Causal overlap and self-reference: a brief summary

Vitor Tschoepke
vitor.tschoepke@gmail.com

The purpose of this text is to present a summary of the theory of self-reference as a result of the superposition of the causal history of a system[1]. Self-reference is discussed here as an effect of the association between memory and causality. When considering the eventual situation of a physical system, different previous alternatives can take it to the same state. The means that constituted it are not intrinsic to it, there are no elements in it to retroact to its previous state. In a system of causal superposition, however, the state contains the history of the states that constituted it.

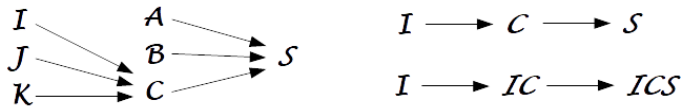

Figure 1. Different alternative states can precede a specific configuration. Here we discuss the case of the previous states constituting the current state, and thus, the reconstitution is part of their reality.

This occurs in systems of *causal delay*, or, systems with memory. In this type of system (a special case of causality itself), the evolution of the system is followed by the delay in leaving the past states. It will incorporate the changes but, resisting them, and confronting them with the tendency to remain, will have the simultaneous recording of the path from the past to the present.

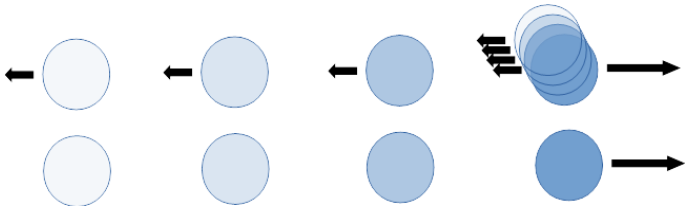

Figure 2. Representation of the causal delay. The direct consequence is the dynamics of evolution being constitutive of the state.

A particular state will thus have the internal dynamics of this evolution. Each state will thus have internal information:

a) the measure of change of each stage of the series, the reunion of an effect on its cause, and not only an alternative expression or other of its possibilities.

b) the determination of which accumulated state will precede, and which will succeed the other, or the ladder of past and relative futures.

The dependence between cause and effect and the relation of succession arise as extra properties. This information is not found outside of this dynamic, for in this case the relation between the previous and subsequent cause is lost, and its past is only a contingency. Only at this level can these properties emerge as such.

[1]For more information about the study: https://philpapers.org/rec/TSCRAT

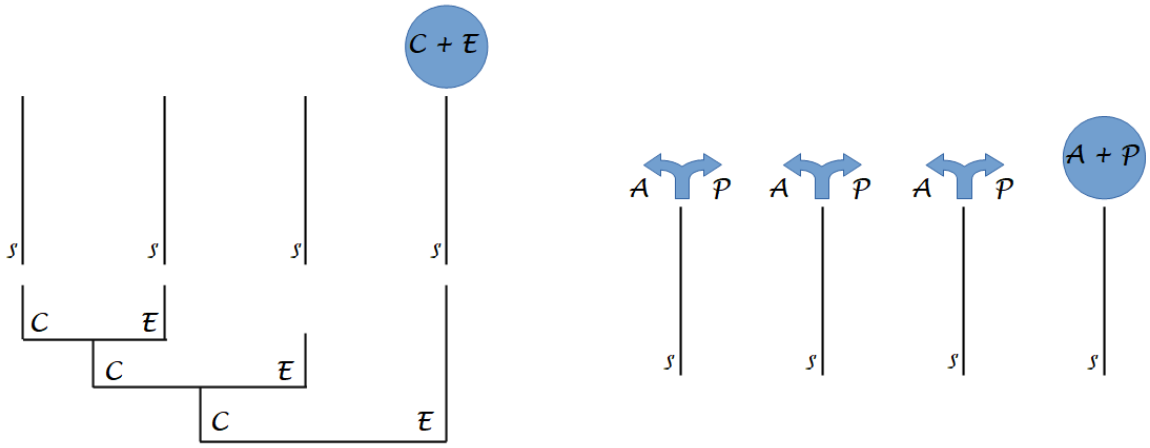

Figure 3. In the schematic we have S: state; C: cause; E: effect; A: antecedence; P: posteriority. Properties that only exist in the dynamics of the transition emerge as state information.

This reasoning leads to a next step. If a state is superimposed, it occurs amidst the continuous accumulation of other, also overlapping states, which in turn contain the generalization of succession and causality between its stages. Thus, as each accumulates the properties of its constituents, by generalizing them (identifying or isolating properties that exist exclusively at the level of succession), they apply to the series, and to themselves. Since the first level abstracts a state, placing it on a continuum, on the next level, succession and cause and effect begin to apply to themselves.

Different cause-effect pairs are then causes and effects of each other and the property, common to either pair, is generalized. The withdrawal of cause-and-effect information starts to apply to itself, and thus becomes self-inclusive.

The same goes for succession. It occurs between states that have withdrawn their own succession from their series, so in the confrontation between them this property is raised informationally as an element, independent of one or another succession, just as it abstracts from particular states and is not found in them.

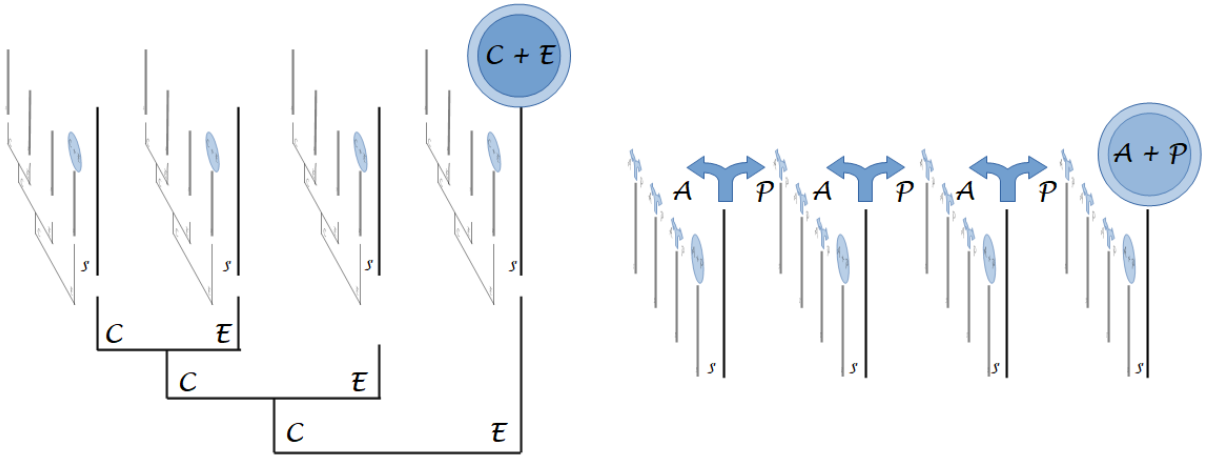

Figure 4: Representation of the generalization of properties, as cause and effect and succession. Applied to themselves in the series, they become self-inclusive.

The reference is a projective capacity, or, of extension from one instance to another. From the particular state one has its perspective enlarged to a succession; this is in turn extended to the succession itself, regardless of what events it is given. In this step, then, the sequence

applies to itself, that is, the self-reference of a property is the projection on the same level as it exists. If in the first level the new category that arises does not exist in its components, the self-referential properties need not be generalized by other levels, since they generalize themselves.

These two levels of dynamics flow naturally from the causal delays themselves, and coexist simultaneously. To understand, just think of the decomposition of a state of memory. Memory is the reconstitution of the past from the present. As each previous state of memory has its own reconstituted series, memory is self-inclusive, or, it is formed of states with its own memory. The same goes for future expectation. Each state of the series has its own relative future ladder, and its projective relation to its immediate future is abstracted, independent of that of one particular moment or another.

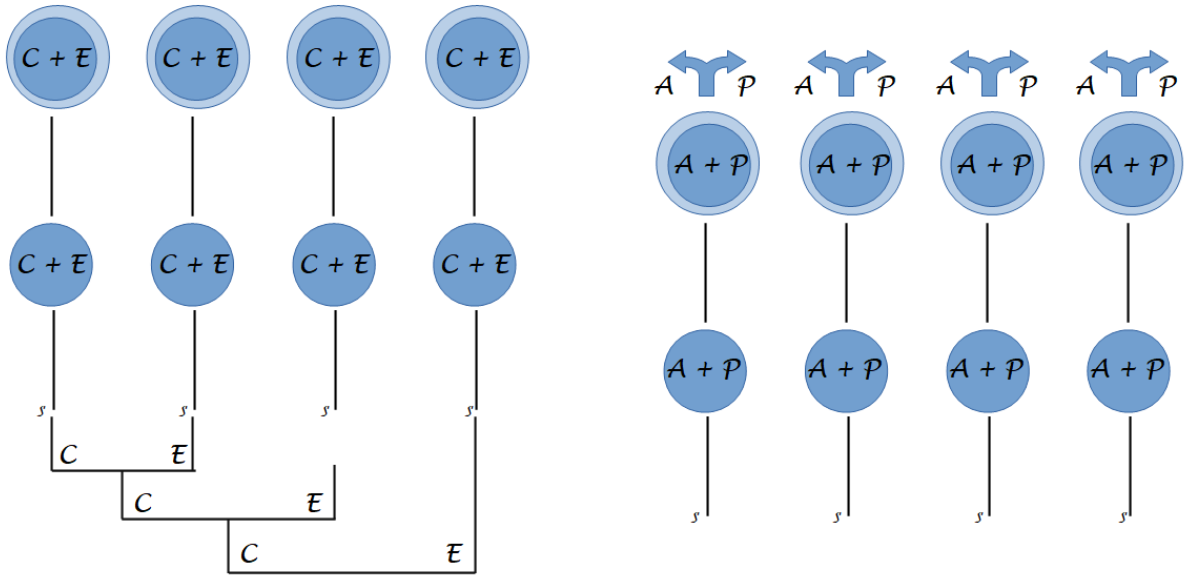

Figure 5: The two levels of dynamics are expressed simultaneously in the state, the generalized property, and its application to itself.

If we consider a physical state as a brain state, we can consider that it has a description in three-dimensional space, as a unified field of tensions. A succession of its states in time, accumulated in a superposed state, has in the first level the informational equivalent to a four-dimensional state. At the second level, that of generalization and self-inclusion, we would have the informational equivalent to the fifth dimension. The first level is expressed as an effective relation, the local reality of a cause-effect pair, identified at a time. At the second level, a given overlap between states reveals a general potentiality, a general space of possible causal events.

A certain causal orientation between states in this way will only be informative when confronted with the general space perspective of possible links between states as a condition of their possibility. That is, it will be part of the physical information of the state that it is one among other possible ones. The general space of all possible states, the structure, in addition to being referenced by the particular state, will include itself in each unfolding, being self-referential.