Cosmic

Greg

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1 Cosmic

Notes on Helier Robinson's *Cosmic Coincidences.* http://arxiv-web3.library.cornell.edu/abs/1111.4562

1.1 Abstract

Arising out of an attempt at a new foundations of mathematics, in which relations are more primitive than sets, and out of the theoretical physicists' concept of underlying causes of empirical phenomena, the idea of a purely mathematical possible world (of underlying causes) is developed. It is shown that at least one, and at most one, possible world is actual, and that the one that is actual is the best (as in the philosophy of Leibniz), and therefore requires the cosmic coincidences to exist. This best is actual necessarily because of having a higher level top relation than any other possible world, and because of this top relation possessing the property of intrinsic necessary existence.

1.2 The Problem of Cosmic Coincidences

The *Problem of Cosmic Coincidences* refers to the improbability of certain parameters in theoretical physics having the values that they do. Following Lee Smolin (Smolin, 1997) Robinson lists four solutions to this problem:

- Anthropic explanation
- Fine-tuning explanation
- One consistent mathematical system
- Universes emerge from black holes

For Robinson, none of these options are satisfactory, so he posits a fifth explanation, which derives from the work of GW Leibniz. Leibniz claims that the "actual world exists necessarily because it is the best of all possibles." The world that Leibniz refers to is not the world of empirical phenomena that we experience, but rather the world of underlying causes of these empirical phenomena.

So for Robinson, there are two worlds, the *EMPIRICAL WORLD* and the *UNDERLYING WORLD*, and it is crucial for the argument that we are clear about which of these worlds that we are talking about.

The core of the argument rests on the concept of *NECESSARY EXISTENCE* or *ACTUALITY*. According to Robinson: "If this concept is neither self-contradictory nor implies a contradiction, then whatever has this necessary existence must exist in at least one among all possible worlds, making that one possible world actual."

1.3 Relational Philosophy of Mathematics

Robinson's argument rests on a philosophy of mathematics based on relations rather than sets. According to Robinson, in set theory, the defintion of relations "involves a vicious circle": the definition of relations as subsets of Cartesian products presupposes the relation of set membership and the relations of logical argument forms.

Since relations (arguably) are more important than sets in mathematics, and sets can be defined easily in terms of relations, relations should be made fundamental in mathematics.

Once relations are made fundamental, we can distinguish between three kinds of defined sets:

- Intensional sets
- Extensional sets
- Nominal sets

The *INTENSION* of a set (if it has one) is all those properties that all and only its members possess.

The *EXTENSION* of a set is the totality of its members.

A *NOMINAL SET* is a set that has a name or a description but otherwise does not exist.

1.4 Possible and Actual

1.5 Summary of Argument

1.5.1 Overview of what has been said so far

- At most one possible world can be actual
- At least one possible world must be actual
- At most one possible world containing a relation possessing INE can exist
- At least one relation possessing INE must exist

The only way in which all these four conditions can occur together is if this relation possessing INE emerges as the top relation of a possible world having a higher top level than any other possible world, which makes the relation possessing INE unique among all possible worlds. The possible world possessing this unique relation must be the best of all possibles **G**. This unique relation must be **T**, possessing the emergent property of INE. Thus:

1.6 Bibliographic Information