Second International Conference on
Geometry, Integrability and Quantization
June 7–15, 2000, Varna, Bulgaria
Ivaïlo M. Mladenov and Gregory L. Naber, Editors
Coral Press, Sofia 2001, pp 265-279

A PRIMER ON OBSERVER THEORY

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Abstract. This article is a survey which presents the essential ideas of "Observer Theory", a formal theory of perception, developed since the late 80's by Bruce Bennett and Donald Hoffman (both at U.C. Irvine) and myself. First I present the structure of an observer and one type of a framework, within which interactions between observers may be studied. Then I discuss the kinds of dynamics that can arise from such a framework, and how the dynamics can give rise to higher-level or "specialized" observers. Finally I indicate briefly what this says about "true" perception (i. e., perception adapted to the "world" the observer framework is in) and some possible ramifications which could lead to a deeper understanding of the origin of quantum systems and measurement theory. The general reference for this work is Bennett, Hoffman and Prakash [1].

1. Definition and Examples of Observer

We acknowledge certain principles as guiding any formal definition of an observer:

A. Perception is a process of inference.
That is, an act of perception is a *process* of arriving at conclusions from a set of premises. Premises and conclusions are *propositions,* i. e., statements that can only be either true or false. No special or customary meaning of "inference" is meant beyond this. For example, consider the familiar "Necker Cube" in Fig. 1.
Here the premises are a set of lines in the plane and, for most people, the conclusion is, at any given moment, a cube in space. So we can say that the conclusion is a 3-dimensional figure, while the premise is a 2-dimensional one — clearly an inference (and an illusory one at that!) and