

Manuscript

Causal-logical Ontology

Abstract

In this paper we begin categorizing a plurality of possible worlds on the basis of permitting or not permitting ontologically different things to be causally connected. We build the work on the dual principle that all universes are causally closed either because no universe causes anything outside itself or because no universe has anything in it that is caused by another universe.

1. Introduction

Philosophical ontology can be investigated by means of logic in a specific manner with help of the concept of causality. In this paper we do that from a standpoint of two broad views of causal closure. The first one is the view that causal closure (of a universe) forbids anything in a causally closed universe to cause anything outside the very universe. The second one forbids anything in a causally closed universe to be caused by anything originating in another universe. With help of these two notions we can begin categorizing a universe of ontologies.

2. One or more causally linked universes

Let us start with a simple assumption.

Assumption 1 (A1): Things that are causally linked have one and the same ontological status.

If we set aside all ontologies that permit causally parallel universes (universes that are not causally linked) A1 constitutes the basis for an ontology, traditional *monism*. If we in this context say that something is, for example, *physical*, then everything is physical. By this standard we have a first element in our 'universe of ontologies'.

Postulate 1 (P1): All universes are causally linked.

Assumption 2 (A2): Things that are causally linked may not have one and the same ontological status.

To make A2 intelligible we should relate it to the notion of the causal closure of a universe. In Gamper (2017) we see an example of the second view of causal closure. Gamper utilizes the idea that a universe is causally closed if nothing from another universe causes anything in it. The difference between the two views is that the second permits interfaces between causally closed universes. Two things according to this view can be causally linked even though they have different ontological statuses. They cannot be causally linked *directly* but rather *indirectly*. Things of different ontological statuses can be indirectly causally linked if the universes they belong to are joined by interfaces.

A2, therefore, may generate ontologies that are based on the second view of causal closure, or, more precisely, may generate ontologies that are based on the assumption that there are interfaces between universes. Accordingly, A2 constitutes the basis for ontologies that permit classical *dualism* and *pluralism*.

3. Vertical and horizontal interfaces

Following A2 and the assumption that there are interfaces between universes we can focus the alternative that there are more than one universe and that they are joined by interfaces. In our categorization of ontologies we now are in position to define a group of ontologies that corresponds to there being two, three, and so on and forth universes, all joined by interfaces. We call such interfaces *vertical* interfaces. Vertical interfaces, according to this terminology, are interfaces caused by one universe and causing another universe.

We may now be more explicit in relation to what an interface would be. Relying on the concept of a universe encompassing all things of a specific ontological status, an interface is defined as something encompassing things of *more* than one ontological status. A concrete example would be the singularity inside a black hole would it be both mathematical (as in having no physical extension) and physical (as in having physical mass).

As black holes often are seen as products of physical processes, they should not pass as interfaces in the sense discussed. That is because they are not *vertical* interfaces. Instead they could be seen as *horizontal* interfaces. We simply define horizontal interfaces as interfaces between universes $w+1$ and w where interfaces between universes w and $a+1$ are caused by vertical interfaces. In our example the corresponding vertical interface would be the initial singularity related to the Big Bang.

In our categorization, thus, a new group of ontologies would correspond to an assumption that permitted horizontal interfaces.

Assumption 3 (A3): some interfaces cause universes (vertical interfaces) and some interfaces do not cause universes (horizontal interfaces).

4. A first cause

Since A2 permits interfaces per se, we actually are allowed to suggest that there may be a first cause to any series of universes. Only A1 rules out that possibility. We on this ground can add to our catalog of ontologies any ontology based on A2 with the addition of it having a first cause. The reason is that both our basic assumptions forbids a universe to cause another universe. The second assumption, however, permits an interface to cause a first universe.

5. Extended interfaces

A final add-on in this exposé is the possibility of what will be called *extended interfaces*. Extended interfaces are interfaces composed of things that have ontological statuses of more than one interface. There are two possible ways to conceptualize extended interfaces. The first is to permit a horizontal interface to be accompanied with yet other ontological statuses. To not complicate things more than necessary, we will assume extended interfaces to be composed of ontological statuses of two or more interfaces, not, for example, of the ontological statuses of one interface with the addition of only one additional ontological status.

Postulate 2 (P2): Extended interfaces have all the ontological statuses of at least two interfaces.

Assumption 4 (A4): Some interfaces may be composed of things of combinations of the ontological statuses of two or more interfaces.

A concrete example of an extended interface would be the eventually that the contents of a singularity inside a black hole would be physical, mathematical, and have the ontological statuses of the first cause (which by definition would have more than one ontological status).

The other possibility is to permit vertical interfaces to be accompanied with other ontological statuses. In our standard example that would entail that the singularity inside the Big Bang would have the ontological statuses of at least one more interface.

Before we sum things up we will forbid any universe to cause more than one interface.

Postulate 3 (P3): A universe can cause no more than one interface.

With P3 we ascertain that the number of universes corresponds to the number of interfaces.

6. Results

Our ontologies will be composed of universes and interfaces. The universes will have different ontological statuses while the interfaces will have different ontological statuses as well as be of different kinds; vertical, horizontal, and extended interfaces.

6.1 Ontologies based on A1

A1 entails either one and only one universe or no universe at all. These alternatives are the common pair of *monism* versus *nihilism*.

6.2 Ontologies based on A2

6.2.1 A first cause

Since A2 allows a first cause any A2 based ontology comes in two flavors, with and without a first cause (except for Nihilism).

6.2.2 Consecutive interfaces

Given a first universe we gather consecutive universes with adjoining interfaces as one main group of ontologies. If we for instance have four universes our ontology on this stage gives us four universes and three interfaces adjoining them. These universes also may or may not have an initial first cause, constituting a fourth interface. So, four universes entail seven or eight different ontological realms.

6.2.3 Horizontal interfaces

Given the group of ontologies building on consecutive interfaces we have the opportunity to consider the class of horizontal interfaces in each individual case of a specific interface. Each vertical interface possibly has a horizontal twin. In the four universes case we have seven or eight ontological realms not considering horizontal interfaces. If we take in such interfaces we have three additional ontological realms to consider, one for each interface between two universes. Four universes, thus, may generate up to eleven ontological realms.

6.2.4 Extended interfaces

The extended interfaces are combinations of interfaces. If we look at the four universes case we have three vertical interfaces and three possible horizontal interfaces and also a first interface in the first cause case. If we look at the first interface it may have its horizontal twin. In both cases the first cause interface could be combined with either interface. Without the first cause interface the first interface between universes does not correspond to an extended interface, nor its horizontal twin. The second interface between universes could be combined with the first interface between universes as well as with its horizontal twin. This applies also to the twin interface of the second interface between universes.

We see here the exponential character of the number of potential ontological realms as the number of consecutive interfaces raises.

7. Conclusion

Developing ontologies on the ground of permitting or not permitting ontologically different things to have causal links is a viable path towards establishing a robust manifold of 'possible worlds'.

Reference

Gamper, J. (2017). On a Loophole in Causal Closure. *Philosophia* 45, 631–636.