



## Functions

Larry Wright

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## FUNCTIONS

**T**HE NOTION of function is not all there is to teleology, although it is sometimes treated as though it were. Function is not even the central, or paradigm, teleological concept. But it *is* interesting *and* important; and it is still not as well understood as it should be, considering the amount of serious scholarship devoted to it during the last decade or two. Let us hope this justifies my excursion into these murky waters.

Like nearly every word in English, “function” is multilaterally ambiguous. Consider:

1.  $y = f(x)$ /The pressure of a gas is a function of its temperature.
2. The Apollonaut’s banquet was a major state function.
3. I simply can’t function when I’ve got a cold.
4. The heart functions in this way . . . (something about serial muscular contractions).
5. The function of the heart is pumping blood.
6. The function of the sweep-second hand on a watch is to make seconds easier to read.
7. Letting in light is one function of the windows of a house.
8. The wood box next to the fireplace currently functions as a dog’s sleeping quarters.

It is interesting to notice that the word “function” has a spectrum of meanings even within the last six illustrations, which are the only ones at all relevant to a teleologically oriented study. Numbers 3, 4, and 8 are substantially different from one another, but they are each, from a teleological point of view, peripheral cases by comparison with 5, 6, and 7, which are the usual paradigms. And even these latter three are individually distinct in some respects, but much less profoundly than the others.

Quite obviously, making some systematic sense of the logical differentiation implicit in categorizing these cases as peripheral

and paradigmatic is a major task of this paper. But a clue that we are on the right track here can be found in a symptomatic grammatical distinction present in the last six illustrations: in the peripheral cases the word "function" is itself the verb, whereas in the more central cases "function" is a noun, used with the verb "to be." And since the controversy revolves around what *the function* of something *is*, the grammatical role of "function" in 5, 6, and 7 makes them heavy favorites for the logical place of honor in this discussion.

### SOME RUDIMENTARY DISTINCTIONS

1. *Functions v. goals.* There seems to be a strong temptation to treat functions as representative of the set of central teleological concepts which cluster around goal-directedness. However, even a cursory examination of the usual sorts of examples reveals a very important distinction. Goal-directedness is a behavioral predicate. The *direction* is the direction of behavior. When we do speak of objects (homing torpedoes) or individuals (General MacArthur) as being goal-directed, we are speaking indirectly of their behavior. We would argue against the claim that they are goal-directed by appeal to their behavior (for example, the torpedo, or the General, did not *change course* at the appropriate time, and so forth). On the other hand, many things have *functions* (for example, chairs and windpipes) which do not behave *at all*, much less goal-directedly. And behavior can have a function without being goal-directed—for example, pacing the floor or blinking your eye. But even when goal-directed behavior has a function, very often its function is quite different from the achievement of its *goal*. For example, some fresh-water plankton diurnally vary their distance below the surface. The *goal* of this behavior is to keep light intensity in their environment relatively constant. This can be determined by experimenting with artificial light sources. The *function* of this behavior, on the other hand, is keeping constant the oxygen supply, which normally varies with sunlight intensity. There are many instances to be found in the study of organisms in which the function of

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a certain goal-directed activity is not some further goal of that activity, as it usually is in human behavior, but rather some natural concomitant or consequence of the immediate goal. Other examples are food-gathering, nest-making, and copulation. Clearly function and goal-directedness are not congruent concepts. There is an important sense in which they are wholly distinct. In any case, the relationship between functions and goals is a complicated and tenuous one; and becoming clearer about the nature of that relationship is one aim of this essay.

2. *A function v. the function.* Recent analyses of function, including all those treated here, have tended to focus on a function of something, by contrast with *the* function of something. This tendency is understandable; for any analysis of this sort aims at generality, and "a function" would seem intrinsically more general than "the function" because it avoids one obvious restriction. This generality, however, is superficial: the notion of *a* function is derivable from the notion of *the* function (more than one thing meets the criteria) just as easily as the reverse (only one thing meets the criteria). Furthermore, the notion of *a* function is much more easily confused with certain peripheral, quasi-functional ascriptions which are examined below. In short, the discussion of this paper is concerned with *a* function of *X* only in so far as it is the sort of thing which would be *the* function of *X* if *X* had no others. Accordingly, I take the definite-article formulation as paradigmatic and will deal primarily with it, adding comments in terms of the indefinite-article formulation parenthetically, where appropriate.

3. *Function v. accident.* Very likely the central distinction of this analysis is that between the *function* of something and other things it does which are *not* its function (or one of its functions). The function of a telephone is effecting rapid, convenient communication. But there are many other things telephones do: take up space on my desk, disturb me at night, absorb and reflect light, and so forth. The function of the heart is pumping blood, not producing a thumping noise or making wiggly lines on electrocardiograms, which are also things it does. This is sometimes put as the distinction between a function, and something done merely "by accident." Explaining the propriety of

this way of speaking—that is, making sense of the function/accident distinction—is another aim, perhaps the *primary* aim of the following analysis.

4. *Conscious v. natural functions.* The notion of accident will raise some interesting and important questions across another rudimentary distinction: the distinction between natural functions and consciously designed ones. Natural functions are the common organismic ones such as the function of the heart, mentioned above. Other examples are the function of the kidneys to remove metabolic wastes from the bloodstream, and the function of the lens of the human eye to focus an image on the retina. Consciously designed functions commonly (though not necessarily) involve artifacts, such as the telephone and the watch's sweep hand mentioned previously. Other examples of this type would be the function of a door knob, a headlight dimmer switch, the circumferential grooves in a pneumatic tire tread, or a police force. Richard Sorabji has argued<sup>1</sup> that "designed" is too strong as a description of this category, and that less elaborate conscious effort would be adequate to give something a function of this sort. I think he is right. I have used the stronger version only to overdraw the distinction hyperbolically. In deference to his point I will drop the term "designed" and talk of the distinction as between natural and conscious functions.

Of the two, natural functions are philosophically the more problematic. Several schools of thought, for different reasons, want to deny that there are natural functions, as opposed to conscious ones. Or, what comes to the same thing, they want to deny that natural functions are functions in anything like the same sense that conscious functions are. Some theologians want to say that the organs of organisms get their functions through God's conscious design, and hence these things *have* functions, but not natural functions *as opposed to* conscious ones. Some scientists, like B. F. Skinner, would *deny* that organs and organismic activity have functions *because* there is no conscious effort or design involved.

Now it seems to me that the notion of an organ having a func-

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<sup>1</sup> Richard Sorabji, "Function," *Philosophical Quarterly*, 14 (1964), 290.

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tion—both in everyday conversation and in biology—has no strong theological commitments. Specifically, it seems to me consistent, appropriate, and even common for an atheist to say that the function of the kidney is elimination of metabolic wastes. Furthermore, it seems clear that conscious and natural functions are functions in the same sense, despite their obvious differences. Functional ascriptions of either sort have a profoundly similar ring. Compare “the function of that cover is to keep the distributor dry” with “the function of the epiglottis is to keep food out of the windpipe.” It is even more difficult to detect a difference in what is being requested: “What is the function of the human windpipe?” versus “What is the function of a car’s exhaust pipe?” Certainly no analysis should begin by supposing that the two sorts are wildly different, or that only one is really legitimate. That is a possible *conclusion* of an analysis, not a reasonable presupposition. Accordingly, the final major aim of this analysis will be to make sense of natural functions, both as functions in the same sense as consciously contrived ones, and as functions independent of any theological presuppositions—that is, independent of conscious purpose. It follows that this analysis is committed to finding a way of stating what it is to be a function—even in the conscious cases—that does not rely on an appeal to consciousness. If no formulation of this kind can be found despite an honest search, only then should we begin to take seriously the view that we actually mean something quite different by “function” in these two contexts.

### SOME ANALYSES OF FUNCTION

The analysis of function for which I wish to argue grew out of a detailed critical examination of several recent attempts in the literature to produce such an analysis, and it is best understood in that context. For this reason, and because it will help clarify the aims I have sketched above, I will begin by presenting the kernel of that critical examination.

The first analysis I want to consider is an early one by Morton

Beckner.<sup>2</sup> Here Beckner contends that to say something  $s$  has function  $F'$  in system  $s'$  is to say that

There is a set of circumstances in which:  $F'$  occurs when  $s'$  has  $s$ , AND  $F'$  does not occur when  $s'$  does not have  $s$  [p. 113].<sup>3</sup>

For example, "the human heart has the function of circulating blood" means that there is a set of circumstances in which circulation occurs in humans when they have a heart, and does not when they do not. Translated into the familiar jargon,  $s$  has function  $F'$  in  $s'$  if and only if there is a set of circumstances containing  $s$  which are sufficient for the occurrence of  $F'$  and which also require  $s$  in order to be sufficient for  $F'$ . Now it is not clear whether the "requirement" here is necessity or merely non-redundancy. If it is necessity, then under the most natural interpretation of "circumstances" (environment), it is simply mistaken. There are *no* circumstances in which, for example, the heart is absolutely irreplaceable: we could always pump blood in some other way. On the other hand, if the requirement here is only non-redundancy, the mistake is more subtle.

In this case Beckner's formula would hold for cases in which  $s$  merely *does*  $F'$ , but in which  $F'$  is not the function of  $s$ . For example, the heart is a non-redundant member of a set of conditions or circumstances which are sufficient for a throbbing noise. But making a throbbing noise is not a function of the heart, it is just something it does—accidentally. In fact, there are even dysfunctional cases which fit the formula: in some circumstances, livers are non-redundant for cirrhosis, but cirrhotic debilitation could not conceivably be the (or a) function of the liver. So this analysis fails on the functional/accidental distinction: it includes too much.

After first considering a view essentially similar to this one, John Canfield has offered a more elaborate analysis.<sup>4</sup> According to Canfield:

<sup>2</sup> Morton Beckner, *The Biological Way of Thought* (New York, 1959), ch. 6.

<sup>3</sup> Beckner gives an alternative formulation in which we can speak of *activities* as having functions, instead of *things*. I have abbreviated it here for convenience and clarity. The logical points are the same.

<sup>4</sup> John Canfield, "Teleological Explanations in Biology," *The British Journal for the Philosophy of Science*, vol. 14 (1964).

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A function of *I* (in *S*) is to do *C* means *I* does *C* and that *C* is done is useful to *S*. For example, "(In vertebrates) a function of the liver is to secrete bile" means "the liver secretes bile, and that bile is secreted in vertebrates is useful to them" [p. 290].

Canfield recognizes that natural functions are the problematic ones, but he devotes his attention solely to those cases. He treats only the organs and parts of organisms studied by biology, to the exclusion of the consciously designed functions of artifacts. As a result of this emphasis, his analysis is, without modification, almost impossible to apply to conscious functions. But even with appropriate modifications, it turns out to be inadequate to the characterization of either conscious or natural function.

In the conscious cases, there is an enormous problem in identifying the system *S*, in which *I* is functioning, and to which it must be useful. The function of the sweep-second hand of a watch is to make seconds easier to read. It would be most natural to say that the system in which the sweep hand is functioning—by analogy with the organismic cases—is the watch itself; but it is hard to make sense of the easier reading being useful to the mechanism. On the other hand, the best candidate for the system to which the easier reading is useful is the person wearing the watch; but this does not seem to make sense as the system in which the sweep hand is functioning.

The crucial difficulty of Canfield's analysis begins to appear at this point: no matter what modifications we make in his formula to avoid the problem of identifying the system *S*, we must retain the requirement that *C* be useful. This is really the major contribution of his analysis, and to abandon it is to abandon the analysis. The difficulty with this is that, for example, in the watch case, it is clearly not necessary that easily read seconds be useful to the watch-wearer—or anyone else—in order that making seconds easier to read be the function of the sweep hand of that wearer's watch. My watch has a sweep-second hand, and I occasionally use it to time things to the degree of accuracy it allows: it is useful to me. Now suppose I were to lose interest in reading time to that degree of accuracy. Suppose my life changed radically so that nothing I ever did could require that sort of chronological precision. Would that mean the sweep

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hand on my particular watch no longer has the function of making seconds easier to read? Clearly not. If someone were to ask what the sweep hand's function was ("What's it do?," "What's it there for?") I would still have to say it made seconds easier to read, although I might yawningly append an autobiographical note about my utter lack of interest in that feature. Similarly, the function of that button on my dashboard is to activate the windshield washer, even if all it does is make the mess on the windshield worse, and hence is not useful at all. That would be its *function* even if I never took my car out of the garage—or broke the windshield.

It is natural at this point to attempt to patch up the analysis by reducing the requirement that *C* be useful, to the requirement that *C usually* be useful. But this will not do either, because it is easy to think of cases in which we would talk of something's having a function even though doing that thing was quite *generally* of no use to anybody. For example, a machine whose function was to count Pepsi Cola bottle caps at the city dump; or M.I.T.'s ultimate machine of a few years back, whose only function was to turn itself off. The source of the difficulty in all of these cases is that what the thing in question (watch, washer button, counting machine) was *designed* to do has been left out of the calculation. And, of course, in these cases, if something is designed to do *X*, then doing *X* is its function even if doing *X* is generally useless, silly, or even harmful. In fact, intention is so central here that it allows us to say the function of *I* is to do *C*, even when *I* cannot even *do C*. If the windshield washer switch comes from the factory defective, and is never repaired, we would still say that its *function* is to activate the washer system; which is to say: that is what it was *designed* to do.

It might appear that this commits us to the view that natural and consciously contrived functions cannot possibly be the same sort of function. If conscious intent is what *determines* the function an artifact has got, there is no parallel in natural functions. I take this to be mistaken, and will show why later. For now it is only important to show, from this unique vantage, the nature of the most formidable obstacle to be overcome in unifying natural and conscious functions.

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The argument thus far has shown that meeting Canfield's criteria is not necessary for something to be a function. It can easily be shown that meeting them is also not sufficient. We are always hearing stories about the belt buckles of the Old West or on foreign battlefields which save their wearers' lives by deflecting bullets. From several points of view that is a very useful thing for them to do. But that does not make bullet deflection the function—or even *a* function—of belt buckles. The list of such cases is endless. Artifacts do all kinds of useful things which are not their functions. Blowouts cause you to miss flights that crash. Noisy wheel bearings cause you to have the front end checked over when you are normally too lazy. The sweep hand of a watch might brush the dust off the numbers, and so forth.

All this results from the inability of Canfield's analysis to handle what we took to be one of the fundamental distinctions of function talk: accidental versus nonaccidental. Something can do something useful purely by accident, but it cannot have, as its function, something it does only by accident. Something that *I* does by accident cannot be the function of *I*. The cases above allow us to begin to make some fairly clear sense of this notion of accident, at least for artifacts. Buckles stop bullets only by accident. Blowouts only accidentally keep us off doomed airplanes. Sweep hands only accidentally brush dust, if they do it at all. And this brings us back to the grammatical distinction I made at the outset when I divided the list of illustrations into "central" and "peripheral" ones. When something does something useful by accident rather than design, as in these examples, we signal the difference by a standard sort of "let's pretend" talk. Instead of using the verb "to be" or the verb "to have," and saying the thing in question *has* such and such a function, or saying that *is* its function, we use the expression "functioning as." We might say the belt buckle *functioned as* a bullet shield, or the blow-out *functioned as* divine intervention, or the sweep hand *functions as* a dust brush. Canfield's analysis does not embrace this distinction at all.

So far I have shown only that Canfield's formula fails to handle conscious functions. This means it is incapable of showing natural

functions to be functions in the same full-blooded sense as conscious ones, which is indeed serious; but that, it might be argued, really misses the point of his analysis. Canfield is not interested in conscious functions. He would be happy just to handle natural functions. For the reasons set down above, however, I am looking for an analysis which will *unify* conscious and natural functions, and it is important to see why Canfield's analysis cannot produce that unification. Furthermore, Canfield's analysis has difficulties in handling natural functions that closely parallel the difficulties it has with conscious functions; which is just what we should expect if the two are functions in the same sense.

For example, it is absurd to say with Pangloss that the function of the human nose is to support eyeglasses. It is absurd to suggest that the support of eyeglasses is even one of its functions. The function of the nose has something to do with keeping the air we breathe (and smell) warm and dry. But supporting a pince-nez, just as displaying rings and warpaint, is something the human nose does, and is useful to the system having the nose: so it fits Canfield's formula. Even the heart throb, our paradigm of non-function, fits the formula: the sound made by the heart is an enormously useful diagnostic aid, not only as to the condition of the heart, but also for certain respiratory and neurological conditions. More bizarre instances are conceivable. If surgeons began attaching cardiac pacemakers to the sixth rib of heart patients, or implanting microphones in the wrist of C.I.A. agents, we could then say that these were useful things for the sixth rib and the wrist (respectively) to do. But that would not make pacemaker-hanging a function of the sixth rib, or microphone concealment a function of the human wrist.

There seems to be the same distinction here that we saw in conscious functions. It makes perfectly good sense to say the nose *functions as* an eyeglass support; the heart, through its thump, *functions as* a diagnostic aid; the sixth rib *functions as* a pacemaker hook in the circumstances described above. This, it seems to me, is precisely the distinction we make when we say, for example, that the sweep-second hand *functions as* a dust brush, while denying that brushing dust is one of the sweep hand's functions.

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And it is here that we can make sense of the notion of accident in the case of natural functions: it is merely fortuitous that the nose supports eyeglasses; it is happy chance that the heart throb is diagnostically significant; it would be the merest serendipity if the sixth rib were to be a particularly good pacemaker hook. It is (would be) only *accidental* that (if) these things turned out to be useful in these ways. Accordingly, we have already drawn a much stronger parallel between natural functions and conscious functions than Canfield's analysis will allow.

Thus far I have ignored Canfield's analysis of usefulness:

[In plants and animals other than man, that *C* is done is useful to *S* means] if, *ceteris paribus*, *C* were not done in *S*, then the probability of that *S* surviving or having descendants would be smaller than the probability of an *S* in which *C* is done surviving or having descendants [p. 292].

I have ignored it because its explicit and implicit restrictions make it even more difficult to work this analysis into the unifying one I am trying to produce. Even within its restrictions (natural functions in plants and animals other than man), however, the extended analysis fails for reasons very like the ones we have already examined. Hanging a pacemaker on the sixth rib of a cardiovascularly inept lynx would be useful to that cat in precisely Canfield's sense of "useful": it would make it more likely that the cat would survive and/or have descendants. Obviously the same can be said for the diagnostic value of an animal's heart sounds. So usefulness—even in this very restricted sense—does not make the right function/accident distinction: some things do useful things which are not their functions, or even one of their functions.

The third analysis I wish to examine is a more recent one by Morton Beckner.<sup>5</sup> This analysis is particularly interesting for two reasons. First, Beckner is openly (p. 160) trying to accommodate both natural and conscious functions under one description. Second, he wants to avoid saying things like (to use his

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<sup>5</sup> Morton Beckner, "Function and Teleology," *Journal of the History of Biology*, vol. 2 (1969).

examples) “A function of the heart is to make heart sounds” and “A function of the Earth is to intercept passing meteorites.” So his aims are very like the ones I have argued for: to produce a unifying analysis, and one which distinguishes between functions and things done by accident. And since the heart sound is useful, and intercepting meteorites could be (perhaps already is), Beckner would probably agree in principle with the above criticism of Canfield.

Beckner’s formulation is quite elaborate, so I will present it in eight distinct parts, clarify the individual parts, and then offer an illustration before going on to raise difficulties with them collectively as an analysis of the concept of function. That formulation is:

*P* has function *F* in *S* if and only if<sup>6</sup>:

1. *P* is a part of *S* (in the normal sense of “part”).
2. *P* contributes to *F*. (*P*’s being part of *S* makes the occurrence of *F* more likely.)
3. *F* is an activity in or of the system *S*.
4. *S* is structured in such a way that a significant number of its parts contribute to the activities of other parts, and of the system itself.
5. The parts of *S* and their mutual contributions are identified by the same conceptual scheme which is employed in the statement that *P* has function *F* in system *S*.
6. A significant number of critical parts (of *S*) and their activities definitionally contribute to one or more activities of the whole system *S*.
7. *F* is or contributes to an activity *A* of the whole system *S*.<sup>7</sup>
8. *A* is one of those activities of *S* to which a significant number of critical parts and their activities definitionally contribute.

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<sup>6</sup> As before, Beckner gives an alternative formulation so that we can speak either of a thing or of an activity having a function. My treatment will be limited to things, but again the logical points are the same.

<sup>7</sup> Beckner seems to suggest (p. 160, top) that *F* must be an activity of the whole system *S*, which, of course, would conflict with part of 3. But his illustration, reproduced below, suggests the phrasing I have used here.

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Two points of clarification must be made at once. First, the notion of “the same conceptual scheme” in number 5 is obscure in some respects, and the considerable attention devoted to it by Beckner does not help very much. In general all one can say is that  $P$ ,  $F$ , and the other parts and activities of  $S$  must be *systematically* related to one another. But in practice the point is easier to make. For example, if we wish to speak of removing metabolic wastes as the function of the human kidney, the relevant conceptual scheme contains other human organs, life, and perhaps ecology in general, but not atoms, molecular bonds, and force fields. The second point concerns the “definitional contribution” in number 6. A part (or activity) makes a definitional contribution to an activity if that contribution is part of what we mean by the word which refers to that part (or activity). For example, part of what we mean by “heart” in a biological or medical context is “something which pumps blood”: we would allow considerable variation in structure or appearance and still call something a heart if it served that function. Beckner illustrates how all these steps work together, once again using the heart.

It is true that a function of the heart is to pump blood. The heart does pump blood; the body is a complex system of parts that by definition aid in certain activities of the whole body, such as locomotion, self-maintenance, copulation; the concepts “heart” and “blood” are recognizably components of the scheme we employ in describing this complex system; and blood-pumping does contribute to activities of the whole organism to which many of its organs, tissues and other parts definitionally contribute [p. 160].

There are several difficulties with this analysis. They appear below, roughly in order of increasing severity.

First, Beckner’s problems with the system  $S$  are in some ways worse than Canfield’s; for Beckner explicitly wants to include artifacts, and in addition he says much more definite things about the relationship among  $P$ ,  $F$ , and  $S$ . So in this case, when we say the function of a watch’s sweep hand is making seconds easier to read, we must not only find a system *of* which the sweep hand is a part, and *in* or *of* which “making seconds easier

to read" is an activity, but this activity must be or contribute to one to which a number of the system's critical parts definitionally contribute. In the case of the natural functions of the organs and other parts of organisms, the system  $S$  is typically a natural unit, easy to subdivide from the environment: the organism itself. But for the conscious functions of artifacts, such systems, if they can be found at all, must be hacked out of the environment rather arbitrarily. With no more of a guide than Beckner has given us, there is nothing like a guarantee that we can always find such a system. Accordingly, when our minds boggle—as I take it they do in trying to conceive of "making seconds easier to read" being an activity at all, much less one meeting all of the other conditions of this analysis—we have to say that the analysis is at best too obscure to be applicable to such cases, and is perhaps just mistaken.

A second difficulty stems directly from the first. It is not at all clear that functions—even natural functions—have to be activities at all, let alone activities of the sort required by Beckner. Making seconds easier to read is an example, but there are many others: preventing skids in wet weather, keeping your pants up, or propping open my office door. All of these things are legitimate functions (of tire treads, belts, and doorstops, respectively); none are activities in any recognizable sense.

Thirdly, we noticed in our discussion of Canfield that something could do a useful thing by accident, in the appropriate sense of "accident." Similarly, a part of a system meeting all of Beckner's criteria might easily make a contribution to an activity of that system also quite by accident. For example, an internal-combustion engine is a system satisfying Beckner's criteria for  $S$ . If a small nut were to work itself loose and fall under the valve-adjustment screw in such a way as to adjust properly a poorly adjusted valve, it would make an accidental contribution to the smooth running of that engine. We would never call the maintenance of proper valve adjustment the *function* of the nut. If it got the adjustment right it was just an accident. But on Beckner's formulation, we would have to call that its function. The nut does keep the valve adjusted; the engine is a complex system of parts that by definition aid in certain activities of the whole body,

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such as generation of torque and self-maintenance (lubrication, heat dissipation); the concepts "nut," "valve," and "valve adjustment" are components of the scheme we employ in describing this complex system; and proper valve adjustment does contribute to the smooth running of the (whole) engine, which is an activity to which many of the other parts of the engine definitionally contribute (flywheel, connecting rod, exhaust ports).

The final difficulty is also related to one we raised for Canfield's analysis. There we noticed that if an artifact was explicitly designed to do something, *that* usually *determines* its function, irrespective of how well or badly it does the thing it was supposed to do. An analogous point can be made here. If  $X$  was designed to do  $Y$ , then  $Y$  is  $X$ 's function regardless of what contributions  $X$  does in fact make or fail to make. For example, the *function* of the federal automotive safety regulations is to make driving and riding in a car safer. And this is so even if they actually have just the opposite effect, through some psychodynamic or automotive quirk.

So in spite of their enormous differences, this analysis and Canfield's fail for very similar reasons: problems with the notion of system  $S$ , failure to rule out some accidental cases, and general inability to account for the obvious role of design.

There have been several other interesting attempts in the recent literature to provide an analysis of function. Most notable are those by Carl Hempel,<sup>8</sup> Hugh Lehman,<sup>9</sup> Richard Sorabji,<sup>10</sup> Francisco Ayala,<sup>11</sup> and Michael Ruse.<sup>12</sup> The last two of these do a somewhat better job on the function/accident distinction than the ones we have examined. But other than that, a discussion of these analyses would be largely redundant on the

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<sup>8</sup> Carl Hempel, "The Logic of Functional Analyses," in L. Gross (ed.) *Symposium on Sociological Theory* (New York, 1959).

<sup>9</sup> Hugh Lehman, "Functional Explanations in Biology," *Philosophy of Science*, vol. 32 (1965).

<sup>10</sup> Sorabji, *op. cit.*

<sup>11</sup> Francisco J. Ayala, "Teleological Explanation in Evolutionary Biology," *Philosophy of Science*, vol. 37 (1970).

<sup>12</sup> Michael E. Ruse, "Function Statements in Biology," *Philosophy of Science*, vol. 38 (1971).

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discussions of Beckner and Canfield. So I think we have gone far enough in clarifying the issues to begin constructing an alternative analysis.

AN ALTERNATIVE VIEW

The treatments we have so far considered have overlooked, ignored, or at any rate failed to make, one important observation: that functional ascriptions are—intrinsically, if you will—explanatory. Merely saying of something, *X*, that it has a certain function, is to offer an important kind of explanation of *X*. The failure to consider this, or at least take it seriously, is, I think, responsible for the systematic failure of these analyses to provide an accurate account of functions.

There are two related considerations which urge this observation upon us. First, the “in order to” in functional ascriptions is a teleological “in order to.” Its role in functional ascriptions (the heart beats in order to circulate blood) is quite parallel to the role of “in order to” in goal ascriptions (the rabbit is running in order to escape from the dog). Accordingly, we should expect functional ascriptions to be explanatory in something like the same way as goal ascriptions.<sup>13</sup> When we say that the rabbit is running in order to escape from the dog, we are explaining *why* the rabbit is running. If we say that John got up early in order to study, we are offering an explanation of his getting up early. Similarly in the functional cases. When we say that the distributor has that cover in order to keep the rain out, we are explaining *why* the distributor has that cover. And when we say the heart beats in order to pump blood, we are ordinarily taken to be offering an explanation of why the heart beats. This last sort of case represents the most troublesome problem in the logic of function, but it must be faced squarely, and, once faced, I think its solution is fairly straightforward.

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<sup>13</sup> This is not to abandon, or even modify, the previous distinction between functions and goals: the point can be made in this form only *given* the distinction. Nevertheless, support is provided for the analysis I am presenting here by the fact that the “in order to” of goal-directedness can be afforded a parallel treatment. For that parallel treatment see my paper “Explanation and Teleology,” in the June 1972 issue of *Philosophy of Science*.

## FUNCTIONS

The second consideration which recommends holding out for the explanatory status of functional ascriptions is the contextual equivalence of several sorts of requests. Consider:

1. What is the function of *X*?
2. Why do *C*'s have *X*'s?
3. Why do *X*'s do *Y*?

In the appropriate context, each of these is asking for the function of *X* "What is the function of the heart?," "Why do humans have a heart?," "Why does the heart beat?" All are answered by saying, "To pump blood," in the context we are considering. Questions of the second and third sort, being "Why?" questions, are undisguised requests for explanations. So in this context functional attributions are presumed to be explanatory. And why-form function requests are by no means bizarre or esoteric ways of asking for a function. Consider:

- Why do porcupines have sharp quills?
- Why do (some) watches have a sweep-second hand?
- Why do ducks have webbed feet?
- Why do headlight bulbs have two filaments?

These are rather ordinary ways of asking for a function. And if that is so, then it is ordinarily supposed that a function explains why each of these things is the case. The function of the quills is why porcupines *have* them, and so forth.

Moreover, the kind of explanatory role suggested by both of these considerations is not the anemic "What's it good for?" sort of thing often imputed to functional explanations. It is rather something more substantial than that. If to specify the function of quills is to explain why porcupines *have* them, then the function must be the reason they *have* them. That is, the ascription of a function must be explanatory in a rather strong sense. To choose the weaker interpretation, as Canfield does,<sup>14</sup> is once again to run afoul of the function-accident distinction. For, to use his example, if "Why do animals have livers?" is a request for a function, it cannot be rendered "What is the liver good for?"

<sup>14</sup> Canfield, *op. cit.*, p. 295.

Livers are good for many things which are not their functions, just like anything else. Noses are good for supporting eyeglasses, fountain pens are good for cleaning your fingernails, and livers are good for dinner with onions. No, the *function* of the liver is that *particular* thing it is good for which explains why animals have them.

Putting the matter in this way suggests that functional ascription-explanations are in some sense etiological, concern the causal background of the phenomenon under consideration. And this is indeed what I wish to argue: functional explanations, although plainly not causal in the usual, restricted sense, do concern how the thing with the function *got there*. Hence they *are* etiological, which is to say “causal” in an extended sense. But this is still a very contentious view. Functional and teleological explanations are usually *contrasted with* causal ones, and we should not abandon that contrast lightly: we should be driven to it.

What drives us to this position is the specific difficulty the best-looking alternative accounts have in making the function/accident distinction. We have seen that no matter how useful it is for  $X$  to do  $Z$ , or what contribution  $X$ 's doing  $Z$  makes within a complex system,<sup>15</sup> these sorts of consideration are never sufficient for saying that the function of  $X$  is  $Z$ . It could still turn out that  $X$  did  $Z$  only by accident. But all of the accident counterexamples can be avoided if we include as part of the analysis something about how  $X$  came to be there (wherever): namely, that it is there *because it does*  $Z$ —with an etiological “because.” The buckle, the heart, the nose, the engine nut, and so forth were not there *because* they stop bullets, throb, support glasses, adjust the valve, and all the other things which were falsely attributed as functions, respectively. Those pseudo functions could not be called upon to explain how those things *got* there. This seems to be what was missing in each of those cases.

In other words, saying that the function of  $X$  is  $Z$  is saying at least that

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<sup>15</sup> It is sometimes urged that this sort of thing is all a teleological explanation is asserting; this is all “why?” asks in these contexts.

## FUNCTIONS

(1)  $X$  is there *because* it does  $\mathcal{Z}$ .

or

Doing  $\mathcal{Z}$  is the *reason*  $X$  is there.

or

That  $X$  does  $\mathcal{Z}$  is *why*  $X$  is there.

where “because,” “reason,” and “why” have an etiological force. And it turns out that “ $X$  is there because it does  $\mathcal{Z}$ ,”<sup>16</sup> with the proper understanding of “because,” “does,” and “is there” provides us with not only a necessary condition for the standard cases of functions, but also the kernel of an adequate analysis. Let us look briefly at those key terms.

“Because” is of course to be understood in its explanatory rather than evidential sense. It is not the “because” in “It is hot because it is red.” More importantly, “because” is to be taken (as it ordinarily is anyway) to be indifferent to the philosophical reasons/causes distinction. The “because” in “He did not go to class because he wanted to study” and in “It exploded because it got too hot” are both etiological in the appropriate way.<sup>17</sup> And finally, it is worth pointing out here that in this sense “ $A$  because  $B$ ” does not require that  $B$  be either necessary or sufficient for  $A$ . Racing cars have airfoils because they generate a downforce (negative lift) which augments traction. But their generation of negative lift is neither necessary nor sufficient for racing cars to have wings: they could be there merely for aesthetic reasons, or they could be forbidden by the rules. Nevertheless, if you want to know why they are there, it is because they produce negative lift. All of this comes to saying that “because” here is to be taken in its ordinary, conversational, causal-explanatory sense.

Complications arise with respect to “does” primarily because on the above condition “ $\mathcal{Z}$  is the function of  $X$ ” is reasonably taken to entail “ $X$  does  $\mathcal{Z}$ .” Although in most cases there is no

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<sup>16</sup> I take the other forms to be essentially equivalent and subject, *mutatis mutandis*, to the same explication.

<sup>17</sup> Of course, it follows that the notion of a *reason* offered in one of the alternative formulations is the standard conversational one as well: the reason it exploded was that it got too hot.

question at all about what it is for  $X$  to do  $Z$ , the matter is highly context-dependent and so perhaps I should mention an extreme case, if only as notice that we should include it. In some contexts we will allow that  $X$  does  $Z$  even though  $Z$  never occurs. For example, the button on the dashboard activates the windshield washer system (that is what it does, I can tell by the circuit diagram) even though it never has and never will. An unused organic or organismic emergency reaction might have the same status. All that seems to be required is that  $X$  be *able* to do  $Z$  under the appropriate conditions; for example, when the button is pushed or in the presence of a threat to safety.

The vagueness of "is there" is probably what Beckner and Canfield were trying to avoid by introducing the system  $S$  into their formulations. It is much more difficult, however, to avoid the difficulties with the system  $S$  than to clarify adequately this more general place-marker. "Is there" is straightforward and unproblematic in most contexts, but some illustrations of importantly different ways in which it can be rendered might be helpful. It can mean something like "is where it is," as in "keeping food out of the windpipe is the reason the epiglottis is where it is." It can mean " $C$ 's have them," as in "animals have hearts because they pump blood." Or it can mean merely "exists (at all)," as in "keeping snow from drifting across roads (and so forth) is why there are snow fences."

Now, saying that (1), understood in this way, should be construed as a necessary condition for taking  $Z$  to be the function of  $X$ , is merely to put in precise terms the moral of our examination of the function/accident distinction. We saw above that the accident counterexamples could not meet this requirement. On the other hand, this condition *is* met in all of the center-of-the-page cases. This is quite easy to show in the conscious cases. When we say the function of  $X$  is  $Z$  in these cases, we are saying that at least some effort was made to get  $X$  (sweep hand, button on dashboard) where it is precisely because it does  $Z$  (whatever). Doing  $Z$  is the reason  $X$  is there. *That* is why the effort was made. The reason the sweep-second hand is there is that it makes seconds easier to read. It is there *because* it does that. Similarly, rifles have safeties because they prevent accidental discharge.

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It is only slightly less obvious how natural functions can satisfy (1): We can say that the natural function of something—say, an organ in an organism—is the reason the organ is there by invoking natural selection. If an organ has been naturally differentially selected-for by virtue of something it does, we can say that the reason the organ is there is that it does that something. Hence we can say animals have kidneys *because* they eliminate metabolic wastes from the bloodstream; porcupines have quills *because* they protect them from predatory enemies; plants have chlorophyll *because* chlorophyll enables plants to accomplish photosynthesis; the heart beats *because* its beating pumps blood. And each of these can be rather mechanically put in the “reason that” form. The reason porcupines have quills is that they protect them from predatory enemies, and so forth.

It is easy to show that this formula does not represent a sufficient condition for being a function, which is to say there is something more to be said about precisely what it is to be a function. The most easily generable set of cases to be excluded is of this kind: oxygen combines readily with hemoglobin, and that is the (etiologiical) reason it is found in human bloodstreams. But there is something colossally fatuous in maintaining that the function of that oxygen is to combine with hemoglobin, even though it is there because it does that. The function of the oxygen in human bloodstreams is providing energy in oxidation reactions, not combining with hemoglobin. Combining with hemoglobin is only a means to that end. This is a useful example. It points to a contrast in the notion of “because” employed here which is easy to overlook and crucial to an elucidation of functions.

As I pointed out above, if producing energy is the function of the oxygen, then oxygen must be there (in the blood) because it produces energy. But the “because” in “It is there because it produces energy” is importantly different from the “because” in “It is there because it combines with hemoglobin.” They suggest different *sorts* of etiologies. If carbon monoxide, which we know to combine readily with hemoglobin, were suddenly to become able to produce energy by appropriate (non-lethal) reactions in our cells and, further, the atmosphere were suddenly(!) to become filled with CO, we could properly say that

the reason CO was in our bloodstreams was that it combines readily with hemoglobin. We could not properly say, however, that CO was there because it produces *energy*. And that is precisely what we could say about oxygen, on purely evolutionary-etiological grounds.

All of this indicates that it is the nature of the etiology itself which determines the propriety of a functional explanation; there must be specifically functional etiologies. When we say the function of  $X$  is  $Z$  (to do  $Z$ ) we are saying that  $X$  is there because it does  $Z$ , but with a further qualification. We are explaining how  $X$  came to be there, but only certain kinds of explanations of how  $X$  came to be there will do. The causal/functional distinction is a distinction *among* etiologies; it is not a contrast between etiologies and something else.

This distinction can be displayed using the notion of a causal consequence.<sup>18</sup> When we give a functional explanation of  $X$  by appeal to  $Z$  (" $X$  does  $Z$ "),  $Z$  is always a consequence or result of  $X$ 's being there (in the sense of "is there" sketched above).<sup>19</sup> So when we say that  $Z$  is the function of  $X$ , we are not only saying that  $X$  is there because it does  $Z$ , we are also saying that  $Z$  is (or happens as) a result or consequence of  $X$ 's being there. Not only is chlorophyll in plants *because* it allows them to perform photosynthesis, photosynthesis is a *consequence* of the chlorophyll's being there. Not only is the valve-adjusting screw there *because* it allows the clearance to be easily adjusted, the possibility of easy adjustment is a *consequence* of the screw's being there. Quite obviously, "consequence of" here does not mean "guaranteed by." " $Z$  is a consequence of  $X$ ," very much like " $X$  does  $Z$ " earlier, must be consistent with  $Z$ 's not occurring. When we say that photosynthesis is a consequence of chlorophyll, we allow

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<sup>18</sup> The qualification "causal" here serves merely to indicate that this is not the purely inferential sense of "consequence." I am not talking about the result or consequence of an argument—e.g., necessary conditions for the truth of a set of premises. The precise construction of "consequence" appropriate here will become clear below.

<sup>19</sup> It is worth recalling here that "is there" can only sometimes, but not usually, be rendered "exists (at all)." So, contrary to many accounts, what is being explained, and what  $Z$  is the result of, can very often *not* be characterized as "that  $X$  exists" *simpliciter*.

that some green plants may never be exposed to light, and that all green plants may at some time or other not be exposed to light. Furthermore, this consequence relationship does not mean that whenever  $Z$  *does* occur, happen, obtain, exist, and so forth, it is as a consequence of  $X$ . There is room for a multiplicity of sufficient conditions, overdetermined or otherwise. Other things besides the adjusting screw may provide easy adjustment of the clearance. This (the inferential) aspect of consequence, as that notion is used here, can be roughly captured by saying that there are circumstances (of recognizable propriety) in which  $X$  is non-redundant for  $Z$ . The aspect of "consequence" of central importance here, however, is its asymmetry. " $A$  is a consequence of  $B$ " is in virtually every context incompatible with " $B$  is a consequence of  $A$ ." The source of this asymmetry is difficult to specify, and I shall not try.<sup>20</sup> It is enough that it be clearly present in the specific cases.

Accordingly, if we understand the key terms as they have been explicated here, we can conveniently summarize this analysis as follows:

The function of  $X$  is  $Z$  *means*

- (2) (a)  $X$  is there because it does  $Z$ ,
- (b)  $Z$  is a consequence (or result) of  $X$ 's being there.

The first part, (a), displays the etiological form of functional ascription-explanations, and the second part, (b), describes the convolution which distinguishes functional etiologies from the rest. It is the second part of course which distinguishes the combining with hemoglobin from the producing of energy in the oxygen-respiration example. Its combining with hemoglobin is emphatically not a consequence of oxygen's being in our blood; just the reverse is true. On the other hand, its producing energy *is* a result of its being there.

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<sup>20</sup> It is often claimed that the asymmetry is temporal, but there are many difficulties with this view. Douglas Gasking, in "Causation and Recipes," *Mind* (Oct., 1955), attempts to account for it in terms of manipulability with some success. But manipulability is even less generally applicable than time order, so, as far as I know, the problem remains.

The very best evidence that this analysis is on the right track is that it seems to include the entire array of standard cases we have been considering, while at the same time avoiding several very persistent classes of counterexamples. In addition to this, however, there are some more general considerations which urge this position upon us.<sup>21</sup> First, and perhaps most impressive, this analysis shows what it is about functions that is teleological. It provides an etiological rationale for the functional "in order to," just as recent discussions have for other teleological concepts. The role of the consequences of  $X$  in its own etiology provide functional ascription-explanations with a convoluted forward orientation which precisely parallels that found by recent analyses in ascription-explanations employing the concepts goal and intention.<sup>22</sup> In a functional explanation, the consequences of  $X$ 's being there (where it is, and so forth) must be invoked to explain why  $X$  is there (exists, and so forth). Functional characterizations, by their very nature, license these explanatory appeals. Furthermore, as I hinted earlier, ( $b$ ) is often simply implicit in the "because" of ( $a$ ). When this is so, the "because" is the specifically teleological one sometimes identified as peculiarly appropriate in functional contexts. The peculiarly functional "because" is the normal etiological one, except that it is limited to consequences in this way. The request for an explanation as well will very often contain this implicit restriction, hence limiting the appropriate replies to something in terms of this "because"—that is, to functional explanations. "Why is it there?" in some contexts, and "What does it do?" in most, unpack into "What consequences does it have that account for its being there?"

The second general consideration which recommends this analysis is that it both accounts for the propriety of, and at the same time elucidates the notion of, natural selection. To make this clear, it is important first to say something about the unqualified notion of selection, from which natural selection is derived.

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<sup>21</sup> The following considerations are intended primarily as support for the entire analysis considered whole. Since ( $a$ ) has already been examined extensively, however, I have biased the argument slightly to emphasize ( $b$ ).

<sup>22</sup> The primary discussions of this sort I have in mind are those in Charles Taylor's *Explanation of Behavior* and the literature to which it has given rise.

According to the standard view, which I will accept for expository purposes, the paradigm cases of selection involve conscious choice, perhaps even deliberation. We can then understand other uses of "select" and "selection" as extensions of this use: drawing attention to specific individual *features* of the paradigm which occur in subconscious or nonconscious cases. Of course, the range of extensions arrays itself into a spectrum from more or less literal to openly metaphorical. Now, there is an important distinction within the paradigmatic, conscious cases. I can say I selected something,  $X$ , even though I cannot give a reason for having chosen it: I am asked to select a ball from among those on the table in front of me. I choose the blue one and am asked why I did. I may say something like "I don't know; it just struck me, I guess." Alternately, I could without adding much give something which has the form of a reason: "Because it is blue. Yes, I'm sure it was the color." In both of these cases I want to refer to the selection as "mere discrimination," for reasons which will become apparent below. On the other hand, there are a number of contexts in which another, more elaborate reply is possible and natural. I could say something of the form "I selected  $X$  because it does  $Z$ ," where  $Z$  would be some possibility opened by, some advantage that would accrue from, or some other result of having (using, and so forth)  $X$ . "I chose American Airlines because its five-across seating allows me to stretch out." Or "They selected DuPont Nomex because of the superior protection it affords in a fire."<sup>23</sup> Let me refer to selection by virtue of resultant advantage of this sort as "consequence-selection." Plainly, it is this kind of selection, as opposed to mere discrimination, that lies behind conscious functions: the consequence *is* the function. Equally plainly, it is specifically this kind of selection of which *natural* selection represents an extension.

But the parallel between natural selection and conscious consequence-selection is much more striking than is sometimes

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<sup>23</sup> Of course the advantage is not always stated explicitly; "I chose American because of its five-across seating." But for it to be selection of the sort described here, as opposed to mere discrimination, something like an advantage must be at least implicit.

thought. True, the presence or absence of volition is an important difference, at least in some contexts. We might want to say that *natural* selection is really *self*-selection, nothing is *doing* the selecting; given the nature of  $X$ ,  $\mathcal{Z}$ , and the environment,  $X$  will *automatically* be selected. Quite so. But here the above distinction between kinds of conscious selection becomes crucial. For consequence-selection, by contrast with mere discrimination, de-emphasizes volition in just such a way as to blur its distinction from natural selection on precisely this point. Given our criteria, we might well say that  $X$  *does* select itself in conscious consequence-selection. By the very nature of  $X$ ,  $\mathcal{Z}$ , and our criteria (the implementation of which may be considered the environment),  $X$  will automatically be selected.<sup>24</sup> The cases are very close indeed.

Let us now see how this analysis squares with the desiderata we have developed. First, it is quite clearly a unifying analysis: the formula applies to natural and conscious functions indifferently. Both natural and conscious functions are functions by virtue of their being the reason the thing with the function "is there," subject to the above restrictions. The differentiating feature is merely the *sort* of reason appropriate in either case: specifically, whether a conscious agent was involved or no. But in the functional-explanatory context which we are examining, the difference is minimal. When we explain the presence or existence of  $X$  by appeal to a consequence  $\mathcal{Z}$ , the overriding consideration is that  $\mathcal{Z}$  must be or create conditions conducive to the survival or maintenance of  $X$ . The exact *nature* of the conditions is inessential to the possibility of this form of explanation: it can be looked upon as a matter of mere etiological detail, nothing in the essential form of the explanation. In any given case something could conceivably get a function through either sort of consideration. Accordingly, this analysis begs no theological questions. The organs of organisms could logically possibly get their functions through God's conscious design; but we can also make perfectly good sense of their functions in the absence of divine intervention. And in either case they would be functions

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<sup>24</sup> This is a version of the old problem about the tension between rationality and freedom.

## FUNCTIONS

in precisely the same sense. This of course was accomplished only by disallowing explicit mention of intent or purpose in accounting for conscious functions. Nevertheless, the above formula can account for the very close relationship between design and function which the previous analyses could not. For, excepting bizarre circumstances, in virtually all of the usual contexts,  $X$  was designed to do  $\mathcal{Z}$  simply entails that  $X$  is there because it results in  $\mathcal{Z}$ .

Second, this analysis makes a clear and cogent distinction between function and accident. The things  $X$  can be said to do by accident are the things it results in which cannot explain how it came to be there. And we have seen that this circumvents the accident counterexamples brought to bear on the other analyses. It is merely accidental that the chlorophyll in plants freshens breath. But what it does for plants when the sun shines is no accident—that is why it is there. Furthermore, in this sense, “ $X$  did  $\mathcal{Z}$  accidentally” is obviously consistent with  $X$ 's doing  $\mathcal{Z}$  having well-defined causal antecedents, just like the normal cases of other sorts of accident (automobile accidents, accidental meetings, and so forth). Given enough data it could even have been predictable that the belt buckle would deflect the bullet. But such deflection was still in the appropriate sense accidental: that is not why the buckle was there.

Furthermore, it is worth noting that something can get a function—either conscious or natural—as the result of an accident of this sort. Organismic mutations are paradigmatically accidental in this sense. But that only disqualifies an organ from functionhood for the first—or the first few—generations. If it survives by dint of its doing something, then that something becomes its function on this analysis. Similarly for artifacts. For example, if an earthquake shifted the rollers of a transistor production-line conveyor belt, causing the belt to ripple in just such a way that defective transistors would not pass over the ripple, while good transistors would, we could say that the ripple was *functioning as* a quality control sorter. But it would be incorrect to say that the ripple *had* the function of quality control sorting. It does not *have* a function at all. It is there only by accident. Sorting can, however, *become* its function if its sorting ability ever becomes a reason for

preserving the ripple: if, for example, the company decides against repairing the conveyor belt *for that reason*. This accords nicely with Richard Sorabji's comment that in conscious cases, saying the function of  $X$  is  $Z$  requires at least "that some efforts are or would if necessary be made" to obtain  $Z$  from  $X$ .<sup>25</sup>

Third, the notion of something having more than one function is derivative. It is obtained by substituting something like "partly because"<sup>26</sup> for "because" in the formula. Brushing dust off the numbers is one of the functions of the watch's sweep-second hand if that feature is *one* of the (restricted, etiological) reasons the sweep hand is there. Similarly in the case of natural functions. If two or three things that livers do all contribute to the survival of organisms which have livers, we must appeal to all three in an evolutionary account of why those organisms have livers. Hence the liver would have more than one function in such organisms: we would have to say that each one was *a* function of the liver.

Happily, the analysis I am here proposing also accounts for the undoubted attractiveness of the other analyses we have examined. Beckner's first analysis is virtually included in this one under the rubric " $X$  does  $Z$ ." The rest of the formula can be thought of as a qualification to avoid some rather straightforward counterexamples which Beckner himself is concerned to circumvent in his more recent attempt. Canfield's "usefulness" is even easier to accommodate: the usefulness of something,  $Z$ , which  $X$  does is *very usually* an informative way of characterizing why  $X$  has survived in an evolutionary process, or the reason  $X$  was consciously constructed. The important point to notice is that this is only *usually* the case, not necessarily: not all useful  $Z$ 's can explain survival and some things are constructed to do wholly useless things. As for Beckner's most recent analysis, the complex,

<sup>25</sup> Sorabji, *op. cit.*, p. 290.

<sup>26</sup> Again, it is worth pointing out that "partly" here does not indicate that "because," when *not* so qualified, represents a sufficient condition relationship. It merely serves to indicate that more than one thing plays an explanatorily relevant role in this particular case. More than one thing must be mentioned to answer adequately the functional "why?" question in this context. But that answer, as usual, need not provide a sufficient condition for the occurrence of  $X$ .

mutually contributory relationship among parts central to it is precisely the sort of thing often responsible for the survival and reproduction of organisms on one hand, and for the construction of complex mechanisms on the other. Again the valuable features of that analysis are incorporated in this one.

There is still one sort of case in which we clearly want to be able to speak of a function, but which offends the letter of this analysis as it stands. In several contexts, some of which we have already examined, we want to be able to say that  $X$  has the function  $Z$ , even though  $X$  cannot be said to do  $Z$ .  $X$  is not even *able* to do  $Z$  under the requisite conditions. In the cases of this sort I have already mentioned (the defective washer switch and ineffective governmental safety regulations), it has seemed necessary to italicize (emphasize, underline) the word "function" in order to make its use plausible and appropriate. This is a logical flag: it signals that a special or peculiar contrast is being made, that the case departs from the paradigms in a systematic but intelligible way. Accordingly, an analysis has to make sense of such a case as a variant.

On the present analysis, the italic type signals the dropping of the (usually presumed) second condition.  $X$  does *not* result in  $Z$ , although, paradoxically, doing  $Z$  *is* the reason  $X$  is there. Of course, in the abstract, this sounds fatuous. But we have already seen cases in which it is natural and appropriate. That *is* the reason  $X$  (switch, safety regulations) is there. And a slightly more defensive formulation of (2) will include them directly: a functional ascription-explanation accounts for  $X$ 's being there by appeal to  $X$ 's resulting in  $Z$ . These cases *do* appeal to  $X$ 's resulting in  $Z$  to explain the occurrence of  $X$ , even though  $X$  does *not* result in  $Z$ . So the form of the explanation is functional even in these peculiar cases.

Interestingly, this account even handles the exotic fact that these italicized functions of  $X$  can cease being even italicized functions without dispensing with or directly altering  $X$ . (Something that  $X$  did not do can stop being its function!) For example, if the ineffective safety regulations were superseded by another set, and merely left on the books through legislative sloth or expediency, we would no longer even say they had the (italicized)

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*function* of making driving less dangerous. But, of course, that would no longer be the reason they were there. The explanation would then have to appeal to legislative sloth or expediency. This is usually done with verb tenses: that *was* its function, but is not any longer; that was why it was there at one time, but is not why it is still there. A similar treatment can be given vestigial organs, such as the vermiform appendix in humans.

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*University of California, Riverside*