CHAPTER 1

Meta-View

BRIDGES

When I was a child, I lived in an area renowned for its many wooden covered bridges. Sometimes my family would take a Sunday drive just for the pleasure of crossing over one of those bridges. Something was enticing about driving across those creaking boards; just being on that bridge was a little like wandering for a moment into another world. You could not go there just any old way. For example, trucks were not permitted on the bridge—at least not heavy trucks. It always looked different once you had actually crossed over, too. Looking back at a bridge is not at all the same experience as looking toward it.

Those wooden bridges had been carefully constructed so that they could handle a certain load of weight. As I think back on them, I realize that a great deal of mathematics must have been involved in building them. You could not see the mathematics, of course. Yet what you saw there was, in a very tangible way, a reflection of the mathematics involved.

Not long ago I had the opportunity to take my first journey across San Francisco's Golden Gate Bridge. Built of huge steel girders, towering into the skyline, bearing multilanes of bumper-to-bumper traffic, this bridge is a masterpiece of mathematical engineering. You can not travel across it without being sucked up into modern technology. The wonders of our Western world envelop you on this bridge, swaddling you in a physical and emotional setting totally different from that of the wooden bridge. The wooden bridge calls forth a slow, gentle pace—you are tempted to stop the car and walk leisurely, meditatively across. Not so with the Golden Gate. Here, with the rush of traffic, it is undesirable to

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walk across. If you are on foot, the Golden Gate Bridge is not the bridge for you.

Now, a true footbridge offers a totally different experience. When I was a kid, a creek ran across our property, and the only way to traverse this creek was via a large log that had fallen across it. I was never very surefooted, and so I crossed it only reluctantly and warily. Still, the log bridge had its own enticement. When I was on it, I was unaware of any mathematical genius invoked by it, although I am sure that today I could certainly find mathematical relations that would at least partially describe it. Yet such relationships would be artificial and imposed from without, rather than being an intrinsic part of the design—unless, of course, as astronomer James Jeans once proclaimed, "God truly is a mathematician."[1]

Describing these three bridges may seem like an odd place to begin a study on metaphor, metaphysics, and metamathematics, but I believe there are parallels that make the comparison both appropriate and apt. The landscape you are invited to explore in *What Number Is God?* is mostly the abstract territory of metaphysics. The bridges we will travel are those of something I will call metaphorical language, although, as we will see, that phrase implies neither metaphor nor language *per se*. Furthermore, bound in varying degrees to each of these bridges is a philosophy of mathematics, that is, a metamathematics.

In a sense, this study is itself a bridge, for it offers to take you from wherever you are into the domain of ultimate questions. What is life all about? How did it come about? What will happen to it? Such questions lie beyond the physical, in the territory of the metaphysical. Countless people have explored this territory—many have drawn maps for others to follow. Some have even devoted entire lives to this exploration. Probably every individual examines this landscape at one time or another. This work, too, will touch on these issues, but only peripherally, for the real focus of this study is the bridges themselves. How do we get from here to there? What enables us to cross over that fine line of the concrete and mundane to the abstract and ethereal? What connects the physical to the metaphysical?

Some people would probably say it is religion that connects us. Others might say that it is science. Such answers seem to me to be rather like the vehicles themselves that travel the bridge. The

bridge they travel across is, I would suggest, metaphorical language. Tied up in the construction of this metaphorical language is an underlying mathematics. Sometimes, as with the log bridge, the mathematics involved is hidden or only questionably there. In other cases, as with the Golden Gate Bridge, the mathematics is integral to the basic structure of the bridge. However, as with all our normal-world bridges, you might not even see the mathematics unless someone pointed it out to you. It is this attempt to point out the mathematics, to make it visible that serves as the distinguishing feature of this study.

    What Number Is God? Metaphors, Metaphysics, Metamathematics, and the Nature of Things is a bridge about bridges—a sort of meta-bridge. To state explicitly the implicit, this study is itself a meta-phor, from the Greek meta, meaning "over," and pherien, meaning "to bear." It is part of a large body of symbolic language that "bears us over," in this case to the realm of metaphysics, using a foundation of metamathematical girders. Let us zero in, now, and take a closer look at metamathematics, metaphysics, and metaphor, in the hope that we may ultimately come to a better understanding of their interaction.

METAMATHEMATICS

The beginnings of metamathematics can be traced to the mathematician David Hilbert (1862–1943), who first used the term in the late 1920s to refer to a formalist foundation of mathematics. His was one of several different attempts within the mathematical world to deal with the disturbing paradoxes or "antinomies," which Bertrand Russell and Alfred North Whitehead had uncovered in the set theory of Georg Cantor. Cantor's ideas had revolutionized mathematical thinking only a few decades earlier. (We will encounter them in more detail in chapter 4). In essence, his set theory offered the notion that the set—an arbitrary collection of distinct objects—could be used as the basic building block of all of mathematics. Many readers may remember the "new math," which captivated our education system in the 1960s and 1970s. This "new" mathematics was an outcome of Cantor's powerful vision of set theory. However, in its more sophisticated forms, set theory led to a series of contradictions that threatened to undermine all of mathematics. Growing out of the desire to avoid such

a devastation were three main remedies: the logistic efforts of Russell, the intuitive or constructivist school of the Dutch topologist L. E. J. Brouwer, and the formalist foundation of Hilbert grew out of the desire to avoid such a devastation. Each of these remedies turned out to have its own particular difficulties, but the school of Hilbert primarily concerns us here.

Hilbert's approach was to try to prove *mathematically* the consistency of classical mathematics. Davis and Hersh, in their 1981 study of mathematical development and philosophy, give a succinct account of Hilbert's three-step program as follows.

> 1) Introduce a formal language and formal rules of inference, sufficient so that every "correct proof" of a classical theorem could be represented by a formal derivation, starting from axioms, with each step mechanically checkable. This had already been accomplished in large part by Frege, Russell, and Whitehead.
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> 2) Develop a theory of combinatorial properties of this formal language, regarded as a finite set of symbols subject to permutation and rearrangements as provided by the rules of inference, now regarded as rules for transforming formulas. This theory was called "meta-mathematics."
>
> 3) Prove by purely finite arguments that a contradiction, for example $1 = 0$, cannot be derived within this system.[2]

The motivation for Hilbert's metamathematical theory was (in his own words):

> to establish once and for all the certitude of mathematical methods. . . . The present state of affairs where we run up against the paradoxes is intolerable. Just think, the definitions and deductive methods which everyone learns, teaches and uses in mathematics, the paragon of truth and certitude, lead to absurdities! If mathematical thinking is defective, where are we to find truth and certitude?[3]

Unfortunately, this quest for absolute conviction, which has so often permeated mathematical thinking, ultimately reduced Hilbert's program to a meaningless game of manipulating formal symbols. The *meaning* of the symbols used in this "game" became what Davis and Hersh term "something extra-mathematical."

The search for certitude and truth, and the conviction that it may be found in mathematics, have a long history. Our earliest records of mathematics date back about 5,000 years. For much of

that time, mathematical statements were conceived of as true to the degree that they accurately described or agreed with or predicted the "real" world. Gradually, the statements became more and more isolated from the real world, so that, by Hilbert's time, their truth or falsity could be "deduced" from other statements or postulates that had purely arbitrary starting places. In short, mathematical statements "had an existence and a truth or falsehood of their own, independent of the 'real' world."[4]

Such certitude, and indeed, the whole flavor of Hilbert's formalist foundations, came into serious question when, in 1930, Kurt Gödel published his famous incompleteness theorems. These theorems showed that the quest for absolute truth that Hilbert strove to acquire could be obtained only by sacrificing the consistency of the system of thought. Gödel's theorems brought about (or are bringing about[5]) in the last half-century what has been called a "paradigm shift in mathematics." As John Carpenter puts it, "We have now come to the idea that for mathematical statements, anyway, provability is no longer a necessary criterion for truth."[6]

Hilbert's formal theory of foundations lost much of its impact following Gödel's introduction of his theorems, but the term "metamathematics" hung around. Gödel himself was a metamathematician. He developed an elaborate coding system of numbers (called Gödel-numbering) to represent symbols and sequences of symbols (statements). Then he investigated mathematical reasoning itself by means of this mathematical coding system. Metamathematics, while still referring to a very formal set of symbols with which to study mathematics, began to emphasize its "study" aspect as well as its "formal" aspect. Gradually the term acquired a second, broader meaning as the "philosophy of mathematics."[7]

Perhaps the best-known metamathematician in this more generalized sense of the word is Douglas Hofstadter. In his 1979 Pulitzer Prize winning work, *Gödel, Escher, and Bach,* Hofstadter showed that Gödel's discovery was "in its barest form . . . a translation of an ancient paradox—the Epimenides or liar paradox—into mathematical terms."[8] Gödel's theorem described only deductive systems that had reached a certain level of complexity. Hofstadter speculates that this level of complexity is characterized by the ability of the system to be self-reflexive, that is, to make statements concerning itself. This characteristic of self-reference is

one that many people have long associated chiefly with human nature.[9] Although he is cautious in his willingness to generalize implications of Gödel's theorem to areas outside of mathematics,[10] Hofstadter nonetheless creates an intricate "golden braid" between mathematics, art, and music that ultimately serves to delve not only into music and the arts, but also into the very nature of human consciousness itself.

Hofstadter is a computer scientist whose main area of investigation is artificial intelligence. Not surprisingly, he is interested in (and assumes the possibility of) detecting appropriate mathematical guidelines or rules to create intelligence in a machine. His speculations about such rules give us the general flavor of his work and his philosophy, and so I quote from it here at some length.

> Computers by their very nature are the most inflexible, desireless, rule-following of beasts. Fast though they may be, they are nonetheless the epitome of unconsciousness. How, then, can intelligent behavior be programmed? Isn't this the most blatant of contradictions in terms? One of the major theses of this book is that it is not a contradiction at all. One of the major purposes of this book is to urge each reader to confront the apparent contradiction head on, . . . so that in the end the reader might emerge with new insights into the seemingly unbreachable gulf between the formal and the informal, the animate and the inanimate, the flexible and the inflexible.
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> This is what Artificial Intelligence research is all about. And the strange flavor of AI work is that people try to put together long sets of rules in strict formalisms which tell inflexible machines how to be flexible.
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> What sort of "rules" could possibly capture all of what we think of as intelligent behavior, however? Certainly there must be rules on all sorts of different levels. There must be many "just plain" rules. There must be "metarules" to modify the "just plain" rules; then "metametarules" to modify the metarules, and so on. The flexibility of intelligence comes from the enormous number of different rules, and levels of rules.[11]

Such is the thought process of a modern day meta-thinker. Is Hofstadter a metamathematician, concerned with the translation of formal systems of mathematics into the informal, animate, flexible realm of human consciousness? Or is he a metaphysician, concerned with the questions of being and knowledge? The an-

swer, I think, is both. This is not to suggest that all metaphysicians are metamathematicians, or vice versa. Yet the borderline between the two zones is fuzzy at best, and here, right on that border, is the place where Hofstadter seems to most like to walk. Perhaps Hofstadter is on a bridge, a bridge built with mathematical care and precision, a bridge that winds around so that it keeps looking back on itself. This is a bridge that connects meta-worlds, a bridge that goes beyond the abstract, speculative world of mathematics and beyond the ordinary, everyday world of the physical to the metaphysical.

METAPHYSICS

"Metaphysics" has varied definitions. Theologian Ian Barbour describes it as "the search for a set of general categories in terms of which diverse types of experience can be interpreted."[12] Philosopher Frank Dilley calls it (following Whitehead) "the philosophical discipline concerned with discovering the ideas which are indispensable to the analysis of everything that happens, the discipline concerned with describing the nature of things."[13] He distinguishes it from science in that it deals with the whole of reality and from religion in that religion deals with human attitudes towards the ultimate. Physicist Paul Davies calls it "theories about theories of physics."[14] Paul Moser defines what he calls "the broad construal of metaphysics" as "the philosophical investigation of what there is or how things are in general." He adds that "the notion of how things are is basically the notion of what items (e.g., objects, features of objects, relations between objects and/or features), if any, exist."[15] For many of us, however, "metaphysics" refers simply to what lies *beyond* or *after* the physical, and it implies the arena of the non-concrete or abstract.

In fact, the term has a fairly concrete origin. It was first used to refer to the portion of Aristotle's collected treatises that followed or came after the section dealing with the physical world. Nicholas Lobkowicz, in an article written for a handbook on metaphysics and ontology, points out that there is nonetheless a congruency between the content of these works and the implications of the title: "Aristotle claims that they contain a 'first philosophy,' 'wisdom,' and 'theology' and deal mainly with realities that are subsi-

stent (or separate from matter) and immobile." He notes an ambi-
guity in Aristotle's treatment of the topic, however, for Aristotle
"also claims that the subject matter of this part of philosophy is
'being as being' and he indicates that it also deals with the first
premisses [*sic*] of knowledge."

The inconsistencies in Aristotle's treatises have "puzzled schol-
ars since antiquity." Lobkowicz continues:

> Perhaps the only consistent interpretation was advanced by
> Aquinas. Objects of physics and mathematics are "constituted"
> by acts of abstraction. . . . Metaphysics on the contrary presup-
> poses an act of "separation," i.e., a negative judgement to the
> effect that to be does not necessarily entail being corporeal. Un-
> der this premiss [*sic*] an observer whose scope of cognition is
> limited to what his senses offer tries to isolate those features of
> physical realities that can be attributed to immaterial realities,
> and by inference construes whatever is to be said about the lat-
> ter. . . . Accordingly, metaphysics deals with whatever throws
> light on what is common to bodies and spirits as well as on their
> interrelation.[16]

Thus the metaphysics of Aristotle and Aquinas, while delving
into the realm beyond the physical, do not quite leave it altogether.
A connection is to be found in metaphysics between the routine,
sense-enriched realm of our normal everyday experience and the
realm that has come to be called "nonmaterial entities."[17] Over
the years, this conception of metaphysics as that which is beyond,
yet still connected to, the physical world has worn many different
frames, frames that alter our entire sense of the conception. In a
vein somewhat similar to the path of mathematics, metaphysics
gradually became more and more closely linked to logic and purely
conceptual issues. In the seventeenth and eighteenth centuries,
metaphysics "began to fall apart into a discipline discussing the
most general concepts and 'natural theology.' . . . [L]ogic and
mathematics became a pattern of thought to which both the meth-
od and the content of metaphysics had to adjust."[18]

Some philosophers, including Lobkowicz, see a modern trend
away from this highly *abstract,* speculative framing of metaphysics
toward "aspects reminiscent of what thinkers such as Aristotle and
Aquinas intended."[19] Put another way, it may well be that we are
currently undergoing a "paradigm shift" in our understanding of

what we mean by the very notion of abstraction. Epistemologist J. Samuel Bois is certainly representative of those who believe in such a contemporary trend, although according to his vision, it is more of a move to something *beyond* early Greek and Aristotelian thinking than *back* to it.

Bois has outlined a theory of knowledge based on a metaphysics of human evolution. In particular, he sees the history of Western civilization as undergoing a series of conceptual revolutions, what he calls radical and irreversible changes in some fundamental element of human life. The first of these conceptual revolutions occurred from 650 to 350 B.C.—the age of the Greek philosophers we have just been discussing. While Bois allows that these Greek philosophers did not agree in their various theories, he suggests that they "all held the revolutionary idea that there was such a thing as *the nature of things,* and that whatever existed remained identical with its natural self: a man was a man, and he could not originate from a dragon's tooth, nor could he be transformed into a snake." Aristotle, according to Bois, played the role in this conceptual revolution of "a codifier, or system-builder, who made explicit the methods of thinking that were characteristic of the age."[20]

The second conceptual revolution occurred roughly from the 1500s to the 1700s—the late Renaissance era. Again, theories differed among the great thinkers of this age. But the similarity that Bois believes bound them together and that made it a revolution in conceptual "thinking, feeling, planning, and deciding"[21] was the *birth of the scientific method.* This birth Bois sees as a move from deductive to inductive reasoning. Francis Bacon, like Aristotle before him, was the primary codifier of the revolution, the one who "formulated the methods of thinking characteristic of the period."[22]

The third conceptual revolution, says Bois, is happening right now. The similarity that the geniuses of this period all display again represents a change in our methods of thinking. But it is a change that has yet to be completely identified because "the system has not yet been fully worked out." However, Bois does identify the present counterpart to Aristotle and Bacon as Alfred Korzybski. Korzybski, with his 1933 publication of *Science and Sanity,* founded the field of general semantics, and he

took upon himself the task of explicitly formulating and arranging into a system the methods of thinking that make our epoch different from the previous ones. He did not limit himself to logic, deductive or inductive. He thought in terms of *psycho-logics,* of a science of thinking, not as an activity that stands by itself, but as a science of our evaluating processes—of how we react to persons, events, and symbols according to what they mean to us at the moment of impact.[23]

Thus, Bois sets forth a theory about how humankind views itself, a theory he holds is more consistent with our present stage of evolution on earth than with the conditions of the ancient Greeks in the Mediterranean world. His outline of the basic assumptions of this theory are similarly consistent with presuppositions that I bring to my own present study, and so I reproduce them here.

1. Logic—deductive or inductive, symbolic or classical—is superseded by psycho-logics. Mental activity no longer stands by itself, and it is not studied by itself. It is only one aspect of a greater whole, called semantic transaction, which is our main unit of discourse.

2. There is no one method of thinking that is common to all, and no laws of logic apply to all members of the human race. There are semantic states, now more and more frequently called *epistemes* by Foucault and others, that vary from culture to culture, or that change within a culture in the course of history.

3. Through our language—and the culture of it is one aspect—we have developed a structured unconscious in us that involves a metaphysics—the metaphysics of subject and predicate, of substances and qualities, of agent and action.

4. Our experiences are constructs of our own processes in transaction. Our contacts with the world "inside" and "outside" ourselves can be seen as so many acts of abstracting, and this process of abstracting proceeds at different levels. By being aware of the differences between these levels we can solve many paradoxes and facilitate agreement.[24]

To these four basic themes I would add one more, that one way (perhaps, for some, even the *best* way) to understand these first four is with the aid of mathematics. I do not think that Bois would be uncomfortable with this assumption. For one thing, Korzybski himself relied heavily on mathematics in the formulation of his general semantics. Bois, too, later in his work, implicitly assumes

something of the sort when he notes that "The inventor of symbols and symbol systems is the person who blazes the trail of our advance. The mathematician has been doing it with spectacular success for the natural sciences, and it is the task of the epistemologist to do it for the human sciences."[25]

Bois focuses his metaphysics on the way we use language (in the broad sense of the word) in the process of *abstracting*. I quote here from a variety of places in his *Art of Awareness:*

> To "abstract" means to leave out certain features of a situation, to register only those that are relevant to our needs, our purposes, or our habits. (73)

> We abstract—that is we select from among the characteristics of the total ongoing world of processes—what lies within our capacity to observe with our unaided senses or with instruments. (80)

> There is no real permanency anywhere but in our delusional static picture of what is going on in the world and in us. Our acts of abstracting are passing pointed contacts between two moving "realities," or ongoings, the world and ourselves, and the relation between them is an undetermined variable. (80)

> The first step of abstracting takes us from what is going on to what we take into account. . . . The second step of abstracting takes us from what we are concerned with to what we say about it. (81)

> Our assumptions, our preconceived notions—particularly those that served us well in the past—act as a filter for our abstracting processes. (97)

> We become what we abstract, transform, and assimilate. (100)

> . . . fitting thought elements into the proper structure has become one of the main concerns of the epistemology of our generation. Many new words, or old words used in a new way, replace such simple terms as "idea," "thought," "concept," or "reasoning." We now hear of *Gestalt, configuration, conceptual organization, constructs, patterns, schemas, conceptual coordinates, closed and open systems, maps, structures, multidimensional manifolds, and models.* (201–2)

> Words come out of a speaker's mouth one at a time and enter the listener's ear in the same serial order, but they are really labels that express elements of a structure in the speaker's mind, and

they are intended to create a similar structure in the listener's. This they often fail to achieve. (202)

Bois's comments strongly suggest his presupposition of some other realm than the one we perceive with our senses. When we abstract, we leave out *certain features of a situation,* we select from among *characteristics of the total ongoing world of processes,* we filter something, we start from a place of *what* is *going on* and move elsewhere, we are the connection or *passing pointed contact* between ourselves and something else. This "something else" I hypothesize as being a kind of "primordial chaos," about which I will say more later. Further, to alter one of his statements slightly, I suggest that whatever we abstract, transform, and assimilate out of this primordial chaos is what we become, indeed, what we are.

This view is not particularly original (but, then, according to this view, not much is). It bears, in fact, a certain resemblance to the seventeenth-century metaphysics of mathematician/philosopher Leibniz. According to Leibniz, the entire created universe consists of mindlike entities, or Monads, some of which are more developed than others but all of which perceive the whole of the universe. How much of the universe is self-consciously or knowingly perceived is a matter of degree. A material object, for example, perceives the universe only subconsciously. Humans are more fully aware; but even though we perceive the whole of the universe, we still are aware of only a small portion of it. Most of it remains hidden to our consciousness behind some sort of threshold that it fails to traverse.

Leibniz's metaphysics, according to H. H. Price, lends itself to an interpretation that today lies on the fringes of science, in an area *beyond* the range of normal experience or scientifically explainable phenomena—what the *American Heritage Dictionary* defines as "paranormal." Price, a "philosopher who happens to be interested in psychical research as well,"[26] has argued that Leibniz was the first modern philosopher to suggest that there are mental processes below or beyond consciousness. Price sees Leibniz as the one among the great classical philosophers "whose ideas are most suggestive for the Psychical Researcher," and he says the following about Leibniz's doctrine of "omniscience."

It is the idea that each of us, below the level of consciousness,

is all the time in touch with a very much wider range of facts and happenings than he is consciously aware of.

If we do consider this suggestion, just to see what its consequences are, we find that it alters the questions we commonly ask about paranormal cognition. We no longer ask "Why does paranormal cognition occasionally occur?" Instead, we ask "Why does it occur so seldom?"[27]

Price suggests that such cognitions are brought into our consciousness with varying degrees of symbolism or, alternatively, of literalness. The theory he puts forth meshes so well with my own personal experience that I feel compelled to share here a couple of personal stories.

Several years ago, some friends and I shared Thanksgiving dinner at one of the buildings that house some of the students from Meadville/Lombard Theological School in Chicago, Illinois. Following our rather traditional feast, we decided to join in a game of Trivial Pursuit, a popular social game that I have never particularly enjoyed, probably because I do not seem to have a brain that recalls details easily. Read that another way, and you might say that I am lousy at the game. I am the sort of player whom nobody who takes the game seriously wants to have on their team. It was to everyone's astonishment, therefore, not the least of all mine, when, to the question as to what was the state flower of Alaska (which had stumped *everyone* on our team) I suddenly and at the very last moment ("Oh, just take a guess!") announced (correctly) "Forget-me-not." That is not the typical answer that one expects to "just guess," and I can only say I wish I had had a camera to record the expressions of amazement that my unthinking, intuitive response evoked on the faces of my comrades.

The second story happened many years ago when I was only a young teenager and was visiting my cousin Sue. I remember the incident after all these years because it elicited the same kind of intense, amazed responses from both my cousin and the woman who ran the day care center where Sue worked part time. Sue had taken me with her to the center. We walked in and, immediately, Sue introduced me to the director. Mrs. X, Sue's director, began to give me a short rundown on some of the children who at that particular moment were off elsewhere doing some other activity. She mentioned that one particularly sweet little girl was ill and was

absent that day. Almost instantaneously, and without thinking about what I was saying, I asked the Director if that would be so-and-so. The actual detail of her name now slips my memory, but it was, in fact, the correct name of the one child who was not attending that day. To fully appreciate the extent of the Director's and Sue's astonishment, you will note that I had not visited my cousin at her home since I had been a preschooler, I had never before been to this center, I had never heard Sue mention any of the children by name or personality, and I had virtually walked in the door only a couple of minutes earlier. The name, it seemed, appeared "out of nowhere."

Much as I might like to, I cannot, however, claim special psychic powers in either of these two instances. In the one case I am sure and in the other I suspect that the two names that came to me so unexpectedly did not, in fact, appear "out of nowhere." With Sue and her director, I was even able to explain right then and there how I had come to this information. Essentially it was one of those moments when things "just connected" in an unusually quick but otherwise logically deducible fashion. As I came into the center, I observed (I believe not consciously) a number of open cubicles where it was clear that the children normally hung their wraps, kept their sack lunches, etc. Each cubicle was carefully labeled in big print with the first name of the child who would be using it. Of all these cubicles, only one remained rather conspicuously bare: it was the name printed above this cubicle that I had offered as the name of the missing child. All of this had happened very, very rapidly. In fact, I had not even been aware that my brain had observed and processed all of this information until the circumstances surrounding my naming the child had evoked what must have been the conclusion of this mental reasoning process. (Alas, I confess that, to my knowledge, my brain does not *normally* seem to function so efficiently—so perhaps there is yet some justification for the label "paranormal.")

The other incident leaves me more baffled. How was I, who forget trivial details routinely, able to produce "Forget-me-not" almost as an afterthought? Upon reflection, I suspect that it may have been, quite literally, an *after* thought. Somewhere in the dimmest regions of my consciousness I vaguely recall the possibility that I might have encountered the same question at some earlier

playing of the game. I am not sure. But certainly it is possible and perhaps even probable that I might have heard the question previously, stored the answer in some barely accessible region of my subconscious, and retrieved it almost without volition when I least expected it.

Thus I can offer convincing (at least to me) rationales for why both of these events, which on the surface appeared to be highly mysterious and clairvoyant, might be well within the "range of normal experience or scientifically explainable phenomena." So much for paranormal occurrences.

Or is it?

For I confess to having experienced, at various times, a number of other, equally baffling, equally mysterious happenings that, try as I might, I can not "explain" in the least. Of course, that in no way assumes that such an explanation is nonexistent—it could merely reflect on my inadequate ability to produce it. In fact, because a part of me likes tidy little understandings, I conjecture up the hypothesis that the whole universe, that Everything, exists in that primordial chaos I mentioned earlier, and that it is only by virtue of some sort of superimposed ordering structure that filters this chaos into meaningful units that we have the world as we know it. I do not know how such an ordering filter might be superimposed (although I suspect it has something to do with what I call God), but I further hypothesize that all sorts of filters are possible. One such filter is what we know of as the human being. This is a self-reflexive filter. It looks back on itself and calls the process of doing so "abstracting."

This self-reflexive filter has possibilities that we have, to varying degrees, ignored in recent years, namely our "psychic" possibilities. Using Price's line of reasoning, the two names that I brought up "out of nowhere" in my stories would be fairly literal pieces of information that had been relegated to the realm of the subconscious or unconscious. Price posits that not all paranormal cognitions are so literal: often they are partially or completely "symbolic"—"what emerges into the consciousness . . . often does not directly and literally represent the fact which one is paranormally aware of, or 'in touch with', at the unconscious level, but represents it only in an indirect and oblique manner."[28] Thus, an idea from the realm of the unconscious may be disguised, or may

even have some other image or concept substituted for it before it can pass the threshold into consciousness. "Symbolization (in this sense of the word) is a means of overcoming, or circumventing, some kind of barrier or censorship which tends to keep the paranormally-acquired information from getting into consciousness at all."[29]

Just exactly what is this "Censor"[30] and why should there be one? Price suggests that, first of all, there may have been a time in human evolution when the paranormal powers were more commonly used, but because they tend to be indiscriminate, they would not have been as valuable to survival as the guides provided by sense organs such as the eyes and ears. Hence, they gave way to the more elaborate nervous system and sense organs. Secondly, he sees in this "Censor" a utilitarian purpose: "I think its function in the end is to preserve the integrity of our personality, because if we were at the mercy of thoughts coming at us from all sides, all the time, so far as I can see the unity of our personality could not be maintained."[31]

Price's theory bears some striking similarities to Bois's comments on abstraction. Both involve an evolutionary aspect. Both postulate the existence of a filter or censor. Both posit a wider realm of some sort accessible to the human consciousness. Both lead into the areas of language and symbolism. I am sure that, with a little reflection, I could find a similar list of differences between the two. What intrigues me, though, is the possibility that both theories (which I have treated with only mediocre justice in my abbreviated rendition here) might be attempts to recognize and articulate the same basic, but "new," way of seeing things.

This new way of seeing, this conceptual revolution, is being addressed, as Bois points out, in many different ways by many different people.[32] Like Bois and Price, these investigators are searching for epistemological clues to our existence, but they do so from perspectives that vary from the highly practical to the highly theoretical. To give some indication of the scope and diversity of the treatments of this theme, I will sketch here three additional arguments that come from the realms of psychology, science, and mathematics.

Psychologist Lawrence Leshan and physicist/scientific philosopher Henry Margenau have set forth a theory in *Einstein's Space and Van Gogh's Sky* that Western culture's rigorous and literal attempts to explain reality fall short primarily because they fail to

take into account the realm of nonphysical experience. They suggest that a new organization of reality is already being developed, a way that goes beyond a reductionistic scientific "rationality" governing the entire cosmos. According to the two collaborators, science and social science alike generally regard sensory reality, the "ordinary everyday state of consciousness," as being the *correct* reality. Any others are simply aberrations from it. Not so, say Margenau and Leshan. True enough, we humans are "conditioned to assume that we *know* the one truth and that everything else is, somehow, less real. To question this seems to us to be abandoning all reason and placing ourselves in a chaotic and unpredictable cosmos. . . . Nevertheless, very often, if we scientifically follow the data and their implications, our older theories must be abandoned."[33]

According to the two researchers, the way we perceive and organize our perceptions is a learned way, one affected largely by the language we use and by the questions we pose. Somewhat reminiscent of Bois, they suggest three major historical developments that have altered our perceptions.

> The great discovery of the ancient world (about 600 B.C.) was that there was an intelligible structure to the world. The great discovery of the Renaissance in Europe was that we could use this structure for our purposes, that the more we understood it, the more we could control matter and energy. The great discovery of the present-day revolution is that—within limits—the structure is up to us, and different formulations of it must be used with different types of experience and to attain different goals.[34]

What Margenau and Leshan ultimately posit is a pluralistic *domain theory,* where different domains of experience have different observables, different vocabularies, and different metaphysics. There is the domain of the social scientist, of the scientist, of the parapsychologist, of art, of ethics, of consciousness. Sometimes these domains are compatible, sometimes not. But in any case trouble often arises when the rules of organization of one are applied to another and judgements are made on the assumption that there is only one ultimately *correct* domain. According to this thesis,

> [T]he cosmos is divided into *domains* of experience. In each of these certain observables "appear." Some domains bear a se-

quential relationship to each other, and when this is true, a number of definite statements can be made about their relationships. Domains fall into larger groupings called *realms,* and each realm has a special organization of reality (metaphysical system) which is necessary to make the data from it lawful.[35]

These domains are also referred to as "levels," a terminology that the authors maintain often leads to discussions of reductionism (from one level to another) with associated hierarchies of truth-value.[36] They prefer to use a nonhierarchical notion of "transcendent but compatible elaboration." In this view, which the authors still characterize as scientific, the chief interest is not in some trait, such as size, of a particular domain, but in the "observables called into being as we pass from one domain to another. . . . Strictly speaking, what emerges was already there, invisible and unexpected. We, however, wish to emphasize the uniqueness of the new observables, their creation by a new theoretical approach, the scientist's inability of simply conceiving them from a domain in which they have no meaning."[37]

What becomes important for Margenau and Leshan, then, is that different realities or different states of consciousness are desirable and even necessary for the human well-being. From the social science perspective, there are (they claim) at least four different ways of being-in-the-world—the sensory, clairvoyant, transpsychic, and mythic.[38] *All* of these "are needed if the individual is to avoid becoming stunted in his development."[39] They acknowledge that our everyday, verbal language is generally useful and adequate to describe the data in the sensory realm. They argue, however, that in the realms of inner experience, "we have never developed a language relevant to the data. We constantly use metaphors from the see-touch realm as if the data of our inner experience were the same as that of our eyes and touch organs."[40] Metaphor, they feel, is helpful but lacking, and "one of our tasks in developing a science of the inner life will be the development of an adequate language."[41]

There are difficulties with their argument at this point. For example, in developing a *science* of the *inner life,* they appear to blend the very levels or domains that they seem otherwise to separate carefully as alternative but valid ways of perceiving. Furthermore, they observe that the richest language developed thus far for use in the domain of the inner life is that associated

with astrology, yet they promptly dismiss astrology as pseudos-cience "because it consistently uses both the mythic mode-of-being and the sensory mode."[42] I see here two main weaknesses. First, they treat astrology in the same pejorative manner in which they later criticize, in a sympathetic critique of psi occur-rence (extrasensory perception, psychokinesisz, etc.), "most sci-entists today" for treating parapsychology[43]. Secondly, while they allow for more than the four possible ways of organizing reality noted above, they do not allow for (or, indeed, even con-sider the possibility of) legitimate domains that are mixes of these four domains. Astrology was rejected as a pseudoscience *because* it blended two ways of seeing. It is not at all evident to me that such a blurring of the domains is not, in fact, precisely what we routinely do much of the time. Nor is it evident to me that such a blurring is anything other than one more, to use their terminology, "altered state of consciousness."

In spite of these reservations, I read their arguments as gener-ally consistent with, though by no means identical to, the sketches I have given of the epistemological approaches of Bois and Price. Bois and Price are coming from the arenas of general semantics and philosophy, respectively; Margenau and Leshan from physics and psychology. From the fields of neurobiology and population stud-ies comes yet another version of this "new way of thinking," set forth in Robert Ornstein's and Paul Ehrlich's *New World New Mind*.

The basic thesis in this more recent book is that there is a mismatch between the human mind and the world people inhabit. The human mind developed to respond to short-term, localized situations such as dodging a lion before it ate you.

> The human mind evolved to register short-term changes, from moment to moment, day to day, and season to season, and to overlook the "backdrop" against which those took place. That backdrop only changed significantly on a time scale of centuries or longer. Not only did our evolutionary background predispose us to live in a world of caricatures and physically equip us to draw only part of the picture, it also predisposed us to focus on certain parts of the "image" and ignore others.[44]

Like all animals, humans have only a limited ability to sense the environment. "*All* sensory systems filter information from the out-

side world, their environments—and the human system is no ex-
ception."[45]

But now, say the authors, our world has changed. We live in a
world of gradual changes—changes in the ozone layer, changes in
population patterns, changes in nuclear build-up. The human ner-
vous system is not matched to this world of large gradual changes,
and so we fail to respond to the new dangers that threaten to
annihilate us as surely as the lion threatened to annihilate our
hunter-predecessor. "The pattern of selectivity programmed into
human beings by the old world is now fatally obsolete in the new.
We need a new basis for making selections."[46] We need, in short, a
new mind.

Thus the thesis set forth here is similar to the three I have
previously outlined in that it posits the need for a new way of
thinking that, incidentally, it later suggests we are already begin-
ning to develop. This new way of thinking is based on the idea that
we selectively filter (via our perceptions) a "chaotic and chang-
ing"[47] external world into "radical mental filtrations" or "carica-
tures"[48] that "are useful insofar as they correspond *closely enough*
with reality that they help us to survive."[49] Furthermore, it is not
just our perceptions that are subject to the simplifying processes of
the mind, but our thought processes as well; and the filtering of
our thought into categories is "peculiar to individual cultures and
can be observed in the structure of different languages."[50] Culture,
previous experiences, and present attitudes all "strongly affect
what we perceive," and in particular, "whatever gets close to us, in
space or time, is immediately overemphasized."[51] Finally, like Bois
who sought this change in perception through the art of "scien-
tifically guided self-awareness,"[52] Ornstein and Ehrlich suggest
that "what we can do is to begin to call the attention of people to
their own caricatures of reality and to the new world itself."[53]

But here, the similarity seems to end, for the new way of seeing
that Ornstein and Ehrlich promote is one based fully in behavioral
modification, education, practicality, systematic programs of change,
and so forth. Their catalogue of possibilities for real change is
filled with details, explicit everyday examples, down-to-earth secu-
lar activities. Not here will we find any talk of altered states of
consciousness or paranormal knowledge. Not here will we find, as
we do in Bois, talk of meditation, of holistic communication and

empathy, of "sensory deconcentration" as a way "of loosening the concentration involved in whatever we do in earnest."[54] Rather, Ornstein and Ehrlich offer the insight that events such as "dramatic therapeutic techniques, fantastic 'cures,' and dramatic 'states of mind,' are, like vivid emergencies, overemphasized. This leads us to distort our perceptions of some of the most important institutions in our lives, such as medicine, psychotherapy, and religion."[55] To them, meditation, for example, is an archaic exercise "which was meant for a particular community in another era" and is now offered "via mass indoctrination to everyone."[56] Here, in Ornstein and Erhlich's firmly entrenched secular humanism,[57] we find a skepticism and cynicism that almost directly contradicts many tenets of the previous three renditions of the same basic "filter" epistemological viewpoint.

An interesting version which in many ways spans the gap between these two viewpoints is that offered by Douglas Hofstadter in *Gödel, Escher, Bach,* which I turn to now in somewhat more depth than in the previous section of this chapter. "It was only with the advent of computers that people actually tried to create 'thinking' machines, and witnessed bizarre variations on the theme of thought," says Hofstadter. "As a result, we have acquired, in the last twenty years or so, a *new kind of perspective* on what thought is, and what it is not" (emphasis added)."[58]

When we try to understand Hofstadter's understanding of thought, we engage, at least according to his theory, in a kind of "quasi-isomorphism" or partial mapping of two key features characterizing the "brains of people whose style of thinking is similar—in particular, a correspondence of 1) the repertoire of symbols, and 2) the triggering patterns of symbols."[59] He likens this thought process to a *trip* we take through the networklike structure of our brains, a structure that is at least somewhat similar to his own brain. Major *towns* we pass through on this trip are the symbols that we activate. Somewhat facetiously, the author helpfully(?) presents a map of a tiny portion of his own "semantic network" (see figure 1.1)[60] so that we can compare our travels. In a Platonic-like quest for an ideal, he observes that our individual thought-maps are dependent upon "external, predetermined geological facts." "It is necessary to begin with identical external conditions—otherwise nothing will match."[61]
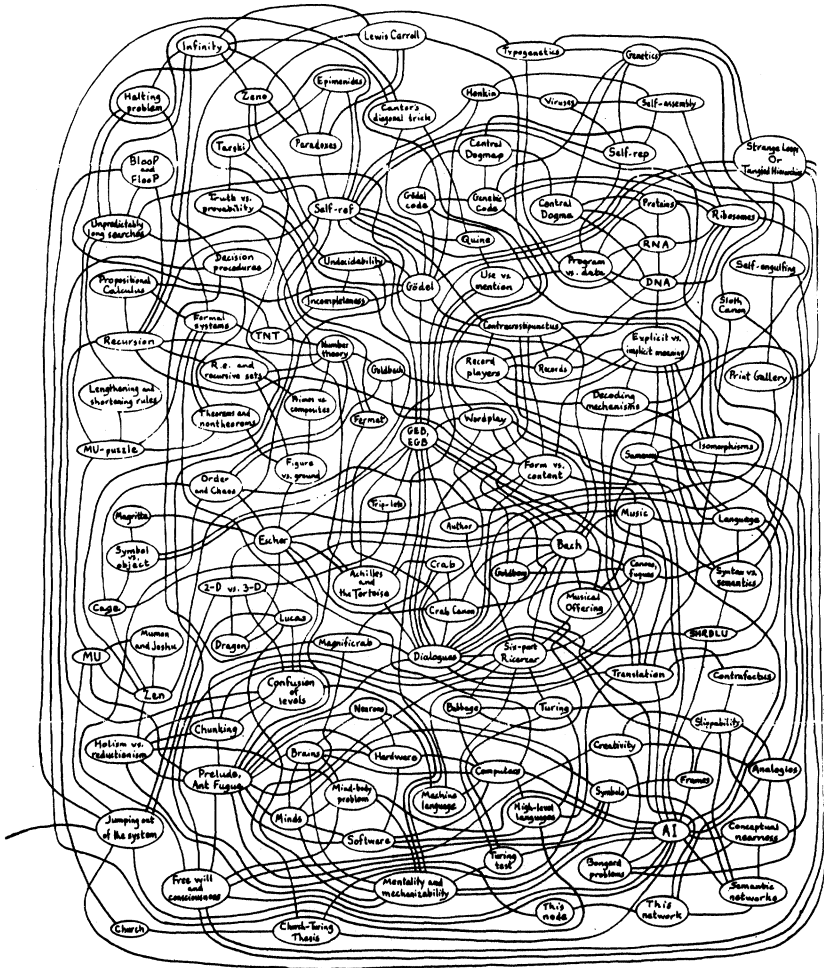
FIGURE 1.1
Hofstadter's Semantic Network

If enough towns or symbols are "visited" in the thought process, we activate a *subsystem*, which is then

> able to act autonomously, making use of some resources in our brains for support. By this, I mean that a subsystem symbolizing a friend can activate many of the symbols in my brain just as I can. For instance, I can fire up my subsystem for a good friend and virtually feel myself in his shoes, running through thoughts

> which he might have, activating symbols in sequences which
> reflect his thinking patterns more accurately than my own. It
> could be said that my model of this friend, as embodied in a
> subsystem of my brain, constitutes my own chunked description
> of his brain.[62]

In an analogy that I cannot begin to do adequate justice to,
Hofstadter likens this whole process to one of shared codes that
can be used by two or more distinct timesharing programs running
on a single computer.

The variations and subtleties that he draws from this theme are
as fascinating as they are incredible, and they often touch on philo-
sophical issues. The brain, he argues, functions on different levels
much like the different language levels of a computer (e.g., hard-
wired, machine language, assembly language, compiler language,
interpreters).[63] Sometimes levels can be mixed, as when a com-
puter operator forgets which language the computer is using and
types something that makes no sense at that level, though it would
make perfect sense on another. Some levels (the "higher" ones) are
more flexible than others, but, ultimately, they must "bottom out"
in "hardware." "This is a kind of primordial self-knowledge which
is so obvious that it is hard to see it at all; it is like being conscious
that the air is there."[64] Most of the time, we mix levels without
difficulty: reading a book, for example, requires us to read mean-
ing into sequences of alphabetic letters and more or less overlook
or ignore the hardware marks that make up the sequences. When
mixing levels does cause confusion, when we run up against some
"defect" of the mind, it is because of the hard-wiring way our
brains are organized. Yet somewhat paradoxically, it is this very
tendency to go up a level, indeed, to jump out of the system entire-
ly, which, though impossible, nonetheless "lies behind all progress
in art, music, and other human endeavors."[65]

A "self-subsystem" (which, like all subsystems, is both a com-
plex of symbols and a symbol in itself) can play the role of
"soul."[66] After all, when we are aware of our own thoughts, is that
not clear evidence that we are reading our own brains at the sym-
bol level?[67] Are we not, in some Zen-like sense,[68] attempting a sort
of self-transcendence? But this raises familiar philosophical ques-
tions. Who does the symbol-manipulating? Who is the activating
agent? "You cannot quite break out of your own skin and be on the
outside of yourself," notes Hofstadter. "A computer program can

modify itself, but it cannot violate its own instructions. This is reminiscent of the humorous paradoxical question, 'Can God make a stone so heavy that he can't lift it?' "[69]

Hofstadter's computer/brain analogy is, in many ways, mechanistic. Like Ornstein and Ehrlich, he focuses on physiological limitations and needs: at bottom is the "hardware." Yet his talk of levels is reminiscent of Leshan and Margenau's domains and, even more so, of the emphasis on the levels of abstraction that form the foundation of Bois's transactional theory. Here, too, are implicit and explicit references to the filter theme that runs throughout our earlier discussion: indeed, we find in *Gödel, Escher, Bach* one whole section devoted to the theme of "Finding Order by Choosing the Right Filter."[70] Furthermore, though he cautions against overstressing the role of language in molding thoughts (preferring, instead, to emphasize the role of culture in shaping thoughts),[71] his entire work concentrates on symbols and the extension of formal language systems into the realm of epistemology.

It is here, in his consistent interjection of formal mathematics into all realms of his thesis, that we find what I believe is the truly unique feature of his work. He interweaves this material in two alternating ways. First, he uses direct exposition, proffering a constant mix of formal mathematical theory and epistemological quest. Perhaps the following two short passages will give the flavor of this methodology.

> Stepping out of one purely typographical system into another isomorphic typographical system is not a very exciting thing to do; whereas stepping out of the typographical domain into an isomorphic part of number theory has some kind of unexplored potential. It is as if somebody had known musical scores all his life, but purely visually—and then, all of a sudden someone introduced him to the mapping between sounds and musical scores. What a rich, new world! Then, again, it is as if somebody had been familiar with string figures all his life, but purely as string figures, devoid of meaning—and then, all of a sudden, someone introduced him to the mapping between stories and strings. What a revelation! The discovery of Gödel-numbering has been likened to the discovery, by Descartes, of the isomorphism between curves in a plane and equations in two variables: incredibly simple, once you see it—and opening onto a vast new world.[72]

> We seem to be making a rather abrupt transition from brains and minds to technicalities of mathematics and computer science.

Though the transition is abrupt in some ways, it makes some sense. We just saw how a certain kind of self-awareness seems to be at the crux of consciousness. Now we are going to scrutinize "self-awareness" in more formal settings, such as TNT [Typographical Number Theory]. The gulf between TNT and a mind is wide, but some of the ideas will be most illuminating, and perhaps metaphorically transportable back to our thoughts about consciousness.[73]

One word in the last sentence quoted above gives a clue to the second major way in which Hofstadter weaves metamathematics, the theory of formal mathematical languages, into a metaphysics of knowledge. The word? "Metaphorically." Hofstadter is a master of metaphor. Not only does he fill his expository sections with analogies and likenesses, but he also begins each major chapter with a carefully constructed metaphorical dialogue between Achilles and the Tortoise (of Zeno's vintage) and assorted other characters. The purpose of this technique is, as he states himself:

> to present new concepts twice: almost every new concept is first presented *metaphorically* in a Dialogue, yielding a set of concrete visual images; then these serve, during the reading of the following Chapter, as an intuitive background for a more serious and abstract presentation of the same concept. In many of the Dialogues I appear to be talking about one idea on the surface, but in reality I am talking about some other idea, in a thinly disguised way.[74] (emphasis added)

Hofstadter's fictitious conversations are, in essence, "concrete visual" *bridges* bearing us over into the space of a "more serious and abstract" concept. When we read these dialogues, we may or may not be struck by the mathematics we find in them, for they vary considerably in the degree to which they explicitly express mathematics. But whether or not it squeezes through the filter of our previous experience, the mathematics is undeniably there.

Now, it seems to me that the root common denominator between all five of the metaphysical approaches discussed in this section is that they focus on *how* we see/think, rather than on *what* we see/think. It is as though we are but one step away from the abstract realm of what Plato called a world of Forms, and we decide that we are not really interested in immersing ourselves in this world, after all. What we really want to do is to take a closer look at the steps we are taking to get there. This is an "almost" meta-physics. It is a metaphysics that is not about metaphysics, but

about what connects our sense-world to it. It is, in short, a metaphysics about bridges.

Plato knew about this bridge, of course. He called it the World-Soul. Davies points out that the contemporary philosopher Walter Mayerstein "likens Plato's World-Soul to the modern concept of mathematical theory, being the thing that connects our sense experiences with the principles on which the universe is built, and provides us with what we call understanding."[75] While I agree that Mayerstein is "on" to something, I don't think he has it quite right. For while the mathematics is definitely involved in building the bridge, the bridge itself is better called a metaphor.

METAPHOR

The definition I like best of "metaphor" is one given by Sallie McFague in her definitive study on metaphorical theology: "a metaphor is seeing one thing *as* something else."[76] We "see as." We see God as father, and then all our actions are based on this way of seeing or perceiving. We see God as mother, and our actions change according to this way of seeing. The implication that I latch on to here is that metaphor is a way of seeing.

McFague's definition has both a narrow and a broad interpretation. Janet Soskice, for instance, tightens it up considerably when she quite properly (at least according to the dictionary meaning) restricts the setting of metaphor to linguistics: "metaphor is that figure of speech whereby we speak about one thing in terms which are seen to be suggestive of another."[77] Her emphasis here, and throughout her book, is that metaphor is a trope, a figure of speech, that is, a mode of language use and not a physical object, mental act, or process. However, Soskice later systematically loosens this restriction in effect if not in actuality when she claims a meaning for "model" that, so far as I can tell, virtually replicates that of "metaphor" except for this purely linguistic restriction. "Our suggestion," she says "is that model and metaphor are closely linked; when we use a model, we regard one thing or state of affairs in terms of another, and when we use a metaphor, we speak of one thing or state of affairs in language suggestive of another."[78]

Others, less linguistically oriented, are more willing to broaden the basic sense in which they use the term, usually by avoiding or

sliding over its purely literary context. Colin Turbayne employs a broad definition as "the presentation of the facts of one category in the idioms appropriate to another."[79] Donald Schon, in *Invention and the Evolution of Ideas,* uses the term in a wide sense that includes what others call model.[80] Robert Romanyshyn says that a "metaphor is a way of seeing something through something else."[81] The emphasis, for Romanyshyn, is on the *through*. "A metaphor . . . is not essentially a way of seeing how one reality is *like* another. It is a way of seeing one reality *through* another. Its resemblance, if we should call it that, is the resemblance which a reflection bears to the reality of which it is a reflection. It is not a real (factual) resemblance but a resemblance where likeness is a difference."[82] Behind this seemingly contradictory statement lies Romanyshyn's thesis that reality itself is "originally metaphorical, and its data are not facts, but metaphors."[83] According to his vision, the human psychological life *forgets* this metaphorical nature of reality.

An example Romanyshyn uses to illustrate his thesis deals with Isaac Newton's discovery that light is composed of a rainbow spectrum of colors. The spectrum of light that Newton saw by dispersing sunlight through a prism (i.e., by "seeing" in a specific way) "explains" the ordinary rainbow in the sense that the

> rainbow is the spectrum in the world. The refraction of the daylight sun, the visible evidence that the spectrum lies *in* nature.
>
> It requires, however, only a brief reflection to realize that this . . . point is not quite acceptable. Although the spectrum may explain the rainbow, the rainbow *is not* the spectrum. Or, to be more precise here, the rainbow *is* the spectrum, provided that this "is" is understood as a metaphor. In other words, the statement is correctly understood when one comprehends that it indicates *a way of seeing*, and not simply something to be seen. "The rainbow is the spectrum" is a prescription about *how* to look . . .
>
> . . . the spectrum is there neither *because* nor *before* Newton looks, but *when* and in relation to *how* he looks. This acknowledgement . . . illustrates the temporality of human experience, a temporality which is marked by the passage to the literal from the metaphorical. A reality which originally appears metaphorically is forgotten and as such becomes a literal, empirical fact. A spectrum which is also a way of seeing becomes only something to be seen.[84]