

# The Cybernetic Cut and CS Bridge

(From Scirus Sci-Topics Pages)

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The Cybernetic Cut [1,2] delineates one of the most fundamental dichotomies of reality. Physicodynamics (physicality: Jacques Monod's "chance and necessity;" mass/energy interactions alone) lie on one side of a great divide. On the other side lies formalism—the abstract, conceptual, nonphysical ability to choose with intent what aspects of ontological being will be preferred, pursued, selected, rearranged, integrated, measured, calculated, computed, and organized into pragmatic utility.

Cybernetics studies mechanisms of control. But control requires purposeful choice contingency, not chance contingency. To control is to steer toward the goal of pragmatic success. Neither chance contingency nor the fixed laws of physics can participate in purposefully choosing arbitrary controls.

Decision theory, algorithmic optimization, computation, cybernetics, and engineering all originate on the formal side of The Cybernetic Cut. Language, mathematics, logic theory, symbol systems, code bijection, genetic prescription, and the scientific method itself also flow from the formal side of The Cybernetic Cut [1,2]

Purposeful choices can be represented using physical symbol vehicles in a material symbol system (MSS) [3-5]. Physical tokens can be purposefully selected from an alphabet or phase space of physical objects. In this way nonphysical choices made with intent can be instantiated into physicality.

Another method of instantiation of formalisms into physicality is through the deliberate selection of particular settings of physicodynamically-inert configurable switches [4,6]. Other terms for physicodynamically inert

include “dynamically decoupled, incoherent or indeterminant.” Although the configurable switches themselves are physical, their settings are ultimately determined formally by Choice Determinism (CD), independent of cause-and-effect physical determinism (PD). Another published term for Choice Determinism (CD) is Choice-Contingent Causation and Control (CCCC) [79].

A Configurable Switch (CS) Bridge traverses The Cybernetic Cut [1,2]. The essence of The Cybernetic Cut principle is that traffic flow is *unidirectional* across this CS Bridge from Formalism (the far side of the Cybernetic Cut) to Physicality (the near side of The Cybernetic Cut).

Falsifying The Cybernetic Cut would require nothing more than demonstrating a bidirectional flow across the CS Bridge. Thus far, no one has ever observed physicality itself instructing, programming, or instituting non-trivial formal organization and function. While many have tried to assert that mind is nothing more than a secretion of physical brain, naturalistic neurophysiological research has born very little fruit. The Mind/Body Problem remains alive and well. Not even a plausible model has been able to depict how mass/energy interactions alone (Chance and Necessity) [10,11] could possibly generate Prescriptive Information (PI) [12] and programming, let alone the processing machinery needed to execute that PI [8].

Howard H. Pattee originally championed the term “epistemic cut” to describe the symbol-matter, subject-object, genotype-phenotype distinction [13-17]. But the precise point of contact between formalism and physicality still needed elucidation. Mere description also needed to be differentiated from prescription. How does nonphysical mind arise from physicality to then establish formal control over that physicality (e.g., engineering feats, computer science)? How did inanimate nature give rise to an algorithmically organized, semiotic and cybernetic life? [18]. Both the practice of physics and life itself require traversing not only an epistemic cut, but The Cybernetic Cut. All known life is cybernetic [7,9,12,19-24].

The Cybernetic Cut elucidates the difference between constraints and controls [20], between laws and rules, and between order and organization [24]. Constraints consist of initial conditions and the orderliness of nature. Controls *steer* toward the goal of function. Laws describe fixed relationships of invariant physicodynamic orderliness. Rules suggest what *voluntary*

*behavior* will produce the best utility. Rules are regularly broken; laws are not. When rules are regularly disobeyed, practical proficiency usually suffers. Rules are formal. Rules are generally made to streamline and optimize pragmatic behavior. Such behavior is choice contingent, not physicodynamically determined.

The self-ordered dissipative structures of chaos theory are technically not organized [24]. Organization arises only out of choice contingency via prescriptive information (PI) [12]. PI instructs or actually produces formal utility. PI contains high numbers of bits of probabilistic uncertainty with low redundancy, order, pattern and probability. Choice contingency adds a whole new dimension invisible to chance and necessity. The physicodynamic side of The Cybernetic Cut provides no mechanism for generating PI. PI arises only on the formal side of the Cut [1,2].

Prigogine's self-ordered dissipative structures are low informational. Bathtub-drain vortices, hurricanes and tornadoes manifest high redundancy and pattern, high probability and low uncertainty with no imagination, creativity or engineering skills [24]. Self-ordered purely physicalistic structures typically destroy organization; they do not program it.

Organization requires freedom of deliberate selection *for potential* function [25,26]. Natural selection is merely Selection *FROM AMONG* existing function [8]. Natural selection cannot program new formal organization or function. Natural selection is nothing more than the differential survival and reproduction of the fittest already-existing organisms [27]. Organization is accomplished via decision nodes, logic gates, and configurable switch-settings. Decision nodes cannot be reduced to mere bifurcation points or bits of Shannon probabilistic combinatorial uncertainty. Chance and necessity are blind to formal function, and cannot pursue it [11]. Computational halting arises on the formal side of The Cybernetic Cut ravine. To affect physicality, such computation must be transported across the one-way CS Bridge via formal (abstract, conceptual, mental, non physical) programming of physical logic gates.

**Table 1.** The difference between physicality and those aspects of reality that traverse The Cybernetic Cut into the sphere of pragmatic controls.

## Physicodynamics

Physical  
Incapable of making decisions  
Constraint based  
Natural-process based  
Constraints just “happen”  
Forced by laws & Brownian movement  
Incapable of learning  
Product of cause-and-effect chain  
Determined by inflexible law  
Blind to practical function  
Self-ordering physicodynamics  
Chance and necessity  
No autonomy  
Inanimacy cannot program algorithms  
Oblivious to prescriptive information  
Blind to efficiency  
Non creative  
Values and pursues nothing

## Traversing the Cybernetic Cut

Nonphysical & Formal  
Decision-node based  
Control based  
Formal prescription based  
Constraints are deliberately chosen  
Writes and voluntarily uses formal rules  
Learns and instructs  
Programmer produced  
Directed by choice with intent  
Makes functional things happen  
Formally organizational  
Optimization of genetic algorithms  
Autonomy  
Programs configurable switches  
Writes prescriptive information  
Managerially efficient  
Creative  
Values and pursues utility

**Keywords:** Bifurcation points; Configurable switches; Decision nodes; Logic gates; Biocybernetics; Biosemiosis; Biosemiotics; Self-assembly; Self-organization; Sign Systems; Symbol systems.

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