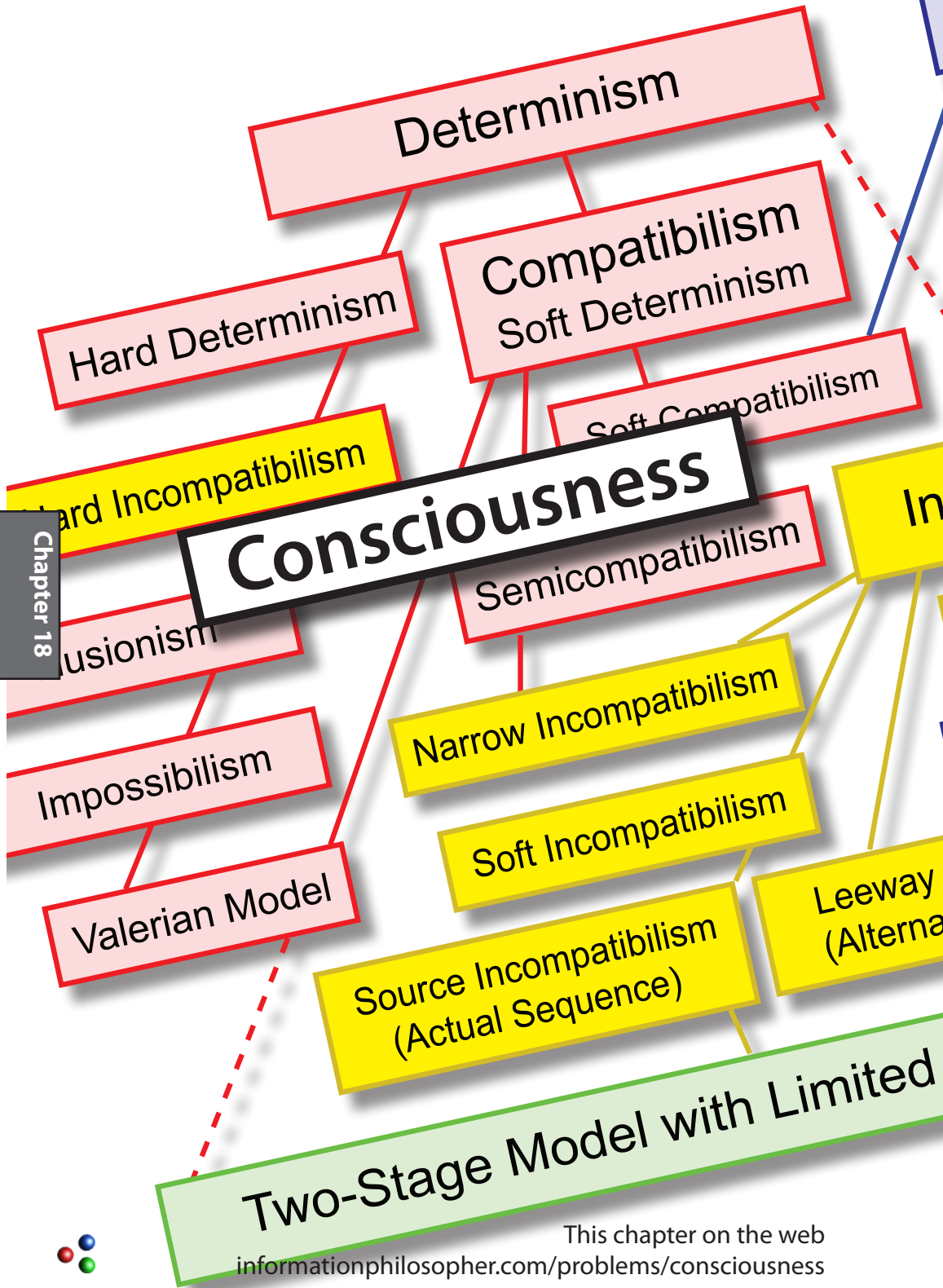




Consciousness

Consciousness can be defined in information terms as an entity (usually a living thing, but we can also include artificially conscious machines or computers) that reacts to the information (and particularly to changes in the information) in its environment.

In the context of information philosophy, we can define this as information consciousness.

Thus an animal in a deep sleep is not conscious because it ignores changes in its environment. And robots may be conscious in our sense. Even the lowliest control system using negative feedback (a thermostat, for example) is in a minimal sense conscious of changes in its environment.

The Experience Recorder Reproducer (ERR)

This definition of consciousness fits with our model of the mind as an experience recorder and reproducer (ERR). The ERR model stands in contrast to the popular cognitive science or “computational” model of a mind as a digital computer. No algorithms or stored programs are needed for the ERR model.

The physical metaphor is a non-linear random-access data recorder, where data is stored using content-addressable memory (the memory address is the data content itself). Simpler than a computer with stored algorithms, a better technological metaphor might be a video and sound recorder, enhanced with the ability to record smells, tastes, touches, and critically essential, feelings.

The biological model is neurons that wire together during an organism’s experiences, in multiple sensory and limbic systems, such that later firing of even a part of the wired neurons can stimulate firing of all or part of the original complex.

Neuroscientists are investigating how diverse signals from multiple pathways can be unified in the brain. We offer no specific insight into these “binding” problems. Nor can we shed much light on the question of philosophical “meaning” of any given information structure, beyond the obvious relevance (survival value) for the organism of remembering past experiences.



A conscious being is constantly recording information about its perceptions of the external world, and most importantly for ERR, it is simultaneously recording its feelings. Sensory data such as sights, sounds, smells, tastes, and tactile sensations are recorded in a sequence along with pleasure and pain states, fear and comfort levels, etc.

All these experiential and emotional data are recorded in association with one another. This means that when the experiences are reproduced (played back in a temporal sequence), the accompanying emotions are once again felt, in synchronization.

The capability of reproducing experiences is critical to learning from past experiences, so as to make them guides for action in future experiences. The ERR model is the minimal mind model that provides for such learning by living organisms.

The ERR model does not need computer-like decision algorithms to reproduce past experiences. All that is required is that past experiences “play back” whenever they are stimulated by present experiences that resemble the past experiences in one or more ways. When the organism recreates experiences by acting them out, they can become “habitual” and “subconscious” information structures.

It is critical that the original emotions play back, along with any variations in current emotions. ERR might then become an explanatory basis for conditioning experiments, classical Pavlovian and operant, and in general a model for associative learning.

BERNARD BAARS’ Global Workspace Theory uses the metaphor of a “Theater of Consciousness,” in which there is an audience of purposeful agents calling for the attention of the executive on stage.

In the ERR model, vast numbers of past experiences clamor for the attention of the central executive at all times, whenever anything in current experience has some resemblance.

If we define “current experience” as all afferent perceptions and the current contents of consciousness itself, we get a dynamic self-



referential system with plenty of opportunities for negative and positive feedback.

WILLIAM JAMES' description of a "stream of consciousness" together with a "blooming, buzzing confusion" of the unconscious appear to describe the ERR model very well.

In the "blackboard" model of Allan Newell and HERBERT SIMON, concepts written on the blackboard call up similar concepts by association from deep memory structures. The ERR model supports this view, and explains the mechanism by which concepts (past experiences) come to the blackboard.

In DANIEL DENNETT's consciousness model, the mind is made up of innumerable functional homunculi, each with its own goals and purposes.

Some of these homunculi are information structures formed genetically, which transmit "learning" or "knowledge" from generation to generation. Others are environmentally and socially conditioned, or consciously learned.

Four "Levels" of Consciousness

Instinctive Consciousness - by animals with little or no learning capability. Automatic reactions to environmental conditions are transmitted genetically. Information about past experiences (by prior generations of the organism) is only present implicitly in the inherited reactions

Learned Consciousness - for animals whose past experiences guide current choices. Conscious, but mostly habitual, reactions are developed through experience, including instruction by parents and peers.

Predictive Consciousness - The Sequencer in the ERR system can play back beyond the current situation, allowing the organism to use imagination and foresight to evaluate the future consequences of its choices.

Reflective (Normative) Consciousness - in which conscious deliberation about values influences the choice of behaviors.

