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Natural Signs and Evidence

Central to the subject Peirce called "semiotic", the general theory of signs, was the conception of a natural sign, an event or object with significance for an interpreter that is not produced by some other agent with communicative intent. Semiotic was based on the principle that there were fundamental similarities between such signs and their interpretation and communicated signs or "comsigns" (as Charles Morris termed them) that were important to an understanding of the use and interpretation of human language. This principle I believe to be a sound one, but not relative to most of the examples of natural signs given by early philosophers, by Peirce, and by recent British and American writers such as Price, Alston, and Grice. These philosophers have, almost to a man, given as examples of natural signs objects whose function is very different from that of a sign and for which there are no basic similarities to utterances in human speech.

I. Evidence and Supporting Generalizations

The following are some examples of natural signs used in traditional and recent discussions.
1) clouds as a sign of rain
2) spots as a sign of measles
3) a bullet hole as a sign of a fired bullet
4) boulders as a sign of glacial activity[1].

There are important differences between these examples. In 1) the clouds (or better, temperature changes in the clouds) are a cause of the rain that follows, whereas in 2)--4) what is identified as a sign is regarded as an effect of what it is a sign of: the disease causes the spots, the fired bullet the hole, the glacier the boulders. The spots we would call a "symptom" of measles, whereas this term is used only in medical diagnosis and is inappropriate for the other examples. 3) and 4) are perhaps the most similar, but the glacial activity causing the boulders occurred millions of years ago, while for 3) the cause of the hole may have been very recent.

Nevertheless, all the above examples share an essential feature, that of being supported by causal generalizations believed to be true. To state the sign relation in 1)—4) is, in effect, to restate these causal generalizations. To say 'Clouds are a sign of rain' implies our being able to say 'Clouds cause rain', or better, 'Clouds are a sufficient condition for rain'; to say 'Spots are a sign of measles' implies 'Measles are a cause of spots'; and similarly for 3) and 4). And when we see clouds on this or that particular occasion we infer the rain on the basis of our belief in the causal generalization. A similar inference occurs when we observe on some occasion what we believe to be the effect of some cause as its necessary condition. We infer to the fired bullet because we believe the generalization 'Fired bullets cause holes (of such a shape)' is true. More generally, to say

'*A* is the sign of *B*' in the examples 1)—4) is to imply either '*A* is a sufficient cause of *B*' or '*B* is a necessary cause of *A*'. It is on the basis of the first generalization that we infer from a particular occurrence of *A* on a given occasion to the future occurrence of its effect *B*, as in example 1). On the basis of the second generalization we are able to infer from an occurrence of *A* to the past occurrence of *B* as its necessary cause, as in 2)—4). Both generalizations may be acquired by induction in personal experience, or may be believed on the basis of what has been asserted by another.

When this feature is present, to say that *A* is a sign of *B* is only another (and potentially misleading) way of saying that an occurrence of *A* observed on some occasion is *evidence* of a future or past occurrence of *B*, since the requirements for the sign and evidence relations are identical. Both require supporting generalizations stating causal relations. Very abstract and technical generalizations are often presupposed when the evidence is said to be "scientific", e.g. when we speak of a fossil being evidence of prior life, the streak on a photographic plate evidence of a nuclear particle, the shift in spectral line evidence of a receding galaxy, etc. In all such cases the inference from an occurrence *a* of *A* (the particular fossil now being held, the streak on this plate before us) to an occurrence *b* of *B* (past life, passage of a particle) is a deductive inference whose other premiss is the supporting causal generalizations. Its form is either

> *A* is the sufficient cause of *B*.
> Evidence a occurs.
> _____
> *b* will occur.

or

> *B* is the necessary cause of *A*.
> Evidence a occurs.
> _____
> *b* has occured.

The truth of the first premiss in both inferences logically justifies inferring the conclusion. In the first inference when we infer to an occurence *b* of *B* we are said to *predict b*; in the second we *retrodict b* as the past cause of *a*.

It is not necessary, of course, that the generalization occurring in the first premiss be a causal one. I see a Sunday newspaper on my neighbor Smith's porch at 11 A.M., and take this as evidence that he and his family have left for the weekend. The generalizations 'Whenever Smith leaves for the weekend his paper is left at 11 A.M. Sunday on his porch' that supports the inference is a so-called "accidental" generalization, not a causal one. Most of the examples of natural signs which are evidence given in philosophic discussions have presupposed, however, the law-like variety. Nor is it necessary that we be able to provide an explicit verbal formulation of the generalization employed in inferring from evidence. Sometimes the source of a belief may be forgotten or resist verbalization. Typically, we can, in fact, provide linguistic expression for the generalization supporting the evidence. But at any rate, it is always legitimate to ask for a justification for someone taking an object or event as evidence, and this justification must be stated in the form of a generalization.

Note that the inferences from evidence to a past cause or future effect do not depend on any fixed, restricted temporal interval between the evidence *a* and an occurrence of *B*. The rain may occur in a few minutes, hours, or even days. It is for this reason that

Price refers to clouds as a "long-range sign" of rain, one for which the occurrence of what it stands for may be some considerable time in the future, in contrast to "short-range signs", e.g. lightning as a sign of thunder.[2] When we retrodict the fired bullet from the evidence of the hole before us, there is also no requirement that the bullet have been fired at any particular time. It may have been recently, or some years back. There is often additional information that will, in fact, date the occurrence of B. We know, for example, that measles are contemporaneous with the spots it causes that the glaciers occurred many millions years before the boulders now see. But absence of such dating does not prevent a certain object or event from functioning as evidence.

It should also be noted that the generalizations presupposed in stating that a is evidence of b may be statistical. Depending on the probability of the generalization we speak of the evidence as being more or less *reliable*. We never judge evidence true or false. If the rains fails to follow the clouds, it is because clouds are relatively unreliable evidence, but there is no sense in which we would say they are "false". The causal generalization on the basis of which we infer from evidence, in contrast, is true or false rather than being reliable or unreliable, and may (if uniform rather than statistical) be judged false as a result of our determining the absence of what we predict or retrodict. But this evaluation of the generalization has no application to evidence observed on this or that occasion.

Now in all these respects — the existence of a supporting generalization, temporal indefiniteness, and the inapplicability of truth or falsity — examples 1)—4) are strikingly different from utterances of primitive forms of sentences as the basic signs used in human communication. Consider, for example, the single-word sentence 'Red' accompanied by a pointing gesture and the feature-placing sentence 'It is raining'. We speak of 'Red' being a sign of redness and 'It is raining' being a sign of rain. But obviously the interpretation of neither of them requires a belief in a generalization of any kind, certainly not a causal one, but also not a generalization about how the expressions are used. As a consequence, there is no inference to what the utterance stands for by way of a generalization, nor any point to asking for a justification for taking the utterances as signs of what they signify. Further, the temporal reference for utterances of both sentences is fixed by the contexts in which they occur. On hearing the utterances we believe that what is pointed to is red at the time the utterance of 'Red' occurs, believe that it is now raining. Extension of temporal reference is possible only by adding tense indicators or specifications of time that presuppose a relatively abstract system of measuring temporal intervals. Finally, and just as obviously, utterances of such sentences are judged to be true or false at the time and place indicated by the context in which they occur and gestures or other devices that may accompany them. Speakers, the persons who produce the utterances, are said to be reliable or unreliable, but their utterances are true or false.

These are fundamental differences. They seem to have been the reason that some have questioned whether there is a generic conception of a sign common to natural signs and speech utterances. Alston concludes that there are no features common to such diverse signs as an utterance of 'Red' and boulders as a sign of glaciers; semiotic is a misguided attempt to specify what do not exist.[3] Every attempt to define what is meant by a sign will either be vacuous or select features some of which will not be present in objects commonly regarded as signs. There are at best, Alston argues, family resemblances, features shared by some but not all signs. Such a conclusion is indeed guaranteed by

applying the term 'sign' to examples of evidence supported by causal generalizations. Whether it can be maintained after restricting natural signs to exclude evidence is a question we can best raise after considering some examples of uncommunicated signs which function in an entirely different way.

II. Pre-Linguistic Natural Signs

To interpret evidence requires an ability to use language and formulate causal generalizations. No such ability seems required for the following examples of natural signs to have significance for their interpreters.

5) a bell as a sign of an electric shock
6) lightning as a sign of thunder
7) smoke as a sign of fire.

5) is the type of natural sign used by experimental psychologists in formulating laws governing conditioned reflex learning. The pairing of the bell with the shock is done by an experimenter with some animal subject. Examples similar to 5) drawn from animal learning experiments constituted the model of a natural sign used by Morris in his *Signs, Language and Behavior.* But interpretation based only on prior associations of one type of event with another is not peculiar to lower animals. Prior to the acquisition of language children regularly interpret such signs, e.g. the sight of the flame as a sign of intense heat, as in Hume's famous example.

After acquiring language it is more difficult to isolate such examples. But 6) perhaps qualifies as one, since we interpret the lightning as a sign based on a direct prior association, and no linguistic generalization seems presupposed. Lightning, in fact, does cause thunder. But it is not necessary to believe this in any form capable of linguistic expression to interpret the first event as a sign of the second. It thus makes no sense here to speak of the lightning as "evidence" of thunder. To be sure, we can formulate the generalization 'Lightning causes thunder'. But it would seem that, at least normally, we are not using the generalization to support an inference to the thunder; we simply expect the thunder in a direct, immediate way.

The traditional example 7) is much more problematic, and is one of countless borderline cases that arise after the stage of language acquisition. It seems that belief in the generalization 'Fire causes smoke' is not ncessarily presupposed in the interpretation of the smoke as a sign, that prior associations are in themselves sufficient. Yet we do in fact arrive at by induction such generalizations, and employ them relative to such events. Hence, the smoke could be regarded as evidence, especially if the fire were hidden and inaccessible to observation (the smoking mattress, smouldering leaves, etc.). In this case we would infer to the fire on the basis of the evidence and a supporting generalization.

5) and 6) I shall refer to as examples of *pre-linguistic natural signs,* with 7) an intermediary case between them and the examples of evidence previously listed. It is my contention that only signs of this variety bear any important analogy to comsigns such as signals (gestures, warning cries, etc.) and utterances of sentences in human language, and that the term 'sign' is a misnomer when applied outside this restricted range of natural

signs. For pre-linguistic signs a particular occurrence *a* of *A* is a sign token of a type of object *B* independently of the existence of a generalization of the form '*A* is the cause (or effect) of *B*'. There is a direct expectation of *B* that is not the result of an inference from *a* and the generalization.

These pre-linguistic natural signs differ also with regard to their temporal reference. The occurrence of the signified event *B* is expected within a relatively restricted temporal after the occurrence of the sign *A* at what we shall refer to as the *referent occasion*. The electric shock is administered shortly after the sounding of the bell; the thunder follows within a few seconds of the lightning. This referent occasion is directly related to the occasion at which the token of the sign occurs. As experiments with animals and children have shown, to extend it beyond a restricted temporal interval is to prevent the possibility of learning that one event is a sign of another. There are psychological limitations on any organism's ability to relate temporally remote events without the ability to use language. If the shock is administered some minutes after the sound of the bell, it never becomes a sign for the dog. If thunder were to follow the lightning minutes instead of seconds later, we would need belief in a causal generalization expressible in language in order to relate the first event to the second.

At the referent occasion the interpreter recognizes an occurrence or non-occurence of the type of object or event signified by the sign, whether or not there is then a shock within the given interval,whether there is thunder. Such recognition is at least analogous to judgments of truth and falsity as applied to utterances of primitive sentences. They differ in that sentences have a fixed meaning that judgements of falsity do not affect, whereas to recognize a non-occurrence of what is signified by a natural sign often leads to modifying the type of sign that has a given significance. For example, the dog learns to discriminate sounds of the bell followed by the shock from those that do not; we learn to discriminate lightning due to storms from "heat lightning" on summer days once having recognized that no thunder follows during the summer. Nevertheless, recognition of occurrences and non-occurrences can be regarded as a primitive form of judgement as it occurs in the interpretation of linguistic signs, and 'true' and 'false' can be applied to natural signs in an extended, analogical sense.

In all the respects, then, that evidence differs markedly from utterances of primitive sentences such as 'Red' or 'It is raining' pre-linguistic natural signs present basic similarities. Like speech utterances they presuppose no linguistic generalizations, their temporal reference is directly related to the occasion at which the token of the sign occurs, and at the referent occasion there is at least an act analogous to the judgement of truth and falsity of utterances as opposed to a judgement that bears on the presupposed generalization. As applied to these pre-linguistic signs there seems to be a generic conception of a sign that can be extended to linguistic signs in a way not possible when applied to evidence. By restricting the term 'natural sign' to signs of this type we thus avoid Alston's skepticism regarding the semiotic program.

It is noteworthy that experimental psychologists such as Watson, Tolman, and more recently O.H. Mowrer and C.E. Osgood do not fall into the error of the philosophic tradition in confusing evidence with natural signs, nor did Morris insofar as he based his analysis of signs on earlier behavioral models. Adopting behavioral criteria for a sign and its significance insures ruling out evidence as an object of investigation, since its relatively

abstract function precludes simple forms of behavior and experimentation with animals. Without such constraints the philosophic tradition has confused the sophisticated ability to interpret evidence with the ability to interpret a primitive form of sign, and comitted a form of what Whitehead seems to have meant by what he called the fallacy of "misplaced concreteness".

III. Evidence and Meaning

The misclassification of evidence as a type of sign is accompanied by the misleading extension of terms such as 'interpretation' and 'meaning' to evidence. It is common to speak of our "interpreting" the evidence, e.g. interpreting the fossil as evidence (a sign of) life, interpreting the streak on the photographic plate as evidence of a certain particle. But surely such interpretation differs markedly from that of an utterance of a sentence. To interpret evidence is to identify it as an instance of a cause or effect stated in the causal generalization that supports it, to identify it as an instance *a* of some type *A* for which there is a generalization '*A* is the cause (or effect) or *B*'.

In his much-discussed essay "Meaning" Grice proposes criteria by which to distinguish "natural" from "non-natural" meaning, or the meaning of a natural sign from that of a comsign used to communicate from speaker to hearer.[4] The criteria are stated in terms of a complex set of intentions on the part of the speaker which are necessary and sufficient for a sign to have non-natural meaning. Grice applies these criteria to the example of someone dropping the handkerchief of a person Y at the scene of a murder in order to lead the detectives on the case to suspect Y. The handkerchief, Grice argues, has natural meaning for the detectives, since an intent on the part of the person dropping it necessary for it to have non-natural meaning (the intent to have his intention recognized) is absent.

But the handkerchief can be said to have "meaning" only in a figurative sense that seems to bear no important similarities to the manner in which a sentence has meaning. The detectives may take the handkerchief as evidence of Y's guilt, but only on the basis of a belief in some generalization such as 'Handkerchiefs are dropped by their owners at places they have been'. Such a generalization may be said to have the meaning of a sentence in language, but the handkerchief itself has meaning for the detectives only in the sense that it is identified as an instance of what is referred to in the generalization. The contrast Grice purports to make between signs with different types of meaning is actually a contrast between evidence identified as an instance of a meaningful generalization and comsigns which have meaning in the standard sense.

A similar extension of the term 'meaning' occurs for examples 1)–4) as types of evidence. We do say 'Clouds mean rain', 'Spots mean measles', 'A bullet hole means a bullet has been fired', and 'Boulders mean prior glacial activity'. But, of course, these are also but figures of speech, and the sense of 'meaning' applied here is in no manner analogous to its application to expressions in a language. Again, it is the generalization that licenses the inferences from such evidence that can only properly be said to be meaningful. The evidence itself has meaning only insofar as it is identified as an instance of one of these generalizations.

No such figurative sense is being employed when we refer to the meaning of a genuine (i.e., pre-linguistic) natural sign. Here a sign type is said to have meaning or significance by virtue of prior associations between tokens of it and occurrences of a second type of event. This latter event type is the meaning of the sign, as the shock (as a type of event) is the meaning of the bell, the thunder the meaning of the lightning. To interpret a token of the sign is to expect the type of event signified at the referent occasion. This interpretation is analogous to our expecting or believing redness when we hear 'Red' at the place indicated by an accompanying pointing gesture or believing that there will be rain when we hear 'It is raining'. As mentioned above, they differ in that the recognition of a non-occurrence of the signified event at the referent occasion for a natural sign leads to a modification of its meaning in a manner not found for so-called "conventional" signs. To interpret the latter is to follow a socially accepted rule which is not changed when an utterance is judged false. Still, the similarity is sufficient to analogically extend the term 'meaning' to natural signs.

Summary

To summarize our main conclusions: Most examples given of natural signs have been examples of evidence supported by a causal generalization from which we infer to some particular cause or effect. This evidence differs from utterances of primitive sentences in fundamental ways, fundamental enough to destroy the basic analogy required for a general theory of signs. The analogy only exists when the term 'natural sign' is restricted to objects and events that are not supported by a generalization and whose temporal reference is limited to a referent occasion proximate to the occasion at which the sign token occurs. Natural signs in this restricted sense permit the analogical extension of terms such as 'meaning', 'truth', and 'falsity' in a manner not possible for evidence.

Notes

1. 1) is used by H.H. Price in *Thinking and Experience* (Cambridge: Harvard University Press, 1953), pp. 106ff, and occurs in many traditional discussions. 2) is also used by many writers, most recently by H.P. Grice in "Meaning", *Philosophical Review*, Vol. 66 (1957), pp. 377–388. 3) is one of several similar examples used by Charles Peirce to illustrate an "index" or indexical sign. See *The Collected Papers of Charles Sanders Peirce*, edited by Hartshorne and Weiss (Cambridge: Harvard University Press, 1931), 2.304. Another example of Peirce's makes explicit the dependence of indexical signs on causal generalizations: "A low barometer with a moist air is an index of rain; that is we suppose that the forces of nature establish a probable connection between the low barometer with moist air and coming rain." (2.286) 4) occurs in William Alson's *Philosophy of Language* (Englewood: Prentice Hall, 1964), p. 50.
2. Price, *Thinking and Experience*, p. 106.
3. Alston, *Philosophy of Language*, ch. 3.
4. Grice, "Meaning", pp. 381, 382.

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