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AN EMPIRICAL CONSIDERATION OF SUBSTANCE

Richard J. CONNELL

RECENTLY the publication of certain books and the appearance of journal articles on substance indicate that the topic is of lively interest. The interest, however, has not prevented the disparities in the way the topic is treated from suggesting that the discussion might not be properly focused. Aristotle was the first to articulate a precise notion of substance, and his views dominated philosophy until the modern era, at which time they were summarily removed from the arena by David Hume's attack on them. Since that day substance has been a sort of *persona non grata*, at least in Anglo-American philosophy, few philosophers having found the notion advantageous to their enterprises.

But though substance has returned as an arguable philosophic issue, the current discussions seem to miss the central point. As Hume alleged, Aristotle did indeed view substance as a substratum in which accidents — or modes, as Hume preferred to call them — reside. His attack was directed squarely at that point. But from what I can see, the current essays do not grasp what Aristotle held, so they also fail to see the flaw in Hume's attack. Hence I wish to declare at the outset that I consider Aristotle to have spoken correctly when he said that realities are of two kinds, substance and accident. My aim will be, then, to present the notion of substance as a substratum and to defend it against Hume's attack. Let me stress, however, that I do not intend to write an historical essay on what Aristotle held, for what he held is of much less significance than whether what he held is right or wrong, true or false. And so although the view I shall defend seems to me to be Aristotle's, that is a minor matter, and I shall direct my efforts towards presenting an empirical account of the notion of substance. To do so I must ask the reader to grant that in some measure we can know the world "out there"; if he does, I think I can make my case with him.

A) *Beginnings in ordinary experience*

As signs of things, words provide the mind with a shortcut to reality. They are the mind's own tool for noting similarities and distinctions, and they provide it with a handy starting point for reflective analyses of notions that are already present to it in a non-reflective, non-analytic way. As the analytic philosophers have been at pains to tell us, a good look at the meaning and uses of words is a fruitful way to begin philosophical considerations.

With that in mind one might do well to note that the words of ordinary language tell us the world contains a great many "things" that are made of "stuff". It also tells us that both things and stuff have numerous "properties", and that without undergoing modifications in themselves, things and stuffs are subject to many changes in their states, conditions, appearances, traits, properties. But though language is made for drawing the mind's attention to similarities and distinctions, differences in language do not necessarily entail differences in the realities they signify, since different modes of speaking can, as everyone knows, be correlated with the same reality. Nevertheless in a concrete case when the modes of speaking are different the realities are probably different too. Consequently if language signifies that both things and stuff remain while their conditions, states, etc., change, then the probability that they are different obliges one to examine them and ask: what is a thing? a stuff? what sort of a reality is a property? are there real differences that correspond to these verbal differences? or ought the language to be corrected so as to remove the source of what is actually an illusion? Whatever position one ultimately takes on these issues, whether he maintains that the realities are different or whether he maintains that the language ought to be corrected, the problem is clearly centered on the realities themselves; for in order to judge that a mode of speaking is illusory, one first has to know the character of what is signified. On those grounds, then, I shall approach the issue of substance by using the mode of speaking as a starting point.

First let me note that words such as "thing" and "stuff" and "condition" and "state" and "appearance" and "property" do not, in ordinary speech, refer to fictions; they all refer to something in the actual world "out there". On that account they can, in a negative way, be said to have something in common insofar as they do not signify fictions and do signify realities; so one may appropriately note that the real is *that which exists outside the mind.* Few readers, I dare to anticipate, will deny that this is an accurate account of the most general sense of the word. (The phrase, "outside the mind", merely emphasizes what "exists" means and does not add to the content of its sense.) Yet the primary issue is not what such words have in common in their significations, but how they differ.

If we start with the words "thing" and "stuff", we see that the first of the two words signifies a readily distinguished individual, such as an animal or plant, individuals which are obviously units possessing the character of independent wholes. "Stuff", on the other hand, signifies realities such as water, iron, salt, etc., in which individuals, even when they exist, are not so easily detected. But we do speak

of "grains of salt", "pieces of iron", and "drops of water", although none of these has the readily determined, easily recognized individual independence of organisms. A "grain" or "drop" or "crystal" or "molecule" or "atom" is always a grain or drop or atom "of something". Each of these words signifies a part of a whole, an "amount" that is less clearly an individual than an organism. Despite these distinctions, however, the point will be made a bit later that things and stuff are more alike than different.

In contrast to "thing" and "stuff", words such as "property", "condition", "state", "appearance", and the like do not first of all suggest individuals to the mind; rather, they suggest realities that are assigned to or predicated of things and stuffs. We say "The elephant is gray", or "The elephant is large", predicating the gray and large of elephant; but we do not say, "The large or gray is elephant", except when we understand *thing* to accompany *large* or *gray* as in "large thing" or "gray thing". Furthermore, we do not admit that shape is a stuff, that color is a stuff, that viscosity is a stuff, that conductivity is a stuff, that hardness is a stuff, etc. Whatever its nature or character, stuff cannot be predicated of such properties. Now differences in modes of speaking such as these allow us to infer with probability that they depend upon differences in realities; so we must turn our attention directly to the latter.

Observations of natural objects often reveal that variations in some traits of objects occur while something else which accompanies the traits remains untouched. When an animal, or any other body for that matter, moves from one place to another, its location varies without its other attributes changing. In like manner, a lump of clay can undergo a change of shape without at the same time undergoing changes in other properties too. Again, when water turns to ice we hold the former to differ from the latter not as a kind of stuff but only in its superficial attributes. The point is that in all these examples a modification in one reality occurs while something else — whatever it may be — remains unmodified. But more importantly, after the changes have been completed in the animal and the clay there is "more" identity left, so to speak, than there is difference that has been introduced.

If we look at ourselves, we confront the most obvious case in which something varies while something else remains. As many have noted before me, men stay the same in all important attributes when they go from here to there, when they change their position from sitting to standing, or even when they grow from being a child to an adult. Apropos of these cases we signify the differences in the realities by saying that men, animals, and all other things and stuffs, remain what they are as things or stuffs, while undergoing a number of superficial modifications. (Of course we do recognize modifications that affect the things or stuff, for example, chemical reactions, as well as the production and death of organisms. These, however, are not the issue at the moment.) And so employing a language that does not prejudge the issue, if observation shows that in all these changes "much" is unmodified while a "little" is varied, then what can one say about the nature of the "much" and the "little"? What does such simultaneous variation and identity imply?

A well known philosopher of science has suggested how we are to view the difference between the "little" and the "much":

> Operationalism... fails to impart meaning to substantive concepts — that is, concepts related to entities that are regarded as the carriers of operationally determinable qualities or quantities. To illustrate this latter point: it is possible to define, in terms of instrumental procedures, the charge, the mass, and the spin of an electron, but hardly the electron itself[1].

Here Margenau distinguishes two sorts of realities, qualities and quantities on one hand, and their "carriers" on the other. We can, he says, define the former operationally, through instrumental procedures, but we cannot define "the electron itself" in that fashion. And when we ask ourselves how the carrier and what it carries are to be compared to one another, how the charge, the spin, etc., are to be compared to the electron itself, we are asking the basic question that seeks to know how they differ as realities. What Margenau describes in relation to the submicroscopic can, however, be more easily considered in relation to the macroscopic.

Upon focusing on a simple example — for instance, a piece of clay that is molded so as to change its shape — reflection will show that several realities are present. We see a varying shape and also a color, texture, mass, and many other attributes that do not vary; and hence the principle of non-contradiction requires that the shape be distinguished from them. Yet if one focuses his attention more closely on the shape, he sees that it always exists or occurs in conjunction with something else; he will recognize that shape is rather obviously a mode, a limit, a boundary where something else — that which is signified by "clay" — leaves off; and this is true whether clay be a reality distinct from the attributes assigned to it, or whether it be one or several of those attributes. Hence because shape is a boundary, a mode, a modification of something else, whether "something else" signifies an observable attribute or an unobservable substratum underlying the attribute, shape can have no separate existence.

And if once again we reflect on ourselves, we readily see that our shape is our boundary, that our shape is truly the limit where we leave off; and as Margenau would say, that we are the carriers of our shapes. Beyond any doubt shape is a reality, and beyond any doubt it is a reality that exists in something other than itself. Shape, then (and many other properties as well), *exists*, as Aristotle noted, *in another as in a subject;* and insofar as shape exists in another it is dependent on that other. We ought to note, moreover, that the phrase "as in a subject" is not a useless part of this formula, for it indicates the meaning of "in" which is appropriate here. One thing can be in another in many ways: as a hat is in a closet, as an effect is in a cause, as a cause is in an effect, as a part is in a whole, etc. And so what the defining formula makes plain is that shape exists in another as in a carrier, as Margenau says, or as in a subject or substratum as Aristotle said.

The magnitude or size of something illustrates the same definition; for the size of what is called a "thing" or "stuff" can differ without the thing or stuff differing, and it never occurs or exists except in one or the other of them. Just as shape is in

1. Henry MARGENAU, « Interpretations and Misinterpretations of Operationalism », in *The Validation of Scientific Theories* (Boston: The Beacon Press, 1956), p. 39.

something else as in a subject, so size too is in something else as in a subject. To be a little more precise, shape limits something else insofar as it limits the magnitude or size of something else.

Up to this point our considerations have borne upon shape and size as particular instances of a general kind of reality that modifies something else insofar as it resides in the something else. This kind of reality the medievals called an *accidens*, which is usually translated into English as "accident". (In this context "accident" obviously does not have the meaning of "incidental" or "contingent", although some accidents belong contingently to things. Nor does it mean "fortuitous" or "by chance.") Many different modifiers or accidents reside in things, including relations, position, location, qualities such as viscosity, elasticity, etc., and no attempt will be made here to list them all. But having touched on their general character, what does one then say about their carrier, about the something else in which they must exist as their subject or substratum?

If shape is a reality which exists in another as in a subject, then quite naturally questions must arise about the subject itself. Does it, too, exist in something else as in a subject? and if so, does this second subject require another *ad infinitum*? The absurdity here is patent, however, for a process *ad infinitum* is not possible, from which one may infer that *something* must exist that does not require a subject in which to exist. Such a reality Aristotle called "substance", defining it as *that which exists in itself* (or by itself) *and not in another as in a subject.* That the definition truly describes things and stuffs bears emphasizing, for clearly they do not exist in subjects. For example, water does not exist in another as in a subject, electrons (if they occur as they are conceived) do not exist in another as in a subject, men and other organisms do not exist in another as in a subject, etc.

As the reader can see from the definitions above, the notion of a modifying trait and the notion of substance are understood simultaneously and in relation to one another, which is to say that the definition of one depends upon understanding the other. Of the two, substance is "more" a reality than the modifying traits that exist in it. Now at this point the character of the "little" and the "much" should be plain; still, I would like to repeat for the sake of emphasis that the ordinary materials we call stuffs, as well as the things made from them, either are or contain something that does not exist in another as in a subject; that is to say, either they are or they contain a substance or substances. The realities we signify by "elephant", "chipmunk", "iron", "copper", etc., clearly fit such a description. (*Containing a substance* is given as an alternative to *being a substance* because in that way whether an organism, for instance, is a substance or whether it is a collection of substances is an issue that is left unprejudiced and open to further inquiry.)

Applying the definition to some of the objects of our considerations, we can see that anything which truly has the character of an element or elementary body will be a substance. This also applies to photons; for however amorphous and "intangible" they may be in some respects, if they exist as they are conceived, then photons do not exist in another as in a subject. On the contrary, they are conceived as existing by themselves; they are thought to be packets of energy-stuff. Once

again, howevermuch an elementary body of any sort may be conceived to exist in a place or in some whole, etc., it certainly is not conceived as existing in a subject. What is true of the microscopic is even more evidently true of the macroscopic, for we ourselves are easily recognized as instances of the general notion.

So having outlined what substance is, we are in a position to note that its empirically obtained definition does not imply either an unqualified permanence or an unqualified independence. Substance is permanent *in relation to the physical changes* (as the physicist calls them) *of shape and color and temperature and viscosity, etc. that occur in it*, but the definition of substance does not imply that it is permanent in an absolute sense. His idealism aside, Kant is not justified, therefore, in arguing that the permanent as such is the substratum; for whether permanent or impermanent a subject can be a substratum[2]. I might add that Bertrand Russell also thinks of substance according to an a priori conception the essence of which is permanence[3]. Similarly, a substance is independent of a subject in its existence, but an independence of that kind is in no way absolute; substance is *not* independent in the sense that it is uncaused and needs nothing else to exist (and is therefore God) as Descartes, for example, would have it. Thus, assuming the impossible, were permanence and independence to be predicated of substance in an unqualified way, these attributes would have to be proved of it through an argument starting from something more than the definiton that has been given. On that account criticisms which attack the Aristotelian notion of substance on the grounds of absolute permanence and absolute independence are altogether unwarranted and stem from a misconception.

Another misconception that gives rise to many problems about natural entities has to do with the simple and composed. The definition of substance in no way implies that substance is simple rather than composed. We do, however, tend to assume that it has to be simple, an error well illustrated in Leibniz' *Monadology:*

1. The Monad, of which we will speak here, is nothing else than a simple substance, which goes to make up composites; by simple, we mean without parts.
2. There must be simple substances because there are composites; for a composite is nothing else than a collection or *aggregatum* of simple substances[4].

Leibniz actually begs the question in his argument, but the same unwarranted assumption about the simplicity of substance is made by a contemporary author:

> A "living" substance has often been spoken of. This concept is due to a fundamental fallacy. There is no "living substance" in the sense that lead,

2 *Critique of Pure Reason*, trans. Norman Kemp Smith (London: Macmillan & Co. Ltd., 1956), pp. 212 ff., also p. 229.

3. *Our Knowledge of the External World*, A Mentor Book (New York: The New American Library of World Literature, Inc., 1960), lecture IV.

4. LEIBNIZ, trans. George R. Montgomery (LaSalle, Illinois: The Open Court Publishing Company, 1962), p. 251.

> water, or cellulose are substances, where any arbitrarily taken part shows the same properties as the rest. Rather is life bound to individualized and organized systems, the destruction of which puts an end to it[5].

Let me repeat, the assumption that a substance must be simple is not warranted by the definition, a definition that is empirically obtained in relation to accident, and so the passages quoted above beg a question that no Aristotelian would concede. Such an error suggests that imagination has interferred with understanding[6].

According to yet another misconception the first problem of substance is the problem of individuation, and one has to concede that according to the notion presented singulars are substances in the fullest sense of the word. Yet one can hardly deny that singulars may be considered according to that which they have in common, and that which they have in common is their character of existing in themselves and not in another as in a subject. On that account the problem of individuation is posterior to the problem of substance, and one can investigate it only when he knows what substances considered commonly are. Though I would agree that time and position (in the sense of location) are the identifying marks of individual substances, I would not agree that position *is* substance, a view held by Anthony Quinton[7]. Position requires a subject in order to exist; it is always assigned to something else and cannot exist in or by itself.

Although the considerations that have been made up to now are incomplete and will be supplemented by others to follow, some remarks Anthony Quinton makes may be usefully noted, for they show that from the very beginning he leaves behind everything that belongs to the Aristotelian consideration of substance, and so in a way he is representative of many contemporary philosophers:

> Substance is the oldest topic of philosophic inquiry and it is also one of the most entangled. The Ionian philosophers are generally recognized to have inaugurated western philosophy by asking the question: what is the ultimate stuff or raw material of the world? Substance is the central theme of the first and most influential of philosophical text-books, Aristotle's *Metaphysics*. From that time to this every major philosopher has occupied himself with the problem of which of the many kinds of things the world appears to contain really or fundamentally exists. In the course of this development a number of disparate issues have to be brought together under one head. I shall argue that there are four quite distinct, even if not wholly independent, problems of substance whose solution has been obstructed by persistent failure to recognize the distinctions between them. This confusion has been assisted by the fact that three of the problems of substance, at any rate, are of much the same general form. In each case the idea of substance is invoked to explain how things in general or some large and important class of things, admitted to be complexes of elements of some kind, are unified as wholes. Positive theories of substance explain the unification of these complexes by their connection with a special

5. Ludwig VON BERTALANFFY, *Problems of Life* (New York: John Wiley and Sons, Inc., 1952), p. 13.
6. LEIBNIZ, like many others, has gone about philosophizing in an *a priori* fashion, failing to keep in mind that one's definitions have to account for what he observes.
7. Anthony QUINTON, *The nature of Things* (London and Boston: Routledge & Kegan Paul, 1973).

> additional unifying element. The negative theories that reject substance hold that there is no more to the complexes in question than the collection of elements of which they are composed[8].

Quinton first notes that the Ionians posed the problem of substance by asking about the "ultimate stuff or raw material of the world", and from there he moves on to another question about "which of the many kinds of things the world appears to contain really or fundamentally exists". Yet nowhere does he define either *stuff* or *fundamental existence*, leaving his essay bereft of a genuine principle of manifestation. (This sort of omisssion is rather common.) Then after his introduction he goes on to state that there are four separate problems of substance: individuation, identity, objectivity, and the foundations of knowledge, all of which he introduces without relating them either to the Ionian stuff that he says first introduces the problem of substance into philosophy or to things that fundamentally exist. One is left to wonder how the Ionians' and Quinton's views can go together.

We may note, however, that Quinton categorizes theories of substance as either positive or negative, a division that is useful. Positive theories "explain the unification of complexes by their connection with a special unifying element", a phrase in which one might possibly find something that is distantly similar to the Aristotelian carrier or substratum. On the other hand, the negative theories hold that "there is no more to the complexes in question than the collection of elements of which they are composed", (the bundle theories) a statement directly opposed to the Aristotelian notion and one that leads us to David Hume. He is the first to have substituted the notion of a collection of qualities for a substance modified by properties residing in it. On that account examining without delay what Hume said seems advisable.

B) *Hume's attack on substance*

Hume denounced in his *Treatise* the whole notion of substance, and he did so without blush or apology:

> ... We have, therefore, no idea of substance, distinct from that of a collection of particular qualities, nor have we any other meaning when we either talk or reason concerning it.
>
> The idea of a substance as well as that of a mode, is nothing but a collection of simple ideas, that are united by the imagination, and have a particular name assigned them, by which we are able to recall, either to ourselves or others, that collection. But the difference betwixt these ideas consists in this, that the particular qualities, which form a substance, are commonly referr'd to an unknown *something*, in which they are supposed to inhere; or granting this fiction should not take place, are at least supposed to be closely and inseparately connected by the relations of contiguity and causation[9].

8. *Ibid.*, p. 3.
9. David HUME, *A Treatise of Human Nature*, ed. Selby-Bigge (Oxford: The Clarendon Press, 1975), p. 16. Hume makes these points in other places of the *Treatise* too, but this is a clear statement of his position and it suffices.

Having heard what he thinks about substance, we ought to hear what he thinks about modifiers or accidents:

> The notion of *accidents* is an unavoidable consequence of this method of thinking with regard to substances or substantial forms; nor can we forbear looking upon colours, sounds, tastes, figures, and other properties of bodies, as existences, which cannot subsist apart, but require a subject of inhesion to sustain and support them. For having never discover'd any of these sensible qualities, where, for the reasons above mention'd, we did not likewise fancy a substance to exist; the same habit, which makes us infer a connection betwixt cause and effect, makes us here infer a dependence of every quality on the unknown substance. The custom of imagining a dependence has the same effect as the custom of observing it would have. This conceit however, is no more reasonable than any of the foregoing. Every quality being a distinct thing from another, may be conceiv'd to exist apart, and may exist apart not only from every other quality, but from that unintelligible chimera of a substance [10].

The first of these quotations tells us we have no idea of substance, and so we are foolish to think it exists. Of course experience does show us certain qualities, yet substance, because it is thought to underlie the qualities, must remain beyond the reach of experience, which means that no one committed to an empirical philosophical position can have any truck with it. The second quotation then asserts that because modifiers (accidents) are distinct they can exist apart from a substratum; so plainly he opposes everything the foregoing pages contain.

As one might expect, Hume's doctrine of personal identity reflects his denial of substance. He notes that some philosophers (not to mention the plain man) think (imagine, he says) they have an idea of *self*, and to this he sets himself in opposition on the ground that

> ... It must be some one impression that gives rise to every real idea. But self or person is not any one impression, but that to which our several impressions and ideas are supposed to have a reference. If any impression gives rise to the idea of self, that impression must continue invariably the same, thro' the whole course of our lives; since self is suppos'd to exist after that manner. But there is no impression constant and invariable...
>
> But farther, what must become of all our particular perceptions upon this hypothesis? All these are different, and distinguishable, and separable from each other, and may be separately consider'd, and may exist separately, and have no need of anything to support their existence [11].

Hume attacks the self as an individual substance, finding it as unacceptable as the general notion of substance. Thus it is clear that Hume provides the prototype of the « negative theories of substance », as Quinton calls them. Without fear of contradiction one may say that contemporary anti-substance philosophies all depend upon Hume's denials.

One contemporary proponent of a negative theory clearly shares Hume's view:

10. *Ibid.*, p. 222.
11. *Ibid.*, p. 251.

> ... If the substantive ego is not revealed in self-consciousness, it is not revealed anywhere. The existence of such an entity is completely unverifiable. And accordingly, we must conclude that the assumption of its existence is no less metaphysical than Locke's discredited assumption of the existence of a material substratum. For it is clearly no more significant to assert that an "unobservable somewhat" underlies the sensations which are the sole empirical manifestations of a material thing. The considerations which make it necessary, as Berkeley saw, to give a phenomenalist account of material things, make it necessary also, as Berkeley did not see, to give a phenomenalist account of the self[12].

Ayer, too, regards the existence of a substantive ego as unverifiable, first because it is not revealed in self-consciousness; second because there is no point in assuming an « unobservable somewhat » to underly sensations. But one might ask on what grounds the claim is made that if substance is to be revealed it must be revealed in self-consciousness (whatever Ayer might mean by that), for none are stated. Nonetheless his objections (which come from Hume) do raise a point, for if substance or substances are not revealed either in sensory experience or in the consciousness of self, then we must ask, how are they known? In addition to the common, generic definition defended earlier and applicable to any substance whatsoever, if anything further is to be known about substance, if there are species under the general category, then how are they to be known, especially if substance is unobservable? But this problem can be postponed, for it is not the immediate issue. The matter at hand is to reinforce the general definition in the face of Hume's attack; consequently if someone thinks the distinctions and definitions presented earlier that were founded on experience are insufficiently supported, then perhaps he will be convinced by an argument which shows that *some substance* must exist (however we know it) and which starts from the position Hume himself takes.

Let it be supposed that Hume is right: no substratum underlies the qualities we observe. And let it also be supposed that the qualities are real and do exist outside the knower, for we cannot forget our realist presupposition. From these premisses it then follows that the qualities cannot be modifiers, they cannot be accidents according to the Aristotelian notion; for modifiers exist in another as in a subject. If, however, the qualities do exist, and if they do not exist in a substratum, as Hume claims, then they must exist independently of a subject; for there is no third alternative. Hume actually takes the position that the qualities exist but not in another as in a subject. To do that, however, is to endorse the definition of *substance*, from which one may conclude that Hume's qualities must now be regarded as *substances in the Aristotelian sense*. What it all comes to is that Hume has denied the reality of Aristotle's accidents by turning them into substances, and he explicitly concedes what has just been claimed when he says: "Every quality being

12. A. J. Ayer, *Language, Truth and Logic* (New York: Dover Publications, Inc.) p. 126. Roderick Chisholm recognizes that the notion of self must make use of substance, and he denies Hume on this point. (See « On the Observability of the Self », *Philosophy and Phenomenological Research*, Vol. XXX (1969), pp. 7-21.) He does not, however, destroy the Scot's position, as I shall attempt to do in the pages that follow.

a distinct thing from another, may be conceived to exist apart, and may exist apart not only from every other quality, but from that unintelligible chimera of a substance." What could be clearer? Qualities may be conceived to exist apart. And so Hume would appear not to realize what he has done. By failing to pay careful attention to the definition of substance, he has suported it in a backhanded way.

We may also say that from Hume's position certain consequences follow which show still more emphatically that he cannot succeed with his denial of accidents. For if "substances" are collections of qualities (as they must be in all negative theories), and if qualities have become substances, then things and stuffs are collections of qualities-become-substances. An elephant, therefore, would be an aggregate made up of a shape that is a substance, a color that is a substance, a motion that is a substance, a density that is a substance, a viscosity that is a substance, a size that is a substance, etc., all gathered together like marbles in a heap. But one can easily see that such a notion is false, for whatever an elephant may be, it is surely not an aggregate of that type.

As a second illustration let us suppose that the shape and the motion of a billiard ball are qualities-become-substances. From this supposition it then follows that the motion of the ball must be distinct and separate from the shape and that the motion must be united to the shape exteriorly; that is, the motion must be united to the shape in the way in which an arm is joined to its body and one freight car to another; for the only other alternative, which is absurd, is to conceive substances as interpenetrating one another. (Assuming the latter, no two qualities which are interpenetrating substances could be distinguished from one another; they would be identical, or at least whatever differences they had would not be distinguishable.) On the other hand, if the motion is exterior to the shape, then what happens when the "ball" moves? Does the motion pull the shape along like an appendage? If so, then the shape moves too, and there is not one motion but two, which means that the number of motions in the "ball" will be equal to the number of qualities-become-substances in the collection. Moreover, every motion but the first will reside in other traits and will be accidents or modifiers of the traits. But if the motion does not pull the shape along, then shape and motion must become constantly more separated, and the "ball" could hardly be said to move. Now the absurdity of both of these alternatives is obvious, yet both follow necessarily from the supposition that the apprehended qualities do not inhere in a subject and are independent entities. In contrast, given both shape and motion as modifiers of a substratum, no difficulty arises; for only one motion exists and it belongs to the ball which is its carrier. The other qualities "ride along" with the motion because they reside in Margenau's carrier-substratum, the proper subject or receiver of the motion. The upshot of all this is that the reality of substance cannot be denied under any circumstances. Hume succeeds only in destroying accidents by making them into substances, and this final state of affairs is worse for him than the first.

This finishes what needs to be said about the fundamental notion and Hume's attack on it. As I remarked in the beginning, the reader is now able to see how to deal with other anti-substance philosophies, particularly those of the process type,

which like Hume deny the necessity of a substratum. Motion or process or "creativity" or something similar is considered to be fundamental and to stand in no need of a substratum. Process then becomes substance, with all the consequences that entails.