Interactivism:

A Manifesto

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Why a manifesto? Interactivism is a complex philosophical and theoretical system; its focus is on the mind and person, but it also extends beyond those domains. The assumptions underlying and framing this system differ strongly from those that dominate contemporary studies of the mind and person — across philosophy, psychology, cognitive science, neuroscience, and other related disciplines. The point of a manifesto is to outline and argue for such a framework of assumptions. If they are correct, as I and others contend, then much of the work in these areas is fundamentally misguided and in error. Conversely, what is required is not just a new, better model or theory, but a basic shift in those deeper assumptions. That is what I wish to urge upon the reader.

Interactivism, however, did not begin with such scope, nor did it begin with any such intentions. Instead, it has grown through a process of coherence- and consistency-seeking relative to the underlying assumptions in its relatively narrow first beginnings — so much of the study of minds and persons is dominated by assumptions that are inconsistent with those that I began with that the choice I kept encountering was either to give up what I had developed, or to diagnose, critique, and replace the offending interfacing work. The choice was *forced*: models of narrower processes must ultimately interface and integrate with related phenomena, but, if the available models of those related phenomena could not be integrated with the model that I already had developed (because of those inconsistent underlying assumptions), then the goal and desideratum of such integration had to count as a potential refutation against one or the other of the offending theories. Because I am persuaded that the assumptions framing the interactive model are correct, and have only become more so over the decades of its development, my choice has been to continue extending the model into new phenomena in ways that are consistent.

So, What is Interactivism?

The interactive model has a number of levels, ranging from the metaphysical to particular theoretical models for particular phenomena. At the broadest level, interactivism involves a commitment to a strict naturalism. By naturalism is meant (roughly) a regulative assumption that reality is integrated; that there are no isolatable and independent grounds of reality, such as would be the case if the world were made of Cartesian substances; that there is no ultimate barrier to further questioning and potential understanding, such as would be the case if the world were made of Empedoclean earth, air, fire, and water. In such a case, for example, (as well as for the Cartesian version of a substance metaphysics) it would not make sense to ask Where does earth come from? or Why is water stable? Such basic substances are the limits of understanding. The grounds for naturalism are at least two-fold: 1) the history of science seems to show that there are no such barriers to further understanding — we now have naturalistic understandings of, for example, fire, heat, life, magnetism, and so on — and 2) the assumption of any such barriers at this point would itself be without warrant and a pointless obstruction to investigation.

Closely related to this naturalism is a process metaphysics: the fundamental nature of the world is organizations of process. Again, there are several grounds for this:

1) the history of science involves a progressive replacement of substance models with process models — e.g., phlogiston with combustion, caloric with thermal heat, vital fluid with self maintaining and self reproducing organizations of process, and so on —
2) our best science tells us that there are no particles, only the processes of quantum fields,
3) there are serious conceptual flaws with a strict particle metaphysics, and
4) emergence is only possible within a process metaphysics, and
    a) emergence has clearly occurred, and
    b) only by taking emergence seriously can we account for such emergent phenomena as life and mind (and representation) (Bickhard, 2000; Campbell & Bickhard, in preparation).

The name interactivism derives from the model for representation that developed within this framework. Roughly, representation emerges in the presuppositions of anticipatory interactive processes in (natural or artificial) agents. The first dubbing of the model as Interactivist was by Rita Vuyk who called the model "Radical Interactivism" in Vuyk (1981), and I decided that the term captured the spirit of the model well.

The general interactivist model also includes models of virtually all other mental and some social phenomena, such as learning, emotions, consciousness, language, perception, memory, motivation, neural realizations of mental phenomena, the nature and emergence of social reality, the nature and emergence of human sociality and the social ontology of the person, development, personality and psychopathology, rationality, and so on. It also addresses phenomena such as normative biological functionality, the rationality of realism, truth, progressiveness, and "induction" in science, the emergent evolution of the biosphere, and so on. (See Bickhard, 1978, 1980b, 1992c, 1992d, 1993, 1995, 1996, 1999, 2000b, 2000c, 2001, 2002, in press-d, in preparation; Bickhard & Campbell, 1996; Bickhard & Christopher, 1994; Bickhard & Terveen, 1995; Campbell & Bickhard, 1992b; Campbell, Christopher, Bickhard, in press; Christensen & Bickhard, 2002; Levine & Bickhard, 1999.)

This architecture of metaphysical commitments and models is not a deductive system; you cannot begin with the metaphysics and deduce the models. Instead, it is a nested hierarchy or lattice of *constraints*, beginning with the metaphysical and reaching deep into the theoretical, within which ever more specific modeling and constraint discovery can take place. Explorations into the social or biological, for a slightly different example, proceed by adopting the broadest possible set of constraints that apply, and exploring for their implications and for any further constraints that might be found. The model of the nature of language does not pose relevant strong constraints for exploring the nature of evolutionary species, for example, but the model of emergence does. The general approach, then, can be extended horizontally (e.g., into the biological or social) as well as vertically (e.g., deeper into the mental).

What are the Relationships between Interactivism and Other Theories?

Interactivism shares with Piaget's genetic epistemology a pragmatist commitment to process and action as the proper framework for modeling mental phenomena. It shares the entailment from an action base to a constructivism — the only way that action systems can be created is by construction; action systems cannot be created by passive processes such as transduction or induction. But interactivism differs strongly from Piaget in giving a central (though far from exclusive) importance to processes of variational construction and selection. Interactivism borrows freely from Piaget for some particular models, e.g., of manipulable objects. Interactivism is broader than Piaget's model, addressing, for example, emotions, language, biological normative function, and a number of other phenomena that Piaget did not address with explicit models. The interactive model diverges from Piaget in a number of particular and general ways. Perhaps most important is a rejection of the widespread notion of figurative knowledge in Piaget, particularly, though far from exclusively, in perception. This notion has introduced a vestigial encodingist conception of representation into Piaget's models at several points (Campbell & Bickhard, 1986; Bickhard & Campbell, 1989; Bickhard, 1992). The interactive model of representation is different from Piaget's, as is the model of the epistemology of logical and mathematical necessity, and so on. The developmental model within interactivism has been called neo-neo-Piagetian, and I suppose that is not inaccurate in some respects, though it does not convey the breadth of the model or the divergences from Piaget's work. It also suggests that the interactive model emerged out of genetic epistemology, but that is historically inaccurate.

More broadly, the interactive model is pragmatist in its process and action framework, in its criticisms of encodingism (e.g., spectator models, as the pragmatists sometimes called them), in its focus on consequences in action and interaction. It differs in its explicit model of representation, among other places: Peirce's model of representation most resembles external representation rather than mental representation, in this view. The interactive model of representation is more akin to Peirce's model of meaning. Dewey's discussions of language sometimes sound very much like the

interactive model of language, but he had no real details, and interactivism would not join with Dewey in rendering truth as warranted assertability. The interactive model of perception is much like Gibson's theory, but some careful work separating Gibson's theory from his metatheory has to be done before that comment will hold, and even then there are still some differences (Bickhard & Richie, 1983). Many models of language have focused on action and pragmatic aspects of language, including context dependencies, but they all retain an encoding model of representation, usually of propositions (Bickhard, 1980, 1987; Bickhard & Campbell, 1992; Campbell & Bickhard, 1992). And so on: there are many partial convergences with and borrowings from the literature into the interactive model, but fundamental differences also exist in each case.

How does Interactivism Connect with Data?

The warrants for many of the broader, metaphysical, commitments of interactivism are not empirical in any direct way, but rather derive from the fact that these positions make possible models and understandings that are impossible within alternative frameworks. These commitments avoid fatal problems that alternative frameworks and approaches and models cannot avoid. The millennia old problem of encodingism as a framework for modeling representation, for example, if the critique is correct, has never before been dissolved or solved. The interactive model of representation claims to do exactly that for the very large family of fatal problems that are associated with encodingist assumptions (no matter how deeply implicit).

Turning now to some empirical explanations and predictions: The interactivist model of perception predicts that people have no problem estimating relative temporal durations or accelerations, something that is impossible on standard snapshot models of perception. Piaget was among the few who realized that this was a problem, including for his own model, but, if perception is an ongoing temporal process, rather than a file of snapshots, then such estimations are no problem at all, and that is in fact what we find (Richie & Bickhard, 1988; Ramalho, 1990). With respect to perception, the interactive model is closer to Gibson than to Piaget.

The developmental model predicts that there will be an initial domain general, relatively age synchronous stage shift, which is empirically found to occur at about age

3.5-4, followed by non-domain-general and non-synchronous further stage developments. It is the only model to make such a prediction; it made it as early as the early 1970s; and it appears so far to be what we find (in spite of the general refusal to consider domain general changes) (Bickhard, 1992b).

Associated with that change, there should be a neural maturation, probably a myelinization, in substrate neural architecture. At least one part of that architecture is likely to involve a pre-frontal to head-of-caudate to reticular nuclei of the thalamus projection. The caudate to thalamic projection, in particular, is a good candidate. This has not been empirically explored.

The rationality model and the associated philosophy of science model explain a number of phenomena in science, such as the progressivity of science, the rational role of truth and realism in science, and the rationality of apparent induction, that are seriously problematic on standard approaches. The rationality model makes predictions about what sorts of educational and curriculum designs should work best, a prediction confirmed in at least one study (Wu, 1993).

The model explains the developmental sequence of, in modified Tulving terms, enactive, semantic, episodic, and autobiographical memory (Bickhard, 1992b) — a sequence that makes no sense from standard encoding perspectives. And so on. In general, the model makes contact with the empirical world in many places, though only a few have been empirically tested. (For another, one that initiated a family of research [sorry for the pun], see Wedemeyer, Bickhard, Cooper, 1989.)

What's Wrong with Dominant Assumptions?

The study of the mind is the last major holdout against the historical abandonment of substance models for process models. Phlogiston (fire), caloric (heat), magnetic fluid (magnetism), vital fluid (life) are all recognized as not only false models for their respective phenomena, but the wrong kind of model. Neither fire nor heat nor magnetism nor life are phenomena of particular substances. Instead, each is a kind of process.

Furthermore, our best contemporary science tells us that there are no substances. Fundamental physics models all of reality in terms of quantum fields, not substances — and not particles (Aitchison, 1985; Bickhard, 2000; Brown & Harré, 1988; Cao, 1999;

Davies, 1984; Halverson & Clifton, 2002; Kaku, 1993; Nakahara, 1992; Ryder, 1985; Saunders & Brown, 1991; Weinberg, 1977, 1996, 1997, 2000). Particle models partially fit because of the quantization of the field processes, but that quantization is akin to the integer number of vibrational waves in a guitar string, and there are no more physical particles than there are guitar sound particles. So, a substance approach to understanding mental phenomena can at best be heuristic — there is no ground in underlying physics — and is conceptually dangerous even as a heuristic.

For example, substances, and structures made out of substances, are inherently stable. They change if something makes them change, but otherwise do not. If we are attempting to model psychopathology, and are using a substance/structural framework, we will inherently model pathological phenomena as stable. Unlearning or changing such structures will require specific intervention. But, if mind is process, intrinsically self-organizing, then the deep problematic of psychopathology is precisely why it remains stable. Why don't we all "just" unlearn such pathologies? A substance framework, then, even as heuristic, puts the most basic questions of stability and change beyond examination: stability is presupposed, and therefore is not a phenomenon requiring explanation.

Still further, a substance metaphysics makes emergence impossible — Empedocles' earth, air, fire, and water cannot support the emergence of a new kind of substance, nor of new earth, air, fire, or water. But virtually everything in the universe has emerged since the Big Bang, and substance approaches cannot account for that. In particular, a substance metaphysics makes *normative* emergence impossible — substances are not themselves inherently normative, and Hume's argument concludes that norms cannot be derived from, or emergent from, facts such as about substances.

But almost nothing about mind or the person can be understood without taking normativity into account. Representation is normative: it can be true or false. Learning is normative: it can succeed or fail. Rationality, psychopathology, social interaction, forms of language, as well as ethics, are all normative. Substance frameworks have nothing to say about the central normative aspects of these and related phenomena, and, therefore, little to say about the mind or person.

Process and emergence, and the emergence of normativity in particular, must be addressed and understood in order to adequately model the mind and person. So long as we continue within a framework of substance metaphysical presuppositions, we will remain in a position akin to someone attempting to model fire with a more successful substance account than phlogiston. It is not just the particular model in terms of phlogiston that must be rejected and overcome, it is the entire substance framework out of which the notion of phlogiston is proposed. Substitute representation, cognition, language, psychopathology, emotions, memory, development, sociality, and so on for phlogiston, and you have the state of contemporary studies of the mind and person.

Representation. I will make these points more specific with respect to part of the original core of the interactive model: representation. Consider a paradigm of a substance model of representation, Plato and Aristotle's analogy between perception and the impression of a signet ring into wax. One of the central problems that this example illustrates is the problem of the normativity of representation. There are a number of relationships between the form in the wax and the form of the ring, and several of them have been — and still are — taken to constitute the crucial representational relationship. Suppose that it is the causal relationship between the pressing of the ring and the impression in the wax that is taken to be constitutive of representation. Then here are some of the problems that emerge:

- If the causal relationship exists, then the representation exists; if the causal relationship does not exist, then the representation does not exist. These are the only two possibilities, and this leaves no way in which the case of "a representation exists but is false about what it is representing" can be modeled. There are only two possibilities in the modeling resources, but three distinction representation conditions must be modeled: exists and is correct, exists and is incorrect, and does not exist.
- Within the strictly factual realm of the causal relationship, there are myriads of causal relationships throughout the universe — every instance of causally paired events — and almost none of them is representational. What is special about those that allegedly are representational?

- Causality is transitive, so if the causal relationship exists with the ring, it also exists with the quantum activities in the ring, with whatever is pressing the ring, with the ring a second ago, with the ring a year ago, with the materials out of which the ring is constructed, with the stellar processes that constructed those materials, and so on. In the case of vision, relationships with the light similarly proliferate. Which of these is to be the crucial representational relationship? And how does the perceiver "know" what that special relationship is (supposed to be) with? Note that this last question is the representational question all over again: the entire account contains a circularity at its core.

All of these problems recur regardless of which relationship between the ring and the wax is selected as the constitutive one: causal, nomological, informational, or iso- or homo-morphic. And they recur if we substitute the latest technological analogy for signet rings and wax: "transduction" of light in the retina and learning as "induction". There is no resource for capturing the normativity of representational content.

Focusing on the content aspect of this problem, we find, for example, arguments that, because we have no model of the origin of representation in learning, it must all be innate (Fodor, 1975, 1981).[1] But, within these frameworks, evolution cannot solve the normativity problem anymore than can learning or development. And if it is presumed that evolution somehow can solve this problem, then there is no argument available about why learning and development could not avail themselves of the same kinds of processes.

Piaget pointed out a version of this issue: if representation of the world were in some sense a copy of the world, then we would have to already know the world in order to construct our copy of it (Piaget, 1970). Once again, the issue of content remains unmodeled. Any presumption that it *is* modeled is circular because there is simply no way to model the origin of normative representational content within a substance

[1] But see Fodor: "the argument has to be wrong, ... *a nativism pushed to that point becomes unsupportable, ... something important must have been left aside*. What I think it shows is really not so much an a priori argument for nativism as that *there must be some notion of learning that is so incredibly different from the one we have imagined* that we don't even know what it would be like as things now stand" (Piattelli-Palmarini, 1980, p. 269)

framework: substances are factual, not normative, and substances do not permit emergence, certainly not normative emergence.

This circularity with respect to content is often manifested as a source of such normativity within the alleged model of normative representation itself. This can be implicit, as when there is one or more hidden homunculus interpreters that provide and translate representations, or explicit, as when representation is "modeled", but only from the perspective of some observer of, or commentator on, the overall situation who then becomes the source of judgement that some "representation" is correct or incorrect. Representation must ultimately be modeled as emergent within cognitive systems themselves: it presumably emerged in that way during the course of evolution.

Another perspective on this point concerning content derives from a kind of correspondence relationship that *is* a representational relationship: genuine encodings. "…" encodes "S" in Morse code, for example, or neutrino counts "encode" properties of fusion processes in the sun. These are unproblematic relationships in themselves, but encoding cannot be a foundational form of representation because in all cases of genuine encodings, both ends of the encoding relationship — e.g., "…" and "S" — as well as the relationship itself, must be already known, already represented, in some agent's mind in order for the encoding relationship to exist at all. Encodings make use of representation; encodings transform the form of representation — "…" can be sent over telegraph wires while "S" cannot. Encodings do not generate emergent new representations, do not provide basic representations.

Encodings are derivative forms of representation. "…" borrows its content from "S". The significance of the neutrino counts is in terms of already known and represented models and parameters concerning fusion in the sun. An encoding can be defined in terms of other encodings, and perhaps those in terms of still others, but in some finite number of steps a base of representations must be available that serves as the foundation out of which all other "encoding" representations can be defined. It is this base that Fodor argues must be innate because we have no models of how any such foundational representation could emerge. Consider an element of such a basic set: how does it receive its representational content? If it is defined in terms of other representations, then it is not foundational, contrary to assumption. But that leaves only

that element itself, “X” say, as the source of representational content. But ““X” represents X” does not suffice to provide any content at all, and thus does not suffice to constitute “X” as a representation at all. The assumption, whether implicit or explicit, that all representation is of the form of encodings — encodingism — encounters this basic incoherence at its roots.

A substance metaphysical framework forces representation to be modeled as some sort of factual relationship that somehow represents, encodes, whatever is to be represented. But encoding is a normative concept, and substance models cannot make good on it. The assumption that all representation is some form of encoding cannot work, and must finally be abandoned (Bickhard, 1993, in press, in press-b; in press-c; Bickhard & Terveen, 1995).

This raises the obvious promissory note for a model of representation that can address these issues. But, before outlining such a model, I would like to point out that the difficulties and impossibilities illustrated for substance frameworks attempting to model representation all turn on the inability of substance metaphysics to handle emergence, and especially normative emergence. As such, versions of these problems recur for every normative phenomenon that we might wish to address. With respect to mind and the person, that includes virtually every phenomenon of any relevance. Substance metaphysics render minds and persons impossible to model and impossible to understand. A massive elimination of these approaches is needed, though that is not to be easily accomplished: substance presuppositions can be subtle and ubiquitous. They are not necessarily obvious, and the problems that they produce are not necessarily obvious either.

The Interactive Model of Representation

Normativity involves an asymmetric distinction between normative good and bad. In the case of representation, this normative asymmetry is between true and false. Making distinctions is easy in the factual world — any differential response will accomplish that — but modeling the normative asymmetry of the distinction is far more problematic. This is particularly so since most of the laws of physics are inherently symmetric — but not all of them. I propose to derive normative asymmetry from an

asymmetry in thermodynamics. In particular, a system that is at thermodynamic equilibrium will stay at equilibrium without any additional intervention. A system that is far from equilibrium, in contrast, must have ongoing interactions and exchanges with its environment in order to stay far from equilibrium. A far from equilibrium system that is isolated will cease to exist as it goes to equilibrium. This is the basic generative asymmetry out of which normative asymmetry emerges.

Most far from equilibrium systems are maintained in their far from equilibrium condition by external processes. A set of pumps may pump chemicals from various reservoirs into a chemical bath, thus maintaining the bath at a far from equilibrium condition. Such systems can exhibit many important phenomena, such as self-organization. More important for my purposes, however, are far from equilibrium systems that make their own contributions to the maintenance of their far from equilibrium condition. A candle flame is a canonical example. It maintains above threshold combustion temperature, vaporizes wax into fuel, and, in standard gravitational and atmospheric conditions, induces convection, which brings in fresh oxygen and gets rid of waste products. I call such systems *self-maintenant*.

A *recursively* self-maintenant system, in turn, is one that can maintain its condition of being self-maintenant in response to various changes in environmental conditions. A candle flame cannot adopt any new methods to maintain itself when it is running out of candle. A bacterium, however, may be able to swim so long as it is swimming up a sugar gradient, but tumble for a moment if it finds itself swimming down a sugar gradient (Campbell, D., 1974, 1990). Swimming is self-maintenant if pointed toward higher concentrations of sugar, but it is dysfunctional if pointed toward lower sugar concentrations.[2] Similarly, tumbling is a contribution to the maintenance of far from equilibrium conditions if the bacterium is pointed toward lower sugar concentrations, but not if pointed in the opposite orientation. Recursive self-maintenance, then, requires sensitivity to the environment, and appropriate switching between or among available interactions with the world in order to select an interaction that maintains the condition of being self-maintenant in the face of differing conditions.

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[2] I do model normative function in these terms, but will not develop that model here (Bickhard, 1993, 1998b, 2000c, in press; Christensen & Bickhard, 2002).

The key property here for current purposes is that such selection of interactions involve *dynamic presuppositions* about the environment. Swimming is only appropriate in certain kinds of environmental conditions and relations, and is inappropriate otherwise. In that sense, swimming presupposes that ***this*** environment is one of those environments in which swimming is appropriate. But such presuppositions can be *wrong*; they can be *false*. The bacterium may swim up a saccharin gradient as well as a sugar gradient, and that does not contribute to the maintenance of its far from equilibrium condition. Here, I claim, is the fundamental emergence of representational normativity.

Much more needs to be elaborated for this to address issues of representation across multiple levels of kind and complexity — How could such a model handle representations of objects? How could it address representations of abstractions, such as of electrons or numbers? How could it model *system detection* of representational error, as in error guided behavior and learning?[3] What about memory, perception, learning, imagery, concepts, language, and so on and on. All these are addressed elsewhere, and I will not recap the specialized models here (Bickhard, 1980, 1992c, 1992d, 1993, 1995, 1998, 1998b, 1999, 2000b, 2001, 2001, in preparation, in press, in press-d; Bickhard & Campbell, 1992, 1996; Bickhard & Christopher, 1994; Bickhard & Richie, 1983; Bickhard & Terveen, 1995; Campbell & Bickhard, 1986, 1992b; Campbell, Christopher, Bickhard, in press; Christensen & Bickhard, 2002). Suffice it for current purposes to have offered an account of the *emergence* of *representational normative content*, however much in a primitive form, within a *process* rather than a substance framework. The aporia of substance frameworks can be left behind.

Conclusion

Phenomena of mind and person are normative phenomena, emergent normative phenomena. Substance metaphysics are false and misleading about the physical, chemical, and biological world, and they make any account of genuine emergence impossible. They especially preclude accounting for normative phenomena because

[3] This is actually easy for the interactive model (Bickhard, 1999, 2000b, in press; Levine & Bickhard, 1999), but is impossible for any other model in the literature, and, in fact, is not even addressed by any other model in the literature.

substances are not themselves normative and they block an emergence account of normativity.

Substance metaphysics have been abandoned in physics, chemistry, and mostly in biology. They retain a dominance in studies of minds and persons. This is likely at least in part due to the particular difficulties that substance frameworks impose on any attempt to address normative phenomena: substance frameworks are not only false, they preclude emergence, and yet they make emergence the only naturalistic option for normativity because substances themselves are not normative. It is long past time to transcend these perplexities, to abandon the frameworks and assumptions that produce them.

A process metaphysical naturalism for mind and person is possible, has been developing for some decades, and extends in multiple directions. It originated with an interactive model of representation, and, consequently, the entire model has been dubbed interactivism. Interactivism not only offers particular models for many phenomena of mind and person, it also offers a demonstration that a "process naturalistic emergence" approach can be carried out, and with fruitful results. That is, interactivism offers particular models for particular phenomena, *and* a demonstration of possibility and particular guidance for further theoretical and empirical development within such a process framework.

All theories are ultimately found wanting. It would be inconsistent to argue for the detailed truth of the interactive model: the model forces an epistemological fallibilism. But progress in science proceeds as much by the discovery of new errors to be avoided and new ways to avoid them as it does by the accumulation of timeless truths: Aristotle's physics involved laws that changed from one place to another; Newton introduced a criterion of place invariance, and that rejected Aristotle; Special Relativity introduced a criterion of velocity invariance, and that rejected Newton; General Relativity introduced a criterion of acceleration invariance, and that forced a shift from Minkowski space-time to Reimannian geometry. It is already historically obvious that substance approaches must be replaced with process approaches. Interactivism demonstrates that this holds for mind and person just as much as it does for fire, heat, and life.

False assumptions doom science to ultimate failure and often to irrelevance: witness phlogiston, caloric, associationistic behaviorism, and two-layer perceptrons. Interactivism is at the forefront of the exploration of process naturalism with respect to the normative phenomena of minds and persons. Interactivism is the entry into the future.

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