

Grundlagen der Systembiologie und der Modellierung epigenetischer Prozesse

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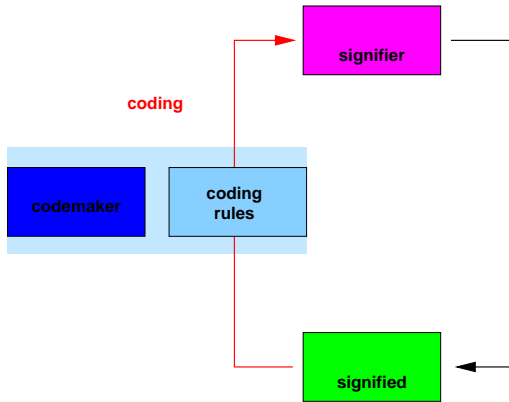
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Biosemiotics

- ▶ Semiosis = origin of signs
- ▶ Semiotics = the study of sign systems
 - ▶ Semantics = relation between signs and signified
 - ▶ Syntactics = relations among signs
 - ▶ Pragmatics = relation between signs and their effects on the people who use them
- ▶ Biosemiotics = life interpreted as a sign system
- ▶ claim: semiosis is the immanent and intrinsic feature of life
- ▶ challenge: prove that the cell is a semiotic system

Definition of Semiosis

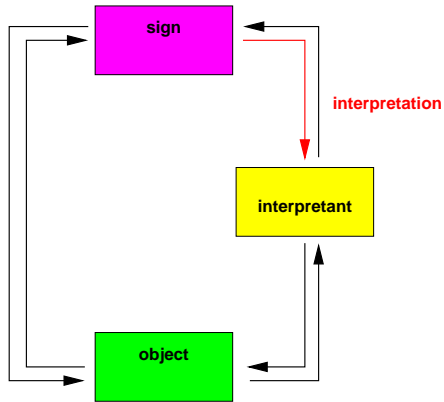
Ferdinand de Saussure (1857-1913)



dualistic model

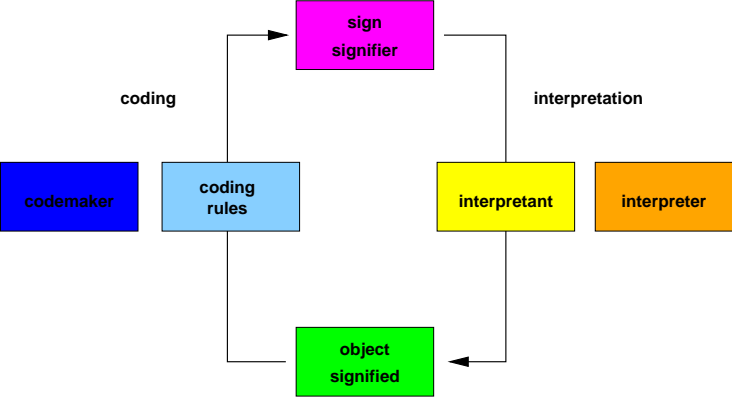
Definition of Semiosis

Charles Sanders Peirce (1839-1914)

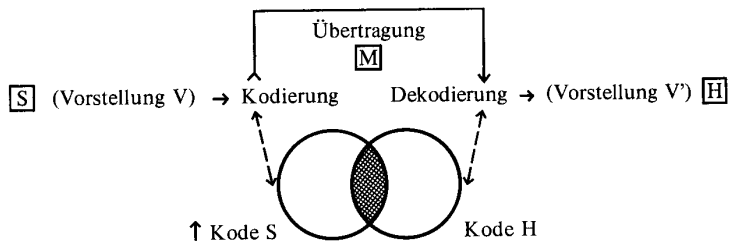


triadic model

Definition of Semiosis

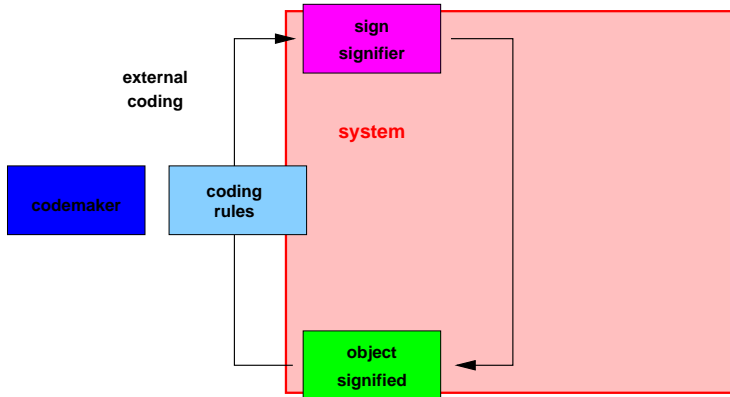


Similarity to Communication Systems



Definition of Semiosis

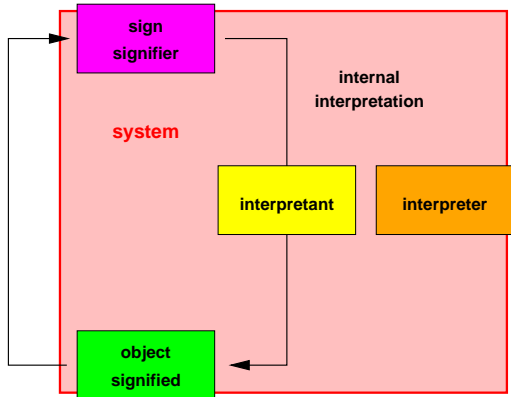
Saussure interpreted by Barbieri



- ▶ Saussure: model based on **external coding**
- ▶ rules come from the outside of the system

Definition of Semiosis

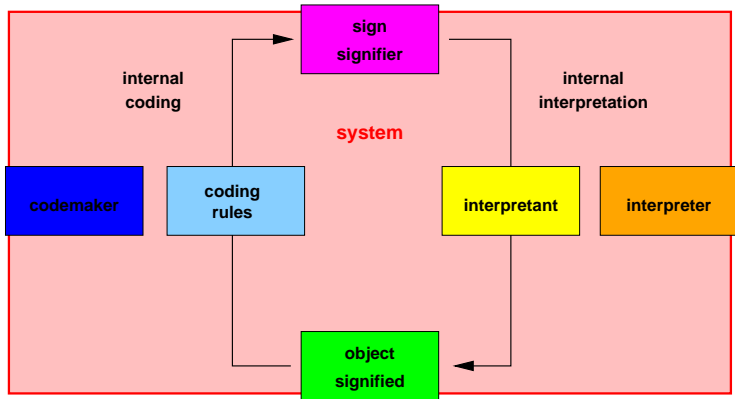
Peirce interpreted by Barbieri



- ▶ Peirce: model based on **internal interpretation**
- ▶ interpretation produced within the system

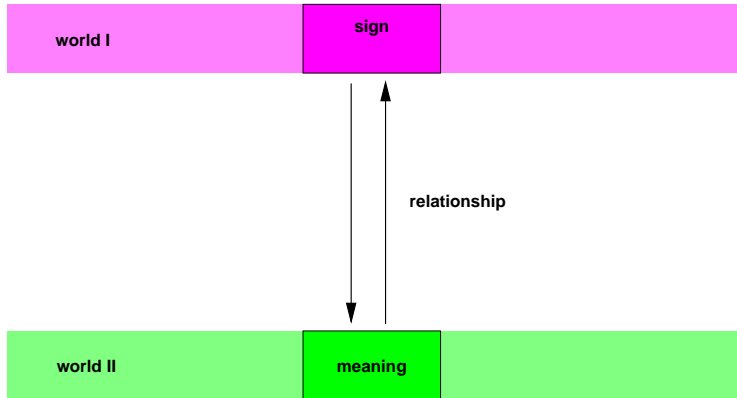
Definition of Semiosis

Code Model by Marcello Barbieri



- ▶ model based on **internal coding/codemaker**

Signs and Meanings



- ▶ sign and meaning are two sides of the same coin

The Code Model of Semiosis

- ▶ a sign is a sign only if it stands for something that is other than itself
- ▶ this otherness implies at least some degree of independence
- ▶ a semiotic system combines two worlds between which there is **no necessary/physical link**
- ▶ a semiotic system is a system made of two worlds that are connected by the **conventional rules** of a **code**
- ▶ the act of coding requires the **codemaker**

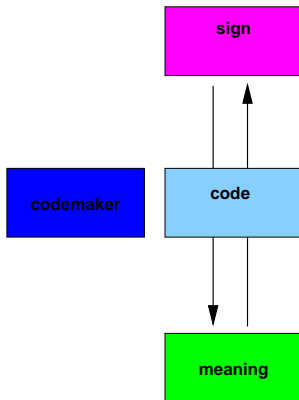
Signs and Meanings

- ▶ sign: object or event in the physical world that represents an object or event in the physical world
- ▶ meaning: mental image of an object or event in the physical world
- ▶ example
 - ▶ sign: spoken word “dog”
 - ▶ meaning: the mental image of a dog
 - ▶ relationship by convention: different languages use different words for the same object or physical event
 - ▶ sounds and mental images are separable
- ▶ taken apart, signs and meanings stop functioning as signs and meanings

More on Signs

- ▶ conventional signs
 - ▶ no physical relation between signifiers and meanings
 - ▶ establish by arbitrary rules
 - ▶ e.g. languages, numbers, national flags
- ▶ natural signs
 - ▶ physical link between signifier and meaning is always present
 - ▶ establish by physical laws
 - ▶ e.g. symptoms, smoke as sign for fire
 - ▶ relationship is underdetermined
- ▶ iconic signs: signifier is perceived as resembling or imitating the signified
- ▶ indexical signs: signifier is directly connected in some way (physically or causally) to the signified
- ▶ symbolic signs: signifier is fundamentally arbitrary or purely conventional

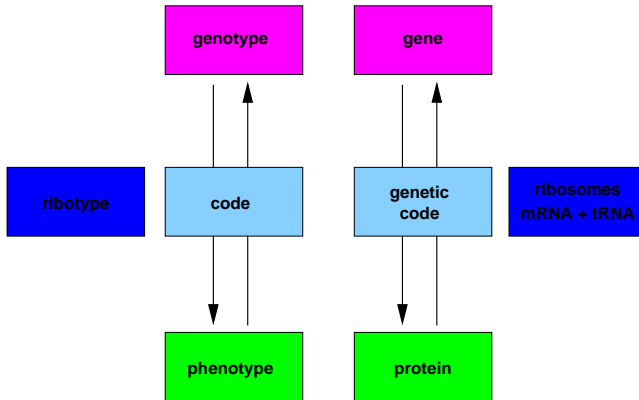
The Code Model of Semiosis



The Levels of Signs, Codes and Meanings

- ▶ cultural signs and cultural meanings require a cultural code
- ▶ mental signs and mental meanings require a mental code
- ▶ organic signs and organic meanings require an organic code

Semiosis in the Cell



References



[Barbieri, 2008] Marcello Barbieri. *The Code Model of Semiosis: The First Step Toward a Scientific Biosemiotics*. *The American Journal of Semiotics* (2008) 24.1-3, p23-37.



[Barbieri, 2009] Marcello Barbieri. *Three Types of Semiosis*. *Biosemiotics* (2009) 2, p19-30.