A Brief Introduction to N-universes

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The n-universes are a methodological tool the scope of which proves to be general and which find to apply in the thought experiments underlying philosophical problems. The n-universes have been introduced in Franceschi (2001) in the context of the study of Goodman's paradox and described in more detail in Franceschi (2002), in the context of their application to the paradoxes related to the Doomsday argument. I propose here to present the basic elements of the n-universes, from an essentially pragmatic standpoint, i.e. by describing accurately the step-by-step process which leads to the modelisation of a thought experiment.

Presentation of n-universes

The n-universes are simplified models of the physical universe corresponding to a real situation referred to in a thought experiment. Making application of Occam's razor, the n-universes thus make it possible to model a real situation with the help of the simplest model of universe, while nevertheless preserving the fundamental structure of the corresponding real situation. Let us describe then the essential elements of n-universes, from a basically operational standpoint. When one proceeds thus to model a concrete situation with a n-universe, one can determine its structure by means of the successive answers to the four following questions:

1. *does the n-universe have constants or variables?*

The first task consists in determining which are the *criteria* of the n-universe corresponding to a given situation. These latter criteria include both constants and variables. Among the most common criteria, one can thus mention the temporal (Time) and spatial (Loc) criteria, but also the criteria of colour (Col), shape, temperature, polarisation, etc. Usually, the n-universe corresponding to a given thought experiment comprises at least the criteria of time and space. This can be illustrated through the following examples:
- the $\Omega Obj_0Time_0Loc_0$: a n-universe comprising a unique object, a temporal constant and a spatial constant
- the $\Omega ObjColTime_0Loc$: a n-universe comprising multiple objects, a colour variable, a temporal constant and a space variable

2. *does the n-universe comprises a unique object or multiple objects?*

It is also worth drawing a distinction according to whether the given n-universe comprises either one single object (ΩObj_0) or multiple objects (ΩObj). To cite a few examples:
- the $\Omega Obj_0TimeLoc_0$: a n-universe comprising a unique object, a temporal variable and a spatial constant
- the $\Omega ObjTimeLoc$: a n-universe comprising multiple objects, a temporal variable and a space variable.

3. *is a given variable-criterion demultiplied or not?*

This distinction only relates to the variable-criteria of a given n-universe, and does not apply to constant-criteria. A given variable-criterion χ (time, space, colour, etc.) of a n-universe can be demultiplied (χ^*) or not (χ). If the variable-criterion χ is demultiplied, an object in this type of n-universe can exemplify several taxa of the criterion χ. In our physical universe, objects have a

property of temporal persistence: they exemplify thus several successive temporal positions. The corresponding model is a n-universe where the objects are demultiplied with regard to the temporal criterion (ΩObjTime*). To take an example:

- the ΩObjTime*$ObjLoc_0$: a n-universe with multiple objects comprising a temporal variable and a spatial constant; the objects are also demultiplied with regard to the temporal criterion, so that a given object can thus exemplify several different temporal positions.

4. *are the multiple objects in a one-one or in a many-one relation with regard to a given criterion?*

This last distinction does not apply to the n-universes comprising one single object and only relates to those n-universes comprising *multiple* objects. Among these latter n-universes, one can then distinguish two cases. First, when the same taxon of a given criterion χ is exemplified by several objects, these latter are in *many-one* relation with the χ criterion (ΩObj*χ). By contrast, when every taxon of a given χ criterion is only exemplified by one single object, the objects are in *one-one* relation with this last criterion (ΩObjχ). To give a few examples:

- the ΩObj*Col_0Obj*$Time_0$ObjLoc: this type of n-universe with multiple objects comprises a colour constant (Col_0), a temporal constant ($Time_0$) and a spatial variable (Loc); moreover, the objects are in a *many-one* relation with the colour constant, so that all objects share the same colour; in addition, the objects are in a *many-one* relation with the time constant, so that several objects can exist at a the unique temporal position; on the other hand, the objects are in *one-one* relation with the space criterion, so that only one object can exist at a given space location (*Fig. 1*)

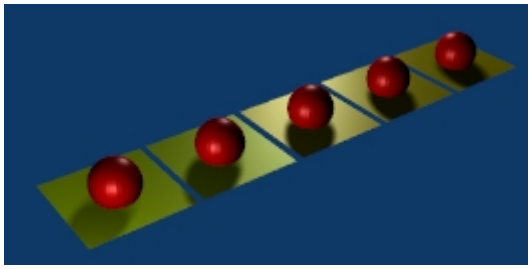

Figure 1

- the ΩObjColObj*$Time_0$ObjLoc: this type of n-universe with multiple objects comprises a colour variable (Col), a temporal constant ($Time_0$) and a spatial variable (Loc); moreover, the objects are in a *one-one* relation with the colour variable, so that all objects can have a different colour; in addition, the objects are in a *many-one* relation with the time constant, so that several objects can exist at a the unique temporal position; on the other hand, the objects are in *one-one* relation with the space criterion, so that only one object can exist at a given space location (*Fig. 2*)

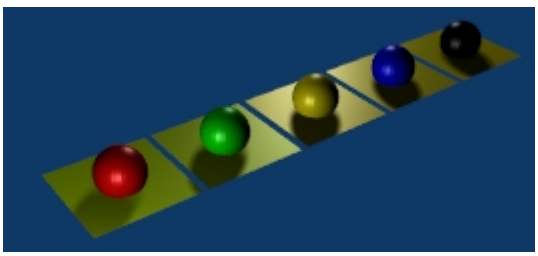

Figure 2

- the ΩObj*ColObj*$Time_0$ObjLoc: this type of n-universe with multiple objects comprises a colour variable (Col), a temporal constant ($Time_0$) and a spatial variable (Loc); moreover, the objects are in a *many-one* relation with the colour variable, so that several objects can have the same colour; in addition, the objects are in a *many-one* relation with the time constant, so that several objects can exist at a the unique temporal position; lastly, the objects are in *one-one* relation with the space criterion, so that only one object can exist at a given space location (*Fig. 3*)

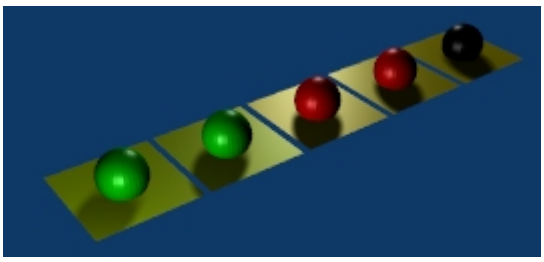

Figure 3

- the ΩObj*Col_0Obj*$Time_0$Obj*Loc: this type of n-universe with multiple objects comprises a colour constant (Col_0), a temporal constant ($Time_0$) and a spatial variable (Loc); moreover, the objects are in a *many-one* relation with the colour constant, so that several objects can share the same colour; in addition, the objects are in a *many-one* relation with the time constant, so that several objects can exist at a the unique temporal position; on the other hand, the objects are in *many-one* relation with the space criterion, so that only several objects can occupy the same space location (*Fig. 4*)

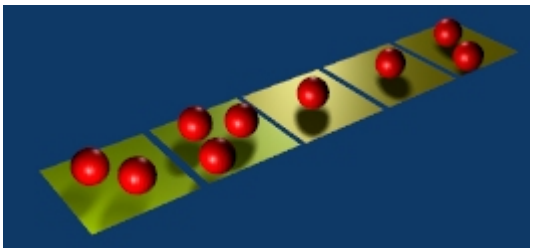

Figure 4

First steps with n-universes

At this step, we are in a position to illustrate what precedes through a concrete example. Consider then the following experiment, described by John Leslie (1996, p. 191):

> You develop amnesia in a windowless room. Where should you think yourself more likely to be: in Little Puddle with a tiny situation, or in London? Suppose you remember that Little Puddle's population is fifty while London's is ten million, and suppose you have nothing but those figures to guide you. (…) Then you should prefer to think yourself in London. For what if you instead saw no reason for favouring the belief that you were in the larger of the two places? Forced to bet on the one or on the other, suppose you betted you were in Little Puddle. If everybody in the two places developed amnesia and betted as you had done, there would be ten million losers and only fifty winners. So, it would seem, betting on London is far more rational. The right estimate of your chances of being there rather than in Little Puddle, on the evidence on your possession, could well be reckoned as ten million to fifty.

Let us proceed now to model the situation corresponding to the *Little Puddle/London experiment* in the framework of n-universes. What are thus the criteria of the corresponding n-universe? It appears first that the corresponding situation characterises itself with the presence of multiple individuals, namely 50 inhabitants in Little Puddle and 10 million in London. Consequently, the corresponding n-universe comprises multiple objects (ΩObj). It also appears that the Little Puddle/London experiment takes place at one single temporal position. Thus, the corresponding n-universe has a constant-time (Ω $Time_0$). Moreover, several inhabitants exist simultaneously at the unique temporal position $Time_0$. Hence, the objects are in *many-one* relation with the temporal constant (ΩObj*$Time_0$). Moreover, two space locations are explicitly distinguished: Little Puddle (Loc_1) and London (Loc_2). The corresponding situation can thus be modelled in a n-universe comprising a space variable (ΩLoc) which includes two different locations: Loc_1 and Loc_2. Furthermore, it proves that each inhabitant is either in Little Puddle or in London, so as a given inhabitant cannot occupy several space locations at the same time. Thus the space criterion is not demultiplied. Lastly, it is worth noting that several

people can be at the same time at a given space location: there are thus 50 inhabitants in Little Puddle and 10 million in London. Consequently, the objects are in *many-one* relation with the space variable (ΩObj*Loc). Taking into account what precedes, it follows that the situation corresponding to the Little Puddle/London experiment can be modelled in a ΩObj*$Time_0$Obj*Loc, a n-universe with multiple objects, comprising a temporal constant and a space variable, where the objects are in *many-one* relation with the time-constant and the space variable.

Conclusion

The n-universes, as we have just seen through the above illustration, make it possible to model the situations described in thought experiments, by simplifying their intrinsic elements in virtue of Occam's razor. The n-universes then often allow to remove the inherent ambiguity and complexity which renders more difficult the reasoning regarding these thought experiments.

References

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