Neuropsychological Foundations of Phenomenology: Is It Possible?

Patrick Suppes*

Introduction
First, let me say that it is a pleasure to dedicate this lecture to Dagfinn Follesdal. I have known him for four decades, and we have given a large number of seminars together at Stanford. If I know anything at all about phenomenology, it is entirely due to him. He has carefully explained to me many features of Husserl’s work. If you find that I have missed the point in various matters, do not blame him, but put it down to my being a poor listener, and at times a poor student. This last remark is not one of pseudo-humble apology. In fact, I think that in the kind of matters that lie at the intersection of scientific psychology and neuroscience, on the one hand, and phenomenology on the other, I probably have the weakness of being too confident that whatever phenomenologists have to say I can ultimately find, for the parts that I am willing to accept, some reasonable scientific account. This lack of neutrality will shine through in what I have to say today. Yet, I will do my best to be quite explicit about those aspects of the scientific side of the ledger that are not well worked out and do not deal adequately with your own favorite phenomenological concept.

I also understand that by concentrating on the work of Husserl, transmitted to me mainly by Dagfinn, not only in lectures, but in his wonderfully clear articles, I am taking a particular route into phenomenology that may be different from the one some of you cherish. Nevertheless, I hope what I have to say today will still contribute in a general manner to understanding the potential and the limitations of giving an account of phenomenological thought and concepts in scientific terms.

I also want to stress what I consider a very positive aspect of phenomenology, in contrast especially with much modern philosophy of mind. This is the emphasis on the details of experience, and the recognition that

* Stanford University
how the subtleties of perception are dealt with is critical to any successful phenomenological theory. In a very different way, a similar emphasis is to be found in my two favorite classical philosophers of mind, namely, Aristotle and Hume. I will occasionally have something to say about them in comparison with Dagfinn’s clarifying version of Husserl.

This lecture has three parts. First, I want to go through the instructive article about phenomenology that Dagfinn wrote for psychologists in 1974 for the *Handbook of Perception*. I stress this handbook is one that is written for psychologists, not philosophers. The first volume is on historical and philosophical roots of perception. I outline how I propose, from a neuropsychological standpoint, to analyze the most important specific concepts, such as that of *noema*. In the second part, I turn to a brief discussion, of two more general concepts of phenomenology that it seems to me are of central importance and also controversial. These are the concepts of intentionality and consciousness. Finally, in the third part, I turn to a general concept of meaning, one that is psychologically based, and, I think, relevant to phenomenology.

I. Phenomenology à la Føllesdal with emphasis on perception

Dagfinn begins with a discussion of intentionality, but I want to reserve that for later and to begin with one of the specific technical concepts of Husserl, namely, that of noema. Dagfinn initially quotes a brief statement from Husserl (1952, p. 89). The noema of a physical object is a “generalization of the notion of meaning to the realm of all acts”. This is certainly the kind of remark that needs a lot of unpacking, but Dagfinn says something immediately thereafter that provides the needed explanation.

Just as the meaning of a linguistic expression determines which object the expression refers to, so the noema determines what the object of an act is—if the act has an object; some acts have a noema for which there is no corresponding object. (Føllesdal, 1974, p. 379)

Dagfinn next gives in an enlightening paragraph an example I will not quote, but summarize. The noema of a tree that a person is looking at is a complex structure, which consists of many features or aspects of the tree. Now, these features are not all of the features, but the ones that, as I understand it, are the kinds of features that are known to the perceiver. This does
not mean that in a given act of visual perception all of these features or properties are ones that can be immediately available to perception. A favorite example of Dagfinn’s, one that I have always liked, is the back side of a tree that we are looking at. It is part of the general structural view we hold of trees that they are not simply paintings on a wall but have mass and volume in three dimensions, and therefore, when we are looking at them from a given viewpoint there is also a back side because they are also not transparent.

Dagfinn and Husserl emphasize that this structure is not an abstract structure simply given in the physical world, but is one related to the act of perceiving. I take this to mean that the structure is one that is built up in a complex fashion from individual experiences, and the experiences of others communicated to us, that fix the structure of a tree or whatever object we are considering. It does not mean that we include in the noema all of the physics we know about trees, such as the behavior of the particular atoms that make up the tree. One of the remarks I would make is that, as I understand it, a foundational account of the features of a tree that make up the structure or the noema is not something that is given in a mathematically exact form. Also, I would surmise that the structure that constitutes the noema of a physical object, such as a tree or a chair, can be different for different individuals and different cultures. What is important is that even though the noema is an abstract structure, it is not a particular structure at a given time and place. It is like the type of a token in linguistic usage.

This remark takes us to the closely related concept of noesis. I do not think the parallel is exact but, as already suggested, the noesis of a structure stands to the noema as a token of a word stands to its type—the noema is abstract and timeless, the noesis temporal and concrete.

The concrete, but strongly structural character of a noesis is, in many respects, close to the structural process neuroscientists are looking for to solve the binding problem. How does the brain put together nearly simultaneous perceptual input to associate this electromagnetic congeries of signals with the concept of seeing a tree? The psychologist J. J. Gibson, whom I knew fairly well, pushed hard for a concept of “direct” perception. Yet we can ask from a neuroscience perspective, “What could possibly be meant by direct reference?” By “direct” we usually think of $x$ going to $y$ without intermediate considerations, but if anything was ever obvious, no
act of perception is ever direct in the brain. Anyone who looks at the complexity of our auditory or visual systems, not to speak of the other senses, knows how ironic the description of perception as being direct is. It will be a long time before we have understood the intricate computational details of any one of these neural systems. It is rightly often said that, after the human brain itself, the next most complicated structure in the universe, as we know it, is the human visual system. These skeptical remarks apply, with little change, to philosophical theories of direct reference.

The third concept of this trio is that of the *hyle*, which is immediately reminiscent of Aristotle’s *φύσις*, his concept of matter. It seems to me useful to think of Husserl’s hyle as being close to Aristotle’s concept, even though differences can be found. For example, he certainly wants to introduce hyle in connection with acts, not simply in terms of the world as it is, independent of any act. But the remarks about it are close to saying that the hyle of an experience is the givenness of that experience, that which makes it, in its particular time and place, exactly what it is. It is the hyle that supports, so to speak, the inexhaustible features of the object toward which the act is directed. I will not try to put this other ways. Many of you can do a better job than I can. It is more important for me to make as transparent as I can my modification of these notions to put them within the scientific framework of psychology and neuroscience.

First, let us begin with the concept of a noema, which is the easiest for my analysis. It is close to the ordinary concept of structure in modern mathematics and logic. But it is characteristic of the use of structures in any scientific theory that the concepts included in the structure are very far from offering a full description of the physical or psychological object or process being considered. Only certain limited features are actually brought in to a particular theory, but in phenomenological terms the structure is that of a determinable X. One way of thinking about this is that the neuropsychological scientific approach can in any given theoretical set up deal with only part of the noemata. What phenomenology supplies, in its concentration on the richness of experience, and its inexhaustible nature from a conceptual standpoint, is a vast collection of features that can be the focus of a given particular scientific theory. A well-worn but classic and easily understood example is that in standard forms of classical mechanics the color of objects plays no role and is not formulated directly as a physi-
cal concept, even though it is one of the most striking perceptual features of physical objects that we ordinarily encounter.

So, my first point is that the structures that we use in scientific theories, where we are focused on certain properties or relations of objects, form substructures of various noemata. The substructures that we use in formulating about classical particle mechanics or something very different, electromagnetic theory, are substructures coherent with the richer phenomenological noemata of the experiences involved in either classical mechanics or the more subtle phenomena of electricity and magnetism.

The second point is that for such identified substructures of a given scientific theory we then have well defined concepts of isomorphism for particular realizations of these concepts, especially for what I would now term substructures of noëses, that is, substructures that are particular realizations in some concrete place and time, of the particular scientific theory being considered.

I also remark that because of the inexhaustible character, and our inability, with which I entirely agree, to express in a completely exhaustive way the nature of experience, there is no natural notion of isomorphism for noemata or noëses, because we are not able to list all the features that should be included in a possible isomorphism.

However, it seems to me there is an essential difference between the structural isomorphism of noemata and noëses. A noema is an abstract structure with a natural equivalence relation that is, in fact, a congruence relation, as in algebra and pure geometry. A concrete noesis, on the other hand, has to characterize approximately equivalent perceptions, which is naturally a similarity relation, i.e., a relation that is reflexive and symmetric, but not necessarily transitive, or in some cases not even symmetric (Tversky, 1977). Such a notion of similarity is widely used in psychology, where the need for thresholds in recognizing the approximate equivalence of all kinds of signals and other phenomena in perception requires a generalization of equivalence to something weaker. Moreover, the extensive literature on these subjects, summarized in some detail in Suppes et al. (1989), includes a probabilistic version as well which goes back to the early work of Thurstone (1927a, b). A recent good analysis of the importance of such a concept of similarity in the early work of Carnap is that of Leitgeb (2007).
Finally, the hyle is for me the givenness in experience. It provides a conceptual basis for realizing that, no matter how detailed the isomorphism between two noeses of a given noema, there is still a difference, because of the uniqueness of the particular time and place of each noesis. Notice that this recognition of the given lies outside the formal structure of scientific theories, as ordinarily considered. What they have to say about this point is not very interesting.

On the other hand, I emphasize that I am not stressing for one moment just the nature of scientific theory itself. It is when we turn to scientific experimentation that the notion of hyle has a proper place. A given experiment, confirming or disconfirming some aspect of a particular scientific theory, must take place at a given time and place with given equipment and given individuals performing the experiment—performing as I would want to say here, various particular acts. The particularity of the givenness of an experiment is what constitutes the hyle, and is an essential part of any serious account of science, that is, any account that necessarily deals with experiment as well as with theory.

What I said about the given very much fits in with Aristotle’s concept of hyle, for matter provides the content of form. In the *De Anima*, for example, the psychological mechanisms for perception and higher intellectual functions are forms without matter or hyle. The forms, or noemata, are what are abstracted from the hyle. These forms are sensible forms in the case of perception and intelligible forms in the case of higher functions.

A second point to stress about my own views of both scientific theory and experiment is that it is the experimental side of science that is closest to the phenomenological account of experience, for the openness and the inexhaustible character of the concrete acts needed in performing experiments are clearly recognizable. Any attempt to fully formalize experimentation is, for too many reasons to be enumerated here, a foolish undertaking. All experiments of any deep scientific merit contain relatively detailed accounts of what the experimenters did and, in fact, are written in phenomenological terms: what specific acts as experimenters did they perform, in what context and with what equipment? And that equipment itself was used and evaluated in terms that are not merely scientific, but also include the phenomenologically given.
We must not be misled by the fact that there are significant parts of experimentation that can be formalized. A good example is statistical design. In the case of medicine, where in many cases, fundamental scientific theories are often completely lacking, the most important aspect of the scientific method is the application of statistical-design principles. Even though these design principles can be stated in very sharp mathematical form, it does not mean the experimentation itself can be put into such mathematical form. The experimentation will continually be a matter of practice.

The joke used to be at the Stanford Linear Accelerator Center (SLAC), that the theoretical physicists complained that the experimental physicists never understood what they were talking about; the experimental physicist complained that the engineers and technicians, who ran all of the equipment, never quite satisfied what they wanted; and the engineers and the technicians continually complained that the experimentalists would do very much better experiments if they only understood the equipment—and God help them if a theoretician was ever permitted to touch the equipment.

This joke says something serious about scientific experimentation at a high level. It is very much a phenomenological kind of experience. Only a very feeble summary is given on the intricacies of equipment behavior in any modern physical experiments, in the publications reporting them. It is not possible to give what you might think of as a complete account. All we can do is summarize some of the features. A favorite resort in the case of complicated equipment is to give a reference to the manual produced by the manufacturer as to what its performance characteristics are, or should be. Hopefully, they match approximately what occurred in the experiment. Such scientific experimentation is the great large-scale phenomenological aspect of modern science.

When I stand in my garden looking in any given direction, the perceptual detail I am aware of, not to speak of that which I am not, defies complete description. The necessary vocabulary to accurately describe the spatial patterns of shape, color, texture, mass and the like does not exist in any natural language. Even Proust, that master of perceptual detail, was crude in comparison with the swift but rich survey my eyes (and others', of course, as well) can make. Perhaps an even better example is the richness of unspoken and indescribable visual, auditory, and sometimes tactile per-
ception used to control and manage our physical motions in any part of the natural world. Scientifically, we can focus on some small piece of the action, so to speak, but a full synoptic analysis is hopeless and a mistaken, as well as unachievable, scientific goal.

The absence of a complete foundation does not mean that the relation between phenomenology, on the one hand, and psychology and neuroscience, on the other, is hostile or competing. But a recognition that, of course, it is a scientific task to keep enlarging the range and depth of the theories and experiments developed and confirmed as having some validity. And yet from any serious viewpoint of analysis on the nature of experience, the subject matter of phenomenology will remain inexhaustible and not be covered in any complete way by scientific results. Indeed, I am including scientific experiments as part of phenomenology, because of their essential, uneliminable givenness.

I also want to stress that what I just said does not mean that I think phenomenology has some privileged access to knowledge that is not available in any scientific fashion, something that has often been claimed mistakenly in the history of philosophy. The openness of phenomenology and the acceptability of it in the modern world are based upon its splendid emphasis on the richness of experience and the recognition that our scientific endeavors will never be complete. In emphasizing this viewpoint phenomenologists need not transcend experience in any Kantian fashion by developing pure apriori synthetic concepts and propositions about nature, or a moral philosophy whose central concepts lie outside experience entirely.

II. Intentionality and consciousness
I focus on intentionality, with an afterword on consciousness.

Intentionality. All animate matter is intentional. Why? Consider plants and bacteria. Their genetic evolution depends upon accidental and probabilistic mutations, as their main mechanism. Of course, the accidental mutations themselves are not individually intentional. It is, rather, a necessary feature of the selection process that a fundamental goal of all life, namely, survival of the species, is facilitated by this process.

It is important to recognize that accidental means, themselves intrinsically nonintentional, can, and often do, contribute to the highest intellec-
tual goals, such as the development of a new theory for some part of physics or biology, not to speak of mathematics.

It is empirically untenable, I would argue, on the basis of many famous incidents in the history of science to claim that new discoveries are reached by calm, deliberate and conceptually explicit chains of reasoning. Accidental and probabilistic associations, whose process cannot be brought to conscious awareness, are central to finding new results of any intellectual depth. I have expanded on these ideas in an earlier article (Suppes, 2003). But linking intentionality up and down the phylogenetic tree of species implies no claim that all kinds of intentionality are equal in the pantheon of nature.

It is also a mistake to think that there is a sharp, identifiable cleavage between animate and inanimate matter, the intentional and nonintentional. The slope from the lofty peaks of human intentionality to the valleys of none is slippery, with no natural stopping point. Were the Australian stromatolites that flourished 3.4 billion years ago as perhaps the earliest form of life really to be classified as such (Allwood et al., 2006)? It surely does not deeply matter, for the historical creation of new organic molecules was a necessary preliminary, and wherever we draw what we may call the line of life in evolution, the differences for species close to the line, but on different sides will seem small in the context of the long and complex ascent to our species.

The next step up from plants and bacteria is to the species that clearly demonstrate some form of elementary associative learning. Little worms, like *Aplysia* or *C. Elegans*, whose DNA is so surprisingly close to our own for long sequences of the universal four-letter alphabet, are good examples. Their genetic evolution has given them a repertoire of acts: approach stimuli favorable for finding food, withdraw from a range of stimuli that are noxious and deadly.

Given this repertoire, they can now be conditioned to approach some new stimuli and avoid others, toward which they have no instinctive bias to approach or avoid. Such simple associative learning will modify their cell structures, but not in ways that will be genetically inherited. They can be taught under supervised, i.e., experimental, procedures to learn new intentional acts of approach and avoidance. In principle, such associative learning regimes are of the same general kind that are used to teach, in a super-
vised way, many things to children. And these same kinds of associations are used in an unsupervised way in scientific discoveries of all sorts.

Many phenomenologists and cognitive psychologists will strongly disagree with the claim I have been making about the central role of associative processes for almost all species, high and low, but above those species that are incapable of association. I cannot take the time to argue this point in detail here, but I have done so in several other places, e.g., Suppes (2002).

**Consciousness.** Like William James, Husserl has a very liberal use of the concept of consciousness. In many ways, a better term for both of them is “mental phenomena”. For example, when in the discussion of the transcendental reduction Husserl refers to directing one’s attention to the sphere of consciousness, I would, from a scientific psychological perspective, speak of the directedness of intention. Examples would then include many acts performed on the edge, or outside of, the edge of consciousness, but ones that only make sense in terms of their intentional directedness, not at all in terms of their description in ordinary physical language, for instance, my regular walking from one office to another in Ventura Hall at Stanford, where I have had my office for fifty years. There may be in texts of Husserl I do not know proper detailed reference to the intentional mental phenomena that are unconscious and dominate much of our mental activity. From a cognitive standpoint alone, I have in mind the unconscious associations so central to creative activity in both theoretical and practical endeavors, from the outward reaches of modern mathematics to the high art of reaching compromise in all serious political matters. To believe that conscious rational deliberation is central to any of these creative efforts is to have, in my view, a scientifically unsupportable view of human thinking processes.

Now in William James’ case, where I know the texts well, I find it easy to modify his usage of the term “consciousness” to restrict it to the modern psychological sense of direct awareness. As in the past, I leave it to Dagfinn to instruct me on how I should reconstruct Husserl on this matter.

There is another point about the directedness of intentions that I need to clarify. This is the issue of intentional acts that do not have a physical object or process as their focus, because of a cognitive mistake or a hallu-
cination, for instance. I agree with Husserl that this is a problem that must be dealt with. But I have no difficulty with it. From a neuroscientific standpoint, intention is not directly focused on external physical objects or processes, but on their brain representations. In other words, attention requires perception and perception requires brain images of what is perceived. There can be, in the process, quite naturally, responses of the neural system that we would externally count as errors of perception. Such *as if* acts are in fact much studied in scientific psychology, and the view mainly adopted seems compatible with Husserl’s. In cases even of direct awareness—consciousness in the strong sense I use—of the perception, the intentional sense of directedness, even in error, can remain very strong. (As I have gotten older, I am increasingly aware of this in the greater number of mistaken visual perceptions I have, even when in a state of very strong focused attention.)

In a recent article (Føllesdal, 2006), Dagfinn gives a detailed analysis of Husserl’s concept of anticipations in experience, which can be characterized as features of the physical objects or processes we encounter. So when we see a car driving by its color and shape are anticipated features. Such anticipations are the constituents of the noematic *sense* of the noema, which following the Fregean tradition we may think of as the meaning of the noema. Dagfinn stresses that anticipations may be experienced consciously or unconsciously, and there are also many features of the noema of an object or process that we have not yet experienced, but potentially may do so in the future. He says that Husserl regards “anticipations as largely sedimentations from past experience. They might hence differ from person to person, dependent upon their personal history. The dynamics of this sedimentation process is a major theme in Husserl. An important subtheme is the adaptations that yield intersubjectivity.” (p. 378). This setup seems most congenial to my own scientific theorizing about how the brain works, as a vast dynamic adaptive associative network. More on this in the next section.

III. A psychological concept of meaning
The meaning of a word or a feature of a noema is given by a subnetwork of associations activated when the word is heard or read, and this same pro-
cess also occurs when an object or process is perceived. Anticipations in Husserl’s sense are immediately activated in the network. This is not the place to offer a battery of details, but I stress two conceptual points. First, this account of meaning leaves no natural place for a sharp distinction between the analytic and synthetic. Second, it also leaves no place for a sharp distinction between the intentionally loaded meaning of a perceptual anticipation, for instance, of color or shape, and the meaning of a word or phrase. From an evolutionary standpoint, one of the most important aspects of language is surely our ability to use it to communicate anticipations to each other.

So I challenge the idea that the fundamental concept of meaning of an expression or perception is abstract and external. Dagfinn has pointed out to me that people are sensitive to this use of abstract. I am also sensitive, because I think one of the characteristic problems in going from psychology to neuroscience is that there is not any clear sense of abstract that applies directly to the brain. Everything in the brain is physically given activity or anatomy. So what in neural activity can be properly and directly regarded as abstract? Well, I think abstract meaning must be a derivative notion. If we take the brain seriously we are not going to have any immediate sense of the abstract, even though, psychologically there is a tendency to talk about abstract concepts. But in order to talk about the abstract, as we ordinarily like to talk about it, we must have a sense of representation, and how are we to think of representations in the brain? There must be something concrete there. The brain has only purely physical processes. There must be something concrete to be the representation of that which is to be represented. For cognitive relevance, the abstract concept must have, in this neural sense, a concrete brain representation. So, for example, if I talk about the brain representation of a word, it will be something physical that is a representation, probably of the spoken structure of the word, and will have an approximate structural isomorphism to that structure.

Given this neuropsychological viewpoint, it would be mistaken to hold that meanings are abstract and eternal objects. So I would find the phenomenological sense of meaning to be one with which I can be quite sympathetic. In addition, a point, as I understand it, of Husserl’s that I very much agree with is this. It is a mistake to think of meanings being restricted to language. Perception and experience generally are saturated with
meaning. If you ask me for the meaning of the word Paris, I would want to respond and I would want to say something about the meaning of the word.

But for me the meaning of Paris, the city, is much richer than the meaning of the word. And I think this is related, but is related to a distinction that is too often sharp. I also insist on an evolutionary picture. The perceptual system is something that is millions of years old in mammals, and along with it is the development of Husserlian anticipations. In contrast, natural language, as spoken by humans, is a very recent development. The richness and depth of the apparatus that is used in perception, as a whole, is evident, compared to the relative newness and restricted character of language. I want to make a series of remarks that are focused on this contrast.

I start with the neural phenomena of the very large area of association in the human brain and the proper emphasis on the centrality of association in the theory of mind, starting with Hume in his treatise (1739/1951) and followed up by an endless body of research since then. The crucial point about meaning for me is to use the concept of associative network to give the meaning dynamically of a word or a city, or anything else in my experience. This network is huge and continually changing. The next important concept is activation. Why do we need a notion of activation related to the notion of meaning? Because we have, each of us, such a large complex associative network. If when I said Paris all nodes and branches of your associative networks lighted up, your heads would look like light bulbs because there would be so much electrical activity. The critical point is that it would be impossible to compute anything seriously. And so what is important is that only a subnetwork is activated. What nodes are activated? Those with the strongest associations to the brain “image” of Paris, often also adjusted to the context in which the word is being used. It is this subnetwork of associations that we can think of as being the neural representation of meaning.

I expand on aspects of these neural associative networks relevant to meaning. I begin by emphasizing the dynamical nature of meaning and belief. Over two meetings, one in California and now this one in Bern, I have had an extended discussion with Dag Prawitz about whether or not we can come to complete agreement on the nature of mathematical proof. It has been a wonderful extended discussion. My associations have been modi-
fied throughout these conversations with him and that means the meanings, and also my beliefs, have been continually modified dynamically.

Dag is very persuasive and careful in arguing various points. So as we talk, I am continuing to modify internally my beliefs. One of the most important aspects that comes out of a neural scientific view of how the brain is working is that there is this continued modulation of associations that has in its own way a holistic effect. Changing the strength of one association changes the relative strength of others. Of course, the associations on which strongly held beliefs principally depend can only be changed by major changes in the strengths of some other key associations, which are unlikely in the ordinary course of events.

You might ask, “Is there anything besides the associative network carrying meaning?” Well, the broad answer is negative, but it is very important to immediately emphasize what is additional. This is also a neuroscientific point even more than a psychological one. The great problem in the philosophy of mind, as expounded by modern philosophers, is the mind, as conceived by them, is not able to do anything. There is no doing. It is very quiet and reflective, meant to be deliberate in the best cases, but the actual way of doing anything is not laid out. If I give such a model of mind a question and it has to find an answer, no account is given in any detail of how this might be computed, or how the organization of the necessarily complicated reasoning in some cases, is to be accomplished. In another direction, given the necessity of driving a car or doing anything physically coordinated, how does the mind work, and how does the mind think about how it works in such temporally constrained cases? The standard philosophy of mind is missing the essential ingredients to handle any of these problems.

In the case of the associative view of mind as fundamental, many cognitive scientists have asserted it is too elementary and too simple an idea, and some philosophers have seconded this view. I want to explain why this response to the claim that association is universal and computationally powerful is wrong. Well, my first rhetorical retort is the kind that one philosopher likes to say to another, “You just didn’t think about this matter hard enough.” I want to be more circuitous in my substantive answer. In many ways the single most fundamental result in logic in the twentieth century was discovering the set of computable functions and un-
derstanding how that set could be defined in multiple extensionally equivalent ways; above all, how any computable function can be computed. Equally important is the realization, that the apparatus for computing such function is extraordinarily simple. The product of the number of states and the number of symbols is a well-recognized measure of the simplicity of a universal Turing machine. Still one of the very best results is Marvin Minsky’s UTM’s product of twenty-eight, seven internal states and four symbols. Well, exactly the same thing can be said about associative networks. It is very easy to have an associative network mimic or represent any universal Turing machine. So the account I want to give of meaning is, I think compatible with what I hear phenomenologists saying, even though I have a very naturalistic view about both meaning and belief. Remember what marked belief for Hume, a certain feeling, a certain vividness. I used already the modern term for this, activation. The way we produce a current belief is by activating some subnetwork, which is activated usually by incoming stimuli. Prior to activation, beliefs are only potential, in a sense not too far from what Aristotle says of knowledge in the *De Anima* (417b5–417b20). “We don’t have a little database, Ah, here’s belief 1 and here’s belief 2, here’s belief 3, let’s go look up belief number 300, 561.” It isn’t like that at all. Beliefs are dynamic, only computed at the last moment as they should. Now many, of course, will not change much at all. I am not saying, for example, that you, or anybody you know, is changing views about the flatness of the earth from moment to moment—nothing like that. But in the overall dynamic structure, belief changes, sometimes suddenly, and with it meaning, a point vividly illustrated by dramatists and novelists since ancient times, as a mirror of something that occurs continually in human relations.

**References**


