



# Steinbeis

## Varieties of Contemporary Second-Order Cybernetics

Karl H. Müller

Steinbeis Transfer Center

**New Cybernetics**

Orlando, July 8, 2016

# Overview

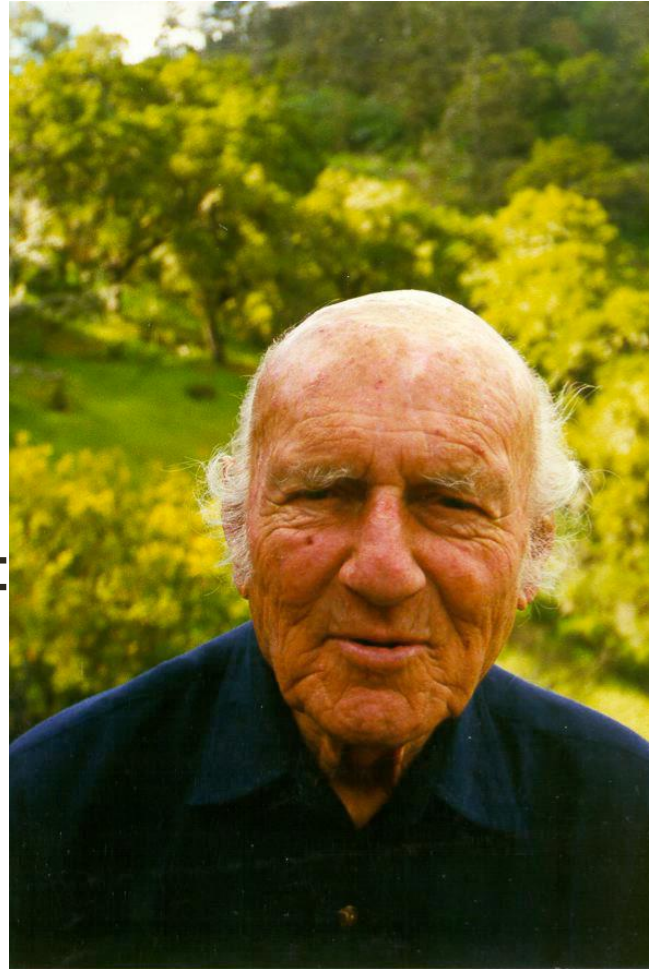
- The Mysteries of Second-Order Cybernetics
- Two Epistemic Modes
- Science I and Its General Methodology
- Science II and the Mode from Within
- Second-Order Cybernetics and a Fivefold Agenda from Within

# The Mysteries of Second-Order Cybernetics

Heinz von Foerster  
(1911 – 2002)

First-Order Cybernetics:  
The Cybernetics of Systems Observed

Second-Order Cybernetics:  
The Cybernetics of Observing Systems



# The Mysteries of Second-Order Cybernetics

Ranulph Glanville,  
(1946 – 2014)  
The Black Box  
(3 vol.)

President of  
the American  
Society for Cy-  
bernetics (2009  
- 2014)

Professor for  
Innovation Design,  
Royal College of  
Art, London



Professor for Research  
Design, Catholic Uni-  
versity of Leuven

# Kline-Martin Hypothesis:

Second-order cybernetics was

- a. developed insufficiently as a research program
- b. exhibited no tangible effects on other disciplines
- c. will remain irrelevant in the future

# The Five Most Important Publications by Heinz von Foerster

- Das Gedächtnis. Eine quantenmechanische Untersuchung [Memory. A Quantum-Mechanical Investigation] (1948)
- “Some Remarks on Changing Populations” (1959)
- “Doomsday: Friday, November 13, AD 2026” (1960)
- “Objects: Tokens for Eigenbehaviors” (1976)
- “Ethics and Second-Order Cybernetics” (1992)



# Two Epistemic Modes

Heinz von Foerster:

“Am I an observer who stands outside and looks in as God-Heinz or am I part of the world, a fellow player, a fellow being?” (Foerster, 2014:128)

„A Part“

„Apart“

# The Exo-Mode and the Endo-Mode

- **Exo-Mode**

(Science from Without)

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- Appearance
- World and I: separated
- Schizoid
- Monological
- Denotative
- Describing
- You say how it is
- Cogito, ergo sum
- 

- **Endo-Mode**

(Science from Within)

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- Function
  - World and I: one
  - Homonoid
  - Dialogical
  - Connotative
  - Creating
  - It is how you say it
  - Cogito, ergo sumus
-



# The Traditional Way of World-Making

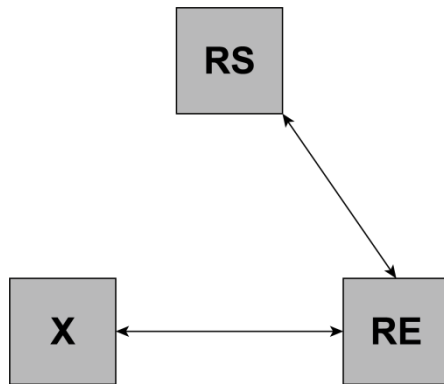
Eric Kandel (“Age of Insight”):

“Scientists make models of elementary features of the world that can be tested and reformulated. These tests rely on removing the subjective biases of the observer and relying on objective measurements and evaluations”.  
(Kandel, 2012:449)

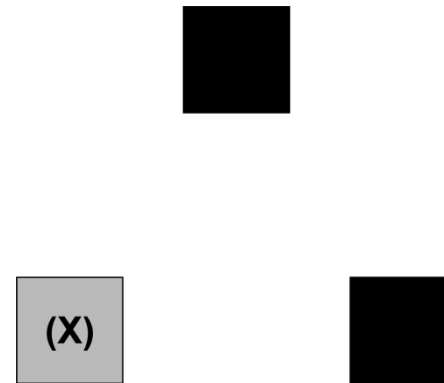


# The Traditional Exo-Mode

Initial Stage

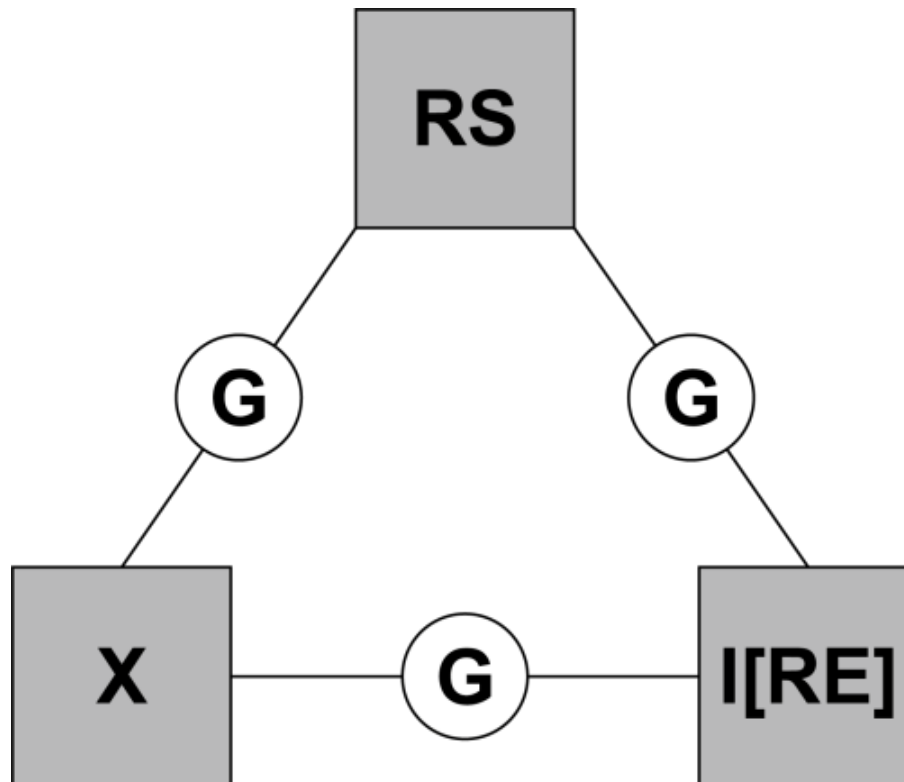


Final Stage



# The Endo-Mode (Science from Within)

Triadic Research Networks, Recursively Organized, Operationally Closed



# Church-Curry Fixed Point Theorem

In generative triadic Networks („Reflexive Domains“ (L.H. Kauffman)):

Church-Curry fixed point theorem.

Let  $D$  be a reflexive domain and let  $T$  be any element of the domain  $D$ . Then there is an element  $X$  in  $D$  such that  $X$  is a fixed point for  $T$ . That is,  $TX = X$ .

In every operationally closed system there arise Eigenvalues. (Heinz von Foerster)

# Examples for Eigenforms

Domain: Numbers  $\{1, 2, 3, \dots, 999\}$

Operation: Extracting the square root (SQRT)

Initial Value: .....

Eigenform:  $D(1, \text{SQRT}) = 1$

Experiment E, Researchers R, Result of Experiment

X:

Eigenform:  $E(R, X) = X$

# The Mysteries of Second-Order Cybernetics Demystified

First-Order Cybernetics  $\equiv$

Cybernetics from Without  $\equiv$

Exo-Cybernetics

Second-Order Cybernetics  $\equiv$

Cybernetics from within  $\equiv$

Endo-Cybernetics

# Two Types of „Second-Order“

Exo-Mode

Endo-Mode

First-O. Science	Exo-Psychology First-Order Cybernetics	Endo-Psychology Second-Order Cybernetics
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Second-O. Science	Second-Order Exo-Psychology	Second-Order Endo-Psychology
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# The Five-Fold Agenda for Second-Order (Endo-)Cybernetics

- Agenda I: Building an Alternative General Methodology of Science
- Agenda II: Creating Special Endo-Methodologies for Scientific Disciplines
- Agenda III: Foundations, Reframing, Contextualizations within and across Scientific Disciplines
- Agenda IV: Reflexive Circles in „Applied“ Domains like Design, Education, Consulting, etc.
- Agenda V: Reflexive Circles in Artistic Domains (Music, Theater, etc.)



# The Five-Fold Agenda of Ranulph Glanville

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The Black Box  
(3 vol.)

Composer,  
Architect,  
Designer

Professor for  
Innovation Design,  
Royal College of  
Art, London



Professor for Research  
Design, Catholic Uni-  
versity of Leuven

# Partial Rejection of the Kline- Martin Hypothesis

Second-order (Endo-)cybernetics was developed insufficiently in the past, had very little impact so far,

**BUT:**

can be advanced to a coherent and exciting research agenda in the future.

# Literature

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# Contact:

Karl H. Müller

Steinbeis Transfer Center

New Cybernetics

Vienna, Austria

[khm@chello.at](mailto:khm@chello.at)

0043 1 664 4191961