SOME THOUGHTS ON WHAT EMPIRICISM NEEDS

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My interest has long been directed toward the nature of ideas, how they are expressed (language), how they fit together (logic), and how they relate to the world (epistemology). If one's primary concern is the discipline of philosophy, there is good reason for this. For as other fields have their areas of specialization, so it appears to me does philosophy, and this is the area of ideas or concepts.

In working out the material for the book that I wrote many years ago as an introductory philosophy text,[1] I discovered that upon considering the normal processes of thought, I had to include three basic ones, which are abstracting, generalizing, and imagining. Abstracting and generalizing have long been at the forefront of any consideration of the nature of ideas, although they have often been confused. But imagination has been sadly neglected until recently. This is the case most likely because of a limiting of imagination to the free, creative, and scientifically wayward use of mental images, or even because imagining has been thought of as meaning "imaginary" or "unreal." But to limit imagination to the free fantasy or illusionary type, however, is an unfortunate mistake.[2]

Epistemologically, I have always favored some form of empiricism, although it has seemed obvious that without a proper accounting of the role of imagination, empiricism is woefully inadequate as an account of the sources of many, if not most, of our ideas. But when we acknowledge the ways in which imagination functions, then only can we ascribe the roots of our thoughts to experience, an experience which must include not only the products of direct perception but especially the products of the imaginative modifications and contributions thereto.

Let me review briefly what I mean by the terms abstracting, generalizing, and imagining. By "abstracting," to borrow Whitehead's phrase, I simply mean ". . . directing

attention to something which is in nature, and thereby isolating it for the purpose of contemplation."[3] In other words, an abstraction is a fragment of experience upon which someone focuses attention while disregarding the surroundings or background. Abstractions are not hypostatized entities that exist somehow apart from the rest of reality. I could also use the word "prescind," a favorite of Peirce's, which is used by H. N. Lee for what I here have in mind. To quote Lee: ". . . when parts have been distinguished in perception, prescinding can come into play. To prescind is to isolate for purposes of thought one of the parts found by analysis."[4] He includes as the steps of inductive procedure, analyzing, prescinding, generalizing, and making functional abstractions,[5] which is pretty much what I am saying, except what he means by "functional abstractions" I am including with the forms of imagination and by prescinding I mean just simple abstracting.

As for "generalizing," we both mean the gathering together into classes of those bits of experience that show dominant similarities. These may be the ordinary objects of first-hand experience, like tables and chairs, trees and birds, and so on, or they may be the more imaginatively refined segments of experience, like geometric figures, numbers, or classes. I shall return to figures, numbers, and classes later.

Now let me indicate again how what I am calling *imagination* functions. When we consider the limitations of actual perceiving, we are struck with the vast amount of thinking that deals with matters that are not within direct perception. There are many ways of rearranging, substituting, completing, extending, and refining the bits and pieces that we analyze out of immediate experience, and these ways give rise to what I am calling the products of imagination. Here we must include the extensions of terms to new cases, as in broadening the meaning of a word or in transferring it metaphorically to a quite dissimilar situation. And we must include the refinements and perfections of our geometric shapes, such as, conceiving perfect circles and triangles, or also the adding of numbers in our series of countings past any observable limits, as well as the myriad of relations that can be conceived within our classificational, geometric, and enumerative concepts. So, it is not just those imaginatively altered (or recombined) creatures, like centaurs, harpies, chimeras, and so on, that are attributable to imagination. Imagination should not be blamed for its extravagancies but should be studied for all its contributions to the world of ideas, whether fanciful or not. In fact, imaginary ideas form the heart and center of the world as we understand it, whether or not they reflect its realities.

In addition to the more rigorously systematic uses of imagination, there are of course the aesthetic and moral uses. The whole range of literary, visual, and musical creations are extremely valuable in our effort to understand and enjoy the vast extent of our imaginings and even the reflection of our particularly human nature. Likewise, the moral and social uses of imagination, without which we would be much more the victims of mere instinct and impulse than we are, constitute an extremely important area of concepts produced by imagination.

How, then, does imagination function? Let me review briefly some of the basic moves that we make with imagination. First, there are the *rearrangements* of objects as first experienced. We can imagine the furniture in different positions or substitute a new object for an old one in our mind's eye, as we say. Second, we can *complete* imaginatively the scene before us or add to it either more of the same or something different. Then, third, we can *extend or reduce* the sizes of perceivable things or even move them toward some sort of imaginary limit, such as, a line without breadth or a point that is in space but occupies no space. And, fourth, we can *change the range* of our generalized terms to include fewer and fewer similar cases, even to including those in which the thread of similarity is minimal, as in many metaphorical expressions still too new to have become so habitual as to be literal.

In this last case, we should distinguish between degrees of extension. Simple extension of a term is to other rather similar cases; for example, starting with an ordinary wooden chair and then extending the word to include overstuffed chairs, rocking chairs, metal chairs, and so on. But we can imaginatively use the same term to refer to something quite

different, such as, a rock that happens to resemble a chair in shape. The further afield that we carry a term's referential range from its most normal (literal) meaning, the more metaphorical it appears to be.

An even greater extension of meaning is the transfer to something associated in some way with the original object or event other than by simple similarity, as in calling a person a "chair" through transfers from "one who occupied a position of authority over a group" (as "chairman" or "chairwoman") to just the simple genderless epithet, "chair." Sometimes we distinguish "metaphor," which is based on analogies and similarities, from "metonomy," which is based on some frequent attribute or often associated object or event (for example, "They set a good table" referring to the food on the table), and from "synecdoche," which is based on a part/whole or whole/part relation (for example, "They attacked the outpost with fifty rifle" meaning fifty persons with rifles). But there are many relations other than those of similarity, attribution, or part/whole relations that give rise to figurative transfers, and I would prefer to call them all "metaphors" since metaphor etymologically means "transfer" without indicating the basis of the transfer.

And this brings me to my major point, which is the importance of what I would like to call *imaginative metaphorical exploration*. In the world of the intellect, in the world of ideas and what we can do with them, the crucial activity for investigating the world as perceived and as generating new points of view and new understandings is imaginative metaphorical exploration.

To illustrate, consider the importance to our primitive ancestors of dressing up and acting like some of the animals or birds upon which their lives depended. This amounts to a transfer of one's own person and personality into something quite different. But to take more examples closer to us, there are the cases of electricity being thought of as a fluid, the atom as a miniature solar system, language as a game, or the brain as a computer. The list could go on, but these examples should suffice to demonstrate my point about the useful insights gained by imaginative metaphorical exploration. And in connection with the brain/computer analogy, I am reminded of LaMettrie, an army physician in the first half of the eighteenth century who wrote a book, *Man: A Machine*, in which he compared the brain to the best developed mechanisms of the period, a violin and a harpsichord:

> As a violin string or a harpsichord key vibrates and gives forth sound, so the cerebral fibres, struck by waves of sound, are stimulated to render or repeat the words that strike them. And as the structrue of the brain is such that when eyes well formed for seeing have once perceived the image of objects, the brain cannot help seeing their images and their differences, so that when the signs of these differences have been traced or imprinted in the brain, the soul necessarily examines their relations—an examination that would have been impossible without the discovery of signs or the invention of language.[6]

I wonder if our current metaphorical explorations will sound as naive in two hundred years? And in view of the current interest in artificial intelligence, it is worth noting that the brain/computer analogy may have real difficulties in accounting for the imaginative activity of the brain. Even if it were possible to program a computer to have it make all our imaginative moves, it still would need to be told which ones to make, whereas the brain is free both to go in all sorts of directions and also to decide on its own in what direction to go.

What, then, are the basic abstractive patterns with which we make our metaphorical explorations? I believe that there are fundamentally four: (1) observing groupings and classifications, which eventuates in class logic; (2) recognizing spatial shapes and configurations, which eventuates in geometry; (3) counting or enumerating individuals, which eventuates in arithmetic; and (4) plotting patterns of change, which eventuates in our studies of motion and in formulating

rules of inference. These are the bases of our systematic understanding of the world and of ourselves, and are traceable back to very early origins in human thought.

A characteristic of our abstractions is that they form themselves into stable, unchanging relationships. This is even true of our patterns of change, for we try to relate these to forms of motion that can be conceived geometrically and measured, giving us numerical time-space relationships that can be graphed. No wonder that Plato, idealizing this world of abstractive concepts, considered that it represents our most permanent realities. But unfortunately motions and changes are a basic part of our experienced world, and trying to imagine them as somehow less real than their unchanging formalizations does not lead to a sound picture of the world as it is for us.

Classifying, which is the result of generalizing, is clearly as old as language itself; for language, as it has developed in human use, already focuses attention upon groupings of similar objects, events, qualities, or relations. We learn to talk by naming things as they are classified.

When we look for the basic relationships that are embedded in ordinary languages, what we discover is of course a system of class relationships. Some terms are more inclusive, others less so. Some of the more inclusive terms include some of the less inclusive (for example, "animal" to "dog"), and so we begin to build up the familiar Aristotelian categories of logical relationships, including the propositional relationships that led to his syllogistic system. Surely this is a remarkable achievement of human understanding. But please note how much of it is due to our ability to imagine conceptually the interrelationships involved.

Turning to shapes and numbers, it is difficult to say whether our observation of shapes or our observation of numbers came first. Primitive peoples certainly knew how to draw figures (as witnessed by the cave paintings of our Paleolithic ancestors and the geometry of Stonehenge), indicating observation of shapes. And numbering is probably indicated, just as primitively, by the prehistoric inscriptions found on some pebbles at Mas d'Azil, France.[7] But certain primitive tribes, especially in Australia, have been studied from the point of view of their simplified systems of counting (for example, one, two, one-two, two-two, many).[8] Most peoples used their fingers, or fingers plus toes, for counting, giving us the decimal and vigesimal systems, although the dozen is in many ways a better number than ten. One author puts it as follows:

> There is reason to believe that the scale of twelve . . . was favored in prehistoric times in various parts of the world, . . . chiefly in relation to measurements. It may have been suggested by the approximate number of lunations in a year, and it was undoubtedly its divisibility by two, three, four, thus allowing for simple fractional parts, that made it attractive.[9]

How we play around with numbers affords us interesting examples of the way in which imagination works. For example, even before the introduction of a special symbol for zero (but much more afterwards), people were thinking of negative numbers, and when the irrationals turned up, as in the relation of the diagonal of a square to one of the sides, more imaginative thinking was required. And, since all square roots, whether positive or negative, must be positive, there is no reason for not extending the imaginary range of numbers into square roots of negative numbers. What did we do but add these to our list of possible numbers and call them "imaginary numbers."

Similarly, interest in the relationships among various regular shapes was developing into geometry. According to one authority, Thales had formulated such observations as: (1) any circle is bisected by its diameter; (2) the angles at the base of an isosceles triangle are equal; (3) when two lines intersect, the vertical angles are equal; (4) an angle in a semicircle is a right angle; (5) the sides of similar triangles are proportional; and (6) two triangles are congruent if they have two angles and a side respectively equal.[10] The Egyptians had long

practiced the techniques of applied geometry in their constructions, but the formulation of the principles seems to have been left to the Greeks, fascinated as they were by general formulas.

Next, we notice how the human mind through imaginative metaphorical exploration was able to extend and transfer each basic systematic pattern to other areas, including each other. For example, probably the first effort to do this was in applying counting to measurements. Our experience basically includes not only clearly separate objects but also varieties of continua, especially in space and time. We already noticed that the Mesopotamians applied numbers to the heavens and to the measurement of time. Undoubtedly they were not alone, nor were they the first to do this, for it would be unthinkable not to extend the advantages of counting to the world of continua. We find units of measurement in the systems of each of the world's cultures. So, let us take the simple act of measuring our experienced continua as the first kind of extension from one of our systems to another.

Another metaphorical exploration of a numerical upon a geometric scheme came with the development of analytic geometry by Descartes. Of course, the very idea of algebra itself can be considered an extension of the classificational or generalizational system to the realm of numbering, for formulating an algebraic proposition simply means using some symbol for a generalized number to allow an easier formulation of numerical relations that are not specifically tied to some given number. But, with analytic geometry came the application of algebraic formulae to geometric shapes as imagined on a two or three-dimensional set of coordinates, and this offered an extremely fertile imaginative way to deal with shapes.

A further effort to explore one system in terms of another occurred in the nineteenth century when George Boole thought he could develop an algebraic formulation not of numbers or shapes but of class relationships. Today we have seen the advantages and disadvantages of this effort. The real advantage, I believe, was to show more clearly than before the possibilities of interrelating classes, especially through the use of Venn's diagrams. And the chief disadvantage was probably simply to prove again that number systems and classes are quite different and that their interrelations cannot be superimposed upon one another. Undoubtedly this is a very important lesson, so perhaps it should be included among the advantages.

Patterns of change are also important abstractions necessary for our efforts to understand. It is intriguing to speculate on the possibility that these patterns have afforded the basis for building *inferential* systems.

Some sequences in our experiences recur again and again, leading to habits of expectation. But there is no certainty here. Sometimes the sequences are broken or changed. Let me propose that such sequences form the basis of our inductive inferences. On the other hand, when an inference is clearly obvious and necessary, we call it deductive or demonstrative. The basic difference between inductive inference and deductive inference, I believe, lies in the degree of conceptual formalization associated with deduction. When we can conceive a pattern (or part of a pattern) with great conceptual clarity, then we can make necessary inferences from one part to another. For example, when we clearly conceive our number systems as containing a sequence of integers, each one representing one more than the last, then with this pattern in mind, we can deduce that 2+3 = 5 or that 1/2 + 3/4 = 1 1/4, and so on. Sometimes we call such inferences "analytic" since they result from clearly analyzing a given mental image or pattern.

But, whether we call the deductive process as here described "analytic" or "synthetic" depends on our starting point. We use one pattern to illuminate the other—which gives us an imaginative metaphorical exploration. By way of an example, consider Kant's claim that 7 + 5 = 12 is a case of a synthetic judgment. Kant was seeking an example of a secure judgment that would also be a synthetic judgment in order to extricate the foundations of reasoning from the uncertainties of probabilistic inductive judgments. A purely analytic judgment or inference apparently did not satisfy Kant's desire for

something both secure and at the same time innovative. But this need not be the case, for a full conceptual scheme of 7+5 = 12 is certainly both imaginatively innovative and analytically secure.[11]

Long before Kant, the ideal of a deductive system had dawned upon the Greek thinkers, as developed into the Euclidean formulation of geometric principles. This model was later idealized for other realms of knowledge, as witnessed by Spinoza's *Ethics*. And the ideal of a complete deductive system for all of the principles of logic and mathematics certainly motivated Russell when, along with Whitehead, he developed the calculus of propositions in the *Principia Mathematica*.

It is my contention that even the developed idea of a deductive system, such as the one just mentioned, has arisen from first-hand experiences of classes, numbers, shapes, and changes, plus abstraction, generalization, and imagination. We observe sequences of events as they naturally occur, and of course our ability to perform even the simplest acts requires that we can already imagine the sequences that are necessary to achieve our goals. We build up habits of expectations of sequences of change, and then we can imaginatively alter these sequences to create others. In this way from empirical bases along with the use of imagination our intellectual systems are constructed.

In conclusion, I will repeat my main claim: an empirical epistemology will work only if we include the many products of imaginative metaphorical exploration within what we mean by "experience." I have said nothing here about modes of verification of these products of thought and therefore about what can be asserted to be "realities." That is another problem.

NOTES

**Editors' Note:* H[ubert] G. Alexander received his BA in 1930 from Pomona College and his PhD in 1934 from Yale University. He taught in the Department of Philosophy at the University of New Mexico from 1935 until retirement in

1975, serving as Chair from 1947-65.

[1]H. G. Alexander, *Language and Thinking* (New York: D. Van Nostrand, 1967), revised and republished as *The Language and Logic of Philosophy* (Lanham, MD: University Press of America, 1988).

[2]For example, Mark Johnson has put it most emphatically in *The Body in the Mind* (Chicago: U of Chicago P, 1987), ch. 6. He proclaims that ". . . it is important to revive and enrich our notion of imagination if we are to overcome certain undesirable effects of a deeply rooted set of dichotomies that have dominated Western philosophy" (140).

[3]Alfred North Whitehead, *Science and the Modern World* (New York: Macmillan, 1925) 173.

[4]H. N. Lee, *Percepts, Concepts, and Theoretic Knowledge* (Memphis, TN: Memphis State UP, 1973) 156.

[5]Lee 163.

[6]J. O. LaMettrie, *Man: A Machine* (Lasalle, IL: Open Court, 1943) 105.

[7]Charles Berlitz, *Native Tongues* (New York: Grosset & Dunlap, 1982) 100.

[8]See Dirk J. Struik, *A Concise History of Mathematics* (New York: Dover, 1948) 3.

[9]D. E. Smith, *History of Mathematics*, vol. 1 (New York: Dover, 1951) 11.

[10]Smith 67-68.

[11]See Johnson, ch. 6. He gives an account of Kant's theory of imagination as (a) reproductive imagination, (b) productive

imagination, (c) the schematism, and (d) the creative operation of imagination in reflective judgment. For types of synthetic imagination, see Johnson 149.