In this paper, I wish to describe the categorical nature of the mind/brain state from its origins in drive to the refinements of human cognition. Categories are concepts with a broader scope. The virtual quality of category members corresponds to the relation of whole and part. A successive individuation of categories is the foundational operation of the mind/brain state. There is a similarity to fractal theory and the mereology of wholes and parts, though categories are not sums or containers, members are virtual and the whole/part specification is qualitative, unlike the self-similar replications of fractal theory. The discussion takes up the problem of causal transmission between the mind and brain and within and across mental states, concluding that an assimilation model has more explanatory power than a strictly causal one, in keeping with the distinction of potential/actual from cause/effect. The idea that mind-brain interaction is causal introduces the possibility of subjectivity independent of a material substrate. This leads to speculation on a world soul animating the brain as part of nature, and conversely, the effort to extract all vestiges of spirit to leave a purely material organism and universe. There is no bifurcation of the mental and physical; rather a graded series of stages with properties of material and subjective entities that eventuate in human mentality. This conforms to a neutral monism. Duration is inherent in nature and evolves in company with organisms of increasing complexity.

**Key words:** organism, fractal theory, human mentality
INTRODUCTION

I am very honored to be invited to contribute to this special edition of Acta Neuropsychologica, recognizing the extraordinary contribution to neuropsychology by Professor Maria Pachalska (see: Fig. 1).

Over the years, she has been a leading teacher and researcher in this field with sufficient papers and books for 3 lifetimes, in addition to being a dear friend and dedicated colleague, selfless in her assistance to students and co-workers and much loved by all who know her. Since much of her work concerns the relation of the mind and brain (Brown & Pachalska 2003; Pachalska 2002; 2003, 2005; 2012, 2017, Pąchalska & MacQueen 2005, 2008; Pąchalska et al. 2009; 2012a &b; 2017), this is the topic of my paper.

This essay explores some aspects of the relation of the mind to brain that follow on from the preceding discussion (Brown 2014). The various approaches in philosophy to this topic do not unravel the problem but tend to propose overarching “solutions”; for example, the mind is eliminated, reduced or identical to brain function, conceived in terms of a dual-vocabulary or construed as epiphenomenal or parallel to brain activity. I have speculated on a neutral monism. In most of these instances, there is a materialistic shift, with a focus less on mentality in relation to specific brain activity than on neuroscience and a faith in future brain research, the assumption being that one can ignore normal and abnormal psychology or the infrastructure of cognition for generalities of the reduction of mind to brain on the presumption that details will eventually be sorted out by objective science. Entire functions, capacities or classes of behavior are correlated with parts of the brain – love, moral sense – but specific performances give con-

Moreover, there is no concerted effort to specify the relation to the underlying brain process, for example, neural systems involved in the experience of saying a word or seeing a particular object; rather the focus is on general statements as to the relation of mind to brain without regard for the attributes of mentality and how these might be realized in the brain process (Brown 1996; 2000, 2004; 2015). How does the brain process create a category; what is the role of memory in thinking from a neural perspective; how do words arise without thinking about them; how does conversation express thought or belief especially if one discovers the thought after the words are spoken, and how do values, consciousness, intentionality or meanings correspond to patterns of neural firing? The approach is much like attributing schizophrenia or autism to a gene, a virus or toxin with no explanation of hallucination or aberrant behavior (Brown 2004). The facile descent to a lower level or the simple collapse of the mind to brain is not an explanation but a finesse of the actual problem, which is less the brain substrate of mind than how the particulars of the mind are generated (Brown 2015).

One strategy is to extract general principles, even laws, of mental activity and speculate on how these principles might be instantiated in the brain. One of the more important of these regularities is the universal problem of category. A category is a more inclusive concept. Items in a category are potential sub-categories for further partition or they precipitate as finalities in the actualization process. That is, a category encloses a multitude of unactualized members which once elicited can deposit inter alia in action, perception or language, or serve as categories for subsequent partitions. The process of whole/part transition corresponds to an elicitation of items or members that, if not realized, retain the potential for further transformation. The category/member relation is comparable to that of whole and part such that the progression from holistic to analytic is analogous to that from category to member. Many terms have been used to describe this process, including individuation, specification, differentiation, analysis, as well as frame/content, surround/center, ground/figure, lateral inhibition, sculpting, parcellation and trimming of redundancy. The central feature is the elimination or inhibition of irrelevance as a means to final precision or definiteness. The iteration of this process over phases lays down the mind/brain state. Moreover, the propagation from one phase to the next by way of categories, not modular elements, accounts for the experience that a memorial fragment can reprise an entire event-category (Brown & Pachalska 2003).

The whole/part relation can be found in the most basic physical entities but in more advanced organism categorization is most evident in instinctual drive. In animals, the repertoire of behavior is limited mainly to predation, defense, mating and maternal care, which represent categories shaped by inherited constraints on instinctual drive. Such categories include predator/prey behavior, aggression, defense, food and mate selection. This foundation of behavior is reinforced by
recurrent occasions of satisfaction, which serve to elicit action appropriate to external conditions and constrain random or maladaptive behavior. The categorical nature of drive allows a flexibility that is not self-evident in the fixity and necessity of cause and effect.

Drive-categories correspond to neural configurations with the potential to partition to sub-categories. For example, on one occasion, chasing and killing a gazelle is the primary option; on another, feeding on a dead carcass. On one occasion the animal feeds at the site of the kill, on another it conceals or removes its prey. A drive is not a rigid set of instructions but a general framework for behaviors that, within limits, adapt to circumstance. Thus, hunger leads to predation as drive partitions to various implementations; stalking, deference to the hierarchy in a group or feeding order. The category realizes paradigmatic features that expand or contract according to intrinsic (age, health) and extrinsic (abundance, scarcity) conditions. In the human mind, these features and their neural correlates are derived through many subsequent partitions such that the outcome – compassion, table manners - appears quite distant from the originating drive.

The sexual urge or the feeling of hunger and its neural correlates generate virtual objects – instinctual, experiential – to satisfy categorical-primitives that govern further transformations and prevent derailments or maladaptive associations (Brown 2012). Hunger might develop to greed or acquisitiveness; sexuality to a manifold of variations. Objects or goals relating to drive-based categories propagate by metaphoric extension or overlap of shared features. The difficulty in neuroscience to demonstrate this pattern is that the brain process entails widely-distributed wave or field effects, not dissimilar from those postulated in Gestalt theory, while research tends to involve single unit studies that sample a fraction of the configuration or distributed system. At the other extreme, metabolic studies focus mainly on whole behaviors, not local features of brain or mental activity.

Another source of category-formation in the brain comes from repetition, relative constancy of behavior and the daily recurrence of environments, such that similar patterns recur to reinforce categorical groupings. The strategy of a lion pursuing a gazelle or a bird pouncing on a grub is sufficiently repetitive that the recurrence of neural activity underlying the behavior tends to accentuate the pattern. The play of infant animals and early training further reinforce drive-categories. Trial and error helps to strengthen adaptive routines, increase fitness and eliminate maladaptive behaviors. The evolutionary principle that matches organism to surround continues in trial and error to map behavior to successful strategies. The instinctual category that propels behavior is reinforced and expanded by experience. The same process occurs in the pattern recognition of ethological studies, for example, a mouse or chicken for the outline of a hawk.

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1 A simple example concerns my one year old son who was shown a ball and told the name, which he did not repeat until a pea rolled off his plate. Clearly, the generalization of roundness to different objects conforms to the notion of early category formation. There are many such examples in the literature, including categorization bed in operant conditioning.
The neural configuration that corresponds to patterns of behavior and object-recognition is the equivalent of a category in that it includes paradigmatic features, such as size, color or contour, but excludes non-matches or atypical features. The instinctual category leads to a behavioral response that ignores or suppresses competing stimuli outside the category boundary. The configural pattern is the basis of ensuing partitions. The onset of an act of cognition in instinctual drive establishes a categorical foundation that undergoes multiple partitions as it branches into finer derivations over phases in the mental state.

The neural basis of drive-categories has not to my knowledge been researched. However, the bottom-up derivation of configural groupings mediated by myriad synapses over a wide area of the brain can hardly be disputed. Perception and action arise out of instinctual categories that frame the actualization of a series of whole/part transitions that arborize into acts, objects and ideas. This sequence is the fundamental operation of the brain. The commonality of whole/part shifts implies some degree of isomorphism of the neural and mental process, inferred from focal lesions that selectively expose preliminary phases (symptoms) in terms of category/member specifications. The conclusion is that a single process of qualitative whole/part or category/member specification, iterated at successive phases from instinct to final act or object, is the fundamental operation that governs the moment-to-moment derivation of the mind/brain state. In this respect, there is identity but no reduction of the mind to the brain. The study of the mind reveals the nature of the brain, not the other way around.

COMMENTS ON RESEARCH

Generally, philosophical speculation on the mind/brain takes a holistic approach, with the brain as a global physical entity and the mind as a generalized object. This is the most comfortable perspective for a third-person externalism which can ignore mental function and subjectivity as well as the detail of psychological study and brain organization. For this approach, a slab of brain might well elaborate a partial state of mind since the structure of the mind and brain is excluded from theory. For example, a concept of input and output ignores the complex multi-tiered organization that supports the object- and act-development. No wonder that for most externalists, it is irrelevant whether the physical substrate of the mind is carbon or silicon.

The alternative is to explore the micro-structure of the brain and the neural processes through which the attributes of mentality are generated. However, even this approach is dogged by an objectivism that does not take the subjective seriously. Partly this reflects dogma and the Zeitgeist, but also limits on methodologies. Among the strategies for brain study are imaging techniques, surgical procedures, brain stimulation, unit studies and, of most importance, pathological disruptions by focal lesions. Studies that look for correlations of local or distributed functional systems are incapable of the fine analysis of the systems they explore. A slight change of method, arousal or perturbation can lead to vast dif-
ferences in correlations. For example, different studies of phonology have found activation in multiple areas. This is not taken as a refutation or critique of the method but as indicating a network in which all locations are engaged. Focal activation is designed to support discrete or modular localization, whereas a widespread activation supports a distributed network. What would it take to refute these findings? In contrast, single unit studies which look at cell response to stimulation sample a limited number of units and are oblivious to observations inconsistent with expectations, such as cells in the visual area that respond to auditory stimulation, or sign language in the deaf that activates cells associated with audition.

Of the various techniques to study the mind and brain, those involving the symptoms of local brain lesion are considered the least scientific or reliable, often dismissed as observational, descriptive, anecdotal and non-repeatable. For these reasons, as well as the large corpus of clinical material that dissuades careful study, there has been a concerted effort to turn descriptive psychology into a scientific discipline by delegitimizing a qualitative approach to symptoms in favor of quantitative studies in which probe stimuli, so it is argued, yield a collection of correct and incorrect responses irrespective of error type, the goal of which, consistent with circuit board models of processors, inputs and outputs, is to obtain scores in which the measurement of performance replaces the nature of the performance being measured. Partly, the problem is a lack of theory concerning the origin and meaning of the symptom, and the presumption that errors, especially of language, are mere guesses of no interpretive value. A model of symptom-formation and its relevance to mind/brain theory has been described in detail elsewhere, but the arguments confirm that whole/part transitions in the mind/brain mediate act- and object-development.

**Unconscious mind**

There is such overwhelming evidence of unconscious cognition inferred from its conscious products that to deny its occurrence is either willful ignorance of the origins of conscious thought, or assumes the indefensible position that all thought arises in consciousness. Some philosophers (Searle 1969) dismiss the unconscious as mere physiology. However, in addition to dream, unconscious cognition includes hypnotic, trance and mystical states, creativity, myth, non-intentional moods or objectless states such as diffuse anxiety or unresolved conflict, drive and motivation, sleepwalking and other dissociative states, “slips of the tongue,” obsessions and compulsions, right hemisphere cognition in a “split brain” case, not to mention the whole “storehouse” of grammar, memory, beliefs, presuppositions and values that account for thought, acts, objects and language (Brown 2008). There are also experimental probes of non-conscious processes, such as masking, tachistoscopic presentation (percept-genetic and related studies), priming, learning during anesthesia, incidental and procedural learning, conditioning, habit and skill formation. To dismiss the unconscious as physiology avoids the obligation to go beyond negation to a more exact account of the transition to consciousness, its immediate precursors and evolutionary ancestry.
In some respects, the unconscious mind is of a greater relevance to subjectivism than the conscious mind, since the interpretation of the unconscious and its manifestations brings the relation of the physical brain to mentality into clear focus, whereas consciousness raises questions on dualism or epiphenomenalism that are not helpful in deciphering the mind/brain relation. Cognition in the absence of consciousness raises the question of the subjectivity of the "physiological" process; that is, mentation without consciousness. While it is unlikely that animals have an unconscious stratum in relation to conscious awareness, or that they have a fraction of the complexity of the content in the human unconscious – which is necessarily derived in large part from conscious experience – the mentality or subjectivity of brain activity independent of consciousness is supported by unconscious cognition in humans. In sum, though the human unconscious depends heavily on material acquired during consciousness, which is unlikely in animals, the occurrence of unconscious mind reinforces arguments as to a non-conscious mentality, thus, the subjectivity of physical states in an organism prior to conscious awareness.

Causation and the mind/brain state

It seems clear from the standpoint of identity or neutral monism that the brain does not cause mental activity. The mind is not a causal object and the necessity of a causal step from the brain to the mind, or the reverse, is implausible. One- or two-way causation entails an interaction of the mind and brain as separate and distinct "objects." The inference that brain activity causes mental activity appears to be a result of the assumption that the physical is primary and mentation a resultant of the physical process, and the common sense observation that the mind causes behavior mediated by the brain; namely, the everyday experience that thoughts and feelings cause behavior, which implies that the mind is a causal output of the brain and, conversely, that the mind acts on the brain to cause behavior. The presumption is that if a mental state can cause a motor act, physical states can cause occasions of the mind, that is, the mind-brain relation is causal in both directions. This may be plausible for some, but it is difficult to explain how mental phenomena could act on a physical brain and how the brain could cause mental states. For these and other reasons, a causal account of mind-brain interaction has little current support.

In prior discussions I have argued that the overlap of mind/brain states constrains consequent states to conform to prior ones, inducing the prior state to assimilate the state that follows. This preserves continuity across mind/brain states and explains the impact of the antecedent state on that which follows. As to the effect of will or thought on action, the hypothesis is that a configurual bias precipitates a sequence of category/item transforms as a kind of psychic corridor traversed by states dedicated to action. The finalities of introspection that arise as a subjective aim form a bottom-up pathway – a set of constraints – through which the action-development is realized.
Prior to achieving finality in a state of indecision, action is forestalled or uncertain, not necessarily because of conflict but for the lack of a singular template through which the act can be specified. The final sequence has insufficient specificity to serve as a track for the derivation of behavior. This means that decision does not implement action but provides a configured sequence through which action is derived. Whether or not the assimilation of the action-development to the parallel process of thought-development is causal is unresolved, but there is no direct linkage of thought, decision or judgment and behavior, which is why rational thought can be construed as a justification for action, not its immediate cause.

If causation is not between the mind and brain, can it be posited across or within mind/brain states? Most accounts of transition postulate causal relations from one state to the next. In Buddhist thought, which has support in some contemporary models, each state is an encapsulated moment (ksana) of arising and descending that passes to the next in a causal chain. The state develops, subsides and gives way to the ensuing state. Whether arising and subsidence are transmitted as a packet or only a portion, and what constitutes a state - boundaries, contents, duration – except for microgenetic theory are matters of infrequent commentary, for the most part not even discussed in causal accounts in spite of much speculation on the transition from cause to effect, what is carried over into the effect, the source of novelty and so on.

The problem is still more complex. With overlap in succession, if the mind/brain state does not exist until it actualizes, how can early phases prior to completion cause early phases in the oncoming state? Indeed, if the ensuing state is activated before the prior state exists, the ensuing state could exercise a mode of backward causation on the forming but not-yet-actual current state (Brown 2008). The overlap of early segments, which preserves identity, continuity and the stability of self, character and experience, can be conceived as an assimilation of T2 to T1 or the reverse. Once the current state exists it can serve as a causal entity but how would causation call up the oncoming state if it is already in the process of actualizing?

In this context it is important to emphasize again that genuine change occurs in the actualization of an epoch and that apparent or illusory change occurs in the transition of one epoch to another. Genuine change is the becoming-into-being (existence) of an entity – the actualization of a sequence of categories - while apparent change is the progression from one epoch of being to another, namely, the observed and presumed causal sequence of events in the world. An epochal state is an instance of being that is inert, its dynamic – becoming – exhausted in its formation. The process of entity creation is complete on the actualization of an epoch of being (category, substance), which on achieving existence passes away in its replacement, while continuity depends on the overlap of epochs (Fig. 2).

We perceive events, not objects. An event is the more or less arbitrary duration over a series of recurrent epochs. The rate of replacement is probably constant for each entity, while event-duration, which depends on the limits of an
event, can be rapid (a punch) or slow (a prizefight). The change is attributed to a changing or transitory object, i.e., to objects or events in the world, whereas genuine change in the observer’s mind is imperceptible.

This raises the problem of cause and effect in a replacement model. For one thing, if the assimilation of one state to another is guided by constraints, the transition would not conform to causal laws since constraints are not clearly causes (Brown 2015). The process account of the state – a becoming-into-being – is inconsistent with a substantive cause, especially if the actualized state includes the subsidence as well as the arising. If the state is a completed process of actualization, does the succession cause an ensuing state, or does it cause earlier, then later, phases in the antecedent state? The state does not come into existence until all phases are traversed, yet the ensuing state begins prior to the completion of the current state. While in the replacement, the consequent state is generated by, and takes the place of, the antecedent one, distal segments of the earlier state vanish before those of the ensuing state occur. This means that distal segments, say for an act or external object, have no causal efficacy for distal phases in the ensuing state.

The base of the state instigates the “abiding” features of drive and personality through a replication by overlap of early phases, with final phases compelled by sensation to model the occasion. Only intermediate phases have some degree of plasticity; they are less adapted, less assimilated and of dubious causal effect. If causation between states occurs, it would be maximal early in the state by virtue of overlap and distal by sensibility but relaxed over pre-terminal segments.
This implies that a completed state does not cause its successor, which begins prior to the actualization of its predecessor.

In a conversation on momentariness many years ago in Sikkim with a Buddhist monk on what happens between moments in the transmission from cause to effect, an impasse was reached on the explanation of continuity, change and the distinction of cause from effect. On a process model, the continuous transition is relatively seamless. On an atomic or modular account, cause and effect are discrete, with a multitude of causal pairs in the succession leading to an infinite regress in the interstices of the micro-transition. In both instances, especially with a replacement model, there is a possibility of multiple minds and worlds between mental states.

For some philosophers, a mental state refers to a content – qualia, proposition – without regard for spatio-temporal context or antecedent history. The aim is to isolate the content as a mental solid which can, in principle, be related to local brain activity and other mental contents, which are also conceived as modular. A heuristic advantage means little if it leads to a false narrative. Qualia can be anything from an after-image or feeling to the perceptible world. It is odd that after-images are often employed as examples of qualia since, following Emmert’s law, they have physical features unlike hallucinations or other forms of imagery. Moreover, their relation to palinopsia and the flight of colors is ignored. As to propositions, a sample proposition such as the redundant grass is green, supposes considerable experiential knowledge that is divorced from the propositional content. Such statements are artificial implants in the mental state. With respect to brain correlation, the presumption is that the content represents a demarcated particular that reduces to local activity in brain. The isolate is not psychologically real and its presumed localization is a philosophical fantasy.

**What is the mind?**

Typically, the mind is defined as that aspect of the organism that exhibits thought, feeling and awareness, which includes our primate neighbors and possibly animals quite far down the evolutionary scale. At some level of the primitive mind, say that of a bat or octopus, the relation of the mind to the brain is not a vexing problem, even if behavioral performances cannot be correlated with specific brain areas or processes (Brown 1977; 2015). Since the self, consciousness, language, intentionality and other features of human mentation have not arisen, the inner life of the organism (Brown 2009), if there is one, is inaccessible. In such animals we are generally content to identify the mind with the brain or the nervous system, or the latter with behavior, which is interpreted as an implementation of the connectivity, even if precise correlates with behavior are unknown.

As mentality increases in complexity, its correlation becomes more elusive, while in the human mind, except for a rough approximation, it is largely opaque. Language is responsible for much of the distance from earlier forms, but it is likely that a feral child has mental capacities beyond those of wild animals (Brown 2011). The maturation of human and chimpanzee infants are roughly comparable
during the first year of life, even favoring the chimp, but with the advent of language the intellect of the child rapidly moves ahead. Clinical findings indicate that the productive and receptive aspects of language originate in relation to action and perception systems in the brain. Language parasitizes existing systems; it is not exclusively neocortical but develops over stages in evolutionary growth. Areas for speech production are proximate to those for oral and limb movement and vocalization, while those for speech perception involve regions for auditory and visual perception.

The temporal lobe in a monkey is largely visual. Bilateral lesions produce difficulty in selecting an object from a visual array (Brown 2003). The deficit is neither solely perceptual nor memorial but appears to involve an intermediate phase of isolating an item within a group of other items. The problem in visual selection involves brain regions that in man underlie the process of word-selection (Brown 1972). We know from pathological disruption that in humans these areas mediate the selection of a word from a category or a phonemic string from a lexical frame. In addition the regions on the medial surface of the hemisphere involved in the isolation cry of a monkey are vital to the initiation of an utterance in man. In my view, language begins with the ability to name objects and the phonology to produce the name in speech, with syntax coming later. The pattern of act, object and language formation in relation to evolutionary growth trends is essential to understand the correlation of mind or behavior to local and widespread brain regions, a relation more complex than a statement of mind/brain identity.

What then is a mind or brain? Is the cardiac ganglion of a sea slug a brain or the nerve cells in the limbs of an octopus? As the nervous system evolves to a brain, behavior evolves from relative automaticity to adaptive originality, at which point the evidence for a subjective component can be entertained. The subjective evolves with the brain from a stage where the brain and behavior are firmly joined to one in which the mind appears to exhibit non-physical properties. But the ingredients of the brain linked to the mind evolve together with their subjectivity.

The conditions for the mind are present in elementary entities, proto-psychic features that together with physical features evolve to a primitive mentality. One can ask if a semblance of the mind is present in every atom or cell in the body or brain? Is the mind generated by the brain as a whole or are only certain portions involved? Large areas of the brain can be removed with little or no demonstrable effect on mentation, while local portions can be damaged with profound effects on specific cognitive functions. The conclusion is that what counts is less the brain region than the pattern of brain activity that makes consciousness and attendant capacities possible (Brown 2010). Since the pattern is common to all brain systems, individual systems or components can be sacrificed and mentality goes on. The mind does not ordinarily regress to animal or childhood function; rather, basic attributes – consciousness, duration, a present moment, intentional thought, dream and the unconscious, aesthetic preferences and so on – are largely spared even with a severe compromise of language, action or perception.
Language may be responsible for the unique character of the human mind but, except for verbal thought, many attributes of the mind persist when language is lost. More precisely, the actualization of each component of mentality suffices to sustain the human psyche even with disruption within a given component. In animals lacking the specialization of the human brain, this commonality of pattern - category/item transition - survives multiple ablations. This has suggested mass action or equipotentiality (Lashley 1951 or holographic organization (Pribram 1984). A vulnerability to focal lesion results from the sequestration of function in the human brain, which can be interpreted as a furtherance of whole/part analysis, but the non-specific or general features of human mentality are still evident.

**Mind, spirit, soul**

The properties of the organism that evolve to the attributes of human mentality, such as duration, becoming, the distribution of feeling into value, the forward surge to a subjective aim as the seed of purposefulness, are intrinsic to the material substrate through which they develop, while the pattern of actualization of the mental state, inferred from the analysis of defects, corresponds to the pattern of brain activity through which mentality is derived. Passage to finality carries the organism to an open future. Each instance of re-actualization is a kind of re-birth that gives the sense of a force or spirit through which life is sustained. The recapitulation of evolutionary growth trends in each recurrence propels brain process in the direction of phyletic advance. Each state surges into existence out of the shadows of the unconscious to the clarity of conscious thought and a motion to the future, a birth out of death from darkness to light, from the invisible sources of being to the palpable reality of existence.

The diversity of particulars that are generated in an act of perception appear to exist as independent objects but arise from a unitary source in the human mind/brain. Could one say that nature – seen and unseen – also arises from a single source, the mind of a deity or a collective spirit? The life and death of an organism, the interdependence of organic forms, the multiplicity of the natural world, generates a universe out of a singularity in recurrent acts of creation. Does the mind elaborate entities in nature as the human mind elaborates objects in perception? If the rudiments of the human mind are present in nature, nature exhibits proto-mentality. An intuition of the proto-psychic in nature along with the instantiation of the subjectivity in the human brain as part of physical nature, are pillars of religious thought. This appears in the ancient belief – even in contemporary Hinduism - in a multitude of deities that correspond to mental attributes or human personality, in most instances felt as personal gods to those who fear or worship them. This same intuition is on display in totemic and other animistic beliefs which presume a continuum of nature and the mind and/or the presence in the natural process of the very properties that account for the evolution of the human mind.

The partition to diversity in the mental state, like that of evolutionary nature, the creation in the mind of an object world along with the development of consciousness out of instinct and automatism, lead to the belief that nature itself has
the ingredients of mentality. The gods that realize the traits of the human mind are eventually replaced by a single all-knowing, all-powerful god outside nature, or by an impersonal spirit within the natural process, an example of which is Whitehead’s process god. The divine is conceived as an attribute or emergent of nature, not as a power external to the universe that controls the world machine or manipulates human destiny. Feelings of awe and the sublime, in which a point in time and space is felt in relation to eternity and infinity, evoke the overwhelming grandeur of the universe in comparison to the animating spirit in each fleeting instance of life.

The sense of the spirit in nature — élan vital, life force, divine impulse — derives from an attribution to nature of the recurrent surge of process in the mental state extracted from the embodiments of physical process. The spirit is an extract of human personality which individuates a multiplicity of living gods. Among the attributes that consolidate a spirit-infused essence, the most fundamental is the soul which is conceived as arising from physical process but transcending and surviving the death of the body. A deity abides in the passage of nature; a soul abides in the passage of the self. The immersion of the soul in the mind of nature, or its reunion with god, in returning to the nature from which it arose, is the reverse of the emergence of the self out of physical process. There is a parallel between the relation of mind to brain and that of god or spirit to nature. Those who reduce the mind to brain would also reduce the spirit to nature (Brown 2005). Both instances eliminate mentality from the physical mechanism.

The present moment can be interpreted as an instance of the eternal present of a god’s mind (Eckert), just as the category/member transition over levels in mind/brain can be extrapolated to the specification of particulars, including the human mind, out of the widest possible category, the all-inclusive mind of a god. That is, the universality of a god is to individualities as essentially boundless categories are to the proliferation of actualities in the mind. I would stress that this is not an argument for the existence of a personal god but for a continuum of the proto-psychic throughout physical nature, which opens the door to the possibility of spirit as one source of belief in a god, and with subjectivity in the process of nature, a reverence for the divine.

**Time and the mental state**

The nature of time is interwoven with the problem of the mind and brain, whether in causal theory or a concept of becoming, particularly in a replacement theory, since duration is inherent in the mental state. Further, there is a distinction of the duration of becoming in physical entities and the mind/brain state, and the phenomenal duration of the present, both of which present a challenge to the usual assumption of physical instantaneous in material entities. Of the various perspectives on time, the most common are: Newtonian absolute time, which has its application in local contexts as well as clock time; the relational time of Einstein, which has greater import in cosmic or macro-system analysis; and the mode of time discussed in this section, subjective time experience, which accounts *inter alia* for the duration of the present and the ordered series of events
from past to future. In physical theory, time is a dimension of space, while subjective time depends on memory. Since Heraclitus and Parmenides, time has been conceived as either instantaneous or continuous, that is, a series of discrete instants or points, or an unbroken flow or stream. An alternative to these concepts, which reflects the way time is modeled in the brain, is a process of recurrence in a motionless point that is replaced, with the passage of time more like a fountain than a river.

The concept of recurrence is deeply ingrained in the cyclical nature of life; circadian, lunar, seasonal, sleep/wake, vibratory and other periodic processes, the oscillatory nature of respiration, ambulation, and the rhythmic structure of speech, as well as the vibratory foundations of inorganic matter. These periodic or recurrent processes differ in scale but all testify to the centrality of iteration in cognition and in the psychology of time experience. Specifically, moments in time actualize through a becoming into existence, such that each actualization comprises phases of transition within an encapsulated point. The actuality is a recurrence that exists as a moment in time or a time-creating moment when the becoming is complete. As Whitehead put it, “half a wave tells only half the story” (Whitehead, 1934). An instant refers to an isolable slice of process; a moment refers to the minimal duration of a thing or one cycle of its existence.

The actualization of a moment, like the surge of a fountain, is a non-temporal succession with an epochal character. A moment in the subjective life of an organism is a becoming-into-being. Being is the frame, category or collection of all phases in becoming. Continuity across moments occurs by the overlap of epochs. The oncoming moment assimilates to the current one so the mapping of one actualization to the next gives the impression of a stream-like flow of passage. More precisely, the becoming of an existent absorbs its successor, which begins to actualize before the predecessor achieves actuality; that is, the assimilation of T2 in T1 begins prior to the existence of either state. The incompleteness is necessary for the miscibility – the becoming part of – one state in another. The continuity of adjacent states is a resolution of becoming with a momentary epoch. Time feels continuous since we cannot grasp the individual moment as one state blends into the next. The replacement of actualities differs from a causal sequence of atomic instants, since states are assimilated prior to their existence; that is, the antecedent assimilates to the consequent, and the reverse, before either exist, each becoming an existent only after it is replaced. Again Whitehead, “each occasion presupposes the antecedent world as active in its own nature.” The sequence of mental states entails a replacement of irreducible packets of becoming that collectively are minimal units or “drops” of experience (James 1890).

Things become what they are and in the course of becoming are replaced. A forward-moving present is replaced by an oncoming future that actualizes part of an ensuing state that is a constituent of early segments in the present state, and then lapses to a layered succession of a more or less distant past. The immediate future is in the present before the present becomes what it is, such that the leading edge of the present always incorporates the state that follows. The
present becomes past by failing to achieve actuality in successive revivals. In this way, the immediate future becomes the past on further replacement, with each new present vanishing into the jaws of memory. We experience clock time, but moments are not experienced, nor do we experience the present as it rolls into the future consuming the oncoming events in which it is embedded. We live in the present unable to grasp it, much as we cannot catch a perception (Hume). Experience in each present incorporates a series of states none of which can be experienced, nor can boundaries be demarcated nor their constituents isolated. States (epochs) overlap, so do durations, with no anterior or posterior limits. Durations and moments are categories transformed in the exchange of ingredients.

The forward motion of the present is due to novel replacement. Would the feeling of motion differ if each moment was the same as the preceding one? Likely, it is less the novelty in experience that accounts for forward movement than the fading of the present. If events were unchanging, identical oncoming moments would impact the past as much as the future, since each present would be all there is without a past for comparison. In rare cases of bilateral temporal lobe damage from encephalitis the immediate past is lost. The person lives in a shrunken present. Without duration there is no implicit relation to a past, that is, to incompletely revived former presents, so that redundancy or novelty cannot be established. Consciousness in such a person is a rapid replacement of durationless states. The person lives on the knife edge of passage in a state of disorientation with a stroboscopic now. A present that consists of one or a few states allows one to listen to music but hear only the immediate tones without recollection or sense of continuity with what came before. When the disparity of perception and forgetting essential to duration is lost, the now is instantaneous, as in dream, with the self carried along by events.

Events

All objects are events – durations of change with arbitrary boundaries – that comprise a series of mental states. Are events in time or is time in events? The variety of events that constitute conscious experience implies that duration is a category for events of different epochal cycles, with recurrence governed by the cycle, not the events, yet from a subjective point of view, timeless events and time without events cannot exist.

Though epochs enclose phases in succession, an actuality achieves temporal order over a series. The succession of phases within a mental state is non-temporal until completion at which point the embedded segments unscroll in temporal order. A series of states is necessary to have incomplete revivals, which create posterior boundaries for the present. In objects like trees and chairs, the sequence of states does not appear to change because each state is a near-replicate of the prior one. Change in a moving object, in speech or music, represents a novel sequence of overlapping epochs, though change is within the becoming, not the difference from one epoch to another, which is an appearance of change spread out as a two-dimensional line over the replacement.
If all events ceased including those in the brain, the world would come to a halt and time would cease as well. If time should stop, so would all events, but in some sense this happens every moment in the renewal of time and events by the oncoming state (mental state, state of the world). Time is suspended in the interstices of mental states, though overlap of adjacencies prior to completion prevents a timeless interval. The effect is similar to the \textit{phi} phenomenon, or a movie reel, where rapid replacement obscures eventless gaps, but in the mental state it is not only the rapidity of replacement but the overlap that insures continuity - as well as personal identity and the preservation of core attributes of personality - which would be lost in a causal series of modular or atomic states. The difference is that with the \textit{phi} phenomena or movie reel the mind “fills in” the intervals, but if continuity is generated independent of experiential content, what is the relation of time to events?

One speaks of objects, but all objects are events and all events are perceptions of the world. If a present duration is about two seconds of clock time (Pöppel), this would include 20-30 mental states, perhaps more, which is probably necessary for the recession of the past to form a moving boundary of the present. A disappearance of events, as in snow blindness, tends to produce hallucinations and disorientation, that is, incomplete objects and a degraded present. The absence of all events leads to sleep, while in dream, endogenous events create a brief duration that allows a fleeting consciousness and a passive self that apprehends but has no control over events.

Thus, the response to the question of the relation of time and events is that the mind requires events to generate the duration necessary for self and consciousness. External events expand duration by carrying the state to an objective actuality. Without external objects, internal imagery has limited duration; there is a rudimentary self and consciousness but no past, no future, no agency. Perceived events, revived to a diminishing degree, uncover stages in memory and, through memory, establish a disparity with immediate perception that becomes the duration of the present. Dream images do not behave as perceptions; there is no “decay,” or at least it is insufficient to create a present duration essential for an experience of the past. The feeling of agency is also absent since the future state always comes as a surprise.

The importance of events is not only to inject novelty into the present but, through forgetting, to create the duration necessary for novelty to be recognized. An animal past that consists only of learning, habit or incidental memory lacks the recurrence of past actualities as contents in consciousness. It is not essential for an animal to have an explicit recollection of the past, and for the human mind it is also the implicit past, not the recollected past, that is most important in duration experience. The incomplete revival of the recent past, conscious or not, establishes the posterior boundary of the present which, like the occurrent state, is continuously being replaced by its successor. Past states sink beneath the floor of recall in the progressive attenuation of revival. We can say that events create subjective time in two ways, by replacing the forward edge of the occurrent
state by novelty and by establishing duration in fading to an unconscious level. A representational past is no less important to time-experience than events which, without a past, would exist in a before/after relation without temporal awareness or episodic locus.

The duration of the present was termed specious by James (op. cit.), or considered virtual, phenomenal or illusory in my own prior writings, since duration is presumed not to occur in the material world and physical time is conceived as before and after without a present or perspective. Perhaps we should think again about this distinction. The minimal duration of becoming essential for physical entities to exist evolves to more extensive durations in higher organisms where existence refers to the duration of a mental state. Duration is not an addition to nature but an inherent feature that expands over the evolutionary sequence. The primary shift in the human mind is that the duration of the mental state, or the duration required for the mental state to exist, includes prior states as receding approximations to the occurrent one. This implies that the human mind is not set against a physical nature but is the known apex of evolutionary reach, with features essential for the mind part of the inorganic world. To give Whitehead (Whitehead, 1934: 70-71) the last word, “we should conceive mental operations as among the factors which make up the constitution of Nature.”

REFERENCES


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