———. 1979. *The Ecological Approach to Visual Perception.* Boston: Houghton Mifflin.

Gibson, J. J., G. A. Kaplan, H. N. Reynolds, and K. Wheeler. 1969. "The Change from Visible to Invisible: A Study of Optical Transitions." *Perception and Psychophysics* 5:113–16.

Johnson, M. 1987. *The Body in the Mind.* Chicago: University of Chicago Press.

Kellman, P. J. 1984. "Perception of Three-Dimensional Form by Human Infants." *Perception and Psychophysics* 36:353–58.

Lakoff, G., and M. Johnson. 1980. *Metaphors We Live By.* Chicago: University of Chicago Press.

Lee, D. N. 1980. "The Optic Flow Field: The Foundation of Vision." *Philosophical Transactions of the Royal Society of London* B290:169–79.

Marr, D. 1982. *Vision.* New York: W. H. Freeman.

Neisser, U. 1989. "Direct Perception and Recognition as Distinct Perceptual Systems." Paper presented to the Cognitive Science Society, Ann Arbor, Mich.

Rumelhart, D. E., and J. L. McClelland. 1986. *Parallel Distributed Processing,* vol. 1. Cambridge: MIT Press.

Searle, J. R. 1980. "Minds, Brains, and Programs." *Behavioral and Brain Sciences* 3:417–57.

Spelke, E. 1976. "Infants' Intermodal Perception of Events." *Cognitive Psychology* 8:553–60.

Turing, A. M. 1950. "Computing Machinery and Intelligence." *Mind* 59:433–60.

Ullmann, S. 1979. "The Interpretation of Structure from Motion." *Proceedings of the Royal Society of London* B203:405–26.

Ungergleider, L. G., and M. Mishkin. 1982. "Two Cortical Visual Systems." In *Analysis of Visual Behavior,* edited by D. J. Ingle, M. A. Goodale, and R. J. W. Mansfield. Cambridge: MIT Press.

Wallach, H., and D. N. O'Connell. 1953. "The Kinetic Depth Effect." *Journal of Experimental Psychology* 45:205–17.

Warren, W. H., and D. Hannon. 1988. "Direction of Self-Motion is Perceived from Optical Flow." *Nature* 336:162–63.

Weizenbaum, J. 1976. *Computer Power and Human Reason.* New York: W. H. Freeman.

Yonas, A., ed. 1988. *Perceptual Development in Infancy.* Hillsdale, N.J.: Lawrence Erlbaum Associates.

— CHAPTER 7 —

On the Phenomenology of Remembering: The Neglected Case of Place Memory

Edward S. Casey

The world cannot be decomposed into independent fragments.
—John Haugeland, *Artificial Intelligence*

I

Ulric Neisser wrote in 1976 that "we have almost no systematic knowledge about memory as it occurs in the course of everyday life." This statement appears in Neisser's *Cognition and Reality,* a remarkable book that reoriented my thinking—and that of many others—as to the character and direction of cognitive psychology, a field that Neisser himself had helped to found officially only a decade earlier. In particular, I took the sentence I have just cited as a clarion call for my own work as a phenomenologist who is very much concerned with human experience "in the course of everyday life" or, in phenomenological lingo, the everyday "life-world," first named and explored by Edmund Husserl in the 1920s and 1930s and aided and supplemented by the work of Martin Heidegger and Maurice Merleau-Ponty.

None of these three phenomenological pioneers, however, had provided anything like "systematic knowledge about memory" as it operates in the life-world of human subjects. Inspired by Neisser's call to order and troubled by the dearth of phenomenological descriptions of memory, I set out in 1977 to rectify the situation. For the last decade I have been investigating human memory in what Neisser now names *natural contexts.* In his 1982 book *Memory Observed* he calls for a return to "the low road . . . of memory in ordinary human experience" (p. xi) in contrast with the much-trodden high road of "well-controlled experiments" (p. xi) in which psychologists of memory have invested so much of their time and effort since Ebbinghaus's elegant experiments with nonsense syllables in the 1880s.

It turns out that the low road of memory in natural contexts is by no

means a deprived path but a richly adorned spectacle once we take the time to attend to it. In *Memory Observed* we are treated to a life-giving diet of neglected figures and texts from Freud and Schachtel to Bateson and Luria. The results are as invigorating as they are disturbing: invigorating because of the extraordinary new vistas opened up (or rather, *re*opened after their closure in experimental contexts), disturbing because of a lack of overall shape or system. We learn much about memory "as it occurs in the course of everyday life," while realizing at the same time how little "systematic knowledge about memory" we possess after all.

My own work in the past ten years has been aimed at gaining such systematic knowledge about memory in natural contexts. I say "aimed at," for I cannot claim to have taken more than a few steps toward this goal. These steps along the low road of "memory in ordinary human experience" were published in a book entitled *Remembering: A Phenomenological Study,* itself a sequel to an earlier study of imagining first published in 1976. In the new work, I explore, descriptively and minutely, various modes of representational and nonrepresentational memory. I am especially exercised about the latter because it is my view that representational forms of remembering have received the lion's share of attention from philosophers and psychologists alike in the last century—indeed, since representational models of mind were first proposed in the seventeenth century by Descartes, Locke, and others. The hegemony of these models is such that one form of memory—namely, recollective or "secondary" memory—has been given a privileged place in thinking about memory *überhaupt.* Because this kind of memory is typically conceived as "reproductive" in a sense that implies the quasi-pictorial replication of past experience, we witness a working presumption that all significant human remembering—"memory *par excellence"* in Bergson's revealing phrase from *Matter and Memory* (1896)—is at once representational and founded on isomorphic relations between the representing content of what we remember and the represented thing or event we are recalling.

This is hardly the moment to call such a view of memory into question, and in any case the essential spadework of a devastating critique of representationalism has been undertaken by Richard Rorty in his deconstructive treatise, *Philosophy and the Mirror of Nature.* Let me say only that my own effort has been to concentrate on the leading forms of nonrepresentational remembering in order to discern their main descriptive lineaments, their basic structures. By *nonrepresentational remembering* I mean minimally those forms of memory that (1) do not require the mediation of representations ("ideas," signs, *Vorstellungen*) for their enactment; (2) do not call for simulacra of various sorts, "icons" in whatever sense; and (3) do not demand the reproduction of point-by-point

detail in what is remembered in order to count as a valid or even veridical case of remembering. Granting that some kinds of memory do legitimately invoke one or more of these three criteria—for example, "eidetic" memory and much recollection of an exclusively visual sort—I have focussed instead on types of *non*representational remembering, first identifying and then fleshing out an adequate description of these types. The task has proved arduous but rewarding; and it raises questions that are directly pertinent to the subject matter of this book.

II

In pursuing this study of nonrepresentational remembering, I have been in effect attempting to answer Ulric Neisser's pressing two-part question posed in *Memory Observed:* "Are there functionally different types of memory in everyday life? If so, what are they?" (p. 13). What they are—the types I have considered, at least—are six in number: reminding, reminiscing, recognizing, body memory, place memory, and commemoration. These all exhibit what I like to call a *thick autonomy* of operation—in contrast with the *thin autonomy* of imagination—but beyond this they have little in common. And this very lack of commonality—of what earlier phenomenologists themselves would have called an *eidos* or essence shared by all—is part of the point. In Neisser's blunt but apposite formulation: "'Memory' does not exist" (1982, 12), any more than learning in general exists. What exists is a proliferation of kinds of remembering, above all in its nonrepresentational reaches. Therefore I would not want to say that the six types I have singled out are exhaustive of these reaches—or even that they are strictly exemplary or representative either. But they *are* interesting and important ways in which we remember in the ongoing life-world of our experience, and merit our attention as such. (Neisser invokes the criterion of importance when he states that "if X is an interesting or socially significant aspect of memory, then psychologists have hardly ever studied X" [p. 4]!)

Thus, for example, *reminding* arises constantly in the daily concourse. Not only do we devise reminders (which need not, though they may, resemble their remindands), but we are continually confronted with reminders not of our making: "Now that you've said *that,* it reminds me of what I was going to say to you." Here the "that" need not be *like* in any discernible, representable way what I am reminded of. Instead, it conveys my mind to the remindand by a movement that I call *adumbration* and that cannot be reduced to either indicative or iconic connection. Similarly, when I *recognize* a person—say, Bob Burton, whom I have not seen in twenty

years since we were graduate students together in Chicago—I do not check out an inner image, or other representation, of my friend: his face and body give themselves out as already (and instantly) recognizable to me, as featuring familiarity on their very sleeve, as it were. Here what is remembered, far from being contained in intrapsychic space, suffuses what I perceive as I perceive Burton; and in this natural context Bergson is right to say that "perception is full of memories." So too in *reminiscing* my remembering takes place indispensably in an overt and social space, a space co-constituted by natural language and human companionship in which remembering arises (as Merleau-Ponty put it in another context) "at the edges of signs."

If reminding, recognizing, and reminiscing are forms of memory that begin to take us beyond mind conceived as a set of privately possessed representations—to put us resolutely in the public sphere of memoranda in the office and casual talk on the porch, everywhere dependent on acts of perceptual recognition—the other three types of nonrepresentational remembering pull us still further out of the mind trap of mediating ideas and images. Now we are ineluctably in *medias res,* in the middle of things that are themselves situated in natural contexts. Consider only that in the case of *body memories* we are in the full and massive tilt of human being-in-the-world (in Heidegger's phrase), a "being" and a "world" that exceed any set of determinate representations. Habitual body memories in particular—for example, the enacted remembering of skills now sedimented into our daily routines—illustrate the fully immersed character of remembering by (and in) the lived body, that is to say, remembering in its way and on its terms and not in terms of ideational contents brought back to mind. When I remember how to perform the breast stroke, I need not recall the particular episodes in which I first picked up this skill; I need only go through the requisite body movements and then I *am* remembering in the appropriate manner.

To continue this brief *Überblick* of memory in its nonrepresentational avatars, when we *commemorate* something we are enacting the past once more, but this time in the shape of a ritual (itself often mediated by a text) that pays homage to the event commemorated by the mere fact that I (typically in the company of others) undertake certain actions at the present moment of commemoration. Even if I entertain absolutely no pious thoughts about the *commemorandum,* much less envisage the latter in exact *eidola,* I am still commemorating. At the most, we can be said to remember *through* various *commemorabilia* such as mute monuments or eloquent speeches; but these commemorative vehicles are concrete and public in status and in no way a matter of mental representations that we

might summon up on the occasion. And, as in the instance of reminiscing, the natural context for commemorating is social in format; hence the *com-* of the word *commemoration* itself. We here enter the difficult but fascinating realm of "collective memory," as Maurice Halbwachs (a disciple of Bergson) has termed it. In this realm we are far indeed from the privatism of mind as the putative seat of memory. We are adrift in an indelibly interpersonal world of remembering-with-others and not by ourselves alone.

III

So far so good—or rather, ho hum! you might well be saying to yourself. Casey is simply telling us what we already know and is therefore subject to Neisser's charge that experimental psychologists often come up with "results" already known to ten-year-olds (cf. Neisser 1982, 6). I would even accept this charge, since I consider it no disgrace to remind people of what they know—and may well have known better at age ten than at age fifty—yet have come to forget by oversophistication of philosophy or psychology or adult life itself. Austin and Wittgenstein would agree with Heidegger's apothegm that the proper task of philosophy is to redirect our attention to the ordinary—so that it can be seen as extraordinary in its very ordinariness. The same point applies to the final form of remembering in natural contexts to which I want to turn our attention, *place memory.* Yet this particular form of ordinary remembering has been far more conspicuously neglected by memory theorists than any of the five preceding forms. If traces of these five are touched on by the more generous memorists such as James and Bartlett and Freud, no trace of place memory seems to have been permitted to survive in the writings of leading researchers into memory in the last two centuries. And yet in my considered view place memory is integral to most, if not all, human remembering. What is going on here? We seem to have a situation in which the extraordinary is now located in the very neglect of the ordinary itself.

The reasons for the (still continuing) neglect of place memory are legion. They relate to a privileging of time over space in the wake of the Cartesian subjectification of all modes of representation, including memory. If time alone is the "inner sense" in Kant's term, then it is the appropriate medium for the representation of any human experiences, among which past experiences will figure prominently. One crucial effect of this close tie between time and subjective representation is that space becomes, by default, merely "external" in Kant's word. It becomes what I prefer to call

a "site" rather than being accorded the full complexity of place. (Part of the complexity is precisely the fact that place is inseparably linked to the human subject and is in the end not external to this subject at all, as we can see most perspicuously in the case of inhabited places or "dwellings.") Now, a site is a leveled-down place; in it, space is conceived as strictly homogeneous in constitution and isotropic in directionality; and the difference between positions in a site (and there are only determinate positions therein) is determined exclusively as "distance," that is, as a metric matter. The result of the shrinkage of place into site is, of course, an augmentation of instrumental value, because sites are more easily manipulated and measured (and their contents replaced) than ordinary perceived places, which are comparatively recalcitrant to such maneuvers. Indeed, it is just this recalcitrance that makes places so apt to be powerful purveyors of memories, to be that sector of the life-world best suited for the holding and keeping of a past that would otherwise be obliterated or at least obscured by the passage of time within the remembering subject.

As I see it, we witness here a primary paradox of memory theory in philosophy and psychology alike. The historical fact is that place has been thrust aside as an important factor in remembering. It has been assumed that the experience of places *per se* has no intrinsic value for memory—or, at best, that place is part of the "background" of remembering. This last move is predictable insofar as the ambiguity of place itself, its indeterminacy of extent and shape, offends the analytical or formal intellect, which attempts to 'marginalize' that which resists exact specification. Yet the ambiguity of place—its unusual combination of properties such as the enclosing and the encompassing, the impersonal and the expressive—is just what renders it most suitable to support and convey many memories arising from natural human contexts that are themselves inherently ambiguous. But we need not rely on place's ambiguity to discern its importance for remembering. For it is another historical fact that in the pre-Cartesian world place and memory were deeply allied—most strikingly in the ancient "art of memory" that originated in Greece and spread westward to the rest of Europe and eastward to China. In the *ars memorativa,* a grid of places such as the rooms in a house or houses along a street was memorized in advance. Onto each of these prememorized places was deposited an image of the item to be remembered; in Cicero's words, "Persons desiring to train the faculty of memory must select places and form images of the things they wish to remember and store these images in the places, so that the order of the places will preserve the order of the things" (*De oratore,* bk. 2, 86). If the order of places can preserve the order of things remembered, then the memorial significance of place for memory must be considerable.

I would argue that this significance is by no means confined to the

role of place in the mnemotechnique of ordered *loci.* Not only in this technique—whose utility remains at our disposal even today—does place become part of the very foreground of remembering; but in many acts of remembrance having nothing to do with memorizing lists of items place also figures prominently. The reason for this is straightforward, even if it has been systematically overlooked: Place possesses a uniquely situating capacity, bestowing on memories a "local habitation" if not a precise "name." This situating capacity of place is singled out by T. S. Eliot in "Burnt Norton" (stanza 2):

> I can only say, *there* we have been: but I cannot say where.
> And I cannot say, how long, for that is to place it in time.

The "there" points to place in all its situational power—in contrast with the precise "where" that would be its site specification (for example, on a map) and in contrast as well with the "how long" that would reduce the event remembered to its exact duration or date. Yet we need no poet to tell us of place's central role in remembering. Only recall any childhood memory, or indeed almost any recent memory, and notice how crucially place specific and place supportive it is. When I remember visiting my grandparents in Abilene, Kansas, for example, I recall myself as fully ensconced in their house on Vine Street. This house is more than a mere "setting," a sheer backdrop or site, for what I remember is the form of particular actions undertaken there. The house is itself an integral part of what I remember, giving shape and consistency to the episodes focussed on in secondary memory, sustaining these episodes and often forming part of their very content. If something like this is true of many of our memories, it is all the more amazing that place has not been given its due in philosophical and psychological theories of human memory.

In my view the following factors are critical to the operation of place in much ordinary remembering:

- *Containment.* In *Physics,* Aristotle defines place *(topos)* as "the innermost motionless boundary of what contains" (212a, 20–21), a statement that I would pair with a claim of Gaston Bachelard's in *The Poetics of Space:* "Memories are motionless, and the more securely they are fixed in space, the sounder they are" (1964, 9). Places stabilize the content of memories by containing them, fixing them as it were—*fixing them in a place,* which acts as a locatory matrix for these contents, closing them in from without.
- *Boundary.* By speaking of place as a matter of "boundary" *(peras)* Aristotle suggests a second trait of the placement of memories. In contrast

with a strict "limit," which is the metrically determinable perimeter of a site, a boundary encloses while at the same time opening up; it is expansive as well as delimiting. As Heidegger has put it, "A boundary is not that at which something stops but, as the Greeks recognized, that from which something *begins its presencing*" (Heidegger 1971, 154). An aspect, therefore, of what Aristotle calls place's *distinct potency* is its ability to contain by the kind of boundary that preserves its content while remaining porous—as is the case with so many of our ordinary memories that refuse to be confined to their own inner limits but link up with other memories by ties that were called *associationist* in the eighteenth and nineteenth centuries.

• *Horizon.* This is perhaps the leading instance of a place boundary. (On this link see Heidegger 1971, 154.) As we shall return to the notion of horizon in a moment, suffice it to say for now that the horizon is the area of a place where its explicit visibility recedes into nonvisibility (where "visibility" could be replaced by "audibility," "tactility," etc.).

• *Protuberances.* This awkward term designates the variegated features of a (remembered) place that serve as points of attachment for specific memorial content; "things to hang our memories on," as we might say. Such protuberances could be inanimate objects, people, events *qua* discrete episodes, and so forth. In certain respects they are comparable to the classical Gestalt idea of "figures"; in other respects, they are more like J. J. Gibson's notion of perceptual "gradients." In any case, they are adhesive hooks for the particularities of what we remember.

• *Depth.* There is no place without a significant component of recession in depth, its "third dimension." Gibsonian gradients obtain not only in perception but in memory of place as well. In fact, a depthless place ceases to be a "place" in the sense I have been discussing; it becomes a "site," which possesses distance but not depth. Unlike the sheer spatiality of distance, depth is spatiotemporal and as such gives to places that peculiar density that makes them such suitable vehicles of memories, because it allows for the close packing of content within one and the same spatial spread.

• *World.* This is all that place makes available to us, whether in perception or in memory; it is the unity of all that is placed in perceiving or in remembering. As such, it includes all five of the preceding factors in one encompassing whole. Far from this being merely a summative matter, the world of a given place exceeds that place in the way that, say, the earth exceeds the particular regions of which it is composed. Or to put it the other way around, *place localizes world,* affording it anchorage and boundary. As such, it is a crucial component of what we remember—as we realize when we speak spontaneously of "the world of our childhood

memories," including the more specific world of a given group of such memories (e.g., those once again of my experiences in my grandparents' home in Abilene). Despite its abstract appearance, 'world' is a quite concrete constituent of our remembering.

IV

Let us now change scene for a while. We have been speaking about various forms of nonrepresentational memory and in particular of place memory. But a question of quite pressing contemporary significance poses itself soon after any such review of recent research, whether it be pursued phenomenologically in natural contexts or experimentally in laboratories. This is the question of *computer simulation,* which is equivalent to the question of artificial intelligence. (On this equivalence, see Boden 1977, 5). How much of human memory can be successfully simulated on computers—where *simulated* has the broad scope of "functional simulation" as discussed so lucidly in Paul Churchland's book *Matter and Consciousness* (1984, 92ff.). For it is not a matter of strict structural isomorphism between the design of the computer and the gestalt of what we remember, much less of a one-to-one correspondence between hardware and wetware. It *is* a matter of meaningful—which is to say, convincing and coherent—simulation by a universal Turing machine of the process of human remembering, including the peculiarities of the content of memories. Some significant equivalent, if not an icon, of these peculiarities must be forthcoming for the claim of computer simulation to be borne out in a given instance.

Lest you anticipate massive Pyrrhonian skepticism from me, let me concede immediately that I believe there is a very high probability of cogent machine simulation in the first three cases of nonrepresentational memory which I cited earlier. I do not see why a computer could not construct artificial contexts of reminding that are meaningfully equivalent to reminding in the central sense of one item adumbrating another item as to-be-done (i.e., the remindand); in fact, this happens all the time in the ordinary operation of any computer, and all that we would have to do is to expand the range of reminders and remindands to approximate to unprogrammed circumstances of being reminded of something. The case of recognizing is also easy to grant; computers are already programmed for recognizing all kinds of things, and there is no reason in principle why they could not come to recognize the subtle features of, say, recognizing a certain emotional state as it is evinced on a human face. Even reminiscing is far from anything we would want to exclude from the precincts of

adequate simulation, because we can certainly carry on conversations with computers that would bear on a commonly shared past, such as the past of its own program modifications as effected by ourselves. (Whether we could reminisce *nostalgically* together is far from clear, however.)

Moreover, let us grant that the case of simulating body memories is at least moot—as moot as Dennett has found the simulation of pain to be in "Why You Can't Make a Computer That Feels Pain" (1981, 190–229). Dennett's skepticism is based, however, on an apparently "irredeemable incoherence in our ordinary concept of pain" (p. 228), *not* on an in-principle unsimulatability of pain in a robot. The case must remain moot until at least the moment when a "good physiological subpersonal theory" of body memory as of pain will be discovered (p. 228). Here, however, we would have to ask if body memories are strictly construable as "subpersonal." Merleau-Ponty proposes the more helpful term *pre-personal.* And we can let the case of commemoration go for now as something just too complex to try out as the subject of simulation, even in a thought experiment. Commemoration possesses too many variables—or more exactly, variables of too great an order of complexity (e.g., that of 'ritual')—for it to form a fair test case of computer simulation at this time. Let us say that the matter is undecided, although not necessarily undecidable.

Place memory, however, is apt for consideration at this point. It is not too complex to speculate about in terms of simulation. In fact, we have located only six basic variables, none of which is as complex as the historicity or sociality that is endemic to commemoration. Further, one of these variables, depth, has already achieved the beginnings of plausible simulation in the work of David Marr and his associates. What, then, about the other variables? Here I would like to restrict consideration to just two of these, namely "horizon" and "world." As for the remaining factors, boundary is the genus of which horizon is a (twofold) species; that is, there are boundaries, such as those between contiguous objects, that are not horizonal in character, so that much (but not necessarily all) that holds of horizon will also hold of boundary as regards difficulty of simulation. Containment, in contrast, admits of a comparatively unproblematic simulability, as in the case of depth. Let us take another look at each.

Horizon

I have said that "horizon" connotes the region where the visible trails off into the nonvisible. This is true both of what Husserl calls the *inner horizon* and the *outer horizon.* The inner horizon of something is constituted by the unseen sides or surfaces of a particular object. The outer horizon is formed when this object, often in connection with other objects,

is experienced as set within a scene that itself vanishes into the unseen—as in the usual sense of "horizon" as the area where earth meets sky. (On the double horizon of the life-world, see Husserl 1936, 162.) Both senses of horizon share a basic feature, the actively implied or "co-intended" status of the nongiven parts or sides. These latter form a "coherent systematic group" that is in "accord and harmony" with the actually given parts or sides (Gurwitsch 1964, 211 and 209); each part or side is thus "a phase within a process" (p. 207). Far from being a merely contingent feature of the circumstance, this double horizonality of any place (whether perceived or remembered) helps to knit the place together as *one* continuous place, a place that extends beyond its actually presented edges and surfaces. If it did not so extend (and if it were not known precisely as so extending), not only would the place lack depth, but it would fall apart into a discontinuous series of appearances. The inner and outer horizons of a place provide the invisible inseams of that place—and, by further extension, of any concatenated series of places such as we encounter in moving through a landscape. (Cf. E. Straus on this last point: We go from place to place within a landscape thanks to the horizon [Straus 1963, 318ff].)

World

Indeed, at the limit, a plenum of places constitutes a world; and if horizons are essential to places, they must be constitutive of entire worlds as well. Therefore Husserl speaks explicitly of the "world-horizon" in one compound term (Husserl 1936, 143, as well as Gurwitsch 1964, 369, where *world* is linked explicitly with the *external* horizon: "With the experience of pointing references to the outer horizon, we are at the phenomenological root and origin of the awareness we have of the world") But the world, unlike a horizon, has a distinctive format that can only be called a *style* and in particular an *invariant general style* (Husserl 1936, 31). Although individual horizons are not distinctive as such, worlds are distinctive as bearing a characteristic style: therefore we speak of "the world of Oxford philosophy" as well as of "the world of Combray" (the latter being explicitly a matter of place memory). Moreover, a world presents itself to us as a special kind of whole: not just as a totality of objects and horizons but as an "all-encompassing unity" (*Alleinheit* is Husserl's revealing word, [Husserl 1936, 31]). For our purposes, the crucial aspect of world is that on both grounds—as a matter of general style and as an all-encompassing unity—it does not have the status of an object. Objects constitute it, fill it up, but it is not itself an object. As Husserl says, a world "does not exist as *an* entity, as an object" (p. 143; Husserl's italics). Neither does the horizon, inner or outer. This, too, is nonentitative in standing, not because

it is a function of style or of being a particular kind of whole, but because it is an indeterminate region of an object or a scene by its very nature. Horizon, like world, is preobjective. Both contain and encompass objects (and events) but neither is discrete enough to be conceived adequately or accurately as an object (or event).

V

So we can begin to grasp the dimension of the problem, that is, where the challenge lies. As preobjective in status, horizon and world, as two of the primary parameters of place memory, are not nothing—they are powerful presences in such memory as they are in perception—but they are not mere 'things' either. They are a rather peculiar kind of 'something'—a something that resists reduction to the categories of determinate object- or eventhood. If this is the case, how are they to be represented in a computer simulation? How can anything so radically indeterminate as horizon and world come to be meaningfully simulated? Doesn't simulation require some minimum of determinateness, some at least provisional entitative standing such as that possessed by an edge or a shape? Isn't this so even on the functionalist paradigm, if functions are to be functions of something determinate or determinable? But horizon and world are neither determinate nor determinable; at least they are not so in the kind of terms that correspond strictly to the units of a given computer program, units that themselves require a determinacy with which the "fringiness" of horizons and worlds seems strictly incompatible.

Or we can put the challenge in another way. It has been said that "the horizon adds nothing to the world" (Peursen 1978, 184). This is so even though "in adding nothing to the world [the horizon] is all the more indispensable" (p. 184). Now, if the horizon adds *nothing* to the world, by which we are to understand *nothing objectively determinate,* and if the world itself is the sort of all-encompassing whole that is itself objectively indeterminate, then how can either horizon or world be computer simulated? Are we not at an impasse here, an aporia of a most revealing kind? Does not place memory (or do not at least two very basic aspects of place memory, without which it could not exist) point therefore to certain inherent limits of artificial intelligence? If so, we would have on our hands the extraordinary situation of a neglected and seemingly marginal phenomenon issuing an important caveat to the theoretical optimism, the high hopes, of contemporary computerphiles. It would also be a striking instance of the "low road" of description of memory in natural contexts

calling into question certain of the more ambitious assumptions of the high road of theory out of touch with such contexts, especially the potent context that places provide for human memory.

Thus far my argument is an argument from what we could call the *indefeasible indeterminacy* of horizon and world as primary parameters of place memory. As such, it is analogous to the way in which William James and Husserl (much influenced by James on this point) adduced the phenomenon of "primary memory" as an argument against a strictly associationist model of mind. The indeterminate fringes of such memory—their nuanced *Absinken,* to use Husserl's expressive term—defy reduction to the exact specifications of clock time and above all to the two axes of such time: namely, sheer simultaneity and sheer succession. Primary memory had also been a neglected phenomenon before James singled it out for discussion in *The Principles of Psychology* in 1890.[1] But the import of the phenomenon is vast—much vaster than one would expect when attending to its evanescent trajectory. A comparable importance may lie concealed in the discovery of "iconic" and "echoic" memory in vision and speech, respectively. (In the same scathing critique of experimental psychology, Neisser cites such modes of memory—though wondering if they can still be called *memory* in any usual sense—as matters of genuine importance and of which a ten-year-old does *not* have knowledge; see Neisser 1982, 7.) Here, then, I am inviting you to ponder the possibility that there is yet another basic form of remembering besides primary and echoic memory—one that, like them, has been overlooked continually in previous research and that, also like them, is of crucial significance not in spite of but *because of* its very indeterminacy. And I am taking the further (and admittedly audacious) step of suggesting that just as James and Husserl found in primary memory a phenomenon that failed to fit existing paradigms of the mind's operation (and thus challenged these very paradigms),[2] so perhaps place memory may come to be a thorn in the flesh of certain contemporary paradigms of the mind's functioning and in particular those paradigms inherent in computer simulation of human experience.

Well, this is really to throw down the gauntlet! It is a tall order, and I am not the one to fill the order in detail, because my knowledge of the field of artificial intelligence is at best patchy and provisional. But I want to set forth the challenge nonetheless—out of my very ignorance of the field—so that it can be debated and tested by those who know better. And I shall conclude this already rather rambling chapter with ten comments that embroider on my challenge even if they do not pretend to bear it out in any rigorous way.

VI

1. First of all, a mere matter of observation concerning the current state of affairs in computer simulation. When I read lists of items that are subject to simulation, actual or presently under commission, I cannot help but be struck by the omission of anything remotely resembling "horizon" or "world." At one point in *Matter and Consciousness,* Paul Churchland cites "spatial shapes, social relations, linguistic structures, color, motion, and so forth" (Churchland 1984, 92) as suitable topics of simulation. Each of these topics possesses a certain critical determinacy, a more or less exact identifiability or definability of content that lends itself to machine modeling. Similarly, David Marr mentions the following as prime subjects of simulation in the vision realm: "the detection of repetition, certain visual illusions, the notion of separate linearly adding channels, separation of overall shape from fine local detail, and a simple expression of size invariance" (cited in Haugeland 1981, 140). About this list Marr remarks that "simple operations on a spatial frequency representation of an image can mimic [these] visual phenomena [as] exhibited by our visual systems" (Haugeland 1981, 140). Here Marr *seems* to be suggesting that representability, especially as based on isomorphism of structure (what else can "mimic" imply?), is indeed intrinsic to computer simulation in the visual realm. If he *is* suggesting this (and I am not certain that he is), then the chances of simulating a phenomenon like the horizon will be dim, given that it is notoriously difficult to produce a simulacrum of something that does not have entitative status, that "adds nothing to the world."

2. Speaking of the *world,* the only mention I can find of *this* problematic term occurs on the very top of what we might call *Pylyshyn's Pyramid,* as set forth in his "Complexity and the Study of Artificial and Human Intelligence" and shown here in figure 7.1. This is said to be a figure "for subdividing the world into various sources of behavioral complexity" (Haugeland 1981). But having said that and producing the pyramidal diagram itself, Pylyshyn has *nothing more to say* about "the world," a phrase he revealingly puts in double quote marks as if to indicate at once his respect for the notion and yet his reluctance to discuss it directly. Revealing as well is the position of "The World" at the top of the pyramid of "sources of behavioral complexity." This literal top-down diagramming both acknowledges the position of "world" as somehow *on top* insofar as it is (once more in Husserl's description) "an all-encompassing unity," while leaving it unattended in its remote supremacy. This seems to intimate that "world" resists computer simulation for two reasons: as indefeasibly indeterminate (as is "horizon" as well) *and* as all-embracing. The truly encompassing, as Karl Jaspers has maintained, can be

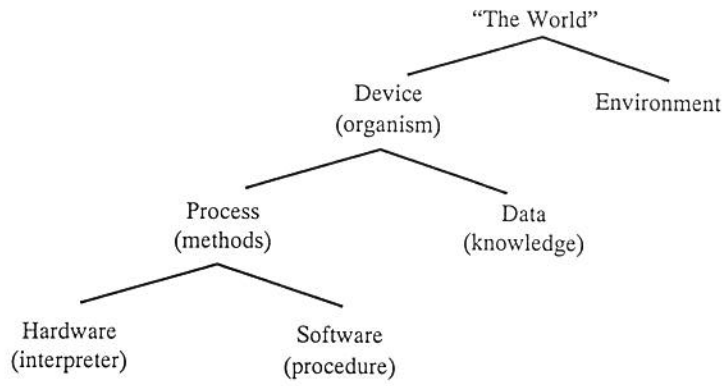

Figure 7.1

Pylyshyn's Pyramid, as reproduced in Haugeland 1981, 71. Published originally in Ringle 1979, 28.

expressed only in a "cipher script," which is to say, in a language lacking precise designators. Or, to put it differently, a "block world," a world that is the mere summation of determinate objects, is *no world at all.* I take the term *block world* here from Churchland's observation that Winograd's SHRDLU "manipulates the elements in the (simulated) block world that is all that it knows" (Churchland 1984, 118). Such a world is not only not a world in the sense that we draw on in ordinary language as it reflects ordinary perception—in other words, the 'world' of the "life-world"—but this nonworld has no horizon either, because no accumulation of manipulable "elements" will constitute a horizon. A genuine horizon is presumed by the objects we perceive and remember and is not added to them as if it were itself simply another discrete element.

3. In *Matter and Consciousness* Churchland proposes what I take to be the cognitive equivalent of "world." This is the notion of a knowledge "network" or "framework" (Churchland 1984, 56ff. and 90). The most encompassing such network, short of a fully ramified scientific model of the universe, is that of "folk psychology," which "embodies the accumulated wisdom of thousands of generations' attempts to understand how we humans work" (p. 57). Apart from the burning issue of whether folk psychology will or will not be replaced by the advances of neuroscience (and in particular by an eliminative materialism), such a folk wisdom does

possess a reasonable facsimile of the two major properties that we have found to reside in the idea of "world": indeterminacy and encompassingness. The particular beliefs of folk psychology are notoriously indefinite and yet they claim to be all-explanatory of human experience. Thus there seems to be some kind of isomorphism after all, now between the entirety of folk psychology, its network as "global" (p. 119), and the phenomenon of world itself as itself a global unity. But if so, this only pushes back the problem a step further, for we have no convincing computer simulation of folk psychology any more than we do of the world. Each has yet to be simulated, and recourse to one as illuminating the other (which is *not* Churchland's intention) will be of no avail. And, in any case, as Churchland himself admits, "We have not yet solved the problem of how such global amounts of knowledge [as are found in folk psychology] can even be *acquired*" (p. 19, his italics), much less represented by machines; and he adds sagely, "We cannot expect to create in a mere few decades what it has taken the evolutionary process 3 billion years to make" (p. 119).

4. Here one might speculate that to the considerable temporal spread of this evolutionary process—its very diachronic extension—corresponds the equally complex but synchronic spatial spread of the circumambient world we are capable of experiencing at this stage of evolution. The immensity of the one answers to the immensity of the other. If we cannot easily, or perhaps ever, program cognitive operations that have taken so long to evolve, then it would be idle to expect that we could program (easily or ever) the environment to which we have become so sensitive. But this is truly a matter of speculation, much too much so to pursue further in the present context.

5. Another angle on the problem is that of the part-whole relation. I have been struck by Boden's statement that any "interpretive scheme [that simulates perceptual phenomena] requires an analysis of the phenomenon into the 'parts' that it takes to be significant" (Boden 1977, 183). I take this to mean that without analyzability into discrete parts a given phenomenon cannot be meaningfully simulated. But is this not precisely what is problematic in the phenomena of horizon and world? Do not these latter resist analysis into anything like parts or elements from which they would be built up, once more like blocks? Are not both horizon and world the kind of wholes that are not the mere sum of their parts? I am reminded here of Plato's distinction in the *Theaetetus* between the sort of whole in which "the whole thing must be the same as all the parts" (204a)—as in the case of twenty drachmas regarded as the simple sum of twenty individual coins—and the sort of whole that is "a single thing that arises out of the parts and is different from the aggregate of the parts" (204a). Surely horizons and worlds constitute the second case in point, a case in

which "the whole is different from the sum" (204b). How is *this* kind of whole to be represented in a program that is strictly dependent on an additive analysis that entails the first, merely summative, kind of whole?

6. My difficulty in answering this last question leads me to think that even if a claim were to be made that something like place is includable in a computer simulation, it would turn out on close inspection that what is included is what I have called *site* and not place as I have described it. For it is precisely sites that lend themselves to quantitative assessment and thus to additive treatment, whereas places resist such assessment and treatment. And yet it is in this very resistance that their value for memory resides. In an earlier nomenclature we would say that memorability is enhanced by qualitative multiplicity or, in Kant's terminology, by "intensive [versus extensive] magnitude." If places are genuinely intensive and qualitative in their presented structures, then they cannot be readily dissolved into elements or parts that can in turn be simulated with facility on a computer. Even if we grant that computers can think and remember in many ways—and in some ways better than human beings themselves—here is a way in which they may not be able to remember at all.

7. Let me be still more specific about this last line of thought. By saying that there is an all-too-natural temptation to reduce "place" to "site," I mean that any effort to make places, and therefore place memories, programmable will be based on a reduced version of the place parameters with which we have been concerned. And this is just what has happened, so far as I can detect. Thus D. L. Waltz's program for three-dimensional description of objects speaks tantalizingly of "the scene-background boundary" of the figures being disambiguated and identified by his program (see the discussion of Waltz's work in Boden 1977, 222–26). Such a boundary may seem to be the equivalent of what I have called the *external horizon,* but in fact it consists entirely in the explicit contours made by the figures under scrutiny—in other words, of determinate lines and edges. Yet the visible external horizon as it forms part of our ongoing visual experience is not reducible to a line or set of lines. This is why I have called it a species of "boundary" in the active and expansive sense suggested by Heidegger ("that from which something begins its presencing"). *This* boundary is not a matter of lines alone, not even of the lines that delineate a scene from its background (helpful as these may be as cues in ordinary perception).

Similarly, 'world' becomes construed as "environmental context" (Boden 1977, 385), that is to say, as a "relatively simple epistemological domain" (p. 436). Such a context or domain is epitomized in what is revealingly called a *micro-world.* Haugeland defines a micro-world as "a contrived artificial domain in which the possible objects, properties, and

events are all narrowly and explicitly defined in advance" (Haugeland 1985, 185). He adds "nothing can happen in a micro-world that isn't expressly permitted in the specification" (p. 185). Since a horizon (in my sense) is not an object, property, or event, it cannot belong to such a mini-world. Nor can such qualities as amiability, terrifyingness, or any other form of emotional expressiveness. A micro-world is a leveled-down affair: "SHRDLU performs so glibly," comments Haugeland, "only because his domain has been stripped of anything that could ever require genuine wit or understanding. . . . SHRDLU has no sense of situation" (pp. 190, 192). In terms of my focus here we would have to say that SHRDLU has *no sense of place.* And when Haugeland adds that "the main point, of course, is that most of the world is *not* a micro-world" (p. 193, his italics), we would go on to say that most of the real world is composed of experienced places and that micro-worlds do not adequately represent such places.

8. Places or situations bring with them what Haugeland calls an *unbounded potential relevance* (p. 192). As such, they illustrate "the indispensability of rich background knowledge" (Boden 1977, 206). Such knowledge has two features pertinent for our purposes. First, it is intimately tied to habitual body memories, which is where our knowledge about places tends to sediment itself when it is not being actively entertained in place memories as such. These body memories bear the burden of place—as we can see from the fact that they so often have to do with orientation in places we have known. The intricate interplay between body, place, and memory is still more difficult to simulate than anything we have so far considered—and yet place memories themselves almost always possess a deep-lying bodily basis. Second, the background knowledge at work in embodied place memories is itself indeterminate in character; it concerns typicalities more than details, "*how it was* to inhabit my childhood home." I may remember how it was to do so without many, if any, explicit recollections of being there. My remembering, and thus my knowing, is indefinite; and yet it may be altogether undiminished in its poignancy. Therefore we are led to acknowledge once more the importance of nonrepresentational remembering, a remembering in which the determinacy of representational content is nondetrimentally absent.

9. Despite my emphasis in this chapter on the indeterminate, I do not want to be misunderstood on one basic point. My claim is not merely that there is a discrepancy between the indeterminacy of given phenomena (horizon and world) and the determinacy of a digital computer language. This discrepancy is not ultimate. in fact, we bridge it over—or at least suspend it—every time we *talk* or *write* about the phenomenon in question. Phonemes and graphemes are perfectly determinate entities, and yet we use them to signify the perceptually (and emotionally) indefinite, not to

mention what is often all too conceptually indefinite as well! On this score I would agree with Boden's critique of Hubert Dreyfus, who has also appealed to indeterminacy in his book *What Computers Can't Do.* (Dreyfus's recourse to indeterminacy has different grounds from my own—namely, the "lived body" of Merleau-Ponty and the "life forms" of Wittgenstein.) Boden writes:

> Dreyfus claims that 'indeterminate' information, and thinking that does not proceed by discrete steps, cannot possibly be simulated on a purely digital machine. . . . Dreyfus is here confusing the information code with the information coded . . . indeterminate information is sometimes represented in a discrete fashion, so that one cannot infer from the discrete structure of the code that the information coded is not continuous. (Boden 1977, 437)

Thus one need not invoke analog computers as the way out of the dilemma, tempting as this might seem to be. (See Dreyfus 1979, 71 and esp. 195, where Dreyfus admits that "given enough memory and time, any computer—even such a special sort of analog computer [as would simulate perception]—could be simulated on a digital machine." This is a crucial concession, as Boden points out (p. 437).

Rather, we must in my view leave the situation precisely as I have posed it, as a challenge. It is a challenge, but not, I believe, an in-principle impossibility, to simulate horizons and worlds on digital equipment. The indeterminate *can* be represented by the determinate (and the reverse as well), as we witness daily in the use of ordinary language. Once we admit the possibility, and take up the challenge, the questions become much more pragmatic: How will we go about such simulation? How stringent should our criteria of simulation be? If they are *too* stringent, we may not, after all, accomplish the modeling we seek, but only increasing nearness to an asymptote of perfection. But it would be folly to assume, out of theoretical optimism, that we can certainly reach an ideal of completely satisfactory representation—as is all too often euphorically claimed. Here I prefer Churchland's advice: "No doubt patience is also required here" (Churchland 1984, 119). What is needed is a guarded optimism that allows (with Haugeland) that "the world cannot be decomposed into independent fragments" (Haugeland 1985, 195)—this is the lesson of James and Husserl, and of Heidegger and Merleau-Ponty—while granting nevertheless that the indecomposable world (filled with its equally indecomposable horizons) may in principle be adequately, if not fully, simulated by computers. But if it is to be simulated adequately, it cannot be reduced first to a shrunken residue—to a micro-world—and *then* simulated: That is a victory won too cheaply.

10. In closing, let me just say that the very enterprise on which I have rested my case, namely, phenomenology, achieves in its own way something like the moderate goal I have just been advocating for AI. If the asymptotic limits of computer simulation reflect its ineluctably formal mode of representation, its requisite reliance on determinate means of computation and display, the aims of phenomenology as an eidetic undertaking—as a disciplined descriptive inquiry into the basic forms of human experience—are no less regulative in status. Phenomenologists also attempt to simulate this experience in a formal manner, that is, by the discernment of structures that stand as invariant across the diversity of contingent variations. It became clear—clear already to Husserl himself—that the project was vast; and he never claimed to provide anything like a complete set of "regional ontologies" that would exhaustively represent the variety of possible experiences. Some exact descriptions were forthcoming—for instance, of consciousness and embodiment—but much was left in an adumbrated state that has still not, many decades later, attained the lucidity of exact representation.

The difference between AI and phenomenology on this score, of course, is that the very formal structures considered most significant by Husserl and his followers are the same structures I have found to be problematically simulatable on computers. These are the fundamental structures of the life-world—such things as horizons and the "all-encompassing unity" of the world itself. Passionately pursued by phenomenologists, who are by no means in agreement even today as to their detailed constitution, such structures are just what eludes artificial intelligence in this historical period. And, precisely as intrinsic to a certain form of memory that I have singled out for discussion in this chapter, the same structures also elude contemporary psychology in its effort to come to terms with the complexity of human remembering. In place and in memory, then,—or more exactly, in place memory—we witness a set of phenomena that, however indeterminate they may be, hold out promise as a possible point of convergence for workers in all three fields. It is a point where phenomenology may have something positive to contribute to the contemporary conversation between cognitive psychology and artificial intelligence, both of which have things to learn in turn from a consideration of the neglected case of place memory as it is illuminated in a perspicuous phenomenological description.

Notes

1. It can be argued that Henri Bergson had already identified the same phenomenon in his *Time and Free Will* (1888).

2. Indeed, Gadamer has argued that the entire phenomenological enterprise devolved from the discovery of primary memory, whose penumbral quality allowed for a radical redescription of the human life-world as a field with indefinite fringes at its edges. (Cf. H.-G. Gadamer, *Truth and Method,* part 2, pp. 216ff.) It is striking that in his 1904–5 lectures on time-consciousness, Husserl describes as "horizons" what James had called the "fringes" of primary memory; Husserl thereby designates yet a third form of horizon in experience.

References

Aristotle. 1941. *Physics.* Translated by R. P. Hardy and R. K. Gaye. In *The Basic Works of Aristotle,* edited by R. McKeon, 278. New York: Random House.

Bachelard, G. 1964. *The Poetics of Space.* Translated by M. Jolas. New York: Orion Press.

Bergson, H. 1960 [1888]. *Time and Free Will.* Translated by F. L. Pogson. New York: Harper Torchbooks.

Boden, M. 1977. *Artificial Intelligence and Natural Man.* New York: Basic Books.

Casey, E. S. 1976. *Imagining: A Phenomenological Study.* Bloomington: Indiana University Press.

———. 1987. *Remembering: A Phenomenological Study.* Bloomington: Indiana University Press.

Churchland, P. M. 1984. *Matter and Consciousness.* Cambridge: MIT Press.

Cicero. 1966. *De oratore,* bk. 2, 86, 251–54. In *The Art of Memory,* by F. A. Yates, 6. London: Routledge and Kegan Paul.

Dennett, D. C. 1981. "Why You Can't Make a Computer That Feels Pain." In *Brainstorms,* 190–229. Cambridge: MIT Press.

Dreyfus, H. L. 1979. *What Computers Can't Do.* New York: Harper and Row.

Eliot. T. S. 1963. "Burnt Norton" (part of *The Four Quartets).* In *Collected Poems 1909–1962.* New York: Harcourt, Brace and World.

Gadamer, H.-G. 1975. *Truth and Method.* New York: Seabury Press.

Gurwitsch, A. 1964. *The Field of Consciousness.* Pittsburgh: Duquesne University Press.

Haugeland, J. 1981. *Mind Design.* Cambridge: MIT Press.

———. 1985. *Artificial Intelligence.* Cambridge: MIT Press.

Heidegger, M. 1971. *Poetry, Language, Thought.* Translated by A. Hofstadter. New York: Harper and Row.

Husserl, E. 1970 [1936]. *The Crisis of European Sciences and Transcendental Phenomenology.* Translated by D. Carr. Evanston, Ill.: Northwestern University Press.

James, W. 1950 [1890]. *The Principles of Psychology.* New York: Dover Books.

Neisser, U. 1976. *Cognition and Reality.* San Francisco: W. H. Freeman.