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Explanation, Mechanism, and Teleology *

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In a recent article in this Journal (Vol. XXI, No. 25), Dr. E. R. Guthrie considers Purpose and Mechanism as categories of explanation in psychology, his general conclusion being that teleological explanation is not so intrinsically despicable, after all, as it is often thought to be. The present writer is in thorough agreement with that conclusion, but it seems to him that Dr. Guthrie's distinction between mechanism and teleology is much too loose to be satisfactory, and that he classes as explanations many things which have no title to that name. It is obviously highly desirable to define explanation, purposiveness, and explanation in terms of purpose with precision, for otherwise clear and firm conclusions can not possibly be reached. The present paper attempts such definitions briefly.

First, with regard to the logical nature of Explanation. Dr. Guthrie characterizes explanation as the "assigning a fact or an event to a category of some sort." Thus, "the apple falls . . . because every pair of physical objects will, under similar circumstances, approach each other. The dog seeks food because all living creatures do this." And he quite rightly, although I believe with undue resignation, points out that these cases are, logically, exactly parallel to the classical horrible example, according to which the fact that a man who has taken opium, sleeps, is "explained" by saying that men who have taken opium always do. But the correct conclusion to be drawn from this parallelism is, I submit, that since admittedly nothing whatever is explained in the latter case, neither is anything explained at all in the former, and therefore that explanation can not be defined as the "assigning the event to be explained to a class of similar events."

*Explanation essentially consists in the offering of a hypothesis of fact, standing to the fact to be explained as case of antecedent to case of consequent of some already known law of connection (laws of bare conjunction statistically obtained, will not do). Thus, the hypothesis that the tree was shaken *does* explain the fact that an apple fell, under the general rule, already experimentally ascertained, that when an apple tree is shaken, ripe apples fall. We may, of course, go on and ask for an explanation of the *other* fact*

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that they always fall then. And one can doubtless be given, but it will consist, once more, in the mention of something from which, under some already known law, the fact that apples do fall then, follows. Charles Peirce,¹ with great insight, pointed out something which seems never to have been adequately noticed before, and to have been largely forgotten since, namely that inferences are not of two sorts only, but of *three sorts*: From Rule and Case to Result (Deduction), from Case and Result to Rule (Induction), and from Rule and Result to Case. Peirce very unfortunately called this third sort of inference "Hypothesis," while hypothesis in fact means the making of *any sort* of a conjecture. The word which exactly designates this third sort of inference in common usage, from which there is no occasion to depart, is *Diagnosis*, or inference from Circumstantial Evidence. Now, when the Rule under which a diagnosis is made is a law of *connection* (causal or logical), the diagnosis *explains* the observed fact from which it started. But (and Peirce did not perceive this) when the Rule is a law of bare *conjunction*, a merely statistical uniformity, the diagnosis *does not explain*. Thus, from the observation that an animal has cloven hoofs one frames, diagnostically, the hypothesis that it ruminates, under the statistical law that all ruminants have cloven hoofs. But that diagnosis, whether correct or not, *does not* in the least *explain* the cloven hoofs; it *merely predicts them* under the law.

My second point concerns certain cases referred to by Dr. Guthrie as cases of purposiveness, which, it seems to me, have no *a priori* title to that name, e.g., in particular those which he borrows from Haldane—"physiological states of equilibrium whose disturbance causes their own reestablishment." One can not help wondering why the predictions on the basis of known normal causal sequences mentioned by Dr. Guthrie in the last paragraph on p. 676 are referred to by him as predictions "in terms of purpose." The only excuse for it would seem to be the perfectly gratuitous labeling of the effect an "end result." When the water level in a tank equipped with a ball float is lowered by the withdrawal of water, that disturbance causes the ball to fall and to open the intake pipe, and thus the disturbance itself causes the reestablishment of the original water level.² The process is automatic, but none the less purely mechanical, for automatism is one thing and purposiveness another. And the fact that, in the similar case of the maintenance of the proportion of blood salts to blood volume, we do not know the mechanism, does not warrant the conclusion that purpose is involved, but only the conclusion that we do not know what the explanation is (which the details of the mechanism would constitute). Prediction is one thing, and explanation of the predictability another thing.

¹ *Popular Science Monthly*, Aug., 1878, "Deduction, Induction and Hypothesis". *Johns Hopkins Studies in Logic*, "A Theory of Probable Inference".

² Stevenson Smith, "Regulation in Behavior", *The Journal of Philosophy*, 11, pp. 320-326.

Moreover, it is not strictly correct to say, as Haldane apparently does, that the maintenance of the proportion is predictable. What can be said is, that either somehow the proportion will be maintained, or else the animal will sicken or die—which, as Dr. Guthrie notes, many have done. Of course, that an animal is *now* healthy, enables us to infer (predict) that, in spite of the ingestion of water, the proportion was somehow maintained—also, obviously, that somehow he escaped his enemies, etc.—but *not* that these various necessary conditions of life and health were provided by some intelligence *purposing* that it should live and be healthy. Again, that the soldiers in a hospital ward were all wounded in “non-vital organs” was not, as a pious man thought, evidence of the purpose and mercy of God—unless perhaps none of the soldiers shot were to be found in the graveyard! The phenomenon of maintenance of an equilibrium, whether physical or physiological, is, like every other phenomenon, dependent upon the joint presence of various conditions, but is not on that account any more purposive than the rest. If we label it an “end” or “end result,” rather than an “effect,” it is only because *we* then *import* into it our own interest in it and our desire that it occur, but not because we *find* a purpose objectively and intrinsically present in it as a necessary part of its description. In all cases of this sort, what we have as the law under which we infer, is a law of the type “Only if *X*, *Y*,” instead of one of the type “If *X*, *Y*,” i.e., a law informing us of that in the *absence* of which *Y* does *not* occur, instead of one informing us of that in the *presence* of which *Y* does occur. And obviously, when the law is of the “Only if *X*, *Y*” type, prediction is from the truth of the consequent to that of the antecedent, or from the falsity of the antecedent to that of the consequent.

But, in such cases, how about *explanation*? It is here, truly, that the methodological Devil puts forth his strongest and most subtle temptation, against which nothing but the most careful analysis will avail. The situation is this: Explanation, as we have seen, consists in the supposition of something that would have been *sufficient* to the existence of the observed fact under a given known law. This being so, *no explanation is possible under a law of the “Only if *X*, *Y*” type* (e.g., Only if moisture is present will a plant live); for since the observed fact is here *X* (e.g., moisture is present), the factuality of *X* could under this type of law be explained, if at all, only by the hypothesis of the factuality of *Y* (e.g., that the plant will live). But the relation of *Y* to *X* under a law of this type is *not* “sufficient to,” but the very different one of “*contingent upon*.” Therefore the hypothesis that *Y* will be a fact cannot explain the factuality of *X*.) How, indeed, could a fact that has not yet occurred explain, i.e., be a possible cause of, a fact that has already occurred? And it is here that the teleological temptation comes in: Obviously, whispers the Devil, only if an intelligence aware of the contingency of the second upon the first, and desiring the occurrence of the second, is thereby moved to bring about the first!

That is, in truth, a hypothesis explanatory of the occurrence of X, and it is a teleological one. And I do not mean to say that such an explanation is not, in some cases, a perfectly good and proper one and the only correct one. My only concern is to point out that *it is even then not what was asked for*, i.e., it is not an explanation of the occurrence of X under the law that "Only if X occurs, does Y occur." It is an explanation of X under *another* law, viz., the law that "If an agent believes that Y is contingent upon X and desires Y, then that agent is likely to do X"; and this is still a law of the "If" type, which is the only type under which explanations are possible. It is also, of course, the only sort of explanation of X in which the dependence of Y on X enters, although it enters in it *not as something true*, but only *as something believed*. But then we may well ask, if all that is wanted is an explanation of X, why insist on dragging Y into it at any cost? Why not, in the absence of evidence of the existence of an agent and his purpose, frame an explanation of X under some other law known, e.g., under the law that "If W, X" by the hypothesis that W occurred? The teleological explanation is certainly not forced on us *a priori* by the situation. It must compete with possible mechanical explanations, e.g., an evolutionary one, and the choice between them is to be made on precisely the usual grounds of choice between rival explanations, viz., relative antecedent probability, relative simplicity, etc.

The analysis of the distinction between purpose and mechanism has already been adumbrated in the above. To be able properly to speak of an act (or event) as purposive, it is neither necessary nor sufficient that the act be such that unless it occurs some specified result will not occur. What is essential, on the other hand, is that the following elements be present, or be supposed, by the speaker, to be present:

1. *Belief* by the performer of the act in a law (of either type), e.g., that If X occurs, Y occurs.
2. *Desire* by the performer that Y shall occur.
3. *Causation by that desire and that belief jointly*, of the performance of X.

It follows from this definition of purposiveness that only the acts of entities capable of belief and desire, are capable of being purposive, and therefore that the occurrences of "inanimate nature" can not be spoken of as purposive without contradiction, unless belief and desire be injected into nature, e.g., as often has been done, by viewing its occurrences as acts of God. And the disrepute into which teleological explanations have fallen is doubtless due to their having been so frequently thus put forth in cases where the existence of the agent appealed to and of his beliefs and desires, was not already known, but invented outright and purely *ad hoc*,—this obviously constituting explanation of the *ignotum, per ignotius*. But when antecedent evidence for their existence is present (e.g., when the hypothetical agent is a human being), a teleological explanation is methodologi-

cally quite respectable, although, like any other, it may in a given case not happen to be the correct one.

It is interesting and quite important to note that it makes no essential difference to the definition of a purposive act given above, whether the words "belief" and "desire" which occur in it, be interpreted in terms of consciousness, or purely in terms of neurons and nerve currents. The essential point is, that unless it be *true* that belief and desire (no matter in what terms described), are present, there is no purposiveness. If belief and desire are given a description in terms of purely neural mechanisms, then what we have to say is that unless *just these particular types of neural mechanisms* are involved, the act performed can not be spoken of as purposive, while if they are involved it must be so spoken of. And there is usually little dispute between the behaviorists and their opponents as to whether, in any given case, belief and desire *are* present; the dispute is as to how they shall be described. By way of illustration, we may take two examples used by Dr. Stevenson Smith (*loc. cit.*, p. 324) as cases of what he calls "positive regulation." When a squirrel stores away food, I take it that neither behaviorists nor their opponents would assert that the squirrel *believes* that if he stores nuts he will not starve next winter, nor that he, at the time, *desires* not to starve next winter. Then, if that is not asserted, the squirrel's act may be "positive regulation," but it is *not a purposive act*. On the other hand, when a prospector digs for gold, behaviorists and their opponents alike would grant that he *believes* that if he digs he will probably find gold, and that he *desires* to find some. If both these things are granted, then the prospector's act may be "positive regulation," but *it is a purposive act* all the same.

So much for the definition of purposive acts. Now an *explanation* of a fact, e.g., the fall of an apple, can be said to be teleological, or in terms of purpose, when the hypothetical cause offered as explanation (e.g., that a boy shook the tree) is regarded not as a "blind" occurrence, but as a "purposive" act, i.e., as being the *effect* in an agent of his *desire* for the fact (the fall of the apple) and of his *belief* that the act (shaking the tree) would cause the fact. Obviously that is sometimes the exact history of the occurrence of the fall of an apple, and in every such case none but a teleological explanation will be correct, and therefore no other can ever replace it. This remains so, as already stated, even if "belief" and "desire" are themselves capable of being described as special kinds of mechanisms. Mechanism and teleology are therefore not logically incompatible.