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### De emergentie en evolutie van drie werelden

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## **Korte Engelse samenvatting en conclusie**



## Een korte Engelse samenvatting en conclusie

### Summary and conclusion

Title of the dissertation:

## **The Emergence and Evolution of Three Worlds**

Subtitle:

### **Second Revision of Poppers Three Worlds Theory**

### **Purpose and origin of the dissertation**

Karl Popper's three worlds theory is an attractive theory for those who want to defend a non-reductionistic metaphysics all owing for epistemic changes of perspective. In the first place, the three worlds theory is a theory that strives to provide an ordering of *all* entities in reality. This ordering is realized by the physical, mental and abstract status that entities possess. This status characterises the entities in world 1, world 2 en world 3, respectively. According to Popper, these three domains together constitute the whole of reality.

From an epistemological point of view, the physical entities of world 1 have in common with each other that they can be known from a third person perspective. But, the 'epistemological recognizability' of these entities becomes actual only after the birth of world 2 and 3 in the history of the universe. It is important to note that in this dissertation one of the basic assumptions underlying the historical determination of Popper's three worlds is an evolutionary point of view.

A similar situation holds for the entities of world 2, the mental entities or states of affairs. These are knowable only from a first person perspective. The origin of the first person perspective coincides with the origin of world 2 in the history of the universe. Being recognizable only from a first person perspective is a property which is common to all entities of world 2. The entities of world 2 constitute a class of entities which is distinguished by this property from the entities of world 1.

The abstract entities of world 3 also have an epistemological property in common. The entities of world 3 are, like the entities of world 1, knowable from a third person perspective. World 1 and world 3 together constitute the objective part of reality. The character of world 3 is classified by Popper as 'man-made'. But, the creation of abstract

entities, like arguments and theories, can have unexpected implications which can be discovered. So, these entities are 'given'. Already existing entities are also 'given' for those who are not familiar with them. So, these entities can be discovered.

Popper's original three worlds theory has been revised and further elaborated by Veening, after the latter had noted the following problems in Popper's theory:

- there is no differentiation between entities within a world
- Popper suggests that *all* cases of relatedness between entities from different worlds are of the same kind
- there is no distinction between relations of entities within a world and relations of entities from different worlds.

In order to solve these problems, Veening developed his own theory (3Wt-R) which is characterized by the existence of a) subworlds, b) different relations and c) a specific notation for entities.

Ad a) A subworld is a subset of world 1, world 2 or world 3 and will be denoted by the H-concept. The H-domain stands for 'habitat' and is also called 'life-world' by Veening. The result is the existence of H1-, H2- and H3-domains.

Ad b) The power of relatedness between entities can be represented by the connection-coefficient **C**. When there is no relation between entities, the value of **C** is 0, and when the relation is as strong as possible, **C** takes the value 1. In this manner a continuum is created in which there is a position for the power of each case of relatedness. With the terms 'pendant entities' and 'analog entities' the differentiation between the relations in a world and the relations between worlds are represented.

Ad c) A further differentiation between entities in 3Wt-R is made by means of subscripts to W1 (world 1), W2 (world 2) and W3 (world 3). The same holds for the subsets H1, H2 and H3. The result is a very informative notation and a conceptual elaboration of the theory of Popper. For example, a W3.2.1-entity is a concept (W3) of an observation or remembrance (W2) of a physical entity (W1). Veening also uses the notation  $e^{3.2.1}$  for this entity. With this notation it is possible to reformulate philosophical and scientific questions and, possibly, to formulate them in a more effective way.

The central issue of Veening's theory is his rejection of monistic and dualistic positions. They are too reductionistic in his opinion. An adequate metaphysical theory is only possible by following the way of triadism. Therefore, the three worlds must be radically distinguished.

Besides the differences between Popper's original theory (3Wt) and the revised version developed by Veening (3Wt-R) there are also many similarities between both theories.

Both theories imply the following questions:

- 1) Are 3Wt and 3Wt-R compatible with substance monism and/or materialism? It is significant to remark that Popper himself didn't appreciate the term 'substance'. Veening seems to be a pluralist on this topic.
- 2) What is the relation between the three worlds? Popper regularly refers to the principle of emergentism, but it is not clear what the precise meaning of this notion is in his work. The next question is closely related to this issue.
- 3) What is the relation between the history of the three worlds and evolutionary theories? Veening did not write very much on this topic in his work. In the opinion of Veening, relations between worlds are always relations between entities and H-domains contained in these worlds. "The" relation between worlds doesn't exist.

Considering point 2 and 3, in this dissertation, the choice is made to investigate the principle of emergentism and especially the diachronic variant of emergentism. Another question which is implied, mainly by 3Wt-R, is:

- 4) What is the status of the 'life-worlds' (H's) ? Do we have to understand them as phenomenological, epistemological or only as existential?

These questions constituted the inspiration to write this dissertation. Veening's revised version of the three worlds theory clearly is an improvement compared with Popper's original theory. However, the theory as developed by Veening leaves too many questions unanswered to accept it uncritically.

## Summary and conclusions of the chapters

In chapter 1, part A, which was also published as an independent article in the journal ANTW, the proposal is formulated to combine the principle of emergentism with symmetry breakings, similar to those in the work of K. Mainzer. Mainzer thinks that the term 'symmetry breaking' is an ontological notion and that the reconstruction of symmetry breakings (theory reduction) is an epistemological issue. In Mainzer's opinion, a symmetry/symmetry breaking is the fundamental category for a successful and consistent framework of scientific research. Mainzer's work is closely related to complexity theory. Physical, mental and social parts of reality are non-linear, complex and computational. Symmetries and symmetry breakings are central notions of these systems.

The proposal of chapter 1, part A, to combine the relation of the three worlds with symmetries and symmetry breakings, yields a prospect for a precise historical and evolutionary description of the development of the three worlds. A successful

confrontation between the three worlds theory and Mainzer's convictions makes the defence of substance monism/materialism and the claim of a many-layered reality compatible.

With the launch of the proposal of chapter 1, part A, a beginning is made with the development of 3Wt-R<sub>2</sub> (the second revision of the three worlds theory).

The research presented in chapter 2 concerns the symmetries and symmetry breakings *in* the three worlds. The purpose of this research was to gain more knowledge about the process of symmetry breaking itself.

The process of symmetry breaking that occurs in the phenomenon of ferromagnetism is studied. This is an example of symmetry breaking in non-living entities in world 1. Given the fact that there are also living entities in world 1, symmetry breakings in the regeneration and the reproduction of the polyp hydra were also considered. The emergent entities in this kind of symmetry breakings are respectively a magnetic field and the introduction of a new level of organization during the evolution.

Some very famous visual illusions were chosen as examples of symmetry breakings in world 2. Illusions are subjective *experiences* and it is evident that they belong to world 2. These illusions were not analyzed in great depth, as there exists a huge volume of literature on this topic. It is evident, and that is important enough, that in the case of illusions the *experience* of depth, foreground and background emerges by the appearance of symmetry breakings.

As a case-study and an example of symmetry breaking in world 3, in chapter 2, the 'underdetermination of theories' thesis is considered. This thesis has been responsible for a lot of commotion among philosophers. The abstract character of the 'underdetermination of theories' thesis ensures that a further explanation is not needed to conceive of it as an element of world 3 and a potential case-study of symmetry breaking. The research into symmetries and symmetry breakings is, in relation to this thesis as an element of world 3, quite important. The reason is that the theories 3Wt and 3Wt-R as *theories* belong to world 3. If the result of the 'underdetermination of theories' thesis is generalizable to all symmetry breakings in world 3, than this provides a new insight to the relation of symmetries/symmetry breakings and the three worlds theory.

Another question is whether the 'underdetermination of theories' thesis, eventually in a revised version, is applicable to the three worlds theory itself. This question in turn affects the question to which degree the three worlds theory can be interpreted in a realist instead of only an instrumentalist manner.

In this part of chapter 2 it is shown that at least three types of symmetry breakings can be distinguished.

In chapter 3 the structure of worlds 1, 2 and 3 is examined.

During the research into the structure of world 1 the work of Leyton was taken into focus. In Leyton's opinion, objects are known by reconstructions of symmetry breakings. The forms of objects are determined by one single causal chain through time. However, Leyton had done a better job if he had assumed a *category* of causal chains to explain the origin (of the forms) of objects and not assumed one unique causal path to recognize an object. By using the term *category* it is very easy to jump to the work of Kant, which forms a central part of the research into the structure of world 2.

In chapter 3, one of the issues was the investigation of the possibility to interpret symmetry breakings and their reconstructions as 'Formen der Anschauung'. The modification of Kant's philosophy using symmetries and symmetry breakings apparently has many advantages. These are elaborately discussed. Although the 'modification' of Kant's philosophy into a three layered ontology is not totally new and can be found with many neo-Kantians, the result of the research in chapter 3 can hardly be positioned in the Kantian tradition.

It is established that the structure of world 3 can be characterized by N:M relations between entities. This observation yields the possibility to start with the formalisation of the notion of emergence. The result of such a project plays an important role in the development of new forms of emergence for the three worlds theory. This last point occurs in chapter 4.

In order to develop new forms of emergence, chapter 4 begins with an overview of the different forms of emergence which are currently discussed. These different forms can roughly be divided into two groups, namely synchronic and diachronic forms of emergence.

Chapter 4 subsequently confronts the different forms of emergence with the examples of symmetry breaking discussed in chapter 2. In addition, research is done into the relationship between the different forms of emergence and the three worlds themselves.

Although special forms of emergence are appropriate to guarantee the substantial unity of the three worlds without sacrificing their mutual differences, the principle of emergence cannot be uncritically accepted. The threat of causal overdetermination, which occurs very soon in the defence of a pluralistic ontology, can diminish the power of the principle of emergence. In chapter 4 it is tried to solve this problem by 1) making a distinction between causal and effective interactions, 2) interpreting life-worlds (H's) as 'states of affairs' and 3) letting levels of organisation arise by means of symmetry breakings.



The result of this project is the development of four special forms of emergence for the three worlds theory, namely three diachronic forms of emergence (emergence<sub>3Wt-1</sub> to emergence<sub>3Wt-3</sub>) and one synchronic form of emergence (emergence<sub>3Wt-4</sub>).

It was a very remarkable observation that the manifestation of emergence<sub>3Wt-4</sub> in world 2 is equal to the finishing of the ontological manifestation of the first person perspective and that the manifestation of emergence<sub>3Wt-4</sub> in world 3 is equal to the finishing of the ontological manifestation of the third person perspective. By way of the phenomenon of emergence<sub>3Wt-4</sub> epistemological perspectives on reality become completely ontologically determined. This ontological determination can be justified by the all-embracing character of the three worlds theory.

At the end of chapter 4 the second revision of the three world theory is baptised as 3Wt-R<sub>2</sub>.

In chapter 1, part B, in combination with chapter 4, part B, research has been done into possible neurological evidence for 3Wt-R<sub>2</sub>. The purpose of this research is the search for an empirical underpinning for 3Wt-R<sub>2</sub>. To reach this goal, the work of the neurologist Damasio has been studied. Although many readers associate Damasio's work with the position of a sense-datum theory, it is possible to find in his work a defence for an (ontologically) three domain reality.

The existence of physical entities is recognized by reductionists (materialists), as well as non-reductionists. There is still a lot of discussion these days about the existence of mental entities and states of affairs. The research into Damasio's work in relation to the three worlds theory yields the following striking conclusion for the world 2-entities and the status for H<sub>2</sub>'s: "The emergence of world 2 has taken place by one symmetry breaking. This symmetry breaking can be described by the symmetry breaking in the scheme "Object/Subject  $\leftrightarrow$  Object/Subject" with the result that (the first) H<sub>2</sub>=W<sub>2</sub>. Since the appearance of world 2 in the evolution of life the existence of world 2 is ensured by an (endless) chain of symmetry breakings at the level of concrete and particular entities."

It is less easy to make plausible the independant existence of abstract entities as inhabitants of world 3. To do this job, again the work of Damasio is studied for neurological evidence. With some care, the following conclusion can be formulated: "Only for the first appearance of a symmetry breaking in the scheme "Speaker/Listener  $\leftrightarrow$  Speaker/Listener" does it hold that H<sub>3</sub>=W<sub>3</sub>. World 3 is more than the sum of the organisms which together constitute the substrate at the underlying micro-level. The reason for this is that the emergence of a new level of organization by means of symmetry breakings entails a separate ontological domain of concepts, theories, critical arguments etc. From an epistemological point of view, the coming into existence

of world 3 is responsible for the emergence of the third person perspective.

Although it is not claimed that the defence of an empirical underpinning of the three worlds theory is completed, the claim that there is a generous neurological support for the theory can be justified.

In chapter 5, it is attempted to articulate 3Wt-R<sub>2</sub> further by searching for the different characteristics of 3Wt-R<sub>2</sub>.

In the philosophical literature, when Popper's three worlds theory is discussed, most arrows are fired at the claim of the existence of world 3. Using the argument of 'The Problem of the Printed Line', it is attempted to save world 3.

After this attempt at saving world 3, some epistemological research is done into the relation of Popper's three worlds and 'possible worlds'. The relation of the three worlds, in terms of possible worlds, can probably be expressed in a very precise and formal way.

Subsequently, it is tried to make a connection between 3Wt-R<sub>2</sub> and the topic of 'internalism versus externalism'. The most salient property is that world 1, in contrast to worlds 2 and 3, is spatio-temporal.

The question why reality would be built of three domains and not more is a question to which the answer is the most salient aspect of the three worlds theory. On the basis of the work of Penrose, Ellis and Saleemi an adequate answer is being sought. For the moment, a 3-layered ontology seems the most plausible one.

The theory of 3Wt-R<sub>2</sub> acquires clearer contours by confronting it with the preceding theory of 3Wt-R. In this confrontation the accent is of course placed on the relations between the three worlds and the different entities. The result of adding temporal subscripts to the H's and W's in 3Wt-R<sub>2</sub> is an increased distance between 3Wt-R and 3Wt-R<sub>2</sub>.

After this exercise the subject of study was the symmetric and recursive structure of 3Wt-R<sub>2</sub>. The recursive structure of 3Wt-R<sub>2</sub> is the result of the fact that theories, and thus 3Wt-R<sub>2</sub> itself, belong to world 3. At the end of chapter 5, it was found that this characteristic of 3Wt-R<sub>2</sub> was of a great importance for the interpretation of 3Wt-R<sub>2</sub> in a constructive realistic manner.

It has become clear in chapter 5 that the fact that ontology and epistemology are two sides of the same coin is a very salient characteristic of 3Wt-R<sub>2</sub>.

Chapter 6 contains an extended summary as well as the conclusions of this dissertation.

## Final conclusion

The final conclusion that can perhaps be drawn is that the revision of the original three worlds theory of Popper into 3Wt-R<sub>2</sub> provides a very rich conceptual scheme on the basis of strong metaphysical and empirical grounds. A scheme with a basis that can foster the reformulation and revisiting of philosophical and scientific questions and problems. In addition, this dissertation offers enough anchor points for further study into its triadistic metaphysics. The waiting is for 3Wt-R<sub>3</sub>.....



