

## Emergence

The mysteriousness of the concept of emergence has its cause in a certain metaphysics, which has been dominant as so-called 'substance ontology' already since antiquity in the whole European cultural area. It derives its plausibility from certain psychological features of our cognitive apparatus. Our perception and thinking apparatus is trained to perceive single objects, their properties and their relations to each other. Processes also play a role in this kind of cognition, but have been philosophically marginalized in the course of European intellectual history because of their difficult tangibility.

The Christian worldview of an omnipotent and omniscient creator was a decisive factor in this development. Already in late antiquity, God was depicted as a transcendent person whose world creation was based on a plan. Since God was conceived as perfect in every respect, this plan also had to be perfect from the beginning.

At the end of the Middle Ages and in the course of the rise of natural sciences in Europe, this conception of the Christian God gave rise to the idea that the world is a clockwork that functions according to eternal laws that have existed from the beginning of the world. This conception, however, that the set of rules of the cosmos is fixed from the beginning and is not subject to any development, is an assertion which could never be proved and is also not provable at all, consequently an axiom. This axiom, which could hold on even over the discovery of relativistic physics and quantum physics into modern theoretic physics (up to the now largely abandoned attempt to find a theory of everything), is the main reason why the concept of emergence is so puzzling. Because emergence is the opposite of a physical reductionism of the course of the world to fixed, physical basic rules.

We can now sketch an alternative model to this fundamental conception without having to correct our empirically based, physical world view even in the slightest. The only, however essential difference consists in the fact that an accordingly changed cosmological model allows an evolution of the structure of the cosmos. That again is the basis of every consistent model of emergence.

First, a few things about the concept of emergence and the foundations of current physical ontology:

The concept of emergence is related to the concept of evolution, only a little more general in that 'evolution' was initially used only for the biological sphere. 'Emergence', on the other hand, concerns what could also be called 'cosmic evolution'.

The cosmologically earliest emergence already occurred when different forms of particulars emerged from the protophysical possibility space. They took the shape of three kinds of particulars that emerged from the cosmic universal or all-process in the course of the cosmic evolution as relatively decoupled or encapsulated particulars, namely:

- (1) **Fields, objects and systems of objects (called: entities), as well as**
- (2) **Changes in the state** of these entities, and
- (3) individual **processes** between them.

Between these three entity types and the processes running between them together with the state changes at the entities which cause these processes, there is an interrelatedness. None of these

cosmological structure elements and with them their assignment in space and time can be removed without the whole cosmic structure collapsing.

All three of these fundamental structural elements are characterized as singularity by the fact that they are both dynamic, i.e. interacting part of the whole cosmos, and also and nevertheless separate. Concerning the separateness of systems and objects I call this 'relative encapsulation', where systems are more weakly encapsulated than e.g. physical objects.

Now, this process-logical connection does not take place arbitrarily, but - especially on the physical level - very regularly. This regularity is traditionally called 'laws of nature'. However, this is a very problematic conception of the physical cosmos, because it implies the ontological dissimilarity of laws and what they are to be applied from, i.e. an - unless one is religious - inexplicable cosmological dualism.

Therefore, it is better to speak of a **conditional structure**, because this only implies an intrinsic restriction of the possible process structures, but neither a legislator nor abstract laws separated from the physical cosmos.

→ On the concept of conditional structure: explanation with examples.

Thus, compared to a static set of rules, a set of conditions already fulfills perhaps the most important prerequisite for emergence, namely the possibility of **internal differentiation** (in German: 'Binnendifferenzierung') of the established conditions.

The next step as a consequence of an emerging internal differentiation is the stabilization of certain condition levels or structural levels. I call these **layers of existence**. These layers build on each other linearly, i.e. each layer fulfills all process conditions of all preceding layers but adds for its part new process conditions.

→ Examples of ontological stratification.

The question here, however, is whether these layers are cleanly and erratically separated from each other. The answer is: No, they are not. The transitions are fluid. Nevertheless, stability levels are formed. The too 'hard' layer picture must therefore be refined. For this purpose, we choose the counter-model of Hegel's developmental spiral of progress, which is not steady either but ascends discontinuously from thesis and antithesis to the respective new level of synthesis, but it does so in innumerable small steps. This spiral must be imagined as a spiral, which shows (metaphorically / visually) thickenings on the respective stability levels.

→ Image of a development spiral in contrast to simple layering.

Finally, however, it is very important what the increasingly dense set of conditions means with regard to the possibility space of a stability level. Answer: Each new stability level not only restricts the process space of the preceding levels but also creates completely new process possibilities.

→ Examples of the restriction of a process space by internal differentiation with simultaneous opening of new **possibility spaces** on the respective new stability level.

In order to be able to represent such a developmentally open, structural evolution, however, one should not focus on certain new objects and their attributes or new processes between them, but on **object, state, and process types**. Only by means of typification of the new can the diversity of the new and thus also the identification of successful types and thus the stabilization of an emergence level be represented.

→ Examples of entity, state, and process types.

An evolutionary open ontology explains many things that a cosmology fixed on natural laws cannot explain.