.
63. Hilary Putnam, *The Collapse of the Fact/Value Dichotomy and Other Essays* (Cambridge, MA: Harvard University Press, 2002).
64. Dewey, *Experience and Nature*, p. 12.
65. Dewey, 'Experience, Knowledge and Value: A Rejoinder,' in *The Philosophy of John Dewey*, ed. Paul A. Schilpp (New York: Tudor, 1939), p. 531.
66. Dewey, *Logic: The Theory of Inquiry,* in *The Later Works of John Dewey, Volume 12*, ed. Jo Ann Bodyston (Carbondale: Southern Illinois University Press, 1938/1986), pp 71–72 and 69.
67. Ibid., p. 72.
68. Ibid.
69. We hasten to add the role of computer and information sciences both in advancing our understanding of biology and neuroscience and in significantly modifying our everyday lives. Without the shared questions about the nature of mentation, we would never have had the insights raised by the Turing Test, nor the application of those insights to biological phenomena. Furthermore, the further application of computer and information sciences to everyday life have, unfortunately, brought about a rise in disease that comes with a more sedentary lifestyle made possible by greater ease of communication.
70. John Dewey, 'The Influence of Darwinism on Philosophy,' in *The Influence of Darwin on Philosophy and Other Essays in Contemporary Thought*, ed. Larry A. Hickman (Carbondale, IL: Southern Illinois University Press, 1910/2007), p. 7.