

**BEING ON EARTH**  
**Practice In Tending the Appearances**

Georg Maier  
Ronald Brady  
Stephen Edelglass

SENSRI / THE NATURE INSTITUTE  
Saratoga Springs, New York • Ghent, New York

*Being on Earth: Practice In Tending the Appearances*  
Copyright © 2006 SENSRI

All rights reserved under International and Pan-American Copyright Conventions. Published in the United States by SENSRI (Saratoga Experiential Natural Science Research Institute) and The Nature Institute. You may copy this book for non-commercial purposes.

SENSRI, 23 Hutchins Street, Saratoga Springs, New York 12866.

The Nature Institute, 20 May Hill Road, Ghent, New York 12075.

## About the Authors

After taking his Ph.D. in physics in 1960, **Georg Maier** spent about seven years doing nuclear-based research, particularly in the field of neutron optics. From 1969 to 1998 he worked at the Research Institute of the Goetheanum in Dornach, Switzerland, pursuing investigations in many fields of physics and publishing numerous papers. His text, *Optik der Bilder*, is currently being translated for publication in English. Now retired, he continues his researches in Dornach, where he lives.

At the time of his death in March, 2003, **Ronald Brady** was a professor of philosophy teaching in the School of American Studies at Ramapo College, Mahwah, New Jersey. Having taken a B.S. in literature from the University of California, Berkeley, he did his Ph.D. work in philosophy at the State University of New York, Buffalo. Brady authored papers in both science and philosophy, and contributed to books on epistemology and evolutionary biology. Some of his papers have been gathered at <http://natureinstitute.org/txt/rb>. He was both a founding member of SENSRI and an affiliate researcher of The Nature Institute.

**Stephen Edelglass** graduated from MIT (B.S. and M.S., mechanical engineering) and the Stevens Institute of Technology (M.S., physics, and Ph.D., metallurgy). He was professor of mechanical engineering at The Cooper Union for the Advancement of Science and Art before assuming a position as Director of Science at the Threefold Educational Foundation (Chestnut Ridge, NY) and faculty member in the Sunbridge College graduate program. He authored several books in materials science and philosophy of science, and contributed a number of research papers in materials science, epistemology and pedagogy. He was the recipient of a National Science Foundation Faculty Fellowship. He died in November, 2000, before the writing of this book was completed.

## Contents

### Preface. How This Book Came About.

### Chapter 1. Direct Experience (Ronald Brady)

Memories of a Wrong-minded Student  
Being Serious  
Direct Experience Examined  
First Doubt: Do the Senses Discover or Manufacture?  
Second Doubt: The Power of the Mind to Combine  
The Power of the Mind to Attend and to Intend  
The Modeled Relation of Subject and Object: The Historical Problem  
Our Senses Bear Witness to an Encounter  
I “See” by My Understanding as Much as by My Eyes  
Experience as an Object of Attention  
“Who Hath Measur’d the Ground?”  
My Activity Produces the Stable Object

### Chapter 2. Sense Perception as Individual Experience (Georg Maier)

Berkeley’s Approach to Vision  
Optical Appearances Need Not Be Representations of Material Bodies  
Critique of the Concept of Rays  
We See Images, Not Solid Objects  
How We Normally Associate Vision with Physical Depth  
Stereoscopic Vision Can Direct Our Movements in Body Space  
Combining Perspective and Stereoscopic Vision in Movement  
Pure Objects of Sight as a Limiting Case  
A World of Light and Color  
Objects of Sight as Straightforward Physical Quantities  
Outness Proper: Extension into Which We Move Our Bodies  
A Set of Exercises in Perceptual Activity, in Attending, in Encountering

### **Chapter 3. Reflections Upon a Pond (Stephen Edelglass)**

A Pond as Space Creator  
The Spatial Character of Mirror Images Seen in Water  
The Law of Reflection

### **Chapter 4. Intentionality (Ronald Brady)**

I Believed the Column Was of Solid Granite  
Everyone Has Intuitions But They Confuse Them with the Senses  
Exercises in Attending: (1) Taking Notice  
Exercises in Attending: (2) Attending to the Focal Point  
Exercises in Attending: (3) Ignoring and Attending  
Recognizing  
The Hidden Image  
Kanizsa's Undepicted Forms  
Activity and Consciousness: Discovering Meaning  
Bring Me Any Worms That Sneer at You  
Intentionality

### **Chapter 5. A Physicist Discovers Aesthetics (Georg Maier)**

About Playing  
Crystal Set  
Electric Bell  
Chemistry and Physics  
You Are No Good at Chemistry  
Diploma Thesis  
Alternative Research  
Neutron Optics at Nuclear Reactors  
Watching Waves: An Exercise in Observation  
A Search for a Characteristic Gesture for the Reactor Process  
Discovering Aesthetics: The Hidden Aim of a Long Journey

## **Chapter 6. Aesthetics: Appreciating the Appearances (Georg Maier)**

Appreciating as a Mode of Cognition  
Aesthetics: A Mode of Cognition Complementary to Logic  
Skilled Expression of the Truth  
Aesthetic Cognition Happens During Perception  
Levels of Intentional Activity  
First Level: Orientation in the Physical Surroundings  
Second Level: Meeting an Expressive Whole  
Third Level: Accompanying  
Three Senses Mediate Aesthetic Cognition

## **Chapter 7. The Rite of Spring (Stephen Edelglass)**

## **Chapter 8. Manifestation from Inside Out (Ronald Brady)**

“Yes, Somehow the More Beautiful Object is Always the More Intelligible”  
Appreciating Some Examples of Historic Architecture  
Brancusi  
The Evolution of Phenomena

## **Chapter 9. The World Inside the Human Being is the Inside of Nature**

(Text by Rudolf Steiner and commentary by Georg Maier)

## **Chapter 10. Habitats (Georg Maier)**

Connectedness: A Summary  
The Inseparable Connection to the Surroundings  
Physics  
Appearances Resulting from Conditions Cooperating in the Present  
Rocks and Minerals  
Even Organisms Appear as the Environment Calls for Them  
Farming  
Animals Behave According to “Image Habitats”  
Human Detachment from Sense Perception Allows Attachment to Ideals  
Nevertheless, We Are Supported by Our Own Singular Biographic Habitats  
Outlook: Individual Recognition

### **Chapter 11. Existence (Georg Maier)**

Encounters and Their Consequences  
Encounters in a Fairy Tale  
Existence in Letting the Appearance Appear  
Contingent Events  
On the Artistic Nature of Tasks  
Turning the Inside Out and the Outside In

### **Chapter 12. Company (Georg Maier)**

Searching Inside and Outside  
Can Habitats Be Recognized as a Reality?  
Appreciation: Recognition and Integration  
Accompanying and Being Accompanied  
Biography as the Work of Company  
How the Turn in My Path Came About  
Company in a Single Encounter  
Company: The Realistic Concept of Society

### **Chapter 13. Schooling Perception (Stephen Edelglass)**

### **Bibliography**

## How This Book Came About

The subtitle of this book—“Practice In Tending the Appearances”—has two meanings:

You are being offered practice in *tending to*—looking after and heeding—the appearances.

You are also invited to *intend* the appearances. The meaning of “intend” is illustrated every time you make a choice.

In the early 1980s Stephen Edelglass, along with John Davy and Hans Gebert, was working on a book whose aim was to reimagine science. But Davy died in 1984, and for some time the manuscript rested in a drawer. Eventually Stephen got Georg Maier involved in writing, and the result was eventually published in 1992 under the title *Matter and Mind*, then republished in 1997 as *The Marriage of Sense and Thought*. In the preface to this second edition, Stephen wrote:

While the first edition was well received, readers did not always notice that a truly phenomena-based science has radical implications for understanding sense experience and the world of phenomena. The present revised edition is an attempt to remedy that situation.

In order to set forth these “radical implications” more fully and explicitly, Stephen and Georg began to think of writing an entirely new book. And Ron Brady, who had pursued a deep and precise understanding of sense experience, was an obvious collaborator for the project. Two of the tentative titles, taken from a 1997 outline, suggest what was aimed at: *Giving up Metaphysics* and *Modern Esoteric Practice*. By the way, in those days Stephen was already convinced that Steve Talbott would be the ideal editor.

In 1997 they began to write. Stephen aimed at applying the phenomena-based approach in education. Georg tried at first to write about the meaning of “esoteric,” but this turned out to be much too historical and was scrapped, just as a chapter on afterimages and allied effects. Those philosophers of appearance with the B-names: George Berkeley, Alexander Gottlieb Baumgarten, and Heinrich Barth became his theme. Ron was writing up his work on



intentionality, grounded in phenomenology. Drawing from Steiner and Barfield, Ron had consciously recorded his own experience in creating the appearances on a daily basis. The dialogic relationship between the individual mind's active thinking and the world became his central focal point. In this way, a philosopher of science joined the two physicists.

In July, 2000, the authors, reinforced by Hanna Edelglass, Michael D'Aleo, and Johannes Köhl, discussed the project at a meeting in Saratoga Springs, New York, at the end of which the themes the authors would work on were fixed anew. The tentative title now read, *For the Time Being*. We decided that each author should begin his contribution with a biographical essay, as Ron had done. But then Stephen fell ill in the fall of that year and died on November 17, 2000. Thanks to encouragement by the supporting group, Ron and Georg were able to continue their work. Michael D'Aleo took over project management on behalf of the Saratoga Experiential Natural Science Research Institute, SENSRI.

All of those participating (now also with Ellen Dolgin and Christa Maier) met in 2001 in Saratoga. There a new outline was created, with chapters by Ron and Georg, as well as chapters already written by Stephen. Then there was a meeting in 2002 in Switzerland, where each chapter was read and discussed, and suggestions and revisions were considered. By the end of that series of discussions we fixed August 15, 2003, as the target for completion. Hanna had by now formulated the title, *Being on Earth*. Ron would come to see Georg the following March, by which time the outlined plan was to have been carried out. When Ron arrived, they were able to agree that the outlined plan was indeed basically achieved; but then, on March 27, 2003, Ron suddenly died at the Goetheanum in Dornach, on the way to the auditorium where he was to give a talk.

In keeping with the target date, the manuscript was put together with Michael's help in the beginning of August, 2003, in Saratoga Springs. The manuscript could now be read by those interested in it. For some years, Michael had been intensively looking for an editor, but no one had agreed to do the work. Moreover the book was now an orphan, being an American book without a living American author. It was really in need of being adopted. With this in mind, Hanna, Michael, Christa, and Georg went to visit Henrike and Craig Holdredge and Steve Talbott at the Nature Institute in Ghent, N.Y., on August 7. To our surprise, Steve volunteered to work through the manuscript with people at the Institute, finding out where things are not yet plausible to the reader, and since then a lively and productive correspondence between him and Georg ensued, mainly from 2004 to the fall of 2005 when we deemed the manuscript to be finished.

The manuscript has been slow in evolving. The logical next step would have been to look for a publisher, and it became apparent to us that publication was still far ahead. And at this point

we have decided to try out the still rather novel variant of an electronic publication on the Internet.

This introduction may be taken to be an integral part of chapter 12, “Company.”

*Ellen Dolgin, Hanna Edelglass, Georg Maier, Michael D’Aleo, Steve Talbott*

## 1. Direct Experience

Ronald Brady

The term “experience” seems to be necessary for any modern English speaker—we continually find that there can be no substitute for the notion. After all, “experience” contains our only evidence of the world, or rather, our only evidence that anything really is, which makes it fundamental to our sense of reality. The term itself derives from a Latin original meaning “test” or “proof.” From the Latin past participle we get the term “expert,” and every entry under “experience” in the Oxford English Dictionary implies the same positive handle on knowing. And in English, an idea, no matter how abstract, must be “sensible” if it is to be considered at all; the underlying reference to experience is linguistically applied to distinguish between “sense” and “nonsense.”

This is why it seems so odd, and so disturbing, that today “experience” often bears exactly the opposite connotation. “Of course, I can only speak from my own experience, but ...” or “Our experience of the matter differs,” which reduces the meaning of the term to something as relativized as “point of view.” Even if the dictionary has not yet caught up with this usage, the average speaker finds it totally familiar. But the odd dissonance this reversal of meaning can create is another matter. Empirical science, for example, should be based upon experience, if we follow the etymology of “empirical” (from the Greek for “experienced”). I suppose most scientists would still claim that it is. But when the uninitiated attempt to come to grips with the actual practice of a “hard” science, they find that the authoritative language has moved from the positive knowing of the first meaning to the subjectivity of the second. And I speak from experience.

### *Memories of a Wrong-minded Student.*

When I began college as a chemistry major, my enthusiasm for science was somewhat dampened by meeting a professor of chemistry who pointed out the difference between my own goals and those he, as an experienced professional, would call mature. My passion, he noted, was entirely focused on direct experience. My sense of chemical change was invested in sensible

qualities: in smells, colors, the effervescence of liquids, the appearance of precipitates, the light and violence of flame, and so on. But, he countered, this was probably closer to medieval alchemy than to chemistry. Chemistry is really a matter of molecular and atomic events of which we can have only a theoretical grasp. By contrast, the sensible experience on which my excitement centered was secondary—it was not the external reality but merely the effect of that reality on the human senses.

I was reminded of this professor when I later spoke to a morphologist at Berkeley about my interest in Goethe's attempt to approach science by keeping to direct experience. The morphologist responded: "You are interested in this approach because you are a nature appreciator, while I am a productive scientist." I left his office feeling very deflated. Again a representative of science had put his finger on my immaturity.

I hope the reader can feel some sympathy for my situation. One of the difficulties with scientific accounts of the world is their apparent insistence on an "objective" reality that cannot be directly experienced, with the resulting demotion of experience—what our senses make out of the world—to a mere show that differs substantially from "what is really there." This is something we all know and do not think about very much. When I entered college as a chemistry major this line of reasoning did not distress me greatly, despite the professor's warning. I had no serious difficulties in basic chemistry and positively loved "qualitative chemistry"—a course given completely to the analysis of unknown compounds, in which sensible qualities like the colors of precipitates were important for the detection of elements.

Arriving at "quantitative chemistry," however, I entered a realm where everything was done mathematically and the mathematics themselves were grounded in an imperceptible molecular world that we could access only by theoretical models. (Years later I discovered that one could teach the course by deriving the mathematics directly from the experienced phenomena, but this is almost never done, and no one showed me the connection at the time.) I now found that the chemistry professor with whom I had my college interview understood my problem better than I did. My first reaction was to feel the world of chemistry, which had previously contained some of the most beautiful and mysterious experiences of the natural world, now becoming gray, dry, and lifeless. My second reaction was to leave chemistry.

By the time I arrived at Berkeley I was a graduate student in literature. The morphologist had it right—I was an appreciator, and even, as the chemist had feared, a romantic. After all, I now read Wordsworth, Coleridge, Keats, Shelley, Schiller, and Goethe and took them seriously. I suppose I knew that these writers often appealed to a criterion of significance that was both rooted in direct experience and "merely aesthetic," by which most scientists would understand "merely pleasing." But unlike my original mentors I still didn't understand how this sort of

corruption disqualified me for science. When I came across Goethe's scientific works, I became fascinated with his insistence that one need not depart from direct, sensible experience in order to do science. But when the morphologist pointed out that this interest made me a "nature appreciator," the words seemed to invoke an equivalent of original sin. For a moment my "appreciation" appeared as an entirely subjective act—an assignment of value based on my own pleasure that had no meaning for scientific truth.

It was not long after the conversation with the morphologist—I was still crossing the campus—when I realized that something was wrong somewhere. What had happened to the first meaning of "experience"? I was standing at the edge of the eucalyptus grove. The massive trees towered far above me; their leaf and nut litter covered the floor of the grove. The morning sun was growing warm and the air was pungent with eucalyptus. I could hear birds and a buzzing sound from some unseen insect tribe. At that moment sensible reality seemed very impressive. Was this just my indulgence in appreciation? If I called these things "tangible" and "concrete," was my criterion merely aesthetic?

How common, I wonder, is this dilemma? In retrospect I wonder how many people come to some form of this question, perhaps more than once, but eventually drop the whole business. Surely that was the advice implied by my counselors. From the judgment that an interest in the sensible qualities of chemistry showed immaturity to the conclusion that a science based on immediate perception was merely "nature appreciation," my tutors presented a unified front. A modern education seems to produce a tolerance for the dissonance between the two meanings of "experience," and, most importantly, a willingness to switch to the subjective meaning whenever our experience, if taken too seriously, might bring us into conflict with accepted theory.

I have become more acutely aware of these things in the years since that Berkeley morning, for although I did not fully realize it at the time, at that very moment I switched from defense to offense. I could not escape the sense that the botany professor's remarks implied a serious error. Of course, we cannot claim importance for a viewpoint merely because we happen to like it—that is, "appreciate" it—but this sort of criticism simply cannot apply to the importance of direct perception. The immediate evidence of the senses is not a "point of view," and the first meaning of "experience"—the test of reality—is still valid. Even the scientist cannot afford to lose the ground of experience. I seemed to see it clearly. A mistake had been made.

I resisted the temptation to return to the Botany Department looking for a fight. I saw that the relation between the two meanings of "experience" had not been sorted out correctly, but I was not yet ready to defend my insight. For one thing, I did not understand how or where science, ostensibly based on experience, had demoted experience to a subjective status? Besides, how could a graduate student in literature presume to detect a flaw in so authoritative an

institution as science? Big game is hunted with big artillery. My training, it seemed, had left me unarmed.

Over the intervening years, however, I could not let the matter drop, although I began to suspect that current training left everyone unarmed. I proposed a dissertation on the crossover between scientific observation and aesthetic experience in Goethe's science. Naturally, the Literature Department wouldn't hear of it. Aesthetic experience, they repeated knowingly, is important to literature but not to science. With a certain sense of déjà vu, I left Literature. The people in History of Ideas were more reassuring. They were confident that Goethe's connection between aesthetics and science would make a good dissertation, *provided*, and they stressed the necessity of this, I would keep to the task of tracing influence. Whether Goethe was right or wrong in this matter could not be part of a historical discussion. When I balked, they sent me to Philosophy. The Philosophy Department said they were glad to get me. For how long? I wondered.

### ***Being Serious***

This book came to be written when two physicists and a philosopher compared notes. We all shared a distrust of the way direct experience was demoted in the sciences, but more importantly, we thought there was room to do otherwise and do better. Of course, this position was not easy to sell. After all, the development of mathematical physics was made possible by discovering a world that could be the object of *numerical measurement*—in Galileo's abstraction, a world inhabited only by *bodies* divested of all but “primary qualities” (shape, velocity, size, mass, and number). Galileo performed the feat of abstraction, but physics has pursued it since, and, like Galileo, has generally assumed that the resulting picture is not merely *a way* of looking at the world (a way that allows mathematical treatment), but *the way* of looking—the only true approach to the reality of the world that human cognition can make.

The enormous powers secured by this mode of investigation have produced such an overwhelming impression of success that its authority is beyond question. In one sense, the *truth* of the method is obvious. And yet the image of reality that the sciences have developed leaves out a good amount of the experientially known as uninformative—that is, *less than real*. This conflict has bothered artists and philosophers more than scientists, but it lies at the heart of our present culture. I doubt that anyone who has had any scientific education can escape moments when this dissonance is painfully felt. It is such a normal part of life, in fact, that it has become a

background condition for all we do and is hardly noticed until we come to one of those disappointing moments when, perhaps, an aesthetic valuation falls prey to scientific representation.

For all our familiarity with this conflict and our recognition of the authority of science, the three of us did not see the divorce of the scientific and the experiential as a demand of truth. Truth was indeed secured in the sciences, in the verifiable measures of physics and other sciences, but this accomplishment did not, to our minds, mean that the scientific world picture was identical with reality. The truth of a measure is not able to specify its meaning. Only a larger context can do that. Let me explain.

The opposition often felt between the view of much of science and the claims of immediate experience began with the Galilean split between the primary qualities and “secondary qualities” (direct sensations such as colors, sounds, tastes, and smells). The primary qualities are those that, in the Galilean argument, *cannot be divorced from the concept of a body*. The secondary qualities can be divorced, however, and Galileo, reasoning that they were not necessary to bodies, saw no other source for them but the human senses, concluding that “they reside only in consciousness” (Galileo 1957, p. 274). Descartes and Locke were in substantial agreement with this judgment, although they argued that a particular sensation—let us say a certain color—can only appear on a surface if the surface possesses the power of producing that color in the human sense organ, thus linking the color to the observed body. Yet the color itself still resided only in consciousness, for it remained the *effect* of powers possessed by the observed body and/or the sensing mechanism, and the effect need not resemble its cause.

And now a problem comes into view. It is impossible for a world possessing only primary qualities to appear sensibly, since the senses speak in terms of secondary qualities. The primary qualities are discovered through the senses as *relations* between secondary qualities, and must be abstracted from appearances by a mental act. (Shape, for instance, is seen only through variations in color and/or brightness.) Thus we know the world of physics only mediately, as it is deduced from the world of appearances, but the world of appearances is known more immediately, as it appears to experience. Indeed, the primary qualities are part of this experiential picture, but when they have been abstracted from it a great deal of the apparent world has been left behind, existing, it would seem, only as a mental picture in an individual consciousness. This is the *demotion* of direct experience spoken of above.

The effort to distinguish elements of experience in this manner, picking out and relating only those that belong to Galileo’s concept of bodies, must be recognized as a great feat of abstraction—one that represents, historically, an advance in human thinking. This is the very act that produced an object for mathematical physics. After all, the primary qualities are numerically

measurable, while the others are not. But to venture further and treat the resulting division as a distinction between what exists “externally”—independently of the observer—and what does not is another matter entirely. Here something has been added to the original distinction between primary and secondary that is not derivable from the distinction itself. We have no a priori knowledge that only the measurable is real (“out there”) and the rest merely subjective (“in here”). During the Renaissance, however, for reasons that pertain to the times, Galileo’s distinction was given just this significance. (For discussion of this historical development, see *The Marriage of Sense & Thought* by Edelglass, Maier, et al. 1997.)

Of course, for the Renaissance mind as well as the modern, the lawful mathematical relations revealed through measures testify to an underlying reality. This conclusion derives from equating the independently *real* with the *lawful*, a fundamental premise of Western thought. The equation of real with lawful, however, says nothing about what qualifies as lawful. Thus it does not follow that what is not numerically measurable is also not lawful. Yet this second judgment was added to the first, and the West after the Renaissance adopted a worldview that fosters a deep split between theoretical knowledge and experience. This view assigns external, lawful, and independent existence only to the world measured in terms of primary qualities. It demotes to a contingent existence, dependent upon the individual observer, everything left over after the primary information has been abstracted. This demotion is what I meant by remarking that the truth of the measure does not provide a context adequate for specifying the meaning of the measure. The discovery of a lawful reality permitting mathematical treatment says nothing about the remainder of experience that does not permit such treatment.

The assumption that “lawful” is identical with “measurable” is often entertained today and it still, for many thinkers, serves to distinguish individual subjectivity from independent reality. In general, scientific methodology still depends upon measurement of primary qualities, and, since those qualities are assumed to be independent of the observer, it uses methods of measurement that either omit the observer entirely (by substituting mechanical devices) or attempt to escape subjective variation by generalizing on the reports of multiple observers. Immediate experience is *individual*—not a good candidate for what is normally termed “scientific observation”—and far richer than its measured relations. So “scientific observation” represents but a small part of the original content.

Left over when the scientific information has been abstracted is the part of experience that, like colors or sounds, cannot be known *except* through direct experience. The majority position holds that a direct connection to individual human consciousness disqualifies this portion of experience from scientific investigation. But there is a minority position, and we have found a



historical thread of opposition to the majority position running from its inception in the renaissance to the present day. After all, an exhaustive equation of law with numerical measurement is a weak premise—hardly something that will stand up to direct experience.

### *Direct Experience Examined*

Before we examine direct experience, perhaps we should examine the viability of such “unscientific” investigation—that is, investigation of experience by experience. We are so accustomed to making another sort of investigation that it may seem perverse to suppose that the mere observation of direct experience could have worthwhile results, but I propose to make such observations, and to do so from the standpoint of the individual—a standpoint sometimes thought to impugn the resulting observations. Moreover, the following reflections, derived largely by a method of introspection, are claimed to describe a lawful reality. It remains to the reader to decide the truth of this claim.

When we look for the world it is always conveniently there, “at our fingertips” so to speak. But although it is so readily at hand, this very availability appears to depend upon several elements that belong to the observer rather than to the observed. This judgment does not demand any more information than any person has at his or her immediate disposal. Consider the following.

If you have loitered on the Berkeley campus, you may have come upon that towering eucalyptus grove mentioned above, and if you were moved to enter it, you probably noticed the dark, woody, nut-like objects scattered in the leaf litter. On occasion these may have drawn your immediate attention by falling through the leaves (registering hits on several of them) and reaching the ground with a small but solid thud. If you moved to investigate more closely, you found the nut somewhat smaller, harder, and more compact than an acorn, ridged and granular rather than smooth. When bruised, these little nuts give off a strong scent, a more potent version of the smell always detected in the grove. They are too hard to crack with your teeth, but if they are flattened with a stone and placed in the mouth, the scent is supplemented with a related pungent taste, which may quickly bring you to spit it out. All this information is immediately available and, except for the experiment on taste, has probably been collected by innumerable visitors to the grove.

If we look back at my account, however, we can find in it the imprint of something other than the grove. The naturalness of my investigation, its everyday quality, depends a good deal on the order in which the observations are introduced. The grove is, to begin with, visual. You can

see, or imagine seeing, the “massive” trees at a distance. Upon entering the grove, you may see the eucalyptus fruits in the leaf litter, or hear one fall through the leaves and hit the ground. Even in your imagination the grove is located by sight, our most distant sense, but sound soon joins the account, and I also mentioned scent in the first account above. Sight again guides our movement in touching, but once in hand the fruit reveals qualities that sight alone would be inadequate to investigate. At this close proximity, scent is noticeably more pungent than in the grove at large, and the close interplay between scent and taste that we experience during every meal leads me, if perhaps not more sensible people, to taste.

The description of my investigation is clearly structured by my tools of investigation, that is, my senses. This seems natural, in part because the senses that operate at a distance are utilized to establish a context and a purpose for those that can work only at close quarters. Of course, until I think about it, the sequence of the senses is tacit within an investigation that appears seamless. I am aware that I investigate those things that attract my attention, but I focus on them, not on how I investigate.

When I begin attending to my own part in the situation, however, the whole story seems to alter. As soon as I reflect that the “sights and sounds” of the place were forms of experienced sensation, I become aware that the seamless picture appearing to my understanding was actually received through very different sense reports, each of which lacked a reference to any other sense. Yet for my consciousness the eucalyptus nut, despite my experiencing it through several senses, was not partitioned. The unity of those reports—the fact that all the differing senses still portrayed the same seamless object—could not have been a product of any one of the reports, but must have been a product of *how I used or understood* them.

The more I pay attention to myself during my visit to the grove, the more I seem to have contributed to its appearance. Does this mean that my perception of the grove is compromised by my own contributions?

### ***First Doubt: Do the Senses Discover or Manufacture?***

The question arises from the usual model of perception, which assumes a clear separation between the objects independent of consciousness and the observing consciousness. This understanding of perception argues that an accurate description of external objects must be free of all qualities deriving from consciousness, which is why the observer’s contributions discovered in the preceding paragraph seem to raise a difficulty. There are, in fact, not one but two difficulties.

The first and most obvious occasion of doubt concerns the senses. We need only a brief consideration to reconstruct it. The human being is equipped most obviously with senses of sight, hearing, touch, taste, and smell (and perhaps others that will come under discussion later). While it is conceivable that other beings would bring other senses to the task, I must use what I have. But this admission seems to evoke a limitation. At least some part of this touchable, noisy, colored, and scented world is derived from my nature, rather than simply existing on its own. After all, color would not exist for an organism without a color-sensing organ, nor scent for one without an olfactory sense. Or are all these qualities (and perhaps others discoverable only by sense organs I do not possess) actually “there” merely waiting to be sensed? Do the senses discover or manufacture?

We may be able to gather evidence bearing on this question by examining an account first proposed by “the father of sense physiology,” Johannes Mueller (1801-1858). He formulated the “principle of specific nerve energies,” which proposes that the sensation received from a specific sense organ depends on the nature of that organ and not on the nature of the stimulation. Take, for example, the taste of salt that results when the tip of the tongue is mechanically stimulated by flicking the underside of the tip with your fingernail. The resulting salty taste is clearly not an indication that your fingertip is salty. In fact, if you smear it with honey before the test the results do not differ. As you can verify for yourself, a small amount of salt placed in the mouth seems to be generally noticeable, but particularly so at the tip of the tongue. Sugar, on the other hand, hardly registers right under the tip, but is quite noticeable on the top. Presumably the flicking finger stimulates the salt receptors that are concentrated on the underside of the tip.

Similarly, mechanical pressure on the closed eyelids, which compresses the eyeball to some degree, results in a complex show of light and color, often in vibrant patterns. (The experiment should be done with great caution to avoid eye injuries.) This much the reader may investigate directly. Physiology textbooks indicate that when mechanical, thermal, or electrical stimulation is applied to the olfactory nerve, the test subject detects scents. When such stimulation is applied to the auditory nerve, the subject hears sounds, and so forth. Each organ, it would seem, translates all disturbances into its own language, whether light and color or sound, scent, or taste, without regard for the nature of the stimulation. Thus, when I see a red flower, or hear a chord on the piano, the eye or ear has presumably received some form of original stimulation, but it seems that the resulting sensation need not resemble the original stimulation.

Evidence of this sort is often used to discredit the notion that the senses accurately reproduce an external world. But what is specifically attacked here is the content of direct sensation: brightness, color, smell, taste, sound, warmth, cold, and so on. The above discussion therefore brings into doubt the so-called “secondary qualities” of experience rather than the

“primary qualities” (shape, number, mass, velocity, position, and so on) which are all discovered by relations between sensations and do not partake of the qualities of sensation itself. Thus we arrive at the strategy of Galilean and Newtonian physics: if we leave out the secondary qualities of direct sensation and reduce our picture of the world to one describable by primary qualities only, the resulting account might present accurate information about the world as it is, with no distortions from the observer.

### ***Second Doubt: The Power of the Mind to Combine***

But just here we meet the second type of perceiver contribution. The astute observer will notice that to speak of the way things “seem” to the senses is perhaps to engage in a figure of speech. The senses may be involved in observation, but they do not constitute the observer. It is to us, rather than to our senses, that things *seem*. The senses fulfill their functions but they pass no judgments. To us “the world” seems colored, sounded, scented, and touchable—all of these at once. But since no one sense could have this impression, the multifaceted world can *seem* to be so only through the involvement of another part of our nature.

When I stood in the eucalyptus grove I was not confused by the multiple reports of my senses. Upon hearing the nut hitting leaves on its way down, I looked up expectantly at the trees and was rewarded with the sight of a bouncing nut, accompanied by those small thuds. I was able to coordinate sight and sound effortlessly, guided by my idea that such noise would necessitate a moving body, which would also be visible to the eye. Naturally, I also assumed that the quite noticeable scent of the grove would have an identifiable—a visible and touchable—source. While each sense organ presumably worked independently, my grasp of the situation was capable of unifying their reports to such a degree that I would momentarily forget that I had separate senses. Rather than experiencing some kind of combination of multiple reports, I experienced a seamless world, rich with multiple qualities. To me it was *this world*, rather than *my nature*, that appeared to possess all these different elements.

The “naturalness” of my description and the “ready-to-hand” quality of the things found in the grove were derived as much from this synthetic power as they were from the reports of the senses. I committed violence upon the observable world by asking you to break it into sense fragments in order to become aware of how dependent we are upon the working of multiple senses. But just because we gain this awareness, the power of the mind to combine the reports of several senses into a seamless world becomes apparent. Of course, it became apparent to

Johannes Mueller too, and for similar reasons. Any close examination of just what the senses deliver will detect the synthesizing agent that must coordinate the sense reports if these reports are to lead to a unified world.

### ***The Power of the Mind to Attend and to Intend***

In postulating a mental activity quite distinct from the specific energies of the senses, Mueller referred to the activity as “attention” or “intention.” It is our attention, he argued, that brings our sense experience into focus or allows it to drop below the threshold of consciousness by ignoring it. While listening to the combined sounds of an orchestra, he suggested, we can easily focus our attention upon one section, say the flutes, and immediately all other sections become background to their sound, a condition that reverses easily enough when we switch our focus to the strings and the flutes drop into the general background. The walker meditating upon a pressing matter does not hear the cries of street merchants. Even the pain of a serious wound, Mueller records, is sometimes unfelt when the attention is concentrated on some other point.

Of course, if something so capable of demanding attention as pain can fail to reach our consciousness due to our focus on something else, it seems quite obvious that other potential perceptions could also be overlooked. How often have I been asked how I could miss seeing something “right under my nose,” even though I had actually searched for the very item! We are all quite aware of this possibility, but it may escape our notice that the power to make things disappear could also be a power to make things appear. When someone redirected my attention, the previously unnoticed object suddenly appeared (gained notice) right under my nose.

The reader may recall other examples. When looking out on an open field by twilight, I am often distracted by what seem to be, in the periphery of my vision, dark figures moving in some manner. When I turn to look directly at them I find nothing more than the bordering trees, with perhaps swaying branches. But even when I know this and look out into the field once more, the dark figures may reoccur. I am aware that they seem to be a product of my mistaking something in the surroundings, but that confers no immunity.

A more expanded version of this experience, sometimes called a “double-take,” occurs when a first appearance is, on the second “take,” replaced by something else. This is the familiar instance of “I thought I saw, but found it was ...” or “She had her apron wrapped around her and he took her for a swan,” as I remember the popular lyrics of forty years ago. The perceptual double-take is the paradigm case of the connection between attention and the perceived appearance. In this type of experience I first see a situation in one way, in terms of one set of

relations, but within a very short period the field of vision is somehow rearranged, and I see the situation quite differently, in terms of another set of relations. Although I dismiss my first “take” as a “mis-take,” it is a mistake that I actually saw, and thus I came by an appearance (momentarily) by the grace of this mistake. In normal perception I do not notice any “taking” because my focus is upon what I perceive rather than my own activity in perceiving, and thus that activity, like anything else I do not focus upon, is allowed to drop below the threshold of consciousness.

When something goes wrong, however—when my activity is not transparent to its object but becomes somehow opaque, as in the first moment of the double-take—I become suddenly aware of my own participation in the result. As soon as I identify that first appearance as mistaken, I am aware that it was *my* mistake, which makes the second appearance *my* correction, something I can now see because I have changed my mental focus. A brief reflection on these results suggests that both moments of the double-take are products of my own activity, and this activity provides ways of looking—takes—without which neither could appear. If this description is even close to being correct, however, it seems possible that no perception can come to consciousness without a proposal of *relations* from the active perceiver, and these relations would include the primary qualities.

These two sources of doubt—the respective contributions of the mind and the senses to perception—haunt all modern thought. As we reflect on the fact that no perception can be innocent of perceiver contribution, it may seem that no perception can present its object as it really is, but only as translated into the language of the senses and that of the mind. “We can know the world only indirectly, from what our senses and mind make out of it.” So apparent is this conclusion that it has become ubiquitous in many fields of inquiry.

### ***The Modeled Relation of Subject and Object—The Historical Problem***

Let us reexamine the starting point of the preceding arguments, for they are all built on a single structure. In the model I evoked above, the perceiving subject and the perceived object are necessarily two separate objects in a world of material objects. Since subject and object are independent, perception takes place through the effect of the object upon the subject, or rather upon the sense organs of the subject. Such an influence must be detected through changes in the organs. But this very model introduces a qualitative break between the original stimuli and the resulting sensible picture, for the latter is found within consciousness, while the former is part of

the external world. Perception becomes problematic when we consider by what mechanical process the subject can gather an accurate picture of the *external* object through changes *internal* to the subject—that is, when we consider how this picture can be *independent* of the process of perception.

This difficulty applies to *any* form of perception, including that of our own bodies, for in sensible perception the receptive organ must be impressed by some independent stimulus, and must measure the stimulus by the resulting changes within itself. Once again the interaction of two independent entities, impinging stimulus and receiving sense organ, gives rise to a problem if the goal of the interaction is to discover the nature of the stimulus independent of the nature of the perceptive organ. Thus all perceptual events must be modeled on the very structure that is the heart of the problem—that is, given the interaction of two independent entities, how can one record the nature of the other independent of its own nature? The problem as stated is inescapable, which is why we should make sure we have formulated *the right problem*.

How did we come to know there is a problem of perception? That is, how do we know that perception entails the interaction of two independent entities and that the encounter is detected by sense organs which record it through internal changes? Is this not a conclusion that requires perceptual knowledge? Discussions of perception often model the situation in terms of a knowable subject and an independent and perhaps even unknowable object, but when we go about knowing the perceiving subject do we not labor under the very same difficulties that call our impressions of the object into doubt? After all, to be known, the subject must be object to itself and to the process of perception. Thus knowledge of both subject and object is called into question by the same arguments, but it is just such “knowledge” that we must take for granted in order to construct the problem of perception. We must know enough to specify the existence of both observer and observed, and to specify their independence, in order to generate a problem of interaction.

The “problem of perception” is largely derived from the mechanical model of perception, but most discussions of the subject take the model to be beyond question. This seems surprisingly forgetful of the knowledge claims implied and the difficulty entailed in any effort to substantiate them. In order to *know* so much about the two independent entities of the model, for example, we would need sources of knowledge that the model denies to us, and, worse, I would have to know them prior to mounting a science (since the scientific methods used will be constructed upon the modeled relation of subject and object). The immediate perception of the apparent independence of subject and object is obviously made questionable by the difficulties discovered in the attempt to trace the mechanical chain of perception, which produces, among

other problems, the two doubts above. It seems obvious, therefore, that the model itself can only be hypothetical, along with the independent external objects that are supposed to lie beyond immediate experience.

A common response to these observations, common even from people in the field of perception studies, is that the original picture of the interaction of independent objects was learned through evolution or through the learning inherent in our early years, and it is therefore based on some sort of “common sense,” which, of course, is thought to be beyond question. Or, in the short version given to me by a scientist colleague, “I must believe that there is something *out there*.”

The naiveté of such responses is disturbing, for it suggests that the original assumptions are not open to question. Yet it appears clear that the model of perception is drawn from “knowledge” of the world that, according to the model, cannot be secured by perception. It is perhaps worth remembering that Immanuel Kant, who gave philosophic formulation to the “things-in-themselves” existing “out there,” pointed out that logically we could never know the nature of these hypothetical entities, *nor even whether they actually existed*. Our belief in them, he concluded, derived from the nature of our own thought. My colleague’s response, based on the *necessity* of belief, was properly Kantian.

Although the mechanical explanation of perception exhibits what might be termed “performative contradiction” (since it denies the knowledge claims that it is constructed upon), I am aware that a good many thinkers will not be willing to let the hypothesis go, hoping that some new twist of argument or new empirical information will remove the difficulty. On the other hand, if we *do not* attempt a third-person account, but investigate immediate perceptual experience on the basis of direct introspection, the situation looks quite different.

The performative contradiction is generated by the assumption of mechanical relations between object and perceiving subject that seem to deny the knowledge needed to form the model. But consider: if these relations are not assumed, there would be no reason to impugn the apparent truth of direct perception. Or perhaps this is another way of saying that we must not forget what we have already granted in getting this far. Obviously direct perception is in some sense accurate to reality, or we would have nothing to talk about here. Thus we can begin again, but this time from the assumption that our act of perception is an act of knowing, and our investigation can focus on how this takes place. The elements of this investigation will be drawn from experience, and unlike the “things-in-themselves” that provide the teleology to the usual investigation, they will consist entirely of either “things-for-us” or implications drawn directly from these. Approached in this manner, the act of perception appears somewhat unfamiliar.



### *Our Senses Bear Witness to an Encounter*

When my account of the grove came to a consideration of how I perceived the grove, it also came to difficulty. I had just written

...for my consciousness the eucalyptus nut, despite my experiencing it through several senses, was not partitioned. The unity of those reports—the fact that all the differing senses still portrayed the same seamless object—could not have been a product of any one of the reports, but must have been a product of *how I used or understood* them.

I came to a halt at that point because of the implication that the eucalyptus nut was not simply “photographed” by my senses, but was experienced through the effect of my own action on the report of the senses. My next sections examined the doubts generated by discovery of my mental participation in my observations.

The naive reaction to these doubts is to seek to eliminate or minimize the observer's contribution. Yet when we examine perception generally, no perceptual result appears to be innocent of such participation. Given any sensible situation, for example, we are not inactive, but meet the perception from a certain point of view, and therefore we must *choose* the focus of our attention—for one thing, we must decide whether to look toward the world or toward ourselves. Let me review my time in the grove once again. As I entered the grove in my original narrative, I was entranced by the nature of the objects, which were communicated in a “natural” mode, presenting a world ready-to-hand and available to me. But as I explored further in the above discussion, another pole came to manifestation. When I looked for elements of my own nature in the perceptual experience, the objective world seemed to recede, letting me fall deeper and deeper into the intricacies of the perceiving subject.

If we examine this transition more closely, it becomes obvious that the objective world seems to “recede” just because it is less and less the target of my attention. As my attention shifts to myself, the content of my perception seems largely a function of my own nature. Were we to go on in this vein, the world would recede even further and experience would appear to derive almost completely *from* the subject because it would be almost completely *of* the subject. For the same reason, my first experience of the grove appeared to derive entirely *from* the grove since it seemed entirely *of* the grove. In that mode of experience the activity of the self had slipped

below my horizon. Yet in either case this apparent isolation is produced by a kind of forgetfulness.

After all, however innocent of the perceiving subject the world may appear, that appearance always specifies something of the perceiver as well as the perceived. We must remember, for example, that if our bodies are parts of that same world, our sensible situation is always an interaction between two elements. Thus our senses bear witness to an *encounter*, not a fact viewed from nowhere. The visible picture that we have of any object can be achieved only from one location, and the same would hold for the quality of sound. The visible world is always structured as a “looked at” world, the world of touch is always “touched,” and all observations are “for” the conscious observer. Thus perceptual information on the perceiver is always given along with information on the perceptible objects. If we suppose that the appearances before us are innocent of our looking at them, we have forgotten something that should be quite obvious—namely, that the observer and the observing situation always appear with the observed.

In fact, neither the world nor the subject can become perceptible except under the conditions described; both are given, at least potentially, in the same encounter, but we choose which view to actualize, and our focus on one pole leaves the other pole in an implicit condition. This is true of all polar relations, as with the concepts of plus and minus, or affirmation and negation. One pole always implies the other and cannot be thought without that implication. So a perception of the world is grounded in a potential perception of the observer, and vice versa. The perceptual world is a whole. In any perceptual situation we are tacitly aware of the other pole of the experience, and the possibility of choice.

### *I “See” by My Understanding as Much as by My Eyes*

The notion of choice may seem unproblematic at first glance—we choose different targets for our gaze whenever we like. As I shift my gaze from object to object in the room, I simply move between objects already perceived, singling out first one and then another for closer inspection. But the sort of choice that is of interest here is the one we must make between *potential* rather than actual observations. Let me explain.

At the edge of a pond or lake you can find a zone of just the right depth to yield either reflections of the opposing trees or a view of the sandy or muddy bottom. When you attend to the bottom, surprisingly the reflections are lost, and when you view the reflected trees, you cannot see the bottom—but each is immediately available when you look for it. The images involved require a different focus of the eyes, and thus we may correlate the alternation with the

everyday experience of looking at something nearby, while the distant background blurs, and then something distant, while the foreground blurs. But in this case the two images are not adjacent but overlapping, and the difference of focal length is so great that each seems to disappear when the other is visible. (You can do the same thing using a piece of window glass as the reflecting/transparent surface, as long as the illumination of the area on one side of the glass is balanced with that on the other, as when you look through the window of a house at dusk.)

Now, I am aware that from an “external” point of view this example seems to show nothing more than the fact that a distant object cannot come into focus while our instrument—the eye or a telescope—has been focused for a near one. But look at the matter in another way. From the point of view of my experience, the situation is not at all simple. After all, no image is there *for me* until I notice it. In the case of the images available from the edge of the pond, I cannot obtain either reflections or bottom until I have focused upon, or chosen, them. If I seem to begin with one—say, the reflections—that is because I have already achieved the required focus, even if I did so unconsciously. Thus my own active participation, my choice, whether conscious or unconscious, is required. I had to look for the images to see them—there was a preparation.

Although we rarely notice such preparation, it is present, and can often be far more complex than the above example. Let me try another example. When standing on the edge of a shallow lake in bright summer sunlight, I spent some time watching the small waves (two and three inches high) on the surface. The water was so transparent to the light, and so shallow, that I could easily see the sandy bottom. I could also, by a slight adjustment, see the tall trees on the distant shore reflected on the surface. But here the surface waves introduced a third element, and I became interested in how I saw them. The water, as I remarked, was clear—so clear that the sandy bottom, about six to eight inches deep, was very bright and grainy. Since I was able to look right through the waves, almost as if they were not there, it was obvious that I could not actually “see” a wave as one sees opaque objects. Yet surely I was making them out by reflected light, even as I see the opaque objects of the world. But how? I became intrigued with the problem.

As I sit writing I have two examples of a similar nature in my room. To my right a glass-covered print hangs on the wall; behind me I can look into a large mirror. In both cases I cannot “see” the glass as I see other objects in the room. I see it rather by the reflections in it. (The reader should probably try looking.) I can see a lamp and the far wall reflected in the glass of the print. If I choose to do so, I can look into the depth of the reflection and make out details of the scene. But I can also “see” the glass by conceiving of a plane, immediately in front of the print, that holds the reflection. (I find that it helps to move, allowing the image to move within the

glass.) In this case I do not focus at the focal length of the lamp but of the glass. When approached in this manner, the glass is quite visible. The mirror is another problem.

Of course, the solution is similar, but this time there is nothing “behind”—only the invisible glass, but no print. When the mirror is clear, the glass is quite invisible, yet the concept of a plane that holds the reflection still works. The plane of the mirror seems to become visible whenever I look *at* it, rather than *through* it (at the reflected scene). When the mirror is clean, however, this plane is ghostly, a locus that holds the images, a reflective sheen, but something we seem to think more than see.

Compared to the mirror, the waves are far more satisfactory. The water was clear, but the surface reflected the image of distant trees. I found that when I looked at the trees the waves were nothing more than regular disturbances, running wiggles, in the image. There was no hint of three-dimensionality in these disturbances—they bent the trunks of the trees, for example, to the left and to the right. I could easily change the focal length of my looking and find the sandy bottom, which was relatively unaffected by the waves. But finding the waves themselves necessitated a change in the manner in which I followed the distortions mentioned earlier. Instead of looking to the mirrored scene, I looked for the surface, which I had to conceive as the locus of the disturbances. When I did this, the regular distortions became regular articulations of that same surface. That is, I was now grasping what had been a bending of the images *as a bending of the plane* that held them, and I was attending to the plane. The trees were immediately lost, but three-inch waves stood up and ran in toward the shore. As I switched from trees to waves the change was always startling. The waves seemed to grow out of nothing.

Focal length is merely a relation of physical optics, and we may model the situation mechanically in the way we model the operation of a camera. But the person who uses the camera already knows what the camera is to be focused upon, while an account of human perception must begin with the situation as it is *for us*, prior to the inception of our own activity. And, of course, prior to our notice the situation is simply not there for us.

In order that something be there to notice, we must choose a focus, and choice is a directed act. As I look out the window, for example, and change the focus of my eyes, moving in jumps from nearer to farther objects and back again, I must lead my activity by a concept of the distance. I must choose my mental focus, even as I must choose the focal point of my eyes, but the latter *follows* the former, for my eyes could not attempt to focus on what has not yet come to mind. By the same token, if I had not conceived the regular distortions of the mirrored images as articulations of a single plane, I would not have found the waves at all. *I see by my*

*understanding as much as by my eyes.* The crucial element in sense perception is the person using the senses.

The situations obtained by viewing shallow water are common enough, but asking the right questions about them can lead to uncommon insights. If I see by my understanding as much as by my eyes, then what is given to the eyes is not fixed, but can yield different things to different understandings. At the point of becoming mentally active (in response to a sensible situation), I am not faced with given objects (images), but with a set of potentials that require my action if I am to come by any image at all. Consider that alongside the pond I can, at will, translate the same complex of visual sensations into three mutually exclusive images. Such a claim does not contradict common experience; it only differs from what we usually notice in common experience. And besides, the everyday view of perception must ignore the *necessity* of dual focus when we use the sense of touch.

I am typing near a rather heavy brass lamp. When I reach out and take hold of the lamp it feels very solid and cold. But while still gripping the column of the lamp I can attend to my hand: I feel that my palm and the inner surface of my fingers are quite cold, and the hand is tensed against resistance—but while I hold this focus I do not “see” the lamp, I sense only my hand. Investigating further I find that as I place my hand on varied objects in the room I can achieve either focus—the object or the hand. Thus, in the same sensible situation, I can choose very different experiences. In daily activity I have occasion to switch back and forth between these two foci quite often, and sometimes quite rapidly. As I shift, I do not forget about the focus I am not activating, for I continually hold it, as it were, in potential. After all, I must understand their relation, or my body will be instantly endangered. Everyone masters this ability at an early age.

But notice that while the young child, or even the animal, commands mastery of this relation between the sensing organ and the object sensed, consciousness of *how* we manage the relation is not part of doing it. When we explain the feat we must recognize our own activity whereby we shift our attention from one pole to the other, integrating information from both in our total grasp of the situation. Thus the real genie within this bottle is the mental activity of intending, or understanding, without which the explanation would not make sense. But this activity, taken for granted in all moments of consciousness, is *an element usually unconscious in mental life*. Our usual picture of the world has omitted ourselves from that world. We perceive the lamp, we perceive the hand, but we do not also perceive the activity that alters focus. And thus we arrive at the notion that the lamp and the hand are simply there, impressing themselves on us through a mechanical process.

### *Experience as an Object of Attention.*

I have been arguing the nature of *experience*, but perhaps I am doing something unusual. Experience, as it is for us, is not a normal object of observation. We habitually focus not upon the nature of experience, but upon the object of experience, as that object is thought in the mind. Yet if the observations above have been recognizable, we *are* able to depart from an exclusive focus on the theoretical object and shift our gaze to the nature of experience itself. But experience as an object of observation must be distinguished from those objects common to the present empirical sciences.

Experience is necessarily “for” someone, and, of course, only that “someone” knows it directly. I am aware when I remember my experiences that they belong to me. It is only when I look closely, however—only when I am aware of the activity with which I meet the perceptual situation—that I am also aware *why* the result belongs to me. The multivalent quality of perception—our ability to find different things in the same sensible situation—links it to the activity of the subject in a manner absent from the usual reports of observation in the sciences. When I focus on “my experience,” I do not *mean* to observe a separable object but a phenomenon (visual, auditory, or otherwise) that requires my activity and that may alter as my activity does.

That alteration, if it happens, is always an alteration in how the given sensible situation is conceived, and therefore *represented*, for my perception represents the perceptual situation as I conceive it. This insight has been implied by everything examined above, for we all know that recognition (whether correct or incorrect) demands that we grasp a situation in specific terms. As I discussed above in the passage on the problem of perceptual double-takes, the most common perceptual errors contain a notion of thought: “For a moment I thought you were my brother,” or, “How easily is a bush supposed a bear.” Both perceptual error and perceptual success are inexorably tied to understanding, for my “experience” is also my representation of the situation in terms of my understanding, and this element of cognition may not be separated from the perceptual object.

Our common habit of representing the images about us as independent of our participation is itself a case in point. Although we understand that our senses (and mind, in a more sophisticated view) form and sustain the picture, we assume that we see *in* the picture what is independent of the picture. Of course the distinction is too difficult to maintain, which results in the working assumption that the images *are* the independent things. (However, we do not bring this

assumption to artistic images, and therefore have no problem with Magritte's painting of a pipe labeled, "This is not a pipe.") Thus our "normal" representation of the world—the way things actually seem to us—is as objects independent of any observer. But since this seeming is itself a representation, the contradiction revealed by the discovery of observer participation derives from the original framework of our representation. It does not come from the senses but from thought—it is our usual mode of understanding, or misunderstanding, that brings about the problem.

My arguments in this section are not intended to question the ability of human perception to discover reality, but only to undermine the usual assumptions about perceptual experience. I do not believe that perception is merely subjective, but I know that I will seem to be suggesting just this to the reader who takes perceptual images to be independent of their observer. When I argue that such a separation cannot be maintained, I am not judging the result by a view that models objectivity on separation, but trying to discard that model. After all, the goal was never entirely desirable. An observation—the tree standing there minding its own business—is made into an *experience* only by our claim of possession: "This happened to me; it is *my* experience." Only our individual and necessary connection to the observation provides any ground for testimony, and the testimony of experience seems to be our only basis for claims about the world.

### ***"Who Hath Measur'd the Ground?"***

The representation of the world as innocent of our own contribution leads to a certain manner of speaking of the world, and this discourse is perhaps more perfectly developed in natural science than anywhere else. After all, such science attempts to *think* the world as it is in itself—that is, independent of that thinking. Since experiential claims about the world manifest a necessary connection to the subject, they are not fully voiced in scientific prose. In fact the rhetoric of science is structured to distance the *report* from the individual making it. Any perusal of scientific papers will reveal the generalized use of the passive voice, designed to make the objects, rather than the investigator, the subject of the sentence. And as Alan Gross (*A Rhetoric of Science*) notes, the use of the passive voice appears to be increasing. He argues that

such change is a consequence of the social pressures that shape science in conformity to a worldview that has material objects rather than people as its center of interest. To say routinely, *I poured the distillate into the flask*, is to assume a people centered world; to

say routinely, *The distillate was poured into a flask* is to assume an object-centered world, the world of science.... (Gross 1996, p. xxix)

Gross predicts further that “the prose of science will evolve into an embodiment of its worldview,” and in this manner achieve greater efficiency and effectiveness within that context. The purpose of such stylistic devices is the elimination of the individual observer, but notice that in such prose a simple record of measures and procedures replaces *the testimony of a witness*.

Thus scientific reports concern themselves with *what* the measure is rather than *for whom?* These two questions have not been equivalent since the rise of the modern worldview with its preferred mode of representation. For such a worldview the conscious subject is necessarily “subjective,” that is, it bears no test of truth within it and thus requires external evidence to confirm its ideas. Were the subject to contribute to all perceptions, the resulting “evidence,” so it is thought, would be distorted, and perception would fail of its purpose. The notion that the two questions above cannot be separated therefore becomes something of a nightmare for the quest for objectivity.

On the other hand we all employ an idea of human faculties that does not fit this model. The testimony of a witness requires not merely a witness but a “reliable witness” who can be taken seriously, and the reliability depends upon the understanding of the witness. In the simplest case the witness must be capable of distinguishing, for example, visual after-images, motion after-effects, dreams, hallucinations, and a host of other oddities from the events on the street. Beyond such obvious problems lie the subtler distinctions we must make in order to “see” how fast an object is moving or tell what sort of sound we have heard or even what species of weed we have just stepped on. And the scientific observer in the laboratory must have the skills to make observations that only long practice can tutor. It would seem that the more carefully we try to “see” the world, the greater the perceptual skill and understanding required to perform the seeing. The usual presumption that the contribution of the observer to observation must be minimized to maximize accuracy to the “thing-in-itself” is apparently reversed here. Yet the notion that there are perceptual skills requiring long years of effort to perfect, such as the immediate recognition of species in the field or the detection of animal signs in the wild, is found in all cultures. Reliability, it would seem, is not derived from the measure, but only from the skill and intelligence of the person taking it. It is generated by *what we put into our observation*, not by what we take away.

Given the discussion above I do not see how we can avoid the conclusion that our activity precedes and prepares for perception—that is just the way it is. And so far in the examination this contribution does not imply any degradation in the accuracy of our perceptions. If anything,



it seems to provide a framework that makes perception possible where otherwise it could not be obtained. But if it is true that our own activity contributes the standards governing the act of perception, then this activity is even more fundamental than I have argued so far.

In Shakespeare's *Henry V*, when the Constable of France is told, in the night before the battle of Agincourt, that the English army lies a certain number of paces distant, he asks, sensibly, "Who hath measur'd the ground?" Implied in his question, of course, is not only who but how, since presumably the person would not be welcomed at the English end of the field.

The Constable's gentle skepticism is well taken, and I wonder if there is not cause for a similar response to the formulation of objectivity that has dogged this discussion from its inception—that is, the objectivity based on the independence of the object from observer contribution. Certainly the representation of an independent, unparticipated world implies the notion of "objective" treatment—it is built in, so to speak. But it is built in to the picture of the world in our thought, and that picture is supposed to be the result of earlier investigations. What were these investigations? Who has measured the ground?

### ***My Activity Produces the Stable Object***

I have already indicated the performative contradiction that arises at this point for the mechanical model. In our current terms, to "measure the ground" of perception requires knowledge that the reigning model of perception would deny to us. But now I want to approach the problem in a more positive manner. I remarked above that we must remember what we had allowed in order to get this far. Presumably we have some understanding of what we are talking about, and that understanding was gained by some measuring of experience. I think it possible to remember how this was done.

All modern accounts of perception seem to agree that the subject is *given* something other than thinking—other than mental activity—to focus that mental activity upon. I have referred to this element as the sensible situation, and it seems to me that "given" is a good term, for this situation is not produced by our own activity but simply *suffered* by the subject. But let me add that, according to my argument so far, the given element cannot yet be a world of recognizable things, for these can arise *only when I choose a mode of representation*. The things are not there *for me* prior to the activity of recognition (or representation) by which I come to realize that they are there.

Thus the sensible situation alone does not label these things for me—I must recognize them through my own act of understanding. And the fact that we do not begin with experience but must create it through our own activity on the sensible given alters the logic of the problem. (Obviously, as above, I have come to these conclusions by analysis after the fact. We are not directly conscious of a pre-experiential given, but understand its contribution by an examination of conscious experience.)

The activity preceding my discovery of a world cannot be random, but must contain certain standards. Even a relatively young child has the ability, for instance, to look again and correct the first impression. Any normal human being seems critical enough to understand, through the experience of looking again and in a different manner, that a second impression may correct the first, and a third, the second, and so on. But notice that a specific framework for subject-object relations is crucial to this enterprise. Our *default* understanding of the process by which we gain successive “takes” on a matter is that we are correcting our view of the *same* object, rather than substituting a different object; the object of perception is stable while our views of it are alterable. We search for such stability before we find it, and without this guide our own perception could not settle upon a stable world at all. Obviously then, this act of perception must contain firm parameters that *do not need* to be discovered before they can be used, or no understanding could ever result from it.

As one follows out the default position it becomes obvious that there can be no concept of a “search” unless there is subjective activity and a subject to whom things appear or seem. Without the understanding that I form my own impression, or take, of the situation, the changes of successive takes would deny stability to the intended target. On the other hand, my grasp of this “taking” *as my own activity* makes possible the stable subject-object relation and includes an understanding of truth and error, since implicit in the notion of a “take” is the possibility of error.

As I implied above, the notion of “correction” implies method, and of course my cognition must take place methodically in order to recognize, as well as to relate what has been recognized, or correct recognitions. But again, since this is a prerequisite of successful application, the “rules” guiding cognition are in place *prior* to learning anything from its application. Thus these directives would seem to be original with our activity. Intentionality evidently contains its own directive—we know *how* to understand prior to understanding anything. We must think *before* we can learn anything from our thinking (thinking in the widest sense of the term), and we must intend to understand before we do. Thus, the method by which all our thinking and intending is done already guides our efforts before they can come to a result—before, in fact, any consciousness of the objects of cognition arises. Here is another way to understand perceptual

activity: subject and perceptual object cannot be separated, but that fact is not pejorative, for *the test of truth resides within the activity of the subject*.

If this is so, then one more important point follows from it. I named two doubts above, but I have addressed only one—the problem of the contribution of the mind. I have left the senses without comment up to this point, because at this point their “problem” alters. Let me explain.

Galileo deemed the senses unreliable because the world of bodies, as he conceived it, could be abstracted from all direct sensations and treated mathematically without reference to the secondary qualities. Once he relegated the direct perceptual qualities to the human sense organs, they were only mediately useful in gathering evidence of the world beyond the senses. The search for stable entities is thereby restricted to entities lying beyond the sensible situation—to one kind of entity and one kind of stability—perhaps because this was the only world that Galileo could imagine.

Yet our original search for stability, from which all others must be derived, is addressed directly to the sensible situation, and were it to fail in that arena no other application could be conceived, for conscious experience would be lacking. The only test that can be applied here is our arrival, in direct experience, at a stable object of perception, and as we know, perception passes this test at every moment of the day. Therefore, when we begin from the apparent truth of immediate perception, neither of the doubts described above present any serious problems. Those sprung from an assumptive model.

## **2. Sense Perception as Individual Experience**

### **Pursuing George Berkeley's Thoughts on Vision**

Georg Maier

#### **Berkeley's Approach to Vision**

My interest in developing optics on the basis of sense perception was kindled when I read George Berkeley's "Essay towards a New Theory of Vision" of 1709. The essay was a firm and emphatic plea for an *experiential understanding of vision*. And Berkeley's views were just as controversial as those voiced by the wrong-minded student of the last chapter. He claimed, rather dramatically, that the "things of sight" are incommensurable with the "things of touch"; therefore, as perceiving beings, we inhabit two different worlds: a world of images appearing as we open our eyes and a world of tangible objects that our body's surface may detect when feeling direct contact to them. In moving our body to distant objects we find further "things of touch." Berkeley argued that, in contrast, the images we see are not perceived at any such distance from our body.

It is worthwhile to look into examples that seem to support his argument and also examples that seem not to uphold it. But in doing so we must be aware of Berkeley's philosophical aims. He was leading his readers toward a stance he would defend later: disbelief in the existence of a material world. Of course, we cannot adopt his views wholesale three hundred years later, nor need you fear that the following will be an excursion into the history of philosophy. I will not advocate Berkeley's notorious "immaterialist" doctrine. But it turns out worthwhile to take seriously his claims about the difference between seen objects and those given to the sense of touch.

Berkeley's assertions still come as a bit of a shock—as they are meant to. We are all quite sure we live in a world basically made up of touchable objects which the eye simply experiences in a different, non-touching sort of way. But Berkeley helps us to see a visual world that cannot be taken as the mere replica or re-presentation of a tactile one. Since this book is intended to spark interest in experience as such, attempting to come to terms with his claims may prove useful. At the very least it will enable us to become more familiar with the circumstances of

visual perception. Further, it will lead us to various non-tactile features of our optical interactions.

A reminder: *it is essential* to gain for yourself the experiences described in this chapter. Otherwise the text can have little meaning, since it is about your experience and not about a set of ideas. There are few printed illustrations here, since they would be inadequate to support the full-bodied experience we are after.

### **Optical Appearances Need Not Be Representations of Material Bodies**

Objects, or as Berkeley says, things or ideas, of sight need not be tangible. At sunrise, when the dazzling sun appears above the horizon, the world around me brightens. Turning away from the sun, I discover my shadow, which extends far out from my feet. I recognize it as the distorted image of my body. At the far end of my shadow I discover its head, which, incidentally, looks rather small. Under some conditions a bright halo radiates around the shadow's head.

If I close my eyes, all this vanishes. The "ideas of sight" are absent and I become all the more conscious of what I experience as "things of touch." Walking around, I feel the ground. Maybe it is a soft lawn. Stooping down, I touch the grass and, if conditions are right, I may feel the cool wetness of the morning's dew. Dew as a "thing of touch" turns out to be associated with the appearance of the halo as an "idea of sight."

If others are next to me, I will be able to compare their shadows with my own. Like mine, their shadows will be associated with their bodies. But it now becomes apparent that their shadow heads lack the splendor of my own halo. But if I dare tell them this, they are not impressed, since in their view *I* am the one missing a halo. Everyone will find the halo only around his or her own "head."

As we move around, our shadows accompany us. This, of course, is a truism. But it may seem a bit odd once we notice certain things about the seen landscape extending from our feet to the horizon. As we walk, we pass quickly by the seen foreground, while the far background, seen at a distance to our right and left, seems to be accompanying us. For the moment, it is enough to point out that, according to this foreground/background criterion, *our own* shadows, as "things of sight," act as if they belong to the distant background.

At this point, recall that your own shadow always remains opposite to the sun, regardless of your movements. And the halo stays fixed around the shadow of your head as you look at it. The shadows of our own heads, it appears, are rather special: in comparing them to, say, the shadows

of our legs, we can remind ourselves that our heads are the locus from where we look. And, as seen from there, my *own* shadow's head is directly opposite the sun! So at last we come to the conclusion that the "ever-so-bright halo" encircles the direction opposite the sun—the sun being a "thing of sight" at great distance and therefore belonging to the appearances that accompany us as we move through the landscape. Needless to say, other people's shadows do not satisfy this special criterion of being opposite the sun *as seen from my eyes*.

### *Critique of the Concept of Rays*

In Berkeley's time, illumination, shadows, and sight were already being treated in the framework of three-dimensional body space. One became accustomed to imagining light issuing from sources in the form of rays, as Newton had proposed. Rays were taken to be like straight lines. And such straight lines—of appropriate length—were taken to connect the seen objects with the eye. Then, as a matter of course, seen objects were taken to be at the corresponding distance from the eye.

We may arrive at the idea of straight-line rays by considering our experience in setting fence posts. One way to ensure that the posts are in a straight line is to set each new post by looking down the "line" of existing posts. In doing this we take a vantage point from which all the other posts almost vanish behind the one nearest us. Slight deviations from a straight line then become very noticeable. It will be the same if we look along a stretched string: closing one eye, we move our head as close as possible to the position from which the string's appearance will shrink almost to a point. Thus we should bear in mind that the straight line of sight will *not* appear to the eye as an extended line. Rather, the line reduces, for the person looking along it, to a *single point*. It is something like the vanishing point of perspective art.

The idea of straight-line rays provided the explanation for shadows in Berkeley's time. Shadows resulted where opaque objects stopped rays from hitting an illuminated surface, while neighboring rays could pass along an entirely transparent path. Similarly, vision was thought to result when rays from illuminated objects concentrated on the human eye. Given an opposite direction, these rays could be taken as rays of sight. Berkeley criticized this whole approach because it *strays from the original perspective of the observer*. *Rays seen from the side as straight lines are not given in sense experience*. Above all, we cannot see the lines of sight imagined to be the explanation of vision. Moreover, such lines would degenerate to a point when seen by the eye to which they are supposed to lead. Berkeley's argument now was that the length

of the supposed lines of sight is not a visible quantity. Therefore *distance* of the seen world from the eye is not part of what we perceive *directly* in vision.

### ***We See Images, Not Solid Objects***

Berkeley's admittedly radical view is perhaps best understood if we provisionally assign what is *seen* to a realm of its own. Instead of putting vision into a three-dimensional, or spatial, framework, he reminds us that the seen world as sensed by our eyes is given in the form of fundamentally *two-dimensional* images. As we turn our head, say, to the right, new visible content wanders into our field of vision from the right, while we lose sight of appearances we had seen on our left. If we continue to turn in the same direction, not only turning our neck, but swiveling our whole body, we may scan the entire panorama of our surroundings. After a full turn we will have covered an angle of 360°. In this way we may understand our field of vision to be of *angular extension* between left and right and also between up and down. Inside that frame we perceive *images*—Berkeley called them *ideas*—composed of different colors in different levels of light or dark. We will see that these basically given properties of vision may be modified in diverse ways. But if we are prepared to travel with him this far, we can well understand his ploy of contrasting the “ideas of sight” (or “immediate objects of sight”) with the “objects of touch” that give us our paradigm of solid spatial nature. For example, he notes that pure “ideas of sight” are not perceived as being a certain distance from the eye; they lack the dimension of depth. This lack may prove less perplexing if we keep in mind that we cannot perceive the length of the “rays” usually drawn from the seen object to the eye. (In more modern usage, one would say that such lines are not observables for the sense of sight.)

Since we are so deeply accustomed to locating percepts in the outside world—the world we explore by moving our limbs—we will at first be surprised by Berkeley's contention that seen images themselves are not located “out there.” He writes that they lack *outness* (§126). Using the appearance of the moon to explain properties of a typical “object of sight,” Berkeley wrote (§44):

Suppose, for example, that looking at the moon I should say it were fifty or sixty semidiameters of the earth distant from me [sixty is accurate]. Let us see what moon this is spoken of: it is plain it cannot be the visible moon, or anything like the visible moon, or that which I see, which is only a round, luminous plane of about 30 visible points [half a degree] in diameter. For in case I am carried from the place where I stand

directly toward the moon, it is manifest the object varies, still as I go on; and by the time that I am advanced fifty or sixty semidiameters of the earth, I shall be so far from being near a small, round, luminous flat [surface] that I shall perceive nothing like it; this object having long since disappeared, and if I would recover it, it must be by going back to the earth from whence I set out.

The visible moon as we normally experience it is an image seen while standing on the earth. And although on other grounds we may reasonably assign a body we call “the moon” to the realm of tangible, three-dimensional space, we cannot do this based on the visual image alone. Realizing this, we may take an interest in the more subtly differentiated understanding of vision proper that Berkeley is offering us.

### ***How We Normally Associate Vision with Physical Depth***

Of course, the seen world is normally taken to be “out there”—out there in the three-dimensional realm of touch space. In everyday life we successfully walk through complex spatial settings, for example through rooms with a lot of furniture, finding our way, say, to a chair. And we usually sit down on it without first touching it in order to be sure of its position. So vision guides us in a three-dimensional world in our daily life. In actual fact, however, little-noticed, non-visual sense percepts accompany the “ideas of sight” and relate them to touch space. In order to judge distance, we are supported by a number of effects that we will now explore.

a. When *moving*, we notice that things change in our field of vision. When walking on a paved sidewalk, watching our step, we are bound to see our feet stepping onto ever new paving stones. What we had seen in front of us comes nearer, only to pass by and vanish behind us. When watching the changing scene to our right or left, we find that things move past us at different speeds, the most fleeting ones being those nearest our path. We get the most solid impression of their form as we pass them. It is as if we were touching them from different sides in succession—as if what happens all at once in stereoscopic vision (see below) were now taking place in time. Looking out a side window of a moving vehicle while driving through a hilly area, we often get a vivid impression of the spatial structure of the landscape. All the while the things on the far horizon seem to accompany us, as if they were our true companions. As we change our direction, new escorts take over.

The truest—and the only escorts at sea—are, of course, the stars. While these do move in the course of time, perhaps we can consider the starry heaven to be one of the best examples of a



Berkeleyan “object of sight,” the moon being the most variable and most characteristic image in this context.

b. *Perspective* gives intimations of distance, since visible size decreases with distance. Looking down a straight avenue flanked by trees of uniform height, we will see their converging rows vanish into a point. At our end of the avenue, the limits of our field of vision will no longer allow us to survey a whole tree’s height, but instead details in a trunk’s bark or even the veins of leaves become apparent. It’s hard to describe this span in manners of appearance without alluding to distance. Berkeley argued that the immediate visual image is one thing, and what we infer as a result of perspective effects is quite another; the difference between the two should be respected. What the image of the landscape is said to imply (that is, distance) is an *interpretation* of the given (two-dimensional) visual percept, not an integral part of it.

c. Due to *atmospheric perspective*—the influence of a denser or hazier atmosphere—the colors of objects in the landscape change at a distance. Vegetation loses the quality of fresh green, and darker parts appear more bluish. Such effects again *imply* distance. But to judge distances correctly on this basis one must be aware of the effect of the sunlight illuminating the landscape: under a sky overcast by clouds, the effect of a slight haze will be similar in all directions, but this will be very different if the sun is shining directly, and all the more if it is not too high overhead. Then, when we look toward the sun, we will be looking directly at the shaded, darker side of any trees or buildings. These render a background in front of which we will readily see the haze that lights up most brightly in that direction. Grays will appear to dominate the scene. Conversely, when the sun is behind us the atmosphere will seem much more transparent; everything is directly illuminated and all object colors possess a striking clarity. Now it will seem that things are much nearer to us and it is hard to estimate their distance. It is as if a gauge for distance has been lost.

d. *Stereoscopic vision*, the effect of seeing things with two eyes that are set apart, gives us a feeling for the *spatial form* of nearby objects. We achieve stereoscopic vision by bringing the different images from our two eyes into at least partial coincidence. This also gives us a hint about the relative *distance* of nearby objects. This “sense” works in a rather hidden way; nevertheless, it is of great practical value in everyday life. You will immediately experience this when you close one eye, keep your head still, and try to pour coffee into a cup that someone has set a horizontal arm’s length away on the table. Under these circumstances, you will hardly dare to attempt this feat.

When looking at a scene of some depth with both eyes open, the difficulty arises that at any particular moment we can only make the two images we form coincide at a single distance. So

when holding up one finger, but looking past it at a person farther away, the finger will be seen doubled, and both views of the finger will seem partially transparent. But when choosing to look at the finger, we may notice that the person seen behind it now has doubled outlines. As soon as we close one of our eyes, all this breaks down and with it our ability to sense distance stereoscopically.

Stereoscopic vision not only signals distance; it also can convey the quality of full bodily solidity. Looking at my thumb with both eyes at close range, I will get just that impression. Two images are united, but they can be investigated separately by closing one eye at a time. And in comparing them I find that they differ; each is formed from a special vantage point, because the eyes are located at different positions.

As we have seen when changing our focus between finger and background, we can fix our gaze into space at will. While reading, you will be moving your attention along the lines of print, keeping your focus at the appropriate distance. But at any moment you can, at will, gaze through the page —now the lines of the text become chaotic; at the ends of the lines you can still see the words singly, while in the middle the text is definitely seen to be double. When looking *through* the text, you are focusing your stereoscopic organ at a distance at which there is nothing to focus on!

Now you are prepared to make a nice, but difficult, experiment: Your two eyes are offered two squares lying next to each other. Looking at them directly, you will first see two images. But then try to stare through the page as you did with the printing. As you already know, this will turn each square into a pair. And the farther away you direct your stare, the more the members of each pair come apart, until at last the left member of the right pair is superimposed on the right member of the left pair:

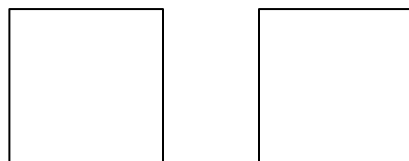


Fig. 1

There seems to be a very strong tendency to let the inside squares merge to form a single square in the middle. Having succeeded in *seeing the three squares*, now try the same thing when both squares contain a vertical line:

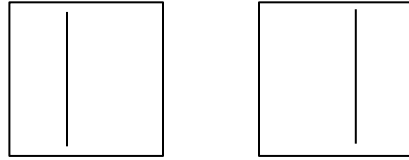


Fig. 2

The added line in the middle (third) square does not seem to lie in the same plane as the square! Perhaps you have noticed that the line appears to be *behind* the frame. When trying the next pair, pay attention to a change in the line's seeming location:

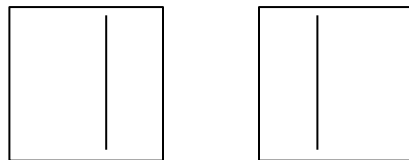


Fig 3

Here is a hint on how to understand what is going on in Figure 2. Suppose you are standing in front of a small window with your nose opposite its center. You are looking through the window at a pole some distance behind the window. Then the left square of Figure 2 represents how you would see the pole and window with your left eye alone when your right eye is closed. Similarly, the right square shows the view with your left eye closed. In merging the two views given to the left eye and the right eye, you have simulated this stereoscopic effect of depth. In Figure 3 the simulated situation implies a pole *in front* of the frame.

In Figures 2 and 3 stereoscopic vision produces from totally flat patterns the effect of *spatial depth*. For those who find this experience intriguing, I recommend Bela Julesz's *Foundations of Cylopean Perception* (1971). He doesn't make you struggle to look past them as I have, since his patterns are in blue and red. All you have to do is look at them through a red filter with one eye and through a blue one with the other.

In the examples, the two respective squares are set apart horizontally. When you begin to look through the page into the far distance, the images split up into pairs, which are again set apart horizontally. At the extreme, the two inner images come together and coincide as one. But

this is no longer true when you either tilt your head to the left or right, or keep your head upright and tilt the page. In other words, stereoscopic vision usually results from combining what our two eyes see from horizontally separate vantage points of equal height.

### ***Stereoscopic Vision Can Direct Our Movements in Body Space***

By now you will have become more familiar with stereoscopic sensing. You will have experienced that it depends on *merging* the two separate images our eyes produce. And in order to effect this merging you must allow your eyeballs to turn within the eye sockets. The nearer an object is, the more the eyeballs must swivel toward the nose. However the object needs to have a structure that lets you notice when the two images merge. As we will see, not all objects offer such a structure. As long as we hold our head upright, our stereoscopic sense seems to work on vertical elements that can be made to coincide when each eye moves appropriately to the left or the right.

A lovely experiment will let you experience this. Take an even, uniform wire or fishing line. (It must not have any kinks or marks on it.) In our experiment we will test how well you can fix a clothespin on that special clothesline. First, the line is held vertically by two assistants, one deep down, near the floor, and one standing on a chair with hand held high. Hold the clothespin in one hand and move it toward the line from one side. Usually this first task is easy to fulfill, and is completed in no time. You can sense the location of the line vividly.

Next the assistants hold the line horizontally at eye-level while standing far to your right and left. You must now move the clothespin toward the line from below. But you will find that the situation has changed radically. As the line is now devoid of visible structure along its horizontal extension; there are no elements for your eyes to concentrate on. The onlookers will only notice that the hand holding the clothespin hesitates, while it is the poor person doing the task who experiences the difference. The line remains at an uncertain distance. Most people will just have a try, hoping to be lucky (and some are). Others will “cheat” in an intelligent way: by moving their heads up and down, they try to get an impression of the line’s location—this trick depends on sensing distance from movement, as we described earlier.

After all the people involved have had their go, it will be worthwhile to think about the role of stereoscopic sensing of location. It does seem that in using it, we introduce a further “sense” to augment the sense of vision. And standing in front of the taut horizontal line one feels that this additional sense has suddenly *gone blind*. One might even concede to Berkeley that this new

sense is one of those that give appearances the character of “outness.” It gives the vertically held line the property of an “idea of touch,” which the line is deprived of when held horizontally.

### ***Combining Perspective and Stereoscopic Vision in Movement***

With both eyes open, look at a bunch of keys you are holding in the palm of your hand. Now move your hand farther away, to full arm’s length, and watch the keys. Still keeping your eyes on them, bring them back to normal reading distance and even a little nearer. In order to become accustomed to the effect, you can continue observing the keys as you move them back and forth.

Now close one eye and repeat the process a few times. In order to become more aware of what is going on, try to pay attention to how your hand appears as seen inside the frame of your field of vision. This time it will be striking how the keys grow in visual size, when brought nearer, diminishing in visual size while being moved away. This variation is an effect of perspective; the keys look smaller at a distance, just as we observed trees appearing smaller at a distance. But now we are seeing a difference in this effect, depending on whether we employ one or two eyes. The effect of changing distance is less striking when we watch our hand and keys with both eyes open. At shorter distances perspective seems to apply only when we close one eye. This may come as a surprise. It seems that in keeping both eyes open—that is, in using stereoscopic vision at close range—we lose the visual quality of perspective. At the same time, we gain a new quality, as if we were “seeing” the keys as “things of touch.” It is as if we could directly *see* body sizes.

In our experiment, we could experience that stereoscopic vision tends to conserve object size, regardless of perspective. As a matter of fact, many craftsmen are very good at estimating the size of relatively near objects, regardless of the exact distance. Consistent with Berkeley, we might say that there are certain spatial clues associated with vision, and these enable us to *interpret* the purely visual image as an in-depth “object of touch.” Stereoscopic vision, in combination with perspective, may provide such vivid spatial clues for nearby objects that the interpretation more or less becomes the direct perception. That is, objects appear to be the “right” size (an unvarying size) regardless of distance. We can emphasize the touch aspect, with its conservation of size, by focusing narrowly on the group of keys as an isolated object. And we can emphasize the purely visual aspect, with variation of apparent size, by attending to the frame of our vision as we move the keys back and forth.

### *Pure Objects of Sight as a Limiting Case*

Summing up, Berkeley's "objects of sight" are best understood as a limiting case or particular aspect of what we experience in the seen world. We may experience "objects of sight" best at the moment when one of the indications of depth loses its effect—when, for example, walking through a hilly landscape, we stop abruptly. As our view of the landscape suddenly freezes, the effect of changing perspective is lost and for an instant what we had just been experiencing as so obviously implying spatial depth just fades away. For a moment the scene seems to lose the *quality* of being at any particular distance. Then, of course, other clues to outer distance become effective and our desire to find ourselves as bodies in a world of spatial nature is again satisfied. We also experienced a loss of depth when we could not bring the clothespin to the horizontal line

When a scene does not forcefully suggest its spatial aspect, we tend to be irritated. Think of walking through the woods, almost in the dark, with the stars above your path. You may then appreciate what it means to lose awareness of the spatial structure of your surroundings. As for the starry sky itself, it is a purely visual scene; lacking all depth clues, we cannot participate in it other than visually.

### *A World of Light and Color*

I have the impression that Berkeley had a premonition of modern painting. Painters eventually discovered that by giving up naturalism they could liberate a purely visual content from any fuller representation of the natural world. Abandoning the attributes of spatial extension instead of emphasizing the likeness to familiar bodies in space, they defamiliarized the content of their composition, giving it the scope of an expression in its own right. And so they discovered ways and means of concentrating on a visual content. *Berkeley's "objects of sight" result from such a special, "purist" way of looking.*

We can deconstruct the usual result of perception in steps:

- In giving up movement, we allow our surroundings more of a chance to appear in a non-spatial manner.

- In giving up stereoscopic sensing of distance, we sacrifice a clue that lets us assign spatial size to a visual image.
- If we also refrain from interpreting what we see in terms of spatial objects, we have removed every condition that supports three-dimensional representation. Yet visual content remains. This is the content of Berkeley's "seen world."

Once we recognize that vision need not be confined to representing bodies in three-dimensional space, we may attend to other traits of the seen world. We may, that is, attend to the qualities uniquely sensed in vision: to *color* and the level of *illumination*. Such qualities will pervade an entire landscape. Thus, as the sun rises, slopes inclined toward the east are illumined, while shadows cover areas slanting west. A sunrise is by no means localized. As the day progresses—even into the night—the scene continues to be transformed qualitatively in ways we can describe with reference to direction, but without reference to distance.

What is true for the course of the day is true also for the development of plant life through the seasons. In the panorama that the sense of sight presents to us, we may participate in processes apparent in the whole of the scene. As the days grow longer and the sun rises higher in the sky and the air becomes warmer, new color permeates the scene. The tender, translucent green of newly sprouting leaves of the beeches accentuates the silver gray of the trunks that had been unobtrusive before. The seasons appear most characteristically in the changing coloration of the landscape, with gaudy autumn finally yielding to the blanket of snow that seems to turn the trees black.

### ***Objects of Sight as Straightforward Physical Quantities***

Most people would be surprised to learn that Berkeley's objects of sight are a valid starting point for a modern science of optics. We will show one aspect of this different approach, touching on the field of illumination.

While the "starry heavens" appear at night without needing any external light, the moon and the planets turn out to be illuminated by the sun, as we can conclude from their changing appearance in the course of time. The moon never shows its back side to the earth, and it shows us its whole front side in full illumination only at full moon. In astronomical terms, the moon is then in opposition to the sun, the two bodies being opposite to each other from a terrestrial viewpoint. At this time the moon appears as a circular disk bathed in sunlight. We could produce

the same “full-moon effect” on a tennis ball by holding it opposite to the sun and just outside the shadow of our own head. The other phases of the moon can be simulated by holding the ball at appropriate angles to the sun. If the daytime moon is present in the sky when we are trying this out, we can duplicate the moon’s phase on the tennis ball by holding it in the direction of the moon.

Now, although the moon is brightly illuminated by the sunshine, the sun’s “light” that supposedly flows through space to be reflected by the moon is not itself a visible phenomenon! This means our Berkeleyan visual standpoint does not allow us to invoke such flowing light in our explanations. What we definitely do know is that sources of illumination are especially bright “things of sight,” as Berkeley would say. And these must be visible from any surface they are illuminating. Putting this in other words, we may formulate the following principle: objects light up according to their visible surroundings. On these terms alone—and without reference to flowing light—we will be able to explain the diminishing brightness of illumination at increasing distance from a lamp.

Illumination is usually explained as follows. Imagine light to be steadily issuing from a lamp in all directions. We assume the surrounding space to be perfectly clear, so no light is lost as it spreads into space. But the light must *expand*, so that its power to illuminate is distributed over surfaces of greater extent at greater distances. Take the lamp to be located at the center of a sphere, with the flow of light distributing itself evenly over the surface of the sphere. The area of this surface grows in proportion to the square of the sphere’s radius. Thus, as distance from the lamp *increases*, the illuminating effect of the lamp *diminishes*, corresponding to the reciprocal of the square of the distance.

This argument depends on our imagining ourselves to be observing light as it crosses space in front of us, as if its movement could be seen from the side. We are all used to imagining this. But if we remind ourselves of the appearance of the moon at night—where we do not see sunlight streaming toward it—we will have to admit that this habit is not supported by experience. Berkeley did not like it. But it has hardly been noticed that his approach—which is meant to rest on sense experience—leads to an alternative train of thought that is just as useful in its result. Doing without the imagined viewer observing a stream of light from the side, we can deal with the problem of illumination this way:

We take lamps to be “objects of sight.” That is, they gain in visible size as we move toward them and diminish in visible size as we move away from them. This is the effect of perspective. And as we will see, this change in visible size is sufficient to give us the law we are seeking. Let us again assume that the atmosphere is perfectly clear. Then we can convince ourselves that the seen brightness of a lamp does not change with distance. That is, if we view two identical frosted



lamps with the second one at a greater distance than the first, and if we allow the first one to overlap our view of the second, then we will readily observe that they appear *equally* bright. The two bright disks will *merge*.

What changes with distance isn't the brightness, but the visible area of the lamp exhibiting this brightness. The *visible area* alone determines the illuminating effect at a given distance from the lamp. (Of course, in science one does not say "visible area"; one speaks of the "solid angle" subtended by a luminous surface.) According to the laws of perspective, the visible area of a lamp will diminish in proportion to the inverse square of its distance from the observer. So we have obtained the same result we did above—but by speaking of the visible area of the light source rather than invisible rays moving through space. Outside the immediate vicinity of the lamp we get exactly the same simple law as above. And since we have given up the usual idealization which treats the lamp as a point source, our formulation of the law now can also deal with the problem of illumination in the immediate vicinity of the lamp—a problem that the point-source idealization cannot handle, namely, the fact that the illumination remains proportional to visible size.\*

Note that by relating the apparent size of the lamp, *its visual quantity*, to its effect as an illuminant, we no longer need to assume that light transports itself through space, at least in the context of problems of illumination. But even in a much wider context modern physics tends to give up the notion of light traveling through space in the way bodies do. For example, we learn from principles of optical imaging that the precision of the image deteriorates as the line of sight (that is, the presumed path of "flowing" light) from object to image is defined more exactly. This can easily be demonstrated. Reduce the aperture of the eye's lens by looking through a tiny hole pricked into a piece of paper. In this way you define the sight path (the imagined "path of light") with greater precision. But the result is a blurring of your sight. The image deteriorates, while your knowledge of the path between it and your eye becomes more accurate. On the other hand, the big telescopes used in astronomy, with their huge openings pointed toward the sky, "see" an ever so finely structured scene. This reciprocal relation between precision of the line of sight and quality of the resulting image suggests that the supposedly *intrinsic* ray-like character of light is really an *artifact* of the mind, an artifact that has been handed down from generation to generation.

---

\* The hypothetical "point source" from which the light is supposed to stream out into space is not given in reality—it would be physically impossible and, moreover, the calculated illuminating effect of such a point at close range would not be what we actually observe. On the other hand, the lamp that is more realistically taken to be of the nature of "things of sight" just grows in solid angle the nearer you approach it, consistent with the observed law of illumination.

### ***Outness Proper: Extension into Which We Move Our Bodies***

Independently of the arguments above, let us compare the reports of the sense of touch with those of the sense of sight. We become much more conscious of the world of touch in the absence of visible percepts. If you close your eyes now, you will be near the usual situation of darkness. Suddenly you will become aware of the sum of tactile contacts your body presently has: the floor under your feet, the seat that is supporting you, the rest under your elbow. From this “home base” you can reach out, seeking to touch the things you remember being around you before you closed your eyes. In reaching out you are prepared for a coming sensation, but even within a visually familiar setting, when contact occurs, it always comes as a bit of a surprise. You can thus become aware of the unfamiliar nature of the external tactile world. This nature is that of “outness,” of being outside our physical body, in contrast to the seen world that renders itself immediately present. Of course, the “things of touch” that we may really experience as such are “near at hand,” in contrast to the visually attainable “things of sight” which, in terms of tactile distance, may be far away. The difference between the two worlds lies in the fact that vision does not have to *overcome* distance in the way our body does.

We have an additional sort of awareness of our immediate spatial surroundings even when we are not in touch with them. For example, we have a deep bodily familiarity with flights of stairs we often ascend and descend. Our feet need little guidance. Similarly, we know when we have made the steps necessary to reach the end of a familiar corridor, without counting them. Small everyday tasks like tying our shoelaces may become more difficult when watched, and certainly so when seen in a mirror. When shaving, I tend to close my eyes. In the same vein, be careful not to watch the tip of your pen too closely when repeating your signature at the counter of a bank. If I want to twist open a screw that is directed upward, I just ask my hand to suggest the appropriate direction of rotation. We begin to understand that there is a need to “translate” our seen surroundings into the tactile context at the disposal of our limbs. The two worlds have a different character. The concept of distance, of spatial extension, is the very real measure of the effort required to bridge space by moving your limbs.

Percepts of touch arise when a part of our body’s surface is felt to be indented. The feeling changes as pressure is changed. You first touch the table with your fingertip, but when you press the finger down you feel a greater tension in finger, hand, and arm. Also, they sense any

movement accompanying the strain, and, in this rather complex situation, you feel that the table is hard, and is not being moved or deformed by the pressure. By moving your fingertip around, you get an impression of the table's surface roughness and its flat form, and you may notice there is a sticky spot on it, after which the fingertip itself may feel sticky, resulting in stronger friction against further movement across the surface. It turns out that the simple reports of touch we rely on in daily life stem from many clues ensuing from different parts of our bodies. The original sensations are perceived inside our bodies and then are translated into characteristic qualities of an external object.

Touch gives only *localized* perceptions characteristically associated with regions on the contours of the physical body. The percepts arise through pressure in a perpendicular direction. In contrast, vision provides us with an *extensive panorama*. Within this panorama we may concentrate on a center of directed interest (recalling the fingertip on the table) wherein more details are forthcoming. But the eye cannot bear to be touched. In a way, it is the opposite of the fingertip that only senses in direct contact; even the near-sighted cannot see things too near the organ of sight. Given that celestial phenomena belong to the world of vision, it is obvious that bodily exertion can hardly give us access to everything we experience visually.

### **A Set of Exercises in Perceptual Activity, in Attending, in Encountering**

Having read this chapter, you are begged to forget all the arguments about Berkeley's assertions. The true aim here was to point out a multitude of phenomena that usually remain unnoticed: your own halo in the dew; the landscape unfolding as you move through it (revealing "distant" views as your true escorts); various experiments with stereoscopic vision where you feel distance without knowing how you judge it; comparison of high-resolution sight with sight through tiny, pin-pricked holes; and so on. The aim was to let you gain experience through exercises—exercises in observing the process of perception itself rather than merely observing unusual perceptual content.

Let us remind ourselves of the questions that came up in the preceding chapter, which gradually made us aware that we do not perceive passively. The kind of attention we offer to the situation at hand turns out to be the foundation of the experience we gain. And that is what the exercises of this chapter are about. The fishing line stretched horizontally in front of me will hardly inform me that its location is not visually perceivable if I don't try to attach the clothespin to it. Nor will the momentary loss of the landscape's spatial character reveal itself to me if I do

not suddenly stop my walking to inquire about it. As our minds contribute *questions* to an encounter, the encountered situation expresses itself more richly. What I really owe to George Berkeley is his questioning of the visual world and its special nature. And that questioning has the potential to generate more questions, more observations. It is fruitful.

Having worked through this chapter about the tactile (spatial) and visual (non-spatial) worlds, you will be ready for the observations to come. The following chapter is about reflection in a pond. Whereas the tactile approach to optics “sees” light bouncing off the water, we will leave the reflected images where we find them: *in the water. Images are where we see them.* But what may surprise you is their three-dimensional character.

### 3. Reflections Upon a Pond

Stephen Edelglass

As an adolescent I spent my summers in what was then a rural community in New York State's Hudson River valley. In those years it was possible to experience a brilliant canopy of stars in the night sky, and, like a moth drawn to a candle flame, I was fascinated by that sky. I wondered, "What is out there? What is beyond the visible dome of the sky?" This nightly attempt to imagine a beyond quickly became unsettling. I was in effect trying to picture the infinite, and eventually I had to stop myself by turning to more mundane concerns.

I suppose that while facing the human impossibility of imagining a cosmos from without—that is, from a God's-eye viewpoint—I developed a yearning to find a basis for cognitional certainty. It was, perhaps, the promise of at least being able to know the physical world with certainty that gave physics its appeal for me.

Later, however, I faced a different kind of crisis. The physicist, I saw, achieved the experience of certainty by reducing knowledge to pictures of changing arrangements of objects (or object-like entities) in space. In a naive sense this approach did seem to work—cognitive certainty of the reduced world of physics was akin to the unquestioning sureness with which we know the existence of a stone. The result, however, was a world picture that was meaningless because there was no room in it for its self-conscious human knower.

#### *A Pond as Space Creator*

Looking into the reflected world of a still pond is like looking through a window. You see a vast space framed by the boundaries of the water. In every way the space of the reflected image appears as limitless as the panorama seen through a window. You can roam with your eyes among the reflected clouds and far distant hills, follow the flight of birds, or examine nearby grasses and flowers. You can even see "underneath" the shore on which you stand simply by leaning out over the water's edge and peering back under your feet, just as you might look down at the view beneath a balcony.

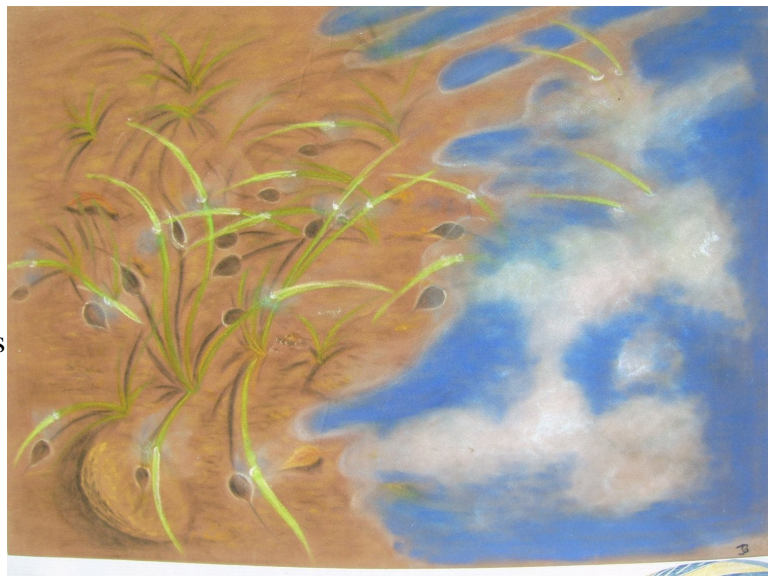
This is not a theoretical matter. But you must actually *look* into still water to appreciate its reflected visual space. Given such an intention, you may marvel at the extent of the space you

see. It is particularly astonishing when you look into a shallow puddle. Even here a window opens onto an infinitely large three-dimensional view. Just as a vast visual world presents itself when you look through a small glass window in a wall, so, too, when you bring your eyes close to the puddle and look “through” it, the boundless visual world of reflection opens to your gaze.

To be sure, we are referring here only to a visual experience and not to the sense of touch. Because you can touch the pond’s surface but cannot reach into its mirror space and feel the objects within it, you may think the reflected image lies on the water’s surface. That is, in order to unify your visual experience with your experience of tangible surfaces, you may miss the three-dimensionality of the reflective space. In this case, the impossibility of conceiving a space that is both three- and two-dimensional at the same time restrains you from *seeing* depth in the mirror space. You give the tangible surface priority over the visual experience and actually see the reflected picture *on* the water’s surface, as if it were a painting.

The three-dimensional visual space and the two-dimensional felt surface of the water cannot be understood as qualities of the same object. Since you cannot reach into the mirror space, the objects seen spatially via binocular vision and perspective do not have a tangible counterpart; you only feel a flat surface. However, once you recognize that reflected space is purely visual and that objects seen in it are intangible, then it is easy to experience the full spatial depth of the reflected image.

The oil pastel by the Swiss biologist Jochen Bockemühl illustrates several phenomena of a still lake. On the right are reflections of clouds in a bright sky. On the left grasses growing in the pond extend up through the water’s surface. *The water itself is not seen.* Still water has no image; its presence is known only through the coordination of the various elements comprising the total picture. For example, each blade of grass appears crimped at a position suggesting a single plane of the water’s surface. The water’s depth is indicated by the relation between these crimps, the duller colored portions of the blades that extend from the crimp to the brownish earth at the bottom of the pond, and the angle these underwater portions make with the



shadows of the grass seen on the bottom of the pond. The shimmering halo of illumination part way along the shadows of the grass blades brings to mind the disturbances in the water's surface where it is penetrated by the blades. And the boundary between regions where the reflected sky is seen and where we see through the water itself to the pond's bottom intimate the fluidity of liquid water.\*

Looking into a pond, we can see either into reflected space or through the water itself, but seldom both at the same time. Where the grasses pass through the water's surface their image is bent. Yet, when we run our hand along a blade of grass we do not feel a crimp or bend where it enters the water. What is more, although we can see our hand move smoothly along the wet blade, we do not feel the blade to be where we see it to be in the water. It is, of course, well known that the visual and felt positions of objects in water do not coincide. Most of us have gotten a sleeve wet reaching for a coin because the pond *appeared* shallower than it really was. In other words, a pond is visually shallower than it is tangibly.

The visual discontinuities in objects where they enter water and the apparent shallowness of the water's bottom are aspects of refraction. With refraction, just as with reflection, tangibly experienced phenomena cannot be reconciled with visual experience. In the case of reflection there is no tangible counterpart at all to the visual objects. We destroy the mirror image—that is, we destroy the conditions necessary for clear reflection—when we try to reach into the mirror space with our hands. In the case of refraction the tangible object space and the visual object space do not coincide. We do not see objects where we feel them to be, and vice versa.

A pond presents us with many phenomena. Fish and other creatures live in the water, as do numerous plants. Insects dart on the surface. The water may be cloudy, clear, or colored. Ripples and waves may attract our eyes, and we may hear their lapping at the shore. Our attention may be drawn to shadows, especially where objects project through the water's surface. The visual images of objects seen through the water's surface do not coincide with the felt positions of

---

\* Stephen enthusiastically points out a multitude of optical effects that are to be found in a picture of a natural situation by Jochen Bockemühl. It is worthwhile to look for and find them; few of us will ever have noticed and understood them all in Nature. Bright reflections such as those of the sky conceal the space inside the water. So where the brown-colored bottom of the pond is seen, as it is on the left side of the picture, this is possible thanks to our facing toward a “dark area” in the vicinity that comes to be reflected by the surface. On the right side, “fingers” of brown extend into the bright sky and such would be explainable by the waves reflecting both sides of a boundary between the sky and such a relatively “dark area” in the surroundings.

The next paragraph is about a comparison of the visual to the tactile. Here, Stephen reminds us of the fact that straight blades appear bent at the surface of the pond. This effect is not conspicuous in the picture. But this is in keeping with experience, for the artist would have had to observe the scene more aslant from the side in order for the bending to be more evident.

those same objects. And, of course, there are the visual objects of the water's reflection space. The mirrored images in this reflection space are less brightly colored than their non-mirrored counterparts.

All these phenomena can awaken questions within us. What qualities of the pond environment are required to support the life of the fish? Or of the insects? Or the plants? What, exactly, is the spatial relation of the visual objects in the water, seen through the water's surface, to their touchable aspect? How does the curvature of the surface at a ripple affect the image seen in mirror space or in the water itself? What qualities of water make it amenable for mirroring? And what is the relation of these qualities to the dimness of the mirror image compared to its ordinary counterpart? How does the water affect the color of an object? Under what conditions do we see through the surface into the space of the water itself, the one in which fish swim? When do we see through the surface into the mirror space where flying birds are visible? Under what conditions may we be lucky enough to notice brilliantly hued spectra at the boundaries of lightly colored rocks lying on the dark earth of the pond's bottom?

Innumerable possible enthusiasms can arise for understanding our experience at the pond. Questions inspired by such enthusiasms are the starting point of science. Scientific concern about the world requires us first to choose among the many possible questions. For example, we shall soon concern ourselves with the spatial character of mirror space. A startling consequence of this intention is that by neglecting the dimness of the reflection *we give up the water itself in our inquiry*. And, of course, at least for the time being, we give up the biology of fish and plants, the physics of refraction, the ecology of fresh water systems, and the display of boundary colors.

### **The Spatial Character of Mirror Images Seen in Water**

Looking into an utterly still pond we observe a striking similarity between the reflected view seen "through" the window of water and the scene above. It's true that when standing at the water's edge and looking into the mirror space we find the reflected image of a person on the shore across from us to differ from the image of the person viewed directly—for example, by being shorter. But any difference disappears when we bring our head down to the water's surface. Then every object above the water has its upside-down counterpart in the mirrored space. Objects in the two spaces are identically arranged except that right and left appear to be reversed. Apparently the difference in image size was due to the vantage point from which we originally viewed them. From the water's surface the perspective of the two spaces is the same.



In either space right and left reverse if we imagine a person to rotate, head over heel, in the manner of a clock hand moving from a twelve o'clock to a six o'clock position. This rotation produces a right side up image and an upside down image resembling the mirrored image and its original. But the right-left reversal produced by this clock rotation is *not* true in the case of the reflecting surface. It is because of the visual expectation of right-left reversal that mirrored images of people may look slightly peculiar and we commonly say, incorrectly, that right and left are reversed in mirroring. We imagine right and left to be reversed in a reflected image only because we imagine the reflection to be achieved through a physical movement—as if we had walked into the mirror and turned around—and what we see doesn't fully agree with this. Reflected images are not obtained through such physical movement and do not obey its laws.

The laws of perspective represent a systematics of human experience of space. The most important of these experiences is that of distance: things appear smaller as they get farther away from us. But there are other, less familiar aspects of perspective. For example, imagine walking along the edge of the reflecting pond parallel to a distant hill. If you focus directly on a cow resting in the pasture between the hill and the pond, you will see the oak tree on the hillside moving along with you, parallel to your direction of motion. But, if you focus instead on the distant oak tree, you will see the cow moving opposite to your direction of motion. You can have exactly the same experience with the cow and tree in the mirrored space.

Another aspect of perspective is that parallel lines appear closer together as they progress into the distance. The rails of a railroad track appear to meet at a faraway point. At the pond you can have this experience by lying down on your back and looking up at the trunks of nearby trees, or by lying on your stomach and looking at the reflected trees. In either case, the tree trunks converge toward a distant point in the sky—the zenith or the reflected zenith. When you lie on your stomach (with your head over the water), your own reflected eyes mark the location of the reflected zenith.

Nearby objects—whether viewed directly or in mirror space—not only appear larger, but also suffer foreshortening. For example, when you stand at the edge of the shore and look at your reflected image in the water, you can completely obliterate the view of your face with one foot, even though the foot is narrower than your face. Your foot and leg dominate the image of a shortened body, illustrating how things appear smaller as they get farther away.

Apparently the reflection space obeys the same laws of perspective as ordinary space. In fact, looking along the length of a tree on the opposite shore of a pond, from the top of the tree down through the water's surface to the top of the reflected tree below, the experience of perspective is seamless. There is no visual discontinuity in looking from one space to the other.

Perspective implies spatial *relations* between the objects themselves and between the objects and the viewer. The apparent scale of objects and the distance of separation between them is interpreted according to these relations. Since the fifteenth century painters have used the laws of perspective to paint two-dimensional representations of visual, three-dimensional experience. But such representations work only for a single viewpoint. When a painting is viewed from any vantage point other than that from which it was painted, the image is distorted, because the perspective is incorrect. The pond's mirror space, in contrast to the perspective of a two-dimensional painting, remains perspectively consistent with ordinary space as we move from one point of view to another. Unlike a painting, the pond's mirror space is a true, three-dimensional visual space.

Recognition of the elements of perspective in a scene depends upon our ability to visually distinguish forms, relative sizes, and motion. This ability depends upon complex mental interpretation of sensory input connected with the musculature of the eyes. Even when viewing stationary objects, the eye makes very fine scanning movements that constantly shift the position of the image on the retina. When viewing forms, for example, our eyes move along significant lines, provided that the lines are large compared to the retinal macula. While we are not usually conscious of these movements, we can become aware of how our eyes trace the outlines of an object or follow it as it moves relative to the background or foreground. This is the visual analog to running our hands along the surface of an object to learn its shape and size, and moving our hands along with an object to detect its motion.

Binocular ("two-eyed") vision is another powerful means by which we experience three-dimensional space, particularly the dimension of depth. Here, too, spatial perception depends on mental assimilation of experience connected with the musculature of the eyes, but now what counts is the change in the angle formed by the slightly differing lines of sight from our two eyes. Smaller angles of binocular view signify greater depth. The activity involved is similar to moving our hands closer together or farther apart to discover the thickness (depth) of an object. We can be quite aware of the effort it takes to make binocular adjustments. That effort is like reaching into or around tangible objects with our limbs. When we see spatially, apparently we use our eyes analogously to our limbs. We can know form, distance, and depth by exploring lines and surfaces with either our arms or our eyes. The tangible and visual experiences gained in this way are compatible with each other.

The spatial consistency between touch and sight enables us to extend our "reach" visually beyond what is possible using only our limbs. In ordinary space, experiences of depth gained through perspective and binocular vision are consistent with and reinforce each other.

We can tentatively conclude from all this that a mirror space is visually identical to the ordinary space in which we live, and that there is no purely visual way to distinguish one from the other. Given this initial surmise, we can now proceed to an unusual demonstration.

### **The Law of Reflection**

Reflection space, like ordinary space, is governed by the familiar laws of perspective. Further, the apparent sizes of objects in ordinary space seem identical to their apparent reflected sizes. We already remarked on this when we bent down until our face almost touched the water and viewed the person on the opposite shore.

At the Exploratorium in San Francisco (and a number of other science museums around the country), you can stand at one edge of a vertical, floor-mounted mirror, with the mirror's plane bisecting your body. If you are at the right vertical edge of the mirror, your body's left half is in front of the mirror surface. A friend standing next to the mirror at its opposite edge now sees what appears to be your complete image, but it consists of two left halves, one in the mirror space and the other in ordinary space. If now you raise your left leg off the ground, your friend sees both legs raised and unsupported. You appear to be levitating.

By looking at objects and their mirrored counterparts from a position close to the plane of the mirror, you can compare the two spaces from nearly identical viewpoints. You thereby eliminate perspective differences between the two scenes, so that corresponding images in tangible body space and mirror space appear to be identical in size. Evidently, the size differences we encountered when comparing ordinary objects and their pond-mirrored images were due to perspective; we stood well within one of the spaces instead of at their mutual boundary.

In tangible body space it is easy enough to measure the size of an object by comparing it with a meter stick placed alongside. But we can't slip a meter stick into mirror space (other than by reflecting it) in order to compare image sizes in reflection space with those in ordinary space. This is clear in the case of a glass or polished-metal mirror, but the pond is more complicated because we can push the measuring stick through the water's surface. Of course, the water's space in which tangible bodies get wet is not the mirror space. Even so, we might imagine inserting the meter stick into the water adjacent to a mirror image and in that way measuring the size of the reflection. But even assuming that the pond is deep enough, the attempt fails. Its futility becomes apparent as soon as we notice that the markings on the submerged part of the

stick appear closer together than the markings on the dry part. This is the refraction mentioned in the previous section; everything, not just the bottom of the pond, appears closer to the surface than it is felt to be when we reach in with a hand.

Nevertheless it is possible to discover the geometric laws that relate tangible body space to its associated mirror space. We can in fact show that the two spaces are not merely similar, but identical. To do so we need a semi-reflecting surface—both reflective and transparent. An ordinary piece of glass windowpane will suffice when looked at from a glancing angle. With the glass pane horizontal in a sunlit room, place a cup right-side-up on the glass surface. When viewed from above—that is, when viewed from the tangible body space of the cup—a reflection of the cup can be seen below through the glass pane. Indeed, we can walk completely around the glass and observe the mirrored cup from all sides in its three-dimensionality.

Now, from below, insert a second, inverted, cup into the reflected image of the original cup and hold it there. From every viewpoint the tangible cup held below the glass, as viewed from above, coincides with the reflected image of the upper cup. And the same is true when, upon kneeling and looking up from below the glass, we compare the reflection of the lower cup with the original cup resting above the pane. That both tangible cups coincide with the boundaries of the mirrored images as observed from all possible directions shows convincingly that images in mirror space and ordinary space are visually identical. They are related to each other according to the law of mirror symmetry. In mirror symmetry corresponding pairs of points lie equidistant from and perpendicular to the mirror plane.

## 4. Intentionality

Ronald Brady

In chapter one I mentioned a colleague who had to “believe that something is out there.” He apparently took the division between “out there” and “in here” to be unproblematic—as if this division was at least something definite. In subsequent discussions he argued that his belief was compelled by the way the world looked—clearly present to our senses and “out there.” Although he knew his position had certain affinities with that of Kant, he saw no reason to be quite as perceptually agnostic as the philosopher. The most conservative position, to his mind, was to assume that the world was fairly close to the way it was perceived, even if we could not prove that. After all, the assumption had taken us far in science.

Unfortunately, “the way the world is perceived,” if we look closely, is not at all as it is described in the “in here versus out there” version. All third-person accounts of this type describe the world as a “view from nowhere,” but actual perception always includes the perceiver doing the viewing. The fiction entertained, of course, is that the perceiver does not need to do anything to perceive the world. Careful attention to our own perceiving shows the opposite, as I argued in chapter one: the perceiver must do a great deal. In fact, any close examination of direct perception must be, in large part, an account of our own activity. I learned this in a very direct manner.

### *I Believed the Column Was of Solid Granite*

After I joined the Philosophy Department I continued my studies of Goethe, and among the philosophical texts I read were, particularly, those that purported to treat of experience. But still the perceived world seemed to escape whatever it pleased mere humans to think about it. The world was “out there,” apart from me and my thinking, and whatever ideas I cared to weave about it were only that—hypotheses of thinking about a world that was not thought, and might have nothing in common with thought. In fact, I was reasoning about this impasse when, in a moment of inattention, I tripped.

It was a serendipitous mistake, although I could easily have been seriously hurt. I had been pacing a large foyer, my hands clasped behind my back, my steps on the marble floor slightly

echoing in the otherwise still place. As I approached one of the large granite columns, my profound demeanor was completely ruined by my own feet: I caught my right toe behind my left ankle and went straight over. My fall was so immediate that I could barely get my hands from behind my back in time to put them between me and the floor. They were certainly too late to ward off the column. I remember falling—it seemed like slow motion—and twisting to get my head and shoulder to one side of the column, since my hands were still coming from behind my back.

As I picked myself up off the floor I was still horrified at the approach of the column, that incredible tube of granite so huge that my skull felt like an eggshell before it. I could not dismiss the memory of that massive density approaching and just slipping by—a collision avoided by a fraction of an inch—and my sense that my head could not survive even a touch. I have no idea how long it would have haunted me had I not remembered, within moments of the experience, that my “massive density” was not a sensible report. I saw the column, but I did not touch it. How could I feel so acutely the mass of the column swinging by?

I would have dismissed the whole thing if that dense mass had not brought on such a flinch reaction that I could not get out of its grip. As the column went by it seemed frighteningly tangible. But how could it be? Here was something felt—that is, sensed—but not by the usual senses. It did not take long to realize that the intuition of solidity, of density, could not be identified with touch either. Mere touch does not reveal much about the occupation of the interior behind the touched surface. It occurred to me, however, that if I had previously been convinced that the column was a fake—a veneer of plastic manufactured for the camera—I would not have felt such a mass swing by, nor flinched so much. But I believed that the column was solid granite. Thus the intuited dense occupation of space fit my understanding of my surroundings exactly—it seemed to be my way of completing the sensible picture.

This insight was more than a little bit disturbing. The reality of solid objects for me was very much represented by the felt solidity of the space they occupy—this is what gives them real presence. But the actual senses of touch and sight could detect only the outer limit of a solid—they had no way of plumbing the interior depths that my intuitive activity had filled in. As I looked around in the world, no object was without some sort of “substance intuition”—stones were stony, wood woody, metal metallic, even though the metal was but a relatively thin sheet. Everything that was properly “solid,” even if hollow, had to contain a finite volume of some substance capable of holding the rigid shape of the object. But this point makes another demand.

As I thought further, I noticed that in order to understand the world as material I had to grasp objects in terms of volumes—had to understand them as invisibly extending behind the visible front. The column I had felt to be so imposing could not be so if it did not actually occupy

a rather large space, which meant, of course, that it had to curve away from me as well as toward me, and the unseen rear curvature was as felt as the visible curve before me. Notice that this is quite different from saying that we can imagine how things would appear if we walked behind the column and looked. The rear curve is necessarily present to our understanding as we view the front, and is fundamental to our estimate of the extension. This form of completion seems to be needed by the world at all times. As I glance around the room, all objects present themselves to my eye according to the same law. Each is closed to its particular volume—the book, the box, the computer printer; each extends invisibly away from the eye as well as visibly toward it, providing a volume that is occupied, totally or in part, by an intuited substance. Otherwise it would not possess the concrete presence that it does.

### *Everyone Has Intuitions But They Confuse Them with the Senses*

The concrete presence of an object was not a part of the world that I expected to be “filled in” by my own activity. The solid mass of a thing announces, to my experience, the reality that I must contend with—the reality that resists my will and forces me to recognize laws governing the phenomena as I understand them. This is the simple dumb facticity with which the physical objects around me occupy space and resist thought (being, as Descartes termed them, “extended” rather than “thinking” substance). Yet the conclusion was inescapable: while the sense report is forced upon me, suffered rather than made, the extension and substance of the object—and with them its “dumb facticity”—are not given in a sensible manner. The Cartesian belief in external, independent, solid objects was not based on an examination of perception, but was only the articulation of a conceptual representation. Immediate sense experience is otherwise.

In later reading I found that I was examining the contribution of what Johannes Mueller called attention and/or intention, and Edmund Husserl, in a quite independent development, also termed intention. But my interest was not a historical one. I had noticed a part of experience that seemed, before this time, always just out of focus—and for that matter, out of the official account. I saw now that objects of perception cannot be given to a passive mind, but show themselves only within a context of active understanding. This activity is a necessary element of phenomenal constitution: it gives us not only ideas about the appearances, but an aspect of the appearances themselves. In fact, if my intuitions can be said to be “in me,” then the intuitive meanings that concretize the things around me appear to be these very things, speaking in me.

Of course, if the “dumb facticity” of the world was given through my own intuition, it need no longer be dumb. I was reminded at this point of a remark by Coleridge that “everyone has

intuitions, but they confuse them with the senses.” I had not realized what he meant when I read it, but I saw now that he was simply pointing to an inattention. It is obvious (as a matter of conceptualization) that everything about us has volume, and thus must extend away even as it extends toward us. We know that, but do not notice that we also tangibly *perceive* objects in this way. That is, our conceptualization is already there in our perception. Nor do we notice that were we to depend on sight alone we would possess only images rather than objects (or perhaps only colors and degrees of brightness, darkness, and saturation), and that touch (including variable pressure, texture, and warmth or cold) never by itself delivers the character of the substance touched. Careful inspection can reveal these things by showing how the qualities of volume and substance are in fact acquired. We need only attend to the actual nature of our perception.

In the cases described above our mental contribution to the phenomena is quite clear because it cannot be confused with the report of the senses. The far side of objects is never available to sensible presentation, but must still be included in the whole presented to understanding. The interior is likewise beyond the actual sense contribution, but without this intuitive contribution the senses, particularly those of touch and sight, seem incapable of representing a world. In both cases we are permitted to examine our act of understanding while it is still being maintained, and observe the manner in which it completes each form. And in both cases we seem to be dealing with what Berkeley called the “ideas of touch.”

### ***Exercises in Attending: (1) Taking Notice***

I want to go back now to a simpler approach, and begin to develop an idea of myself as agent in perception. The first step is to begin to observe the aspect we have ignored, namely, our own activity. Consider the earlier case of overlooking something “right under my nose.” The usual explanation, and perhaps the best one, is that I was not paying attention to it. Even when I appear to synthesize several sense reports into one object, I am simply attending to the object and not to the sensations by which I perceive it. When I pick the flutes out of the orchestral sound I am paying attention to them rather than the rest of the instruments, which become mere background. And even the pain of a wound does not reach my consciousness when I am paying a consuming attention to some other matter. This sort of account at least recognizes that I cannot notice anything without some degree of attentive activity on my part. In fact, it treats “to attend to” as if it were synonymous with “to notice.”

But just here the problem emerges. How do we go about “taking notice” of something? If someone tells you to look at the flowering bushes, you move your gaze across the visual field



and focus your eyes on the bushes. This account assumes that you had already noticed them in the periphery, for you experienced no surprise, and are simply placing your focal attention on them. But the task of moving your gaze and focusing your eyes has no parallel when you attend to the sounds of an orchestra. You can switch from the flutes to the violins without moving, or focusing, your ears.

### ***Exercises in Attending: (2) Attending to the Focal Point***

Mueller noted that he could fix his visual focus on a particular point in a pattern and, without changing the focus of his eyes, move his attention about that center, inspecting each peripheral element in turn. In this manner he satisfied himself that his attention moved independently of his eyes, although in normal sight the latter would always follow the former. The experiment is one we can easily perform—to a certain degree we have all done it—but performing it deliberately provides an actual experience of the distinction between attention, as an independent faculty, and the bodily organs.

At this point I must ask, however, that you actually perform it, for only direct experience can provide a grasp of our attending/intending activity, and for those unfamiliar with it this exercise yields just such experience. My arguments will turn on language drawn directly from this experience and can mean very little without that reference.

In attempting this experiment I found that I had to learn how to keep my eyes still while my attention transited the field. At first my attention was so identified with muscular effort that to move my attention meant to move my gaze, and I had a sense that I could not “see” without this movement. With practice, I found that I could fix my eyes on some point and, while holding that focus, concentrate upon rather than “look at” peripheral configurations well enough to list their colors, shapes, relative size, and number, at least if they were in the immediate periphery. My ability to identify something fell off rapidly as the sight angle between the fixed point of my gaze and the target of my attention increased. Still, larger entities were quite noticeable even at relatively large angles. The hardest part to learn was how to see by merely “attending to” rather than “looking at.”

### *Exercises in Attending: (3) Ignoring and Attending*

As I kept my eyes focused on a specific point in a landscape, for instance, I could learn to “see” the shapes of trees on the right side of the point, but only with effort and difficulty. Instead of a near-immediate “taking hold” of form, as would be the case with a direct gaze, I had to examine something in permanent soft focus—somewhat blurred—and struggle to gain a familiarity with the blurred form. Once I came to an idea of a shape, it seemed to clarify my sight. If I then shifted attention to the left side, my immediate impression was often much less intelligible than the preceding view, and I had to begin the learning process all over again.

The fact that my attention could vary independently of the focal point of my eyes brings the example of sight into line with my experience of the other senses. Just as my visual attention takes in a whole field and then selects particular locations for close inspection, so my auditory attention ranges constantly over a field of sound, selecting for inspection only those that I take to merit closer scrutiny. The same pattern can be found in an examination of the reports of taste, smell, and touch. We cannot “notice” any particular without bringing the faculty of attention, itself independent of the senses, to bear upon it.

The analogous experiment with the auditory sense is much easier to perform. As I sit typing, the computer makes a constant hum but also adds other sounds on occasion, which then become the focus of my auditory attention. I find, however, that I can turn from whatever sound is now in the foreground of my attention and begin to retrieve those that have fallen into the background. The steady hum of the computer, for instance, or the more distant knocking of a hot water pipe, the birdcalls outside the closed window, a passing car—all these sounds are actually absent from my consciousness as I begin my search, but all quickly turn up.

We can rarely afford to be without a specific focus, which creates a specific lack of focus in all other directions. Mueller’s experience of ignoring the cries of street hawkers, for instance, reminds us of how important such a deliberate lack of attending can be. My students were particularly annoyed with the task of mentally searching their own skin area for itching, soreness, or any other surface discomfort. They began to change position in their chairs and suggested that the point was made and we should all move on as quickly as possible.

This sort of noticing activity is easily observed—a fundamental doing that we cannot miss—yet I have left something out. The movement of attention within the sensible field is, as established above, a necessary condition, but it is not a sufficient account of how something is “picked out” of that field, *particularly something previously unnoticed*. The unheard sounds that become heard upon searching for them provide a common example. The soldier who does not notice his wound and the hiker who does not see the still rabbit in the path are not yet conscious

of anything on which to focus attention. They have not yet noticed the pain or the animal, even peripherally, and cannot attend to what is not there. If “to attend to” and “to notice” are interchangeable, then the activity I have been examining clearly does more than move our mental focus between perceptual elements already present to consciousness; it must also allow us to become conscious of previously unnoticed elements (including, I think, noticing that there is a sensible field when we wake to it in the morning).

What was happening during the time I took to “become familiar” with the shapes within the blurred periphery? Why did I find that when I “cheated” and glanced directly at, say, the shapes that lay to the right of my focus, and then repeated the original exercise, it was far easier for me to see what lay within the blur? Evidently, direct focal recognition of shape allowed me to see the same shapes better when they were once again seen only peripherally. Presumably, the time taken to gain familiarity with previously unknown peripheral shapes was devoted to a process of understanding that is something more than concentrating on a new sight angle.

### *Recognizing*

Normal experience also points to this process of understanding. When searching for a particular item in a crowd—let's say a book among books—I find that the search is far quicker if I have a clear picture of the book. If I am mistaken about details—slightly off on the size, the type of printing on the spine, or worst of all, the color—I can look right at it without recognizing it. More disturbing is a failure to recognize a good friend in a crowd due to some fairly minor change in appearance, especially aging. It seems that I recognize an object through an inner preparation as well as what is presented from without. And sometimes my preparation is inadequate.

The principle of camouflage seems to take advantage of this inner preparation. For instance, the simplest form of camouflage is paint. Buildings placed among trees can seem to disappear if painted with foliage patterns, but only because the observers have fooled themselves. When one looks for straight lines and horizontals, the buildings become visible, and obviously would never have disappeared had the observer not formed an expectation of foliage. Recognition does not take place in a vacuum—we see familiar things far more easily than new things; we see what we expect more easily than what we do not. So, again, recognition is facilitated by inner preparation, and when this preparation is not adequate to the situation, considerably more time and effort are needed to sort things out.

*The Hidden Image*

Take, for instance, the effort needed to see Figure 1 if you have never seen it before.



Figure 1

The picture is an actual photograph, although of poor quality and very grainy. It is not oriented correctly on the page, so the observer must also find the right orientation. Many shapes are suggestive, but the actual grainy photograph portrays a familiar object that occupies a good third of the frame, and is not merely suggestive when recognized. I suggest that you spend a little time with the picture in order to verify that no recognizable image seems available upon first examination. Once you are ready to receive some hints, I can add that the plate should be turned so that the Figure 1 caption is on the left side reading downward, and the picture is a photograph of a common animal.

If these hints do not produce a coherent image (I remember that they did not work for me when I first saw the photograph), let me add that the animal is a cow, looking right at you, the head almost filling the left half of the frame. This final and most effective hint consists mainly of the name, but the name often produces quick results because one is already familiar with the animal—looking for the familiar form evidently prepares for actual recognition.

This was the sort of activity mentioned in the experience of the orchestra above, in which one could focus upon one type of instrument and allow the others to become background. When we listen for the sound of the flutes, they stand out for us. In fact, if we are told that while the piece uses horns, there are no trumpets, we can verify this only by listening for the sound of trumpets, which can then, and only then, be “heard” to be missing.

All this, and especially the elusive cow, suggests that we cannot attend to what we do not recognize—that is, recognize as something, some intelligible appearance, whether it be a “correct” one or the first part of a double-take. The step of recognition now appears somewhat mysterious, since prior to recognition of a possible object of consciousness we cannot move our attention to it. After all, finding the cow is not equivalent to finding the right sight angle—even when we look right at it, the cow is still not a locatable site, for we find only separate dark and light patches in our gaze. The cow has no unity that we can fasten upon as a thing, until we see it. But when seen it appears in a unified condition—we can almost have the impression that we “see” the edge of the cow’s face where there is no variation of brightness to allow us to do so. What has provided the unity?

### *Kanizsa’s Undepicted Forms*

This unity can be investigated more closely in our perception of specific figures. Take, for instance, the figure designed by Gaetano Kanizsa (1976), which produces a perception of a central white triangle simply by arranging three black circles with sections missing and three

bent lines on a white background. The observer sees, apparently immediately, a white triangle in the center of the configuration, due to how the forms have been understood. Here is a case where the understanding that produces a consciousness of the white triangle can be reconstructed.

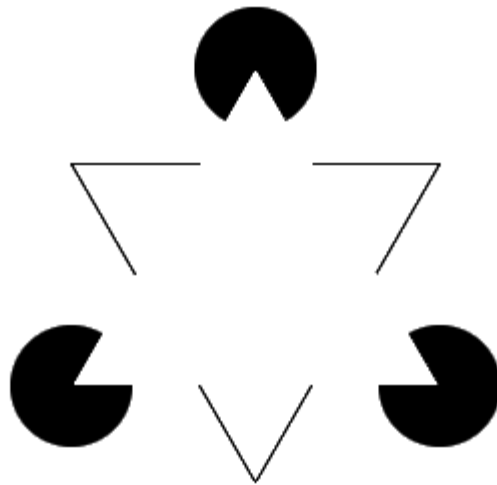


Figure 4

As you can readily verify, if the white triangle is seen, then the underlying forms are grasped as closed; that is, the three black circles are understood to be complete and the bent lines to be part of a continuous triangle. The foreground triangle lies over these forms and thus interrupts them. This triangle will appear somewhat brighter than the rest of the background, but the viewer can mask off all but two elements—a circle and a bent line—and see these elements as nothing more than a black circle with a piece missing, and a bent line. When they appear as nothing more, there is no hint of a brighter triangle. Thus the understood closure of the black forms is the usual condition for the appearance of the white one. But notice that this means that we must understand the configuration in a particular manner *in order to see it*, and not that we arrive at this understanding after we see it.

Another Kanizsa effect is the transparent surface. In Figure 3 below, the white oblong in front of the black forms is produced in the same manner as the white triangle of Figure 2. But if the dark forms are closed with a gray rather than black continuation, the white oblong becomes transparent or translucent, as in Figure 4. In this case, as in the former, the oblong appears to be

brighter than the surround, and a contour is produced between the slightly brighter oblong and its duller surround.

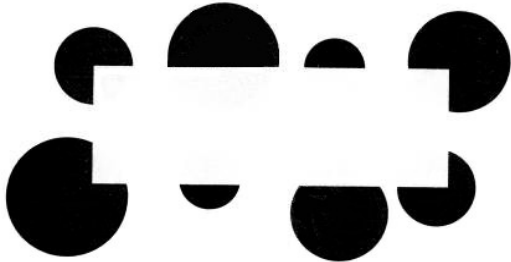


Figure 3

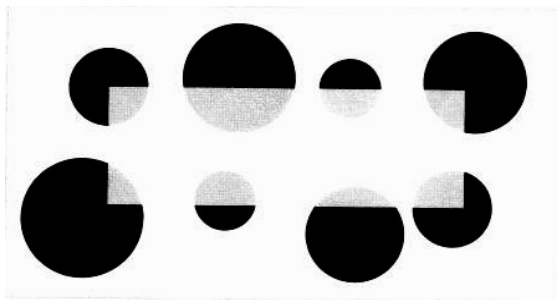


Figure 4

The translucent figure, of course, seems to arise in much the same manner as the original white oblong—that is, seeing an oblong provides a parsimonious understanding of the gray areas. But such an understanding must be seen if it is to apply.

The temptation to suppose that we see the oblong first and understand it later—that is, to suppose it appears without any participation from thinking, so that our mental activity takes hold only after the fact—can be dissipated with a simple experiment. Try to grasp the black areas as holes in something like a slice of Swiss cheese, and see, through the holes, a gray oblong. This may take a while, but once you see the gray oblong as a background figure, its apparent brightness vanishes. The new understanding of Figure 4 produces a new figure, which, of course, can be converted back into the old figure by a return to the old understanding.

For a further demonstration try simply relaxing and staring at any of these configurations without concern for a geometric understanding. In this “vegetating” mood, the design elements seem to “swim” slightly and appear as nothing more than separate elements—for instance, three bent lines and three black circles with slices missing, or eight circles divided into gray and black

areas. But the slightest attempt to make sense of the whole—that is, to put everything into proper spatial relation—will return you to the missing figure.

Here is an aspect of attending that previously escaped our attention. Even in a visual field, objects are not there for our visual attention unless we can notice them, and we do not notice what we do not understand. In the examples above, the viewer must grasp the black elements as closed in order to obtain the figure–ground separation that allows the white triangle to be the foreground, and this understanding must be in place by the time we become conscious of the white triangle or white oblong. Our understanding is a condition by which we become conscious of the appearance, and not something added to the resulting phenomenon. In the viewer's experience the white form is "there" from the beginning, which means that the understanding of closure has been advanced before the viewer is conscious of advancing it. After all, until a unified target is perceived there would be no conscious reason to advance the understanding that underlies it.

Counter-intuitively, the act of recognition lies in our activity immediately anterior to the fact of recognition. (By "anterior" I always mean causally prior, and sometimes chronologically as well.) The objects mentioned are already closed at first notice. The understanding of them as closed, therefore, is our way of noticing the white form. The same is true, as I have already indicated, of the closure of the three-dimensional objects of our usual surroundings. They appear closed in immediate perception. Our intention has preceded that appearance.

### ***Activity and Consciousness: Discovering Meaning***

The mental activity by which we understand our immediate world is perhaps the least observed activity in it. Take, for example, the remark made by H. H. Price (in his book titled *Perception*): "The perceptual act ... is not an activity. There is in it no element of fussiness, no wondering nor questioning. One does not have to take trouble over it—it is a blessed relief from the labour of discursive thought" (Price 1954). The point is put so clearly that, as N. R. Hanson pointed out, it is clearly wrong (Hanson 1969). Professor Price finds no activity in perception because he has looked for none—he begins with the perceptions ready-made, much as the poor reader begins with a text that reads itself.

By this last remark I mean to indicate the attitude that my beginning students often show when they read poetry for the first time and expect the lines of the poem to make a clear, recognizable statement even when read in haste. My warning that the meanings will show up only on repeated readings does not impress them, for it seems absurd, at least until the class



discovers that not everyone sees the same sentences. Even then many are suspicious that the alternate readings cannot be reasonable, an impression I usually disabuse them of by offering ambiguous sentences. Two of my favorites are:

What frightened John was looking at Mary.

and, if spoken without clear punctuation,

I know your plans don't include me

When these lines are heard, they are heard in a definite manner. One gets either “John was frightened by looking at Mary” or “The thing that frightened John was now looking at Mary,” but unless both are heard almost immediately there is no sense of choice. The same is true of the second line, which becomes either “I know that your plans do not include me” or “I know you plans. Don't include me”—again with no sense that we have chosen an interpretation. Yet since the meaning of the line varies independently of the words, our own act of understanding has obviously made the difference. We become aware of this act, of course, after the fact. My students are usually softened up enough by these examples to start “listening” for other meanings in the texts, with relatively good results—relative, that is, to their situation before hearing the ambiguous sentences.

Similarly, the viewer exposed to ambiguous images learns to look for other possibilities in the visual field. If one revisits Figure 1 it is now rather difficult to avoid seeing the cow, but it is still possible to do so, at least for short periods of time, by attempting to see something else. If the page is upright, one may focus on the (almost) bird sitting on the rock at the lower right, or the dark object in the upper left, which seems to extend from background to foreground (from the upper left corner diagonally down) and includes the cow's left eye at nearest lower tip. Some people have mentioned a tortoise, but I have difficulty with that one. The viewer may deliberately look for and actually find such images, and then, before it happens involuntarily, switch back to the cow. That we arrive at different unities by this exercise is undeniable, even if all others are unsatisfying by comparison with the cow.

Of course, images we have previously found are more easily found again with the help of memory, for whatever we did to recognize the object in the first place must presumably be re-invoked in order to remember it. And when I say that the major image is a cow, or ask the reader to see a bird in the lower right quadrant, I am invoking familiar objects and accomplished recognitions. Even the dark object in the upper left quadrant will be treated in terms of past

knowledge—made into a rock in a landscape, for instance. When Polonius asks Hamlet to see his mother, the prince, bothered by the messenger, responds:

Do you see yonder cloud that's almost in the shape of a camel?

Polonius:

By th'mass and 'tis, like a camel indeed.

Hamlet:

Methinks it is like a weasel.

Polonius:

It is backed like a weasel.

Hamlet:

Or, like a whale?

Polonius:

Very like a whale.

Presumably this is an exercise in power, for Polonius will not want to disagree with the prince in his present distempered state, but the scene is more ambiguous. With each new suggestion there is a chance that the cloud may actually take on a resemblance to the named animal. We usually call this suggestion, but in Hamlet, the play in which “Nothing is good or ill but thinking makes it so,” the term seems too small to compass the growing meaning. Even so, were the term not shrunk by the usual outlook to mean mispreparation and mistake, preparation by suggestion would fit our examples here. But we are speaking of a preparation that is as necessary for correct perception as for incorrect.

It is quite apparent that we are responsible for these image “shifts,” as I call them, but we should be careful in forming an idea of just how we do it. Let me review the ground again. It is obvious that each new shift represents a reorganization of the dark and light distributions, and thus each must be grasped through a different set of relations, as a different unity. But since we do not suppose that the overall distribution of dark and light in the visual field is actually changing, we must assign the causal basis of the shifts to the viewer. That causal ground usually escapes consciousness, so we may hypothesize that it is produced either by some non-cognitive

(non-mental) process, which is by definition unconscious, or by a cognitive process (some form of understanding) that is usually below the threshold of consciousness.

The choice of a non-cognitive process would rest on the impression, exemplified by Price, that the images are just there when we look. The suspicion that our mental activity is involved arises when we deliberately shift images, as in the exercises above. We can perform these shifts because relations are never passively received but always grasped by an act of understanding—we must think them if we are to take them in. Thus we make things visible by intending the relations by which they are unified and grasped, and without which they could not appear to us. Obviously, to learn to make a new “shift” we must learn to intend—to grasp the sensible field—with a new set of relations.

From these descriptions we can arrive at a generalized one, which might go as follows: (1) Faced with a sensible situation, the perceiver must advance an intentional proposal—a set of relations—by which to grasp it. (2) The perceiver becomes aware of the result of this proposal, sometimes as a stable perception, sometimes as the first, unstable part of a double-take. If the result is unstable, of course, the perceiver advances another proposal (sometimes this happens so fast that we are barely aware of it, and thus the first proposal might not come to consciousness at all before the second has replaced it).

But notice that intentional proposals need not be advanced by the conscious mind (except in the rare cases of deliberate exercises); rather, consciousness is the result of a successful proposal, which explains why Price could miss the intentional proposal in his study. It has accomplished its function by the time we are conscious of the result. The same thing happens in the deliberate exercises. As we shift through the possible images of Figure 1, or the dual meanings of the ambiguous sentences, we are never aware of having entertained a proposal before we see its results. Rather, we know what proposal we have advanced by observing the results.

[Editor's note: The following text refers to four figures that you will find to be missing. All the figures were taken from the Chuck Close painting, "Roy II", which depicts a human face in profile, with the face consisting of numerous small "glyphs". Figure 5 showed a very small portion of the face, around the bridge of the nose and the eyes. Figure 6 showed somewhat more, Figure 7 still more, and Figure 8 consisted of the entire painting. Close denied permission for use of his painting in a web version of this chapter, and Ron Brady was in the process of developing alternative illustrations when he died in March, 2003. You will find "Roy II" in the book, *Chuck Close - Recent Paintings*, published by Pace Wildenstein in 1995.]

It is possible to provide an example of just this sort of learning. Figures 5, 6, 7, and 8 present a sequence of views of a Chuck Close painting made at different magnifications. Figure 5 shows

a section of the painting at such great magnification that one cannot grasp the context, and so it appears merely as a number of colored patches.

As we pull back from this part of the painting, however, it is integrated in the three following figures into a larger and larger field. By the time we have arrived at Figure 8 we can place the section in question in the context of the whole painting, and in this new whole it takes on a new meaning.

The section portrayed in Figure 5 is, of course, the eye and its immediate surround. But now we can examine the sequence in a different way. If we reverse the process, going back over the sequence to arrive at the section of greatest magnification, we will arrive again at the colored patches, but with a new possibility of seeing. Obviously in the step from 8 to 7 the eye is retained. With a little effort we can still see it when moving from 7 to 6. If we go slowly enough, the eye can still be retraced from 6 to 5. Here—in Figure 5—effort is needed, and you can experiment with your ability to lose the eye and then regain it without glancing back at the more inclusive figures. And whenever your ability to do this disappears, you can quickly regain it by returning to the other figures.

When we return carefully to Figure 5, it is organized (in the original sense of the word: an “organ” is that which carries out a function). We saw no hint of this unity when Figure 5 was first viewed, but now it is possible to see the eye-eyebrow complex that became visible as a part of the whole painting. We have to understand the blue patch (dark in the black-and-white image) as the eye, see the direction of sight, and grasp its relations to the eyebrow and the rest of its context. These relations are both spatial and dynamic—the eye and eyebrow are expressive forms; that is, they are doing something. If we are successful, they will still be doing it as we look at Figure 5.

If we examine our own activity closely, it becomes obvious that the functional doing expressed by the eye-eyebrow complex is not something added to the complex after we have seen it. We must bring forward an organizing intention in order to see it, and this intention includes a sense of the expressed activity. The activity organizes the complex that expresses it. If we see it seeing, we see an eye. Of course, if we relax our effort to grasp the whole complex as an expression of an organizing activity and let our gaze rest on separate patches, then the activity, and therefore the eye, can easily be lost.

### ***Bring Me Any Worms That Sneer at You***

Philosophers make a distinction between the sort of understanding expressed in “knowing that” (I know that all objects fall at the same rate in a vacuum) and “knowing John,” which is a very different form of knowledge. My recognition of John, for instance, contains a type of understanding of John, but I cannot specify my understanding in analytic statements. One does not “explain” how to recognize something, although it is possible to produce directives that greatly facilitate recognition.

For an example of this difference between analytic specification and recognition, consider the account given by C. F. A. Pantin (1954), a lecturer in biology at Cambridge. Pantin points out that in his published papers species had to be identified analytically—that is, all Xs and only Xs have characters 1, 2, 3, and 4. The resulting reasoning was straightforward: this individual has (or does not have) characters 1, 2, 3, 4; thus it is (or is not) an X. Pantin observed that such information is hard-edged: it consists of yes-or-no answers to a series of questions. If the series is definitive, the test allows us to exclude everything that does not belong to the group. Of course such a test still may not tell us what a thing is, in the sense of how to recognize it directly.

In the field, however, such analytic keys are unwieldy to apply and are not often used by experts. Fortunately, Pantin found that “after we have selected the ‘yes’ or ‘no’ characters, a very great deal of the impression which the organism makes upon us still remains ‘unused.’” Thus field recognition can take place on another basis entirely.

Training his students to bring in specimens of *Rhynchodemus bilineatus*, a planarian worm species, he saw that since the planarian has eyes one could imagine it to have a facial expression. Thus he instructed the students to “bring me any worms that sneer at you.” Of course, the student must supply the ability to see the face in terms of a sneer. He gives as another example, “The spines of the sea-urchin I am looking for have something of Chippendale about them—whilst that one looks Heppelwhite.” What is at stake, of course, is the resemblance to certain types of furniture, with which the student receiving the directive is presumably familiar. Pantin observed that when he utilized such directives, the probability of collecting the right species became high.

In attempting to qualify the experience of recognition, Pantin found that it was nearly instantaneous, as was the correction of an error of recognition—for example, “For a moment I thought you were my brother.” This brings it in line with the double-take: an error of perception almost instantaneously made is likewise, when detected by the “peculiar feeling of discomfort” that often accompanies it, almost instantaneously corrected. It seemed to Pantin that this sense of suddenness derived from the fact that recognition works with “the whole available impression,” and detecting wholes is quite different from listing parts. The wholeness is the quality that

escapes the resources of analytic statement. A good metaphor, for example, cannot be communicated by prose paraphrase, no matter how many qualifications we add. For this reason he decided to use the terminology of “aesthetic recognition,” indicating the impossibility of communicating these wholes by analytic methods while recognizing that poetic speech often captures some sense of them.

Of course we cannot define a sneer—that is, cannot propose that “someone is sneering at you if and only if, ... etc.”—any more than we can define a warm smile or even, for that matter, a smile. We can speak of these things only because we have first perceived them, and the language is derived from actual experience. But this property of language allows it to act as a guide to perception. Poetic speech, or good prose fiction, often has an uncanny way of presenting the feel of what happens. This ability to “present” experience vicariously is one of the things we value about metaphorical language: it has a power that allows us to detect resemblance between two different things, like a human sneer and the physiognomy of a planarian species. Such linguistic resources are termed “poetic,” but they seem to produce real experience when applied to the world. The phrase “the worms that sneer at you” makes the hearer all the more likely to see *Rhynchodemus bilineatus* in terms of a sneer and thus recognize it. Language used in this way can act as a guide to experience, as a preparation for seeing in this or that manner. Professor Pantin’s metaphors instruct the student’s perception.

The fact that perception must be learned as a skill is often a sticking point. We would like to say that we open our eyes and things just pop up. But on careful reflection, this rather lazy notion appears to contradict experience. When I deliberately look for similarities in the leaves of plants of the order *Solanaceae* (nightshade family), or try to find an intuited connection between the flowers of the apple, pear, and wild rose, I can gain, through repeated effort, the ability to recognize at a glance the flowers of the family *Rosaceae*, or the apparent identity between the shoot structure of the potato, tomato, eggplant, nightshade, and jimson weed (*Datura*). I see no reason to suppose that this recognition is essentially dissimilar to recognizing John: it is a type of knowledge, although one that cannot be communicated by any series of propositions and can only be learned through direct experience.

It was, after all, our knowledge of cows—our recognition knowledge—that allowed us to see the cow in Figure 1. And as I have argued, such recognition knowledge can be learned—witness the acquisition of a “wise eye” for plant families that botanical training can develop. Thus it does not seem an entirely daring hypothesis to suggest that we have all gained wise eyes for the world in general. Without the proper powers of discrimination we would not be able to pick the objects of the world out of the sensible field any more than we could find the cow, or see the resemblance between members of the *Solanaceae* family that we have not trained

ourselves to recognize. But the suggestion that our activity is necessary not merely to bad photographs or subtle plant discriminations, but also to the common objects of the world that we all see so plainly, will always create resistance. For one thing we have no sense that we are active when we simply see or hear the familiar world. For another, this conclusion appears to stand the original notion of objectivity on its head.

We began in response to the worry that the observer's contribution to perception might contaminate perception. The account so far, however, has suggested that without the observer's contribution perception would have to remain ignorant of the world. Obviously, this conclusion is diametrically opposed to the more popular assumptions regarding perception. Worse yet, it invokes a form of "knowledge" that is for the most part unconscious, is impossible to communicate by analytic statements, and, unlike such statements, resists abstraction from experience. For the last of these qualifications consider that even in the special examples discussed above we intuit that this knowledge can only be gained from experience. We would gain it, for example, by actually seeing the resemblance between *Solanaceae* species. Thus, only those who have seen have this knowledge. But since this knowledge is what I have termed our "preparation" for seeing, it also seems to follow that only those who have this knowledge can see. I think that the apparent oddity of all these qualifications will fall away once the reader subjects his or her own activity to scrutiny and becomes thoroughly familiar with it. Of course, this cannot happen while we accept the rather abstract view of perception received through current literature and do not actually look at our own experience. To the reader's potential doubt, therefore, I can only argue a more searching scrutiny.

### ***Intentionality***

When I spoke above of our ability to recognize something, I opened a subject that is fundamental to any examination of experience, or any theory of knowledge, for that matter. My question, in another form, was, "How does consciousness come by an object of experience?" (where "object," of course, is taken in the purely grammatical sense: such an "object" would be any appearance, any seeming). After all, a mistaken seeming—"For a moment you seemed to be my brother"—is still an experience. And even William James's descriptive phrase for a world of raw, uninterpreted sense experience—"blooming, buzzing confusion"—is still a description of a seeming: "For a moment things seemed only a blooming, buzzing confusion." It obviously makes no sense to speak of experience that does not seem (this or that way), for without a discrimination that makes it a particular experience we cannot differentiate it from anything else,

and therefore could not notice it at all. The question can therefore be rephrased: “How do I become conscious of a seeming?”

Notice that this question is more fundamental than the one that would follow, namely, “How can I know that things are as they seem?” In order to have this problem I must first have some object of consciousness, which is to say, I must take notice of a seeming. This would normally appear rather easily done—we have only to open our eyes. But although we are not conscious of any activity on our part during normal perception, analysis of the double-take above suggests another interpretation. When we replace our first impression with a second, we take it for granted that the first perception was our mistake, thus admitting to an activity that was unconscious in the earlier moment. Our brief consciousness of this activity—during the moment when it becomes opaque to the world—recedes again as soon as perception returns to normal and our activity is transparent to its object. But we can, if we make the effort, bring this activity to consciousness more deliberately.

The intentional faculty appears to bring the sensible situation, unintelligible in itself, to intelligibility by completing what the senses leave in potential. After all, the senses in themselves do not understand; they provide sensation without relation. But phenomena are recognized—that is, grasped in terms of relations and thus understood to the degree that recognition has taken place.

“Paying attention” is a more mysterious activity than it first appears. We know it intimately, because we do it, and not at all, because we do not understand what we do. A comic couplet by Ogden Nash describes a “Water Skater,” a spider-like insect that skates across the surface of the water on six long legs:

If he ever stopped to think  
How he did it, he would sink.

A similar fate awaits those who look too closely at what is actually going on in perception. I mentioned in chapter one that in any perceptual situation one could turn away from the world to the participation of the subject and, by implication, find that the contribution of the subject was always “part” of our perception of the world. In the usual model the “parts” of perception can easily be divided into objective and subjective qualities. But when experience is carefully examined, no “part” appears innocent of our activity. The theoretical problem seems to expand



beyond hope of containment. If the world still appears to be “right there,” an understanding of the process of perception becomes more and more elusive.

## 5. A Physicist Discovers Aesthetics

Georg Maier

Looking back over the course of my life, I can make out a certain path along which I have been led by my developing interest in different forms of understanding. I entered a profession with its own specific approach to the world—a profession requiring intelligence and a talent for inventing logically well-formed connections between abstract ideas. Only gradually did I become more open to present appearance, learning to trust it right into the sphere of personal decisions. If at first I had to devote myself fully to abstraction, it was in order later to develop a contrasting appreciation for the specific and unique appearance.

My memory retains certain scenes that appear to be key experiences along this path. What always strikes me as I recall these scenes is that when they were happening I had a feeling they were significant. Moreover, I am beginning to understand earlier phases as prerequisites for later ones. I see how my life owes its special course to people I met. I read my biography as the story of one who was continually spurred on by individuals who accompanied him, none of whom anticipated what would develop from their participation in my life. Of course, neither did I at the time they were my companions. Company, much more than an “inner voice,” turned out to be my guide.

### *About Playing*

A child prefers to play with certain toys. In playing, he or she will often attribute to the things at hand new, unthought-of roles. While serious *work* is expected to depend on expertise in the proper use of things, on keeping to a given set of rules, serious *real life* leaves scope for improvisation. Things acquire new contexts. New rules evolve in playing that may be valid only in a particular constellation. Art, science, and especially social relations *live* on things being done just for the sake of their happening—as every child at play knows very well.

When I was six years old, we moved to a little country village in the Cotswolds in England that had not yet been reached by electric mains. Indoors a paraffin lamp would light up only a part of a room. Outdoors there was no street lighting, so having an electric flashlight at hand was

of some help. I must have been about eight when I determined to find out how the working parts in a flashlight—battery and bulb—had to be brought into contact to make the bulb glow. I distinctly remember touching the knob at the top of the battery (which in those times looked golden) with the silvery looking bottom end of the bulb—and *nothing happened*.

I repeated this time and again, incredulous to find that the bulb refused to light. At last, my mother came to my help. She took a piece of insulated copper wire, scraped both ends, formed a tight loop around the trunk of the bulb with one end, and held the other end firmly to the bottom of the battery. To my great astonishment, this preparatory procedure changed the situation entirely. Now what I had been trying to do all the time suddenly succeeded. The filament of the bulb lit up! Of course, I had only old, used-up batteries to play with, which made the bulb glow very faintly. But I soon found out how I could add one battery to another, just as they were arranged inside the body of the flashlight. With a long wire connected to the bulb I could get a brighter glow from a whole row of batteries, none of which were very good. And I even found out that by holding batteries in the palm of my hand I could warm them up and so achieve a yet better result.

### *Crystal Set*

After a few years, at about the age of eleven, I put together far more complicated parts according to one of those books about things a boy could do. I had no idea whatsoever how a “wireless set” actually worked. I saved up for and finally bought the necessary parts from a ramshackle second-hand shop in an alley of the town where an old man with a cat sold all sorts of junk. The place smelled of the cat. Following the instructions in the book, I soon received speech and music in my headphones by sheer luck. That was long before high-purity, single-crystal semiconductor materials were used for solid state components; the transistor was still years off. In those days the simplest receiver worked with a “crystal,” a fragment of a metallic-looking mineral in contact with the pointed end of a wire, as a rectifier. In order to receive anything, one had to contact a “good” place on the crystal, which was found by trial and error. But this could be noticed only when a station had already been found by setting the condenser. Both conditions had to be met, but each was contingent upon the other! No electric energy was required to run the receiver, the headphones being activated entirely by the effect of the long antenna.

## ***Electric Bell***

Electricity must have come in later during lessons at school. Learning about it was definitely different from playing with it. All the same, I can only remember one thing happening, but it was very important indeed. Our teacher showed us how an electric bell works. We hear it ringing when a little hammer hits it again and again. How does the hammer's repeated movement come about? Finding this out made me feel "initiated." Recounting the phases of the hammer's movement, we were led to discover an ingenious trick: the electromagnet pulls the hammer toward the bell, but ceases to do so even before the bell is hit; nevertheless, the pull of the magnet has given the hammer enough momentum to strike. A spring holds the hammer away from the bell while it is at rest and pulls it back after each strike. After being pulled back, the hammer must again be propelled toward the bell, which is very simply effected by an electric contact that closes as soon as the hammer moves away from the bell and opens again as the hammer is about to strike. The electric current in the electromagnet is switched on when the contact is closed and switched off when it opens, so the hammer will always get the pull of the magnet as soon as it falls back.

I not only must have understood the trick, but, more than that, must have understood that I had been given the ability to understand! And this is what gave me the feeling of an initiation. I was impressed to discover that the inventions of the time were within my reach. I felt myself promoted from the status of a child who just plays with things to the rank of a person who is growing able to *know how to invent*.

## ***Chemistry and Physics***

Upper school led into science, which I enjoyed as a way of playing with ideas. One day, our chemistry teacher let us participate in preparing hydrochloric acid. I cannot recall how it was done, though of course I have since learned how it must have been. But this does not seem to have been all that important. What struck me on that occasion was that we had prepared a substance that is useful in real life, and so laboratory work moved me into the realm of serious activity in the world. This feeling must have surprised me, for chemistry acquired a new flavor I had not tasted before.

While science appealed to me, I remained shy in my relations with people. Professional life should not engage me too deeply with people! I imagined that in science human relations would

not be so important. Later this certainly turned out to be all wrong, but such a feeling was then governing my image of my future.

Not long before the end of school I received advice about future studies. I visited a cousin, twenty-two years older than myself, a really great physicist who was later to become well known. I think it was the first time I met him. I must have told him about science at school and presumably about my liking for chemistry. He tested my likings and by the time I left him I had changed my mind. Comparing physics and chemistry, he had pointed out that in physics you may solve a problem by thinking it over, while in chemistry you depend on practical know-how, you have to know a great deal, and you will still be obliged to find out even more by gaining specialized experience. His argument for creative mental activity and against dependence on empirical findings appealed to the stronger leanings in me at the time, of which I had not been consciously aware up to that moment. Chemistry was out.

### *You Are No Good at Chemistry*

Chemistry was part of the physics curriculum at university. In one phase of laboratory work we were given a mixture we were to analyze qualitatively. By applying the appropriate tests we were supposed to find evidences for certain ingredients. When we decided to stop our search and offer our results to the instructor, we were by no means certain that they were either correct or complete. So the drawbacks of chemistry I had been told about really were true. The instructor had to examine us after each task to check our knowledge of the chemistry of a certain group of elements. I had to rely heavily on shrewd guessing, mainly trying to deduce my answers from the structure of the periodic table of elements. Of course, the instructor could not be deceived, and one day he told me, “You don’t really know anything about chemistry, but you’re good at thinking!”

### *Diploma Thesis*

For my diploma thesis I was given a “chemical” problem (in the sense of this narrative). It had just been discovered that crystalline layers of certain copper compounds exhibit most interesting spectroscopic phenomena at very low temperatures. I was to prepare one such substance with traces of a second, and then look for spectroscopic results. Not being good at

chemistry, I could only prepare samples with traces in the range of percents instead of parts per million. This turned out to be a great stroke of luck, for my samples showed a new, unexpected effect that supported certain expectations about the mechanism underlying the spectroscopic phenomena. My professor told me, “Now we ought to publish your results in the form of a letter to a scientific journal.” What actually happened? To my surprise, the letter that was written revised history by implying that we had made the experiments because we expected them to add support to the accepted theoretical model!

The difference between chemistry and physics had proved to be true. Certainly unexpected empirical findings proved rather important in this line of research—and also rather beneficial for my personal success! It turned out that this windfall could easily be recoined to give the necessary results for my doctoral thesis.

### *Alternative Research*

What I had experienced was brought home to me forcefully by a project I pursued immediately after my professional training. I spent an apparently fruitless year working on experiments aimed at effects that were supposed to be outside the scope of conventional science. The person I decided to work with had a certain experimental setup in mind, which, as he expected, should bring previously unknown forces within reach of humankind. Full of the best belief, I sailed into my work. Soon I found effects in my apparatus. Things seemed to be going well. But these interesting effects turned out to be explainable by conventional, that is, trivial, physical mechanisms. So I had to modify the experiment by insulating it against the influence of its immediate physical surroundings. This course of events continually repeated itself. My experimental findings were never in keeping with expectations. Slowly but surely it became clear to me that the whole quest kept me in a state of contradiction to experience. I would lose interest in my results as soon as they became explainable. Much later, I would learn that comprehension of an appearance can always be deepened. Explanations are only temporary steps; if taken with too much finality, they can even endanger the deepening of understanding. So, looking back, I could recognize this experience as being of the greatest value for future undertakings. But at the time what I needed was a new job.

## *Neutron Optics at Nuclear Reactors*

In my next step I entered a field in which kinds of forces that had been unknown when I was born were being put to use. A new tool of research with nuclear reactors was being established. The reactor process is governed by the flux of neutrons associated with the fission of uranium, and the neutrons, as they issue from the core of a reactor, can be used for research.

First experiences tend to be strong, persisting in memory. The day I had my interview as a possible future coworker in the Swiss Federal Institute for Reactor Research, the director of the department I was to work in took me on a detailed tour of a reactor installation that was to be put into operation shortly. Since there was as yet no radiation hazard, we visited places that would soon be inaccessible. I was able to see and feel the massive structures necessary to contain the high radiation that would surround the process. At gateways I received a first-hand sense impression of the thickness of the walls of the vaults we entered. I looked through heavy glass “windows” of unimaginable depth. That evening I had to tell my friend and future wife about everything that had so deeply impressed me.

In the routine of daily life that followed, the hall around the reactor was my usual workplace. Here one had to provide for all the experimental details necessary to the research projects. Here, too, many important discussions with co-workers took place— not only on professional matters. On special occasions when things went wrong, my strong first impression of the thick walls and their significance was expanded and intensified. But this never gave me a feeling of danger. The place was the accepted scene of professional effort. Only later, after leaving this field of work, did I begin to contemplate my experiences. Eventually I was led to a negative personal judgment about the industrial use of nuclear energy.

The field of science I had entered utilized leaked-out neutron flux to get information about materials. Everything depends on how the materials being tested *scatter* the neutron flux. I will try to explain what is meant. In a neutron optical experiment, when all is said and done, one always counts events. If the reactor is not running, practically no events are to be detected. When, on the other hand, there are many events, the experimental set-up lets these events form a kind of image of the material you are studying. You can think of neutrons as *particles* where they originate and again when it comes to counting events. And in between you are dealing with neutron *waves* that you must imagine to be embracing the probe material extensively. The apparatus, which must give the neutrons alternative ways of being scattered, puts “questions” to the neutron flux. The answers it receives always fall within the scope of the questioning framework—just like our answers to multiple choice questions. You must specify a set of

alternative models, and you give the material you want to study a chance to express itself within this context. The kind of answer you get is that the distribution of counted events implies different probabilities for the various alternatives you have suggested.

As a beginner, one still felt that events “happened.” But with experience, one realized that a single event or bursts of two or even three in short succession meant nothing whatsoever. Events of this sort must be taken in their statistical averages. I remember watching counters count and gradually conceding that what seemed to be happening in the present was not yet to be taken as a reality in the context of our work. Somehow, we were simultaneously participating in two different realms: one in which our senses could still participate, and another in which probabilities emerging in numerical terms were what really mattered.

It is hardly surprising that computers for data processing were the other novel instrument beside the reactor that one needed for this kind of research. It is interesting that both technologies were invented and developed at the same time. So what we see in the reactor hall as the neutron optical instrument is to be understood as part of a system of which the computer is an integral part. The research workers direct the “attention” of the system when they design the physical installation and also when they write programs for the computer.

After seven years in which I gained practical experience in a field of artificial sensing at the very time it was evolving, I was fortunate enough to be given the opportunity to move into the field of percept-based science. What I did not know when I made the change was that *understanding based on perception is the original meaning of “aesthetics.”*

### ***Watching Waves: An Exercise in Observation***

From the old bridge across the Birs (near Dornach, in Switzerland) one can look down onto the surface of the flowing water. It has actually come almost to a standstill due to being dammed. The old bridge is built of limestone masonry; it has two spans and above the middle pier is a baroque sandstone statue of Saint Nepomuk. The road across the bridge no longer carries any traffic; its cobblestone surface is reserved for pedestrians who can look back to the old houses of Dornachbrugg, then look to the north a little further downstream where the river flows through the “Dornach Canyon” after driving the turbines, or upriver where ducks often swim in groups. One morning, while waiting for a shop to open, I looked upstream, saw the ducks and watched their wakes in the form of a V behind them. It was obvious to me that I was not perceiving the slight ups and downs of waves directly. What appeared was a “waving” of mirror-like reflected



images taken from the visible surroundings. The phenomenon was so intriguing because the images were moving, and it was hard to grasp the principles governing their order. But there is no doubt that what was happening helped make the scene look “watery.” The subject occupied me for a long while afterward. I still like to get people to watch what is happening when they “see waves” on the surface of a gently undulating pond.

In the context of this report, it must be stressed that I did not treat the phenomenon in the way a physicist would tend to do. I did not derive the phenomenon from the obvious model of reflection by a mirror bent in wave form. Rather, I tried to discover how the observed image resulted from a transformation of the image that had been apparent when the ducks were absent. Straying off the path I had chosen as a high school student, I let experience instruct me in finding the appropriate concept.

### *A Search for a Characteristic Gesture for the Reactor Process*

The nuclear power plant at Kaiseraugst to the east of Basel was never built. For years a continuous opposition was kept up to prevent it from ever happening. At the height of the conflict the site was occupied by people who stayed there day and night. Frequently, demonstrations were held there during weekends. Although the demonstrations were serious protests, they were strictly peaceful affairs with an atmosphere of joy that so many interesting people were around. I remember one occasion when the two sides claimed widely differing numbers of participants. With a twinkle in the eye, one would point out that there was one objective number to be taken seriously, which was the very large number of grilled sausages sold and consumed. Such good humor remained part of the atmosphere, despite the fact that a serious power struggle was taking place—after all, people were putting their civic reputations at risk.

My experience gave me reason to opt against this technology. The pros and cons of nuclear energy were supposedly discussed in public strictly on the basis of “objective science.” And, indeed, I became aware that both sides used the kind of logic that had bred this technology. The only difference seemed to be in the way personal risks for the local population were felt. I sensed that what moved the large section of the public, who were opposed to the project, was a feeling for the *gestures of the reactor process*. I suspected that certain images, seldom alluded to, were of important moral content—just as the image of a power plant that ran on practically no fuel must have been an incentive for the development of nuclear energy. (And it still seemed to offer cheap power; the problem of disposal of nuclear waste was greatly underestimated by the pro-

nuclear camp at the time. Since then nuclear energy has turned out to be just too expensive.) So the “official” logic of the discussion was one thing and the driving forces on both sides were quite another. Those opposed could not voice their true misgivings, since these could hardly be expressed in the language of efficiency, which is to say, the language of cost and profit.

I began to ask myself: what image of the reactor process had been forming in *me* while I had been taking advantage of it in my professional career? With the experience I had been granted, I should have been able to characterize the nuclear reactor process in terms of *gestures of a being*. I felt myself committed to the task. The memories of the vaults that impressed me so deeply began to unite with the logical principles that govern the reactor process.

The part neutrons play in the reactor process is comparable to the role of heat in combustion. In a wood fire, for example, the flux of heat from the flames roasts the wood, driving burnable gases out, which in turn nourish the flames. In the reactor process this sort of continuity depends on the neutron flux. The flux ensuing from fission of the special uranium isotope is transformed in a moderator, such as water, so as to cause further fission of uranium. While combustion works on the basis of air being taken in and exhaust gases continuously being returned to the atmosphere, the reactor process needs its surroundings only as a cooling agent, for the heat generated in the reactor process generally has a detrimental effect on the process itself. We must keep in mind, that the reactor contains all the material that it needs to feed its process. If, in combustion, a source of oxygen is admixed to the oxydizable fuel so that it can burn in isolation, then the process of combustion can accelerate to an explosion. And the reactor-process is related to such combustion— both can accelerate.

The elementary theory of reactor dynamics treats the uranium in the fuel elements and the moderator in which these elements are submerged as a single unit. When the parts of this unit are properly arranged, a neutron flux sets in at a certain point, which must be found empirically. This flux is linked with fission in the uranium. Each fission event results from a neutron of low energy being absorbed, and in turn produces a number of high-energy neutrons. While traversing the moderator, neutrons will lose almost all their energy. The theory follows all the possible fates of a freshly emitted neutron that will prevent it from triggering a subsequent fission event. The probability of avoiding all these fates multiplied by the average neutron yield from a single fission event is the index of criticality. If this number is unity, the neutron flux remains at a constant level. As the index depends almost only on this arrangement’s *size, materials, and form*, control of the reactor can be exercised by changing these mechanically. If the index is greater than unity, the process will increase exponentially in time, and the reactor is said to be “supercritical.” You must keep in mind that the average time span of a generation of neutrons

can be extremely short, so there is always a threat of the neutron flux quickly rising from an immeasurable level to a dangerous “excursion” (as we called it) of power.

In this description, concepts of extremely disparate character have been suggested. One can hardly imagine the “fates of the neutrons” to stem from any authentic experience of fate on the part of the neutrons. We form our pictures of such events by relinquishing the terms of first-hand experience. In order to construct morally significant representations of the process in question, we must carefully visualize the various abstract functional *relationships* and the physical conditions giving rise to them. Then we can assess the relevant gestures:

The process depends on no outer agent whatsoever. *Self-excitation* sets in, caused only by the physical arrangement’s *size, materials, and form*. And this self-excitation of the physical object occurs within a confine sealed off from the world at large, *locked away from life* in nature. And likewise in the future: accumulated radioactive waste must be kept locked away from the circulation, the whirl, of life. These relevant gestures characterize the way the process acts; they are found in experience, just as we get to know the behavior of a living being we become familiar with. This characteristic behavior becomes extremely lucid once we compare it to the fundamental processes of plant and animal life and their intimate interrelations. Then it becomes striking how *autistic* the nature of the reactor process really is. When we refer to a behavior of this sort, we are really alluding to a Being, not given in Nature but brought to existence through the activities of cooperating Human Beings.

I began to see that my own convictions about nuclear power resulted from awareness of such characteristic principles of the process. These principles are far removed from the interpenetrating and integral contexts of living processes. And I was further convinced that there must be some common element in various people’s perceptions of the reactor—that the significant gestures must indeed be felt vaguely even by the man in the street.

### ***Discovering Aesthetics: The Hidden Aim of a Long Journey***

All the while, no decisive agreement to give up the project had been reached between the government and the prospective builders of the power plant. The construction equipment could resume work any time, so the opposition remained on the alert. One day, I was told of a group that met regularly in Basel to discuss topics connected to non-violent resistance. It was there that I soon met and got to know a philosopher whom I had already heard speak at a discussion after the Chernobyl catastrophe. Hans Rudolf Schweizer (1932 – 2001) turned out to be *the* specialist

on and translator of Alexander Gottlieb Baumgarten (1714 – 1762), who had coined the word “aesthetics” when envisaging an alternative mode of cognition. Thanks to this encounter, my work on phenomena-based science gained a much wider context. I learned that Baumgarten had conceived “aesthetics” as a name for *all fields of science* based on first-hand experience given by the senses—on images and mental pictures, as opposed to *logic* and analytic reasoning applied to generally accepted knowledge.

Looking back, it is becoming clearer to me that I had been engaged in finding my way between these antagonists all my life. I see my cousin explaining the pros and cons for chemistry and physics, and using arguments for which Baumgarten had coined the appropriate terms. As a high school student, I had opted for logic, fully convinced of its superiority. Later, in doing experimental work for my diploma thesis, I had worked with and mixed materials, which led to surprises. I was gaining know-how from sense percepts, just the way my cousin had warned me. In doing “chemistry,” I found myself beginning to practice the mode of cognition that Baumgarten had envisaged as aesthetics! When my discovery was written up, the professor insisted on putting the whole story into a “logical” framework: we wrote that the experimental work had been undertaken with the aim of supporting the established theoretical understanding.

What were the characteristics of the new science as Baumgarten originally conceived it? Aesthetics was certainly not just a theory of art, or worse, a theory of the production of pleasing impressions. Baumgarten coined the name from *aistheta*, the Greek word for “sense percepts.” Aesthetics as a *new mode of cognition* was to combine two activities: perceiving and representing. That is, Baumgarten was interested in the passive sense impression as expanded by expressive activity. In this book it has become apparent that we engage in expressive activity even *while* we perceive—this being the only way to grasp anything at all. In the following chapter we will begin to compare the methods of logic and aesthetics. This will lead to an assessment of stages in the process of aesthetic cognition. As it will turn out, we will also find that attending, organizing through *intentionality*, and then participating in the appearance are the valid realization of Baumgarten’s vision of a science based on experience.

## 6. Aesthetics: Appreciating the Appearances

Georg Maier

### *Appreciating as a Mode of Cognition*

In chapter one we told how the morphologist and the wrong-minded student met and clashed. The student mentioned his enthusiasm for Goethe's attempt to approach science by keeping to direct experience and was judged a mere nature appreciator, not a productive scientist. There was no way to reconcile that rift. Looking back at the event, the student became aware that, because he cherished gaining experience through the senses he had been found guilty as a sinner bent on enjoying sensual pleasure. But he opted against giving in to the stern commandments of academia; Goethe's insistence that science could be based on direct sensible experience had convinced him that sense experience did not require one to indulge in subjective pleasures. He foresaw its becoming a path to deep reality. The morphologist, on the other hand, presumably remained unaware of such a choice when he took on the path of abstraction.

As indicated at the end of the last chapter, aesthetics as it was established and developed from 1735 on by Baumgarten was an alternative to logic. Logic is cognition based on thoughts, on ideas, on theory. Baumgarten characterized aesthetics, by contrast, as the mode of knowledge dedicated to the individual appearance itself, the *aesthetician* being an individual who finds the utmost truth in the specific experience and the less significant truth in generally applicable, fundamental concepts and theoretical constructions.

In this chapter we will consider how to *appreciate the specific appearance* in an attempt to practice aesthetics in Baumgarten's sense. In his time logic was seen as the true path to objective knowledge. It still is. And, to be sure, this path is positively "anaesthetic"—devoid of sense experience. It is taken as a matter of course in the guild. It leads to knowledge in terms of principles that in turn must be compatible with the basic beliefs of the time. These are seldom voiced explicitly, but they comprise, all the more, the current ideology.

## *How Logic Works*

It is a peculiar undertaking indeed to question the application of logic in cognition and thus, as it seems, in reasoning. As the standard of clearheaded thinking or reasoning, logic cannot be put in doubt. But another trait of logical reasoning is its distance from the wealth of original sense experience: logic draws conclusions from *general ideas* which have been either inherited from tradition or set up hypothetically for the time being.

An eminent example of logical reasoning is the syllogism, which combines a general sentence with a more specific one and leads to a corresponding conclusion. Here is a classic syllogism:

All human beings are mortal.  
Socrates is a human being.  
Therefore Socrates is mortal.

Clearly, the concept of the human being connects the first two sentences and leads to the conclusion, into which it does not enter explicitly. Note that the full meaning—the firsthand experience of mortality—remains in the background; it is not part of the reasoning process. We could just as well have said “two-legged” instead of “mortal” and the same logical relationships would be on display. If we remind ourselves that the conclusion of the syllogism is about the death of an individual, this is our own business and is not required to appreciate the strictly logical aspects of the reasoning.

Logical inference must follow rules that at first sight are just common sense. But these rules have been scrutinized since antiquity with the result that they have been refined more and more and given the rigor of mathematical operations. Steps in valid reasoning must work like steps in mathematical proofs.

So logic as the opposite of aesthetics follows the example practiced in the establishment of mathematics. For geometry Euclid built a methodical edifice which, in principle, is still valid in its structure. How does it work? A set of geometrical objects is given through definition—points, straight lines, planes, and so on. These are ideal: the plane has no thickness, the line has no breadth, and the point has no extension. Then an appropriate set of axioms is chosen to specify how these objects may interrelate. For example, in a plane, two lines must intersect at a mutual point. (Euclid did not yet envisage that point going to infinity as the lines become parallel.) Once

we have laid this foundation for geometry, our next step is to deduce the theorems that allow geometry to be applied in practice. For example, we can prove the theorems governing the geometry of triangles and then can put them to work in surveying. The surveyor establishes geometrical relations between points fixed in the topography. In this way a spiderweb of abstract geometrical relations is cast over the rich diversity of a landscape.

Logical inference in natural science must begin with clear-cut concepts suitable for mathematical reasoning. Experience, on the other hand, tends to be too complicated to be represented by a simple formula. For example, when leaves fall they come down to earth, as do other bodies. Treating this problem logically, we could begin with the fundamental law of nature that all bodies dropped in a vacuum fall in the same manner, gaining speed according to the specific local constant of acceleration. However leaves don't fall like stones do; they float through the air, so that this approach is obviously insufficient. We are required to find an alternative law befitting the fact that, lacking the stone's acceleration, leaves fall with a constant mean downward velocity. We find such behavior in the sinking motion of a body in a viscous liquid. Further steps in the construction of an artificial formulation will be inevitable.

What have we been up to? First, we substituted the empirical phenomenon of falling leaves by a first law. It was a success as far as it fitted the mere fact that leaves come down. But then it turned out to be inadequate in relation even to a mean velocity in downward motion. So we were in need of a better substitute, which, as we know, is still by no means satisfactory. But we were at work, modeling idealized objects. And only such idealized behavior may be admitted into our mathematical reasoning.

In the last chapter, the physics student was told he could solve problems in physics by logical inference. Physics was opposite to an empirical science, such as chemistry. The haphazard movement often shown by a leaf floating through the air is perhaps a paradigm for empirical events. Every time it gains speed in falling, it tends to rise in its flight, but only to stall, and so on. If you try to catch such a lively leaf, you may fall down yourself, so surprising are its movements. What is more, it will not repeat its flight if you give yourself and the leaf a second chance. You might say, a little whimsically, that full understanding of the falling leaf implies a consistent ability to catch it as it floats down to earth. Perhaps some things on earth are just not predetermined; they cannot be wholly captured by reasoning. And perhaps these are the important ones.

Instead of inferring the particular object or event from a general law, we can attempt what is often considered to be the opposite approach. That is, we can attempt the *induction* of a general law from empirical evidence. Does smoking cause cancer? A field study on this question would proceed in the following way.

In a general population two possibly overlapping sub-populations can be distinguished: smokers and people afflicted with lung cancer. We must first count the individuals belonging to each sub-population, and also those belonging to both. Depending on the statistical frequency of smokers with cancer, we may conclude, with more or less confidence, that cancer is correlated to smoking habits. The statistical results establish a certain probability for the relation set forth in the hypothesis.

Two requirements must be met in order to proceed with the inductive method: first, before the field study takes place a specific hypothesis needs to be formulated, and second, we need a number of repetitions of the events we are considering (for example, smoking and getting cancer) in order to obtain the necessary statistical data. The problem is that experience never exactly repeats itself; no two individual lives are identical. One person who smokes and gets cancer leads a different life and has a different history compared to another person who also smokes and gets cancer. So the events we are counting are never the same; we are counting apples and oranges. In induction we do not examine events in all their particularity. Rather, we remain within fixed categories not modifiable according to individual character. We restrict our understanding to objects and relationships of a general nature. Here, as with the Euclidean sort of logical inference, the path of logic leads from above downward—from a basic general principle (“cancer correlates with smoking”) to an abstract criterion (“those who desist from smoking have less chance of getting cancer”) that can then be applied to experience.

In the logical mode of cognition, general concepts in the form of a theory are treasured as the basic knowledge of any science. We try to understand individual events by interpreting them in terms of underlying general concepts. Then the individual event appears to be a conclusion of reasoning that deduces it from abstract principles. So, logic, in the sense in which Baumgarten was referring to it, is a line of thought that begins with a theory and works out special applications that follow from it. If this can be done convincingly, the event in question is held to be in agreement with generally accepted knowledge. If not, the experience will likely be cast in doubt—or, perhaps, if enough nonconforming experience is eventually found, some new fundamental concept may be framed as a hypothesis.

While seeming to be supported by the authority of universally accepted principles, conclusions from general concepts are devoid of the individual, unique, and existential character that authentic sense perceptions have. This was what Baumgarten had in mind when he suggested that a kind of cognition must be possible that is prepared to deal with what is singular in the appearances we meet. In logical terms we could conclude: aesthetics is complementary to logic.



*Aesthetics: A Mode of Cognition Complementary to Logic.*

“In trying to get the highest truth which he is able to see, the aesthetician will . . . prefer the more definite, less general, less abstract, to the general, the abstract and extensive truths, and again prefer the individual as far as possible to the general” (Baumgarten, *Aesthetica*, §439). When we take a logical approach to cognition, we rely on knowledge of a general nature, trusting that it will have the power to *explain* individual and particular experience.

Of course, in experiencing everyday life we are all aestheticians. This becomes all the more true as soon as we leave the artificial conditions of our technical civilization. Out in nature we are exposed, for example, to the ever changing weather. We get wet when it rains, and the smooth stones on the mountain path we are following downhill become dangerously slippery. The problem worsens as dusk sets in. But the sun breaks through clouds on the western horizon, bathing the now-sparkling trees in the evening’s last golden light. Turning back, we are rewarded by a magnificent rainbow contrasting with the anthracite darkness through which it is drawn.

Perhaps these few hints will suggest how we enter the world of the particular. Not one of the events cited above stands outside the net of general scientific concepts. We may certainly recognize them as events of this or that general sort. Recognition will put the specific event inside the context of conceptualized past experience; then an abstract concept occupies our mind, and this concept may obscure special traits of the current appearance.

Presence gives us a chance to observe and participate—not only to judge and to explain. We tend to forget that those phenomena could not come to appearance except through our own “being here.” Thus we may give them attention and factual significance as events in our lives. They become a part of our biography. *It is our appreciation that makes the world specific.*

In logic we meet a hierarchy in which the most general concepts have supremacy over less general ones, and these in turn reign over specific objects or events. This preference for universally applicable concepts has been handed down to the present from ancient Greek philosophy: knowledge was understood as the answer to the question, “To what common group of objects does the individual one belong?” Thus the species depends on the genus, while the genus is independent of the species. In that mode of cognition, knowledge of the genus seems to be the necessary requirement for an understanding of a species – but not vice versa.

For aesthetics Baumgarten explicitly asserts the very opposite scale of values (*Aesthetica*, §440): “The concept of the genus means an idea of a great truth, the truth of the species the idea of a greater, the truth of the individual or the singular means the idea for the highest conceivable

truth.”

### ***Skilled Expression of the Truth***

But aesthetics would be ever so dull and stupid if were true that individual appearances are just given, that they fall into our lap. Rather, they demand appropriate forms of cognitive activity. For Baumgarten, aesthetics was a process in which two elements unite: perception goes hand in hand with representation of the perceived in an artistic process; we perceive meaningfully by giving perception artistic form. The cognitive activity he demanded of the aesthetician called for *skilled expression*. Since Baumgarten had been a poet from the time of his youth, he illustrated this expressive element by quoting examples from ancient Roman poetry.

Artistic handiwork and the culture of its consumption were taken to be the meaning of aesthetics in the times that followed. Its originally intended scope as the form of cognition appropriate to real life has hardly been noticed. Taking aesthetics in the very broad sense in which it was originally conceived, we remain confronted by the question: Is skillful expression in itself the suitable method to establish and intensify the appreciation of sense experience? Can it increase our attention to authentic experience so that the experience becomes clearer, more conscious, more fully felt, and the occasion for stronger commitment?

In Baumgarten’s writings “aesthetic thinking” or “beauteous thinking” is often alluded to, but never clearly specified. Above all, he referred to aesthetics as “sensual cognition.” So we must find out for ourselves what he may have meant. The track I would like to follow takes us to his comments about remaining true to our own experience in the face of the temptations that beset us when we are trying to convince someone (*Aesthetica*, §558 – 559). He puts the temptation this way:

While deeming that one is in the pursuit of truth, one will above all try hard to achieve perfect clarity, distinction, certainty, hopefully moving and forcing consent. One would like to rouse delight and an affection that must follow with necessity.

We are being warned that our objective can easily change from appreciating experience to being successful as an author in reporting on it. And a report will be all the more acceptable the more it remains within the bounds of general understanding. Therefore, as Baumgarten explicitly stressed, those bent on such success will tend to *ignore*:

- whatever is too abundant in content to fit into the perfect picture they have already made;
- whatever has a scope and importance that outruns their current understanding;
- whatever cannot be proved true or false based on what is already known;
- whatever cannot easily be clarified and isn't necessary for the distinctions they want to make;
- whatever suggests the contrary of what they are trying to point out, could hinder its being agreed to, or perhaps even give rise to disgust.

Reading a journalist's rendering of an event in which we ourselves were involved, we often find it crude and oversimplified, missing those intricate points about which we really ought to have a longer conversation. But the journalist's art has a lot to do with simplifying, with practical abstraction.

We, too, are inclined to simplify, even while perceiving. We are bored and just don't bother to look if we find that seemingly similar appearances are recurring. We shrink away from becoming involved in events that do not fit into our habitual way of life, or our worldview. Anyway, we prefer familiar and comfortable topics that don't demand much of our attention. And, of course, we are very suspicious when things come up that run contrary to our beliefs. Likewise, we cringe from exposing ourselves to what we are afraid of experiencing.

But if, in the spirit of aesthetics, we want to appreciate the specific and unique appearances we meet, then we must overcome favor, prejudice, and impatience. We must honor individual appearances by taking responsibility for them. aesthetics is, finally, about personal integrity. We will touch upon this dimension in later chapters.

### ***Aesthetic Cognition Happens During Perception***

Our prejudices may work both when percepts appear and again when we report them. But at what stage are the percepts ignored? Do we ignore them after initially having attended to them? Is Baumgarten merely writing about previously grasped experience being suppressed? Or is he warning us about the danger of losing the percepts before we even notice them, due to inattention?

While most of us may assume that a skillful expression can only be produced *after* the impression it refers to, *this is not necessarily so*. It has been a central aim of this book to elucidate the intentional activity a perceiver necessarily must contribute *while* an appearance is

becoming conscious. The skill in expression Baumgarten talks about is the ability to direct an appropriate intention to the world so as to bring this world to awareness.

Baumgarten warned that our grasp of the perceptual situation is limited by our personal prejudices. When we should be perceiving in the present, our minds stick to familiar judgments made in the past. Earlier in this book it became apparent that we *see as much by our understanding as by our eyes*. In the process of intentional activity, we are not *explaining* an appearance; we are not suggesting a general concept, but are using our ability to express, that is, to describe, in order to let the appearance appear. In describing we make the appearance increasingly specific. This skill is the key to wealthy experience. For such understanding in the present we suggest the term “aesthetic thinking.”

In the chapter on “Intentionality” a host of examples for this process was produced. We may remind ourselves of the granite column, Kanizsa’s patterns, or “What frightened John was looking at Mary,” and particularly the cow hidden in the picture. In the case of the cow, no abstract concept of a species was recognized, but rather a specific image was organized and acknowledged. Clearly, we often, if not usually, intend habitually without noticing how we intend. And this sometimes leads us to a double take, where we more easily notice the second try. This renewed intentional activity is prerequisite to the appearance becoming coherent and satisfactory. As Baumgarten held, aesthetic cognition comes to existence when impression and expressive intention *unite*.

Such aesthetic union can come true on different levels.

### ***Levels of Intentional Activity***

A lot of our cognizing activity is in fact *describing*. We constructed the invisible triangle and saw it as a whiter area. In the case of another Kanizsa pattern, we learned to “flip” it intentionally, following the suggestion to look for a background seen through circular holes. We had first seen, that is expressed it, in another way, following a habit we had formed in looking at the preceding examples. In everyday life, *description* as the *first level* of aesthetic cognition is permanently at work, yielding the apparent world of the senses. Parallel to such image-forming activity are aesthetically uncalled-for logical judgments that tend to cut off our attention, hindering us from forming more specific appearances.

Of course, our initial ability to see the cow depends on our previous experience of creatures with ears, nostrils, and eyes. Then a larger picture opens up into which we can actively integrate

further details, still derived from past experience. For example, we can now see much of the picture as the cow's body, and even the fence beside its head falls into place. But in pointing out all these elements of recognition, we can still miss significant content of the picture.

Do we explicitly take into account that turn of the neck the cow makes in order to look at us? That would be an ingredient of skillful description, but it leads us beyond description. We learn that we may be of interest to the cow. This learning is more than just noticing that the cow has turned its neck; it is becoming aware of an emotional atmosphere to which our own presence contributes. But we may have difficulty articulating this feeling appropriately, while it's easy to report, "The cow turned its neck." A *second level* of aesthetic cognition opens up as we immerse ourselves in the whole present scene and experience its unique expressive aspects.

Moreover, we often find it important to *sustain our attention* in order to remain present and involved in developing events. A word that seems to be appropriate to such continued attention is "accompanying," which I will propose as a *third level* of aesthetic cognition.

### ***First Level: Orientation in the Physical Surroundings***

On the first level, that of description, our intentional activity is biased by *past* experience. It often works almost automatically, as if it were installed in us as instinct. Mere recognition leads to the feeling that we are passive observers of external objects alien to ourselves. Experience on this level comes to us in bits and pieces. But in attending to a scene, patiently describing it to ourselves, we can *acquire new knowledge*. Let us look into two examples.

*The rainbow.* If asked to describe a rainbow from memory, quite a few people will give vague answers. Rainbows happen. There are situations in which the appearance can be expected. Say, in the late afternoon dark clouds coming from the west have brought rain, which is now lessening as the sun begins to shine. If you look at the still blurred landscape to the east, where the receding clouds darken the sky, you will see a brightly colored arc, or parts of one. How are those colors arranged? To answer this, it is worthwhile to look for more of the phenomenon that is developing. It may strike you that the rain in the area inside the arc tends to glisten while immediately outside it looks darker in comparison. In the arc itself, red touches that darkness directly, the qualities contrasting with each other. Inside the red layer follow the other colors—say, brighter yellow, green, blue, and violet, which is innermost and touches the glistening area just mentioned. The trouble is, additional colored arcs may appear between the violet and that glistening, and these may differ from one occasion to the next. That question cannot be taken up

without comparing different rainbows appearing in different rainfalls, so we must shelve it at present. But still, on the whole, the brightness of the violet does not contrast with the glistening as much as the red contrasts with the dark on the outside of the arc. I think it is for this reason that the warmer colors of the spectrum seem to predominate in intensity. If our rainbow happens to be very bright, maybe a second, fainter and broader, outer arc will become visible, inside which the colors are in the opposite order. It will form the outer boundary of the dark area already described, which then turns out to be an arc itself.

In describing, we give the phenomenon and ourselves a chance to make its appearance singular, which is the very opposite to vague. We bring the appearance into a state of marked presence. If, in recollection, previous rainbows seem to have been more magnificent, maybe they were not as carefully observed within the given whole situation at the time. For example, isn't it striking that the rainbow appears when rain and sunshine, two "conflicting" processes, come to coexist? By the way, that circumstance was already touched on implicitly in the descriptions given above. As we will see, such integration of details in one picture is the task of a second level of aesthetic cognition.

*Shimmering views.* A vertical stripe of turbulence in which the details of the landscape seem to shimmer might arouse our interest, since unexpected movement always provides a strong incentive to attend. Turbulence in the visual field is well worth studying as a phenomenon in its own right. We can notice that the undulating stripe is found under the horizon and most likely ends there. Why is this so? The question stimulates us to look at the turbulent image more carefully. Then it becomes apparent that the phenomenon can only be seen where the landscape offers us a pattern made up of contrasting details. These details flicker. The horizon typically subdivides the scene into an upper, less sharply detailed part (the sky) and a finely structured part on the ground. And, looking more attentively, we see this finer structure undergoing rapidly changing distortion. The shimmering, we discover, becomes more vivid when the background scene that is being modified by the effect exhibits strong contrasts.

This effect may also be observed on occasion directly over a fire. If the blaze is intense and the material dry, so that no smoke rises, the fine details may even be completely blurred. So, step by step, we can learn something new through this and many similar instances. The wavelets in the surface of a pond will show up where the reflected image is rich in contrast. Thus, an appearance (for example, the reflected image) can lose its own clarity while promoting the appearance of others (the wavelets).

In this way, by describing a phenomenon in terms we already possess, we can make new observations. For this we must observe how various details interconnect. Having become familiar with such a phenomenon—its modifications as well as the conditions under which it

occurs—we extend the store of experience from which we can recognize things in the future. From this mode of description, we should move on to a next mode of aesthetic appreciation, in which a whole situation may be integrated and appreciated as one image.

***Second Level: Meeting an Expressive Whole.***

Aesthetic thinking strives to be as inclusive as possible in forming a mental picture of the given situation. Goethe offered a good example of this. As an old man he reported to his secretary, Eckermann, the advice he had given the painter Friedrich Preller. It is an explicit example of aesthetic thinking:

I have seen many of his studies from nature. They were excellent, and executed with great energy and life; but they were all isolated objects, of which little can be made when it comes to individual inventions. I have advised him never in future to delineate an isolated object—such as single trees, single heaps of stones, or single cottages—but always to add a background and some surrounding objects.

And for the following reasons: In nature we never see anything isolated; everything is in connection with something else which is before it, beside it, under it and over it. A single object may strike us as particularly picturesque; it is not, however, the object alone which produces this effect; it is the connection in which we see it, with that which is beside, behind and above it—all of which contribute to that effect. Thus during a walk I may see an oak, the picturesque effect of which surprises me. But if I represent it alone, it will perhaps no longer appear as it did, for want of that which contributed to and enhanced the picturesque effect in nature. Thus, too, a wood may appear beautiful through the influence of one particular sky, one particular light, and one particular situation of the sun; but, if I omit all these in my drawing, it will perhaps appear without force, as something indifferent, missing all magical quality.

Further; there is in nature nothing beautiful which is not produced as *true* in conformity with the laws of nature. In order that that truth of nature may also appear as the truth of the picture, it must be accounted for by the introduction of the influential circumstances.

I find by a brook well formed stones, the parts of which exposed to the air are picturesquely covered with green moss. Now it is not alone moisture which has caused this formation; but perhaps also a northerly aspect, or the shade of trees and bushes, have

cooperated. If I omit these influential causes in my picture, it will be without truth and without the proper convincing power.

(Modified and abridged excerpt from Eckermann 1930, conversation of June 5, 1826.)

Goethe is convinced that the *workings* of nature are comprehensive and holistic. So its scenes are naturally composed to perfection. And for this reason we find its appearances beautiful.

There is some danger of misunderstanding what is meant if you take all this as referring only to the successful production of purely naturalistic works of art. Drawing or painting is not the main concern. Goethe is pointing out that the *relationships* between the details of natural appearances are the conceptual elements necessary for understanding the appearances.

Let us remind ourselves that we perceive not only with our eyes, but also expressively, through new forms of insight. We find this expressive and aesthetic thinking at work in Goethe's examples. These reckon with the picturesque effect, the magical quality that a scene may have as a whole. One senses integrating principles. As such, they cannot be verbalized, being sensed as an atmosphere pervading a whole situation. Through such imaginal relationships, aesthetic thinking perceives a lawfulness and consistency underlying the beauty of a natural scene.

It is worth noticing the seemingly pedantic enumeration—"which is before it, beside it, under it and over it"—in Goethe's advice. It can remind us of the *abundance* that is so hard for us to tolerate, but that is wealth for aesthetics, as Baumgarten noted.

### ***The Vegetation Configures Itself in Harmony with the Whole Situation***

Goethe cited two particular fields of experience: illumination as an example of the fleeting nature of lawfulness in the inorganic realm, and living vegetation as an example of interrelated life processes. We will look at the latter in more detail.

Shade is part of the atmosphere in which moss can grow on rocks in a stream. It grows in a manner expressing the overall character of the site, including its illumination. The shade that supports the growth of moss is not only present in the moment; it can be understood as an enduring quality of the site evident on the surface of the rocks in the stream. In representing a scene, we can do justice to this enduring quality by depicting the circumstances that impart it. In his suggestions to Preller, Goethe stressed that a northerly aspect, or trees and bushes producing shade, should also appear in the picture.



It is impressive that here Goethe already takes explicitly into account an ecological context—which has since gained such importance. In the time since Goethe gave his advice, botany has taken up the concept of plant communities (plant sociology): in a natural habitat certain plants necessarily coexist. Thus, for example, in August you can expect to find the blossoms of the famous but rare *edelweiss* in the Alps in certain typical sites. At these sites there is little soil between the rocks, and you will be reminded to watch for *edelweiss* by the conspicuous violet petals of the aster, which it tends to accompany. Such sites get a lot of sunlight from above while offering an extremely infertile ground, so this vegetation conveys a feeling of being lean and able to persevere.

Living beings depend on the integrity of their organization. Their bodies unite the activities and potentials of the specialized organs they possess, which cooperate in such a way that each one depends on others for its existence. Similarly, entire organisms and communities of organisms live in mutual dependence on each other. Life unites a choir of voices collaborating to achieve the communal task. Living beings function as integral parts of the whole sphere of life, which reciprocally supports its members. This whole takes on a particular character in every unique setting, and this character is what Goethe was hinting at when he spoke of the mutually cooperating conditions that can produce a mood or overall expressive quality. And we can participate in this expressive quality, which is why we occasionally speak of the special “atmosphere” of a situation.

### *Awareness of States of Health*

How is it that we can participate in the world on this second level? It seems that the felt condition of my own organism expresses qualities of the scene. This feeling is what integrates the details Goethe told Preller to take into account.

Goethe spoke of a magical quality in the experience of a healthy whole. And in the same context he spoke of the beauty that is linked to truth in the appearances of nature. We somehow sense a person’s health, vigor, and vitality, as if vitality could be perceived directly. On the other hand, when perceiving signs of disorder or injury, we may notice an uneasy feeling that intensifies to a sense of being unwell, to nausea, or even to a fainting spell. This makes more understandable the general opinion that beauty is what pleases, whereas ugliness is felt as uncomfortable, irritating, and displeasing. *We feel healthier in surroundings that are manifestly healthy in themselves.* We are inclined to surround ourselves with beings or things that please us.

People of different tastes have different requirements, and they seek percepts fitting their present needs. Nature and art have great scope as “dietary” agents. One can experience the appearance of fresh green leaves of deciduous trees sprouting in the spring as directly invigorating.

Just as we can feel ourselves limp and listless, so also we can experience the limp leaves of a pumpkin that are wilting after a long hot day in the sunshine, or of many plants in a drought. Our own intrinsic *sense for states of health or wholeness* is the basis for our *sense for situations*. This sense relies on our ability to participate in phenomena. Once we have experienced waxing or waning life, the harmony or dissonance of situations, the variety of atmospheres from inanimate nature all the way to the human social realm, the serious question will arise: in what way are we going to deal with things that don’t look at all nice?

In this case we find the harmony of the picture marred. It appears ugly, and gives rise to disgust. The aesthetic effect is negative. Habitually, we tend to shield ourselves from experience of this kind. And we may remember that Baumgarten explicitly pointed out the bad habit of ignoring what we are afraid will sicken us.

We might one day visit the site of the brook with the mossy stones, which had been so beautiful. To our surprise, the brook is dry, the trees that had given shade are gone, the moss is still there, but its green looks less deep, perhaps even a little yellowish, and its texture has changed as if it had been pressed down slightly. The whole place appears in a pitiful state. We are disappointed and in pain over our loss. We are surprised to notice that we have become involved in a relationship by participating in something that is developing in the course of time.

### ***Third Level: Accompanying***

Aesthetic participation changes in quality as we find ourselves involved in what is developing. This happens when we become attached to a person, to a group of people, to an animal, even to a developing plant, or to a certain landscape as it undergoes natural or human-made change. In all these different cases we assume responsibility for sustaining a relationship that has come alive. A good way to characterize continued attention is to say that we are *accompanying*, or being accompanied by, a friend, a living being, or even a place that has become important or meaningful to us. In the introduction to his *Theory of Color* Goethe pointed out the possible revelations of such attention:

We cannot express the essence of a thing. We only observe effects. But the complete history of the observable effects of the thing does in fact encompass its essence. So, while we cannot adequately characterize a human being in an abstract sense, we can bring together his actions and deeds, and through these we encounter an image of his character. [paraphrased]

A mode of aesthetic cognition is here alluded to that differs from the second level described above. There, various details were integrated into a whole picture, and in the picture's entire extent a single situation held sway. That is, a certain consistency permeated the scene. Thus, for example, each of the plants in the scene appeared in the appropriate stage of its annual development and in harmony with the others. The scene appeared at one single time.

But now, in the mode of accompanying, we take a further step and get to know a "thing" as it may appear differently in the course of time. A big question arises here: what do we mean in alluding to the "same" thing when in fact the appearance we witness has changed? In Goethe's remark cited above, it is called the "essence," and what is meant is something that only reveals itself in the sequence of its states. Therefore it cannot be identified with any one of those states alone.

A classical example for such sequential becoming is the life of a plant. To illustrate this, several stages in the development of the new shoot of a linden tree in spring are depicted here.



Drawing by Mathias Buess.

During the previous year a bud had formed on the tip of a twig. As spring set in, the bud expanded, opened, and the shoot developed. It took only four days from the opening of the bud to reach the next stage in which three leaves had unfolded. Two weeks later, the new shoot had developed all its leaves and was already showing its blossoms. When the tree is in full flower, it will be humming with bees. From then on it will no longer entertain us with new spectacular transformations, so we may have little incentive to sustain our attention. But after months, the foliage will become noticeably coarser, and in a short time the leaves will turn yellow and drop, leaving the shoot ready for wintertime, as depicted in the last phase. On the very left end of the new twig you can discern a thicker part; it had been the tip of the twig that carried the bud. A vestige of the flight apparatus for the seeds remains attached to the twig. Three seeds are also shown.

In summer, as in winter, there are long phases in the life of the tree that, in comparison, seem eventless. As its would-be escorts, we need to redouble our attention during such phases; we are in danger of forgetting our commitment.

Every spring, the foliage on the circumference of a deciduous tree develops from ever so many shoots, a process that repeats itself every year. A linden tree has the potential to outlive those of us who accompany it, continually repeating its cycle year by year. Our individual perspectives of it may vary with time and personal circumstances. For example, the person who sowed the seed and watched the cotyledons unfold may have been concerned to take care of it until it could be planted at a prominent place. A very different perspective opens up as the linden tree grows old and valuable, and perhaps a tree surgeon will have to be called in to save it from breaking apart.

When regarding the seed, one is still ignorant of the specific developments to follow. But one may well decide to support the plant's progress toward becoming a proper tree. In this sense "accompanying" entails setting up a relationship that carries the promise of future experience.

In the quote above, Goethe uses the character of a human being as an example of what we can learn by attending to the actions and deeds flowing from the essence of a being. In the German original "essence" and "being" are two meanings of the same word. When we accompany a process, we take on a project, the project of keeping up awareness over the course of *time* while the object of our awareness is prone to change. This is quite different from the usual meaning of "accompanying," which is to remain near an object or being that *moves in space but does not change*.

In this third mode of aesthetic cognition, experience never leads to an ultimate result. When relating to a friend, we *care* about what we experience together with him or her. This continued caring is the central intentional activity that keeps up the bond. And just as we must open ourselves to new appearances in our human relations, so in all quests for knowledge and understanding we must take active interest and exercise initiative. Moreover, concepts that are open to modification in keeping with this ongoing process of understanding cannot finally be defined in the way logic insists on doing.

### ***Three Senses Mediate Aesthetic Cognition***

In our passage through three levels of aesthetic cognition we have actually distinguished three "senses":

In describing, we use our sense for facts. A sense for the way a being participates in the whole environment becomes apparent on the second level of aesthetic cognition. In accompanying we are sensing the interests and needs of another being, its concerns. Involvement

in aesthetic cognition turns out to be one and the same as committed perception. Rudolf Steiner (1995/1923) introduced these three senses as our realization of the three traditional transcendentals: truth, beauty, and goodness. As perception and cognition coincide, individual human participation takes place; aesthetic involvement becomes serious, it establishes biographical reality.

In going from description of bits and pieces to the second level of aesthetic cognition where we experience an expressive whole, we step into experience that can become new. We needed our past experience initially, just as we needed to recognize the cow before we could read its gesture. That gesture itself cannot be received passively; it is as if we must *act out internally* what we seem to be meeting outside ourselves. Through this participation, we give the present situation a specific content according to our current capacities. Ours is not the only possible appreciation that could have taken place, but it is what really has occurred. We have made a kind of judgment.

In accompanying a subject, we continue to learn and our judgments develop. This is a matter of course in human relations. Our previous experiences of an individual always threaten to burden our future experiences with preconceptions. As we move from one judgment to a later one, we must allow them to be contradictory! Baumgarten's criterion of truth becomes crucial as we confront the individual essence of what we are accompanying. On this third level we are furthest away both from preconception and from the logical mode of cognition. We must accept the development that occurs while at the same time participating in and accepting our share of responsibility for it. The being we accompany is becoming part of our lives.

## 7. The Rite of Spring

Stephen Edelglass

Listen! Pitched in the very highest register of the solo bassoon, a lilting melody and haunting sound—floating, eerily detached—announces the opening section (“Introduction: Adoration of the Earth”) of Igor Stravinsky’s *The Rite of Spring*. We become alert to the uncanny tonal quality of the unusual, high pitch of the instrument. While the rhythmical swing of the melody engages our body to participate in listening, it also demands alertness as the lilting quality is achieved via a constantly changing rhythm within which the melody flows. The meter changes at every bar line: four quarter notes to a measure—that is, four beats to a time unit—followed by three quarter notes to a measure, back to four quarter notes and then two quarter notes to the measure. Instead of a repetitive meter to which we can unconsciously tap our feet, the melody flows within a constantly changing temporal framework. The solo melody is joined by a second bassoon, but in a more usual register, darker and more grounded. While it is easy to follow both tonal lines, the harmonics are dissonant; they do not fall within classical expectations of major and minor keys. A great range of tonality, unlimited by adhering to a single key, announces itself from the very beginning. The tonal richness is emphasized as the other wind instruments join in. Yet the music is still relatively transparent. It is possible to follow separate thematic sequences that are piled one atop the other. Low register strings join in to furnish a throbbing foundation. Finally, the “Introduction” comes to an end with a return of the beginning bassoon solo.

Raw percussive chords hammer at the listener with a primitive beat in the next section (“Dance of the Adolescents”). The rudimentary power of the percussiveness is intensified by the dissonant tonal architecture of the repeated complex of chords in which many tones are piled one above the other. The result is a mighty edifice of primitively beating sound to which the body of the listener resounds.

We need not further describe Stravinsky’s seminal score. Already we have met in it many of the fundamental qualities that distinguish twentieth-century music. Melodies are riotously free flowing, not straitjacketed by expectations of symmetry, repetition, or lyricism. Harmonies gain thrilling power through complex polytonal dissonance made possible by employing multiple musical keys simultaneously. Rhythms are immensely exciting as they are freed from rigid demands of meter. Such music requires active, wakeful, and fresh listening. It cannot be heard

or enjoyed when we bring habitual expectations to it, expectations into which we can sink as into a tub of warm water.

Regard for twentieth-century music is often predicated on understanding its intentions. Listening to *The Rite of Spring* today, we may find it difficult to imagine that there was a near riot in the audience at its first performance in 1913, the same year that Kandinsky painted his *Composition No. 13*. In fact, Pierre Montieus, the conductor at that first Paris performance of the *Rite*, told one of us that he ended the performance prematurely, with a loud chord from the brass, so that the musicians and dancers could vacate the hall and escape the tomatoes. Now, nearly a century after that first performance, listeners readily make sense of the energetic, driving, polyrhythmic and polytonal character of the music. It is invigorating, not at all alien from the rhythms of modern life. We are now capable of *hearing* Stravinsky's music.



## 8. Manifestation from Inside Out

Ronald Brady

### *“Yes, Somehow the More Beautiful Object is Always the More Intelligible”*

As I was pursuing my studies—I think it must have been my fourth year at Berkeley—I read Immanuel Kant under Professor Karl Aschenbrenner, whose kindness toward me I will always remember. Professor Aschenbrenner was concerned with reading Kant, not criticizing him, but I could not resist the latter. He was patient with my probing attacks in class, although some of my fellow students thought I was wasting time. When I wrote a critique that was not easy to read, Aschenbrenner spent the time and effort needed to understand it. In his comments he praised the work for its penetration, adding only that he could wish I had made the discussion “a bit friendlier to the reader.”

When I was leaving Berkeley, I told him I was working on Goethe and the relation of aesthetic experience to knowledge. He seemed to recognize the project, and remarked quietly, “Yes, somehow the more beautiful object is always the more intelligible.” That was my last conversation with the old gentleman, but his remark remained in my memory as a benchmark, acting as a guide in several investigations. I never asked him where he learned the insight, though in later years I regretted this, for I did not understand how a Kantian could entertain such an un-Kantian viewpoint. Only later did I realize that Aschenbrenner had escaped my categorizing. He was not a Kantian at all. When Georg Maier called my attention to Baumgarten, I searched the libraries for translations, but found only one, his short dissertation on poetry. I sent for it, and when I opened to the title page I found something entirely unexpected. The translator was Karl Aschenbrenner, University of California, Berkeley. He had never said a word.

The equation of beauty and intelligibility made by my professor could have been derived from Baumgarten, although it could also have come from other sources—St. Thomas Aquinas’s account of *claritas*, for instance. For our purposes here, however, I would like to approach it through experience. It will be best to begin, I think, not from beauty but from intelligibility.

Let us return for a moment to the cow. I have left the picture in its original orientation because I want to look once again at the other possible figures it presents.



Figure 1

Looking at the picture for the first time, we may easily catch the cat pouncing head down from the upper left. To the right, a little bird is to be found. Some will opt for the “bird” really being a mouse, sitting up on its hind legs. Both solutions fit as possible objects of prey for the cat. But at this stage no feeling of having grasped the situation seems to arise. There are reasons for our not being satisfied: none of the objects we have chosen to identify relates to other parts of the scene. If the cat really were pouncing on a victim, it would have to direct its movement in a more convincing way.

We have not succeeded in unifying the picture into a coherent whole. And this is precisely what will happen when the picture has been turned 90 degrees clockwise. If it is moved far enough away, many of us will need no further instruction. We will discern a head appearing on the left side of the picture. It is facing us. As soon as a head is considered, two black ears, little black eyes and a black muzzle are apt to pop up. It is as if a key were opening a door, behind which the white cow has been waiting. And the cow turns out to fill the whole area of the photograph, the right half of the picture being mainly filled by the cow's body.

Suddenly, we find ourselves facing an animal that has turned its head to face us! The sun is shining from the right. The wire fence to the far left really fits into the scene.

We have found the key to a better unity. It turned a rather chaotic pattern into an occasion to remind ourselves of the feelings we may have when encountering a cow. Somehow this encounter seems to be happening in the very present. A real encounter will not be entirely different, for in both cases what we feel in the cow's turning its attention toward us is inseparable from our own consciousness of attending to the cow. Or, to put it the other way around: something within us reveals the inside of what appears to be meeting us from the outside. We may make the following conjecture:

*Perception begins from the inside.* And it is *inside* ourselves that the “inside” of the perceptual object becomes manifest. This is rather a rash and venturesome inference. In the examples that follow, the role of our own mind in experiencing outer appearances will be of key interest.

### ***Appreciating Some Examples of Historic Architecture***\*

The history of architecture presents us with different styles—for example, the Romanesque and the Gothic. As a rule, the forms of arches and vaults are the characteristic features of these different styles: the perfectly circular form represents the older, Romanesque style, while the typical Gothic arch has a sharp bend at its apex. When standing inside a vault under the Romanesque semicircular bend of masonry, we may find ourselves reminded of being inside a tunnel, deep down under the surface of the earth. On the other hand, when we stand inside the nave of a typical Gothic cathedral, the feeling of being “drawn” upward is almost inescapable. While we are certainly just looking at a construction of blocks of stone, a specific feeling is induced in our bodies that in some way connects to the mechanical aspects of the situation.

---

\*This section was added by Georg Maier.

Both styles of architecture originally depended on pressure between adjacent pieces of masonry for their mechanical stability, which imposed conditions upon the structure as a whole. The more pressure is exerted on a round arch from all sides, the more stable it becomes. The Gothic arch, by contrast, can be understood to consist of supporting piers mutually carrying a load high above the ground.

Strong images can help to connect our experiences inside the respective structures with the mechanical principles we learn theoretically. The round vault may be *imagined* to be part of a tunnel, deep down in the earth. An immense pressure is being held up by the masonry of fine workmanship. There is no need to be afraid that it will buckle. Down in the tunnel, no visible allusions to the vertical dimension are present. The very opposite is true for the Gothic form. Ask someone of similar size to assist you in holding a heavy stone between you as high above your heads as the two of you can reach. Then, as you carefully move apart—just a little, as carefully as you can—each of you will represent the function of one side of a Gothic arch. The *imaginative* picture you are beginning to get will rightly reflect the delicate balance of forces you must maintain in order to hold up the heavy stone.

As soon as we become aware of the structural engineering principles of those historical forms of architecture, we can't help imagining our own body being engaged in the mechanical situation at hand. So again an inner organ, now associated with our limbs, opens up a sense for the inner coherence of such a building. It is as if a key had opened a door to a more intimate engagement with a structure that before we had examined only from afar.

Just as the photograph became richer after we recognized the cow—richer in proportion to the richness of our imagination of the cow's stare—so also can imagination enrich the experience of an edifice. As works of art lead us to an intense imaginative activity, our experience becomes a union of our inside and the world we had taken to be outside us.

### ***Brancusi***

Surely it is clear that *seeing* a work of plastic art requires a particular skill, and thus a particular knowledge. This seeing is difficult and requires effort on the part of the observer. Even as reading a work of imaginative literature, particularly poetry, demands that the reader master an uncommon use of words—the particular *diction* involved—so “seeing” a work of plastic art depends upon mastering the “viewer's diction” demanded by the work.

When a museum visitor does not find a particular painting or sculpture worth looking at, this result is usually charged to differences of taste. But there is an alternative possibility, namely, that the visitor *failed to see the work* by failing to master the required mode of perception. In this case a judgment has been made of something *other* than the work, for it has not been recognized, even as a poem remains unread by the untutored reader who can make little of it. Viewing art, like recognizing plant species, must be a matter of *knowing* before it can be a matter of appreciation. This was obviously the trouble in the court case brought by the Romanian sculptor Constantin Brancusi against U. S. Customs (1926–28) for refusing to recognize the *Golden Bird* as a work of art. When Brancusi brought the *Bird* into New York, Customs levied a duty of \$210 on the piece for its metal value. (An art work in possession of the artist would have been tax-free.) In the subsequent court proceedings, testimony of the witnesses for the Customs authority described a piece that was not a bird, and, indeed, what they described, when used as a guide in order to perceive the work, was indeed *something that could be seen* (Giedion-Welcker 1959, pp. 212–217).

But before we look further at the Customs case, it will be well to explore the divergence of views about another work of art. Consider Figure 2 below, Brancusi's *Newborn*, done in polished bronze.

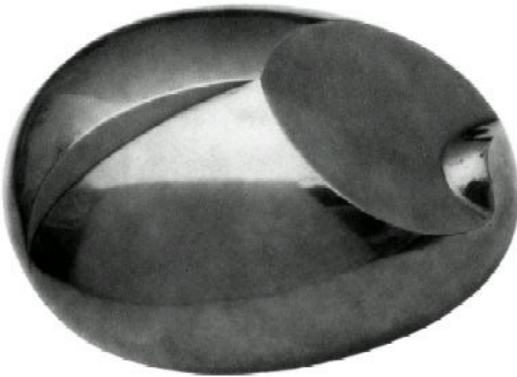


Figure 2. *The Newborn*. (From Geist 1969, p. 71.)

Some years ago I came across a critic who was led by this title to see “a gastrulating embryo” just beginning to differentiate. (I have not been able to find the reference these many years later.) The critic, I speculated at the time, had probably been looking at the work of Jean

Arp, and was unfamiliar with the particular “viewer’s diction” needed to see Brancusi. Thus, his judgment (he thought the piece successful) could apply to Figure 2 only when seen as he suggested. Others, however, have found the sculpture successful for very different reasons.

A greater familiarity with Brancusi’s works allows the viewer to place the piece within another context—another diction—by the technique of juxtaposition with other images that we used to find the eye in the Close painting. The reader need only run through the sequence of Figures 3, 4, and 5 before returning to 2. By then the necessary mode of seeing will be in place.



Figure 3. The head of *The First Step*. The facial elements are reduced to the eye-eyebrow-nose complex and the mouth. The head sat upon the body of a child taking his first step, and the total figure was so obvious that no one would have difficulty finding the context for the head. (From Geist 1969, p. 64.)

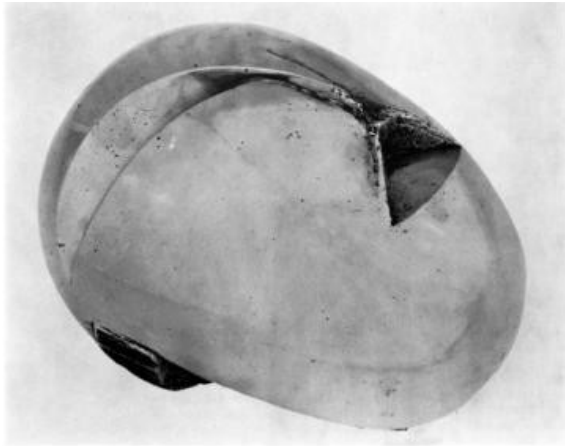


Figure 4. *The First Cry*. The curve of eye, eyebrow and nose are retained from *The First Step*, and the ear is visible. (From Geist 1969, p. 55.)

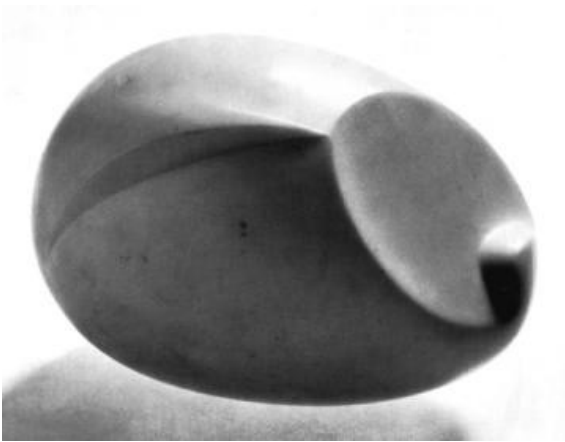


Figure 5. Marble version of *The Newborn*. The eye-nose curve now extends to a flat plane—the wide-open mouth of the infant—punctuated by the chin. If an easier viewing angle is desirable the image may be rotated 90 degrees clockwise, bringing the head upright. (From Geist 1969, p. 70.)

Brancusi's images progress toward specification of a particular object of knowledge. The series moves from a simplified representation of an infant's features to the full specification of an expressive gesture—the wide cry of the mouth. The head of *The First Step* was only part of a

greater whole that did not focus on the head (although the expression can be read as tentative—perhaps right for a first step). *The First Cry* attempts this focus, concentrating on the moment of awakening at birth (presumably when the doctor slaps the rear of the newborn to make the child use his or her lungs). In the next piece the title is replaced by *The Newborn*, dropping any reference to a cry, for this title is all we need. If the latter work is seen as an infant's head at all, it is a crying infant—howling in fact. It is a stunning improvement on the former piece. By comparison, the gesture of *The First Cry* is far more ambiguous—it might be, for instance, the “first stuffed nose.” The solution was relatively new to European art of the time, for the open mouth in the *The First Cry* was indicated by a real cavity, and thus the mouth in these works was, in one sense, more “realistic.” The flat plane of the later work, however, represents the open mouth far more definitely than the “realistic” cavity, for *The Newborn* presents the gesture rather than the geometry of the face

Again we see that the parts are dependent upon our recognition of their context, which is the whole within which they are integrated and, in this case, within which they can carry out their function. We must propose the correct whole in order to see. This is helped by the title of the piece, but once we see the head as that of a newborn, the traumatic moment becomes lucidly clear. The meaning of the perception is recognized, but the *knowing* within this recognition is of a different order than our usual perceptual recognitions. Art does not attempt anything so complex as reality, but presents only a *semblance*, and this semblance develops only that aspect of the reality under consideration. *The Newborn* strives for the gesture of the crying infant, and in doing so it refines away everything extraneous to that end. Thus the final image seems more transparent to the inward meaning than an actual child might be, although our sensitivity to the actual gesture may be improved by our understanding of Brancusi's piece.

Seeing the “transparency” to inward meaning is a perceptual ability that we all share, for it is the foundation for interpreting gesture. The briefest reflection will show that without this “diction” our ability to know the world would be catastrophically reduced. Gesture is recognized immediately, holistically, and fairly accurately, and in human affairs, or our dealings with animals, or even with plants, it is irreplaceable. Brancusi was so affected by the power of the gestures he witnessed in the world that he developed a form of sculpture to present them. His early bronze *Torment* (Figure 6), for example, done in the atelier of Rodin, was conceived when he saw an apprentice being beaten by his master, and the gesture of helpless resignation gave form to the statue. Figure 6 is a museum photograph of the piece, and, as anyone familiar with the artist will know, Brancusi also developed a photographic approach to his own work.





Figure 6. *Torment*. (From Geist 1969, p. 32.)



Figure 7. Plaster original for the bronze sculpture of Figure 6. (From Giedion-Welcker 1959, p. 71.)

In Figure 7 we have Brancusi's own photograph of the plaster version from which the bronze was cast. Brancusi's soft focus, shot angle, and lighting have provided a different approach to the work than the conditions of the museum photograph. The recognition of this

difference is usually instantaneous. The Brancusi photograph makes the piece more transparent to the inward meaning: the gesture and the form are clearer, the piece is more “alive” because its nature is more deeply seen, and thus known, by the viewer. Brancusi’s purpose was clearly interpretive—the diction of his photograph leads to a way to view his art. The photograph of the marble *Newborn* in Figure 5 is, of course, also made by Brancusi.

Art, or at least the sort of art that desires this end, shows us a world in which recognition requires a deep knowledge of its object, knowledge that one might even call wisdom. I do not mean the sort of wisdom that can be separated from experience, but rather just the type that is gathered from much experience. An art of this sort can present the distillation of experience to those who have learned to use their eyes. I suppose this says much about the witnesses at the Customs trial who insisted that Brancusi’s works had little or no relation to their titles. The *Bird* was not a bird, said one, nor could “any flexion of changes” bring about a resemblance.

When the earlier *Maiestra* (the name of a magical bird of a Romanian folktale—see Figure 8) was brought in, the Customs witnesses argued that while it had some resemblance to a bird it was not a competent piece, looking as if it had been executed by a savage or a child.



Figure 8. *Maestra*. (From Geist 1969, p. 51.)

The sculpture may seem odd to someone looking for a resemblance of physical detail, which it refuses to offer. When the movement of the bird, its gestural context, is considered, however, the whole impression changes. The chest and shoulder muscles, and the lifting head, bring to mind the world of birds as we see them daily, when we really see them. And of course the statue may be viewed from the opposite direction.

The photographer Edward Steichen purchased a *Maiestra* (there are several versions) and mounted it on a stone column in his garden. His daughter, seeing the sun fall on the statue, snapped a picture of it with a simple camera (Figure 9). The result is surprising. Perhaps the piece would make a good bird-warder for the garden, for from behind, with the light right, the brooding gesture of a great bird of prey is impossible to miss. This remarkable presence is created by a minimum of articulation, but that purging of unnecessary elements is what makes the piece so powerful and Brancusi's style so striking. The extreme transparency of the piece depends upon a reduction that allows our intuition of inward identity to unify the outer elements into a single gesture, giving us a world in which inner and outer approach each other closely. Notice that inner nature is revealed through outer shape because *the former brings about the organization of the latter*. Without our way of looking—the intention we advance—we could not see the bird of prey. After all, the unifying intuition belongs both to the bird, as its nature, and to us, as our knowledge.



Figure 9. (From Geist 1969, p. 50.)

## *The Evolution of Phenomena*

I can speak of the approach of inner and outer in a work of art due to the character of everyday perception, which presents a world of outsides without clear insides. The world is enigmatic just because of this character of experience. Let me explain. Perception is not knowledge *about*, which is the realm of the proposition, but immediate knowledge *of*, a direct grasp of, the perceived object. But obviously this knowledge is incomplete—I mean incomplete perceptually as well as propositionally. The intentions we bring forward in order to recognize an intelligible world are inadequate to the full task. They fall short on two fronts: they leave a great deal unknown, which we have come to only through the supplement of scientific investigation, and they leave too much *unseen*.

The nature of the perceptual image (taking sight as the model, although analogous relations will hold for the other senses) is that it can, and must, present an inner ground for the outer form. The intuition we bring forward to grasp the whole is itself that ground, but the outward form that results from its grasp will often be far less transparent to the unifying intuition than is the case with the Brancusi images above (Figures 5, 7, and 9). The reason for this is apparent in Brancusi's method. How often do we find in nature an image that is, in all details, so unified that it is as lucid as his sculptures? In any reality more is expressed than the simple nature of the thing, for the rest of the world impinges upon it. Brancusi got around the nexus of causes potentially appearing in every natural image by either refining away everything that was not the intended gesture (Figures 5 and 9) or by taking a subject whose gesture showed a total surrender to the mood it expressed (Figure 7). On occasion, as in the case of the model for *Torment*, the phenomena of the world approach this pure character, but that is the rare moment. Of course, if the world normally had this character there would be little need for art, or at least for an art of the character described here.

That we do recognize such a need suggests that we also recognize, at least subconsciously, that the normal perceptual image is incomplete. A world that was fully our own would not only be propositionally known, but would also be fully recognized. The cultivation of our powers of recognition is an accepted cultural task for each individual—we expect everyone to learn to know the surrounding world. But the fact that such cultivation remains largely an individual task rather than a community effort—unlike, say, the cultivation of scientific knowledge—is evidence that our society has taken the perceptual image to be complete for its adult members. As we have

seen, this is not true, and the average perceptual image is quite plastic and capable of considerable development.

This is why art must be given particular credit for extending our world of knowledge. The semblances constructed through artistic activity can often teach a good deal about their originals, but, more importantly, they teach the viewer about the nature of his or her perceptual images. It is largely in artistic productions that our culture incorporates knowledge of the evolution of phenomena, however tacit this knowledge seems. After all, while the unusual skills of the field botanist, gamekeeper, herb-gatherer, field geologist, and so on, remain distant and mysterious accomplishments for our cultural outlook, the skills involved in *seeing* or *hearing* artistic works are widely recognized. Unfortunately, these skills are thought to bear only upon artistic productions. Natural phenomena, in common assumption, do not call for them, and thus connections between such skills and those of the various professions mentioned are rarely made.

Yet each of these pursuits extends the powers of recognition; that is, they make the perceptual image more complete. The botanist making field identifications, for example, recognizes a species with ease because he or she has been able to make it more transparent to an organizing intuition than it was, say, as an anonymous weed. But the scientist does not have the aid of the artist's rendering in the effort to clarify vision, and therefore must be even more active than the student of art. As recognition expands it must penetrate that "nexus of causes potentially appearing in every natural image," bringing it forward in signatures that can be directly grasped by the trained observer. With further study our botanist may also be able to detect the interaction of other species and the effect of other environmental elements in the formation of the particular specimen examined *in situ*. In this manner the recognized world grows toward intelligibility.

Skills such as these have usually been thought purely individual because they could not be communicated as propositions separable from experience. Only the second clause is accurate. In the moment of recognition, perceiving and knowing are identical: *only those who see can know*, and alternately, *only those who know can see*. But if such knowledge results from a developed skill, it does not follow that it must remain individual. This unity of seeing and knowing has been central to artistic expression for ages, and both the gamekeeper and the field botanist have been able to train others to be like themselves.

At every turn in the road we see images that reveal to the sensitized eye an incomplete character and thus a potential for growth. The question I am raising is not whether we as individuals will accept the task of "helping the appearances to evolve"—although each individual decision is already an advance—but whether we will accept it as a communal task. I think it obvious that new modes of seeing carry with them new revelations of being, even as new

theoretical propositions in science carry similar import. The answer, of course, can arrive only in the somewhat distant future. The question is with us today.

## 9. The World Inside the Human Being is the Inside of Nature.

*Some paragraphs from “Goethe’s Worldview in his Verses in Prose,” chapter eighteen of Nature’s Open Secret (Steiner 2000). This text originated as Rudolf Steiner’s 1897 introduction to part 5 of Goethe’s Writings on Natural Science.*

*These paragraphs by Steiner illuminate the philosophical issues raised in the previous chapter. They may surprise a reader who has not consciously experienced the role of intentionality as illustrated in the examples given throughout this book. Comments upon Steiner’s text are in italics.*

We are not satisfied with what nature freely offers to the observing mind. We feel that, to produce the vast variety of her creations, nature uses driving forces that she initially conceals from the observer. Nature herself does not speak her final word. Our experience reveals what nature can create but not how that creation takes place. The means for unveiling the driving forces of nature exist in the human mind itself. It is here that ideas arise that throw light on the way nature brings forth her creations. What the phenomena of the external world conceal manifests within the human being. What we think through as natural laws is not invented as an addition to nature; it is nature’s own inner constitution. The mind is simply the theater in which nature allows the secrets of her creativity to manifest. What we *observe* is only one aspect of things. The other is what then wells up within our minds. The same things speak to us from outside and from within us. We realize the complete reality only when we join the language of the outer world with that of our inner being. True philosophers throughout time have desired nothing but to proclaim the essential nature of things—what those new things themselves express when the mind is offered as their organ of communication.

*When Steiner contrasts nature’s first appearance with the fuller appearance that arises through its union with our inner being, he is not suggesting that phenomena first arise altogether without intentionality, after which we think about these phenomena to gain a deeper understanding of them. Rather, he is simply taking for granted the (perhaps unconscious) intentionality, rooted in culture and history, through which nature already has come to appearance for us. Then he draws our attention to the philosopher’s (scientist’s) more conscious and disciplined intentions, where we can more easily recognize the role of our inner being in*



*bringing about the appearances. You can think of the matter this way: something meets us in the world, but this something does not become appearance until we have united ourselves intentionally with it, whether in the manner that is largely given to us through our culture, or in the more conscious and sophisticated manner of the scientist.*

*When we observe nature, the focus of our interest depends upon our particular situation and what we bring to the encounter. A great deal hinges on our ability to recognize and then to integrate the details of the context in which we find ourselves, and then to experience the nature of the resulting whole as it appears both to the bodily eye and the mind's eye. Take Goethe's example of the brook:*

*I find by a brook well formed stones, the parts of which exposed to the air are picturesquely covered with green moss. Now it is not alone moisture which has caused this formation; but perhaps also a northerly aspect, or the shade of trees and bushes, have cooperated. If I omit these influential causes in my picture, it will be without truth and without the proper convincing power.*

*First, perhaps, you are struck by something you were not expecting. So you may take notice and attend. Since the green surface contrasts to the surrounding dark areas, you may recognize the moss, especially as you regard the scene with moisture in mind and also note the elements guaranteeing shade for much of the day. As you continue with this inner activity, the scene in its wholeness may acquire the beauty and "magical" quality we earlier heard Goethe speak of. We are reminded of Karl Aschenbrenner's remark, "Yes, somehow the more beautiful object is always the more intelligible."*

When we allow our inner being to speak about nature, we recognize that nature herself fails to fully achieve what her driving forces could accomplish. Inwardly, we see in more complete form what experience contains. We discover that nature has not attained her goals in her creations and we feel a need to express her intentions in more perfect form. Thus we create forms that express what nature willed, but could achieve only to a certain point. Such forms are works of art: human creations showing in more perfect form what nature manifests less perfectly.

Philosophers and artists have a common goal; they attempt to portray the perfection that their spirit sees when they allow nature to impress itself upon them. But they have different

means available for achieving this goal. When philosophers are confronted with a natural process, a *thought*, or *idea* lights up within them. And this is what they express. In artists, on the other hand, a picture of the process arises that reveals it more completely than it could be observed in the external world. Philosophers and artists develop their observations differently. Artists do not need to know the driving forces of nature as they reveal themselves to the philosopher. When they perceive a thing or event, an image immediately arises in their mind in which the laws of nature are more completely expressed than in the corresponding things or events of the outer world. Laws in the form of thoughts do not need to enter their mind. Nevertheless, knowledge and art are related inwardly. They show the *potentials* of nature that have not been fully realized in the external world.

*Goethe, you will recall, was both artist and scientist (“philosopher”), and he clearly brought both sensitivities to the scene by the brook. In this case the brook seemed to yield up its secrets. But Steiner refers, perhaps puzzlingly, to cases where nature does not succeed in expressing herself—cases where her appearances do not fully embody or express the “driving forces” at work. We are given the task of articulating nature's working more purely.*

*We have seen, for example, how an artist may pare away everything superfluous in order to bring a characteristic gesture to fullest visibility. This is what Brancusi achieved again and again. No bird will stretch its body into the vertical the way his birds do. But these birds convey more perfectly than any actual bird (for those who can appreciate it) the gesture of this creature's utter devotion to its song. Likewise, The Newborn brings to appearance the pure expression of an infant's cry.*

*Technological civilization brings nature to a kind of perfection through mechanical means. We are impressed by this perfection when we look down the rows of seemingly endless fields of a single crop reaching to the horizon—a scene made possible by massive machinery, the creation of artificial environments, and, increasingly, genetic engineering. From a different point of view, however, we may say that the opposite of natural perfection is on display here. Nature is being muted; harnessed to the profit-making objective, she cannot express her full potentials. The endless fields manifest something of the barrenness we associate with Silent Spring. Nature's way, by contrast, is one of health in diversity.*

*When we approach such questions esthetically, we not only begin to recognize the steps required for remedy, but we also sense a moral urgency to act.*

The thought-content that arises within us when we confront the external world is truth. We cannot seek any knowledge other than the insight that we ourselves produce. Those who look behind things for something else that is supposed to explain them have not realized that all questions about the essential nature of things can arise only from our human need to permeate our perceptions with thinking. Things speak to us, and our inner nature speaks as we observe them. Both sides of this dialog arise from the same primal being, and we are called on to bring about their mutual understanding. This is what knowledge is all about. Those who understand inherent human needs seek this and nothing else. For those who lack such understanding, the things of the outer world remain alien. Such people do not hear the essential nature of things speaking out of their own inner being. Consequently, they presume that it is concealed behind the things. They believe in another external world behind the perceptible one. But things remain external only as long as we merely observe them. When we reflect on them, they are no longer outside us; we merge with their inner aspect. The contrast between objective, external percept and subjective, inner world of thought exists for us only as long as we fail to recognize that these worlds belong together. Our inner world is nature's inner being.

*Merely observing leaves us in a mode of consciousness in which we remain onlookers, just noting what we have recognized. We have not yet steeped ourselves in the appropriate integrating activity that makes details meaningful in the context of the whole situation. When we do that, the encounter begins to become important to us, leaving an imprint in our biography. Obviously, what remains external is something we have desisted from uniting with.*

These thoughts are not refuted by the fact that different people view things differently. Nor are they refuted because people are organized differently so that we cannot know if a color is seen exactly the same way by different people. The question is not whether we form precisely the same judgment about something, but whether the language of our inner being is the language that expresses the essential nature of things. Individual judgments vary according to individual organization and the perspective of observation, but all judgments arise from the same element and lead to the essential nature of things. This may be expressed in various nuances of thinking, but it nevertheless remains the nature of things.

*If two people experience a situation differently, so that they develop different thoughts about it, this need not result in discord. Through conversation each can live into the experience and thought of the other. In this way, each not only learns to appreciate the other as a person, but*

*also gains new perspectives upon the world. Just as two people looking at a tree from different vantage points gain different, but wholly compatible, views, so we find that different perspectives always enrich our understanding of the world.*

As human beings, if we want to know the essential nature of things, we must allow them to speak through our own mind. All that we can say about their essential nature is taken from the spiritual experiences of our own inner being. Only out of ourselves can we form a conclusion about the world. We must think anthropomorphically. When we say something about the simplest phenomenon—when two bodies collide, for example—we anthropomorphize. Even to conclude that one body strikes another is anthropomorphic. If we want to go beyond mere observation of what happens, we must connect it to the experience of our own body when it sets another body in motion. All physical explanations are hidden anthropomorphisms. We humanize nature by explaining her; we project inner human experiences into her.

But these subjective experiences are the essential inner nature of things. Thus, one cannot argue that we do not recognize objective truth, or the “things in themselves,” because we can form only subjective representations of them. There can be no question of any truth other than subjective human truth. Truth is the projection of subjective experiences into the objective interrelationships of phenomena. These subjective experiences may even assume a completely individual character. Nevertheless, they express the inner nature of things. One can only put into things what one has experienced in oneself. Hence, in a certain sense, each person puts something different into things, depending on his or her individual experiences. My interpretation of certain events in nature is not quite comprehensible to someone who has not had the same inner experience. What is important is not that people all have the same thoughts about things, but that when we think about things, we all live in the element of truth. Therefore, we should not reflect on another’s thoughts as such and accept or reject them, but we should view them as proclamations of that person’s individuality. “Those who contradict and argue should occasionally reflect on the fact that not all languages can be understood by everyone” (*Verses in Prose*). A philosophy can never provide a universal truth, but it does describe the inner experiences through which the philosopher interpreted outer phenomena.

When something expresses its essential being through the agency of a human mind, complete reality manifests only through the confluence of outer objectivity and inner subjectivity. We come to cognize reality neither through one-sided observation nor through one-sided thinking. Reality does not exist as something ready-made in the objective world; it is brought about through the human spirit in its connection with things. Objective things are only an aspect of reality. Goethe answers those who extol only sensory experience: “Experience is

only half of experience. . . . Everything factual is already theory” (*Verses in Prose*). In other words, an ideal element manifests in the human mind when it observes something factual.

*The preceding paragraphs will be baffling to those who still believe their knowledge is knowledge of a world remaining strictly outside them. To gain understanding in the sense meant in this text requires us to develop as individuals, which gives a profound meaning to “learning by doing.” Through active engagement with the world we develop the inner capacities necessary for understanding the world.*

*With the role of intentionality in mind, you will recognize the meaning of the claim that “experience is only half of experience.” Experience has two halves: what the outer world offers us pre-phenomenally, and the inner activity with which we meet this offering. The inner and the outer are in conversation. As we wake up to this conversation, we give up the habit of taking sides in it. That is, we give up identifying ourselves only with the inner half of experience and associate ourselves fully with the understanding that “reality does not exist as something ready-made in the objective world.” The chasm between subject and object then vanishes, as the two merge. Subject and object as such—as separate and opposed realities—cease to exist. And their merging results in our presence of mind—our presence on earth.*

*As human beings, we are limited to states attainable within the conditions of human nature. Aware of this limitation, Goethe was prepared to acknowledge that our experience is of human form—anthropocentric. Only through experience of our own bodies can we recognize other bodies, and we tend to test other bodies by touching them. Our eyes follow the ball in a tennis match as the appropriate muscles allow the eyes to turn in their sockets. Listening to music, we find our respiratory system, even our limbs, stimulated to join in the melody and rhythm. Our practice as gardeners gives us an appreciation for the functioning of climate, soil, and surrounding vegetation in the habitat and development of a particular crop. “Only out of ourselves can we form a conclusion about the world.” But in doing this we are not reaching an inferior understanding. Rather, we become the platform on which the world is communicating with itself.*

*It is admittedly hard to give up the metaphysical dogma of the lone self, the subject cut off from inaccessible objects. A humorous story illustrates the difficulty:*

*Once upon a time there was a mentally ill patient who was convinced that he was a mouse. He was hospitalized in fear of being eaten by a cat, while a psychiatrist worked hard to banish the illusion. Slowly but surely progress seemed to be made, until one day*

*the psychiatrist said to the patient, "We are both sure that you aren't a mouse, so now you can leave this place." The patient answered, "Yes, you are right. Of course I am not a mouse. What a silly idea! But still, I think I should better not leave." Surprised, the doctor asked him why. "Well," said the patient, "I know full well that I am not a mouse. But who can be sure whether the cat knows?"*

*We cannot banish old notions about ourselves without also banishing old notions about reality. We can transcend the lone self only by transcending the ready-made, objective world.*

## 10. Habitats

### On Overcoming the Deep-rooted Metaphysical Prejudice That the Human Individual Is Separate from the “Outside” World

Georg Maier

#### *Connectedness: A Summary*

This chapter leads toward a new understanding of our own selves—that is, a new understanding of the lone self that habitually finds its self-consciousness upon its supposed isolation. Stressing our relations of interdependence with the rest of the world, we will look at the way nature always surrounds its beings with their respective *habitats*. Then we will advance the idea that sense experience is what provides the self with its own individual and specific “habitat.” In philosophical terms we could say that this approach is about giving up the notion of subject-object separation. This deep-rooted, not-at-all-conscious notion *can* be given up, at least during phases of intensified “presence.” And even in everyday life we feel ourselves much less separated from our habitat of current appearances than our supposed separation from the world around us would allow.

The preceding chapters stressed that current appearances need our attention and our intentional activity to emerge into consciousness. As this activity becomes an experience we can esteem those appearances we participate in as being exclusively ours. It is as if we were continually busy choosing just them. We may learn to respect them as the source of new stimuli in our biography that constantly accompany us. As a rule, we do not consciously take our surroundings to be part of ourselves, though we may well feel fond of home, emotionally attached to our place of birth, and involved with all the people who really are part of our lives.

#### *The Inseparable Connection to the Surroundings*

Ecology deals with interrelationships within the sphere of life. While in studying the anatomy of an organism one restricts one’s interest to what is inside the spatial limits of a body, it is obvious that the real living being cannot exist in separation from its habitat. Even in the

inanimate realm experience shows us that the physical object is inseparably connected to its surroundings, as we will see in the following sections. As for human society, the world economy has become a pertinent issue, with local economies losing the autonomy they had when we were all less connected by communication and transportation. We are becoming more and more involved in globally extended social processes and so find ourselves more and more responsible for social as well as ecological issues of global extent. In reflecting upon the surroundings we *inhabit*, we soon find that we exist within different spheres in different ways:

- My physical body is usually in direct contact with, and supported by, the ground—or a floor, or furniture. While it may float, and occasionally jump into the air briefly, my body seems to exhibit a certain heaviness common to both animate and inanimate things.
- To stay alive, I must breathe regularly, occasionally drink water in some form, and eat meals. I participate in life processes as a member of the collective of animate beings. While such beings seem to possess their own discrete, delimited inside spaces, their life processes nevertheless intermingle, in the end forming one unified sphere of life. But this is not to dispute that my own life processes remain individual and centered within (although not confined within) my own skin.
- I can be aware of my present relation to the domains in which I participate via my senses. I experience a world outside myself and, equally, I am aware of sense-related mental pictures appearing through an inner psychic activity of my own, which in turn is intimately connected to my moods. I find my moods being triggered by sense percepts, and I find my moods having influence on my reactions to appearances. Thus I have a private, inner sphere of emotional processes that are very obviously *about my relation to the outer world*. But in this sphere I get the impression of my being lead by behavioral mechanisms.
- Inasmuch as I cannot identify myself wholly with the seemingly automatic psychic sphere just mentioned, a further sphere may be added to our list. We are not accustomed to think of it in terms of a habitat of its own, but, looking back in our biography, we can recognize specific situations in which the choices we made were inside the scope offered us by the surroundings that we met. In this sense they may be compared to the habitats that we know of from the bodily, the organic, and the psychic realm. Can we become



conscious of a corresponding biographic habitat in which our personality is emerging in the present moment?

The notion of an individual “biographic habitat” has been introduced in comparing different realms of existence. We will now inspect in more detail the various relationships in these different realms. In each sphere of nature, seemingly isolated bodies have distinctive and essential relations to their respective environments. It is unusual to use the expression “habitat” in the context of the inanimate, but it is just there in the inanimate realm where the correspondence of the state of a body with that of its surroundings is most perfect, and at the same time most routine.

### *Physics*

Physics is usually taken to be based on the existence of material objects that interact reciprocally according to immaterial laws. Laws are about the characteristic behavior that objects exhibit if brought into a physical situation. Our strong instinct prefers to endow matter with the status of reality. It seems that this is because matter relates to tangibility, to the experience of touch, even if one merely has electrons in mind. By contrast, the relationships with their lawfulness are felt to be immaterial, and they make things we would like to be stable and reliable vulnerable to change.

In order to become aware of the role of the factual environment, we need only remind ourselves of gravity. Immediately it becomes clear that all terrestrial bodies participate in conditions extending at least to a cosmic scale. These conditions can vary in many ways. As astronauts experience in spaceships when cruising without propulsion, bodies lose their weight while their inertia remains. When this happens, the astronauts’ bones tend to weaken. When immersed in water, bodies also lose weight, but become harder to move. Some even float on the surface, and balloons float in the atmosphere, apparently being weightless. A candle’s flame rises up from its wick like a rising balloon as the process of combustion proceeds. In an isolated atmosphere, say inside a jar, the flame reacts to accelerations of the jar (along with its atmosphere and the candle) like a body of *negative inertia*! It leans forward in the direction of acceleration, contradicting our deeply ingrained expectation.

Even such a common substance as water tends to vanish in the altered environmental conditions of wintertime. It turns into a quite different, solid substance—ice—a thin layer of which changes the frictional conditions of road surfaces, with destructive results.

Furthermore, the inorganic realm already teaches us that bodies may belong to their own special environments despite seemingly identical physical situations! So, for example, pieces of different metals will react to the presence of a magnet in different ways—some reacting to it directly (iron), some by having their mobility impeded by an unusual kind of friction (copper), some hardly at all (metals of low conductivity).

Physical phenomena involve specific laws of nature coming into action under appropriate conditions. Thus, on the small scale of a room, the air is warmer near the ceiling than at the floor, while in the open landscape the atmosphere normally gets colder with height. In the first case you can remind yourself of gases changing their density with temperature and thus stratifying accordingly. In the other you will have to take into account that in rising, gases expand in the context of the atmosphere as a whole, and the expansion produces cooling. Obviously a body of gaseous nature is so intimately entangled with its environment that its phenomena can be accounted for only as part and parcel of a greater whole.

### *Appearances Resulting from Conditions Cooperating in the Present*

When a rainbow appears in the drops of rain falling from a dark cloud, a whole scene is set. The conditions cooperating to produce the rainbow are apparent:

- The sun shines from behind the observer.
- The position of the observer's eyes is important, for as it is changed the rainbow will move.
- The drops of rain in front of the observer are illuminated by the sun.

In this example no body, no proper object, stands out as the center of surrounding influences. All the conditions are cooperating on an equal basis to produce the phenomenon. This must have been the kind of thing George Berkeley had in mind as a typical “idea of sight” in contrast to one of touch (chapter 2).

Of course, now that we begin to think about it, all visual appearances in the landscape depend on similar cooperative conditions. We see “green” leaves, but their color changes as we change our perspective in relation to them and the sun. Usually we do not take this into account; we notice only the object: green leaves. But, for example, under an overcast sky the coloration of

leaves changes dramatically depending on whether we view the leaf surfaces from above or below. From below we usually see the darker side of the leaf; its colors, produced in a translucent situation, are luminous. When, on the other hand, we view the leaf from above, its surface is reflective, giving the color a whitish cast. As plants grow, their leaves may overlap to form an inner, darker space. As seen from outside that space, the leaves will tend to look a little more bluish; from inside their mutual shade, they will, by contrast, exhibit a slightly yellowish tinge.

Just as we noted how *conditions unite* to produce a rainbow, we can also observe how *laws unite* in every phenomenon. When a candle is ignited and comes to burn smoothly, illuminating its surroundings, a multitude of physical laws will necessarily be cooperating: the wax will melt; liquid wax will move to the wick in a complicated current; gaseous wax will spread from the wick and react with the air; and the chemical reaction will work in such a way that a bluish part of the flame can be distinguished below the more brilliant yellow part, the latter being prone to emit soot at its upper end.

We may remind ourselves of the examples pointed out in the previous section. In each one, as we change the conditions we modify the process, perhaps allowing it to deteriorate from a practical point of view. As a result of the changes, certain laws recede from the scene, while others gain importance. Far from being a mere inventory of numerous corporeal objects, the physical realm begins to reveal itself as a coherent and dynamic system of lawful interrelatings. These interrelatings are prerequisite to all specific appearances.

### ***Rocks and Minerals***

Because rocks and minerals originate from strata of the earth, they may lead us to events in the geologically distant history of our planet. In geological practice, scientific understanding comprises knowledge of all the successive processes that brought forth the specimen on hand. A stone taken from rubble will lack the “pedigree” of a comparable specimen derived from the matrix rock. As it is severed from the geological layer in which it was formed, the naked stone degenerates to a mineralogically or chemically definable body, and we restrict our understanding of its nature to what we can elucidate in the laboratory.

A great mass of knowledge about geological processes has been acquired, thanks to modern technology. For example, deep-sea exploration gave new insights into the formation of rock material in underwater eruptions. It also taught that all lime material goes into solution before

reaching the deep sea floor, while silicates remain to contribute to sedimentation, thus leading to silicate minerals of organic origin. But the technical means only serve the ability of the geologist to “put things together.” This putting together is done by applying the “principle of actuality,” that is, by imagining that the geological processes were the same as those taking place in the present according to currently observed laws of nature. So it seems that the planet itself becomes intelligible as a developing organism. And it is also understood that the question of its development eventually leads to linking it to the whole of the cosmos. We only take rocks lying on the ground to be relatively isolated objects because we encounter them on an inadequate time scale. On an appropriate time scale they turn out to be wrapped up in continuous processes, as we know them in the animate realm.

### *Even Organisms Appear as the Environment Calls for Them*

Humankind was quite unaware of the role of habitats in nature up to a relatively short time ago. Some time in the seventeenth century Jan Baptista van Helmont made the following experiment: He filled a big pot with 200 pounds of dried earth. Then he moistened the earth and planted a small willow 5 pounds in weight in it. In the 5 years that followed, he kept the earth moist with rainwater and covered it with a lid to prevent dust from settling. The willow grew to become a tree that itself eventually weighed 164 pounds, while the earth in the pot lost only two ounces in its dry weight. Van Helmont thought that the willow tree had transformed from the water alone. Under the influence of the sun and thanks to the support of the moistened soil, which in itself turns out to be full of organic processes, the plant had sucked practically all its matter out of water and air, as we would now say. These basic factors in the willow’s surroundings will readily sustain other plants than just the willow. But the environment has its climate, its special soil, its illumination, and further factors. For example, certain plants indicate the presence of specific chemical elements in the soil.

When we introduce plants or organisms into a certain location we will find that they will live and thrive only in their appropriate environments. Certain environments will rightly be expected to contain the organisms known to be typical for them. This was already well known in times when one was not so certain that organisms must have been descended from similar parent organisms, which is why it seemed sensible to picture a heap of garbage as producing rats. And, as a rule, microorganisms really will appear if given their appropriate environment.

In “nature,” that is, outside the influence of humankind, plants appear in situations that fit them. Furthermore, these situations are decisively determined not only by the local climate and soils, but also by the plants themselves. Coexisting plants form “plant communities” that are themselves like organisms, with the individual species playing the role of different organs. As seen in the context of a larger time scale, plant communities are not necessarily stable entities, but can evolve into further forms in which plants with ever longer life cycles can participate. Here the tropical forests come to mind, built up as they are by an intricately interwoven multitude of very different life forms. As is well known, such highly organized cooperative organisms are lost—as seen on a human timescale—if certain members of them are cut down.

It is worthwhile to compare the relationship between “objects” or “bodies” and their surroundings in the three realms we have taken into account up to this stage:

- Inasmuch as the conditions that participate in the appearances need only interplay in the *present* we will assign it to the inanimate physical realm. So for example, as the rainbow recedes from the scene, no physical trace of its past existence remains.
- In the geological structure of the earth, all we possess are what we interpret as the traces of processes that took place in the past encompassing a joint development of parts that we now distinguish. Our interpretation even requires us to imagine scenes in which we ourselves could not have existed. We must go beyond the inorganic approach.
- Vegetations form habitats in which the species that are involved mutually play the roles of both inhabitant and habitat. They cooperate to produce the situation in which they appear together. The contributions of many life forms unknown to the layperson must be taken into account even to understand the formation of the soil.

Moving on from the paradigm of an inorganic physical realm to the living, we no longer find conditions that may be taken as wholly external to the beings participating in them. The concept of the spatial environment as alien to a body located in it is insufficient. The laboratory, where we can simulate environments at will, may suggest the simplistic thought that even we ourselves are separate from the world. But this is to forget our own role in creating the simulations

## *Farming*

Human agriculture has managed the life processes found in untouched nature to produce a variety of materials for food, clothing, and shelter. We achieve this mainly by doing away with the plant communities in which hunters and gatherers can glean only a small fraction of what the farmer can produce per acre. We bred cultivated plants and domestic animals and learned to set up “artificial” habitats for them. Just think how crops of annual plants require their seeds to be collected and sown every year in soils from which competing plants are excluded. And how the soil, no longer the product of previous stages of natural life, must now be fertilized with natural or synthetic materials transported from elsewhere.

Modern farming can be understood to be modeled after the example of the laboratory. In a laboratory-like setting—for example, in a hydroponic growing chamber—the farmer can regulate all elements of the crop’s environment, including the earth itself, substituting an inert mineral tissue through which a chemically controlled solution can flow. The lighting, along with the temperature and humidity of the atmosphere, is kept at optimal levels. Production continues through the year, because there is no year. Nowadays, this is a practicable option. The hydroponic system, although thoroughly artificial, is designed to provide a habitat complementary to the plant, even if the entire arrangement is for the service of our own needs.

A different kind of agriculture—one based on plant communities—is possible. Craig Sams, Chairman of the UK Soil Association has described the original culture of cacao and the current problems in its production. The cacao tree originates from a lower layer in the rain forest, growing under higher trees, typically mahogany. These give it partial shade, and the leaves that fall down to the ground from the forest’s canopy fertilize the soil in which the cacao tree grows.

This culture of cacao can be sustained indefinitely. When plantations are managed on this more traditional basis, the farmer plants tall shade trees such as mahogany and red cedar. In the long run, these become a valuable by-product—their value can eventually exceed that of the cacao itself. The cacao trees are planted sparsely at five-meter intervals and yield about 500 kilograms per hectare. This at first seems to compare unfavorably with yields of 800 kilograms in “modern” plantations, which have a four times greater density of cacao trees grown without the taller trees the rain forest had contained. Chemical fertilizing becomes necessary, and diseases, which must continually be controlled, get more virulent with time. No extra income from the valuable timber is forthcoming. Craig Sams is supporting smallholder cacao farming on the sustainable basis indicated above—and the Maya Gold Chocolate brand is the result. But, above all, a vast social benefit ensues.

Needless to say, intermediate kinds of farming are practiced. Habitat control can comprise irrigation, chemical fertilizing, herbicides for weed control, pesticides against insect plagues, and so on, all of which isolate the plant from the original local situation. At a certain point genetic engineering will be brought into the picture, as we find our crops unsuited to the artificial habitats we have created for them.

The human attempt to bring nature under control may be understood as the consequence of a deep-seated disbelief in the *sense* of giving the environment an influence on our affairs.

### ***Animals Behave According to “Image Habitats”***

While plants are limited to their cycle of vegetative and generative metamorphosis, animals have the additional dimension of *behavior*. Moving through the landscape, they act under the direct influence of *images*—of scents, for example. A certain species will be bound to react to images associated with it. Given a chance to prowl through a meadow, a cat will stalk ever so carefully, then pause and move warily toward a spot in front of it while assuming a posture of readiness to jump forward. We recognize this as the behavior of a cat when hunting. If a sign of movement then occurs, the cat will pounce upon its location.

As the typical image of a prey animal, the “mouse” is of central importance to cats. If you pull a little woolen ball fixed to a string across the floor, the cat will pounce on it again and again. It seems that at least young cats love this sort of play. But if we take them to be engaged in a mere game, we miss the meaning associated with the moving woolen ball. While it is by no means a mouse, it combines traits typical of mice, as recognized by the cat. The cat is reacting to a “prey situation” out of its deepest nature.

We may call the combination of environmental features relevant to the cat’s behavior an *image*. An animal acts instinctively within an *image habitat* that belongs to the species as its particular perspective. The individual animal needs to be within a spell of the appropriate attention—an actual, present *drive*—in order for an image to work in this way. Early in the morning, birds are observed to sing, and in their singing they participate in a chorus. At other times they are dedicated to picking up morsels of food, while at still other times some will be fully engaged in social life, flying off and landing again with their group, and so on. In each case the attention, or drive, shapes the interaction with the image habitat.

The image nature of triggering percepts has been demonstrated in many cases in the field of psychology. We ourselves are acquainted with the effective character of images and with their

relation to changing phases of directed consciousness. We often react to perceptual situations compulsively. For example, when engaged in a conversation on the telephone, we tend to disregard the rest of our surroundings while being drawn in by the specialized spell of attentiveness that is currently our *state of mind*. No one is present, but we are fully occupied by a *voice image*. Predictable reactions to images play an important part in countless social processes. In advertising, these reactions are not only made use of, but systematically trained.

The close, instinctive connection between animal reaction and image habitat guarantees that the animal will act *wisely*—at least it will do so if it is in an appropriate natural environment, where the images have their due meaning. On the other hand, it seems tragic to watch an animal chained to a fixed pattern of reactions in situations where these reactions are futile—as when a fly endlessly batters itself against the invisible barrier of a window.

Human presence of mind allows for a breathing space between the recognition of the situation and appropriate action. This breathing space makes room for *decision*.

### ***Human Detachment from Sense Perception Allows Attachment to Ideals***

As we have seen, the step from the animal to the human being does not do away with reactions governed by images. When we learn to drive a car, instinctive reactions become habitual. A great part of many skills is based on patterns of behavior acquired through years of practice.

But there is a sphere of freedom from such fixed reactions in which we can decide—can choose, plan, and follow our own ideals. *This is an “ideal” in itself*. It is the ideal of the person who is independent of what his or her environment suggests. On this basis a feeling of self-confidence is nurtured. The attachment to ideals has in many ways turned people away from the images appearing via sense perception. We see many signs of this tendency:

- According to a long tradition the world of the senses, as the “outside world,” is inferior to the world of intellect appearing “inside,” in the mind.
- It is thought that the *outside* world of the senses seduces individuals to sin, misleading them, distracting them from the right path that they must find *inside*.



- A much younger tradition walls off the inner, “subjective” realm of the mind. There is an objective world outside it, but what appears within from the outside is by no means the true reality of the outside. All the isolated mind can do is to become critical, sustaining a stance in which it keeps up its splendid isolation.
- Appearances are taken to represent processes that have nothing to do with ourselves. The outside world turns out to be governed by chance, or impersonal law
- Contemporary natural science embraces the reductionist agenda. It not only tries to explain the workings of the outside world, but also those of the human body and the mind. In the long run it does away with any self. All individual, unique, even mental events lose real meaning and so this agenda tends to sacrifice the basis that made it so successful. For we must remind ourselves how individuals had to fight against the doctrines of their times when they laid the foundations of materialistic science. What they became famous for was their struggle for freedom of individual thinking.
- There is a strong incentive to take over and control the outside world in order to overcome its alien and, above all, seemingly contingent nature.

The human being is going through a transient phase of self-consciousness in which *no individual* habitat at all is really appreciated. That is, we do not recognize empirically given sense experience as a working, *integral part of our own individuality*. As a result a picture emerges that finally lets us give up the concept of human individuality because the *experiential* source of individuation in the biography has been disclaimed.

***Nevertheless, We Are Supported by Our Own Singular Biographic Habitats***

We are beings of habitat in every respect:

- We make use of our physical body according to the conditions of the present local physical situation. (We must.)
- We breathe in the *sphere of life* and feed from the activity of the plants. (We must.)

- We are continually *reacting* to images in a habitual way. (We must.)
- All the same, it is true that we do try to *seclude* ourselves from the hustle and bustle of daily experience, striving to find compelling reasons—generally accepted motifs—for decisions, for which we can be made responsible. (I dare say we must, sometimes.)
- *But* our lives have become the very special ones that we have lived thanks to being guided by many “chance” experiences, *which we need not have taken up*. These may seem to be sensual, or just as well mental, experiences. Such events that come by chance really bestow us with chances! They, I would suggest, form the sphere of the human biographic habitat. (In this last sphere we are left free to act according to our own judgment.) That we find ourselves acting out of this sphere more authentically than out of our isolated “inner life” can become an experience, but it cannot be proved to us by anyone else.

*As individual selves we lead our lives in our own biographic habitat.* To retreat into the seclusion of “inner experience” is in this sense to retreat from ourselves—from the conditions that enable us to grow most healthily.

Not even our physical bodies can function independently of the “outside” world. As living beings, we spread out into the life-sphere of the earth. As we awaken, sense experience arises—*either* to trigger behavior, *or* to be overwhelmed by “inner rulings,” *or* perhaps to be seriously and creatively taken up as integral to our biographies.

### ***Outlook: Individual Recognition***

The concept of a “biographic habitat” may be hard to accept, since it seems to imply that the interwoven physical environments of the multitudes must be specially directed to fit each and every individual. But in our discussion of habitats in other realms of nature we have seen that the same physical environment does take on different meanings for different beings—but does so in a larger harmony, without becoming “schizophrenic.” In the human case we have only added the assumption that each person may impart individual significance to his or her own experiences by *recognizing* them—which is also to allow the individual to express them authentically. You will

recall that this recognition of the full expressive content of experience was the original meaning of aesthetics, as Baumgarten envisaged it.

We will have to take up the question of how appearances are to be understood if they are to be recognized as belonging to our biographic habitat? Certainly this recognition will lead to a change in perspective, for then our specific “outside world” turns out to be an organ of our personality, just as our living body and our seemingly inner psyche. And then we will welcome that specific “outside world” as our source of innovation, of inspiration, of distinction in our biographies. And, of course, all the while our connection to that source will become manifest in our actions.

## 11. Existence

Georg Maier

“Existence” refers, in common usage, to something *being*. When we say a certain rare species exists, we mean that it can be found living now and is not extinct. Existence is about really being present, and that is what this book is about. In its Latin origins, “to exist” included the meaning, “to step forth.” Similarly, we use the word here to emphasize *responsible* human presence coming into appearance—just as it may when we awaken. To exist in this sense is not just to be known and alive, but to be present in one’s biographical habitat in a state of full consciousness and alertness as an individual.

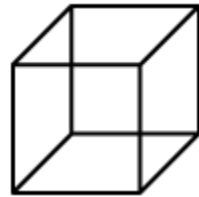
In reading a biography, we are prepared to understand various events as conditions that mold the person. If school teachers expected their pupils to copy their styles exactly in drawing and in written presentations, so that each and every exercise book looked identical, we would not be surprised to find the grown-up individuals having difficulty in following through on their own initiatives. In this sense the biographical habitat is taken to influence the human being, who passively suffers environmental influences.

But the appearances we meet can be much less compelling. One person may recognize that a particular situation calls for personal action, while others may hear no such call. In finding our individual challenges, we come into existence within our own biographical habitat.

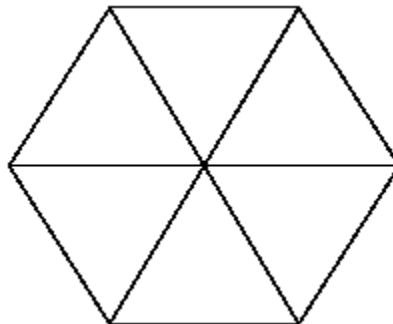
### *Encounters and Their Consequences*

I got to know intentionality when I was told to look at the Necker cube and decide whether I was looking at it from above or below. This cube is one of the best known examples to demonstrate intentionality. The effect relies on a kind of inaccurate perspective. Thus, because the two faces represented as perfect squares are drawn the same size (despite their differing distances from the viewer)—the lines connecting these two faces being drawn parallel to each other—we can easily exchange the front for back and back for front. One day, my colleague Manfred v. Mackensen pointed out a much more profound and, what is more, unnecessary fault in the conventional figure: the two faces that are perfect squares imply that we are viewing the

cube from a point on a straight line perpendicular to their centers—which clearly is not the case. We are instead looking at the cube from a point off-center.



From then on, the Necker cube was changed for me. It still worked, but it was marred by imperfection that I could now appreciate. Moreover, I felt an urge to find a version of the cube without that defect. The seemingly daunting task is to draw a cube in correct perspective while preserving ambiguity. Fortunately, one rather simple solution presents itself:



The figure is just a hexagon with three diagonals. It does not so strongly “require” you to see it as a cube; you can easily take it as a simple plane figure. But if you intend to, you will find four different three-dimensional cubes at your disposal, and these do not suffer from the more serious fault of the Necker figure. You may achieve the effect of looking at a cube from above, taking one of the two parallelograms containing the upper triangle to be toward the top and front. And two further cubes will appear as one of the two parallelograms containing the bottom triangle is taken to be seen from below and in front.

We have just revisited and practiced intentionality as our active role in perception. However,

at this point the story of the Necker cube is meant only as an example to show how a rather modest question can be taken up and recognized as pertinent for an individual. Both my first encounter with the Necker cube and my colleague's critique reached me through the medium of sense perception. Having appeared, they became *my* concerns; I had recognized them—they had recognized me! This book would never have come about if Ron Brady had not recognized the understanding of intentionality as his personal task.

So now we have found our way back to the human self's biographic habitat.

### *Encounters in a Fairy Tale*

In folk or fairy tales the following is typical:

The young hero leaves home, either on a quest, or just to go into the world. On his path, a rather insignificant being appears. In some way it is in need, giving the hero a chance of being of help, perhaps to a little old woman, or to an ant or mouse or bird. He either ignores the encounter or else takes it seriously, listening to what it is asking of him and *acting* accordingly. Moreover, in such tales we hear of three brothers or two sisters passing along the same route, one after the other. Each of them is asked for the same favor—but only one takes pains to help. In return this one receives advice or is given some special gift, which later turns out to be the essential preparation for a crucial task. The others who passed on without taking heed fail at the task.

Here is an example in abbreviated form from *A Dictionary of British Folk-Tales in the English Language* by Kathrine M. Briggs (1991, pp. 560–61). The original Scottish dialect has been slightly revised in favor of common English while retaining the non-standard grammar of the original.

#### The Waters of Life

Now this is the story of a gentleman, who was a very good gentleman, good to everybody, but he was dying. He sent for the doctor, and the doctor said that there was nothing that could cure him in the world—they must find the Waters of Life.

So the doctor told him that the Waters of Life was many—about hundreds of miles away, so they would have to get somebody to find the Waters of Life before he could be cured. So he sent his eldest son and told him that he'd to find the Waters of Life.

So he set on his journey, and after travelling many a mile he came to where there was a rabbit who had been hurt. So he kicked the rabbit out of his road, and walked on. He walked on a lot of

miles till he lost himself in a deep forest—and was never heard of again.

So time went on for a while and he sent for his second son, and he told him that he must find the Waters of Life to save his father. So he set on his journey. After he had traveled many a mile he came to the rabbit lying hurt, and he also kicked the rabbit out of his road.

So it came to the youngest son. He says, “Oh,” he says, “son, try and find me the Waters of Life.” So he set on his journey. So he traveled many a mile till he came to the rabbit. He lifted the poor rabbit up, tried to doctor it, and laid it down gently at the roadside. After he’d traveled a lot of miles, he was getting tired. When he looked around he saw the rabbit at his back. “Jack,” he says, “you’re very tired,” he says. “What are you looking for?”

“Oh,” he says, “I’m looking for the Waters of Life to save my father.”

“Well,” he says, “jump on my back. I’ll take you to the Waters of Life.”

“Oh,” Jack says, “I couldn’t jump on a little rabbit’s back.”

“Oh, yes,” he says, jump on my back, and I’ll take you to the Waters of Life.”

So he jumped on the rabbit’s back, and after he was on, they traveled a lot of miles, till they came to the Waters of Life. So after he got his flask full of water he returned on the return journey—the rabbit took him till a palace, where he got food, where there was a young princess who fell in love with him.

So he returned and he saved his father’s life, and went back and got his princess.

Young Jack participates in the situation he has entered. The injured rabbit does not seem to be related to his pursuit, but here and now Jack finds it *on his path*. He recognizes himself associated with the creature in need and does not “kick it out of his road.” He understands what the situation *requires of him*: “He lifted the poor rabbit up, tried to doctor it, and laid it down gently at the roadside.”

We might be tempted to think that Jack is just a good boy: he is adhering to general ethical principles learned from his good father. Therefore he will later be rewarded with the Waters of Life and the princess. But the story seems to be different. It is much more specific: the rabbit is not merely a moral test, but turns out to be instrumental in bringing him to the Waters of Life. Jack receives this gift only because he is fully present upon his own special path through the world. The story tells us that in tending to the rabbit he has brought the single event into the context of his whole life. He does not say, “This random encounter has nothing to do with my own important purpose, which is to help my father.” *Jack as a whole person is present in the present.*

### *Existence in Letting the Appearance Appear*

The “fairy tale” approach to appearances relates them to our own existence. In the fairy tale the events of the narrative are necessary conditions for the development of the plot, and the plot is about whether the individuals involved understand what the events they meet—that meet them—imply. It can be formulated in philosophical terms. Heinrich Barth (1965) developed Baumgarten’s approach of aesthetics in this direction. Here are some of the philosophical points he makes:

- As an appearance appears, the natural scientist will habitually ask, “*What is this?*” The question “What?” calls for the recognition of the species, a genus, an explanation, a mechanism, a cause, a general law. It takes the event out of the immediate present. And this type of question, even if left unanswered, takes us away from the simple fact of the event’s being here now.
- *Being here now.* In the realm of “Here,” the plain actuality of immediate presence confronts me. In order to stay within this realm, I must give up trying to explain the appearance within a context that leads me away from my meeting it *now*.
- Obviously, it depends on me whether I choose to take up the challenge implied—whether I let it *coincide* with my own biography. Barth used the expression “wakening cry” to point out the way a key experience may arouse us.
- An appropriate cognition of “Here” discloses the bearing of this specific appearance upon me. I wake up into the present. Then the appearance will manifest future tasks; it is revealing a future cause, a calling with which I identify myself. The process as a whole, including suitable action, amounts to the individual really Being on Earth. Then the individual “exists” and is not absent. Barth refrains from alluding to a given “self” that experiences appearances. Instead, he sees existence as being *produced* through cognition of the appearance.
- In the process of cognition—which includes appropriate action—we *step into existence*. We could also say that we *wake up* to existence. The process manifests the authentic role of the individual. Here the chasm between subject and object becomes meaningless.



- Obviously, such cognition occurs in compliance with criteria such as truth, wholeness, and goodness that were traditionally addressed as the “transcendentals.” Perhaps we today would prefer “solidarity” to “goodness.”
- In sum, “letting the appearance appear”—a favorite term in Barth’s philosophy—is a matter of bestowing future significance upon the appearance, which is thereby transformed into an integral part of the existence of the individual. Not letting the appearance appear in this existential sense means isolation from the source of intuition. In letting the appearance appear we become aware of an individual task, an awareness that is the making of the free human being.

After all this, it is perhaps unnecessary to point out how the existential approach is complementary to the detached one, in which the individual remains unaffected by the knowledge gained. Scientific cognition, as it is generally understood, is expected to be “intersubjective”—that is, of equal meaning to all who take interest. The individual is supposed to be detached from knowledge, just as the subject is supposed to be detached from the object. The realm of “What” contains contents that do not touch individual existence.

### *Contingent Events*

The event of appearance in the state of “Here” is severed from necessity. It is unforeseen and unique, with a meaning yet to unfold. The event of two people meeting for the first time is often of such a “Here” character. Perhaps it’s the best-known example. As a relationship develops, the first impression may remain in memory, but it is clearly futile to try to “imprison” the other person within this memory or within any generalization. Attempting this would be detrimental to the potentials of the relationship. In coming to know each other, each learns how to deal with the other’s ways. Not that a set of rules will be specified, but a mutual manner of behaving arises. Looking back, one sees how one’s own development has been influenced, supported, and given new directions, but at no time can the biographical scope of the relationship be judged once for all—or it will slip over into the realm of “What.”

Existence grows from a seed of wonder and amazement. A project begins that needs to be kept in connection with its origin. To grow, it needs a large measure of devotion and loyalty. In faithfully adhering to experience, we begin to enter a new realm, finding ourselves connected with a whole new sphere of life. As long as we remain in the state of “Here,” we will refrain from letting expectations mar that seed’s possible development. Appearances begin to acquire

the dignity of dawn, or of the moment before the first tone of a symphony. Tasks that are taken on tend to develop into more or less long-term projects, in the course of which appearances continue to be the source of advice.

### *On the Artistic Nature of Tasks*

What we are doing in our productive encounter with appearances is *practicing aesthetics*. We are relating to the world like an artist, and by this means we overcome our alienation from the world.

Looking back at “The Waters of Life,” we remember that the story begins with a father who needs help. It is Jack’s mission to find and bring some Water of Life to heal his father. On his path he meets the rabbit that had been kicked away by the previous wayfarers. Jack tries to doctor the rabbit, then gently lays it down. When the rabbit reappears, it takes over, guiding and even carrying Jack to the Waters of Life. As Jack begins to mind the rabbit, the rabbit reciprocally minds Jack’s mission. It is generally true in fairy tales that realms of activity open up for the protagonist when he discovers that it’s *his business* to better a situation that he has recognized to be faulty, inadequate, in need of his help. In the example of the Necker cube, a fault is recognized, and it can drive us toward a more thorough understanding of the geometry involved. A task evoked by an appearance always calls for an insight into the possibilities of transformation. As Ron put it in his discussion of Brancusi (chapter eight):

How often do we find in nature an image that is, in all details, so unified that it is as lucid as his sculptures? In any reality more is expressed than the simple nature of the thing, for the rest of the world impinges upon it. Brancusi got around the nexus of causes potentially appearing in every natural image by either refining away everything that was not the intended gesture or by taking a subject whose gesture showed a total surrender to the mood it expressed.

The artist’s cognition of the appearance is the source for his or her aim. The work of art can be in more perfect harmony with the artist’s insight than can the original appearance, and so it can facilitate our recognition of what the artist intuited in the appearance. That is, we can recognize in the work of art both a present reality and future potentials. We have seen that aesthetic cognition requires, in the first place, a *sense* for facts, a *sense* for the way a being

participates in the whole world, and a *sense* for the interests and needs of another being. These senses will indeed open the world to the individual, giving him or her the means to embark on projects of essentially *artistic* character. Of course, all professions that help us to “be on earth” are *artistic* in this sense. So, for example, we can speak of an art of healing, an art of teaching, a social art, even the art of appropriate technology. But a discipline in which the aims and methods are already given cannot possess the artistic quality we have been speaking of. Rather, artists must *find* their aims *in* a problem which they have encountered and recognized as belonging to their individual selves. The senses for facts, for the way a being is situated in the whole world, and for the interests and needs of another being are ways through which such identification can be effected. What had seemed alien turns into an integral part of ourselves. A transformation occurs which turns our relation to the world “inside out.” Rudolf Steiner gave many of his contemporaries mottoes that seemed paradoxical and were variations on the following lines:

Search inside yourself  
And you will find the world.  
Search in the world outside  
And you will find yourself.

### ***Turning the Inside Out and the Outside In***

How does it come about that intentionality surprises us again and again? It seems a wonder that our inner intuition will reveal and display what had stayed hidden to us as long we remained passive onlookers. Many examples have been given of the power of individual attention to take part in letting appearances appear. What strikes *us* is the experience of our coming into existence as active agents who may harvest what we can decide to keep, to maintain, to nurture, and to ponder on in future. This is exactly what works in active appreciation—being the only way for us to have a world at all. In other words we find the key to conscious appreciation of the world *outside* us *right* inside ourselves. That is the way knowledge of the world is to be acquired.

At the same time, the “normal” understanding of self-cognition implies seclusion from the world. Close your eyes, become deaf to any sounds, isolate yourself from the world. It is presumed that in attending to a voice within, you will recognize who you are. But in this chapter we have been suggesting the very opposite of this: the world bestows upon us the meaning of our lives as we attend to the unforeseen appearance that is presenting itself now. We find self-

cognition turned inside-out. We really exist in achieving full recognition of what the world is telling us.

## 12. Company

*Georg Maier*

### *Searching Inside and Outside*

In the last chapter we asked, “How do appearances become meaningful and consequential to the individual?” And there we drew upon the distinction between *knowing that* and *being here*. Since “being here” leads us to take steps in life, it became apparent that our relation to the world was turning *inside-out*: what had been outside us now showed up as the source of individual counsel—occurring in the guise of accidental events. Here we are no longer talking about an outside world of objects. Rather, we are speaking of appearances we experience as involving ourselves personally. We participate in what appears to be outside us. Insofar as we follow our understanding of the indications we receive, we can truly find ourselves *being here*.

Being here is what happens when the present situation is attended to, intentionally organized, and discovered to be our own business. Being here is just applying the aesthetic approach to real life!

Furthermore, we can remind ourselves of the alternative, anaesthetic, “logical” approach where the individual still remains unaffected by the knowledge he or she gains. As the attitude appropriate for scientific cognition, it is expected to be “intersubjective”—that is, of equal meaning to all who take interest. The individual is supposed to be detached from knowledge, just as the subject is supposed to be detached from the object. This realm is where we search for a general understanding in terms that we can reciprocally communicate with others. The realm of “What” contains contents in a form that does not require, that may even rule out, individual involvement.

Search inside yourself  
And you will find the world.

While sense perception offers us particular appearances, our mind associates these with general concepts. So it is *inside* ourselves that we find the tools necessary to comprehend the world in universal terms, to grasp it “scientifically”. In the process of writing this book its

authors had to search diligently *inside*, looking for conveyable general concepts suitable for that other realm:

Search in the world outside  
And you will find yourself.

Most likely, not all we have produced has turned out to be as “intersubjective” as we hoped and strived to achieve.

### ***Can Habitats Be Recognized as a Reality?***

In seeking appropriate, general concepts for the outside world in its specific association with an individual person, we coined the term “biographic habitat.” It is a novel concept, and keeping in mind that it has been borrowed from ecology, we may remind ourselves of the relation between surroundings, environment, and habitat as they are understood in natural science.

The *surroundings* of an object may be thought of in a merely spatial sense, but also include the ever-changing conditions given, for example, by weather and illumination. We call these surroundings an *environment* when we consider how all the conditions of a place support and sustain the various organisms living there. And the aspects of such an environment, in their relevance to a specific organism, constitute that organism’s *habitat*. That is, a habitat is an environment as experienced by a particular species.

Very different habitats permeate each other within a specific, local environment. Furthermore, each of the naturally coexisting plants and animals participates one way or another in forming conditions the others depend upon. You could say that members of a mutual environment contribute reciprocally to each other’s habitat.

While individual plants typically remain rooted in place, they can emigrate in seed form to areas where a fitting habitat-organism relation may develop. Animals that move in space participate in the conditions of one area after another. Migrating birds offer a striking example of this.

It has already been pointed out that in nature organisms will in many cases be apt to appear spontaneously if offered suitable environments. Before humankind became knowledgeable in the field of zoology, it was thought that rats were bred by heaps of garbage, because experience showed that if you have such a heap of garbage, soon enough rats will inhabit it. Microorganisms especially will tend to appear as conditions hold sway that promote their presence. If left open to

the atmosphere, moist foodstuffs will tend to become moldy. Forms of life not needing to be specially introduced are “cosmopolitan,” potentially living everywhere. Moreover, organisms show an astonishing ability to modify their demands on a habitat; microbes can become insensitive to drugs that once excluded their presence. On a larger time scale, evolution is taken to be effected by modifications in the environment. In general, habitats are structured in time: for example, much of the plant world undergoes phases of development that follow the course of the year, sprouting, blossoming, bearing fruit, and declining.

Here, in summary, are some aspects of the relation between species and habitat:

- The habitat fitting a species is the necessary condition for that species’ physical existence.
- Habitats of different species interpenetrate.
- Species within a shared environment may contribute essentially to the habitats of others.
- Some species move between different spaces, according to the changing needs of their life cycles. Therefore, a habitat may comprise dissimilar geographical areas.
- An environment can work as developing agent for some of its envired species.

So its habitat emerges as an indispensable constituent of a species. That is, a habitat is the essential complement to the physical body. Such deliberations can form a starting point in assessing the *human* biographic habitat. In applying the above list of aspects to human beings, I would tentatively replace “species” with “individual.” In this light we see human individuals as part and parcel of each other’s biographic habitat. They form each other’s *Company*. Furthermore, the Company will effect developments in an individual’s understanding, and individuals living on other continents may well participate in each other’s respective Companies.

### ***Appreciation: Recognition and Integration***

Human *existence*, in the sense of the last chapter, is not something given to us regardless of whether we are asleep, dreaming, preoccupied, or otherwise *not being here*. We exist by

engaging appearances, intentionally organizing them and becoming aware of them as our own business. As we saw in the first chapter of this book, the wrong-minded student was searching for meaningful experience. He was endeavoring to *appreciate* the appearances he encountered.

In extending the concept of habitat to embrace the whole of experience met with in the individual's biography, we are linking events normally taken to be independent. And it is true that they are contingent—they are not part of a foreseeable plan. But this need not mean they happen by chance, at random or haphazardly! It only means that the sense of an event cannot be predicted.

Looking back, we may recognize how certain of our past deeds were stimulated by key appearances. At first, however, it is as if our recollections were made up of unconnected events; we are, as it were, on the first level of appreciation (see chapter six). Nevertheless, at a second level of appreciation we may integrate some events to form *expressive* images. We saw examples in chapter eight: disconnected ink blotches became the image of a cow, and an initially unrecognized metallic configuration became the Newborn. In our present context this discovery of images means recognizing how some events were prerequisite to following ones, which is the contextual aspect of biography. Such special connections within the sequence of events cannot just be asserted; they need to be empirically discovered. Insofar as such relations show up, our world becomes a habitat-world.

### ***Accompanying and Being Accompanied***

In the third level of appreciation, *accompanying*, the crucial relation between events is not causal. As we said earlier, "In accompanying a subject, we continue to learn and our judgments develop. As we move from one judgment to a later one, we confront the individual essence of what we are accompanying. On this third level we are furthest away both from preconception and from the logical mode of cognition. We must accept the development that occurs while at the same time participating in and accepting our share of responsibility for it. The being we accompany has become part of our lives."

As in ecology, we will be led to complement our understanding of ourselves as individuals with an understanding of a specific habitat that belongs to us. And what is more, we will come to recognize our fellow human beings—who participate in our lives, and in whose lives we participate reciprocally—as the *paradigm* of biographic habitat.



If we take the workings of a biographic habitat of our own seriously, then at some point we will get the surprising feeling that what had been the “outside world” is positively engaged in relating to us. In the following remarkable passage Hans Rudolf Schweizer recounts how such an intensive mutual relationship to the mountains developed over the course of a lifetime:

To see is to exchange (seeing is exchanging); we choose and create the images, but even before that they choose us. In this way I have remained spellbound by the mountains since my childhood. They offered me images of never dwindling vigor in rock and ice, in the mountain forest with its hidden sources. They demanded the utmost exertion of body and soul, but they always remained close and familiar to me with their breath and the smell of the Earth, with the clarity and hardness of their forms, in the midst of storm and in face of their ferocity, when we had to find a reliable climbing route for a whole group of people even in a blinding flurry of snowfall, to endure the cold breath of a night spent in high altitude. These days their imaging power concentrates itself more and more inside a limited region, in a particular valley with which my most treasured memories connect. In my early childhood the image of the mountains was above all a high, completely white peak that impressed itself on me, the Weisshorn in the Valais, as seen from its bright eastward side; this still has the same attraction which is beyond words; it is not lessened to a mere symbol for a pure, high goal. When on one of those clear days in October the mountains are freshly and deeply covered with snow, the hours again fill themselves in gazing upon this purest, most shining white of the glacier slopes and I stay rapt as if it were by the most wonderful music.

Certainly everyone would agree that we attend to images, and that we even give rise to them. But Schweizer surprises us by saying that *images first choose us* as those for whom they will be relevant. One phase of this choosing is described when he says, “In my early childhood the image of the mountains was above all a high, completely white peak that impressed itself on me.” (The Weisshorn, as its name suggests, really is a completely white peak. It is only fifteen kilometers north of the less bright and less high, but more famous Matterhorn.) We are apt to believe that this phrase is not to be taken so literally, but in the context of his life, Schweizer, a mountaineer, kept up the special relationship to that very peak. And as in later life the imaging power of the mountains concentrated itself more and more inside a limited region, their appearance gained in impressive power. (To be explicit, that locality was the Lötschental, where, together with friends, he had a hut on Tellialp. From vantage points in that region the beloved

white peak comes into view.) His last sentence compares his enchantment with that of the most wonderful music. Schweizer was a great violinist, keen on playing Bach, so his allusion to music may be taken seriously; in listening we attend to what is communicating itself to us. And further, on the occasions he describes as demanding utmost exertion, it is clear that a reciprocal relationship was being kept up. All in all, in this particular thread of his life he felt himself being accompanied: as a child, as a demanding and responsible alpinist, and in an even more conscious way as having concentrated his interest in the surroundings of that primitive hut on Tellialp.

Another thread of Hans Rudolf Schweizer's biography led him to retire prematurely from teaching Latin, Greek, and philosophy in high school in order to tend to more urgent needs. A new main occupation developed: serving individuals in need of help. These were people who had fled their homes far away from Switzerland, escaping armed conflicts of ethnic nature. He was always busy doing legal paper work for refugees, visiting some in prison awaiting expulsion, paying for urgently needed medical care, even personally establishing a store which was to give a Tamil a livelihood. He invited a Tamil family to live in his house, and they are still there, now as Swiss citizens, thanks to his initiative. When Schweizer died in 2001, friends inherited some of the problems that beset the family.

### ***Biography as the Work of Company***

We have been dealing with the theme of Company from the beginning. In the first chapter Ron told about the chemistry professor who recognized in his young student's passion for sensible qualities an attitude closer to medieval alchemy than to proper chemistry. Later Ron was reminded of this incident by the morphologist who told him who he really is: an "appreciator of nature." Looking back, it became clear to Ron that his professors had understood and expressed his problem better than he could himself. It was as if, in those short interviews, people who hardly knew Ron had recognized him, and had formulated their recognition in spoken words that resounded through years of his life.

Similarly, in "A Physicist Discovers Aesthetics" (chapter 5) I related how the steps in my path led eventually to my becoming one of the authors of this book. The roles of many people are now apparent to me. They led me forward, not knowing that they were agents helping to blaze this singular path.

Both Ron and Stephen met me in Dornach. Ron had come there in 1971 to write his thesis, "Towards a Common Morphology for Aesthetics and Natural Science: A Study of Goethe's

Empiricism.” I had not long previously become a co-worker at the Natural Science Institute at the Goetheanum, and I told him about my colleague Jochen Bockemühl’s studies of plant growth. Through these studies Ron became deeply interested in patterns of leaf formation and transformation. He in return showed me how intentionality works when we look at artistic creations such as those of Brancusi.

Ten years later, Stephen visited Dornach during summer vacation, and we met. Already a physics teacher, he became interested in what I was doing. In the years since Ron’s visit I had developed various tools for teaching phenomenon-based physics, including novel experiments and appropriate trains of thought. A long-lasting friendship ensued as we cooperated at conferences and co-authored *The Marriage of Sense and Thought*.

### ***How the Turn in My Path Came About***

None of this would have happened had I not been at Dornach. A special moment in my life first brought me to Dornach directly after I gained my doctorate in Munich. Sitting in the audience of an engineer, I learned about his quite surprising lines of research. The work did not at all fit into the physics I knew. Although I had never been interested in such unconventional questions, the man caught my attention. When he finished speaking, I found myself remaining in the room and beginning a conversation with him. It turned out that he was looking for a proficient co-worker at his laboratory, so I offered my help. Before the lecture, I had no idea that any such work was even to be imagined. I was simply following an urge to help this man. At the same time I had no knowledge of the basis of his understanding. All I could contribute to his projects was some experience in experimental work. That I did not act in furtherance of my intended career is rather surprising. I responded instead to an unexpected meeting with a fellow human being. After I had spent a year in Dornach, this line of research proved mistaken, and I felt I had wasted a full year. But I was lucky enough to be given a second chance to participate in the physics for which I was professionally trained.

Something else had contributed to my reckless decision—another “bad” experience. I had been great friends with a girl. We were both interested in a new method of inquiry into the world, anthroposophy, and she was better at it than I. She was studying architecture at the same Munich Technical University and we met almost daily. I had gotten used to our sharing of thoughts and interests. Then suddenly she found the man who was to become her husband, and he was not me. It took me months to get over the loss. Being alone was extremely hard, and I

needed human company. During this difficult time, I finished my thesis and was examined by the faculty. Although I must have been nervous, I must also have been grateful for the company of the examiners. In any case, after I was asked to leave the room they eventually decided to award me highest merits. I am convinced that had I not been in such a destabilized state I would never have taken that first step away from a professional academic career in physics. In the long run, the reckless decision of a destabilized man brought him the seeds of experience he would need to develop long years after.

### *Company in a Single Encounter*

Company sounds like a group of people surrounding you whom you know personally. And for the account of how the authors came to meet and how we received help from an event in my past, this is true. The following short tale is about a single encounter with a person who you might think remained a stranger. But it would be wrong to assume that the encounter had no long-term effect—or that the stranger has not accompanied me up to the present.

Someone may show us that what we have been doing habitually day after day is, viewed from a new perspective, inappropriate. The Goetheanum in Dornach, near Basel, Switzerland, is a sublime and unique edifice that stands on a lofty site on a ridge, with access roads coming from below on two sides. My workplace was on the road from the north, whereas my home was to the south. I used to drive over the hill, passing the building at least four times a day. But it often happened that visitors to the grounds would pass by my workplace, itself of striking architecture, and ask to be shown around. One young American, clad in a hippiesque outfit, was greatly interested. We had a nice conversation, and when leaving he incidentally asked me which path he should follow to ascend to the Goetheanum. Since we were standing beside the road, I replied that he could continue along it from here. He was very much surprised, asking me, “Do people *drive* to the building?” I understood him immediately. It was as if a stroke of lightning had flashed. From then on, I was careful never to drive over that hill again. And giving up driving to work, and later giving up the use of a car altogether, I did get to know how shame may aid us in taking up the hints Company intimates to us. As a matter of fact, the young man’s utterance eventually had a great effect in drastically reducing direct access to the building by car—but that is a long story.

### *Company: the Realistic Concept of Society*

I have been pointing out that Company brings us substantial ingredients of our biographical habitat. In customary language, we say “society” when referring to Company in the most general way. Now it is worth stressing that as soon as we recognize the broader mass of human beings as in some way potential messengers of our own future tasks, every encounter with another individual gains an element of expectancy and existential value. Then it becomes interesting to look at how civilization is tending either to support human encounters or, on the contrary, to make them obsolete. We can observe both tendencies.

Statistically, the population of the earth is not only growing, but also being concentrated in densely inhabited areas. Fewer people remain in rural regions, where agriculture is either becoming mechanized or is being given up. Nature is no longer the normal human environment. We increasingly move within human-made physical and social structures. What is more, urban concentration is taking place in the so-called underdeveloped world, where only the most primitive huts shelter many city-dwellers. Under such conditions people get plenty of chances to meet. Most of the time, they are in close contact with other people’s voices, their looks, expressions, and actions. It seems that the human environment consists more and more of Company in these places.

In the more developed world, people are also distancing themselves from nature. But here civilization is developing a practical way of life that tends to reduce the opportunities for direct physical encounters. Technology in connection with a rising consciousness for economic efficiency has brought us to interact more and more with robots, that is, automatic machines of some sort. Thus, for example, we are gaining practice in doing almost everything via the Internet. We have almost done away with the shop or bank counter, across which people used to do business face-to-face. Time spent in contact with the electronic media tends to be time devoid of authentic human interaction. While the automobile bridges ever greater distances, it secludes us from one another. On the whole, while our practical dependence on society grows deeper, we are losing contact with real people.

We cannot offer further advice here concerning practical steps in overcoming such growing alienation from real experience and from human relations. Skeptics may suggest that the blessings of loneliness within the developed world will not be sustained ad infinitum. At present, threats to bodily health in the environment of technical civilization tend to be discussed by many in great detail: global warming, genetically modified food, hazards of electronic contamination, fine particles in the air, and all too many others. What is overlooked in all this is another danger

—namely, the danger that we will lose the kind of life-sustaining experience that only human encounters can bring us.

This book is about the value of our own activity in gaining experience. The theme of Company suggests a new understanding of who we are that can lead us far beyond sole identification with our bodies. We can learn to identify ourselves with the Company that shapes the course of our lives. Every person we meet is in some way or another, an opportunity for us to develop life more fully, while at the same time becoming more entangled in the Company of others.

### 13. Schooling Perception

Stephen Edelglass

On a sunny morning in early May, senior class students of the Green Meadow Waldorf School in Chestnut Ridge in New York's lower Hudson Valley can be seen at the pond mentioned in chapter three. The pond and surrounding woodland are just a short walk from the school campus. As part of their senior physics course in optics, these boys and girls have been asked to observe the pond and its environs. With no instruction other than the injunction to remain silent, they examine and explore whatever catches their interest.

One of the girls, while walking along the grassy margin of the pond, notices a gelatinous mass in the water, filled with small, seed-like, dark brown spheres. She crouches and peers through the water, wondering what this strange, jelly-like universe is doing in the pond. But then she sees a shadow on the bottom and picks out a slowly undulating, fat, and bewhiskered fish hovering nearby. A catfish. Her face lights up as she realizes that the gelatinous conglomeration is a mass of eggs, the spawn of the catfish.

Another girl, drawn by the pure clear tones of a thrush, is standing motionless, trying to locate the source of the birdsong. But within her own silence she becomes aware of the grinding gears of a truck laboring on a road at the top of the rise where her school is situated. Even as she tries to focus her concentration, she becomes aware of the engine of a small plane flying overhead. It begins to dawn on her that the inner peacefulness and openness to the world inspired by the setting (and by the silence requested of her and her classmates) has revealed the extent of the aural intrusion she lives with and habitually blocks out of her consciousness.

Meanwhile, a boy is staring intently at the shallow surface of the pond. He can hardly believe that he is able to see either the mottled bottom of the pond or, by a mere change of focus, a faraway, blue-gray sky

Other students can be seen attending to wavelike distortions at the edges of reflected images, bright halos framing the shadows of insects that rest on the water's surface, differences in brightness between the colors of objects in ordinary space and their reflected counterparts, and so on.

After awhile I call them together to share these various observations. Then, when they have done this, I change the focus of the discussion from describing particular phenomena to describing the process of observation itself. The students become aware that they had selected

particular aspects from the whole of the phenomenal manifold. Awareness of particular aspects is a consequence of their own intentional focus. The phenomena the students described were, so to speak, highlighted out of the fabric of the whole of nature at the pond. And, in just the same way, the phenomena at the pond were selected for focus out of the whole of the world in accord with the teacher's intentions.

When awareness of the role of intention is achieved, the group can make a conscious choice to attend to one or the other of the particular phenomena that interest them. They can do this while remaining aware of the whole. In this way the connection of singular phenomena to the oneness giving rise to them is not severed. Preserving this connection is one of the conditions of knowledge.

With increasing awareness of how their own intentionality determines what they perceive, the students turn to the visual aspects of the pond itself. Now they are intent on describing what can be seen through the window of the pond's surface. Here again, as we discussed in chapter three, many distinct phenomena are available for observation. One possibility is to take the path described in that earlier chapter, through which the law of reflection can be gained.

What is different about such a class? Of immediate note is that it is not usual to begin optics lessons with visual experience of the natural world. Typically, for example, reflection is introduced by saying that a ray of light falling on a smooth surface is reflected from the surface at the same angle as that at which the ray was incident to the surface. Such a statement may have been preceded by a discussion of the reflection of traveling waves. In this customary approach, reflection of light and sound become different aspects of wave reflection. Sometimes there is even a discussion of reflection in terms of photons as well as waves. What is common in almost every treatment we have examined is that the gateway to the world of reflection is via a description of a model. Only seldom are mirrored images themselves mentioned. Human visual experience is ignored.

Vasco Ronchi, the renowned Italian physicist and founder of his country's National Institute of Optics, has written of his increasing perplexity, as his education advanced, in not knowing what knowledge optics encompassed. He was unable to define the term in spite of its being his own specialty. The root of Ronchi's puzzlement lay in his realization that the idealizations of optical physics were incapable of elucidating much of visual experience! Ronchi went on to develop a so-called new optics that combined physics, physiology, and psychology.

Unlike model-based science lessons of the kind Ronchi was exposed to at school and university, the students at the pond encountered scientific questions *in the world*. Natural phenomena, not abstract, pseudo-phenomenal entities, are the starting point of their science studies. The different aspects of a subject are given their experiential context. Such an approach



to science enriches the students' appreciation of the world. The obviously genuine interest and engagement of the students at the pond (who were not selected for their scientific inclinations) is engendered by the meaningful context in which they encounter scientific questions.

Visitors to science classrooms at the Green Meadow Waldorf School often note the extent and intensity of student involvement in the science lessons. Students really do care about accurately discerning details of the phenomena they meet, about inwardly participating in the development of concepts through which they comprehend their experience of phenomena, and about helping each other to gain that understanding. Class discussion is not only earnest, it is also personally generous.

Remarkable instances of student involvement occur repeatedly in the electricity and magnetism class, a four-week physics course offered the first two hours of every morning. Required of *all* eleventh-grade students, it is unusually challenging because it is taught solely in terms of field concepts. The usual metaphysics, based on flow of electrical charges and alignment of magnetic dipoles, is not at all engaged. Instead, attraction and repulsion are understood as a consequence of field reactions. Electrical conductors are materials without internal fields, insulators are partially transparent to electrical fields, and so on.

A field is an activity that expresses itself within a spatial region. Whether agricultural fields, playing fields, or electric, magnetic and gravitational fields, the activity is distributed in space. The farmer prepares the field of activity by plowing and sowing in conjunction with seasonal, climatic, and weather conditions. The physicist prepares an electric field by rubbing and separating materials or by moving a coil of wire in a magnetic field while touching the ends to the plates of a capacitor, all done in dry atmospheric conditions in order to achieve a strong field.

The activity of growth seems to be a direct expression of a causal power. We do not look behind that activity for an explanatory mechanism. While electric fields are not alive—their activity (movement) is not at all expressed as a temporally evolving form—they are nevertheless well conceived to be causally efficient. Unlike a shovel, whose causal activity is understood as a transmitter of the farmer's activity, electric fields are, like the farmer (but without consciousness), directly causal. The lawfulness of the field in conjunction with observed behavior *is* reality. Nothing extraneous has been introduced.

Via field concepts, students gain experience of developing phenomenologically appropriate understandings in situations where no sensible agent is active. In addition, working with fields requires a flexible imagination to assimilate the interactions of one field with another as they combine in new forms. Training the imagination in this way is, of course, pedagogically desirable.

Each year several adolescent girls have engaged this subject with uncommon devotion. Although such girls may be fairly proficient at their schoolwork, they seldom show a special affinity for physical science. For this reason their instructor was puzzled by the girls' ardor for this subject. However, some years ago a seventeen-year-old, Sarah, sought out her school advisor for a conversation about the course and why she so much liked working with the subject.

In seventh and eighth grade Sarah "experimented" with alcohol and marijuana. She drank and smoked repeatedly, while her school friends did not. Her schoolwork suffered. She was in danger.

In ninth grade, with the help of counseling at school, but with little support from her family, Sarah gradually was able to stop her substance abuse. She committed herself to conscientiously doing her schoolwork. But she faced a daily struggle. She often felt in danger of succumbing to her former ways. While her situation was less tenuous in tenth grade, Sarah still felt herself to be in peril.

A year later, however, Sarah told her advisor that when she discovered that she was able to actually think the development of electromagnetic field concepts, she gained the confidence that she could also think the concepts that would enable her to understand her own inner experience. Obviously Sarah was unusual in that she could so clearly articulate her experience. More recently, another girl said that while she is "not interested in physics," she very much liked the experience that "she could make the intangible tangible." In other words, she could grasp the field concepts and thereby understand the phenomena. Other girls say simply that they enjoy the physics courses because they understand it. They feel confident. These girls are confident they can do the course.

It may be that Sarah's inner voice, the voice of her own individual genius—what James Hillman, Rollo May, and others, beginning with Socrates, call the *daimon*, the inspiration for individual human creativity—was so irrepressible that it inspired both her substance abuse *and* her overcoming of it in a new, creative mode. This is what she meant when she spoke of gaining confidence to understand her own inner experience—that is, to gain access to her self. And it is not too far a stretch to understand the other girl's comment about "making the intangible tangible" in a similar way.

Early on in Mary Pipher's bestseller *Reviving Ophelia*, a book about "saving the selves of adolescent girls," the author describes a story told to her by a horticulturist friend. At a science fair on her campus the horticulturist showed a variety of grains, grasses, and trees to a group of junior high school girls. She noted how the younger girls, the seventh graders and some of the eighth graders, were full of questions as they pushed forward to see, touch, and smell everything. But the older girls, those in ninth grade, stood back unsympathetic with their younger

companions' enthusiasm. They looked bored and disgusted. Pipher wrote, "My friend asked herself, What's happened to these girls? What's gone wrong? She told me, 'I wanted to shake them, to say, *Wake up, come back. Is anybody home at your house?*'"

Within the context of adolescent female experience, the Waldorf physics class just described is particularly interesting. The dissimilarity between the eleventh-grade girls' enthusiastic involvement in trying to understand electricity and magnetism and the prim non-involvement of the ninth graders at the science fair is striking. With the Waldorf eleventh-grade girls someone is quite definitely at home. Of course, the eleventh graders are more mature and may have passed through a stage of non-involvement (as did Sarah!).

In younger adolescent girls (thirteen- and fourteen-year-old eighth and ninth graders), non-involvement with the world goes hand in hand with an excessive preoccupation with superficial personal characteristics, a preoccupation encouraged by a contemporary culture in which adolescents suffer a media barrage that is both sexualized and drug-saturated. A pedagogy that recognizes this coupling is capable of helping students to gain their selves rather than trivializing them as so often happens.

Adolescents need to experience the sensual world directly rather than meet models, representations, or virtual realities. Students in early adolescence are only just beginning to develop capacities concerned with the form of reasoning rather than the subject matter itself. Such so-called formal operational capacities make it possible for students to think about their own thinking processes. They enable the rich prospects of the eleventh-grade students in the physics class described above. The younger students can prepare the way for these capacities through practice in grasping the "what" and the "how" of the world via a thinking engagement with actual experience. For example, ninth-grade physics students can immerse their hands in hot, cold, and tepid water in order to begin to conceptualize the concept of temperature from its basis in human experience. And they can take an engine apart in order to understand the application of expansion of gases under pressure in a potentially "embodied" way. This practice is a bridge between meeting the world in a concrete operational mode and in a formal one. Without the formal ability Sarah would not have been able to gain her self through confidence in her ability to understand her own inner experience.

While anecdotes such as the one we told of Sarah do not in any absolute sense confirm the claims we have made about the pedagogical value of phenomena-based science, they do highlight possibilities. In this spirit I would like to tell one more story, that of Teresa, a ninth-grade student. When she came to the Waldorf school in the eighth grade, she seemed withdrawn and angry. She had difficulty completing her schoolwork and would often make loud negative comments about her classmates, about school, about life, and about the world in general. During

the ninth-grade physics class, however, she started to show interest in what was being done. She began to participate in discussions. She completed her work. Her attitude about life improved. At the end of the four-week course Teresa was first in the class to complete the test and asked if she could go quietly to the other side of the room and disassemble a few pieces of apparatus while her classmates continued to work. Presumably Teresa was empowered by the embodied confirmation of her understanding.

Phenomena-based science has significant potential to empower adolescent girls, as well as boys, in their science studies. The subject matter itself can be a significant means for overcoming the oft-noted lack of self-esteem and confidence of adolescent American schoolgirls, a lack that often expresses itself in girls' experiences with science. Assuredly, since teachers are part of the context within which science is met, it is very important that they be sensitive to gender issues as well as enthusiastic, knowledgeable, and caring. Given such teachers, however, the subject matter itself can become a means for accomplishing educational goals having to do with human development. Phenomena-based science, because of its insistence on awareness of the process of knowledge alongside the knowledge gained, seems to move concerns from the realm of gender-specific issues to those that are more generally human.

## Bibliography

- Barth, Heinrich (1965). *Erkenntnis der Existenz*. Basel: Schwabe.
- Baumgarten, Alexander (1988). *Theoretische Ästhetik, Die grundlegenden Abschnitte aus der "Aesthetica" (1750/58)*, translated by Hans Rudolf Schweizer, Latin and German. Hamburg: Felix Meiner Verlag.
- Baumgarten, Alexander (1954). *Reflections on Poetry (1735)*, translated by Karl Aschenbrenner and William B. Holther. Berkeley: University of California Press.
- Berkeley, George (1709). "Essay Towards a New Theory of Vision," pp. 1-32 in *Berkeley: Philosophical Writings*, edited by T. E. Jessop (Austin TX: University of Texas Press, 1953).
- Briggs, Kathrine M. (1991). *A Dictionary of British Folk-Tales in the English Language, Part A, Folk Narratives*, vol. 1. Bloomington IN: Indiana University Press.
- Eckermann, Johann Peter (1930). *Conversations with Goethe*, edited by J. K. Moorhead, translated by John Oxenford. London: J. M. Dent and Sons.
- Edelglass, Stephen, Georg Maier, et al. (1997). *The Marriage of Sense and Thought*. Hudson NY: Lindisfarne Books.
- Galilei, Galileo (1957). *Discoveries and Opinions of Galileo*, translated with introduction and notes by Stillman Drake. New York: Random House.
- Geist, Sidney (1969). *Constantin Brancusi, 1876-1957, A Retrospective Exhibition*. New York: Solomon R. Guggenheim Foundation.
- Giedion-Welcker, Carola (1959). *Constantin Brancusi*. New York: George Braziller.
- Gross, Alan (1996). *A Rhetoric of Science*. Cambridge MA: Harvard University Press.
- Hanson, Norwood Russell (1969). *Patterns of Discovery: An Inquiry into the Conceptual Foundations of Science*. Cambridge: Cambridge University Press.
- Julez, Bela (1971). *Foundations of Cyclopean Perception*. Chicago: University of Chicago Press.
- Kanizsa, Gaetano (1976). "Subjective Contours," *Scientific American* vol. 234, no. 4, pp. 48-52.
- Pantin, C. F. A. (1954). "The Recognition of Species," *Science Progress* vol. 42, pp. 587-98.

Price, H. H. (1954). *Perception*. London: Methuen.

Steiner, Rudolf (1995/1923). *Fall and Redemption*. Lectures 1 and 2. Spring Valley NY: Mercury Press.

Steiner, Rudolf (2000). *Nature's Open Secret: Introductions to Goethe's Scientific Writings*, translated by John Barnes and Mado Spiegler, with an essay on participatory science by John Barnes. Great Barrington MA: Anthroposophic Press.