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MICROGENETIC APPROACH TO THOUGHT AND MEMORY

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SUMMARY

In neuropsychology, disorders of memory and thinking are usually treated as independent problems mediated by different neural substrates. This paper describes the process of thinking from a microgenetic standpoint, and to this end, takes up some aspects of thought that are often neglected in other accounts, such as the relation of conscious thought to unconscious process, the relation to memory, and to the self, agency and causation. The argument is that thought, memory, language and feeling are generated by a common process, with language “grafted” to the axis of act and object development. The apparent separation of these capacities is due to a difference in the configural nature of the core construct, the primary path of its micro-temporal development (action, perception), the dominant segment in the phase-transition and the emphasis in the mental state underlying the final content on visual or verbal imagery, i.e. introspection or imagination. It is hoped that this approach will provide an antidote to the increasing modularization of content and neglect of formative process anterior to content, and recapture the generality out of which an act of cognition develops.

PRELIMINARY QUESTIONS ON THINKING

There are many modes of thought that thinking subsumes: visual, verbal and gestural (in the deaf); imaginative, fantastic, symbolic, animistic, mystical, realistic and logical¹; automatic and deliberative; incidental and obsessive, musical, mathematical; and so on. Thought is an outcome of thinking. There are so many categories of thought and an infinite number of contents that if we take only the content of thought we miss the process of thinking. The same problem occurs in perception, though the content appears to begin with an object that is independent of mind, whereas thought is wholly endogenous. With perception, the content appears outside mind, so the search is for the mechanisms in common to all objects – color, shape, movement, etc. – and the content of the perception is deemed irrelevant to the act of perceiving. We can look at a field, a tree in the field, a branch or leaf, or an owl on the branch, so what counts is the process through which objects are perceived, not the objects themselves. We do not approach thinking in the same way, for the process of thinking is seen as irrelevant to the content of the thought. There are many reasons for this difference, among them the fact, as mentioned, that perception begins, so it is thought, with an actual object while thought develops out of the shadows. Perceptions are shared, while thought is individual, and creativity and pathology are attributed to thinking and its contents, less so to perceptions.

There is also the relation of the self to thinking, both as antecedent to thought and as a possible product of thinking. Descartes' "cogito ergo sum" can be interpreted as "I think", so there is a self that thinks, but also as "thought occurs, and the 'I' is thought up in the act of thinking." Can there be an "I" without thought, or thought without an "I", that is, is the "I" a necessary preliminary to thought, part of the thought or in opposition to it? Is there continuity from self to thought; do they interact – does the self shape thought, and the reverse - and if so, are they mediated by common or distinct processes or mechanisms? Is thought a product, state, process, content or faculty? Is the outcome of thinking a result that stands apart from the process through which it develops or does it include antecedent and/or unconscious phases? Can thinking occur without a thought, as when the effort in thinking is unresolved? Is thinking going on all the time or is it intermittent? Is all thinking a form of problem-solving? Is there unconscious thought? What is day-dreaming? Is the spectrum of thought a continuum, say from dream or imagination to logic, or are there different substrates involved in each form? What is the relevance for everyday thinking of thought disorders such as psychosis, paranoia or hypnotic states? Other aspects of thought could be emphasized, such as effort, volition or spontaneity, propositional content, intentional quality, or the relation of habitual to innovative thought, or pragmatic to creative thought (Pačalska et. al. 2011). Thinking embraces so many differing states or activities that one is hard-pressed to come up with a definition, even a description that does justice to the diversity.

¹ Those who hold logic as the paradigm of thought might recall Heidegger's (1959ed) comment that "logic relieves us of the need for any troublesome inquiry into the essence of thinking".

It is also the case that thought depends to such an extent on language that linguistic analyses have often substituted for accounts of thinking. While problem-solving can be found in the most primitive organisms, there is little question but that human thought is closely bound to language. But how is this relation to be understood? Are the differences between inner and outer speech sufficient to account for thinking? Is a description of inner speech also a description of internal thought and, if so, how does this differ, if it does, from thinking aloud, or in conversation? These are important problems, but not the topic of this paper, in which the focus is on inner speech as a form of verbal imagery, and the role of verbal (and other forms of) imagery in the thought-process (Pachalska et al., 2010).

A discussion of thought also entails a theory of feeling (Brown, 2012). The fusion of feeling and idea is termed “conceptual-feeling” to imply that thought and feeling are not dissociable. Feelings embody concepts; concepts have an affective tone. Instinctual drives implement categories, objects actualize concepts. A thought saturated by feeling is an emotion. A mental state inclined to feeling, such as intense fear or anger, seems independent of thought; the reverse occurs when reason or abstract thought seems independent of emotion, but it is only a matter of emphasis. The affect that is drained from ideas is apparent in their valuation, in argumentation and the aggressive need to persuade. A focus on the content (substance) of thought, e.g. a proposition, depletes anterior feeling (process). The passion is not in the idea but in the covert process of idea-generation. Idea and feeling are unified at the beginning, then diverge, each supporting the other. Feeling obtains in process, content in substance. An accent on one obviates the other.

Feeling begins with unconscious value, accompanies concepts as they pass into objects, and externalizes in object-worth. A thought that asserts a positive or negative direction has a valuation that is close to a desire. The intentional shifts from aboutness to want, from the “I have (know, etc.)” to the “I will or must have (avoid, etc.)”. A state of consciousness for content is immediate, substantive and in the present. Aboutness is not for a particular content or a certain relation to the self. Like the psychotherapist who listens to a statement and then asks, “How do you feel about that?”, when intentionality involves a valuation couched in feelings of want or avoidance it extends to desire and related affects.

THOUGHT, DESIRE AND INTENTIONALITY

Intentionality can be about anything, an experience, a feeling, a memory or a plan, while judgment and valuation are construed as secondary to consciousness of the intentional content. The sequence is presumed to go from consciousness of something to a judgment of its worth or truth, to a feeling and/or response based on that judgment, a progression that appeals to common sense. However, microgenetic theory reverses the sequence (an outline of the mind/brain state is shown in Fig. 1)².

² See Bachman (2012) for a update on the relation of microgenetic theory to cognitive science.

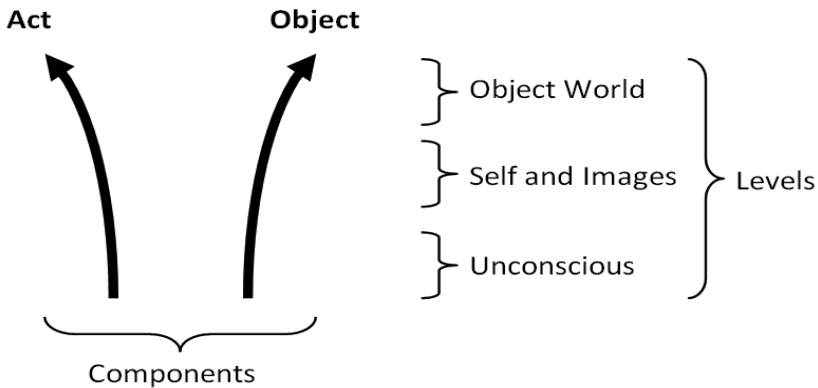


Fig. 1. Action and perception develop over hierarchic systems that retrace patterns in forebrain evolution. A single traversal constitutes the micro-temporal structure of the mind/brain state. A parallel derivation of acts and objects recurs in a fraction of a second. The progression is uni-directional from past to present and from mind to world, leading from an unconscious core through intermediate phases to the external world. Sensation is applied primarily at the distal phase. In humans, the production and comprehension of language are grafted to the motor and perceptual limbs of this system. Action and perception are not a result of neocortical activity alone but are realized over the entire micro-temporal system

Valuation precedes consciousness, including the content to which consciousness is directed, which itself is an outcome of interest (as valuation); a content that is relatively “affect-free” is extracted from antecedents that are affectively charged. A seed of interest is laid down prior to the content. We do not look at something and decide if we are interested. Interest drives the looking beforehand. In the shift from content to feeling, one mental state is replaced by another that is subordinate to a vector of drive. The aboutness in thought transforms to the hoped-for in desire. Rational thought and pragmatic behavior are prominent when personal feeling is subdued. Content cuts off feeling in its formative arc.

The transformation of thought or memory to desire coincides with a shift in the relation to the self. This relation establishes the subjective aim, and thus determines whether the content is impersonal or an object of desire. The shift from content in one state to process in another, e.g. from an emphasis on endpoint cognition to preliminary phases, recaptures the feeling and indecision that anticipate the distal outcome. A prominence of content in one state, and of feeling in another, represents a transition from the substantive to the processual. Content is distinct from feeling even when the feeling is the content. Process deposits content. The content that is deposited enjoys the status of an entity that is distinct from the process behind it. The being of substance (concept, object) is the actualization of the becoming of process (feeling, action). Thus, to be conscious of an object or to think about an idea, though object and idea may seem relatively affect-free, involves an implicit valuation. Ordinarily, the content of the state begins with a disposition that forecasts a response. Mental content is a dead remnant of living process, which is prominent as its immediate precursor, and

disguised, often thinly, as the value of the content to the self. Wanting is prior to having, learning is prior to knowing, valuing is prior to what is valued, and thinking is prior to thought. One could say an intention becomes intentional when necessity gives way to impartiality.

AGENCY

Variations in the content of thought and the quality of feeling in desire deserve careful scrutiny, but this paper explores the act of thinking regardless of what thought is about. The concern is with the nature of thinking, its relation to the self and the effect of thought on behavior. A central question is whether thought is expressive or causal. In psychic- or agent-causation, a self (or thought) is assumed to cause behavior. We tend to accept the idea that thought (reason, desire) is a causal product of the self, and that the self is the cause of action, but we are less convinced that thought is itself a cause for other thoughts or for action. Does one thought call up or cause another, as in a stimulus-response chain? In agent-causation, the issue goes beyond causation to freedom of choice. The feeling of volition, the consciousness of options and the decision to act, heighten the sense of agency. But a self that is constrained or forced to implement an action can still be causal even if the sense of agency or voluntary choice is wanting. With consciousness there is always a self, and with a conscious self there is always choice, even if the choices are unpalatable. Agency inheres in consciousness, though the self can feel helpless or passive to the present conditions.

The conscious self is felt as the cause of action, though we are aware, if vaguely, that the self is susceptible to unconscious influence. We have no direct knowledge of unconscious cause, yet we assume the self has sources of which we are indirectly if at all aware. We are prepared to believe this is so, and speculate on unconscious beliefs, wants and inclinations. If the self arises out of an unconscious core, the core, not the conscious self, would be the primary cause. If the self causes action but is not the primary cause, i.e. it is caused by, or an effect of, anterior process, what is its cause? Are thought and action also effects of this cause? As the parent is a vehicle to transmit the grandparent's genes to the child, is the self a vehicle to transmit the past into the present, when the unconscious motive is conveyed into conscious action?³

This line of thinking raises the problem of spontaneity, which in the absence of deliberation is attributed to unconscious process. Unconscious thought incorporates character, core values and beliefs, and the core self that embodies them. Deliberation is the model of conscious choice but it is uncertain whether choices are causes, effects or neither, while unconscious process, though lacking agency, has a causation like that of animal behavior. How does the automatic pass to re-

³ Collingwood (1940) argued that conscious reason arises from unconscious presuppositions. So too, presumably, does the self. The self that decides, chooses and is felt as the initiator of an action is an outcome of antecedents that include predispositions or proclivities guided by unconscious values and beliefs, attitudinal tendencies that are part of character.

flection, for example, when hesitation in learning becomes automatic in skill, or when action that is automatic becomes a topic for reflection? A young doctor is aware, in an emergency, that if one has to think what to do the patient may die before a decision is made. Learning may be slow, but effective action is prompt and often automatic. Is the delay in deliberation a cause of action, an excursion into other potential causes, or an indecisive self? Deliberation is prominent with new material or a new procedure, such as a piece of music, but with practice, performance becomes automatic over time. Repetition obviates deliberation and facilitates rapid revival. The passage from one to the other is continuous and to some extent reversible. What is the significance of this transition on the argument that different neural systems are involved?

Thoughts come and go and the thinker is often at a loss to explain why some thoughts are conscious and not others. If a thought that demands action precedes the act, is it necessarily causal? If I think (decide, plan) to go to the store, does the prior state of mind – a moment or a month ago – cause the going to the store, or does the action realize a subsequent mental state that merely replaces a prior one? The acts of a lunatic seem driven by irrational thoughts, but one can as well say they reveal the irrationality of the self, i.e. thoughts rational and irrational are attributes or effects of the self to which agency ought to be assigned. One can also ask if thinking anticipates action as an excuse or justification for what is unconsciously “decided”, i.e. if reasoning provides reasons, not causes. Does thought support, rationalize or fill in an unconscious bias? We are guided by unconscious tendencies in the form of beliefs, values and drives, in the same sense that a dextral bias in the tonic neck reflex, the “fencing” position of the newborn, predicts later right-handedness. The orientation bias in the axial plane forecasts a bias in the distal innervation. We do not assume a gradual development to asymmetric action in the distal musculature – though no doubt it occurs, in maturation and in the mental state – but we do speculate on the passage of unconscious to conscious thought.

UNCONSCIOUS THOUGHT⁴

How is the self (as well as thought, reason, feeling) related to action that is spontaneous or automatic, and voluntary or deliberate? If thought is suspended in the transition to automaticity and engaged in volition, how would this come about? With uncertainty or in pathology, actions such as walking and speaking can lose spontaneity. To the extent that spontaneity points to unconscious process, the return of deliberation for acts that have become automatic requires that unconscious process surfaces into consciousness. Can unconscious events become conscious, or is the mode of thinking so different – much as dream differs

⁴ Some philosophers, e.g. Searle, dismiss unconscious thought as mere physiology. But this is also true for conscious thought, except that subjective experience is added. If both conscious and unconscious thought are physiology, the difference is that unconscious thought is not conscious, which after all is the basis for designating it as conscious in the first place.

from waking thought – that the unconscious phase, if it should become conscious, is transformed beyond recognition? This recalls Wittgenstein's claim that if a lion could speak, we wouldn't understand it.

When deliberation becomes automatic, we say that choices are unconscious or fixed in skill, technique or tacit knowledge. Several notions of the unconscious are implied: in one, a repository of beliefs, images, symbols, experiential memories, and other potential contents of thought, much of which is based on dream and its interpretation; another related to skill and learned behavior, whether knitting, chess or grammar; and yet another, similar concept that relates to procedural memory, which is automatic or unconscious skill, such as riding a bicycle or learning a game of cards, usually contrasted with declarative memory, which is conscious and reflective⁵. We assume unconscious skills or memories are the foundation of conscious thought, but in microgenetic theory, certain of these unconscious traits come together in, or issue from, the core self.

We do not as often think of skill in relation to perception though such skills as mirror-reading, eye-hand coordination and pattern detection pass from conscious learning to unconscious knowing. We speak of the "trained eye" of the scientist who knows what to look for or the detective who sees clues where others are baffled, but all of us navigate the environment each moment with little thought to much that is happening around us. Implicit perceptual judgments are continuously made, e.g. spreading cream cheese on my bagel, how long to hold a kiss, with little if any conscious thought. Habits also fall into this category. How are we to conceive an unconscious stage in thought, whether a phase embedded in consciousness or a terminus that is accentuated in dream? Can we say the rapid traversal of a phase that might otherwise actualize in dream is deliberative in wakefulness, even if it is in the language of early mentation?

In microgenetic theory, thought begins with unconscious presupposition, passes through child-like or dream-like cognition, including primitive thought or animism, to actualize in rational thinking (Pachalska et al. 2012). These phases, largely submerged in the rapid transit to consciousness, reappear when the dominant focus at earlier phases coincides with ordinary objects in perception and fluid exchange from depth to surface. On such occasions, thinking will be creative or introspective, with choice, decision and a recrudescence of early memories. If objects are incompletely detached, i.e. image-like, the earlier phase may actualize as psychotic thought. It is only with a heightened emphasis on preliminary cognition in the context of a normal object-development that pathological thinking can be avoided⁶.

In the emergence of early cognition, automatism and spontaneity become hesitant and deliberative. In dream, with an absence of sensory control (sculpting) at

⁵ The distinction of procedural and declarative, or implicit and explicit, is relevant to the discussion of tacit knowing on the one hand and deliberation on the other.

⁶ Earlier accounts of pathological symptoms were often misunderstood as entailing a lesion-induced ceiling on the actualization process. This was refuted by the theory of symptom formation, which rejected the so-called double dissociation in favor of morphogenetic principles, in which the disruption carries through to the developmental endpoint (Brown, 1994).

the end-phase of the microgeny, antecedents are exposed prior to adaptation. The absence of sensory constraint prevents externalization, detachment and fine feature analysis. Cognition lacks the normal accommodation to reality, with hallucination in perception and fantasy or delusion in thought. These outcomes occur in the waking state when the intensity of preliminary cognition overcomes the influence of sensation to coerce the pre-object outward as a final thought or perception. The actuality then has the characteristics of a dream, including a self that is passive, as in dreaming, and felt as a victim to its own imagery, e.g. paranoia.

In sum, cognition early in the actualization is characterized by dream-like phases ordinarily transformed, or embedded in a cognition that is “reality-based”. Antecedents surface as endpoints in the waking state when there is a failure to adapt to (model) the external world. This occurs when the pressure from below overcomes constraints on object- or thought-development, or when constraints are diminished or absent, e.g. dream, sensory deprivation. A deliberate and reversible withdrawal to earlier phases in the presence of normal sensory adaptation accounts for introspection, imagery, fantasy, creative thought and mysticism.

SELF AND THOUGHT

Thinking is something the self does, and thought (desire, etc.) is something the self has. The activity of thinking or desiring – the verb – is an activity of the self, while the outcome – the noun – is an adjunct or possession. The self is the person, not something the person produces; the self does not have a self. Different philosophies and accounts of moral responsibility treat the self as an accumulation of selves over the life span, or the sum of its acts, or the self of the final conscious state. The self must be the outcome of its antecedent states – primarily the immediately preceding one (Brown, 2010a) – but it is still an individuality, not a multiplicity. We recognize a mean or average self, i.e. the core self, that we identify with character, but there is also the conscious or empirical self that, unlike the core self, adapts to exigencies of the moment⁷. The conscious self is nearly-identical to that of the preceding state, in contrast to thought and desire, which are in constant change. A change in desire is not a change in the self unless the self is overcome by desire, in which case we speak of an altered or transformed self. A self that is obsessed is no longer the everyday self. If the change is temporary, the core self recurs. If not, in madness, passion, religious conversion, obsession, relinquishment, addiction or other pathologies, the self may transform to a different person. With marked deviation we say “he is not himself” or “I no longer recognize her”.

Normally, the relation of self to desire (or thought) is comparable to, though less pronounced than, that of agent to action, except that thought and desire stay behind while acts externalize. Thought can externalize in action, in speech, writing

⁷ Some writers, e.g. Damasio, seem to think they have discovered a distinction between a core and conscious self. This distinction is in Kant’s empirical self and self *an sich*, and was discussed *inter alia* by James (1890), as well as in my work over 20 years ago (Brown, 1991).

or composition, as well as in perception (or hallucination). In the former, the sense of volition is retained, even growing stronger. In the latter, i.e. visual imagery, thoughts are like independent objects in relation to which the self is passive⁸. A powerful thought or desire may usurp the agency of the self to such an extent that other thoughts or options are subordinate, neglected or do not arise. The slave to desire has lost freedom of thought, open-mindedness, restraint and choice. The converse occurs when the self feels trapped or condemned and thoughts range freely. A self in prison can think of other times, hopes and delights. Except for obsession, hypnotic states or abject submission, or when there is inability to deviate from habitual lines of ideation, thought is felt as induced, guided or optional. There is always the possibility of change, but for the most part we are “stuck” with the selves we are.

A recurrent intrusion of thought or an obsession can take on a thing-like quality as an isolate in the stream of thinking. In schizophrenia, objects become thought-like while thoughts objectify, to the point where a thought may command the self to act in a certain way. The self submits to its own thought content, which is perceived as that of god, the devil or another person. The objectified voices of paranoid psychosis are thoughts of the self as victim. Since the content of hallucination derives from the self, it must represent some facet of the self’s belief system. A schizophrenic who hears the voice of a Martian hears his own thoughts though they are attributed to an imaginary other. The paranoid hears a voice that reinforces or complements his thoughts, wishes or fears. In rare cases of pathology, the feeling that body parts belong to the person is lost and the parts detach (anosognosia). In other conditions, such as alien hand, a limb may attack or interfere with the self’s own actions.

STABILITY AND CAUSATION

As an agent, the self feels an instigator to thought and action, while thoughts and acts are felt as consequential. The direction is felt as one that goes from self to thought with an outcome in acts. The feeling of this direction is deeply ingrained in the psyche. However, one can ask if the self, as the initial phase in object- and thought-production, is deposited as a type of thought, first unconscious or subliminal, then supraliminal, to give rise to conscious acts and objects. The identity or unity of the self, which is not felt for thought, is a composite of implicit beliefs, values and experiential memory. Nor is agency felt for thought in the same way. Identity and agency are incompatible with the episodic and fluctuating nature of the content and the passage to diversity from the relative constancy of the core.

The unconscious core and the self-in-consciousness recur largely unchanged in contrast to the comings and goings of thought and desire. The feeling of agency owes to the stability of the self in comparison to the dynamic of thought. Causa-

⁸ The loss of agency and activity on the motor side of inner speech (verbal imagery) allows the passivity and receptiveness on the perceptual side to dominate. This accounts for the experience of a content that detaches as the heard voice of another person (See Brown, 2009; 2010, for an account of how this may occur).

tion requires an entity that is sufficiently stable and demarcated to be identified as causal. The near-identity of recurrence gives the sense of a substantial self. A recurrent thought may have a stability of content that approximates the stability of the self. Once thought passes to action (or speech), it is fixed as a temporal object with a thing-like quality, e.g. a statement, that is accessible to others and can be affirmed or validated. The classic example is a proposition as a closed premiss the truth of which is testable. In everyday life, however, we recognize the diversity of thought among innumerable other thoughts in the same self, most of which arise, fade and never recur.

In spite of efforts to understand the self or convey its content, the self is less accessible than thought or language, which may conceal or justify as often as expose or implement. At a distal locus in the mental state, sensory constraints guide object-formation to reproduce the “same” object. The relation of self to thought is uni-directional (Fig. 2). Thus, thought will be irrational when the self is irrational, but an irrational thought can occur to a stable, rational mind. The self is not identified with its thoughts, but any thought offers a glimpse into the potential of the self. Only when a thought frequently recurs and gathers intensity can the self be said to mirror its thoughts.

Agent-causation is the agency of the self, psychic-causation is the causal role of mind (feeling, reason, thought), and both depend on stability. Thoughts, desires and feelings can intensify, but we do not usually think a self or object can intensify, though behavior is attributed to the strength of certain attributes of the self, e.g. courage. A special vividness of the object world would not necessarily provoke a change in the self, though it might arouse greater sensitivity, in poetry, joy, melancholia, and so on. The intensity of a thought over a brief duration can take

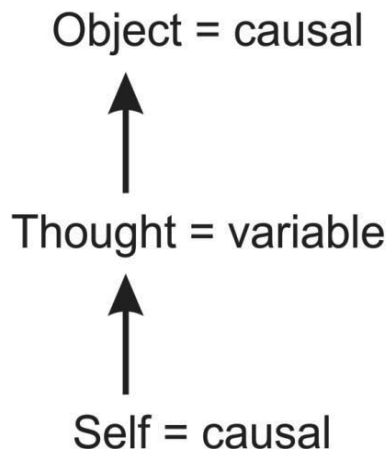


Fig. 2. Self and object recur more or less the same, the self by way of internal constraints (Brown, 2010a), the object by way of sensory constraints. For agent- and object-causation, they achieve stability, concreteness and self-similarity essential to causal entities. Thought is variable and only in special cases does it achieve the sameness of self or object, at which times it too can be felt as causal

the place of stability over many replications, such as a fit of rage or a state of intoxication that leads to actions and reactions, which would not otherwise occur. Still it is more natural to say the person (self) acts in a bizarre or irrational way, rather than that the thought caused the action⁹.

The stability of the self and its objects is established in recurrence, as is, on occasion, that of thought. Thoughts, ideas, propositions, remain in the mind as logical solids, or they externalize as consensual solids, ostensibly outside the psyche. The perception of external objects as causal depends on stability across mental states. A belief in the substantiality of (visual) objects comes from similarity of recurrence, which is invariably a matter of degree. Ice appears substantial; water less so, and vapor least of all. A tree is not a stable entity "out there" in the world, but a model that recurs, actually, a category of like exemplars. The tree quiet in the field, shaking in the wind, bent over with ice and leaves falling is the same tree, or rather, the category of the tree, the members of which are sampled in perception. This is similar to the category of a self, which remains the same in different states and under different conditions. In all instances, e.g. self, thought, object, stability is an ingredient of the intuition of causal power. A self that recurs is apprehended as relatively stable and capable of agency. An external object that recurs is apprehended as substantial and causal. A thought that recurs takes on a motivating power. The causal role of inner and outer objects or events presumes they can be a potential cause or effect in ordinary causation, and in causal persistence which is of still greater import to the mental state (Brown, 1996).

The stability of the self can survive an occasional rupture, for example, an episode of weakness in a person of courage, or an act of foolishness in someone who is prudent. Unless such occurrences are marked and frequent, we do not interpret them as signs of instability but as instances of human fallibility. For the most part, constancy is assigned to character, while deviation is interpreted as anomaly, of circumstance, stress, depression, fear, alcohol or some other influence. The core is felt as persistent though it can be shaken and distorted by extrinsic conditions. The attempt to preserve self-identity is a coping strategy, not only for the individual but for the inference of mind in others. In addition to recurrence, the appearance of substantiality also depends on the invisibility of the process through which contents develop, the categorical nature of content, and a resistance to the chaos that would result on the knowledge and, especially, the feeling that stability is illusory.

The categorical nature of objects is evident when the defining or paradigmatic features of an object are retained on different occasions. A bird that is dying or in flight is more or less the same bird that a moment ago was perched on a branch, but a sparrow that transforms to a crow is perceived as an hallucination, a dream or delusion, in any event, something thought up by the self, not a substantial existent. Substance trumps process in spite of the fact that substance is illusion

⁹ Some take the person to be more than the self, say, to include the body or social interaction, but since everything is in the mind, I see no justification for this distinction.

and process is reality. The carving out of substance is like a stationary wave in an ocean of flux. In a very real sense, the mind creates passing objects so it is not, itself, a momentary and insubstantial creation.

In sum, the stability of a thing or mental content is a necessary component of its inferred causal status. This is true for the self, for perceptual objects, and for feelings and thoughts which, if intense and recurrent, can seem to have causal power. Thoughts or images in dream lack casual power because they are fleeting. But more than stability is needed for causation or agency. A thought or feeling cannot cause an act because it is an outcome of the state in which it occurs. A thought could be an effect but not a cause, since an action must develop out of the antecedents of thought and emotion. In my view, an account of the transition of potential to actual is likely to be more productive, and closer to the truth, than one based on the transition from cause to effect.

A CAUSAL SELF?

The sequence from self to conscious thought, which is partly the basis for inferring a causal relation, does not carry into the sequence from conscious thought to action. The former reflects the potential of the self for a multiplicity of thoughts, the latter, the specificity of a thought and the limited range of possible actions. The progression from potential to definiteness is the direction of actualization that frames the mental state. A well-formulated thought represents a dominant focus in this process, when an object world is present in the background but not emphatic in consciousness. An action requires a mental state that leads from self to act, with the phase of thought inchoate in this transition. That is, first the core gives the thought over a series of mental states; then the core gives the action in the ensuing state(s). The process is constrained by thought without awakening it, which would result in thought as the actual content. Thought is preparatory to action, or reflective of it, but not its cause; conscious thought is an endpoint. Action cannot begin with thought, since every act must traverse the entire transition that begins with the core.

If I think or remember to go to the store and then go, the self is apprehended as an agent, while the thought or recollection plays an uncertain role. One can think or remember to go to the store, but still choose not to go, so the thought or memory is not the cause of the act, though one could say that thought, desire or memory facilitate or are conduits for agent-causation. If the path from self to act traverses an embedded thought, i.e. the configural residue of the thought from the prior state, the constraints of that phase would give the feeling that the action is directed by the thought (Fig. 3). Conscious thought provides options that serve as trial decisions that reinforce agency. To think of going to the store is to entertain the possibility of not going, or going elsewhere, so the self, if causal, does not impel the body in the direction of the thought but may cause it not to move or to move in another direction. Inaction is still action, a mode of causal persistence, like self-similar replications. We could say that thought gives reasons for actions

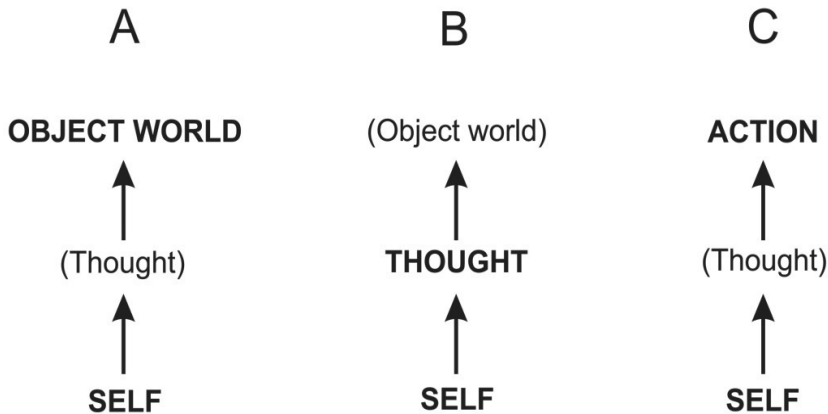


Fig. 3. Mental states A, B and C. At A, the self passes to the object world with thought implicit in the transition. This would be the case in spontaneous action or perception when the unconscious “choice” associated with thinking is buried in the act. At B, the self passes to explicit thought and the object world is implicit in the background. A thought actualizes as the dominant focus of the mental state, and adapts to the world by way of sensory constraints. These constraints are suspended in dream as thought (or perception) is liberated. At C, the self passes to action with thought implicit in the transition. If the explicit thought at B is implicit in the mental state at C, the self will feel that the thought empowers the act

but does not cause them, or that it explores choices in the delay to give an impression of deliberation and, by implication, freedom, or that thinking is exculpatory, not causal or, paradoxically, that thought accentuates the feeling of agency by fostering indecision.

The self that acts without thinking in spontaneous or automatic action is not consciously engaged, though it may be conscious of other activities or contents. This suggests that the thought of an action, or the conscious desire to act, is not a necessary preliminary to bringing the act about. Deliberation accentuates the feeling of volition in an act that might otherwise be impulsive. It is more natural to say, “I decided” or “I acted”, implying the self is an agent than to say “thought decided” or “reason caused an action”. It is not odd to say, “thinking on the problem made me act in such a way”, but the operative word is “me” or the core self. Moreover, the self feels an agent to action more than to thought, and more an agent to thought than thought feels the cause of other thoughts or acts.

Thought feels like a surrogate for action. While it is said that thought fills the delay before action, or that thought is trial action (Englefield, 1985; Brown, 1987), it may be more accurate to say that thought occurs in an attenuated state(s), and then in subsequent states spills into speech or movement. When implicit choice comes to the fore it becomes explicit, options arise and action (or thought) feels voluntary. The feeling of volition, which is distinct from agency¹⁰, develops with

¹⁰ Volition is the feeling of agency and choice. Agency is the presumption that the self causes action. Free will is the volitional quality of agency.

antecedents in language- or object-formation. These antecedents in verbal or visual imagery have a variable degree of volitional feeling, some more than others. We can volitionally imagine all sorts of events and feel some control over eidetic and after-images. Memory images have volitional feeling but they can occur spontaneously. Voluntary thought or imagery, and action, do not occur at the same instant, or in the same mental state, but are successively realized. This implies that the mental state of thought does not cause an action but is replaced by ensuing mental states in which action is the goal.

Object-causation refers to the effect of one object on another, as in billiard-ball causation. The problem is complex, particularly if we ex-Hume arguments on the relation of psyche to necessity. For example, Guyau (Michon et al., 1988) argued that causation and the idea of the future develops in the child's reach for an object. Agent causation refers to the effect of self on action. A direct effect of the self on objects would be telekinesis. Agent causation is the causal effect of self on bodily action, i.e. the implementation by the self (or will) of movements of the limbs or vocal system. A succession of proximate events in mind and world is vital to the inference of causation, though it is not clear if there is a causal effect of a mental state on its successor, or the successor on its predecessor (Brown, 2010a)¹¹. The self, not consciousness, psyche or mind, is the felt source or cause of an action. The idea that mind causes action comes from thinking of an action as the output of thought, not as a constituent of the mind/brain state. That is, a thought or action is not an output that stands apart from its antecedents but incorporates them in its structure.

All action occurs in the body with a secondary effect on objects. Unlike objects that leave the mind to become independent, actions remain in the body and, except for unusual dissociations, are felt to belong to the self. The core self of instinct or drive is bound up with the "body image" or "schema" and bodily awareness. Action is activated in the unconscious core and passes to the conscious self. The "me" of the core is embodied, the conscious "I" less so. The transition from core to self to thought in one mental state is replaced by a transition from core to self to action in another. The activation of core, then conscious self, occurs at the base of every state, a "bottom-up" traversal that explains the feeling of an agentive self behind thoughts and acts.

Most discussions of this topic treat motility as the read-out of a keyboard or action module in motor cortex activated by "central processors", with downstream discharge to brainstem and spinal cord. The microgenetic idea is that action develops in parallel with perception over distributed systems in forebrain evolution from archaic to recent formations. The system is hierarchic and serially enfolds at successive levels (e.g. Yakovlev, 1948) into the axial and postural musculature, then to distal asymmetric movement. Language production is grafted to this system and, like action, develops over a sequence of kinetic rhythms. The transition begins with oscillators that mediate the breath group and respiratory timing, passes to the speech melody and actualizes in the fine temporal sequence of speech sounds.

¹¹ A careful reading of my paper (2010a) on serial order will show a legitimate possibility of backward causation.

The temporal lag in (visual) perception – minimally, the time for the transmission of a signal to retina, optic nerve, geniculate body, optic tract, visual cortex and, in the classical view, the assembly and recognition of the object – is a delay prior to actual perception that is necessarily off-line with unobservable nature¹². This delay corresponds to one in voluntary action, e.g. pre-activation of up to 0.8 seconds prior to a conscious decision to act (Libet, 1999). There is other evidence for pre-activation of volitional action, e.g. a person asked to voluntarily move a finger shows an onset of movement at the peak of normal resting tremor. Action and perception develop in parallel out of the core to conscious acts and objects that mirror - as virtual images or appearances - entities in the physical world. The findings support work long ago by Bernstein (1967) on motility, and Martin (1972) on speech, namely, the entrainment of oscillators or kinetic rhythms prior to the conscious perception of an object and the conscious decision to act.

THE RELATION OF MEMORY TO THOUGHT¹³

The description, duration and theory of replacement of the mental state, the transmission over evolutionary growth planes, the passage from past to present – from the memorial to the perceptual - the sculpting and externalization of image to object and the relation to subjective time, all briefly touched on in this paper, are extensively discussed in prior works, as well as other topics essential to the understanding of thinking, such as emotion, memory and action, and all topics are interpreted from a single coherent theoretical standpoint. The theory applies within and across different modes of cognition, and provides an account of everyday experience as well as aberrations in pathological cases. The framework by which the multitude of disparate brain and psychological findings can be understood is here extended to the problem of thinking¹⁴.

¹² The temporal lag shows the memorial basis of perception, e.g. "there is no essential reason why memory should not be raised to the vividness of the present fact" (Whitehead, 1921). Recent studies by Eagleman (2011) on this topic, including those on the fluid duration of the now and virtual relation of self to motion and voluntary feeling, support microgenetic theory.

¹³ The biological correlates of memory have been studied, though the correlates of thinking are obscure, as are those of most other mental events. Presumably, these correlates are the neuronal populations that, by way of recruitment and synaptic strength, configure a population-dynamic over successive phases. Most likely, the configurations develop as a field effect (Eccles, 1972) or traveling wave (e.g. Tucker, 2008) incorporating lines of development leading to memory, thought, imagery and emotion. The wave-like individuation is uni-directional from an archaic core to an object in consciousness, from unity and simplicity to complexity and diversity. The traversal crosses spatial fields associated with specific capacities, e.g. imagery and thought in egocentric space, action and object in Euclidean space (Brown, 1986; 2010). A critical feature is the sustained specification (analysis) of wholes into parts, guided initially by the internal constraints of habit, value, belief and the immediately prior state, then by the external constraints of sensation (sculpting) on distal segments.

¹⁴ There are many works on thinking, older standards such as Bartlett (1958) and Bruner et al. (1956), and recent ones such as Kahneman (2011), but none to my knowledge that deal with the continuum from one content or mode of thought to another, the relation of thought to image and object or its relation to the self, agency and causation. There are also no writings in which thought is related to a general theory of mind. Instead, the works are devoted in the main to skill, logic, modularity, artificial intelligence, cognitivist and linguistic models, problem solving and decision theory. The definition of thinking substitutes for thought a methodology and the process of thinking is equivalent to its exemplifications.

Thinking is a way of describing mental process when the outcome is thought. Remembering, imaging and having an emotion are ways of describing the same process with a different outcome. We see the relation of thought to memory when memory is productive, or thought is reproductive. We see the relation of thought to imagery in creativity, imagination and inner speech (verbal imagery). We see the relation to emotion in the partition of drive categories to conceptual-feeling and affect-ideas (Brown, 2012). The process is uniform, while its characterization (as thinking, feeling, etc.) reflects a bias toward one outcome or the other. A memory transforms to a thought and the reverse. A thought can be infused with emotion, an emotion may call up a thought. Thinking is the pattern assumed by the momentary process, with memory, feeling and imagery playing a greater or lesser role at each moment.

Take the relation of memory and thought. Obviously, thought develops on the bedrock of experience and learning, whether mathematical, scientific or creative, most of which is unconscious in the form of skill, habit and the like. Thought and memory in consciousness are a mix of the familiar and the novel. An emphasis on the past imports memory into present thought. An emphasis on the present, a direction to the future and the intentional quality of the content, implicate thinking (as expectation or desire), though memory can be an intentional content. Thought is for the possible, memory is for the irredeemable. Memory in the service of thought is the basis of “working memory”, the technical term for holding a memory in the mind to aide in problem solving. For this approach, memory is distinct from thought, in spite of the common intuition that a mix of thought, memory and feeling determines the momentary experience.

The mixing of thought and memory is nicely illustrated by dream, when the content has not yet individuated to the particulars of conscious adaptation (Fig. 4). Is dream a memory transformed to a thought? Is it a thought confounded with a memory? Often it is not possible, on waking from a dream, to say which part was thought and which part memory. One can ask, is a memory that is condensed, fused, or revived in symbolic form, still a memory? Does the “dream-work” signal

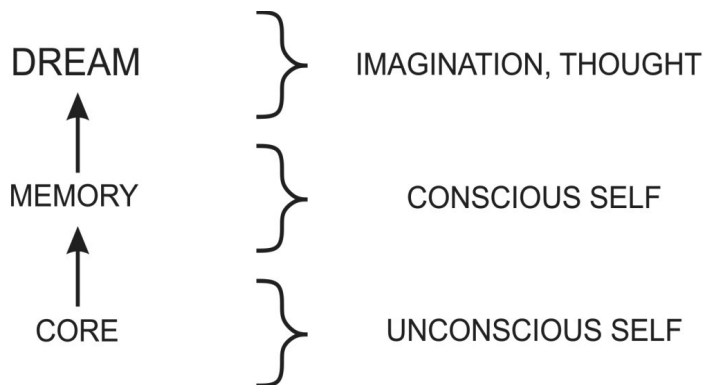


Fig. 4. Without the sensory constraints that would transform the phase to objects, the microgeny actualizes in dream at a phase of imagination and thought

a transition to thinking?¹⁵ One speaks of a memory as incomplete, distorted or derailed, but the deviation from a “template” is often a sign of thought. The inability to distinguish memory and thought does not occur in the dream but on waking. In dream, the past is *Now* without comparison to prior experience. The lack of a feeling of familiarity in the dream content raises the possibility that *the conscious sense of familiarity is critical in the distinction of memory and thought. A memory that is not apprehended as familiar will be taken for a thought, e.g. repeating one’s self or appropriating the work of others without being aware of it. A thought or experience that is novel but feels familiar, as in déjà vu, will be taken for a memory.*

If it is the case that the sense of familiarity decides whether a content is a thought or a memory, what accounts for familiarity? The arousal of prior experience entails an implicit comparison that should occur in every mental state; otherwise, as in the film *Groundhog Day*, each day – each moment – would be a replica of the preceding one. However, the sense of familiarity is unusual for everyday events. Familiarity informs the subject the content is memory, not thought. When I brush my teeth in the morning or drink my coffee, why do I rarely think of these acts as repetitive? This makes it unlikely that familiarity arises from the memorial nature of the content; in any event, the explanation is circular.

Is familiarity a product of memory or an aide to its identification? The prominence of familiarity in *déjà vu* where thought is confused with memory, and the absence of *déjà vu* for most memories, implies that more than familiarity is needed. This additional something, I would hold, is the sense of pastness that inheres in memory but is alien to thought. A feeling of pastness in thought would make the thought seem as if it was thought up before, in other words, that it is a memory. The feeling of pastness owes to an earlier locus in the developing mental state, which specifies the past of earlier experience, even childhood, to the immediacy of perception in the present¹⁶. We know that older brain systems, such as limbic formation, associated with memory (and emotion), are enjoined early in the state. Later phases extend to thought, then to the perception of stable objects. The past is alive when pre-terminal phases recur as memories or undergo transformation to the verbal or visual imagination (Fig. 5).

We understand the common sense distinction of thought and memory, in daily life with forgetfulness, and in diseases that affect memory. We know people with unexceptional or poor memory who excel in thinking, and the reverse¹⁷. Con-

¹⁵ In a classic study, Bettheim and Hartmann (1951) found that the recall of a story with strong affective tone in Korsakoff amnesics showed dream-like distortions, e.g. recalling a story about the rape of a woman as her burning to death in a fire. A deficiency in recall is not necessarily a loss of elements but an intrusion of thought.

¹⁶ On the transformation of memory to perception, and the uncovering of memory “stages” in the course of perceptual “decay”, see the review of my earlier work in Brown (2010).

The ability to retain long texts or new languages on brief exposure, such as learning the bible or teachings in Sanskrit, are examples of prodigious memory, but in memory prodigies there is often a weakness – perhaps a reciprocal deficiency - of conceptual thought (Luria, 1968). The story by Borges, “Funes the Memorius,” makes this point with considerable insight. Unselective recall and poverty of concepts are limiting factors in thinking. Another is forgetting the irrelevant, which is necessary for recalling the essential.

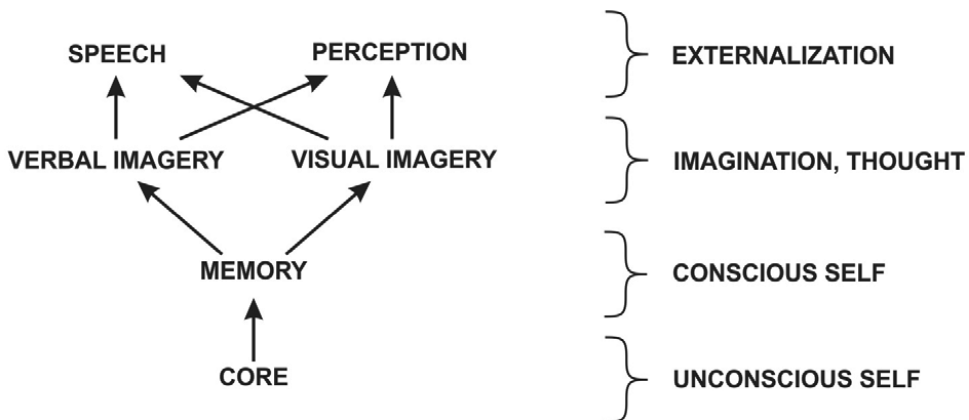


Fig. 5. Sketch of the development of personal and experiential memory into two main paths: (1) verbal imagery and speech; or (2) visual imagination and perception. Visual images can be described or elaborated in speech, and verbal imagery is the ground of speech perception. Other modes of cognition, such as emotion, undergo a similar partition (Brown, 2012). Action (limb, vocal) and perception externalize in an adaptation to the outer world, in contrast to dream, which without sensory modulation of image-development, terminates prematurely as “inner perception” (Fig. 4)

conscious memory can erode while skill remains intact. I have seen many brain-injured or demented patients with severe amnesia and preserved skills, for example, adroit surgeons who cannot remember performing an operation a moment after it is over. Thinking may be relatively spared until old learning is affected. However, in everyday life, thought and memory are intertwined. One says, I was thinking about a walk yesterday or a vacation last year. Thinking about the past is reflecting on memory, or it is memory alone or mixed with thought. To think is to entertain novel ideas, not to resurrect old knowledge, though this can pass for thinking. To say, I remember(ed.), a walk or vacation seems to limit the recall to an isolated event in a relatively brief duration, since a memory that constantly recurs is a sort of rumination, if not a pathological obsession, which in its variation and digression would be equivalent to thought. A distinction could be made between the spontaneous recurrence of a memory, such as that evoked by a taste or encounter, and the voluntary reminiscence of past experience. The former is direct and unsolicited; the latter, embedded in reflection, is more like thinking in which a memory substitutes for a thought (Fig. 6 A and B).

The conclusion is that if the content of thought is felt as past and familiar, the state is recollection; if the content is felt as novel and goal-directed, it is thought; and if the content is felt as novel, spontaneous or random it is imagination. To have a conscious memory is for thought to be guided by intrinsic constraints. To have a conscious object is for thought to be guided by extrinsic (sensory) constraints. A relaxation of inner or outer constraints allows the different forms of imagination to surface.

Memory is the starting point of thought, but thinking, because it develops out of memory, can also evoke past experience. The recollection of emotion in tran-

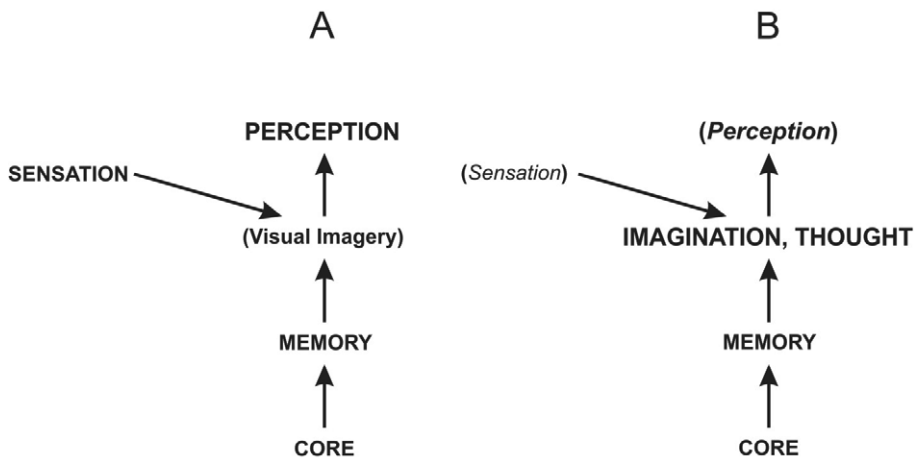


Fig. 6. From core to perception. A) shows a development through the substrates of visual imagery to perception. An internal image (brackets) does not develop. Instead, the substrate that mediates imagery undergoes adaptation to the world by way of sensory constraints. This is ordinary perception without introspection. B) shows the heightening of conscious thought and memory with a reduction of sensory modulation or when the pressure of antecedent phases drives the mental content to verbal or visual thought (introspection). Objects appear through the distal sculpting, but the focus is on memory or thought, while the outer world (brackets) is in the background

quility was, for Wordsworth, the basis of poetic composition. A grandmaster who plays multiple games of blindfold chess evokes the strategy of each game or the pattern of thought in order to reconstruct the location of the pieces. A clue to the dissociation concerns the earlier or foundational status of memory prior to its elaboration in thought. Thought depends at its inception on tacit knowledge (Polanyi, 1973) and learned skills, and deviates from memory as an exploration of its infra-structure, i.e. the lifting of constraints on accurate recall to uncover possibilities previously suppressed (Fig. 6 A,B). For example, in writing his great poem, Wordsworth recalled a voyage through the Alps, including the “associations” (category members and the propagation by way of object-property relations) latent in the memory, the signification, the emotion, the excitement and fatigue, the sounds and sights of nature, in a word the full richness buried in the experience and resurrected in composition.

Conscious memory that is not entirely skill-based is episodic¹⁸, i.e. a particular event or event-series at a specific time, even if it is not dated, and even when the memory is replayed as a topic for thought. The dynamic of thought entails a more persistent engagement. Thought can lead anywhere; memory follows an unconscious “script”. A thought that recurs over time with little change is a memory. One can recall a lengthy series of events, passages of poetry, even whole books, but ordinary memory tends to be restricted to a given content or category

¹⁸ This does not refer to the technical distinction of episodic and semantic memory. In my view, semantic memory is consistent with categories of like-episodes, the particulars of which have mostly been forgotten.

in which specific events are situated, while thought, by its very nature, is divergent and productive. An alteration of memory is often a substitution or elaboration, not just an omission¹⁹, and any deviation in recall is transitional to thought. Conversely, a weakness of thought returns the individual to the familiar, and an outcome that, if repetitious or habitual, approximates memory.

The ability to activate old knowledge and overly-learned, largely unconscious skills mediated by phases early in the mental state is the axis on which thought develops. An inability to bring a past experience into consciousness is a failure of thought as well as memory. The inability to consciously recall (think of) a specific event is also an inability to achieve definiteness. The more precise the to-be-remembered item, the more vulnerable to forgetting, e.g. names, words. Thinking, however, circumvents specificity and makes use of roundabout strategies. *What is lost in a disorder of memory, at least in the early stages, is the ability to think of (reflect on) a specific memory, while unconscious skills that are antecedent to conscious thought, or on which thought depends, are relatively unaffected.*

The physical past of memory is theoretically fixed but the psychic past is unstable. Memory will diminish, grow or diverge over time, and few can sustain a remembrance in consciousness without transformation. This is because memory is not a copy but a re-creation. To maintain a memory in consciousness is to revive it recurrently in spite of the dynamic of the self through which it develops, and the novelty of thought into which it distributes. However, it is difficult to hold in consciousness any *content*; memory, thought or emotion. In some ways, an unremitting focus on a specific content is comparable to the attention to a perceptual feature, in which subtle eye movements (micro-saccades) are needed to avoid the refractoriness that occurs when the gaze is fixed. When eye movements are paralyzed, objects disappear. It is equally difficult to concentrate on a static memory, whether a mantra or scene from the past, since any deviation of the “inner gaze” amends content to some other outcome, e.g. thought, imagination. There are, of course, those who live in or for the past, and many for whom open-mindedness in thought is subsidiary to fixed opinion. Yet, conscious memory is not consciousness of an unexpurgated trace. It is a reflection on the past, on what, why and how things were or might have been. This is memory as a goal, not memory implicit in thought.

The distinction of memory and thought is emphatic when rote learning is contrasted with problem-solving²⁰ in the artificial setting of an experimental study, but the recall of facts is rarely the machine-like, rote retrieval from a hypothetical store that is the dogma of research studies. Yet, on the basis of such studies memory is isolated as a special faculty and divided into a variety of forms, including stages in retrieval, e.g. short-term, long-term, working, iconic, modal-specific and so on²¹.

¹⁹ The most common response in disorders of memory is not “I don’t remember...”.

²⁰ The problem of “problem-solving” is that it combines human thought with the adaption to novel environments of spiders and birds, perhaps paramecia. It is a catch-all term that incorporates the entire evolutionary scale with little justice to the uniqueness of human thought and memory.

²¹ A major problem with the classical approach is the analogy with the computer, e.g. looking-up and retrieving an item from a file or store (critique in Brown, 2010).

To take these divisions as separate operations or mechanisms without clear lines of transition among them, or without a relation to other capacities or modes of cognition, obscures the natural dynamic of recall – its “constructive” or creative quality – not to mention the relation to thought, emotion, etc. Synchronic division is not complemented by diachronic relatedness even if flux is closer than interaction to what is psychologically real.

In the reproduction of a past event, inexactness is thought’s entry point. False memories are thoughts in disguise where the individual may not even be aware of the inaccuracy. For a person to know a memory is inexact implies a standard or template to which it can appeal. This standard is the unconscious construct – or potential – that is configured by the unconscious experience out of which the conscious event is specified. An implicit comparison also occurs in thinking. How otherwise would we know that an idea is original, or that ideas and memories are our own? William James wondered if he was getting mixed up in other people’s dreams. How do we know we are the proprietors of our thoughts and memories and not just parroting other people? Well, often we do, but less often do we admit it. Knowing is deeper than thinking, and potential is earlier than its outcome, in thought and memory, and it is common to both in which parts individuate the whole behind them. To the extent potential is realized in thought or recollection, it provides an intuition of ownership, originality or recurrence, certainty and uncertainty.

Memory and thought are preliminary acts and objects. In the perceptual withdrawal of schizophrenia they signal the onset of delusion which, like dream, is a mix of the two. The more image-like the content, the more thought-like the experience. The three-dimensional image of binocular disparity, and the temporal lag in perception (above), show that objects have a basis in memory, i.e. acts and objects are virtual. As Merleau-Ponty (1992ed) wrote, we remember events into consciousness. The conclusion is that thought, memory, emotion and other “components” of cognition, which are routinely described and demarcated as if they were multiple sub-components, are differing modes of a fundamental process of thought in which one mode is momentarily dominant, and its varied implementations are just so many tributaries of the same stream.

Finally, while the investigation of thought is the province of psychology, the search for the laws of thought has been left largely to logicians and philosophers, where the focus has been on adult cognition, conscious reasoning, predication, syllogism and logic. The implication is that such laws are extrinsic to, and guide, the process of thinking, much as syntactic rules are held to operate on grammatical elements. The law is presumed to determine the outcome of thought, with deviance (illogic) reflecting a lack of conformance to the operative rules. In contrast, for microgenetic theory the “laws” of thought are patterns or regularities *within* the process of thinking that are essentially the same as those for action, perception and memory. The outcome, e.g. dream, propositions, is shaped by the dominant component – action, perception – by the dominant segment in the phase-sequence, by the configuration that traverses the phase, and by the inner and outer constraints on that configuration at successive segments. The outcome

of the process, e.g. an image, a logical premiss, does not represent an aim to formal truth but is an adaptation of internal process to the external occasion in which thinking is an opportunity or a necessity. Specifically, laws are patterns internal to the thought process, which is not governed by rules or truth-conditions but by internal needs and subjective goals, namely adaptation of the final content to inner constraints and those of the immediate surround. This more inclusive approach, which can lead to an account not only of logic but of dream, of the development and disorders of thought, of fantasy and imagination, and of syncretic, animistic or primitive thinking, brings the problem of thinking back into neuropsychology (Pachalska 2011) which is its natural home.

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