The Whole Universe as State

by Sven Nilsen, 2020

Usually in physics, one is thinking about phenomena in a part of the universe. Under an extreme observer selection effect, this is problematic, because it is not easy to draw a boundary between systems affected by the selection effect and systems that are not. Fortunately, when the effect is extreme enough, one can make a great simplification: Consider the whole universe as a state.

The entire universe might be thought of as a particle moving through a space. This space is different than a normal space, because the space of the universe itself is part of the state. Instead, the space might be abstractly thought of as consisting of changes in the internal relations of the universe.

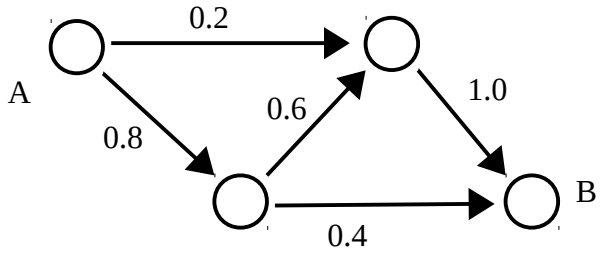
In two identical universes, the same events have the same probability of happening. To a lesser degree, similar events in similar universes have similar probabilities of happening. However, to an observer, two events might look very similar, but the probability that one event happens from the other can be extremely low. On the other hand, large changes taking place in a short time can make two universes look very different. This means that our intuition about similarity among universes is not robust. The correct intuition is directional: Similar universes have often similar events, but similar events does not imply similar universes.

Therefore, it is a good idea to forget how universes look like inside and only define similarity in terms of probabilistic changes.

Another intuition that is misleading is how people think about time. In a space, you would imagine how long time a particle needs to travel from A to B. However, since the positions of a single particle is irrelevant when thinking about whole universes, it also means that time is not relevant in the same sense.

Is it possible to forget time and only reason about observer selection effects when universes are separated by probabilities?

For example, using this definition, there is a probability `1` of moving from A to B:



When forgetting about time, A and B would be very similar, except for the fact that B can not turn into A, since arrows are pointing toward B, but A can turn into B. This leads to inconsistency.

Therefore, it is not possible to ignore time, which must be modeled in addition to probabilities.