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Martin Heidegger's phenomenology and the science of mind

Charles Dale Hollingsworth
Louisiana State University and Agricultural and Mechanical College, cholli6@lsu.edu

MARTIN HEIDEGGER'S PHENOMENOLOGY AND THE SCIENCE OF MIND

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Charles Dale Hollingsworth
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Abstract

Phenomenology and cognitive science present two very different ways of looking at mental activity. Recently, however, there have been some attempts to incorporate phenomenological insights and methods into cognitive science, drawing especially on the works of Martin Heidegger. The purpose of this thesis is to determine if a useful combination of cognitive science with Heidegger's phenomenology is possible, and to determine the form such a combination might take.

This thesis begins with a brief overview of the field of cognitive science, and of some of the problems within the field that might benefit from a phenomenological analysis. It then reviews Winograd and Flores' attempt to rethink cognitive science in Heideggerean terms. Next, Heidegger's work is analyzed in order to see how scientific experimentation is viewed in his phenomenology. Finally, this thesis argues that any useful attempt at reconciling cognitive science and phenomenology must start from a phenomenological, rather than a scientific, standpoint.

Chapter 1

The Computational Model of Mind and its Critics

1.1 Introduction

Contemporary analytic philosophy of mind is closely linked to the discipline known as *cognitive science,* perhaps the most popular contemporary attempt at a scientific study of the mind. At the same time, most continental philosophy can trace its origins back to the phenomenological movement of the early twentieth century. Both cognitive science and phenomenology deal with questions of what it means to be human, and how we are able to interact with one another and with the world. Yet the two fields follow very different methodologies, and sometimes arrive at very different conclusions. Nevertheless, attempts have been made at reconciling the differences between the cognitive and phenomenological approaches, in the hopes of arriving at a more complete picture of human experience. This thesis will examine the views of the human mind offered by both cognitive science and phenomenology, paying special attention to the phenomenology of the early Heidegger, in order to see if there is anything to be gained by combining the two fields.

1.2 A brief history of cognitive science

The term "cognitive science" refers broadly to a movement within psychology and related fields over the last half-century which aims at a scientific understanding of mental activity. It is difficult to give a strict definition of the term, as its

usage varies greatly, and nearly any discipline or theory related to the scientific study of the mind has at some point been labeled "cognitive science." For the sake of simplicity and uniformity, I shall apply the term as it is used by Howard Gardner in *The Mind's New Science: A History of the Cognitive Revolution*. Gardner's book is widely recognized as a solid introduction to the field of cognitive science, and the following overview is largely derived from that work.

Cognitive science can be seen largely as a reaction to the failures of two previous attempts at explaining human thought: introspective psychology and behaviorism. Introspective psychology presupposes the ability of a subject to examine the contents of his or her own consciousness. One of the early proponents of this approach was Franz Brentano. Brentano saw the mind as an active agent, and the primary object of psychology as the intentional act, a mental act directed at some object. For Brentano, the mind was not something that could be observed from the outside in the manner of a scientific experiment. Instead, one must become aware of one's own phenomenal experience in the course of one's everyday life (Gardner 101-2). Brentano is probably best known today as one of the major influences on Edmund Husserl, and is generally considered the forerunner of the field of phenomenology. The emphasis on lived experience and a distrust of scientific "objectivity" have continued to be hallmarks of the phenomenological approach.

Another major figure in the history of introspective psychology is Wilhelm Wundt. Like Brentano, Wundt felt that psychology was properly concerned with conscious experience. Unlike Brentano, however, Wundt believed that some measure of

scientific objectivity was needed if psychology was to produce reliable results. Wundt championed the idea of psychology as an endeavor carried out by trained observers who have learned to chronicle their own inner experiences accurately and objectively. Philosophically, Wundt was an heir to the British empiricist tradition, preserving Hume's distinction between impressions and ideas; introspection's task was to analyze one's complex ideas and identify the impressions with which they were associated (Gardner 102-4). Wundt's program fell out of favor when psychologists began questioning the reliability of introspection, as well as the empiricist assumption that all ideas are the product of impressions, and therefore available to one's conscious introspection. A new breed of psychologists emerged who posited that a great deal of mental activity might be unconscious, and that psychology ought not confine itself to studies of mental imagery (106).

The pinnacle of the anti-introspective movement within psychology was *behaviorism,* perhaps best known for its "black box" approach to the psyche: no attempt is made to posit mental entities such as thoughts, ideas, and emotions, or to provide a physical basis for cognition through the study of neuroanatomy. Instead, cognition is analyzed purely in terms of *stimuli* and *responses*. Through a series of meticulously designed experiments, the behavioral psychologist attempts to determine the correspondence between the various stimuli (or sensations) experienced by an organism to that organism's responses (actions, behaviors). The organism (human or animal) is seen as being essentially passive: its range of behaviors consists entirely of reactions to changes in its environment.

Behaviorism was important because it represented a shift in the perception of psychology from *Geisteswissenschaft* to *Naturwissenschaft*. Behavioral psychology shared with the natural sciences the assumption that the objects of its study were governed by a set of rules, and that these rules could be discovered through the process of scientific experiment. It also resisted the tendency to draw a sharp line between animal and human behavior: humans were seen as following the same pattern of stimulus and response as any animal. Finally, behaviorism dismissed any talk of "free will" or subjective experience as unscientific, preferring to describe human and animal cognition from a detached, third-person perspective.

As important as behaviorism was, it ultimately failed to produce a completely convincing model of behavior, especially with respect to humans. Behavioral psychologists were at a loss to explain how a simple correspondence between stimuli and responses could account for a wide range of incredibly complex human behaviors. Critics such as Karl Lashley and Noam Chomsky demonstrated that certain phenomena, such as the acquisition and use of language, could not be accurately explained in behaviorist terms. Eventually it became clear that any truly scientific approach to explaining human cognition must eschew the "black box" approach in favor of a more complex model of the mind. The successor movement to behaviorism, which sought to provide such a model, became known as cognitive science.

Cognitive scientists strive for a "middle ground" of interpretation. Unlike eliminative materialists such as "neurophilosophers" Paul and Patricia Churchland, they do not attempt to explain human behavior purely in terms of neuroanatomy or brain

chemistry, a move which would effectively reduce psychology to biology, or even chemistry and physics. Yet unlike the behaviorists, cognitive scientists do not treat the mind as a "black box" to be analyzed purely in terms of inputs and outputs. One of the hallmarks of cognitive science is "the assumption that, for scientific purposes, human cognitive activity must be described in terms of symbols, schemas, images, ideas, and other forms of mental representation" (Gardner 39).

A second distinguishing feature of cognitive science is its close relationship to the field of computer science. Most cognitive scientists share the assumption that human and animal cognition are at least in some way analogous to the information processing and decision-making which takes place inside a digital computer. Of particular interest is the field of artificial intelligence, the attempt to simulate human cognition with computer software. Most artificial intelligence systems are designed to perform a certain task without concern for verisimilitude – for example, a computer vision system designed to scan airports for wanted fugitives might bear little or no resemblance to the human vision system. More important for cognitive science is the intersection between artificial intelligence and experimental psychology, in which computers are designed to mimic as closely as possible the actual mental processes of human beings. The importance of artificial intelligence to cognitive science, and the extent to which computers and human minds are similar, are points of contention among cognitive scientists.

Proponents of the *computational model of mind* are inclined to see the human brain and a digital computer as essentially similar in kind. Under this model,

human reasoning is procedural and rule-based, just like a computer program; the task of the cognitive scientist is to "reverse-engineer" the human mind, or to attempt to decipher the program which gives rise to human behavior. Crucial to the computational model of mind is the distinction between software – symbolic representations of information and an encoded set of rules for processing those symbols – and hardware, or the machinery on which the software is implemented. Under the computational model, the term "mind" is associated with software, the proper domain of the cognitive scientist, while "brain" refers to the hardware, the domain of neuroscience. In order to explain some mental activity under the computational model, it is sufficient to produce an algorithm, or software-level description; there is no need to describe cognition at the hardware level in terms of physical brain activity.

The computational model's distinction between software and hardware, or mind and brain, may seem reminiscent of the mind-body distinction drawn by Descartes. However, there are important differences between the substance dualism of Descartes and the mind-brain distinction as understood by cognitive science. Software and hardware, or mind and brain, represent different levels of abstraction, rather than distinct metaphysical entities. As an analogy, consider the disciplines of physics and chemistry: a given system can be described in chemical or in physical terms, yet both approaches describe the same system. Furthermore, any chemical description is, at least in theory, reducible to a physical description: a chemical reaction between, say, an acid and a base can also be described in terms of electron exchanges between ions or molecules. The fact that chemistry and physics represent separate, though related, disciplines means that one

might be able to arrive at a satisfactory *chemical* description of a reaction even before the underlying physics is understood. The science of chemistry was already quite advanced before the modern (physical) model of the atom was developed. Likewise, it is conceivable that a cognitive scientist can produce a satisfactory model of the mind even without fully understanding the underlying neuroscience.

There is an interesting and philosophically important consequence of the mind/brain distinction under the computational model. Computer programs generally have a degree of *platform independence* – the same program may be implemented on various different types of hardware. For example, a simple addition algorithm that produces the sum of two numbers might be implemented on a mechanical adding machine, a pocket calculator, a desktop computer, or even a human brain. The exact physical states of the hardware are irrelevant, as long as there is a direct causal correlation between the physical states of the hardware and the formal states of the computation.[1] Since, under the computational model of mind, the mind is only a specialized type of computation, this means that any properly configured system, whether natural or artificial, could be said to possess a mind simply by implementing the right computation.

One of the standard questions in analytic philosophy of mind is the "problem of other minds," the question of whether one can justifiably overcome solipsism and assert that there exist other beings capable of possessing thoughts or mental states. For the believer in the computational model of mind, this problem is fairly easily

1For a more detailed discussion of what is required for a physical system to implement a program, see David J. Chalmers' "On Implementing a Computation" from *Minds and Machines* (1994).

solved: to have a mind is to implement a computation which performs certain mental tasks. Any physical system which implements such a computation – i. e., which is functionally equivalent at the software level to the human brain – can be said to have a mind. This means not only that we can attribute mental states to other humans; it also implies that we could justifiably attribute mental states to a computer, provided it is running the right program. By accepting the computational model of mind, one is easily led to accept the strong interpretation of artificial intelligence: AI software is more than a simple simulation of thought – it *is* thought, and a sufficiently advanced AI might even be considered a person.

1.3 Critics of the computational model

Many philosophers have been reluctant to accept the implications of the computational model of mind; to them it seems that there is a fundamental difference between human thought and the rote rule-based behavior of digital computers. One of the most famous criticisms of the computational model of mind comes from John Searle. In "Minds, Brains, and Programs," Searle introduces his "Chinese Room" thought experiment to demonstrate the dissimilarity between computer information processing and human thought. He takes as his inspiration a computer program by Roger Schank, which is capable of reading English-language stories and producing correct answers to a limited range of questions about the stories. Some proponents of strong artificial intelligence might say that Schank's program actually understands English, at least to some degree, and that what occurs when the program answers questions about stories is

essentially the same as what occurs when a human answers the same questions (Searle 183-4). To show that the computer does not actually understand anything, Searle asks us to consider the following scenario: A human being with no knowledge of the Chinese language is placed in a room along with a stack of cards, on which are written various instructions. Through a slot in the door, someone outside the room passes a story written in Chinese, along with questions about the story, also in Chinese. By following the instructions written on the cards – instructions which involve nothing more than the manipulation of symbols – the person inside the room is able to write Chinese characters onto a piece of paper and pass it through the slot to the outside. To a native Chinese speaker outside the room, the symbols on the paper appear to be accurate and grammatically correct Chinese-language replies to the questions about the story. The Chinese speaker might be tempted to conclude that the person inside the room understands Chinese. Yet the inhabitant of the room does not; all he has been doing was manipulating symbols, with no knowledge of their meaning (184-6).

Searle's thought experiment appeals to our intuitions about the nature of cognition in order to convince us that computation is not the same thing as thinking. However, it is difficult to tell exactly *how* they differ in Searle's view. It is clear, for example, that Searle does not wish to return to Cartesian substance dualism by imagining a reified mental substance possessed by humans but not computers; in fact, he accuses the proponents of the computational model of advocating a form of dualism themselves (203). Nor does Searle simply presuppose that machines cannot think. On the contrary, he asserts "that *only* a machine could think, and indeed only very special kinds of

machines, namely brains and machines that had the *same causal powers* as brains" (203). Whatever makes thought possible for Searle must be compatible with a materialistic and mechanistic world-view.

Surprisingly, the "missing ingredient" of human thought is a concept more typically associated with phenomenology than cognitive science: *intentionality.* Searle argues against the mind-software/brain-hardware analogy by saying that "the same program could have all sorts of crazy realizations which have no form of intentionality." Any of a variety of mechanical systems could instantiate a program which responds to questions about Chinese stories, but non-biological machines "are the wrong kind of stuff to have intentionality in the first place (only something that has the same causal powers as brains can have intentionality)". Intentional states, says Searle, "are defined in term of their content, not their form" (200).

Searle's main concern seems to be that, in the case of computer information processing as well as the rule-following person in the Chinese room, symbols are being processed strictly as symbols, with no attention being paid to their meaning. His usage of the term "intentionality" implies more than simply being-directed-toward (for a computer can in a sense be said to be "directed toward" its data, just as a camera can be "directed toward" its subject), but a sort of concernful dealing. For one to understand information – as opposed to merely processing it – one must be engaged with it in more than a superficial manner; the information has to *mean something*. Searle's dissatisfactions with the computational theory of mind hint at a phenomenological understanding, yet Searle is firmly committed to a scientific world view. Intentionality for Searle must come from

the brain, not from a Cartesian ego or other such metaphysical entity. Thus he must rely on the nebulous concept of "causal powers" – something he never adequately defines – to explain how intentionality arises from the human brain. Whatever these causal powers are, Searle apparently believes it is up to biology to find them: "Whatever else intentionality is, it is a biological phenomenon, and it is as likely to be causally dependent on the specific biochemistry of its origins as are lactation, photosynthesis, or any other biological phenomena" (204). The notion that biology can account for phenomenology is an interesting one, and we shall later investigate it at length. Nevertheless, there is something ultimately unsatisfactory about Searle's critique. Like Brentano, and the phenomenologists after him, Searle sees intentionality as an integral feature of mental activity; however, his insistence on preserving the materialistic and mechanistic assumptions of cognitive science lead him to posit some vague "power" to explain intentionality.

Another critic of the standard view of cognitive science is Rodney Brooks. As a robotics researcher, Brooks does not share Searle's view that intelligence is a strictly biological phenomenon, or that intentionality is something of which machines are not capable. He does, however, question the emphasis within the field of artificial intelligence on knowledge representation. Traditional artificial intelligence (what John Haugeland refers to as "good old-fashioned AI" or "GOFAI") takes a fairly Humean view of cognition: sensory inputs (impressions) are converted to data (simple ideas) which might be processed at various levels of abstraction (complex ideas). A robot which was designed to find its way around a room, for example, might be equipped with

a vision system designed to take the raw input from a camera and search for specific objects with labels like “chair” and “door”. Its programming would contain instructions like “move around the chair and toward the door.” For Brooks, this representationalist approach is far removed from the way actual humans and animals interact with the world, and deals in needless abstractions.

Brooks contends that “reasoning,” the type of thought which deals mainly with abstractions and representations, is far from the most basic form of cognitive activity, and that much behavior can be explained in much simpler terms. He uses an example first proposed by Herbert Simon: an ant walking along a beach might appear to be following a very complex path, but the complexity is really only a reflection of the complexity of the ant’s environment (Brooks 418). The ant simply reacts to obstacles in its path by walking around them; this behavior is made to seem more complicated because of the great variety of the terrain. Brooks’ approach to explaining human and animal behavior is not to conceive of a central computational system which performs logical operations on mental representations, but rather to propose a number of simple systems working in parallel, which are concerned more with action than with information processing.

Unlike many artificial intelligence systems, Brooks’ robots (which he calls “Creatures,” referring to the fact that they are designed in imitation of simpler animals like insects and reptiles rather than humans) are not designed to operate in a special laboratory environment, but in the real world: “on power-up, they exist in the world and interact with it” (408). Traditional AI systems, for Brooks, “are not participating in a

world at all" (416) but rather deal exclusively with the "model world" which has been programmed into them in order to serve as a representation. The individual systems which make up a Creature are extremely simple: a Creature designed to move toward a light source might have a light-following system that simply turns the Creature toward the brightest light source, and an obstacle-avoiding system which can override the other system and turn the Creature away from objects in its path. None of the individual systems meets the traditional definition of "cognition," but, acting in concert, they manage to produce behavior which seems goal-oriented and intelligent.

Many features of Brooks' approach to cognitive science – the emphasis on embodiment, the notion that a Creature must have a "world," the rejection of mental representations – are reminiscent of the phenomenology of Martin Heidegger as described in his *Being and Time*. Brooks responds to this comparison by saying that he was not specifically inspired by Heidegger, but does not object to his work "being used in philosophical debate as an example on any side of any fence" (415). The fact that Brooks was *not* inspired by Heidegger – that he arrived, through engineering research, at many of the same conclusions Heidegger arrived at through phenomenological investigation, suggests that the possibility of cooperation between the fields of cognitive science and phenomenology might not be completely farfetched. If so, scientific experimentation might be able to provide insights to phenomenologists, and phenomenology might help inspire scientific research. In fact, some attempts have been made at combining cognitive science and phenomenology, and we will next take a detailed look at one such attempt in particular.

Chapter 2

One Attempt at a Heideggerean Approach to Cognitive Science

2.1 Introduction

Martin Heidegger's *Being and Time* presents a detailed phenomenological account of human existence, and challenges many assumptions about the nature of perception, knowledge, and activity. In recent years this work has gained attention from within fields such as cognitive science and analytic philosophy of mind, which have traditionally stressed a view of human existence which is thoroughly non-phenomenological. It is hoped by some within these traditions that Heidegger's analysis would be helpful in clearing up some of the perceived problems generated by computational or representational theories of cognition. Terry Winograd and Fernando Flores, in their book *Understanding Computers And Cognition,* attempt to replace the standard cognitive model with one inspired, in part, by Heidegger; however, the result is ultimately disappointing. By failing to appreciate Heidegger's attempt at an analysis which is both primordial and pre-theoretical, and instead treating his work as one theory of mind among several, Winograd and Flores overlook the most important and distinguishing features of Heidegger's philosopy. The result is an account which bears superficial similarities to Heidegger, but is still thoroughly grounded within the very tradition they seek to criticize.

2.2 Winograd and Flores' *Understanding Computers and Cognition*

Winograd and Flores use the term "rationalistic tradition" to denote the prevailing view which they claim has produced the assumptions behind current theories of cognition. This is not to be confused with the "rationalism" of Descartes or Leibniz, though those thinkers can be placed within that tradition; rather, the "rationalistic tradition" refers to the methodological assumptions which are to some degree shared by Western thought as a whole. They identify three steps in this methodology: a characterization "in terms of identifiable objects with well-defined properties," the search for "general rules that apply to situations in terms of those objects and properties," and the attempt to "Apply the rules logically to the situation of concern, drawing conclusions about what should be done" (Winograd 15). They will then "attempt to show the non-obviousness of the rationalistic orientation and [. . .] reveal the blindness that it generates" (17).

In the field of cognitive science, the rationalistic tradition takes the form of the computational model of mind. This model stems from the assumption that cognition is a special case of symbol manipulation, such as takes place within digital computers. A cognitive system (such as a human being) gathers information about the world which is stored in the mind in the form of symbolic representations. These representations are then manipulated according to an internal set of rules, of which the individual himself may not be consciously aware. The end result of this symbol manipulation is an action on the part of the cognitive system. Cognitive science thus becomes a matter of "reverse engineering," or attempting to discover the mental program which converts perceptions to

actions: "A theory of cognition can be couched as a program in an appropriate symbolic formalism such that the program when run in the appropriate environment will produce the observed behavior" (25).

As its name implies, cognitive science takes cognition to be the fundamental mode of human involvement with the world. Even in our everyday practical activities we are assumed to be performing some form of cognition. If a cognitive scientist wishes, for example, to explain how I am able to perform a simple task like opening a door, he would do so in computational and representational terms. The task would be broken down into broad subtasks like perception and action. Perception might involve some form of pattern recognition in which I compare the raw data of my vision to a mental representation of a door, in order to identify the object before me as a door and locate its knob. Action would take the form of an algorithm which calculates the precise way in which I need to move my arm in order to make contact with the doorknob, turn it, and push the door open. I am of course not consciously performing these calculations. They are assumed to take place in some form in my brain, and it is the task of cognitive science to uncover them.

It is not hard to see that this view of the primacy of cognition runs counter to Heidegger's philosophy. He describes cognition "as a *founded* mode of Being-in-the world" (*BT* 101). In other words, however important it might be, cognition is not the primordial mode in which we are engaged with the world. Cognition treats objects as present-at-hand, as mere things. In treating this mode of being as primordial, traditional cognitive science assumes that there must be some way to explain everyday activities in

terms of dealings with mere things. The door is first a meaningless collection of sense data before I see it as a door, and there must first be a series of kinematic calculations before I can move my arm to open it. But for Heidegger, instrumentality is more primordial than cognition: "The kind of dealing which is closest to us is as we have shown, not a bare perceptual cognition, but rather that kind of concern which manipulates things and puts them to use; and this has its own kind of 'knowledge'" (*BT* 95).

Winograd and Flores agree that the computational, representationalist model does not give an accurate account of human cognition. They turn instead to Heidegger because of his view "that cognition is not based on the systematic manipulation of representations." However, they are careful to distinguish their own work from that of other followers of Heidegger, such as Dreyfus and Haugeland, which "seem at first sight to deny the physical basis of human action." The link by which they seek to connect the Heideggerian non-representational stance with a physical model of cognition lies in the works of neurobiologist Humberto Maturana, who "sets out a conceptual framework in which phenomena of interpretation arise as a necessary consequence of the structure of biological beings" (Winograd 10).

In one passage, for example, Winograd and Flores criticize the representationalist stance by making use of Heidegger's distinction between instrumentality and objectivity:

> The common sense of our tradition is that in order to perceive and relate to things, we must have some content in our minds that corresponds to our knowledge of them. If we focus on concernful activity instead of on detached contemplation, the status of this representation is called into question. In driving a nail with a hammer (as opposed to thinking about a hammer), I need not make use of any explicit representation of the hammer.

> My ability to act comes from my familiarity with *hammering*, not my knowledge of a *hammer* (Winograd 33).

However, Winograd and Flores do not stop with Heidegger. Working as they are from within the scientific tradition, they feel the need to bolster this interpretation with biological evidence. Such evidence is provided by Maturana, who, in studying the vision system of the frog, found that it did not simply transmit raw images to the brain, but rather performed certain functions previously thought to be the domain of cognition. For example, a particular type of optic nerve fiber "responded best to a small dark spot surrounded by light," such as a fly would appear (Winograd 41). This indicated that the frog's fly-catching activities did not necessarily depend on a mental concept or representation of "fly," but were instead at least partly the result of non-cognitive activity in the vision system itself.

Another of Maturana's experiments involves a setup wherein a stick is illuminated on one side by a white light, and on another by a red light. One of the shadows cast by the stick appears green to a human observer, despite the fact that no light of the green wavelength can be detected. This led him to postulate "that the patterns of neural activity produced are the same as those produced by light of a single wavelength normally called green" (Winograd 41). From these and other examples, Winograd and Flores conclude that the nervous system is "a generator of phenomena, rather than [. . .] a filter on the mapping of reality" (42).

Are these neurological accounts true to the spirit of Heidegger's analysis of Dasein? Has Maturana provided experimental verification of Heidegger's anti-representationalist stance? If we begin from a truly Heideggerian standpoint, the answer

to the first question must be negative, and the second question should not even have been asked. Unlike Heidegger, Winograd and Flores are not practicing phenomenology, but instead attempting to borrow phenomenological concepts for use in an enterprise which is still fundamentally scientific. Their failure lies in not realizing that scientific activity is itself a particular mode of engagement. Scientific evidence cannot be used to bolster phenomenological claims, for it is the phenomena themselves to which science must remain truthful.

Modern science, to Heidegger, is a founded mode, a particular type of investigation which is non-primordial. The transition from ancient to modern science was a metaphysical shift characterized by a change in the types of entities with which science was concerned. Whereas in its ordinary everydayness Dasein is concerned with tools and items of equipment, which are associated with a range of activities, occupy a space determined by those activities, and each have their proper place within that space, science deals only with objects occupying a uniform, Cartesian space-time. "The theoretical attitude," writes Trish Glazebrook, "homogenizes not just space and time but also the bodies that are the objects of physics. It homogenizes the objects of physics by projecting their thinghood alike. For it is the thinghood of things that is understood beforehand in the theoretical attitude" (55). Winograd and Flores may want to escape this theoretical attitude and return to ordinary everydayness; however, in their desire to find a "physical basis" for human action, they reveal that they have not truly arrived at a primordial understanding. The hammer which I use to mend my roof is no less physical than the nerve fiber under a microscope; it is simply revealed in a pre-scientific manner.

Nevertheless, Winograd and Flores look to neurological evidence to explain instrumentality. They are attempting to ground Being-in-the-world in a scientific understanding, even as that very scientific understanding is itself founded on Being-in-the-world!

2.3 Science versus Phenomenology

Science, as a general rule, begins with the obvious, and then seeks to dig beneath superficial appearances in order to find a deeper explanation. Thus chemistry proceeds from observations of quantities of chemicals to theories about interactions between molecules, and physiology moves from the observation of an animal's appearance and behavior to theories about blood vessels and muscle fibers. So it is with cognitive science: the ordinary activities of human beings are only the surface, and the task of the scientist is to uncover the mental rules or programs which produce this activity. The cognitive scientist will often find that the easiest task, such as opening a door or identifying the face of a friend, is the most difficult to specify in computational terms.

Phenomenology, on the other hand, has as its foundation that which is the most obvious: the phenomena of experience themselves. It reacts against the tendency of Descartes or Kant to posit some thing "behind" the perception, or to identify the genesis of phenomena in categories within the mind. Instead of formulating a theory that best explains the observations, the phenomenologist strives to make sure that his

observations lay bare the phenomena without being covered over by theory. It seems difficult to imagine an approach more different from scientific investigation.

Does this mean that cognitive science and phenomenology represent two distinct and fundamentally irreconcilable approaches? Not necessarily. But it does mean that we need to clarify the goals of each form of investigation, and identify the types of entities with which they will be concerned. If we assume that both Heidegger's analysis of Dasein and the neuroscientist's study of the brain and nervous system are attempts to understand the workings of the mind, and that both have the mind or consciousness as their object of study, we will have little if any success trying to reconcile the two. But Heidegger is not attempting a study of mind, and his analysis is not something superficial which needs to be supported by further scientific evidence. His subject, Dasein, is more fundamental than either mind or consciousness.

Heidegger wastes no time outlining the scope of his investigation. He begins Division I of *Being and Time* with these words: "We are ourselves the entities to be analysed" (*BT* 67). What follows is to be an account of who we are, not within the confines of a theory of mind, but in all our modes of being. Heidegger takes care to distinguish this "we" from the objects of science: "Sciences are ways of Being in which Dasein comports itself towards entities which it need not be itself" (*BT* 33). By this he does not mean the obvious fact that science can study beings which differ ontically from us, such as planets or microbes; the important distinction is ontological. The objects of science appear in a different way than Dasein itself, even if we are studying the human brain. Science objectifies; it studies entities as separate things in their own right. "But to

Dasein," says Heidegger, "Being in a world is something that belongs essentially" (*BT* 33). Winograd and Flores are rightly suspicious of a theory of mind which treats the isolated human subject as a separate object which must relate to the world through representations. But the scientific study of nerve fibers is just as objective, and just as distant from a true study of Dasein.

2.4 Meaning versus Explanation

As we have seen, cognitive science is primarily concerned with the explanation of human behavior. A model of cognition succeeds if it can account for a set of actions given a particular set of stimuli. The fact that the mental representations and algorithms of theories of cognition have no obvious correlates within conscious experience is untroubling to most cognitive scientists. Theirs is a world of objects; human beings are just the particular objects within that world which they choose to study.

In contrast, Heidegger is concerned from the start with meaning. It is "*the question of the meaning* [Sinn] *of Being"* (*BT* 19) which guides his entire project in *Being and Time*. No theoretical explanation of behavior, no matter how detailed, ever constitutes "meaning" for Heidegger. "Meaning is that wherein the intelligibility of something maintains itself [. . .] The *concept of meaning* embraces the formal existential framework of what necessarily belongs to that which an understanding interpretation Articulates" (193). He goes on to explain that meaning is not a property of entities, but belongs essentially to Dasein. Hence any investigation which does not begin with Dasein, which concerns itself only with the scientific study of entities – whether

traditional cognitive science or the neurophysiology of Maturana – can never truly arrive at meaning.

Magda King's commentary on *Being and Time* offers a straightforward example of the process of finding meaning. If we are told that an unfamiliar building is a "theater," that explanation has meaning to us only insofar as we understand "that it is a building for the production of plays". This in turn only has meaning in terms of our understanding of the range of human activities involved in the production of plays. Ultimately, it is the "world of human existence" which gives meaning to the theater (King 6).

King goes on to explain meaning in terms of the horizon: "The world of our own existence is the horizon in which our everyday understanding moves" (6). Once we become engaged in, say, the pursuit of theoretical physics, our horizon shifts: "The horizon from which things are now understood is the substantiality of matter" (6). Thus, *insofar as he is practicing science,* the scientist finds meaning only within this particular domain. Ordinary everydayness is not "meaningful" to him for this task. Yet even experimental data are meaningful only by virtue of the fact that they belong to Dasein.

Cognitive science would then seem to have a unique problem. It seeks to explain the entire range of human behavior. This includes the activities of ordinary everydayness. So, in a sense, these things are meaningful to the cognitive scientist in a way that they would not be to the theoretical physicist. This does not change the fact that he operates within a particular horizon which includes only objective entities, and within which he himself as Dasein does not appear. Instrumentality, care, all the things which

are most important to Heidegger's analysis, are not to be found in the scientific mode of investigation. They are, however, in a sense present *as absent*. When we "bracket off" our everyday concerns, they do not disappear. They continue to come into play even as we turn our attention towards the objects of science.

If any attempt to combine the insights of Heidegger's phenomenology with the discoveries of science is to be truly successful, it cannot proceed by attempting to explain Dasein in scientific terms. Phenomenological investigation must come first, and it must serve to illuminate our scientific investigations in the light of the existential analytic of Dasein. With their attention to hermeneutics and their critique of the "rationalistic" assumptions of cognitive science, Winograd and Flores believe they have done just that. However, any progress they might have made is destroyed when they turn to the neurological studies of Maturana in an attempt to provide a physical basis for the mind. They have replaced a model which concerns itself with mental representations with one concerned with nerve cells, and have taken what rightfully belongs to Dasein and placed it within a biological substratum. They rightly question the assumptions which led to the unsatisfactory picture of human existence painted by traditional cognitive science, but would do well to question their own assumptions. The analysis presented by Winograd and Flores can help us make some progress in reconciling the phenomenological account of human existence with the psychological, but in order to be truly successful, we must incorporate phenomenology on a much more fundamental level.

Chapter 3

Heidegger on Scientific Experiments

3.1 Introduction

If phenomenology is to be reconciled with the scientific study of the mind in a way that does justice to phenomenology, we must not begin from within the scientific world-view. Instead, we must from the start be true to the aims and goals of phenomenology, and strive to find a way to view scientific data phenomenologically. Fortunately for us, Heidegger did not avoid discussing scientific experiments. Part Two of his *Fundamental Concepts of Metaphysics* deals with the question of whether animals are "world-poor," and in the process of investigating this question Heidegger draws heavily on biological experiments. Before we look at Heidegger's take on the natural sciences, we must examine the concepts and questions that led him to make use of scientific data.

3.2 The relationship between philosophy and zoology

Heidegger does not begin his investigations from a starting point which assumes the existence of material entities as investigated by the sciences -- a perspective which makes it difficult to account for subjective experience. Nor does he begin from a Cartesian ego that must prove the existence of the outside world. In *Being and Time* he writes, "The 'scandal of philosophy' is not that this proof [of the existence of the external world] has yet to be given, but that *such proofs are expected and attempted again and*

again" (*BT* 249, emphasis original). Even if we attempt to sidestep the problem of the external world by claiming that the existence of the subject presupposes a world outside itself, we "would still be starting with the construct of an isolated subject." Heidegger dismisses both the realism and idealism of modern philosophy in favor of Dasein's Being-in-the-world, where Dasein is not to be thought of as a entity within a larger set of entities which make up the "world." Rather, Dasein is identified with *care,* and the world with the scope of Dasein's concern.

Since "world" occupies such a place of prominence in Heidegger's phenomenology, it is vital that we elucidate just what is meant by the term. In *Being and Time,* Heidegger states that he does not use the term in the usual sense, to mean "the totality of those entities which can be present-at-hand within the world." Instead, he takes "world" to mean "that '*wherein'* a factical Dasein as such can be said to 'live'" (*BT* 93). In other words, Heidegger gives the term "world" a phenomenological significance, and does not mean it to denote a collection of objects.

The task of elucidating the meaning of "world" is Heidegger's project in Part Two of *The Fundamental Concepts of Metaphysics*. He proceeds by a comparative examination of three theses: "the stone is worldless, the animal is poor in world, man is world-forming" (185). Heidegger begins "in the middle," taking the thesis that the animal is poor in world as his starting point. He considers whether this thesis should be considered a proposition of zoology, but rejects this categorization: the statement that the animal is world-poor is a *statement of essence,* which does not simply apply to all

animals, but defines what an animal is.[1] Thus "precisely because zoology deals with animals this proposition cannot be a result of zoological investigation; rather it must be its *presupposition*. For this presupposition ultimately involves [. . .] a delimitation of the field within which any positive investigation of animals must move" (*FCM* 186). If the fact that the animal is world-poor were a presupposition of zoology, it would imply that we could not make use of any information garnered from that field in the elucidation of the premise. Must we ignore zoology entirely, and does this make the thesis an arbitrary one?

Heidegger replies in the negative: "The proposition does not derive from zoology, but it cannot be elucidated independently of zoology either. It requires a specific orientation toward zoology and biology in general, and yet it is not through them that its truth is to be determined" (*FCM 187).* To our ordinary understanding, the attempt to establish the relationship between zoology and metaphysics is a circular movement: zoology provides us with the thesis that animals are world-poor, and this thesis is used as a foundation for zoology. In arriving back at the starting point of our investigation, we have moved around the circumference of a circle. Heidegger suggests that we might focus our attention on the center of this circle, rather than attempt to escape the circle entirely through the use of dialectic (187). The relation between metaphysics and science is ambiguous, but this ambiguity is something we must be prepared to accept.

Heidegger claims that biology is in the position of having to defend its own existence, to prevent itself from being subsumed into physics or chemistry. To do so,

[1] The definition of the animal as "world-poor" takes precedence over our everyday usage of the term "animal." Should the great apes, for example, turn out not to be poor in world, they would no longer rate the description "animal."

biology must arrive at a conception "of the fundamental character of living beings themselves as something that cannot be explained or grasped at all in physico-chemical terms" (188). Yet Heidegger is dismissive of anti-mechanistic movements, such as vitalism, which attempt to preserve the distinctive character of biology, yet labor under "misunderstandings as great as those that beset the mechanistic conception of life" (189).

Heidegger asks us to "bear in mind that all the disciplines that deal with life are caught up today in a remarkable transformation, the basic tendency of which is directed to restoring an autonomous status to life" (191). Historically, people have tended to explain life "from the perspective of man," or else "by means of laws adopted from the realm of material nature" (192). Both attempts fail to secure "*the essential nature of life in and of itself*" (192, emphasis original).

3.3 Animals as poor in world

After considering the question of the proper relationship between philosophy and zoology, Heidegger returns to the thesis that animals are poor in world. He admits that this thesis is counterintuitive in light of the work of J. von Uexküll, who speaks frequently of the animal's "environmental world" (192). Nevertheless, Heidegger maintains that the sphere of things to which an animal can relate as a living being is much smaller than that of a human: "The bee, for example, has its hive, its cells, the blossoms it seeks out, and the other bees of the swarm. The bee's world is limited to a specific domain and is strictly circumscribed" (193). The bee's world is limited in penetrability as well as range: a worker bee can know the stamens of blossoms, "but it does not know

the stamens of these blossoms *as* stamens, it knows nothing about the roots of the plant and it cannot know anything about the number of stamens or leaves, for example" (193). The lack of such knowledge is not due to mere ignorance on the part of the bee, something that could be corrected by the bee's coming into contact with the proper phenomena. Rather, the bee is "world-poor" compared to man because it does not even have the possibility of knowing these phenomena.

Heidegger next compares the world-poverty of the animal to the world-absence of the stone: "Neither the stone nor the animal has world. But this not-having of world is not to be understood in the same sense in each case" (196). Whereas animals are deprived of world, stones are incapable even of being deprived of world. To clarify this point, Heidegger accepts a provisional definition of world as "those beings which are in each case accessible and may be dealt with, accessible in such a way that dealing with such beings is possible or necessary for the kind of being pertaining to a particular being" (196). A stone that is touching the earth does not bear a relationship to the earth which is in any way similar to that of the lizard who basks on a warm stone. A stone is something that simply "turns up," but has no access to any other beings. In contrast, the lizard basking on the stone "has sought out this stone and is accustomed to doing so. If we now remove the lizard from its stone, it does not simply lie where we have put it but starts looking for its stone again" (197). The lizard is not one being, present at hand, among others; it has its own relation to the rock, which the rock can never have to another being.

3.4 The bee experiments

Heidegger delves into the question of exactly what constitutes the animal's world in much greater detail with the example of the bee, and this example gives us perhaps the best picture of the relationship between Heidegger's phenomenology and scientific experiment. Heidegger considers the behavior of the bee as it goes in search of pollen. An individual bee will become fixated on a particular type of flower, visiting only flowers of that type and ignoring all others, for weeks at a time. Its search for food "is no mere flying about but is a flying directed toward one particular scent." Once the bee finds a drop of honey[2] in a flower, it "sucks it up, stops sucking, and flies away again." Heidegger questions the reason for the bee's behavior: "But does the bee recognize the fact that the honey is no longer present? Does it fly away because it has recognized this fact?" Heidegger does not think that we should hasten to say that the bee has recognized the honey as present, "especially if we can and indeed must interpret the bee's activity as a driven performing and as drivenness, as behaviour – as behaviour rather than comportment on the part of the bee toward the honey which is present or no longer present" (FCM 241).

In order to answer the question of whether the bee's actions should be considered as behavior or comportment, Heidegger looks to a particular experiment: "A bee was placed before a little bowl filled with so much honey that the bee was unable to suck up the honey all at once. It begins to suck and then after a while breaks off this driven activity of sucking and flies off, leaving the rest of the honey still present in the

2 Heidegger is probably referring to the *nectar* in the flower, rather than to *honey,* the product of the bees' labor.

bowl." We are tempted to say that the bee has recognized the fact that there is more honey present than it can consume. However, the experimenter then cuts away part of the bee's abdomen, so that the honey, as it is consumed, runs out the back of the bee. Now the bee keeps consuming honey until there is no more. The bee "recognizes neither [the presence of too much honey] nor even – though this would be expected to touch it more closely – the absence of its abdomen. There is no question of it recognizing any of this, it continues with its driven activity regardless precisely because it does not recognize that plenty of honey is still present. Rather, the bee is simply taken by its food" (242).

When the bee's abdomen is intact, the bee quits consuming honey because it has become satisfied. The bee's "sense of satisfaction is registered as long as [. . .] the animal remains organically intact" and "cannot be registered in the bee if the abdomen is missing." Satiation "inhibits the bee's driven activity," and "is never a recognition of the presence of nourishment or of the amount of nourishment available" (242). The bee's feeding is an instinctual activity, and "Instinctual activity is not a recognitive self-directing toward objectively present things, but a *behaving"* (243).

Heidegger next considers the question of how a bee finds its way back to the hive. At issue is whether the bee has a "space" in the phenomenological sense. He tells us that "there is orientation only where space is disclosed as such, and thus where the possibility of distinguishing different regions and identifiable locations within these regions is also given." Heidegger questions whether the bee "opens up a space *as* space and flies through it *as* its *spatial flight-path"* (243).

Heidegger considers various factors that might allow bees to find their way

back to the hive. Color would seem to be a factor, since beekeepers will paint hives different colors so that bees do not return to the wrong hive. Additionally, bees can "direct themselves according to the scent which they themselves emit" (244), allowing an individual bee to find the particular swarm to which it belongs. While both color and scent play important rules, they are useful only over short distances, and cannot explain how bees are able to find their way back over a distance of several kilometers. To answer this question, Heidegger again consults experimental evidence.

In the experiment, the beehive is moved a few meters after the bees have been released. When they are ready to return home, the bees make their way to the empty spot where the hive had once stood. They "now become suspicious at the empty spot and eventually find their hive after some searching about" (244). The fact that the bees make their way first to the spot where the hive had been, but no longer was, suggests that some feature of the environment, rather than the color or scent of the hive itself guides them. The use of trees or other objects as landmarks is ruled out, as the bees can successfully navigate even in barren landscapes. One final hypothesis is proposed: the bees navigate by the sun, using the angle between themselves and the sun to provide a sense of direction.

Is the sun hypothesis "simply a last bold attempt to solve the problem because we cannot explain the homeward flight of the bee in any other way"? In order to find out, we must perform another experiment. In this experiment, when a bee has arrived at its feeding place it is imprisoned in a dark box for several hours. When it is finally released, the position of the sun has changed dramatically. Now "the newly freed

bee will seek its hive in the wrong direction," a direction determined by the angle between the bee and the sun. Once it has traveled a distance equal to that between the hive and the feeding place, "the bee stops its linear flight altogether. It then buzzes around looking for its hive which it will eventually find as long as the distance between the hive and its present position has not become too great" (245). Having summarized the facts of the experiment, Heidegger turns to a philosophical evaluation.

3.5 Driven behavior and the disinhibiting ring

Heidegger asks what is going on when the bee sets out to find the hive. He resists the temptation to say that the bee "notices" the sun's angle and the distance traveled, because noticing "always involves noticing something with regard to some end, with intent to something." The bee, however, "is absorbed by a direction, is driven to produce this direction out of itself – without regard to the destination. The bee does not at all comport itself toward particular things, like the hive, the feeding place and so on" (246). Heidegger views the bee's behavior as essentially *driven*. The bee has a drive to strike out in a particular direction determined by the sun's angle; this drive can be overridden by the drive to return home once the bee is within the familiar environment of the hive. All of the bee's behavior can be described in terms of various drives which can exert inhibitory effects on each other: "There is no apprehending, but only a *behaving* here, a driven activity which we must grasp in this way because the possibility of apprehending something as something is *withheld* from the animal" (247). The animal is world-poor because it is captivated by various things – the sun, the scent of flowers, and

so on – but never experiences beings as beings. The animal "does not possess the possibility of attending either to the being that it itself is or to beings other than itself" (248).

Instead of attending to the present-at-hand, "the animal surrounds itself with a *disinhibiting ring* which prescribes what can affect or occasion its behaviour" (255, emphasis original). The animal's various instinctive drives are disinhibited, or made active, whenever that animal comes into contact with certain features of its enviroment (the disinhibiting ring). Heidegger recognizes the similarity of his interpretation to the physiological concept of stimulus and response, but feels that the physiological interpretation "is all too clearly oriented around a comparison with mechanical relations." One must not lose sight of the fact that whatever can be stimulated is "already related and indeed must be related to that which is supposed to be able to stimulate it" (256). Such prior relationship explains why a particular animal might be completely unresponsive to certain stimuli: the animal "does not have any intrinsic drives that are oriented in this direction. It is not instinctually open for this particular possibility of disinhibition" (257).

Heidegger credits von Uexküll with the investigations which revealed the extent to which the organism is bound to its environment. Previous investigations "were based upon the fundamentally misconceived idea that the animal is present at hand, and then subsequently adapts itself to a world that is present at hand" (263). Von Uexküll sought instead "to acquire insight into the *relational structure between the animal and its environment,*" where Heidegger identifies "environment" with his own "disinhibiting ring" (263, emphasis original). Heidegger does not agree entirely with von Uexküll, in

particular on the latter's interpretation of the concept of organism. Heidegger thinks von Uexküll's investigations could lead to "a more radical interpretation of the organism" in which "the totality of the organism would not merely consist in the corporeal totality of the animal," but in the "original totality which is circumscribed by what we called the *disinhibiting ring."* Despite his philosophical disagreements with von Uexküll, Heidegger urges us to recognize "that the engagement with concrete investigations like [von Uexküll's] is one of the most fruitful things that philosophy can learn from contemporary biology" (263).

3.6 A proper approach to science

Heidegger devoted a substantial portion of his *Fundamental Concepts of Metaphysics* to the philosophical interpretation of scientific experiments. It is clear that we cannot therefore take Heidegger to be in any sense anti-scientific, or averse to the possibility of informing phenomenological investigations with scientific data. Perhaps the project of merging phenomenology and cognitive science is not lost. Yet we must be careful to approach science in the proper manner. We cannot interpret an animal's behavior in terms of an already existing conception of the organism, whether physico-chemical, vitalistic, or otherwise. Rather, we must remain open to the possibility of reinterpreting our concept of the organism based on our observations. Our task is to gain insight into an organism's world, and from there to seek the essence of the organism itself.

Chapter 4

Phenomenology and Cognitive Science: Toward a Reconciliation

4.1 Introduction

Chapter One of this thesis introduced some of the main tenets of cognitive science, particularly the computational model of mind, and briefly outlined some criticisms of these tenets. At that time it was tentatively suggested that a phenomenological approach might be useful in overcoming the difficulties identified by the critics. Chapter Two took a detailed look at one particular attempt at combining phenomenology and cognitive science, and pointed out some of the faults of this approach. Having outlined some of Martin Heidegger's own thoughts about scientific experiment in Chapter Three, we must now revisit the topics introduced in the earlier chapters, in order to see if we are any closer to a truly phenomenological understanding of cognitive science.

4.2 Brooks revisited

One of the critics of the computational model of mind introduced in Chapter One was Rodney Brooks, and it was noted that his approach to cognitive science had some similarities to Heidegger's thought, despite the fact that Brooks claims not to have been influenced by Heidegger. These similarities are now even more striking in light of Heidegger's explanation of the behavior of bees. Recall that the bees' behavior was described as purely "driven," the result of a number of simple drives that normally keep

each other in check. The bees' environment played the role of a "disinhibiting ring," containing a number of stimuli which could cause the bees' various drives to become manifested as behaviors such as flying in a straight line or sucking honey. As it turns out, Heidegger's analysis of the bees' behavior could also describe the functioning of Brooks' robotic Creatures.

Brooks describes in detail the design of one of his Creatures named Allen. Allen is composed of three layers of controlling circuits that operate largely independently of each other. One layer is able to "communicate" with another only by suppressing or inhibiting its control signals. For example, one layer has a *wander* function, which selects a random heading and tells the robot to go in that direction. This function can be inhibited by the collision-detecting functions of another layer, which are activated whenever the robot's sonar detects an object in its path (Brooks 408-11). Just as bees will strike out in a particular direction, only to stop when a certain distance has been traveled and begin searching for the hive, so will Allen move in one direction until an object is detected, then stop and look for an unobstructed path.

Heidegger's description of the bees' driven behavior was intended in part to illustrate the fact that the bees are world-poor: beings such as the sun and the hive are accessible to the bees, but they can never be apprehended *as* sun or *as* beehive. Only world-forming beings such as humans can truly comport themselves to other beings. Likewise, Brooks intends his Creatures to serve as models for animal, rather than human, behavior. Brooks contends that animal intelligence is far older, on an evolutionary scale, than human intelligence, and questions the wisdom of AI researchers' attempts to replicate human behavior without first understanding more basic systems (Brooks 396-7).

One of Brooks' chief complaints about standard AI research is its use of abstraction. He notes that most AI programs deal not with real-world data, but with "a restricted set of simple assertions deduced from the real data by humans" (399). Brooks cites von Uexküll's concept of the "perceptual world" or *Merkwelt,* and speculates that the point of abstraction is to ensure "that the program experiences the same 'perceptual world' [. . .] as humans" (400). However, Brooks objects to the use of abstraction, on the grounds that "each animal species, and clearly each robot species with its own distinctly nonhuman sensor suites, will have its own different *Merkwelt"* (400). Recall that Heidegger identified *Merkwelt* with the "disinhibiting ring," and claimed that "individual animals and species of animal are restricted to a quite specific manifold of possible stimuli" (*FCM* 257).

Brooks is correct that abstract thinking is not the most primordial form of human involvement with the world, and it is likely that the type of complex behavior usually associated with human intelligence would not be possible without an underlying substrate of simple driven systems such as Brooks designs for his Creatures. Recall Heidegger's distinction in *Being and Time* between the present-at-hand (the mode of appearing of the hammer considered as an object) and the more primordial ready-to-hand (the mode of appearing of the hammer while it is in use). Even when we are involved in abstract thinking, we may still exhibit the driven behavior of animals. But while it may be foolish to begin an analysis of human behavior with abstract thinking, neither must we leave abstraction entirely out of the picture. For what Brooks refers to as "abstraction" bears some resemblance to the "world-forming" activity of human beings.

Consider what it means to say that the bee has its own particular *Merkwelt.* The bee is able to attend to a certain very specific set of beings, and then only in particular prescribed ways. The bee cannot function outside of its preferred environment. When the bee is kept in a dark enclosure until the sun has changed position, its navigational drive becomes useless and the bee flies off in the wrong direction. And while the bee could be said to "use" the sun to navigate, the bee could never use the sun to tell time. Man is world-forming precisely because he is not bound by a particular *Merkwelt.* Only humans (or other world-forming beings) can produce new beings, not in the ontic sense (as with tool-making), but in the ontological sense. Only world-forming beings can cause the sun to appear in new ways, as a time-keeping tool, or a gaseous celestial body. It is man's world-forming ability which allows him to adapt to new environments, with new ways of seeing and thinking.

4.3 Searle revisited

The phenomenological distinction between world-poor and world-forming beings also helps us sort through some of the muddled thinking of John Searle regarding intentionality and meaning. Recall that in his Chinese Room thought experiment, Searle claimed that a person who used only a set of formal rules to generate correct answers to written Chinese questions could not truly be said to "understand" Chinese. Likewise, Searle contended that a computer program, which does nothing more than manipulate symbols, could never be said to think or understand. While Searle's claims might seem intuitive, he is at a loss to explain exactly *why* the machine does not understand. He claims that "symbol manipulations by themselves don't have any intentionality" (Searle

199), and that only something with "the *same causal powers* as brains" (203) is capable of thought. His final conclusion is that intentionality "is a biological phenomenon" resulting from the particular biochemistry of human beings (204).

If we adopt Heidegger's view, we can avoid the ambiguity of the term "intentionality", as well as the surprising conclusion that thought must be rooted in biochemistry. Where Searle uses the term "intentionality," or directedness, Heidegger would identify at least two ways in which a being can be directed toward another: *captivation* (as the bee is captivated by the sun), and *comportment* (as a human being comports himself towards the sun). Comportment is possible only for world-forming beings, while the world-poor are capable only of captivation.

It should be clear that Roger Schank's programs, which inspired Searle's Chinese Room scenario, are at best world-poor. Schank's programs are designed to take as their input stories about a particular topic (specifically, restaurants) as well as a certain prescribed set of questions about that topic. Just as the bee is restricted to its own bee-world, able to function only in a specific environment, so are Schank's machines limited to their own world. They are captivated by certain symbols, but can never comport themselves to those symbols, or to the things those symbols represent. When removed from their prescribed domain, Schank's machines are as unable to function properly as are the bees when the sun is hidden. The machines' incapability to understand is not due to the fact that they lack "intentionality," but that they are poor in world.

4.4 World formation, organs, and physiology

What, then, is needed for a being to be world-forming? Is biology a factor? Both Searle on one hand, and Winograd and Flores on the other, seem to think that human thought or cognition is somehow dependent on human physiology or biochemistry. The question of whether a claim like "Man is world-forming" could depend on biological claims calls to mind the circular movement discussed in *Fundamental Concepts of Metaphysics.* For if we say that a human being's world, or his capacity for world-formation, is due to his having certain types of neurons, on what do we base this assertion? Aren't neurons themselves phenomena, and isn't the science which discovers them the result of man's world-forming essence?

The question of the role of physiology essentially asks whether our mental capacities are dependent on our organs, and whether the functioning of our organs can be reduced to physics or chemistry. To answer it, we must return to *Fundamental Concepts of Metaphysics,* where Heidegger asks this very question. In considering the question of the proper delimiting of the field of zoology, Heidegger comes across the traditional distinction between the "organic" and the "inorganic." This raises the question: What is organic? What is an organism? Heidegger replies, "An organism is something which possesses organs. The word 'organ' derives from the Greek οργανον or 'instrument'" (*FCM* 213).

It is important at this point to recall the important role that instrumentality plays in Heidegger's phenomenology. An "instrument" for Heidegger is not an object that stands over and against the user. An instrument, when in use, is absorbed in the activity, and is only noticed as an object when it fails to perform its function. Equipment, instruments,

and machines "are neither simply worldless, like the stone, nor are they ever poor in world [. . . They] are worldless, yet as worldless *belong to world*" (213). Instruments are a product of human activity, and are thus dependent on man's capacity for world-formation. This dependence is ontical, not ontological: we do not mean that instruments must be a product of human activity in the sense that they must be manufactured. A rock that is picked up and used as a hammer is an instrument, even though it was not fashioned by man. However, it exists *as* an instrument, *as* a hammer, by virtue of the human activity of hammering.

The activity always precedes the instrument. A hammer exists for hammering; thus the "for-hammering" is a necessary condition of the hammer. "All equipment is what it is and the way it is only within a particular context. This context is determined by a totality of involvements [*Bewandtnisganzheit*] in each case" (215).

Heidegger next considers the question of whether an organ is an instrument. Were this the case, we would have to conclude, perhaps contrary to intuition, that even biological organs are dependent upon the activity for which they are used. More precisely, Heidegger asks, "*Can the animal see because it has eyes, or does it have eyes because it can see?"* He concludes that "It is the *potentiality for seeing* which first makes the possession of eyes possible". This raises a more fundamental question: "*How* must a being *be* in the first place, such that this *possibility of the potentiality for seeing* can belong to its *specific manner of being?"* (218)

Whatever makes seeing possible must not rest on mere physiology. Animal seeing and human seeing are not the same thing, despite the fact that "human beings and animals both possess eyes and even the anatomical structure of the eye is alike in both

cases." Furthermore, even if we consider only animal seeing, there is an important distinction between the eye as an animal's organ of sight and the pen as an instrument of writing, a distinction which goes beyond the simple fact that the two are intended for different sorts of activity: "The pen is an *independent* being, something that is to hand for use by *various different* human beings. The eye, on the contrary, as an organ is *never* present at hand in *this* way for those beings that need and use it." Heidegger is now able to define *organ* provisionally as "an instrument which is incorporated into the user" (219).

Already we can see a potential problem for the reductionist who wishes to ground human mental activity in neurophysiology. When a scientist examines brain cells or nerve tissue in an attempt to discover what makes thought possible, the cells and tissue under investigation are not the same as the cells and tissue being used to ponder the problem. This is true not just in the trivial sense that a doctor cannot examine his own brain while he is using it. Rather, the objects of study are a fundamentally different *kind* of being from the brain and nerves in use, as organs or instruments. They appear in different ways, just as the hammer in use appears as an item of gear rather than as a distinct object. Brain cells and nerve tissue only appear to the neuroscientist as objects because he is involved in the kind of activity that makes them appear as such. The radical move of phenomenology was to start not with a theoretical understanding, in which the world is understood as a collection of physical objects into which the person must somehow be made to fit, but with experience itself. Any attempt to explain phenomenological experience in terms of present-at-hand objects neglects the very purpose of phenomenology.

Nevertheless, scientific investigation may still serve a purpose, and Heidegger draws an example from biology to illustrate his point about the priority of activity over organs. He considers the case of one-celled creatures, amoebae and infusoria. In these creatures there are few, if any, permanent organs, only pseudopods: "They have to form their necessary organs individually in each case, only to destroy them again in turn." Quoting von Uexküll, Heidegger explains that these creatures feed by forming, around the food, "an aperture which first becomes a mouth, then a stomach, then an intestine and finally an anal tract." Heidegger then concludes "that the *capacities* for feeding and for digesting are *prior to the organs in each case*" (224).

Despite the similarities between organs and instruments, Heidegger is not quite ready to view organs as simply a special case of instruments – as instruments that happen to be attached to their user, for example. In considering organs to be instruments, one "fails to consider the organ in terms of the organism." When the organism is considered in the proper fashion, "the specific manner of being proper to living beings does announce itself" (225).

The organ does not relate to its activity in quite the same way as does equipment. "The eye is not serviceable for seeing in the way in which the pen is serviceable for writing. Rather the organ stands in service of the capacity that develops it" (226). A completed piece of equipment is *serviceable for* something, but the organ is *subservient* to its capacity. Heidegger goes on to distinguish between "*readiness for something* and *capacity for something.* A piece of equipment like a pen, for example, is ready for writing but it is not capable of writing" (227). Neither is an eye capable of seeing, except

as it is considered as part of the organism to which it belongs. Capacity belongs to organism, and organs belong to capacity.

4.5 Conclusion

What can Heidegger's investigation of the nature of organs and organisms tell us about the proper relationship between phenomenology and cognitive science? How is the scientific study of mind to proceed if it is to be valuable from a phenomenological standpoint? For one thing, we must not attempt to understand the mind by breaking it down into parts. An organism is more than just a collection of organs, and the organs cannot be understood except in terms of the organism. Just as the Victorian phrenologists had an improper conception of the brain, which posited the existence of a number of discrete cerebral organs corresponding to each human faculty or virtue, so, too, do cognitive scientists misunderstand the mind when they try too hard to break its functioning down into discrete subsystems. The failure of the traditional approach to artificial intelligence, with its high level of abstraction, was to treat the mind as a sort of central processing device which could be hooked up to a number of natural or artificial sense organs.

We also must not proceed as if the mind were nothing more than a level of explanation above the physical. It is wrong to think that we have not "really" explained some mental faculty until we have accounted for it in physiological terms. The mind (in the sense of one's mental faculties) and the brain (in the sense of physiology) are ontologically distinct. When the phenomenologist asks, "How is it that this being has some particular capacity?" he is dealing with a different set of beings entirely than the

scientist who asks, "What physical system could produce this sort of behavior?" If a scientific study of the mind is to be grounded in a phenomenological understanding, it must ask a different sort of questions than the reductionist or the behaviorist. The study of the behavior of humans or animals must seek to answer the question, "What sort of being is capable of this behavior?" Likewise, the neurophysiologist, in studying some part of the brain or nervous system, must ask, "What capacity makes such an organ possible?" In short, the physical must be explained in terms of the phenomenological, rather than the other way around.

There is still a long way to go before there can be any serious cooperation between phenomenology and cognitive science. The two fields have as their objects very different sorts of beings. Yet hopefully we have seen that the notion of using science to inform phenomenology is not a misguided one. As long as phenomenological investigation and scientific experimentation are kept in their proper relationship to one another, the two can be used together as powerful tools for understanding ourselves and our faculties.

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Vita

Charles Hollingsworth was born in Deland, Florida on March 24, 1976, and grew up in Gulfport, Mississippi. He received his Bachelor of Arts in Philosophy from Mississippi State University in 2003, and went on to pursue a Master of Arts in Philosophy at Louisiana State University. He has wide-ranging philosophical interests spanning both the analytic and continental traditions, including the philosophy of mind, philosophy of language, and phenomenology.