On the remembrance of things present : a neuro-epistemological approach

On the Remembrance of Things Present: A Neuro-Epistemological Approach

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I

Let me recollect from Plato's *Meno* the famous passage in which Socrates demonstrates seemingly innate and unknown capacity or knowledge in Meno's "uneducated" slave boy. In this passage Socrates succeeds in getting the slave to prove a theorem in geometry (that the square twice as large as a given square has a side equal to the diagonal of the given square), despite the boy's protestations that he does not know the answer. By reiterating simple facts that the slave admits he does already know, Socrates has him prove the theorem by himself, a feat the boy had thought was beyond his powers. Reasoning is accomplished by dialectical question-and-answer and results in remembering-recollecting or *anamnesis*. For Plato the true objects of knowledge are Forms or Ideas, which are independent of the particular concrete things that embody them. This world-independent mind – a religious concept – implies that "knowledge is already there" latent in the mind and that recollection is the process by which this knowledge is raised to awareness. Not only mathematical but also moral concepts may be remembrances of things present. It is clear that Plato's ἀνάμνησις is not a mnemonic technique for recalling previous experiences. Neither is it a rhetorical art but a dialectical one, activated by appropriate questioning, "mental midwifery" (Coleman 6-10), in which the logic of the world's structure is reflected in the structure of the mind. Aristotle was later to say that the Platonic theory of Forms and Ideas was a variety of the older Pythagoreanism onto which were grafted modifications by the Socratic influence (Coleman 12).

The slave boy's ignorance of geometry (in the *Meno*) is analogous to Maurits Escher's lack of formal training in mathematics. Nevertheless,

subsequent mathematicians showed that Escher's pictures contain deep mathematical symmetries which mathematicians did not discover until much later. Martin Gardner mentions that there are many fascinating unsolved problems in tiling theory, and it is amazing that Escher, without formal training in mathematics, would have based his tilings on so many different kinds of planar symmetry, even including technically difficult tesselations of non-Euclidian planes.

The "knowledge already there" can, apparently, be expressed in a variety of "languages" including those of geometry, mathematics, pictorial language but also through the synaesthetic experience. Gail Gross for one perceives Penrose tilings as a musical polyphony. "This wordless language," she writes, "in particular the musical phase, is my chief way of knowing the world and ordering the universe." Geometric-mathematical stimulus configurations are re-created here as coherent rhythm, accent, melody, harmony, pulse, and so on.

Surprisingly, the "knowledge already there" may be discovered by people who then *ex post facto* realize that what they have found is but a re-discovery or recollection. Schopenhauer, for example, commented about his reluctance to publish certain paradoxical sentences, and was later happily surprised to find these same sentences in ancient writings of great men. Freud, too, found that he could uphold no longer the claim of originality concerning his theory of repression after Otto Rank called his attention to a passage in Schopenhauer's *Welt als Wille und Vorstellung*. That passage completely covered the theory of repression, and Freud remarked that he was ready to renounce his claim to priority against the intuitive insights of philosophers (for references to Schopenhauer and Freud, see Watzlawick).

The "knowledge already there" is also contained in Pascal's "Tu ne me chercherais pas si tu ne m'avais trouvé," and in Hölderlin's "Was Du suchest, es ist nahe, begegnet Dir schon" ("Heimkunft"). Recollection of the "knowledge already there" comes, apparently, not from teaching but from *questioning*, and the starting point of the search is determining its outcome. As Einstein is said to have remarked during a discussion with Heisenberg: the theory is going to determine what we are able to observe. Heidegger seems to refer to this very same "theory" (a body of knowledge "already there"): "when something within-the-world is encountered as such, the thing in question *already* has an involvement which is disclosed in our understanding of the world [i.e. our "theory" of the world], and this

involvement is one which gets laid out by the interpretation" (190-191, my italics).

Hence knowledge "already there" and hermeneutic pre-understanding are related concepts in the sense that meaning and understanding are preconditions of interpretation.

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How has the concept of repetitive recollection of knowledge potentially "already there" been reformulated two and a half millennia after Plato? Let me sketch in broad strokes the answer to this question. Boolean algebra, the binary notion of computers, the "all-or-none" functioning of synapses, the yes or no (true or false) response as well as the moving to (pleasure) or from (pain) are all isomorphic with two-valued Aristotelean logic and language ("tertium non datur"). Clearly, the logic of description is isomorphic to the logic of the operation of the describing system (Maturana 60).

The laws of (physical) reality, i.e. the laws of the "interface" (our observation-dependent transform, or the difference between ourselves and the world) may be expressed by simple mathematical statements (Maturana's operation of the describing system), since these are the algorithms[1] which compress[2] the data of experience to fit those laws in

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[1] An algorithm is a set of rules for getting a specific output from a specific input. The algorithm exists independently of any representation, while a program is the implementation of an algorithm in some well-defined language (mathematical, mechanical, linguistic, neurobiological, metaphorical . . .). The word originates from the last name of the Persian al Khowârizmî, whose textbook on arithmetic had (around A.D. 825) a significant influence for many centuries. When we change the tires on a car, for example, or when we move the decimal point for multiplication or division by multiples of 10, we use an algorithm.

[2] An example of algorithmic compression is the reduction of the input of peripheral sensory receptors from 10^9 bits to 1-50 bits per second in central conscious processing. Another example of such "selective information omission" refers to the mental analysis of chess position. It is estimated that there are as many as 10^{120} different possible games but humans reduce the complexity of this search problem by selectively omitting most of the pathways, whereby the process by which the

this Panglossian or "best of all possible worlds" (Davies). Mathematics is a construct of our brain, and by peering into the universe we may reflect-project the functioning of our own brain. Since it is this reflective interaction between observer and universe that creates reality, it would seem "impossible for mathematic *not* to work in the real world" that has the logical structure of mathematics (Vandervert). Clearly, any system of mathematic or logic is homologous to the organization of the brain and its reality. In effect, reality is isomorphic with the mental modelling of the algorithmic organization of the brain, says Vandervert, or to put it differently: only those parts of the world exist (are real) for which we have an isomorphic perceptual-cognitive counterpart in us (Norwich).

This view is "already there" in Aristotle's idea that in actual perception the perceiver and the object are one and the same despite the difference between their mode of being (*De Anima* 425 b26). Kant also thought that the perceiver's structure determines the perceptual content (quoted by Ben-Ze'ev). Accordingly, the properties of an object have to be located in the interaction between perceiver and perceived.

The bitterness of quinine is in the interaction between taster and quinine; without being tasted, seen and touched quinine is devoid of properties and hence is not "real" (Fischer "Deconstructing reality").

An object with a surface spectral reflectance close to 590 $\mu\mu$ is seen to have a yellow coloring; this is a natural illusion – like any optical illusion – since colours are relational properties of the interaction between perceiver and perceived (Thompson *et al.* 64). If you "wonder where the yellow went," it is both in the head as well as its interaction with the object in three-dimensional space that is constructed by the human nervous system; a system that is, functionally, asymmetric in three dimensions (Berkowitz and Tschirgi).

Norwich illustrates the concept that perception of the states and properties of matter, say, by tactile means seems to require the presence in

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decisions are made to omit particular paths is largely a mystery. Moreover, algorithmic compression occurs not only at the level of omitted data; but also, perhaps more importantly, at the level of omitted logical procedures, procedures which could be and should be applied to data but, as the result of a systematic process of exclusion, are not applied (Resnikoff 9-10).

the perceiving system of the same property as it is discriminating in the "external" world. Degree of solidity is measured *relative* to the solidity of the terminal phalanx. It seems to follow that one can never perceive in this manner in an external system a degree of hardness in excess of that of the bone of the terminal phalanx.

Neither is hearing a passive receptive activity but the production of more new tones the frequencies of which emerge through linear combination of already existing frequencies. Hearing is, so to speak, the linear creation of a non-linear phantasy (Euler 49-51). The inner ear is an active non-linear filter, the producer of new information, i.e. new tone combinations on the one hand, while on the other the inner ear is also capable of destroying information. Neighbouring frequencies are melted, and tones are covered up as a result of the non-linear dynamics of the inner ear. It is seldom realized that the harmonies we hear are not from "out there" but result from the self-organizing co-operative activity of anharmonic, non-linear oscillatory mechanisms (Euler 55-57).

Of course, there are neither external nor internal worlds, but what we have is "resonance" within the self-recognizing awareness of a universe that resonates between selectively stabilized patterns of neuronal connections and firings that fit these patterns.

Vandervert believes that an intuitive discovery is guided by the algorithmic isomorphy between world, brain and mind, and his belief comes close to my conceptualization. Hence in paraphrasing one another we might say that when a mathematician, for example, discovers an equation for the solution of a problem, it is not so much of a discovery but rather the self-recognizing awareness of (Platonic) "knowledge already there," i.e. – in contemporary terms – an algorithm that resonates with the solution: a hearing of the music of one's own nature.

II

We have dealt so far with one form of repetition, that which may be induced by proper questioning in order to evoke the (algorithmic) "knowledge already there." Another form of repetition arises in response to suggestive influence.

The word *influence* emerges in the 13th century (from the Latin *influentia* via French) referring to a drain or emanation from the planets;

but around the end of the same century it already signifies a slow and continuing propagation of an action that originates from a person or thing and is reaching another person or thing. During the second half of the 18th century, however, the source of suggestion may be found in the authority and prestige of a prince, or government, an art, or religion (Chertok). It took about 500 years to transfer the power of planets to the down-to-earth authority of a hierarchically layered social mind.

The word *suggestion* (from the Latin *suggestio* via French) is first attested in the 14th century with a pejorative connotation that is linked to sorcery and diabolic practices. The verb *to suggest*, found from the 16th century onwards, is also "in early use said esp. of insinuating or tempting to evil" (*Oxford English Dictionary*). In his *Meditations sur l'Evangile*, Bossuet denounced the "suggestions" of demons. Not until the middle of the last century, the age of positivism, does a change in meaning occur that sometimes refers to something good. But this happens after the "animal magnetism" of Mesmer – who was the founder of modern psychotherapy – had become so widespread in Germany (1790) that it was almost common practice to consult somnambulists for problems of disease and health, for practical advice, and sometimes for spiritual guidance. The impact of magnetism was equally felt by Catholic as well as Protestant theologians, and a group of mystical Catholic philosophers advocated a "Christian healing art," to be practiced by priests who would combine the sacraments of the Church with the science of magnetism (Ellenberger). Ringseis made himself the promoter of a "Christian Germanic medicine."

The same interest was reflected in the literature of the time. There is hardly one German Romantic poet who remained untouched by the influence of animal magnetism. In the United States interest in magnetism developed more slowly but it gained importance during the 1830s. The connection between magnetism and Christian Science is well known. Edgar Allan Poe was impressed by the doctrine of animal magnetism, and so was E. T. A. Hoffmann. Hypnotism inspired a multitude of novels: the most successful was George du Maurier's bestseller *Trilby*, while Maupassant's short story *Le Horla* was received with no less interest.

Hypnotism provided a first model of the human mind as a double layered domain with a conscious but restricted ego and a subconscious, much wider ego, unknown to the conscious one, but endowed with perceptive and creative powers (Ellenberger).

The turmoil and the craze that animal magnetism had elicited, the

successes and scandals (including the good and bad trips) it provoked repeated themselves 170 years later during the LSD-craze of the 1960s. One of the reasons might have been a common factor: Mesmer, who practiced animal magnetism, was unaware that he discovered hypnosis; neither did the LSD-flower-children realize that a cardinal effect of LSD is that it significantly increases hypnotizability.

Now, in the last decade of the 20th century, psychotherapy is gradually recognized as an indirect form of hypnotherapy. So are the psychoanalytical processes that are embodied in free association, transference, and countertransference. It was precisely when Freud began using what he came to call "free association" that he began using hypnotic techniques as we understand and use them today. Suggestibility is one thing and hypnosis is another. The former refers to an interaction between the social mind and the individual, while degree of hypnotizability is an individual trait. Hypnotic phenomena refer to involuntary responses in a state of awake dreaming and complete relaxation that tempers the voluntary control of action and thus, in our terms, raises the sensory (S) to motor (M) or S/M ratio on the perception-hallucination continuum (left half of the figure printed at the end of the paper).

As far as transference is concerned, Mannoni sketches for us the historical process of elimination that eventually produced transference, i.e. the affective bond between healer and healed (mother and child, reader and text):

> Transference is what remains of diabolic possession, and one reaches it through a series of "subtractions." One eliminates the devil, but one keeps the convulsions. One eliminates the religious relics, but one keeps Mesmer's "magnetism." One gets rid of the Mesmeric tub, but one retains hypnosis and the magical relation. If one eliminates hypnosis (as Freud did) what is left is the transference.

And Roustang concludes that

> Instead of pretending that they (the analysts) have never practiced that sort of thing, psychoanalysis would do better to acknowledge that it is not by accident that the transference arises out of suggestion and hypnosis.

III

The suggestive influence of words is inherent in the unitary nature of information, perception and repetitive action. To give an illustration, let me recall that for Judaism to become Rabbinical Judaism, the men of wisdom were obliged to settle for repetition, rather than for messianic incarnation. The Greek word for Michna is $\delta \epsilon \upsilon \tau \acute{\epsilon} \rho \omega \sigma \iota \varsigma$, repetition. The history of this $\delta \epsilon \upsilon \tau \acute{\epsilon} \rho \omega \sigma \iota \varsigma$, this repetition may be told by borrowing from the Hasidic apologist, quoted by Gershom Scholem, on the last page of his *Major Trends in Jewish Mysticism* (349-50):

> When the Baal Schem had a difficult task before him, he would go to a certain place in the woods, light a fire and meditate in prayer; and what he had set out to perform was done. When a generation later, the Maggid of Meseritz was faced with the same task, he would go to the same place in the woods, and say: We can no longer light a fire, nor do we know the secret meditations belonging to the prayer, but we know the place in the woods, to which it all belongs, and that must be sufficient, and sufficient it was. But when another generation had passed and Rabbi Israel of Rishin was called upon to perform the task, he sat down in his golden chair, in his castle, and said: We cannot light the fire, we cannot speak the prayers, we do not know the place, but we can tell the story of how it was done. And the story teller adds, the story which he told, had the same effect as the action of the other three.

Let me sketch now, rather concisely, the story of the themata that are repeatedly told since Paleolithic times, that is, the themes that were originally discussed and painted on the walls of caves concerned with hunting and fertility. But due to the evolutionary expansion of our cortical interpretive repertoire, its "content" consists now of an expanded variety of themata[3] in form of stories which are constantly re-written for each generation with variations shaped to a large extent by the social mind.

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[3] According to MacLean, in its evolution the human brain expands in hierarchical fashion along the lines of three basic patterns: the reptilian, paleomammalian, and neomammalian. Extensively interconnected, the three basic formations represent an amalgamation of three brains in one, that is, a triune brain. Thanks to improved anatomical, physiological, and chemical techniques, the three basic formations stand out in clearer detail than ever before. They represent the crocodile, the horse

We may visualize this repertoire of stories and scenarios as an immensely large and moving circular continuum of hyper- and hypo-arousal: with revolving stage sets representing levels of arousal (i.e. central sympathetic excitation). Whenever the level of arousal is raised or lowered, a new stage revolves to the fore making available a particular "knowledge that is already there": a story, that is to be re-experienced or flashed back. Hence a particular (algorithmic) knowledge as story may be recovered not only through proper questioning, or suggestive influence, but also by inducing (naturally, pharmacologically or hypnotically) that particular level of central sympathetic arousal at which the story became state-bound. For twenty-two years I was convinced that I had discovered the arousal state-bound nature of experience (Fischer "Arousal-statebound recall," Fischer and Landon), but I did only recollect it. Heinrich von Kleist, in one of his little essays written in 1805 or 1806, already observed *Ueber die Verfertigung der Gedanken beim Reden* ("*On the Gradual Fabrication of Thoughts While Speaking*"):

> Wie notwendig eine gewisse Erregung des Gemüts ist, auch selbst nur, um Vorstellungen, die wir schon gehabt haben, wieder zu erzeugen ... Denn nicht *wir* wissen, es ist allererst ein gewisser *Zustand* unsrer, welcher weiss.

Henri Michaux (131) also observed that

> Dozens of subjects, questioned during or immediately after these (mescalin-induced arousal) states "without parallel," say the same thing. Certain sentences in the recollections of completely different people, are in every respect interchangeable. Just as there is a certain banality of the visionary world . . . one finds in the world of sensations a certain banality within the extraordinary.

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and the human in us. In the field of literature – MacLean continues – it is recognized that there is an irreducible number of basic plots and associated emotions. In describing the functions of the triune brain metaphorically, one might imagine that the reptilian brain provides the basic plots and actions; that the paleomammalian or limbic brain influences emotionally the developments of the plots; while the neomammalian brain has the capacity to expound the plots and emotions in as many ways as there are authors.

A state-bound experience, however, may also be evoked or flashed back through imagery, melodies, tastes (recall Proust's Madeleine!), smells and other symbols re-presenting the repetitive remembrance of things present.

Just one remarkable example should illustrate the repetitive remembrance of things present – one of those domain-specific Darwinian algorithms already built into our brains (?) – the theme of self-emptying of oneself in something else in order to become oneself, a basic theme (Ricoeur 34), that can be found in Paul's *Epistle to the Philippians*, where he speaks of God's self-emptying in Christ. The theme continues to surface in the age of German mystics such as Jakob Boehme, and re-asserts itself through Hegel in order to be recapitulated by Marx. Marx is hence the continuation of a long line of repetitive suggestive influences when he reflects on the creative function of emptying oneself in order to reassert and recapture oneself. Marx reconstructs the concept of labor as a process made meaningful through the "species being" (Feuerbach's term) objectifying itself in an object, in a product and then recognizing itself in the product.

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But at this point we might well raise a rhetorical question. If the (algorithmic) "knowledge is already there," does it make much sense to illustrate the influence of an author upon another chronologically?

In her book, Maria Rosa Menocal ponders the very same question and concludes that literary history is not diachronic, that time is all jumbled up everywhere, authors from different centuries and different universes sit one next to another and shape each other's work. She wonders: "Where is the falsehood in the history that tells us that Borges as a young man learned about literature not from the Argentine short story writers who precede him but rather as he was riding back and forth on the trolleys of Buenos Aires, sitting next to Dante and his *Commedia*? . . . There is a far more compelling and influential reality in the orderings of personal histories – within which, for example, I read Dante as an epigone of Eliot's, going from the *Animula* to the *Purgatorio* – than in other constructs" (Menocal 3). History is neither linear nor clearly distinguishable from literature itself. This model compels us to peruse the Odyssey as if it came after the

Eneid and the *Divine Comedy* before Virgil – while Petrarch and Ezra Pound become Dante's precursors.

How to reconcile the paradoxical tension between "knowledge already there" and suggestive influence? The stylized or ritualized repetition or re-enactment of "knowledge already there" becomes possible, I believe, through suggestive-hypnotic articulation of an imaginative narrative. Such stories are implementations of algorithms, i.e. programs to be decoded-actualized as the remembrance of things present. The suggestive-hypnotic recollection of "knowledge already there" as story reflects the blending of an initial perceptual framework with a metaphoric framework, a blending that is pregnant with "free associations." The stories are by their very nature open-ended, requiring completion through those metaphoric processes that are relevant within the context of their "social mind."

Who are the writers whose stories continue to be told? The ability to involve oneself in imaginative activities seems to be related to hypnotic abilities (Tellegen 1974 and Rhue 1989; both quoted by Brown). Josephine Hilgard, as well as Nadon *et al.* also suggest that "imaginative involvement" significantly predicts the degree of hypnotic talent that implies both hypnotizing ability as well as hypnotizability.[4]

Hence, authors whose stories continue to be told are imaginative hypnotizers who were (self-)hypnotized by another version of the story – the algorithm of which was "already there."[5]

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[4] Arlene Morgan, personal communication 1976. Dr. Morgan started as a secretary with the Hilgards, brought up her two children, making her B.S., then M.Sc. and Ph.D., while continuing as a research associate. After 15 years of collaborating with the Hilgards (around 1977), she became head of the Department of Psychology, Queen's University, St. Lucia, Queensland, Australia. A personality in hypnosis and personality research, she is also a humane person *par excellence*.

[5] I am gratefully indebted to my friends: Privatdozent Dr. Werner Brönnimann, University of St. Gallen, and Professor Max Nänny, University of Zürich, Switzerland, for critically reading and improving an earlier draft of this essay – and Paul D. MacLean, M.D., former chief of the Laboratory of Brain Evolution & Behavior, National Institute of Mental Health, Poolsville, Maryland, U.S.A., for creative stimulation over the years.

Appendix

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Varieties of conscious states are mapped on a *perception-hallucination* continuum of increasing central, sympathetic excitation or hyper-arousal (left half) and a *perception-meditation* continuum of increasing tranquillity or hypo-arousal (right half). There is no labelling in terms of psychopathology, since it is perfectly normal to become hyperphrenic and ultimately ecstatic in response to increasing levels of hyper-arousal (e.g. evoked by battlefront stress). Only when a person gets stuck in a particular state – including the normophrenic one – do we label him/her as abnormal.

The hyper-aroused rapid eye movement (REM) stage of dreaming sleep may be placed between creativity and anxiety on the left side, whereas the delta or slow wave EEG sleep is on the horizontally corresponding right side of the map, i.e. between the hypo-aroused states of zazen and dharna. There is a limit cycle model by McCarley and Massaquoi that posits an alternating discharge of two different sets of neurons originating in the brain stem: cholinergic neurons in the pontine reticular formation - initiating the REM period – and noradrenergic neurons in the locus coeruleus and dorsal raphe nucleus which have a peak discharge activity at the end of the REM cycle. The alternation between non-REM and REM sleep corresponds to a reciprocal balance between these two sets of neurons, the control of a rhythmic dance. Hence each night while asleep, we repeatedly travel to and from hyperaroused and tranquil states, experiencing creative as well as stereotyped dialogues between the (socially programmed) "I" and the (biologically programmed) "Self."

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