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The Layering of the Psyche: Philosophy, Psychiatry, and Difference

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Freud, working from a background in clinical neurology and against a backdrop of burgeoning theory development in biology and neurophysiology, thought that the layers of the mind mirrored the layers of the brain although he was well aware of the conceptual problems involved in trying to identify the two. His associationist view, based on a neurobiological and evolutionary approach to the mind tends to underestimate the role of consciousness in a holistic conception of the psyche. The role of language and the disciplines and practices which structure the psyche make it a domain in which negotiated solutions to life challenges are produced from the socio-cultural resources of discourse applied to the biological propensities resulting from innate dispositions and learning history. Although the biological and social realms obey fundamentally different rules, their psychological effects are realised in a common medium — the brain — a fact that can be detached from reductive approaches to psychology or psychiatry and can give substance to the (post-structural) idea of the body being inscribed like a surface on which events have left their trace.

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The neocortex is the most sophisticated, extensive, and complex processing network in the human brain and it has a fundamentally axial architecture. By that I mean that it is disposed as an extended thick slice with fibres oriented along two axes — one in the plane of the cortex (call it horizontal) and the other orthogonal to it (call it vertical). We see this in any standard diagram of the cortex where the layers of cells are arranged horizontally and the interconnecting fibres are of two types: short and intermediate length or "horizontal" connecting proximal or related cortical areas and "vertical" — both long and short — connecting within cylinders of cortex and between the cortex to lower centres in the brain and spinal cord.

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The layers of the cortex (see Figure 1) clearly show this pattern of connectivity in that both the planar (or horizontal) and the vertical axes have both short and long connections, and different layers receive afferents and send efferents. The net effect of most of the short connections is to transform the cortex into a series of stacks (or columns) which make correlations between closely related aspects of the patterns of information coming in through the afferents. The long connections allow one area of the cortex to mix and meld its information with diverse (in terms of sensory modality and motor output) patterns of information by intercommunicating with quite distant areas of the cortex or more simple relay centres (on incoming and outgoing pathways).

We can generalise by saying that the long fibres for reception and projection connect the subject to the world via sensory surfaces and motor outputs and the short fibres for interconnection allow ever more complex patterns of information and interrelated features of incoming information (including residues of past experience) to control patterns of output (which may iterate within the brain in complex ways). We might therefore read Russell's dictum — "Only

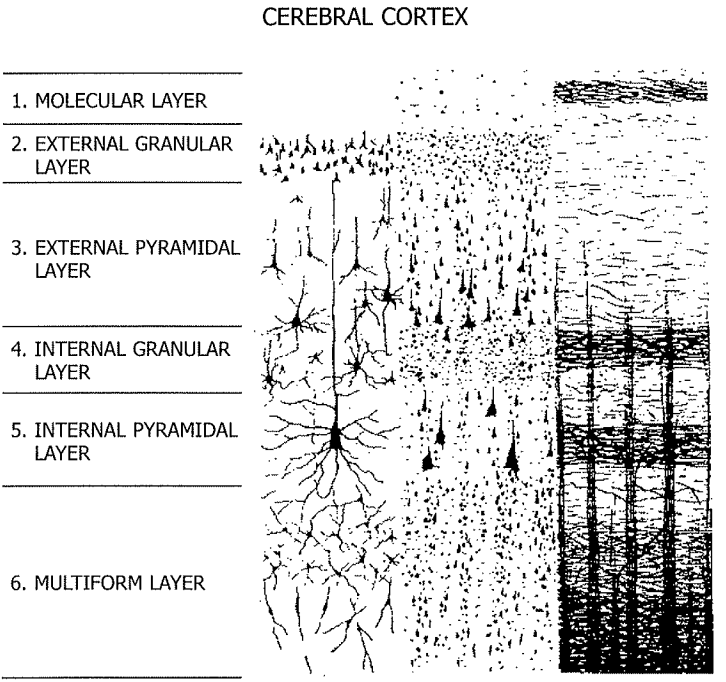


Figure 1. The layers of the cortex are shown as interconnecting cells in the left of the three columns, as cell bodies only (or nodes of computation) in the middle column, and in terms of the fibre connections between cells in the right hand column.

connect"— as having both an internal cognitive meaning ("Make connections between different pieces of information!") and an interactional or ecological meaning ("Connect to your environment!").

Among the cortico-cortical fibres in the human brain are a large number which are in contact with speech and language information for the functional anatomical reason that this information is not nearly as localised as we once thought (Kolb and Whishaw, 1990, p. 583) and for reasons related to the function of language in human thought. In fact some neuropsychologists realised the importance of the connection between language and general cognition over thirty years ago.

> Whereas the relatively elementary forms of regulation of organic processes and even of the simplest forms of behaviour can take place without the aid of speech, higher mental processes are formed and take place on the basis of speech activity. (Luria, 1973, pp. 93–94)

This fact about language takes on great significance when we combine it with our growing knowledge of neural plasticity.

> Maps of the cortex apparently change, the apparent stability in them being a consequence of balanced competition. Changing the balance results in an orderly sequence of change that produces a new balance and a new organisation. (Kolb and Whishaw, 1990, p. 191)

Taken together the cognitive neuroscience suggests that the psyche is in a dynamic and cumulatively changing relationship to the environment of the organism where that relationship is, for human beings, conducted in a linguistically-enriched mode of adaptation (thus, in Luria's terms, "based on speech"). For a follower of Wittgenstein this realisation justifies a reading of "grammar" (or that set of rules which impart orderly and meaningful structure to our language behaviour) somewhat wider than a reading restricted to the syntactical arrangement of linguistic signs (Wittgenstein, 1953). On this wider reading, the "grammar" of colour indicates that colour is a visually accessible property of objects and not the object itself (or any geometrical feature of the object) so that the relevant interactive aspect of the situation must be taken to be rule-informing, for instance when a colour sample is being used to define a colour. For Wittgenstein, grammar is a way of referring to the rules governing the use both of sentences and individual terms.

The brief foray into neuroscience to elucidate the structure of the cerebral cortex taken together with the remarks about language will indicate something of the role that speech and language play in developing a theory of the structure of the psyche. Such a theory should pay attention to actual empirical work in neuroscience and cognitive development. In outline, the thesis is that the horizontal connections which proliferate during learning and experience

(functionally if not structurally) forge links between information arising from the organism's interaction with the environment and a widening set of associations some of which are mediated by complex human sign systems. These links massively expand the competence of the organism in discovering and exploiting affordances and regularities in nature.

Language, Thought and Culture

Thinking involves my using information from the world around me to organize my activity. But in this project I am not alone and I have accumulated a lot of "good tricks" from other human beings (Dennett, 1991, p. 184; Gillett, 1999). They have marked the keys to their ecological success by using words or signs which they exhibit in the presence of (and therefore link to, or use to pick out) regularities in the environment that have proved useful in the adaptation of creatures like us. By exploiting the rules linking signs to features of the world, these signs or markers facilitate communication about the world and provide a sign-related scaffolding for cognition able to be latched on to by other participants in the conversation (Vygotsky, 1929/1962). The principles of grouping that are marked by and imparted through the use of signs, by linking situations and the sets of conditions that characterize them, can properly shape the contents of thought and consciousness and therefore can help a thinker to structure behaviour in a given environment. Imagine, for instance, that I am told to go and look for a tree with orange coloured round objects hanging from it if I want a refreshing snack. I will go off into the local environment shaping the parameters of my conscious search to fit the verbally specified conditions evoked by my instructions. Having acted on the instructions I then learn for myself a good trick — finding oranges — that I can incorporate into my adaptive repertoire for future use. I did it by shaping my cognitive performance (involving selective attention and the construction of perceptual objects) so as to locate and be able to exploit a highly specific set of conditions able to be encountered in my environment and marking a valuable "affordance." Those conditions were specified as instancing an edible object and so as relevant to me whenever I need to eat. Thus the content of my thoughts and actions, shaped "on the basis of speech activity," embeds intentional qualities, that are targeted on an external object (or contingency) and a particular way in which that object engages with a possible or actual interest of the subject. I am enabled by speech (or shared meaning) to pick out an object according to a particular way of thinking of it — here as an edible fruit (Evans, 1982). And this view of consciousness and thought can be broadened to accommodate mental activity not expressible in language. The fact that it is not only the object per se (or *de re*) that is the target of my search but a way of thinking of the object focuses our attention on the aspect of the meaning of a term that philosophers call "sense" rather than reference.

The importance of the difference between the object (per se) and some particular way of thinking of it is made clear by another example: imagine that I am chasing a mouse and that it seems to me that at a certain point it vanishes. I am very puzzled by this vanishing mouse until a friend of mine shows me that what I took to be a piece of blank wall is in fact a cunningly disguised opening allowing access to the hollow interior of the wall. Now here we are both looking at the same thing but we see it in two different ways — I see it as an undistinguished section of wall but he sees a cunningly disguised opening. Any report which does not capture this difference fails as an explanation of my psychological state; "He watched a mouse vanish into a hole in the wall and was puzzled" is not illuminating. Only by taking account of the differing ways we intentionally relate to the crucial bit of the world — that which Frege (1952, pp. 56–57) called the "mode of presentation" or cognitive significance of the bit of the world being thought about — can we differentially account for my puzzlement and his cognitive closure. Haldane (1989) makes the same point arguing for an Aristotelian naturalism about intentionality and "the content of subjects' psychological states." He argues that this aspect of subjects' current activity — its intentionality — informs us "about *them* and so permits us to rationalize their actions" (p. 311) by revealing the way they are reasoning about the world. The intentionality ("way of thinking" or "cognitive significance") of a sign can be fleshed out by examining the concepts informing the subject's thinking as she acts. But as we reflect on the idea of sense it becomes clear that there are two reasons why the "sense" at the heart of thought could not be merely an individual, subjective, or imaginary feature of the way a particular subject relates to an object:

> (i) a concept, if it is to inform our communications to each other, must be an item in public currency and not up for purely subjective determination; and
>
> (ii) it is possible that a causal property of an object itself poorly understood by me — e.g., its metabolic content (as an essential food) — is an important factor in sense as significance or meaning of the object to me. (I am seeking nutritious foods but I only know that celery is not what I am after.)

The basic point about intentionality is important because it allows for a gap between the way of thinking (however inchoate) applied to an object of a given kind and a construal of the object merely considered as a source of physical stimuli, a mismatch identified by phenomenology that will be increasingly important in discussing human psychology (Merleau–Ponty, 1962, pp. 15–16).

These basic philosophical orientations towards meaning enable us to equip ourselves with a reasonable theory of the role of the psyche and its contents in structuring human adaptation. The human organism has a diversity of skills

which transcend any given ecological niche and the narrow range of adaptive strategies likely to work within it. It is therefore unsurprising that the development of the human brain produces, to an extent unparalleled elsewhere in the animal kingdom, an elaboration of structures allowing behaviour to transcend immediate reactions and responses (to current conditions) and to achieve considerable adaptive flexibility in diverse settings. Designing a brain to develop flexibility of behaviour rather than complex innate response repertoires, requires radically different information structures from those of many species who make extensive use of genetically inherited responses and stimulus ordering or collating procedures. One way to do this is to use what we might call *knowledge-based* strategies for organizing behaviour and the mental content that explains the articulation of my activity in a domain. These have two features:

(i) they detach the response to a set of conditions from any immediate connection to those conditions; and

(ii) they draw on cumulative social (not just learned) experience.

The first point is often made against crude pragmatism viz that knowledge in and of itself is valuable apart from any direct connection with an action likely to be successful in the immediate or present situation. The second point is made by Wittgenstein (1972a) who argues that knowledge claims are part of our social fabric of shared activity in the world. Knowledge and its dissemination form a complex social phenomenon whereby warrants are attached to information that is communicated so that what is communicated carries an implicit quality mark indicating the reliance that can be put on it. We are all trained to use these warrants in accordance with strict social sanctions such that others will not be misled by what we say. The result is a shared cultural resource of dependable information apt for the guidance of the perplexed. A "knowledge-based strategy," therefore, enables current experience to be correlated and compared with shared experience and takes account of multiple perspectives and experiences over time as they are accumulated and communicated to each other by a human group through cultural learning. In using knowledge to structure our behaviour each group member benefits from the experiences of others whereas to act on personal persuasion or belief is to venture alone into the hostile world of nature "red in tooth and claw."

We can illustrate by use of an example. Let us say that I am attracted to a bright red berry because I am hungry and seeking something to eat. My first response is to reach out and pick it to put in my mouth but I check that. I then think, <Mmm, red berry, spiky leafed plant low to the ground, heart shaped, pitted surface — I think that is a strawberry and it is safe to eat>. This kind of adaptive strategy saves me a lot of trial and error activity resulting in sore

stomachs, vomiting, or even something worse. But notice that I have interposed a symbolic intermediary between perception and action by drawing on a shared term "strawberry" (which has a completely arbitrary and detachable relation to the presence of a strawberry) to guide my behaviour in an adaptive manner. I could do something with perhaps similar results in a related case by just imitating another human being, but the conceptual ability linked to a reproducible marker or sign is generalizable beyond any situation in which I am jointly present with another (or have ever been). What is more, by learning just which objects in the environment are actually instances of the concept <strawberry>, I can master a technique conveyed by communication and normatively constrained social interaction that helps me master the contingencies of my context.

The technique is shaped by norms governing knowledge and they work as follows. I ask "How do you know that you have a strawberry in front of you?" and then my interlocutor conveys the fact that he has met the prescribed tests for knowledge claims about strawberries (more demanding than those applied to subjective impressions so that they implicitly answer the question "What are your credentials as a strawberry detector and describer?").

This shared practice relies on cognitive strategies (of information gathering from a shared environment) being linked to the meanings of the signs which transmit and mark our shared experience and culture. It is reflected in Luria's observation that:

> The chief distinguishing feature of the regulation of human conscious activity is that this regulation takes place with the close participation of speech . . . . It is therefore natural to seek the programming, regulating and verifying action of the human brain primarily in those forms of conscious activity whose regulation takes place through the intimate participation of speech. (1973, pp. 93–94)

I will argue that the brain deals with the world in terms of the meanings (or "cognitive significances") that have been conferred on objects and events encountered by the subject. To be successful in this activity we have periodically to update our ideas about those things and therefore we develop a diversity of cognitive skills related to the *tracking* of objects. If a particular object (or object type) is important for us we create a name (or singular marking term) or noun (type marking term) for it. That semantic move helps us to notice the regularities shown by individuals and types and to keep a representational record of them (Blackburn, 1984, p. 138). This cumulative record documents objects and events according to their human significance and relies on the relevant stimuli being collated in reproducible patterns associated with the relevant terms (signifiers).

The work of signification may not, however, be perfect at first pass and thus we might expect that the lived narrative which is consciousness is continually being revised and reworked to bring out shades of meaning inherent in past

experiences so that they warrant revisiting and have only quasi-stable dynamic contours in autobiographical cognition. Dennett calls this a "multiple drafts" model of lived consciousness, others refer to it as the plasticity of memory and it favours a holistic (rather than atomistic) reading of the determination of the contents of experience to construct subjective trajectories through an objective world. To have such plasticity within limits is arguably a good thing in that it allows us to keep our world picture current as the evidence accumulates for or against particular constructions of events and situation types that have significant elements or configurations. Our trajectory, framed as it is against a stable lexicon of identifiable (and re-identifiable) individual things and types of thing allows us to constantly revise our strategies in the light of fruitful connections mediated by the multiple associative pathways we exploit in cognitive processing. Without a shared system of markers able to be attached at will to significant sets of conditions we could not upgrade and update our adaptive strategies with anything like the same efficiency.

Lacan, Signification, and the Encounter with the World

Lacan modified Freud's model of the psyche by incorporating structuralism (among other things). Freud's theory is at heart associationist and evolutionary and so the ingredients imported to the account by Lacan (1977) enabled a fecund development of Freud's thought making full use of socio-linguistics and post-structuralist cultural theory. Working with his view will allow us to sketch a theory of the layers of the psyche that looks somewhat more adequate than the original in the light of broader social science scholarship since the Freudian era.

The structuralists regard a sign as comprising a signifier (the actual physical stimulus associated with the symbol, e.g., a spoken word, a hieroglyph, or a picture) and a signified (what is evoked in a well functioning mind that obeys the rules governing meaning). These are inseparable in that a sample of sound (or visual stimulus) is only worth noting when a meaning is attached to it (so that it has communicative value or is part of the discursive currency). The signification, defined in part by the associations of the sign in the language (intralinguistic connections) and in part by the experiences where it is used. Thus the dipartite implication of "Only connect!"

Dennett's "multiple drafts" model suggests a reading of the layers of the psyche somewhat different from Freud's biological and deterministic account, resonates quite nicely with an interpretation of Lacan that reflects our current thinking about neural plasticity and holism. If the inscription of events on the body and brain of the subject is a joint product of context and signification and is only available for discursive reflection in so far as it is articulate, then certain conclusions follow. Context, through our contact with the environment, anchors the subject into a shared and interpersonal world pervaded by language. But

the meaning captured by a linguistic term is tied only to a selective subset of all the stimulus conditions present (those that are invariant on different occasions of legitimate use). Despite the selectivity of signification which determines the currency of a term as it is used in discourse, the brain is not able to be as selective because all aspects of the complex and unfolding incoming stimulus event causally affect the neural networks of the brain in two ways:

(i) they affect the subject directly as physical stimulus events; and

(ii) they affect the subject indirectly through the linguistic associations of the sign (or signs) typically exhibited coincidentally with them.

Thus if I am looking at a strawberry, I may get a set of associations from the stimuli present (redness, the smell of a strawberry garden, the sunny day, the insects flying about, and so on) and from conversations about strawberries (jam, cream, "Strawberry Fields Forever," Wimbledon, and so on). The full impact of a situation thereby transcends the meaning explicitly given it on a given occasion and the semantic content of the words used to convey that meaning. Some of these associations may be unwelcome (the nasty man who did things to me when we were strawberry picking in my infancy) or which nag away at me ("What is that Beatles' song I am trying to think of?"). The possibility opens up that aspects of the way I am affected may escape my conscious appreciation of a situation. It is in this area of mismatch between consciousness and actual immersion in an experience and its reverberating associations that the Freudian concepts of repression and repetition can get a hold. The one refers to aspects of the experience which I am motivated to neglect or divert attention from and the other the nagging incompleteness that can make an experience troubling for reasons I do not understand. Both aspects of the causal-meaningful complex associated with human interaction and relationships may have very marked psychic effects which are, in fact, associated with the content, albeit indeterminate, that the discursive mind does not have ready access to (through active avoidance or insufficiently strong associations). My psychic difficulties in assigning conscious meanings to that which is neglected or discarded from my conscious record-of-life or to that which pulls me to an experience I felt dissatisfied with my "take" on, may represent a complex of speech-and-experience-related forces acting on me as an individual which profoundly affect my psychological adjustment without my appreciating what is happening and why.

Here we might usefully recall that Freud thought he could divide the contents of the mind into the conscious, the preconscious, and the unconscious proper, the latter comprising contents which cannot be laid open to the conscious ego in any explicit form. The modified picture would be as follows.

(a) There are *conscious* and discursively articulate contents available to reason, reflection, and recall without distortion.
(b) There are contents that are accessible to signification without distortion and could be subject to reason, reflection, and recall as for conscious thoughts but are inchoate until the discursive work is done (*preconscious*).
(c) There are processes and events that are to do with the neural mechanisms of mind (such as long term potentiation, habituation, false contour formation, and perceptual masking) and others that cannot figure in the conscious stream on account of psychic forces that may or may not be evident (*unconscious*).

Notice that the contents of states in (b) and (c) are not fully determinate and that the participation of speech is an aspect of them becoming so. At this point, cognitive scientists can help themselves to quasi-computational or connectionist explanations to incorporate the relevant phenomena into their theories and psychotherapists can identify traumata and motivations which have an effect on psychic life and have cathexes associated with them in ways described in theories about the primary process. The key feature that these states share is that they are not straightforwardly available for conscious articulation even though tentative psychic links may be revealed by psychotherapeutic exploration or investigation in various ways.

When we consider that articulation in speech is selective in such a way that it implicitly invokes the norms of judgment imposed on speakers of a language as they learn to master the correct use of terms, the connection between consciousness and reflection is clarified. Consider any term, say "newt"; when it is applied to a set of presented conditions, its use is constrained by training in which one is taught to be fairly sure that the thing one calls a newt is, in fact, a newt. To master the trick of thinking of newts as newts one must learn to base the judgment about what it is only on the features which entail that it counts as a newt and therefore selectively weighting the conditions in making that assignment of cognitive locus or significance. Thus, the "function of speech," explicates an item of content on the basis of the events impinging on the body or brain having undergone a certain amount of language-related (and rule governed) work. This work is not done for unsignified content that is part of the subject's extraconscious life. But, even though the causal role it takes is not the same as it would be if it had been signified or definitively tied to a linguistic term, such material affects the subject's lived conscious narrative in which one tells how things are (in both the recognition and reporting senses of "tell"). Thus "the gap" between activity informed and structured with the aid of speech and the totality of material that helps explain what a person does needs to be carefully examined.

Jaspers does not mention the role of speech when referring to the "extra-conscious mechanisms which are the understructure of our psychic life . . . such as habituation,

memory, after effect, fatigue, etc" (1923/1963, pp. 364–365). However, he denies that the psychic effects are solely mediated by the meaning of events as consciously apprehended by the individuals concerned and, he invokes effects which implicate the human meanings of life events, such as the death of a parent or the fear of one's own death, so that those meanings are relevant to extra-conscious psychic life. Consider, for instance, the well known golf story in which a group of men witness a funeral cortege passing by and one of them doffs his hat and bows his head. The others comment on his piety at which point he remarks "Ah yes, she was a good wife." The humour arises from the meaning and psychic importance that should accompany the event given disruption of cultural meanings of the death of someone closely related to one that we see in the golfer. Our sensitivities are jolted and we respond with humour. The story, concerning a psychopathology of everyday life, reveals the emotive content of the layers of meaning proper to human relationships and the importance in self-formation of hierarchies of choice and motivation (illustrating Jaspers' claims about the psychic effects of experience). Jaspers therefore preserves Freud's insights, anticipates the Lacanian thesis, and, importantly, reflects his own existentialism.

> Everything we experience and do leaves its trace and slowly changes our disposition. People with the same disposition at birth may eventually find themselves in entirely different grooves, simply through their life-history and experiences and the effects of their upbringing as well as of their own efforts at self-education. Once such development has taken place there is no point of return. In this lies the personal responsibility involved in every single experience. (1923/1963, pp. 369–370)

This remark recognises a role for the person in shaping his or her conscious life and autobiography through choices and commitments. It is evident that none of these choices is a simple conscious rational determination to do or be this or that and yet (in accordance with clinical realism) each involves responsibility for what one becomes and together they "coagulate" the pathways structuring the psyche.

Second Nature and Nature — Cathexes and Complexes

It is overwhelmingly plausible that our best model of brain microprocessing and human cognitive function is that provided by parallel distributed processing (PDP) or neural network systems. Such systems receive information into a number of parallel channels which simultaneously awaken patterns of excitation and trigger paths of information transmission. I have indicated that these patterns are disposed three dimensionally with an extended and horizontally interconnected surface level and another set of "vertical" connections which feed into and out of the former at myriad points. The resulting activity is usually treated as instancing vectors in the overall flux of brain activity which reverberate

through interacting levels of processors that can detect patterns in the incoming input according to preformed dispositions to react to those patterns.

> [T]he brain's basic mode of occurrent representation is the activation vector across a proprietary population of neurons — retinal neurons, olfactory neurons, auditory neurons, and so forth. Such activation vectors have a virtue beyond their combinatorially explosive powers of representation. They are ideally suited to participate . . . in a powerful mode of *computation*, namely, vector-to-vector *transformation*. An activation pattern across one neural population (e.g., at the retina) can be transformed into a distinct activation pattern (e.g., at the visual cortex) by way of the axonal fibres projecting from the first population to the second, and by way of the millions of carefully tuned synaptic connections that those fibres make with the neurons at the second or target population. (Churchland and Churchland, 1998, pp. 13–14)

From these "activation vectors" novel patterns of data detection and combination can be generated so as to register and make use of previously unused environmental contingencies. Thus the systems themselves can "learn" to "recognize" certain salient and simple patterns even where these are embedded in a lot of incidental data. The system, one could say, compares activation strengths in different pathways and comes to a "best guess" as to the pattern currently presented from a cumulatively expanding array of possibilities. This heuristic process is highly resistant to corruption, variations from the standard configuration, and incompleteness in the incoming data because it responds to holistic patterns of activity rather than to specific details with key roles (making it vulnerable to minor aberrations). Minor deviations are not, however, ignored, particularly if they capture some regularity associated with a significant environmental contingency. The system also uses higher level patterns of excitation along with contextual and other clues to disambiguate patterns at lower levels. By using both the level picking out the elements in a presented array and the level that detects the overall pattern, the system "works out" what is being presented. This can happen even when the information would not be evident to simple additive feature detectors responding on the basis of necessary and sufficient conditions. For instance, a system may be presented with the following array:

P#N (pin or ptn?)

Now, a system task oriented to detecting English words will use the information that "pin" is a word and "ptn" is not as a cue (from a higher to lower level) and read the middle symbol as "I" rather than "T." This can go on at many levels of complexity and would be enhanced in the context of reading and understanding the following (where both P#N and "fly" present semantic problems).

HE WAS LOOKING FOR A P#N TO HOLD HIS FLY TOGETHER

Our neural network allows us to cognize the world as containing similar and repeated patterns of information and recognisable objects even when much of our information is partial or varies from one presentation of an object to another. For instance, I may see a chair from a particular angle such that one leg was invisible if I closed one eye but, if you asked me what I saw, I would think of what I saw (or picture it if asked to do so) as a chair with four legs. Therefore my mind is working with a picture arising from dynamic cognitive activity using multiple images gained at different times and the composite is, in fact, a construct and not a visual image at all. This construction allows a human being competently to deal with partial, "messy," incomplete and ambiguous information from the world in discerning what is actually there.

There is a profound insight available when we consider PDP systems dealing with non-obvious patterns in the presented data. To get a PDP system to detect and then recognise a pattern of data that does not follow salient lines, we can add a "cue" or correlated teaching input (Rumelhart and McClelland, 1986, p. 184ff). The system at first detects the presence or absence of the cue and, on that basis, groups all the data patterns associated with it. This sets up a quasi-stable pattern of excitatory and inhibitory weightings (or an activation vector) in the network. The cue can then be withdrawn and the system will continue to respond to a set of patterns which it could not have picked out and grouped as a set without the "teaching" input. In effect, the pattern is picked out because it is "marked" by the cue signalling its presence.

Such signs organize or structure input so that it is responded to as instancing non-obvious patterns in the environment (such as the visual information from a well-camouflaged frog at the edge of a pond). On each presentation of the array the number of data groupings that could emerge is indefinitely large and the visual information coming from the frog — the shape, the pattern of light and shadow, the hue and saturation of surface colours, and so on might all change, so that the frog *qua* frog is a non-obvious data package. In fact, once the frog moves, the detection task may be easier (phenomenologically it is). One might conjecture that this is because we have, in common with many other creatures, a tendency to group together stimuli that move together as part of a fairly primitive object-detecting mechanism. But in addition to any of these basic "hard-wired" (or innately "wet-wired") dispositions, humans are always cueing each other to pick objects and features out of the presented array (here we might think of the widespread use of demonstratives to establish semantic relations between signs and the world). Some way of tagging or marking the exact bit of the field where the frog might be found could be used to enhance the ability of the subject's cognitive system to pick out the frog as a recognisable thing of a given type, a recognitional ability that is robust in the face of varying input and no longer requires the "cue" to support it. Thus I might not see the frog unless my companion says it is just there at the point

where the yellow lily is right at the water's edge but after that I may be able to pick it out and track it. In fact, cues or signs potentially serve a further function alongside the development of recognitional skills.

Linguistic signs occur in combination with other signs and thereby forge, through inter-sign associations, connections between the features of the presented pattern and patterns associated with related signs. The strawberry picking example is a simple case where the judgment <this is a strawberry> enables cognitive transitions to be established by using connections between signs. For instance, combinations such as <strawberries are edible>, or the cognitive move <frogs are amphibians> and <amphibians live partly in water and breed in water> connects *frog* and *water* in a way other than through extended exposure to repeated associations (between frogs and water) in an individual learning history. The move therefore draws on a shared cognitive resource, a revolutionary step in the use of information by an organism.

The cumulatively developed range of informational abilities made available by the generative and combinatorial use of sign-related vectors of activation in the human neural network (or more accurately complex of networks) result in a complex cognitive structure. This structure extends and greatly multiplies the flexibility and richness of human cognitive processes. Signs and semantic structure are therefore important keys to understanding the genesis and shape of cognitive abilities realized in brain function. To this end Luria (1973) gives a pervasive role to linguistic signs in human cognition and includes large tracts of brain function in this process.

First, he notes that perception involves mapping presented information onto stable, reproducible and associative structures which enable cognitive manipulation and response organisation. Thus, "perceptual activity is not confined to the processes of visual perception, but necessarily includes the active formation of visual images corresponding to a single word meaning" (1973, pp. 237–238).

I have noted the caveats that ought to be employed here about the "visual" in "visual images." But also note that mapping perceptual presentations onto cognitively relevant structures is plausibly associated with the principled means of grouping stimuli associated with signs and Luria's emphasis on the active (or visual search) nature of perception (1973, p. 229). Thus one should think of human subjects as *information gatherers* using a repertoire of perceptual anticipations or schemata to collect information from their environment.

Luria realizes that if perception is influenced by (the top–down activation of lower assemblies by higher patterns associated with) signs, then interesting conclusions follow about the role of speech and linguistic signs in attention. Targeted responding to a given item requires selective and flexible attention that favours some features of an array at the expense of others. Verbal instructions are often used to direct attention (for instance they alter the electrical shape of the waveform found in expectancy tasks [Howard, Fenton, and Fenwick, 1982]). In this

way our preparedness for environmental data and readiness to make use of it are both influenced by signs so that "voluntary attention is not biological in its origin but a social act" (Luria, 1973, p. 262). Luria implicates signs not only in perception and cognition but also in action, remarking that actions "are dictated by intentions which are formed with the close participation of speech" (p. 37).

Luria believes that the cerebral neocortex or highest level of brain function is involved in all cognitive processes, supporting that claim both by developmental data on selective attention but also by the fact that every brain centre is subject to "top–down" influences from the cortex. Top–down effects modify inputs and channel them in ways that depend on what is happening at other (including the highest) levels of neural function. Such interaction between processing levels is, as noted, a feature of a neural network/PDP systems in disambiguating deficient low-level data. It is plausible that top–down effects, in the brain, allow cortical areas to use familiar patterns (of preferential excitation mirroring conceptual structure and past experience) to enhance data related either to adaptively important and previously encountered or to promising novel patterns (where the promise may arise in unexpected ways from interacting association strengths that are found in the network).

Luria's thesis that the highest levels of cortical processing are configured in ways that reflect the sign-related skills of detection and grouping of information from the environment that arise in language and language-related activities implies that the contents associated with any concept reflect two sorts of constraint:

(i) linguistic constraints arising from the norms or rules governing a sign; and

(ii) environmental conditions typically associated with the sign.

According to the present account, any current input data, say visual information from a frog, could be "lost" in the ongoing stream of brain activity if it were not picked out by some learning set or cognitive instruction condition. This change of sensitivity may be induced by a salient aspect of the frog as an item in the domain (for instance its moving) or by higher commands from the cortex to search the input array for a pattern of information sufficient to warrant the judgment <frog>. The former does not tie the cognitive significance of the object detected to any particular set of constraints and is called by Luria "involuntary attention"; but the latter is linked to social learning. Schema formation or sensitivity setting (particularly invoked by social influences in the human case) affects every level of the neuraxis and, in effect, creates preferential processing paths that respond to frogs. In this sensitized state the cognitive system can pick out frogs and track them through changes in the stimulus array, using perceptual clues and connections within the conceptual system to order the information being received. It is worth dwelling on these two aids to cognition.

The *first* set of aids are part of what Wittgenstein calls "bedrock" — things given as primitive by the natural history of human beings and often shared with other creatures. For instance, the perceptual skills involved in tracking moving objects and anticipating trajectories are useful in following the movements of a frog and are capacities we share with many other animals (even the frog itself). We can assume that, even if these skills are refined as a result of focusing of attention that goes along with learning to pick things out, they are fairly robust and biologically determined standard issue for critters like us (even non-discursive ones).

A *second* set of aids arises from sign-related cognitive inputs (using trans-cortical patterns of vector activation) such as the propositional knowledge that "frogs hop," or "frogs head for water when disturbed," and so on. In our case these allow us to extend our tracking abilities to a wide range of cases by exploiting the ways of thinking we develop in relation to the diverse things that move by flying, leaping, crawling, flowing, even "teleporting," and so on. It is clear that the better the experiential base grounding detection and tracking skills, and the more adequate the conceptual framework brought to bear, the better the individual would be at perceiving, keeping track of, and using information from a wide range of potentially important objects (such as frogs, strawberries, handles, levers, ice-creams, human individuals, fashions in music or art, privileges of office, and so on).

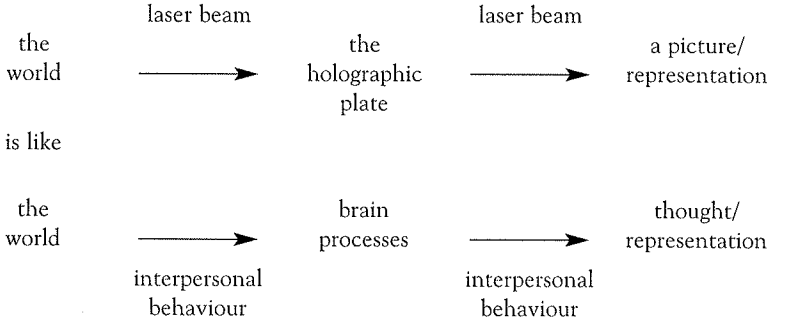
On this account signs and their meanings are the very stuff and driving force of human cognition and behaviour. But notice language is here not just a system of signs disengaged with the world but is tied to human life so that the resulting connectedness articulates with a broad range of inter-related practices and human activities. However, this merely reinforces the point that our adaptive use of language can best be understood with reference to culture, history, and value as constructed by human beings. This point is strengthened when we step back and realize how much of our normal domain of activity as human beings works in ways that we have designed and learned to convey to each other so that most of us spend most of our time among the works of our own hands constructed on the scaffolding of language in such a way that cooperative effort and language provides access to the secrets of the world.

The Holographic Model of Brain Function

The thesis best called discursive naturalism underpins my version of the "holographic model" of brain function (Harre and Gillett, 1994), a model unrelated to but bearing a superficial resemblance to the holographic theory of memory invented by Pribram (1969). A hologram is produced when two laser beams illuminate an object and produce a pattern of wave effects on a photographic plate that yields three-dimensional images of the objects captured. The plate does not obviously show an image resembling the objects pictured and to get the information out of it you have to use laser beams of the right type. What is

more, the information is distributed on the plate; any small fragment of the plate will produce a version of the image, which differs from the full image only in lacking detail.

The posited analogy between holograms and the brain is as follows.



The brain, I have argued, receives information from the world as presented and "illuminated" by human activity and language. Thus the triggering stimuli and the elements of the patterns that we detect are linked to human activities and the words used in those activities. This social milieu picks out and draws the subject's attention to the relevant features and items in the world and then marks them for future use in patterns of organised responding by attaching signs to them. The result is a structure in which packages of information form a set of informational nodes on a grid which maps the organism's location in space and time. The grid and the salient objects related to it comprise a cognitive map of the world as rich as the representational system of the subject will allow. Thus a language-using creature with names for many objects and a large number of cognitive specifications (such as *the big black rock over by the orange grove*) can develop a highly adaptive guide to the affordances of their domain of activity (O'Keefe and Nadel, 1978). If we follow neural network theory then the representation tends to be distributed such that widespread bits of the brain receive information from any object represented on the cognitive map and potentially engage that object with different cognitive loci. For a language-using creature, the map and its various elements are structured with the aid of the signs and symbols used to mark significant information. The signs enable the information pertaining to, say, apples, frogs, or Pierre to be recovered and used in thought by using links forged in the marker system itself. Thus, in an analogous way to the hologram, information is laid down and made useful by the medium (involving language and human forms of life) which has structured it for the individual and we recover the information by using the same medium — the real world replete with language and social interaction.

This model can be combined with (and indeed seems eminently suited to) the recent discussion of dynamic-systems-oriented approaches to cognition where cognition is viewed as comprising interactive partial programs designed to function in relation to an environment but not to carry within themselves a complete representation of the environment apt for computational manipulation and use independent of that environment. Taking that theoretical tack allows us to theorize human cognitive activity as activity in which the targeted contents are partly defined by and therefore intrinsically involve relational techniques adapted to the relevant domain (therefore cognition is intentional in the philosophical sense). These relational techniques and their cerebral representation have two functions. First, they tend to evoke the package of information from an object and second, they allow the organism to exploit the perceptual cycles used to derive pertinent information from that object in the past (Neisser, 1976) and to integrate it into behavioural routines.

Thoughts, Norms, and Structured Information

I have noted that human beings think about the world in structured terms making use of both concepts and conceptions of objects (Evans, 1982, p. 75; Gillett, 1992, chapter 1; Hurford, 2003). When we examine this truism it indicates that there are two radically different types of information package arising from the environment. A thought like <that apple is ripe> makes use of the concepts <apple> and <ripe> and involves my picking out from what is before me <that apple> and the informational features (perhaps implicit or embedded) indicating that the apple is ripe. My thought has a structure based on these elements in that there is something which links it to any other thoughts about *that particular apple* and something different which links it to thoughts about *ripe* oranges, pears, or tomatoes. The former linkages could be said to track a particular and the latter to respond to general features so that I build up an articulated picture of a world comprising objects instancing certain general properties.

These properties of thought rest on techniques or skills based on selective attention to relevant aspects of the stimulus array and tracking items such as "that apple" as an identifiable and re-identifiable things. Both abilities (my ability to apply general concepts and my ability to keep track of particulars) rest on judgments that something counts as the same as something else (a point made by both Kant and Wittgenstein). In using the first ability (i.e., general concepts), I judge that these conditions count as being the same in respect of this general feature as others where the concept is correctly applied. In the second (singular object) case, I judge that a particular or individual presented at time t_2 is the same particular as that encountered at t_1. A cumulative experience of making judgments of these two types builds for me a cognitive map enabling me to behave appropriately in terms of successful strategies and adaptive

techniques that I have learned from others and mastered through experience. This object-feature map and the object placing map combine to tell me what is where in the world and what properties those located objects have.

All this seems uncontentious and not to have any great bearing on the relationship between meaning and the layers of the psyche for a naturalistic account of mind. The judgments through which I build my cognitive map incorporate rules which dictate what counts as the same feature or the same individual (Wittgenstein, 1953, #215). I therefore accept Frege's assertion that the judgments underpinning thought are linked to truth and that truth cannot be a matter of "men's individual states of consciousness"(1918/1977, p. 25) or, more tellingly in the present context, a disposition in the individual psyche.

The rules governing the grasp of a concept and the formation of conceptions of objects are shared in that their whole purpose is for intra-group and interpersonal communication of "good tricks." And I have helped myself to the simplest way to explain this by linking concepts to linguistic terms. What counts as green or a frog could then be argued to depend on rules for the use of the signs or linguistic terms "frog" and "green" rather than on my (or your) internal states and dispositions. In fact, given the intentional adaptation of human cognition so as to exploit collective experience, the conclusion goes through without any special pleading for a theory of meaning (such as those espoused by Frege, Wittgenstein, Dummett, or Davidson). Support for this thesis is seen in Luria's claims for the pervasive role of speech in organizing human psychological function and from further work in cognitive psychology (by Luria's teacher).

Vygotsky (1929/1962) first demonstrated that language provided developing thinkers with the basic tools of cognition and contemporary work supports this conclusion (Karmiloff–Smith, 1992; Luria, 1973, p. 261ff). Children gain competence in cognitive skills by redescribing their initial strategies so as to make significant aspects of those strategies explicit. This "representational redescription" of procedures and their operational elements results in a repertoire of cognitive abilities that is used to increase the range and efficacy of the child's capacities in a given domain. The redescription occurs with the aid of speech as a ready-to-hand set of markers linked to action types, a view of cognition deeply congenial to the present account.

I have remarked that concepts are an interwoven or articulated set of abilities to identify and use significant features of presented information and to organize one's cognitive competence in a given environment. The articulation of such abilities and the signs marking them comprises the multiple links formed between different situations and the human practices that go on in them or (à la Wittgenstein):

> Every sign *by itself* seems dead. *What* gives it life? — In use it is *alive*. Is life breathed into it there? — Or is the *use* its life? (1953, #432)

Wittgenstein's view that "thinking is essentially the activity of operating with signs"(1972b, p. 6) expresses the dipartite connectedness theory (horizontal connectedness to diverse language-related activity and vertical or environmental connectedness between the organism and its context) that I have been developing and the present analysis allows us to revisit the idea that the psyche is layered in ways that have various degrees of access to consciousness or cognitive penetrability.

The Layering of the Psyche

The essential intersubjectivity of language and thought often results in a subject setting aside her own idiosyncratic (and therefore inherently limited) mode of categorization and adjusting what is done to internalized responses to her responses. It is a small step from imitating this other-originating correction to developing the internal disposition to exercise corrective surveillance on one's own intentional activity. Thus, if a subject can learn to self-correct when someone says "Do you really think that is a frog?," she can surely also learn to "say" something similar as part of a reflective commentary on her own cognition. The richer a person's inter-personal and linguistic context and the more consistent the reactions to her own hesitant cognitive efforts, the more competent the subject will become and the more independent in being able to monitor her own thought-life and its conduct. Thus the prescriptive and evaluative stance (taken by others) towards one's own cognitive tendencies adjusts human cognitive skills so that the adaptation of others can be mirrored and reflected on and not merely mimicked. The present explanation of meaning or intentional content (and the concepts which articulate it) implies that human beings are creatures whose minds (and the information processing capacities of the brain) are shaped by norms operating within an interpersonal or social milieu. This thought is summarized in the holographic model of human neurocognition, and can be elaborated to explain the layering of the psyche.

The most straightforwardly physical or bedrock (and therefore cognitively impenetrable) layer of the psyche is a set of neural connections structured by environmental conditions and the contingencies holding between them. But the brain can also be described as an information system structured by human discursive practices with capabilities to organize and use data (construed in a more folk-psychological or commonplace way) and therefore some aspects of its structure are understandable only by appeal to what goes on in that milieu. For that reason we cannot expect to rely on the simple physically specified inputs and outputs (and the spatio-temporal relations between them) that might be considered in psychophysics or neurophysiology to make psychological sense out of what the human brain is doing. Adequately illuminating psychological descriptions of the ways in which human beings adapt to their environments

and the regularities that the brain detects and uses to structure behaviour (richly described to bring out its psychological content e.g., he meant to make her jealous) may therefore only emerge in human discourse. We can express this in a principle concerning psychological explanation:

> Discursive practices and their proper regularities are explanatorily prior to physical descriptions of the processing shape of brain assemblies.

This *principle of discursive explanation* is the key to understanding the layering of the psyche. The layering of the psyche results from the (higher order) effects of discursive structuration (operating through cortico-cortical connections) on the organization of physiological patterns arising from more basic sensori-motor patterns producing a joint satisfaction of both sets of constraints. Moulded by the two sets of contingencies — meaningful and natural — the psyche settles into information processing patterns some of which are replete with and captured by signification and others of which reflect the way brute environmental conditions have causally impinged on the nervous system.

Wittgenstein remarks "If God had looked into our minds he would not have been able to see there whom we were speaking of" (1953, p. 217). This puzzling remark emphasizes the fact that the individual whose name may perhaps be in my mind has only got that name because of a set of language related practices in which I am a participant and no image or averaged imprint of the person concerned will give the meaning of that name. That insight reinforces the claim that thinking of things is not a matter of images in the mind but depends on the practices and language games in which one participates and the objects and people with whom one is actually engaged. Images in the mind may be idiosyncratic or even mistaken but what is recorded in the holographic activity of the brain is a good-enough pattern which, when exposed to ordinary human discourse in a shared environment, is attuned to the object of which the human thinker is thinking and speaking. Absent this condition, or considered *from the point of view of neurophysiology*, there might be nothing intelligible going on but once the regularities are intelligently related to the human ecosphere and an *Ubersicht* of the relevant human practices, the relations between the person and their world are displayed.

Wittgenstein also remarks,

> No supposition seems to me more natural than that there is no process in the brain correlated with associating or with thinking; so that it would be impossible to read off thought-processes from brain-processes. I mean this: If I talk or write there is, I assume, a system of impulses going out from my brain and correlated with my spoken or written thoughts. But why should the *system* continue further in the direction of the centre? Why should this order not proceed, so to speak, out of chaos? The case would be like the following — certain kinds of plants multiply by seed, so that a seed always produces a plant of the

> same kind as that from which it was produced — but *nothing* in the seed corresponds to the plant which comes from it; so that it is impossible to infer the properties or structure of the plant from those of the seed that comes out of it — this can only be done from the *history* of the seed. (1967, #608)

Now Wittgenstein knew as well as we do that the information that results in a fully formed plant is in the [DNA of the] seed. But it is not there in a way that inspecting the molecular biology of the seed shows us the plant in any recognizable way. Armed with a great deal of genetics and some empirically established manuals to get us from genetic structure to plant structure we might have some idea of its mature form but that is very different from looking for something recognisable in or constructed out of an isolated molecular biological profile of the actual material constitution of the seed. The holographic theory implies that similar considerations apply to the layering of the psyche. Just as we need to look at the variations in DNA in the light of co-variations in environment and phenotype so we need to look at neural patterns in the light of the role they play in the intact function of the individual in a discursive environment.

A thinker is introduced to rules and intelligent interactions where cognitive tools are imparted or learnt. The tools are marked by signs and typically relate either to objects or to properties of/groupings of objects as picked out in human activity. We lose sight of the richness of human thinking and behaviour by ignoring these facts and focusing on the narrow parameters of stimulus–response relationships or individual learning history. Wittgenstein sees psychology and the mental ascriptions that form its topic as only being available to us as we consider human beings in the natural context of human life and its institutions.

> Someone says: "Man hopes." How should this phenomenon of natural history be described? — One might observe a child and wait until one day he manifests hope; and then one could say "Today he hoped for the first time". But surely that sounds queer! Although it would be quite natural to say "Today he said 'I hope' for the first time". And why queer? One does not say that a suckling hopes that . . ., but one does say it of a grown-up, — Well, bit by bit daily life becomes such that there is a place for hope in it. (Wittgenstein, 1980, #15)

Psychology, Wittgenstein remarks, deals with certain aspects of human life (1980, #35) and is articulated by the rule-governed use of signs and the practices in which those signs function as discursive currency.

By looking at the functioning of a human individual in the discursive environment (both historical and current) and tracing connections and continuities between situations apt to be linked by the signs that pervade the subject's psyche, we begin to understand the layers of meaning that inform a subject's behaviour. "Greg is thinking about the fact that he is going to be painting the house when the rugby test is on" links Greg's current somewhat preoccupied and concerned state to a designated event — the rugby test, and explains his cognitive

problem in terms of possible future (i.e., non existent) activities. Psychological predicates connect our present selves with our pasts and futures in myriad ways and make sense of what we are doing in terms of that complex temporally extended tapestry of engagement with the world and others. The richness of such predicates reflects the richness of the "tapestry" but the tapestry is more fluid than any textile depiction, it is a palimpsest with multiple layers of inscription on it. The marks appearing there and the links they make are a product of the world we live in, our forms of life and the linguistically permeated activity of which we are capable. Those marks and their points of reinforcement and effacement of each other form the complex pattern corresponding to the layers of the psyche some components of which are so indistinct that they have a shifting and interactive relationship with the individuals reading them.

Conclusion

The layers of the psyche are perhaps not best thought of in the fairly fixed terms of Freudian theory. The conscious realm is the realm, as Freud noted, of the ego and the reality principle and it puts us in touch with the world as we know it with others (thus *con-scio* — knowing with). The preconscious realm is the world as I and others know it and engage with it through our discursive practices but not in a way that is presently well articulated or before the mind.

The unconscious is a more shadowy zone. It is also engaged with the world, both inner and outer, but the engagement is not structured according to the rule-governed and validated significations of language-related activities. The connections in signification are both idiosyncratic and shared and their influence within a life story, although discernible to some extent, is cumulative, continuous, and dynamically shifting. Beneath them is a layer in which brute causal associations between states of the body and conditions in the world dynamically and cumulatively form a (partly inchoate) record of impingements on my body, some sensorimotor, some visceral, some mediated by sounds, and others by ill-formed, half apprehended impressions of this, that, or the other situation. Here is the primary process replete with shifting unprincipled liaisons between words, feelings, felt relationships, and experiences. It is unstable and potentially life altering and sometimes produces explosive effects but all the time it is in a dynamic interaction with the consciously significant narrative that is my conscious life (or my reconstruction of my trajectory through my life-world).

What drops out of (or rises to the surface from) the kaleidoscopic world of the multi-layered psyche is fascinating. It is quickened by words and glances, icons and attention-catching intrusions, facial expressions and tones of voice, and it has the capacity to pull my mind in this direction or that in ways that I may feel in harmony with. That is "what-it-is-like-to-be" (Nagel, 1986) a neural

network the size of a tennis court with shifting patterns of excitation ranging over and between multiple layers of complex computational circuitry the activity in which one has to learn to make sense of.

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