

ON THE FORMALIZATION OF THE PRINCIPIUM RATIONS SUFFICIENTIS

The PRS has been expressed for the first time by Leibniz who considered it as the most fundamental principle. Its simplest formulation is *nihil est sine ratione*. It was later regarded, with the three principles of identity, the contradiction and the excluded middle, as one of the basic principles of logic.

This principle does not appear anymore nowadays in the so-called logic. Why? Is it because, according to Scholz [2], this principle cannot be formalized? However N.C.A. da Costa has recently proposed the following formalization $\forall p \exists q (\neg(q \rightarrow p) \wedge \Box(p \rightarrow q))$ (see [1] for further details).

Schopenhauer was the first to develop a complete and systematic study on the PRS [3]. He considers that this principle is the foundation of all representations. He distinguishes four classes of representations each of these are governed by a different form of the PRS. For example the law of causality rules the sensible representations. One of special interest is the PRS of knowing which Schopenhauer states as following : *truth is the ratio of a judgment to something out of it, its sufficient reason*. There are four types of truth according to the kind of reason on which a judgment is based. The reason may be a sensible representation (material or physical truth), a pure intuition (transcendental or metaphysical truth), a judgment (formal or logical truth) or finally the formal conditions of thought (metalogical truth). Schopenhauer says that there are only four judgments which truth are metalogical : the principles of identity, contradiction, excluded middle and the PRS itself.

The formalization of N.C.A. da Costa is done in a modal quantified *propositional logic*. If we identify the traditional ‘judgment’ with the modern ‘proposition’ this formalization corresponds to one particular case of the PRS of knowing which is itself one of the four forms of the full PRS.

If we want to go ahead we have to consider a system which is not as the so-called present logic all-judgment-like or all-proposition-like or all-formula-like. We shall think of a universal system whose objects can be every kind of things. We shall then consider one binary relation R such that : for any object b there is an object a such that aRb (a is the reason of b). The four forms of the PRS will be distinguished by special restrictions on the arguments of R and on R itself.

References

[1] J.-Y. Béziau, *Le Principe de Raison Suffisante et la Logique selon Arthur Schopenhauer* [in:] **Anais do VII Colóquio de História da Ciência-Século XIX: O Nascimento da Ciência Contemporânea**, UNICAMP, Campinas, 1992.

[2] H. Scholz, **Abriss der Geschichte der Logik**, Karl Albert, Freiburg-München, 1931.

[3] A. Schopenhauer, *Über die vierfache Wurzel des Satzes von zureichenden Grunde* [in:] **Commision der Hof-Buch und Kunsthandlung**, Rudolstadt, 1813 / Herrmann, Francfort, 1847.

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