

Microgenesis and the Mind/Brain State

Interviews with Jason Brown

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This publication is composed of three interviews conducted with Jason W. Brown a few years ago. The first is concerned with early influences that shaped his development of a theory of “microgenesis”. The second focuses on evolutionary principles apparent in brain development and mental processes. In the third interview, Brown discusses the internal processual structure of the “mind/brain state”.

The concept of microgenesis stands in the center of Brown’s work over the decades. It refers to the development of a mind/brain state within a brief present-time scale, be it a percept, a thought, an intuition, or an emotion. The occurrence of a consciously experienced state is understood as a dynamic unfolding and differentiation of a “germ” state which is already embodied in the early stages of microgenetic development. There are a number of points of contact between microgenesis and Alfred Whitehead’s process philosophy.

Brown’s most recent book at the time of the interviews was *Process and the Authentic Life* (2005). Since then he has published *Neuropsychological Foundations of Consciousness* (2010), *Gourmet’s Guide to the Mind* (2012), *Love and Other Emotions* (2012), and the forthcoming *Microgenetic Theory and Process Thought*. His classic work *Self-Embodying Mind* was reissued in 2010 with a new prologue. A *festschrift* in his honor, *Neuropsychology and Philosophy of Mind*, was published in 2008.

Early Influences

David Bradford (DB): Major scientific projects often have a guiding metaphor which shapes the work and serves implicitly as a measure of adequacy. Were there certain images or metaphors that influenced your work from its very beginning, Jason?

Jason Brown (JB): Yes, there is one: a tree or a fountain, understood as the recurrent generation of form, as compared with a river, which portrays time as flowing. These metaphors have been in my mind since the earliest days. I could say now, years later, that the root is the “core self”, the branch is the “concept”, and the leaf is the “object”.

DB: Root, branch, and leaf represent progressive degrees of differentiation. A fountain’s water rises from a single source to traverse a given

set of paths. Both the tree and fountain imply recursion with small adjustments. A river carries novel objects, always in one direction. These metaphors turn on different conceptions of time and change. Was there a particular source for your interest in time and the manner in which it brings about change?

JB: A source of which I am very much aware was Bergson and his work on pure duration. He does not have recurrence as a prominent theme, but he does have the notion of time as a point rather than a continuum. By contrast, the conventional way of thinking about time is to stand above and see it as a line in space rather than a point that recurs. He also viewed perception as an active, productive process which contrasts with the passive in-processing account in neuroscience at that time and up to the present day.

I read Bergson as a teenager and I think somehow these ideas were percolating in the shadows as I began my medical studies. I drifted quite far and did not return to this topic until many years when I began to study psychology and brain function, starting with work on aphasia, a disturbance of the comprehension and formulation of language correlated with dysfunctions in specific brain regions.

DB: What scientific work influenced your early aphasia studies?

JB: One early influence was Paul Weiss, in embryology, who wrote about plasticity and specification; and there were others who had the idea of progressive specification, of individuation or differentiation, rather than accumulation or aggregation. Instead of aggregation or combination as the manner of formation, the idea of wholes that specified into parts was also a guiding metaphor. The metaphor of depth-and-surface was there, too, beginning with Freud's topographic theory, his metapsychology, the work on symptom formation and the transition from unconscious to conscious. Hughlings Jackson, in neurology, had similar ideas. There were several sources in evolutionary biology, people like Herrick, not well known today, and Jennings on the idea of an archetypal or iconic form that is transmuted in different organisms.

Another important influence on my studies of aphasia was the work of Arnold Pick, some of whose writings I had translated into English. Pick had a genetic model of language production, in which an utterance is realized over stages. Paul Schilder also took this approach in neuropsychology, postulating a succession of stages in the realization of an utterance. His paper on the development of thought was critical in my early years. Along with David Rapaport, he might be considered the father of a genetic school in psychoanalysis, in which a qualitative development from unconscious to conscious phases replaced the various interpretations of how ideas become conscious in Freudian orthodoxy.

DB: And how did you get concretely involved with your own work?

JB: None of the ideas just mentioned were formulated in any systematic way, but they were lodged somewhere in memory and framed the way I approached the work that followed on aphasia. I was well prepared for my year in Boston with Norman Geschwind. I had been reading extensively on aphasia and was in the process of writing a book on the topic when I came to Boston.

However, instead of developing separate models for different phenomena, I tried to explain as much as I could in terms of an underlying framework model. I also tried to incorporate a range of observations as arguments for the model, as if its explanatory power derives from its breadth; and to show, or at least prove to myself, that the model was general, authentic, and consistent across the many psychopathological disorders.

DB: Aphasia was your earliest testing ground. You then turned to other functional areas.

JB: As the model took shape, it became apparent to me that it was also applicable to the apraxias, or disorders of action-development, as well as to the agnosias, the disorders of perception that account for deviations in object-development. But the aphasia studies were, and still are in some respects, the doorway to neuropsychology.

DB: And the formulation of a comprehensive theory moved forward continuously.

JB: Yes, continuously but slowly. As you know, the history of aphasia is the history of progressive localization, leading from the phrenologists to Broca, who was as much the last of the phrenologists as the first of the aphasiologists. This led to more precise descriptions and localizations of part-functions, and finally to functional modules, columns, and grandmother cells. Those who protested – the holists – did not have an alternative model; as Rapaport said in a different context, they were ministers without portfolios, critiques without solutions. The problem was to organize the aphasia symptoms in a theory that was consistent within a given domain of functions and across different aspects of language performance, both normal and pathological. The task was to see language perception and production from a unitary standpoint.

When it became clear that the posterior aphasias, which were considered problems in both production and perception, and the anterior aphasias, which were thought of as production disorders, could be understood in terms of a common processing sequence, this allowed me to meld perception and production into a common system. This goes back to Bergson's active or productive theory of perception.

DB: Holistic accounts were unwelcome or ignored when you began the aphasia studies. Why was that?

JB: Consider the history. The standard theory goes back to Meynert and Flechsig. This was the basis for the earliest schemas of aphasia, and the basic outline that has guided thinking on the topic ever since. It is important to stress that the early history of aphasia is also the history of neuropsychology. Since language has been the most localizable function of the brain, the thinking was that if one could not localize language, forget about localizing everything else. Certain conditions like word deafness and auditory agnosias were interpreted as defects at different points in the processing of auditory information. The auditory or the visual signal was thought to arrive at the primary areas, then on to secondary and tertiary areas, and to association cortex.

In this view, there is a linear progression to more complex and multimodal areas by way of association pathways. The secondary and tertiary areas served for “higher” processing and the combining or assembling of sensory data. It was common knowledge that the association or integration cortex in the frontal and parietal regions had undergone the greatest growth in the evolutionary sequence leading to man, and so they were naturally treated as the highest regions of the brain mediating the most complex modes of human thought. But this way of thinking was a fundamental error.

DB: ... because it was not holistic enough?

JB: More than that, there were anatomical difficulties relating to the standard model of neocortical in-processing. For example, work by Bishop and Sanides showed that primary cortices were more recent in evolution than association or integration cortices, so if the direction of the cognitive process had anything to do with evolutionary process there should be a mapping of the evolutionary pattern of forebrain growth to the pattern of realization in language perception and production.

What prevented researchers from considering this idea was the computer model of the brain. Here, both the substrate and the sequence of manufacture were presumed to be unrelated to function, so the anatomical substrates of language were seen as secondary to the theory of language. The idea of input and output mechanisms reduced the complexity of perception and action systems to a sensory and motor apparatus.

In this view, the brain was conceived as a fixed structure, like a radio or television set, now a computer, and the mind as something that overlaid this structure or was discharged through it, like software driving the brain machinery. This is clearly not a dynamic system.

The introduction of evolutionary anatomy and the idea that cerebral growth persisted in patterns of cognitive functions offered a dynamic perspective on prevailing structure, but the field was not ready for such a paradigm shift. Moreover, the details of the new concept still had to be worked out. In the early days of my aphasia work, I could only attempt

to develop from the pathological material a concept of normal and pathological language, and map this system onto evolutionary stages in the brain.

DB: So, summarizing all this, your theory differed from established views on several counts. Linguistic process was viewed as exclusively neocortical and advancing in a point-to-point fashion from primary areas to “higher” centers. The understanding of structure was neutral with respect to evolutionary and morphological development. This outlook lends itself to later computer analogies in which structure is analogous to hardware, and cognitive process is viewed as software which runs without intrinsic links with structure. The localization theory of the time laid the groundwork for the modularity of later cognitive neuropsychology. You were intent on understanding language and later perception and action as expression of a single process whose pattern of activation accorded with the growth planes of brain development.

JB: Yes, David, this is exactly right. And the work of Sanides was important to me, not as a basis for my own thinking, but as an affirmation of my heading in the right direction from an anatomical standpoint. Another anatomist who offered support was Dee Pandya. Dee was a closet Sanidesian, so to say, with an evolutionary way of thinking. He encouraged me to pursue the path that I was on, a quite radical path, in which the primary areas were conceived, not as the initial sites in the reception of sense data which are then assembled into more complex entities, but as termini of the bottom-up actualization.

At the time there was only one theory of brain and language, and that was the old model of centers and pathways. I studied this with my first teacher, Johannes Neilson in California, the leading expert of his days on aphasia. He was thought to be a “localizer”, but his work was subtler than is commonly believed. My next teacher, Norman Geschwind, was a true believer in the static model of the brain, in which language functions were deposited in bins and boxes. In this model it was impossible to map to a dynamic neurology, much less to a dynamic theory of cognition.

When it dawned on me that one could explain the posterior aphasias in terms of levels of perception which correspond with levels of action production, this opened the way for a unified theory. Many thought at the time, and still do, that language is put together in the back of the brain and sent to the frontal lobes for speech. The idea of a simultaneous development from bottom up, from the archaic to the recent in evolutionary structure – a posterior system for language perception, an anterior system for production – was so far outside the usual paradigm that it did not receive much attention in the aphasia community. I was certain that language did not spring *de novo* from a genetic mutation, but was grafted on perceptual and action systems inherited from our animal ancestry.

DB: After all, one of the major deficits of psychology and cognitive science until today is their lack of a consistent overarching theory. Your work in neuropathology was guided by the impulse to move toward such a theory.

JB: Yes, though the initial stages of synthesis occurred without full conscious attention. I recall William James, who wrote, probably in his essay on Fechner, that philosophy is not so much a matter of logic as of vision, the logic coming afterward to fill in the vision. So there was this idea, and then I looked for evidence in order to document it, to confirm it, to work it out.

Evolutionary Principles in Microgenesis

DB: As you indicated at various points before, the principles operative in mental process resemble those active in evolution. For example, as selection pressures determine physical adaptations, so sensory constraints shape object-formation, doing so on a moment-by-moment basis. This is one example. The comparison of evolutionary and microgenetic theories plays a significant role in your approach.

JB: Darwin had certain basic principles in his theory of evolution into which he collapsed the diversity of life forms; survival of the fittest, selection pressure, and adaptation to the environment are the main examples. One could say he tried to explain the diversity in terms of a few common principles. My way of thinking has been similar: to understand the diversity of pathological forms by means of a few underlying principles.

As it turns out, they are evolutionary principles similar to the Darwinian idea of natural selection and competition among organisms. The concept of sensory constraints on object-formation corresponds with the elimination of the unfit. The environment in the form of sensation trims the potential for a diversity of objects to those that conform to the external world. The objects before us are momentary adaptations that have “competed” for survival during the final phases of the object-formation.

The evolutionary theme plays out in the micro-temporal process of the unfolding of thought, act, object, and utterance. A person without natural constraints on object-formation has an illusory or hallucinatory world, and will be, or soon become, psychotic, perhaps placed in an institution where his fictitious perceptions will not subject him to risk.

DB: We are moving quickly. The mental state is central in microgenetic theory. Its synonyms include “cognitive epoch” or “mind/brain state”. “Micro-temporal” process refers to the state’s composition and temporal characteristics. A series of phases or transitions activates neural

structure from brainstem forward, subjecting content to a series of qualitative changes. Pathology impedes or truncates transitions, and the result is symptoms. In later writings, you say the state constitutes the basic unit of time. This is a difficult topic which overlaps with ideas in process philosophy and the Buddhist theory of *nowness*. But let us first stay with evolutionary principles in microgenetic theory.

JB: While phylogenesis refers to a population dynamic in the derivation of species, microgenesis is a theory of the specification of an endogenous act or image in a single individual. Phylogenesis occurs over millions of years, microgenesis in a fraction of a second. In evolution there is excessive or exuberant production of organisms. Many more are born than will survive, and those that do survive must live long enough to reproduce through competitive interaction. This compares with object-formation in microgenesis. Its earliest phase is that of a potential for the development of many different objects, images, dream-like forms. There are intrinsic constraints such as habit and the just-preceding state, and the extrinsic constraints of sensation, that limit the possible routes of development. In evolution, the less fit, or less lucky, organisms die in the world, though anomalies can die stillborn. In microgenesis, objects “die” or remain unrealized, as others take their place. At successive phases, the forming pre-object is subjected to continuous sculpting, trimming, and parsing. In other words, a continuous partition of the developing configuration underlies the final outcome.

DB: All of which is pre-conscious.

JB: Yes, preconscious. But there are also constraints at the final phase of consciousness. This could be interpreted, in agreement with Libet’s work, as a veto on final action. The difference is that we are conscious of the final veto, or constraint, not of the constraints active in antecedent phases. These are unconscious. It is not that volition acts at the terminus of the development to sculpt the final act. Rather, we are just aware of the potential for sculpting when the microgenesis passes through those segments that give rise to choice or decision.

DB: Decision-making amounts to the negation of an imminent possibility. There is no unboundedly free agent in microgenesis, although the feeling of agency accompanies thoughts and actions as they pass into conscious awareness. Amid the preconscious proliferation and the largely automatic suppression of competing possibilities, is there room for choice? And to what degree is it conscious?

JB: We have the opportunity to develop images, thoughts, or pre-actions in the sense of an implicit choice at each phase. By “implicit” I mean unaware. The choice or selection is carried on to the next phase,

where it is transformed into something else. The process has a fractal-like quality, except that the transform is qualitative, not a sequence of self-similar representations.

When a choice becomes explicit, or conscious, and open to introspection, this gives the feeling that we are making conscious decisions. Whether or not we make conscious decisions or are instead informed of decisions that have already occurred is another issue, but the becoming-conscious of implicit choice is part of the feeling of agency and decision. It is important to see that, in microgenetic theory, introspection is a coming-to-the-fore of earlier phases in the actualization process, not an addition to the cognitive process. Incidentally, the notion that consciousness of mental content, introspection, is not appended to the mental state but emerges at a penultimate phase in its development, is consistent with the evolutionary principle that new form arises at earlier, less specialized stages, not by terminal addition.

DB: Early on, evolutionary principles were seen to be active in microgenesis, then afterward you incorporated new information about brain-related changes during fetal and later development.

JB: Well, I incorporated work in morphogenesis, specifically sculpting and parcellation. Papers on parcellation were appearing in the late 1980s, and this concept helped me to see the ontogenetic dimension in morphogenesis. This had previously eluded me, since microgenetic phases were mapped to phylogenetic growth planes without including ontogeny. In the development of the embryonic brain during fetal life, many more cells are produced than survive, and many more connections. It has been shown, for example in macaque, that trillions of connections are lost in the post-fetal growth of the primate forebrain.

This demonstrates that selectivity is achieved by the elimination of cells and connections. In cognition, specificity is achieved by the inhibition of established connections, and then, by a selective individuation leading from potentiality to actuality. More precisely, the elimination of cells and connections in morphogenesis continues in cognitive development by way of inhibition, which accomplishes much the same thing as elimination of connections. The transition from elimination to inhibition then continues as the constraints on the process of actualization, which account for the individuation of parts out of antecedent wholes.

I see this as a cascade of context-item shifts. The point is that the patterns of embryonic growth lay down the patterns of the cognitive process. Morphogenesis does not just give us a brain that outputs function. Instead, the lines of fetal growth continue into maturity as the lines of cognitive process. One could say that specification by the elimination of cells and connections in early life becomes specification by inhibition of established connections, and also the inhibition, or transformation by

constraints, as the cognitive process develops over evolutionary layers. Process is four-dimensional growth. Early in life, form is laid down in the form of morphology. Later, form is laid down in the form of behavior. A single process underlies structure and function.

DB: We are now talking about extended analogies between three kinds of change. The first is evolutionary change; the second is ontogenesis and the developmental changes of morphogenesis; the third is microgenesis. Each has its respective time frame, ranging from very long periods of time in the case of evolution, to months and years in the case of the individual organism, to the fraction of a second required for the completion of individual mental states. All are subject to comparable patterns of change, which are called “process”. The joint emphasis on process shows how the kinds of change are alike.

JB: In evolution, speciation occurs over millions of years. The cat that rubs its back against my leg is the same kind of cat that rubbed its back a thousand years ago. The same cat over and over, like transformations with some novelty over evolutionary time. The growth, death, and replacement of organisms occurs as a cyclical process spread out over the lifespan, while the arising, perishing, and re-birth of a cognition occurs in a fraction of a second as an epoch of change that replaces itself.

But the cyclical nature of replacement differs from the historical nature of a linear concatenation or causal chain of events. It is rather like the tide that surges and withdraws and surges once again, or like the seasons that come and go. Later, I became aware that the concept of the arising and perishing of a temporal present, the mental state, was linked to certain traditions in Indian philosophy as well as to process metaphysics.

DB: We return to Bergson and his idea of time as a recurring point.

JB: Well, Bergson was important to me in other ways too. For one thing, he described perception as active, not a passive input. And, more practically speaking, he also wrote that time given to disputation is time lost. Disputation was not something I wanted to expend energy on, especially since the criticism of the holists has been their lack of an alternative approach that is respectful of the detail. My primary concern was the effort to develop an alternative model. However, working in the context of cognitive psychology, even participating actively in many seminars and conferences during the birth pangs of this new field, it was difficult to avoid taking into consideration the cognitivist perspective and seeing my work as one in opposition.

Yet I would not say the work developed out of opposition to cognitive science, or to localization approaches in neuropsychology. It rather took on shape naturally on its own, though many of the conceptual problems required confronting strongly entrenched views in both of these overlapping

fields. Still, there was a rather hostile environment, and I well recall the many arguments, even the ridicule, at many scientific meetings. I didn't even find a receptive environment in the school of my former teachers, Johannes Nielsen and Norman Geschwind. After Geschwind died, localization theory evolved to an even more virulent modularity.

DB: Which continues to this day.

JB: Yes, and with the semblance of a science offered by neuro-imaging techniques, it is becoming still more pervasive, making it much more difficult to sustain a holistic view, as well as to convince others of its importance. One can challenge modularity on many grounds, as I have. The flow diagrams and circuit boards do not correlate with psychological reality but are a facile means of resolving local findings without an overarching framework. The recent impact of "binding" theory is a good example of an attempt, purely artificial, to tie together the multiplicity of anatomical and functional elements, which have been separated in the trend to ever finer analysis, by an improvised external linkage.

At some point, I realized the futility of argument against the tide of research and decided to dedicate myself to exploring the theory as deeply and widely as possible. In some ways, the progression has been similar to that of Freud, whose theory, having gone through various forms, was extended to literature, religion, and social concepts.

DB: Your book *Process and the Authentic Life* does precisely this. In particular, it focuses on the expressions and neuropsychological formation of value. What stimulated your interest in the matter of value?

JB: I think my interest in value began with a paper on aesthetic perception. This had to do with the idea that one does not see an object and then think about it as a separate phenomenon, though this looks like a natural assumption. In microgenetic theory, one thinks up the object, the object is a thought product. A great deal of thought goes on unconsciously, implicitly and evanescently in perceiving the object. When you see a chair, you know it is a chair. You have a history of encounters with chairs or chair-like objects and the relations of chairs to other kinds of furniture; the richness of the underlying category "furniture" is the background of the perceived chair.

When one thinks about an object, thought is not added to the object. What happens is that you withdraw to preliminary phases in the original object-formation, phases that are more thought-like, less object-like. You retreat into the infrastructure of the object and explore its depth. Thought is kind of an archeology of perception since objects are externalized concepts, their objectifications as it were, while object-concepts are themselves realizations of yet deeper categories.

It is categories all the way down, so to say, as the Buddhists have argued, and I would as well. So, on this way of thinking, aesthetic perception is not an interpretation added to a perception, say the interpretation of a painting or a piece of music, but an exploration of the underpinnings of the original object. The exploration furthers a growth of the concept through metaphoric and other mechanisms.

DB: But isn't this quite counter-intuitive? The common-sense idea is that we see an object, any object, or a work of art, and we think about it, rather than that the object grows out of thought.

JB: This "growing out" is reflected and captured in artistic creation. The artist creates the object the aesthete enjoys, but the latter also creates the object with greater or lesser depth. The object is not an independent thing in the world. Subsequent observation and thought on the object yields the infra-structure of the original perception.

This approach to aesthetics led me to think about drive, desire, and other feelings, including moral feeling, that are also preliminary in the derivation of objects. The microgenetic idea is that feeling accompanies the pre-object outward in its trajectory from mind to world, from the core of the mind to its surface. In my theory, the world is the external rim of the mind. Feeling travels outward as part of the object, and inhabits the object as interest, worth, or value. We do not see an object and add the feeling, but revive the earlier psychic segments of the configuration from which feeling trickled into the externalized object.

DB: Now we are talking about feeling, which – if I remember correctly – was outside our discussion so far.

JB: Let me say that thinking about feeling or emotion created a very interesting new problem for me. Those who study concepts, objects, or language tend to separate them from emotion. Certainly, cognitive psychology and much of prior psychology tended to ignore emotion. Even William James, in his theory with Lange, thought of emotion as a kind of peripheral phenomenon, with emotions attached to thoughts. This is also the case with Freud's concept of cathexis. I could not understand how a thought called up a feeling, or a feeling lured the appropriate thought.

The problem was how feelings and ideas come together, and it did not seem to me that they actually did come together. Rather, they were fused from the start in what one could call, after Freud, a drive representation, or an archaic categorical primitive invested with an affective tonality. I referred to this togetherness of concept and feeling simply as "conceptual feeling" which individuates into what appear to be discrete concepts and feelings, though even the most abstract concepts have a feeling tone and the most primitive feelings devolve out of categories.

It was natural for me to think of a drive-like construct individuating into partial affects and partial concepts, then into lexical and object concepts, and action plans, each having a feeling tone. The feeling can become exaggerated at the expense of the concept, and the concept can become so dry or abstract it seems drained of feeling, but they trace to an earlier phase where the concept and feeling are part of the same entity.

DB: I like this definition of a conceptual feeling: a categorical primitive invested with affective tonality. You mention Freud – a closer analogy is Jung’s theory of the complex. An archetypal structure organizes its content and amplifies its emotional power; in this sense, the complex is like a categorical primitive.

JB: To anticipate, I later came to see the feeling as the becoming, and the concept or object as the being, of the same entity. The feeling is the process, the concept is the substance. In a way, feeling travels with the object into the world and is part of the object. In microgenetic theory, the object is not merely the endpoint of the process, as a product on a conveyor belt, nor the output of the earlier phases, but the entire epoch from bottom to top. An object and the world of which it is a part, is the whole cognition that includes the early phases through which it has been derived.

DB: The point you were just now emphasizing is that object-formation is inherently emotional, and the same would apply to thought and action.

JB: Yes, emotional. The idea that one has a naked object to which feeling or interpretation is added seemed odd to me, since in microgenetic theory all of that was subsumed within the original perception. This under-surface is not apparent to the observer, and so what the observer has to do is delve back into the formative phases in the pre-history of the perception. As you said before, this is quite counter-intuitive!

DB: I suspect it’s also a matter of personal temperament how counter-intuitive these ideas seem. Introversion inclines attention to preliminary phases of object-formation, which may have a salience comparable to fully differentiated objects. Persons trained in certain forms of meditation would experience directly the rising formation of objects in preliminary phases preceding their assumption of definite form and meaning in fully conscious awareness. I suppose these ideas are most counter-intuitive for extroverted individuals with relatively little capacity for introspection. Obviously they are counter-intuitive for the common-sense view that things appear whole-cloth without trailing the residue of earlier cognitive formation.

JB: Coming back to the problem with aesthetic perception: This problem was not, as some analytical thinkers argued, that of applying interpretations to objects but to access the unconscious richness of what is

already there. This is related to the microgenetic concept of memory, where an object, as it develops into the world, passes from long-term through short-term memory to perception. The different phases in object perception are the different stages in memory. It is not as if you see something which is then conveyed to short-term and long-term memory, but rather the reverse. It develops out of long-term memory, out of the past, through short-term memory, closer to the now, and finally into a present object. The direction of microgenesis is from unconscious to conscious, from depth to surface, from self to world, and from past to present. So, the object actually brings the past into the present.

DB: Long-term memory draws on the category that prompts the immediate perception of a given chair.

JB: Yes. But the perception of a chair is also highly constrained by the sense data hitting the brain and conforming an endogenous and wholly intrinsic process to represent the chair.

DB: As if the sensory constraints pick and choose from memory.

JB: Essentially. Sensory constraints arising in brainstem bias early phases in perception in a certain direction. Subsequently, there is a relative suspension of sensory constraints on the developing object as it passes through the limbic system, a phase of personal or experiential memory and feeling. Then, sensation is again exerted on the terminal phase where the final feature details and externalization of the object occur. The object passes through a dream-like phase of personal memory and experience to final exteriorization and detachment as something independent in the world. In neuropathology, we see all these intermediate phases.

I was once asked by Francis Crick when I gave a paper on this topic: "Why couldn't you just reverse the whole process? You know, instead of going bottom to top, just go top to bottom?" My answer was that it would be like reversing evolution, because the growth of an object or the growth of an utterance or an action follows an evolutionary pattern. Evolution is unidirectional, and so is microgenesis. The direction of cognition has to be that of evolutionary growth.

There are other reasons why the process is irreversible, but because the theory reverses the standard view of the direction of percept formation, it was unpalatable to many who research this area. Moreover, in computational psychology and the computer model of the brain, many would argue that it does not matter how you assemble a computer, which parts you put in first. It is similar to the function of a car, which is unaffected if the carburetor is put in before or after the wheels. A brain as a machine is approached in the same way. The stage at which a certain structure appears in evolution was thought to be irrelevant to its function.

On my way of thinking, the evolutionary growth pattern is fundamental to the processing direction in cognition. Later, this idea led to the view that cognition and growth are the same process – that cognition is a mode of growth. Learning and forgetting are the evidence that cognition is a growth process, while behavior involves the dynamic in structure.

Microtemporal Structure of the Mind/Brain State

DB: Let's now talk about the internal structure of the mind/brain state and the sense of time that it entails. This involves consideration of the phases whose serial activation brings the state to the point of completion. If blocked or impeded, as occurs in pathological conditions, the series closes prematurely. Symptoms appear on this basis, and I would suspect that the sense of time is altered as well.

It seems to me that mental processes, under normal conditions, are highly unreliable in the sense that successive sets of states show great variability in their degrees of completeness. This would allow for rapid change in the form and content of consciousness. A person might alternate between attending to emotionally salient remote memories and the absent-minded effort of tallying the debits marked in his check register. Time seems to linger and pool during the reminiscence, but is quickened, uneven, and possibly races during a mathematical task. Another example would be trance-like immersion in hallucinatory imagery, alternating with objective awareness of the ambient environment. To shift from the clinical perspective, the field of religious studies provides an example in the experience of what seems a timeless duration, which the mystic interprets as participation in the eternal life of God.

You hold that neighboring states overlap. The lingering trace of the preceding state sculpts the next in sequence based on the earlier state's imposition of memory. This idea could be extended to account for the near-simultaneous presence of different levels of consciousness. The schizophrenic might listen to his voices while conversing with the hospital attendant. Attention lingers in preliminary, hallucinatory phases, meanwhile the mouth parrots ideas keyed to later phases. Rapid alternation between the two activities would give the impression of their simultaneous occurrence.

JB: These are interesting topics that touch on imagery, introspection, metaphor, and paralogical thinking. I suppose the alteration of timing or of the time sense in, say, melancholia has to do with the loss of objects, especially in severe depression. Many have written that the unconscious is timeless. Eduard von Hartmann was the first, I believe, then Freud and C.G. Jung. I don't think timeless entities can exist, so either the unconscious is not timeless or there are no unconscious entities. Apart

from the hypothesis of abstract or eternal Platonic objects, existence is temporal.

I would prefer to say that events in the physical world, and also unconscious happenings, are simultaneous. One might question the distinction between simultaneity and timelessness, in supposing a lack of temporal order in the simultaneous instant. However, within a simultaneity there is temporal extension, a transition of phases, or becoming, that does not achieve existence until the succession is complete and a single mental state actualizes. This is the difference between the simultaneous and the non-temporal. The simultaneous is potentially temporal but not without a complete epoch of transition. All entities, physical or mental, have a minimal duration over which one complete state is achieved.

The transition within an entity, say a tree in perception or a mental object such as an idea, is the succession from onset to termination that lays down one complete thing. This transition is replaced so rapidly that it is unapparent, and we are aware only of the final actuality, which seems to be a product of the processes on which it depends. In microgenetic theory, an entity or object is not a slice of process in time or the output of prior operations but the full sequence of antecedent phases.

The succession is not “in time” until it terminates and the full sequence is realized. This implies the temporal thickness that all objects or entities possess. In mind, it pertains especially to unconscious phenomena. When unconscious happenings transition to consciousness, they take on temporal order. Presumably, events that remain unconscious still achieve closure and replacement, though we cannot know such events until they become conscious. The dream, for example, in my view is simultaneous until one awakens when for a brief moment it is apprehended all at once in its entirety. In dream, there is no duration, just a present that is constantly replaced. It is only in retrospect, that one attempts to reconstruct the sequence in a narrative that makes sense to the waking subject.

DB: That’s very interesting. It sounds as if the sequential narrative of a dream, which we conceive of temporally, is actually a projection into time of something pristinely embedded in simultaneity.

JB: The creation of temporal order articulates space and gives the succession of events in perception. It is important to distinguish the succession that underlies the perception of events from that which is perceived in the world. The one is real or genuine change that deposits a novel object; the other is apparent or illusory change that results from the replacement of objects, giving the appearance of an ordered series of events. This concept may be difficult to follow. The change we see in the world is illusory; the change we do not see inside an object is genuine and novel. In the replacement of each epoch, genuine change accounts for apparent change.

The question for the philosophical substantialist is how change occurs for “solid” objects, in other words, the nature of the causal step from one state to the next. The problem for process thinking is how flux divides into objects. From a process standpoint, objects are the illusory stabilities of events. The change within the object is invisible while the change across objects is an effect of the replacement of epochs. These concepts conflict with our common-sense view of things.

The feeling of duration requires a past and a present, not mere succession. Duration is bound up with a specious present hovering over the phase transition. The point is that a truncated becoming gives a contracted present. This occurs in severe amnesia, when event-decay is so rapid that unfilled durations shrink. For the amnesic, a month feels like some days. An alteration of time accompanies an alteration of change. In meditation, the goal is to expand the now of present experience so it embraces all past and future time. And you are right: mystics such as Eckart and Coomaraswamy wrote of states in which the now approaches the eternal now of God’s mind.

DB: I notice that you use terms like “transition” and “phase”, but also the term “stratum” has some appeal because of the connotations of surface and depth, which support the idea that neural processing advances toward the forebrain, activating more deeply situated structures before coming to cortex. Can you briefly trace the course of transitions constituting a single state?

JB: As to terminology, I try to avoid “stratum”, as I don’t use “plane”, “stage”, “level”.

DB: Why is that?

JB: The words suggest a more persistently defined, a more static idea than for instance “phase”. Phase has a more dynamic quality. I speak of “phase” or a “phase transition” and of “segments” in the transition as a continuum that is arbitrarily demarcated. One has a kind of clustering at certain phases, but a phase does not usually appear, for it is transformed to an ensuing phase. An intermediate phase is observed as a momentary terminus when it actualizes as a dream image or, in pathology, as a symptom.

DB: I am beginning to doubt my previous understanding of these terms.

JB: David, to clarify, I think that a phase is unstable. It appears as a symptom, but in normal cognition it is always transitional to an ensuing phase. When one phase transitions to the next, it vanishes, having given up what it *was* to what it *becomes*. I avoid terms such as “level”, “stage” or “plane” to avoid the suggestion of stability in the phase. I use the term

“phase transition” for the microgenetic sequence, and the term “segment” for some succession or series of phases within that sequence.

DB: I mentioned the idea that series of states may be highly inconsistent in their respective degrees of development and said this might account for the experience of nearly simultaneously carrying out different kinds of tasks, each keyed to a particular series of phases.

JB: You were speaking about multiple levels, or strata, of consciousness. I think the question is not whether one has multiple levels, or rather phases, but that one needs them, first to be conscious, which occurs when the phase of the self is aware of the phase of an object world. The self-object relation is a relation of early to late phases in the same mental state. Introspection is not an addition to the sequence but a branching from preliminary phases. It entails the coming-to-the-fore of phases between self and object. It is essential that the mental state terminates in a veridical object. Otherwise, introspective contents will undergo distortion in archaic modes of cognition, as occurs in dreams.

Dream is consciousness of an image world when the object-development is arrested. The difference between dream and waking consciousness is that in wakefulness an image occurs in relation to the self at one pole and an object at the other. Images close to waking consciousness tend to be “reality-oriented”; those more preliminary, as with reverie or fantasy, can be like dream-images. Verbal and visual imagery – inner speech, for example, and imaginal images – are interposed between the self and the outer world. The object- and activity-awareness that Piaget thought was typical of young children, perhaps of animals, is an immediacy of awareness, without mediation by a self. I speak of the relation of *subject to object* as “awareness”, and the relation of *self to object* as “consciousness”.

The self is not only conscious of objects, but of images in the context of a perception of the external world. There is also a volitional or intentional quality of the imagery. We feel that we are agents of inner speech, and that we control thought imagery. However, without an external world, an image becomes an actuality or endpoint, as in dream or hallucination. Moreover, the self of dream is a different self than in wakefulness. It is passive, swept along by events, without a sense of willing or guiding events. It is drawn by the events to which it is a witness or victim.

DB: Let me go back to the phase transition. “Transition” avoids the connotation of something fixed and for this reason is preferable to “stratum” or “level”. To grasp the unbroken continuity of the state’s development is not an easy task. A temporal perspective has to be substituted for fixed points of reference. How would you describe in detail the passage of a single state whose outcome is the formation of a particular perceptual object?

JB: Let's say we are looking at a table. We have no sense of an underlying sequence of phases. We just see the table and we think we see it directly. How can we experience an antecedent sequence of phases that very rapidly delivers the table into consciousness?

Usually we can't, but the phases are exposed in pathology. The disorders of object-perception reveal the microtemporal transitions that underlie external objects. In any event, there have to be antecedent phases, whether one thinks of them as assembling the object and projecting it outward or, as I do, individuating the object from a background potential. In either case, there are antecedent events from which the perception develops. These phases are immanent in the object.

In my view, the background is a cascade of whole-part transforms. When one looks at the separate aspects of an object – the color, the shape, the movement, and so on – it is natural to think there are mechanisms in the brain that mediate such features or properties. But in hallucination, one observes that object boundaries are really color boundaries, or boundaries of hue. Without color, and without the achromatic colors, the world is grey and objects disappear. This happens in snow blindness. There is always some color boundary. In hallucination, colors melt off objects into a space that is like an object, a space that is viscous or palpable, not the empty space of normal perception.

DB: That sounds very much like what you said about dreams before.

JB: Yes, I think that in waking hallucination the same features as in dreams are perceived adjacent to normal objects in a separate locus of the visual field. In pathological cases, hallucinations may replace objects in the affected part of the visual field and are often the initial symptom of object loss. Auditory hallucinations replace or rather supplant auditory perceptions. These as well as many other clinical observations and studies indicate that images and perceptions are not served by different mechanisms, but rather images are attenuated objects or, conversely, objects result from sensory constraints applied to exteriorizing imagery.

One could say that perception develops out of an hallucinatory background. More precisely, the ground of the hallucination, not the image content but the phase mediating that content, is transformed by sensation to an external object. An hallucination is what happens to a pre-object, such as an image or a concept, when the final sensory sculpting is not applied. In brief, an object is an image, an hallucination, that is sculpted and so adapted by sensory data to the outside world.

When we withdraw from objects to images, we encounter a variety of image types, each accompanied by a different sense of self and agency. We feel that we search for a memory image; we try to recall a memory and are frustrated if we can't remember it. Hallucinations in pathology or hypnagogy come to us without warning or control. If we reach for an

hallucination it may disappear. In hypnagogic states, which are marvelous to behold – usually faces more brilliant than life, colorful, agonized – one tries to be passive and let the experience continue, but as soon as the eyes are diverted to the image or one reaches for it, the image disappears. To hold it, one must remain a passive spectator like the self in dream.

Actually, the passivity of the dream self is important because I think it explains paranoid ideation, where one has the feeling of being a victim of one's own imagery. Images can even take on a kind of agency of their own, as in command hallucination, where verbal hallucinations instruct the person what to do. The sense of personal agency is lost, or transferred to the image. This, by the way, shows that the feeling of agency or volition is not standing behind the content but develops and changes with the momentary state.

DB: So now we are coming back to agency, volition, and willful action, and their various kinds of impairments. This seems to be a much more subtle picture than flatly declaring free will an illusion.

JB: Normally, we don't feel an agent to objects. They are happenings out there in the world that impinge on us. We do have a sense of agency when we imagine a mouse crawling over the back of an elephant. There is a sense of volition in visual imagery. We can call up the imagined sound of music or a conversation. Volition is not just linked to action; it is also woven into the antecedents of perception. In eidetic imagery, there is some feeling of voluntary control. As eidetic images decay to memory images, the sense of volition changes.

The feeling of volition depends on the dominant phase in the transition, which is associated with different forms of imagery. From this, one can reconstruct the sequence of object- or image-formation, as well as that of object-concept, meaning, and feeling. What I mean by this is that images differ in their meaning-content. Dreams are symbolic images that we feel the need to interpret. Hypnagogic images are filled with affect. Eidetic images are pictorial and appear relatively meaning-free. Memory images can have profound meaning for the individual. The way these different images are related to successive phases in the object-formation – from conceptual feeling to object value, from an archaic to a rational mentation, as well as from past to present or mind to world – reveals the transition from deep phases of categorical primitives associated with drive-like affect to meaning-laden, intentional concepts and images, and finally to world-close configurations achieving mind-independence ...

DB: ... which can never be perfectly independent, because of the series of antecedents from which each emerges.

JB: Yes! As one goes more deeply into the precursors of external objects, one accesses the intense feeling of drive. At the other pole of the

mental state, an object in the world seems free of personal affect, or it seems to have an affect of its own, initially its existence, then its worth or value. There is feeling in the object; rather, objects are filled with our own feeling that travels with them from the mind. We sense this when we love someone, or desire an object, and the object becomes the focus of attention.

In this sense, interest or focal attention is the first sign of value. We see a face in a crowd, we notice it and have some interest in that face. The face takes on greater value than other faces. Gradually, the personality behind the face grows in significance. As we get to know the person, our affection can develop into love. The face of the beloved then fills the entire field, soaks up all of the feeling that was distributed before. Feeling is now concentrated in one object of overwhelming desire. The same applies in the case of other emotions such as fear and hate. They all signal the presence of value.

Emotion becomes intense and is felt in both ourselves and the object. Often, we have the experience of not knowing whether the feeling is in the object or in the self. Is she beautiful because we love her, or do we love her because she is beautiful? Do I desire this diamond because it is valuable, or is its value raised by my desire? We don't know if desire creates the feeling in and for the object or if feeling in the object provokes the desire.

I think this shows that the boundary between self and object, mind and world, is artificial. It also shows that value is a complex phenomenon, with an unconscious core, a conscious desire, and a worth that seems located in the object. The fragile boundary between mind and world is evident in psychosis as thoughts become like objects and objects become thought-like. The psychotic has the insight of a continuous transition from mind to world, which the normal person has lost.

DB: Incipient value is a basic mark of the object's existence. In accruing feeling, it draws and holds attention and assumes focal importance. Once feeling is supplied to the object, mental process is already set in motion.

JB: As we are talking, David, I see that a major preoccupation in all my work has been the subject-object relation. Whether the relationship is framed in terms of self and other, or Buber's "I" and "Thou", it has played a major part in many different approaches to neuropsychology and philosophy.

In my own work, the nature of the self and the relation of self to other, is treated in a subjectivist way. I argue that feeling goes from self to object, that feeling in an object passes into it from the self. Thus, when one begins to fall in love, the self creates the other as a receptacle for its own feeling, which arises in the core and empirical self, flows into

desire and then trickles into the value and interest of the beloved's face. Whether value or interest in the other strengthens or weakens depends on the self-concept, our needs, core values and beliefs.

Essentially, what I tried to work out is how the other is a self-creation. The common-sense idea that we meet a person, get to know each other and gradually, through external contacts, feeling develops, is the usual way of thinking about this experience. For me, it is backwards. Microgenesis is a counter-intuitive theory. It holds that the other is a creation of the self, that the other comes to fill a larger or smaller portion of one's own self-concept, and that in order to know the other one has to withdraw into one's own self more deeply to find a common ground in which antecedents of the self and the other cohabit, a potential out of which both are realized.

The ground that gives rise to the self and the other is beneath my consciousness and that of the other person. I imagine self and other to be part of a deeper unity that has to be accessed in a descent through many, many internal phases.