

CONTRADICTION AND CONTEXTUALISM: An Exploration.

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Hegel made a major effort to go beyond the categories of formism and mechanism. Engels, Plekhanov and others have tried to grasp the significance of this for scientific activity. These notes are simply an effort to remind us of those cogitations; not to provide a scholarly annotation.

Engels has no quarrel with the application of the mechanist hypothesis to genuine cases of interaction, e.g. forces moving in opposite directions, antagonistic or conflicting tendencies or opposing interests. 'Mere antagonism of forces is no contradiction' (Anti-Duhring, 1878). Like Hegel, and Peirce, he thought we had to identify a third level beyond mere existence and inter-action. At this level of TRANSACTIONS he postulated 'the mutual penetration of opposites' and argued that, at this level, the principle of Identity and the 'law of excluded middles' (that A cannot logically be both A and not-A) should be replaced by the principle of contradiction. The relation between an organism and its environment would, in this view, have to be understood in terms of how far the organism has created its environment and that environment has created that organism. Neither can act on the other without essentially acting on itself, this is the contradictory relation into which they are locked; and neither can be understood as an identity in its own right. This is the transformation that is represented in the difference between the following formulations :-

- a) L11 - [L12, L21]
- b) L11 - [L12, L21] - L22.

The first formulation, that used by Bertalanffy and Prigogine, permits the retention of the principles of identity and excluded middle: if L11 is taken as A then A has an identity that is independent of any identity the environment, the L22, assumes and each kind of L11 reacts to the L21's in its own characteristic ways. The A is an A and not not-A. The second formulation implies a relation that only becomes sustainable as it moves toward the following :-

- c) L11(L22) - [L12, L21] - L22(L11).

The interaction of the organism and its environment is not just an exchange but a condition for change in the conditions of any further exchange. A human conversation is typical of this kind of transaction. To adapt Heraclitus' adage, one cannot step twice into the same place in a conversation.

The challenge to the principle of identity is a challenge to the massive scientific investment that has gone into Taxonomy. The validity of that challenge has been accepted by some modern taxonomists (Science, Vol. 174, 1210-1213). They have pointed out that the effort has taken us little beyond what was achieved, for

practical purposes, by pre-literate societies, it has served almost no practical purpose and "has helped us only to a limited extent in understanding the functioning of ecosystems , a problem that is of crucial importance for human survival" (p1212). The principle of identity on which taxonomy is based itself rests on the concepts of substance and attribute and the logic of subject- predicate propositions. The concept of unity of opposites requires a logic of relations within which subject- predicate propositions are but one species. This was the first task that Peirce set for himself.

By far the most critical implications of the reformulation arise from the notion of internal contradictions - primarily conceived of as internal to the ecosystem formed by the organization and its environment rather than internal to the organism or the environment considered in isolation.

Traditional explanations of development have been Aristotle's transformation model and Darwin's variational model. In Aristotle's model each life form has an immanent essence which unfolds its potentialities over time, e.g. the acorn growing into an oak. The sufficient conditions for this development are in the essence and the environment is reduced to providing, more or less at random, some of the necessary conditions. Thus, for the acorn, soil, sunshine and rain are co-producers but only the acorn has the potential of becoming an oak.

Darwin's hypotheses radically changed our view of development but with its reliance on the mechanism of chance trial- and -error it seeks to define the environment without reference to the organism ; the environment with its own processes of change is a given to which the organisms must adapt or perish. The history of evolution is the history of how randomly mutating organisms have adapted in a changing world.

The model we have proposed makes no prior assumption about which, in any change process, is the cause and which the effect, which the source of the sufficient conditions for change. This and the contradictions in the ecosystem relations opens the way for non-linear processes of change of the kind that Thom has tried to map in catastrophe theory.

A process of change initiated or set off by one of the correlative terms, organism or environment, may set off processes in the other that overwhelm the initiating changes - distorting or even reversing the direction of those first changes. Non-linear dynamics are not the sort of processes that emerge from the studies of the experimental physical sciences. In those sciences the tradition is that of controlled isolation. The matter under study is isolated under laboratory conditions and subjected to controlled variation of possible correlates.

Success lies in finding linear relations. Since Willard Gibbs introduction of the phase rule this constraint has not prevented the systematic study of the emergence of qualitative changes in mutually determining heterogeneous chemical mixtures - a

problem similar to that we have posed. It is possible that these phase changes always reflect a restructuring of one or more of the terms to a degree that changes their relation. This seems to be implied in Engels assertion, 'as a law of nature' that quantitative changes lead to qualitative changes, and vice versa. One does not have to accept this as a universally true proposition in order to realize its value as a rule of enquiry : that any observed phase change should be investigated as a possible change in the relation between the correlates, a change which is probably related to structural changes in one or both of the correlates. Similarly a change in phase should alert us to the possibility that quantitative change is being indicated in different ways (e.g. consumption of sulfuric acid was for over one hundred years a splendid index of industrial activity; now, with the emergence of polymer chemistry ethylene consumption has become the prime indicator).

The most difficult to grasp of Engel's three 'laws' is that of 'negation of negation' - the Hegelian triad of thesis- antithesis - synthesis - as the general model of change. It is a proposition that reeks of metaphysics and theology. Engels was not concerned with just any sort of change. He was not concerned with the changes arising from interaction and with which our linear models have coped so well. His concern was with developmental changes arising from transactional relations. The same concern that drove Peirce into semiotics.

If we try, as any scientist must, to identify the appropriate 'unit of analysis' in transactional relations then it is not possible to stop with a unit of just two steps e.g. cause- effect or stimulus- response.

If each of the correlates has within it something of the other, i.e. the basic terms are L11(L22) and L22(L11) and not just L11 and L22, then some interesting features emerge. In the first place an action arising from one of the correlates is not completed when a reaction is produced in the other. It only approaches completion as the reaction confirms (or disconfirms) that it was correctly predicted by the 'internalized other'. Whether it is confirmed or disconfirmed can be established only from the reaction to the reaction. We are talking here of a minimum of three steps for the basic unit of analysis :-

- a) the first step which is acting on an hypothesis about how the other will react (what Peirce would call abduction).
- b) the second step which is not just a reaction to the initiating action but also to the premises of that action (the assumptions about the other that seem to be implied in that particular choice of action).
- c) the third step which communicates by action, or inaction, whether the message sent in the second step has been accepted.

On a short time scale we would call this learning ; on a longer time scale adaptive evolution.

The way I have worded the above is uncomfortably anthropomorphic because it might carry too many unintended assumptions about conscious intentions.

Perhaps a more formal statement might communicate better. Let us assume a change process initiated by changes in the L22. Then something like the following is indicated :-

L22(L11) time 0 --- L22(L11) time 1
L11(L22) time 1 --- L11(L22) time 2
L22(L11) time 2 --- L22(L11) time 3.

The initial change of L22(L11) during time 0 to time 1 must be seen as resulting in L22(L11) at time 3, not L11(L22) at time 2.

Similarly, if the change is initiated by L11 then it is L11(L22) at time 3 which 'closes off' the unit of analysis, not L22(L11) at time 2.

It is the triad of movements that provides the necessary ground for understanding further developments. If we restrict ourselves to the first two successive movements then we have a critical unknown, i.e., what has happened to the influence of (L22) on L22 in the first instance or that of (L11) on L11 in the second.

The experimental 'rat psychologist' discovered this when they found that the rats in Californian labs were hypothesizers whilst those in the Yale labs were associationists. The rats in both places had built up their own internalized (L22) as they were interested in when their next meal would come from their L22.

Peirce in his study of the transactional character of semiotics arrived at the same conclusion re the triadic unit of analysis.