## COGNITION, IRREVERSIBILITY AND THE DIRECTION OF TIME

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## COGNITION, IRREVERSIBILITY AND THE DIRECTION OF TIME ABSTRACT

The problem of the direction of time is tackled by an analysis of a fundamental aspect of cognition. First it is shown that the development of physics reveals four different relations between instrument and object, each linked with one crucial aspect of the acquisition of knowledge. Next it is argued that these four relations together form a complete set, in other words, that they are the only qualitatively different relations possible. The analysis concentrates on the fourth relation (instrument and object most closely connected) and the concomitant basic aspect of cognition: information recording, which appears to be crucial at a

fundamental level of reality. It is argued that at this level it is precisely the inevitable irreversibility, due to this aspect of Cognition, which must be the origin of time and its direction.

## 1. Introduction

Time seems to be a perennial mystery. What is its origin? How is it related with matter? Does all cognition presuppose an already "existing' time, or is there some fundamental connection between cognition and time?

Since the days that Boltzmann claimed that our intuitive distinction between past and future is grounded on the entropic asymmetry, there has been much discussion about the arrow of time in connection with irreversibility and the increase of entropy. However, without conclusive

results.1 It remains a stubborn problem: how to explain time asymmetry, when not only all laws of Newtonian, but also of relativistic and quantum mechanics are time symmetric, i.e., are invariant under time reversal'? 2

## 1 See for recent discussions e.g. Sklar (1992).

2 A remarkable case of time symmetry violation in elementary particle processes is formed by the decay of the neutral K meson. This asymmetry is homological and not de facto. This means that the laws of physics are not completely time-symmetry. It is not yet clear how this case of K meson decay should be explained. For a recent discussion of the Kaon arrow, see Dowe (1992).