Closed Natural Numbers Cosmology

by Sven Nilsen, Zach Smith, 2021

In this paper we show that closed natural numbers applies to many cyclic cosmological theories.

The power of normal paths as abstractions is that one can reason with them without having an exact underlying theory of the phenomena one wishes to predict. This property is in particular helpful for cyclic cosmological[1] theories. A cyclic cosmological theory is when there is a mechanism which "restarts" the space-time as seen from the perspective of observers living inside it.

Closed Natural Numbers[2] Cosmology might be thought of as an assumption that applies to many cosmological theories. It does not make exact predictions, but serves as an explanatory device that does not depend on a specific theory. It uses two assumptions:

1. Events that restart the universe are extremely rare seen from the perspective of observers
2. All or most restarts lead to a similar initial state

The initial state is called `0`.

Successive states, or sets of likely successive states, are called `1, 2, 3, ...`.

With other words, each natural number has an associated state or a set of possible states.

One assumes that each state contributes back to the initial state. This can be probabilistic, so it might be not interpreted as the contribution being perfectly uniform. On average per state, the contribution is extremely low, but since there are infinitely many natural numbers, the in-flow of initial state transitions is large compared to in-flow of non-sequential state transitions.

This picture also makes sense when many possible successors generate possibly many observers which have some kind of common history or origin of their local universe. The more specific a history is described or measured, the less likely is it for many future observers in the total multiverse[3] to share that particular history. With other words, the initial state for most observers is characterised by properties which many initial states have in common, that in turn results in observers.

One way to think about Closed Natural Numbers is by using probability theory[4]:

$$\text{succ}(x : \mathbb{N}_c) = \text{if random}() < \varepsilon \{ 0 \} \text{ else } \{ x + 1 \}$$

For some extremely small probability `ε`, the successor of some closed natural number is `0`. This might be used in theories where e.g. quantum tunnelling[5] might kick start inflation[6] spontaneously. Or, the formation of a black hole generates a new universe within its interior, a relative rare event, but might happen across many possible histories.

Closed Natural Numbers is also useful to think about less intuitive cosmological theories e.g. Conformal Cyclic Cosmology[7] (CCC). In CCC, the entire aeon maps to a single moment of the next aeon, which makes a continuous contribution, consiting of infinitely many events.

References:

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