Mind as Process

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One of the major themes of the history of science is the replacement of substance assumptions about the phenomena of interest with process models. Thus, phlogiston has been replaced by combustion, caloric by random thermal motion, and vital fluid by far-from-equilibrium self-reproducing organizations of process. The most significant exceptions to this historical pattern are found in studies of the mind. Here, substance assumptions are still ubiquitous, ranging from models of representation to those of emotions to personality and psychopathology. Substance assumptions do pernicious damage to our ability to understand such phenomena. In this discussion, I will focus on the problem of representation.

Representation

Representation as Correspondence

Since the ancient Greeks, representation has been conceptualized in terms of some structure or state that corresponds to that which is being represented. Plato and Aristotle, for example, held perception to be akin to the form left behind by a signet ring pressed into wax. Today, such correspondence models of representation are still dominant, and have proliferated into multiple kinds. Differing kinds of correspondence provide one basis for differentiating such models: the correspondences may be causal, nomological, informational, structurally isomorphic, and so on.

Correspondence models suffer from a host of problems, some of ancient provenance, some discovered more recently. One problem is that, for any of the kinds of correspondence, the universe is filled with instances of that kind of correspondence, and almost all of those instances are not representational. Every instance of every causal relationship among events, for example, provides an instance of a causal, nomological, and informational correspondence. And isomorphisms can be defined between almost any pair of sets of what can be defined as elements — that is, both what counts as elements and what counts as the isomorphism relationship are relatively arbitrary. It is generally agreed that something more than just correspondence is required; the class of

correspondences must be drastically narrowed. But this stance presupposes that the correspondence framework is ultimately the right one.

A pervasive problem for correspondence models is that of accounting for the normative aspects of representation. Representation can be in error, and, at least at times for some species, can be discovered to be in error by the organism. In fact, if organism detectable error is not possible, then error guided behavior and learning are not possible.

But accounting for the possibility of just error per se is, at best, extremely difficult for correspondence models: If the crucial correspondence exists, then the representation exists and it is correct, while if the correspondence does not exist then the representation does not exist. There is no third possibility that can account for the representation existing but being in error. In brief, there are three conditions that must be modeled — representation exists and is correct, representation exists and is incorrect, and representation does not exist — but there are only two modeling possibilities — the correspondence exists or it does not. Major efforts to overcome this limitation have been made in the last decades, but without any consensual success, and not one of them even addresses the problem of organism- or system-detectable error.

In this regard, it should be noted that one of the arguments for radical skepticism is an argument that error in our representations *cannot* be detected: to do so would require comparing our representation with what it is supposed to be representing, but our only epistemic access to what we are attempting to represent is via those same representations — any check is circular. Furthermore, attempting to account for representational normativity on the basis of factual correspondences, of whatever kind, encounters the slogan associated with Hume that you cannot derive norms from facts — no "ought" from "is". These are non-trivial problems.

The normative aspect of representation focuses on representational *content*. A representational element is a representation only insofar as it in some sense carries representational content, where content is that which specifies what the representation is *supposed* to represent — and there is the normativity. Representational error occurs when a content is misapplied, when what is being represented is being *mis*represented by an inappropriate content: for example, a horse being represented by a representation with

the content of "cow". Many of the problems of correspondence approaches arise because the same relationship that is supposed to constitute a representing relationship — perhaps a causal contact with a table (via light) — is also the only candidate for constituting or providing the content of the representation — again, a table, since that is what the causal, nomological, informational, etc. relationship is with.

But no factual correspondence automatically carries representational content. No internal state that is in some correspondence announces that it is in such a correspondence nor what the correspondence is with. And to whom would it make the announcement? Content is the fundamental mystery, the normative mystery, of representation.

Fodor points out that we have no model of the learning of basic new representations, of new content. Available models address at best the establishment of belief, or lack thereof, in representations that are constructed out of already available prior representations. The construction of representations out of prior representations can in principle be quite complex, but it cannot iterate indefinitely — there must be some basic level of representations, with their own representational content, that can serve as the constructive atoms for all other representations. These atomic representations, Fodor proposes, must be innate, since there is no other account of their origin (Bickhard, 1991; Fodor, 1981). There is, however, no available account of their evolutionary origin, either.

Fodor's proposal yields a kind of rationalism: the origins of representation are ultimately innate. It assumes that representational content must already exist, in the genome in this case, in order to be available to the mind. Empiricism, too, assumes that representational content comes from somewhere, in this case it comes into the mind from the environment (this assumes that the problems with factual correspondences can somehow be solved or avoided). Neither rationalism nor empiricism account for the emergence of representational content, of the normativity of representation. They both assume that content is provided to the mind from elsewhere.

This is an atomic substance presupposition. Basic substances, including basic atoms, do not come into existence. Empedoclean earth, air, fire, and water can mix in multiple ways, but they do not themselves change. Democritus' atoms, similarly, can

combine and move, but do not themselves change. The underlying presupposition about representational content is that it, too, can combine and be transmitted, but does not change at the basic, root level.

But this cannot be. Representation, including the normativity of representational content, did not exist at the time of the Big Bang. Representation does exist now. It must have come into existence, it must have emerged, somehow. Therefore, any model that precludes such emergence of representation, any model that presupposes substance-like permanence about representation, is falsified.

Representation as Anticipatory Process

I turn now to a model of representation that can account for representational emergence. I argue elsewhere that accounts of genuine emergence can occur only within a process framework (Bickhard & Campbell, 2000).[1] Those arguments will not be presented here, but the model of representation that is outlined is developed within a strict process framework.

Emergence is a property of (some) new levels and new organizations of process. I will model representation in terms of a particular kind of organization of process, a normatively anticipatory process. The development of the model proceeds via a progressive differentiation of kinds of process organization.

Some processes are fleeting, such as the fall of a leaf. Others can last — are stable — for long periods of time. Among organizations of process that are stable, a major category are those that exhibit an energy-well stability. This is a process that would change if sufficient energy were introduced, but will continue indefinitely if the ambient energy is not sufficient to overcome the energy well that the process resides in. The common furniture of the world, atoms, molecules, rocks, and so on, are all examples of energy-well stable organizations of process.

A crucial characteristic of energy-well stabilities is that they remain stable so long as they do not encounter supra-threshold energy. In particular, they remain stable even if closed off from their environments and permitted to go to thermodynamic equilibrium. This is in strong contrast to a second class of stable organizations of process: those that are far from thermodynamic equilibrium. A candle flame, for example, will last for some

period of time, but it cannot be cut off from its environment because to do so would be to drive it to equilibrium, and the candle flame ceases to exist at equilibrium. The candle flame is an organization of process that is necessarily open; it requires continuous interchange and flow with its environment in order to remain far from equilibrium.

Some far from equilibrium processes, a chemical bath for example, are stable only so long as the external pumps and reservoirs that pump new chemicals into the bath are functioning — their stability depends entirely on such external contributions. The candle flame, however, illustrates a richer property: the candle flame contributes to its own stability. It tends to maintain itself; it is *self-maintenant*. It does so by maintaining above combustion threshold temperature, volatizing the wax, and inducing convection which brings in fresh oxygen and gets rid of combustion waste. Self-maintenance is already an emergent property.

Candle flames, however, cannot adjust to any changes in their circumstances. If the wax is about to run out, the flame cannot switch strategies for self-maintenance to one that seeks an alternative fuel. There are systems, however, that can do just that. They alter their self-maintenance activities in accordance with changes in their environments so as to maintain the self-maintenant effects of those strategies. They maintain the property of being self-maintenant across environmental changes; they are *recursively self-maintenant*. A simple example is a bacterium that can swim if it is swimming up a sugar (food) gradient, and tumble if it finds itself swimming down a sugar gradient (Campbell, 1974, 1990). Swimming is self-maintenant *if* it is up a gradient, but not down a gradient. The bacterium must in some way detect the distinction between the two conditions and switch its interactions with the environment accordingly.

Such switching, or selection, among interactive possibilities is, in an important sense, *anticipatory*. In particular, at the moment of selection there is an implicit anticipation that this interaction is in fact going to be self-maintenant, that it is in fact going to be successful in functionally contributing to the system's continued existence. Such anticipation can be false. If the environmental conditions are not supportive of that interaction being functionally self-maintenant for the organism, then the anticipation is false, and it is falsified (perhaps, depending on the complexity and sophistication of the organism, falsified in such a way that the organism can detect that falsification and make

use of it for further control of behavior and for learning). The bacterium, for example, will swim up a saccharin gradient as well as a sugar gradient.

The anticipation functionally presupposes of the environment that it is of the right kind to support the anticipated kind of interaction. It implicitly predicates of the environment whatever those conditions are that would in fact provide that support. Those conditions are not explicitly represented by such anticipation, but they are implicitly presupposed, and in a way that is capable of error and, in principle, of organism detection of error. This, I argue, is the primitive point of emergence of representational content, of representational normativity.

The preceding is the barest outline of a model of the emergence of representation in a particular kind of interactive process. Much more needs to be addressed to fill out this primitive model, and still more in order to demonstrate the adequacy of such an interactive model to more sophisticated kinds of representation and cognition, such as of objects, of events, of abstractions like numbers, memory, perception, rationality, language, and so on. Those discussions must be pursued elsewhere.

The interactive model of representation has a kinship to Peirce's anticipatory model of meaning (Rosenthal, 1983), but with a fundamental difference in that the interactive model recognizes the emergence of representational truth value — thus representational normativity, thus representation — in those anticipatory processes. The interactive model, therefore, furthers the project introduced by Peirce of understanding mind in terms of activity rather than in terms of passive consciousness (Joas, 1993).

Psychopathology

But representation is far from the only mental phenomenon whose understanding is blocked by non-process approaches. I will further illustrate the point with respect to psychopathology. In this case, precisely what needs to be *explained* is instead *presupposed* in taking a substance or structural approach: a massive circularity.

Personality, thus psychopathology, is modeled in terms of various hypothesized underlying structures, such as cathected memories, cathected object (person) representations, or unconscious or preconscious irrational beliefs, and so on (Bickhard, 1989; Bickhard & Christopher, 1994; Christopher, Bickhard, & Lambeth, 2001).

Different structures are presumed to correspond to different ways of functioning in the world, and, in particular, to different ways being dysfunctional — pathological — in the world. In this way, psychopathology is equated to some array of kinds of dysfunctionality, and is explained in terms of corresponding underlying personality structures.

Such structures are assumed to be formed, at least in outline, early in development, and to exert powerful influences throughout one's life. Accordingly, psychotherapy is conceptualized as various kinds of intervention that can exert changes in these structures.

But there is a serious problem with these approaches: we do not, in fact, equate pathology with dysfunctionality. We are all dysfunctional, sometimes with rather high frequency, from ignorance, inattention, insufficient sleep, and so on. We consider dysfunctionality to be pathological only when someone cannot learn from dysfunctional experiences so as to reduce that dysfunctionality. The paradigm therapy clients are those who know exactly what they are doing to repeatedly damage their life, who are bright and motivated to change, who have tried many times to change, but who cannot escape a rigid cycle of repeating self-defeating behavior. Rigidity is the core of pathology, not dysfunctionality per se.

But structures are inherently rigid. They involve no intrinsic change processes. Any changes must originate outside of the structure per se. Conversely, if we recognize persons as open systems, always self-organizing, always engaged in learning and development, then change becomes the default, and rigidity becomes precisely that which requires explanation. How can an open, self-organizing, learning and developing person, become stuck in some rigid, even dysfunctional, way of being in the world? Why don't people simply learn their way out of psychopathology (in which case pathology per se would not exist)?

This, then, is the core question of pathology: how can rigidity occur? Yet it is not a natural question within a structural framework because structures are inherently rigid. The central nature of psychopathology — rigidity — is simply presupposed in structural approaches.[2]

I will not develop a process explanation of psychopathology here, but will note that it must involve some way in which ubiquitous processes of learning, development, and problem solving are somehow systematically misdirected into a rigid, recurrent pattern, an organization of process that is somehow self-generating and self-protective from change (Bickhard, 1989; Bickhard & Christopher, 1994). That is, in a process framework, rigidity must be a self-creating rigidity of organization of process, not a structure.

Structural approaches, then, preclude asking the central questions about psychopathology, and, therefore, preclude any genuine understanding of it. Furthermore, structure distorts conceptions of how therapy could possibly work: wielding an interpersonal sledge-hammer against personality structures is very different from nurturing the freeing up of a stuck process. Structural presuppositions are destructive of understanding the fundamental processes of mental life.

Mind as Process

I have argued that non-process approaches render impossible the understanding of representation and psychopathology. These, however, are just two examples of the general point that studies of the mind and person have yet to make the historical shift to a process framework. We still model perception in terms of the processing of perceptual atoms, learning as rearrangements of already available representations, emotions as blends of basic emotions — that is, of Empedoclean style earth, air, fire, and water (with different names, of course) — consciousness in terms of bits of qualia, and so on (Bickhard, 2000; Bickhard & Richie, 1983; Bickhard & Terveen, 1995). Substance presuppositions can be obvious, but are as often implicit and very difficult to discover and diagnose. Creating viable replacement process models, of course, not only encounters the basic difficulty of all science and philosophy, but encounters in addition the difficulty of avoiding making still another hidden implicit substance assumption in our very attempt to correct such assumptions. We already understand that life is process, not substance; it is proving, nevertheless, extraordinarily difficult to understand mind as process.

References and Further Reading

Bickhard, M. H. (1989). The Nature of Psychopathology. In Lynn Simek-Downing (Ed.) *International Psychotherapy*: *Theories, Research, and Cross-Cultural Implications*. Westport, CT: Praeger Press.

Bickhard, M. H. (1991). The Import of Fodor's Anti-Constructivist Argument. In Les Steffe (Ed.) *Epistemological Foundations of Mathematical Experience.* New York: Springer-Verlag, 14-25.

Bickhard, M. H. (1993). Representational Content in Humans and Machines. *Journal of Experimental and Theoretical Artificial Intelligence*, 5, 285-333.

Bickhard, M. H. (1998). Levels of Representationality. *Journal of Experimental and Theoretical Artificial Intelligence*, *10*(2), 179-215.

Bickhard, M. H. (2000). Motivation and Emotion: An Interactive Process Model. In R. D. Ellis, N. Newton (Eds.) *The Caldron of Consciousness*. (161-178). J. Benjamins.

Bickhard, M. H. (in press-a). Critical Principles: On the Negative Side of Rationality. *New Ideas in Psychology*.

Bickhard, M. H. (in press-b). The Dynamic Emergence of Representation. In H. Clapin, P. Staines, P. Slezak (Eds.) *Representation in Mind: New Approaches to Mental Representation*. Praeger.

Bickhard, M. H., Campbell, D. (2000). Emergence. In P. B. Andersen, C. Emmeche, N. O. Finnemann, P. V. Christiansen (Eds.) *Downward Causation*. (322-348). Aarhus, Denmark: University of Aarhus Press.

Bickhard, M. H., Christopher, J. C. (1994). The Influence of Early Experience on Personality Development. *New Ideas in Psychology*, *12*(3), 229-252.

Bickhard, M. H., Richie, D. M. (1983). *On the Nature of Representation: A Case Study of James Gibson's Theory of Perception*. New York: Praeger Publishers.

Bickhard, M. H., Terveen, L. (1995). *Foundational Issues in Artificial Intelligence and Cognitive Science: Impasse and Solution.* Elsevier Scientific.

Campbell, D. T. (1974). Evolutionary Epistemology. In P. A. Schilpp (Ed.) *The Philosophy of Karl Popper*. (413-463). LaSalle, IL: Open Court.

Campbell, D. T. (1990). Levels of Organization, Downward Causation, and the Selection-Theory Approach to Evolutionary Epistemology. In Greenberg, G., & Tobach, E. (Eds.) *Theories of the Evolution of Knowing*. (1-17). Hillsdale, NJ: Erlbaum.

Campbell, R. J., Bickhard, M. H. (2002, manuscript). Physicalism, Emergence, and Downward Causation.

Christopher, J. C., Bickhard, M. H., Lambeth, G. S. (2001). Otto Kernberg's Object Relations Theory: A Metapsychological Critique. *Theory and Psychology, 11*(5), 687-711.

Cummins, R. (1996). *Representations, Targets, and Attitudes*. MIT.

Dretske, F. I. (1988). *Explaining Behavior*. Cambridge, MA: MIT Press.

Fodor, J. A. (1981). The present status of the innateness controversy. In J. Fodor *RePresentations* (257-316). Cambridge: MIT Press.

Fodor, J. A. (1990). *A Theory of Content*. Cambridge, MA: MIT Press.

Fodor, J. A. (1998). *Concepts: Where Cognitive Science went wrong*. Oxford.

Joas, H. (1993). American Pragmatism and German Thought: A History of Misunderstandings. In H. Joas *Pragmatism and Social Theory*. (94-121). University of Chicago Press.

Kim, J. (1993). *Supervenience and Mind.* Cambridge University Press.

Kim, J. (1997). What is the Problem of Mental Causation? In Chiara, M. L. D., Doets, K., Mundici, D., van Benthem, J. (Eds.) *Structures and Norms in Science*. (319-329). Dordrecht: Kluwer Academic.

Kim, J. (1998). *Mind in a Physical World*. MIT.

Millikan, R. G. (1984). *Language, Thought, and Other Biological Categories*.
　　　Cambridge, MA: MIT Press.

Millikan, R. G. (1993). *White Queen Psychology and Other Essays for Alice*.
　　　Cambridge, MA: MIT Press.

Rosenthal, S. B. (1983). Meaning as Habit: Some Systematic Implications of Peirce's
　　　Pragmatism. In E. Freeman (Ed.) *The Relevance of Charles Peirce*. (312-327).
　　　La Salle, IL: Monist.

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Biography

Mark H. Bickhard obtained his Ph.D. in Human Development from the University of Chicago. He is the Henry R. Luce Professor of Cognitive Robotics and the Philosophy of Knowledge at Lehigh University. His research program consists of developing naturalistic models of the person, spanning the range from the emergence during evolution of biological functions and knowing to the characteristics of full cultural persons.

Endnotes

[1] Here is the gist (see Bickhard & Campbell, 2000; Campbell & Bickhard, 2002): Emergent properties or entities are supposed to emerge in higher levels of organization. Setting aside such issues as what constitutes a *level*, I will proceed via a rebuttal to an argument of Kim (1993, 1997, 1998). Either all causal power is resident in basic physical particles, in which case all "emergence" has no independent causal power — it is causally epiphenomenal — or else some genuinely emergent causal power is produced, in which case basic physical causality is not all that determines physical process. In other words, either no genuine emergence, or else no physical closure of causal processes (a kind of emergent dualism).

In this argument, particles, which have no organization, are the locus of causal power, while organization is merely the arrangement within which, the stage setting for, the working out of the causal interactions of the particles. Organization is not a legitimate locus of causal power.

But there are deep problems, both logical and scientific, with the particle view presupposed in this argument. The scientific point is, perhaps the simplest: there are no particles. Quantum field theory renders everything in terms of quantum fields. Particle-like phenomena are the result of the quantization of the field processes, and that quantization, in turn, is akin to the quantized number of waves in a guitar string. There are no guitar sound particles.

But (quantum) fields are processes, and processes are inherently organized. The notion of a point process makes no sense. In such a process view, then, everything that has causal power does so in virtue of, among other things, its organization. If organization is delegitimated as a locus of causal power, as in a particle framework, then there is no causality in the universe. Conversely, if a process framework is adopted, then organization is legitimated as a potential locus of causal power — included such macro-level organization as constitutes living entities and as constitutes mental processes. In this view, Kim has discovered a *reductio ad absurdum* of non-process metaphysics: they make genuine non-dualistic emergence impossible.

This argument does not provide a model of any specific emergence, but it does clear the metaphysical obstacles away that seem to block any possibility of genuine causal emergence. But, if the argument is correct, genuine emergence can be accounted for only within a process metaphysics.

[2] The closest to addressing this question that is usually found in the literature is the posit of self-fulfilling hypotheses in dealings with the world as a model of why disconfirmations and learning one's way out of pathology do not easily occur. Self-fulfilling presuppositions about the world certainly occur: if I am angry and suspicious about others in anticipation of their disapproval and criticism, then I am likely to find plentiful confirmation of my presuppositions. But such self-fulfilling cycles are never exact. Some people do not respond as readily to my provocations, and others may be simply having a very good day. Why don't I learn such differentiations, and, eventually, learn my way right out of my self-fulfilling cycle? That is, self-fulfilling prophecy cycles do occur, but their rigidity equally requires explanation. They are a part of the problem, not its solution.