

## **Mathematics and metaphysics of self-reflection**

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### ***Introduction***

The difference between the minds of humans and different animals was discussed since the publication of the booklet "The descent of man" (1871) in which Darwin believes that our mind is not qualitatively different from those of animals.

In 2008 Penn, Holyoak and Povinelli published a paper based in significant difference in degree to which human and nonhuman minds are able to approximate the higher-order relational properties of a physical symbol system.

However, these authors do not approach the problem from a mathematical and metaphysical point of view to get to know what is the essence of this difference and this discontinuity.

This work, considering some previous works of the author, adding the theory of perceptual control seeks to demonstrate the essential distinction of the so-called discontinuity.

### ***The Difference of Brains***

For about 25 years, technological methods for studying the human and animal brains have progressed significantly.

Todd M. Preuss (2014), one of the most prominent scientists in this area, explains that humans possess cognitive abilities very different from other animals thanks to the number of unusual facts of our brain.

It highlights that our brain weighs, on average, 1360 gr, which is huge for a being of our body, compared to our closest related Chimpanzee has 1/3 of that weight while its body is similar to ours. Our brain has a greater number of fibers connecting brain regions in specialized human functions such as language, phasor tools, reasoning, and social cognition.

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Hofman (2014), indicates that we are beginning to understand the geometric, biophysical and energy constraints that govern the evolution and functional organization of the brain. And it shows that it has approximately 100 million neurons, more than 100 million km of interconnections and has an estimated memory capacity of  $1.25 \times 10^{12}$  bytes. Those impressive numbers lead to the idea that our cognitive ability is virtually limitless.

Ian Tattersall (2004), believes that form should precede function, and that one of the most famous examples is the feathers of birds that were initially used for isolation for millions of years and eventually turned to fly.

In language, the underlying neural biology was acquired possibly 200,000 years ago, but its cognitive potential was only explored 80 or 60,000 years ago, when symbolic power was manifested by *Homo sapiens*.

According to Tattersall the Cro-Magnons with their art, their music, ornamentation and all the obvious cognitive and social complexities had clearly crossed the critical boundary of being truly human.

We observe that humans have much more association cortex than chimpanzees or any other large primate (Preuss op cit). Carrara-Augustenberg (2010), selecting from existing proposals to interpret consciousness proposes a new theory of the endogenous feedback network.

Previously, however, Hofstadler (2007) had published a book where he said that the self was an endless feedback, without real consistency or it was an illusion.

### ***The importance of feedback***

There are two types of feedback: positive and negative. Negative feedback forms the basis of control cybernetics. Negative is when that feedback returns to the system to achieve some kind of steady state, to compare or correct the response, so the feedback allows homeostasis that maintains the internal stability of organisms in relation to changes in their environment. But also feedbacks are at the base of self-organization and life.

There are positive feedbacks where the response increases the original effect of the stimulus, that is, it accelerates a process to achieve some goal. In neuronal processes there are multiple positive and negative feedbacks that lead to quick and adequate responses.

Byeongwook et al. (2018) determined that a fundamental stage in the sensory information process involves modulation and integration of neural oscillations in certain frequency bands. The authors investigate how top-down inputs cause frequency changes

in slow oscillations during the sensory process and with or slow oscillations are combined with rapid oscillations, which encode sensory inputs.

Several feedback structures are ubiquitously observed in different types of biological networks, including gene regulatory networks, molecular networks, and neural networks, and are the building blocks that perform different functions.

However, a major problem is the cause-and-effect relationship in feedback. A simple causal relationship is difficult because the response of a system is fed back as stimuli, forming part of a chain of causes and effects that leads to a circular argument. But, considering that feedbacks are logically coupled to tractors as suggested by Kwon and Cho (2007), and the existing convergence to obtain optimal network designs, we can induce that the "effect" precedes the cause, as a goal.

Vannini and Di Corpo (2012), showed that Einstein's equation of special relativity is a quadratic equation and quadratic equations always have two solutions, one positive and one negative. The positive solution describes the energy that diverges from a cause located in the past, and propagates into the future (delayed waves). The negative solution is energy located in the future and propagating into the past or present (advanced waves). This retro causality is currently accepted by several scientists (See Cramer, 1986).

Attractors are, in a sense, a fine cause, the manifestation of a biological teleology, because it implies a direction to a certain target.

### ***Biological systems and control***

Claudius Bernard published the concept of the internal medium in 1865, which in 1926 Walter Canon nominated homeostasis. This concept refers to the characteristic of any system that allows to keep your internal system stable in the face of changes in your environment. For example, we have the conservation of acidity-basicity, and temperature.

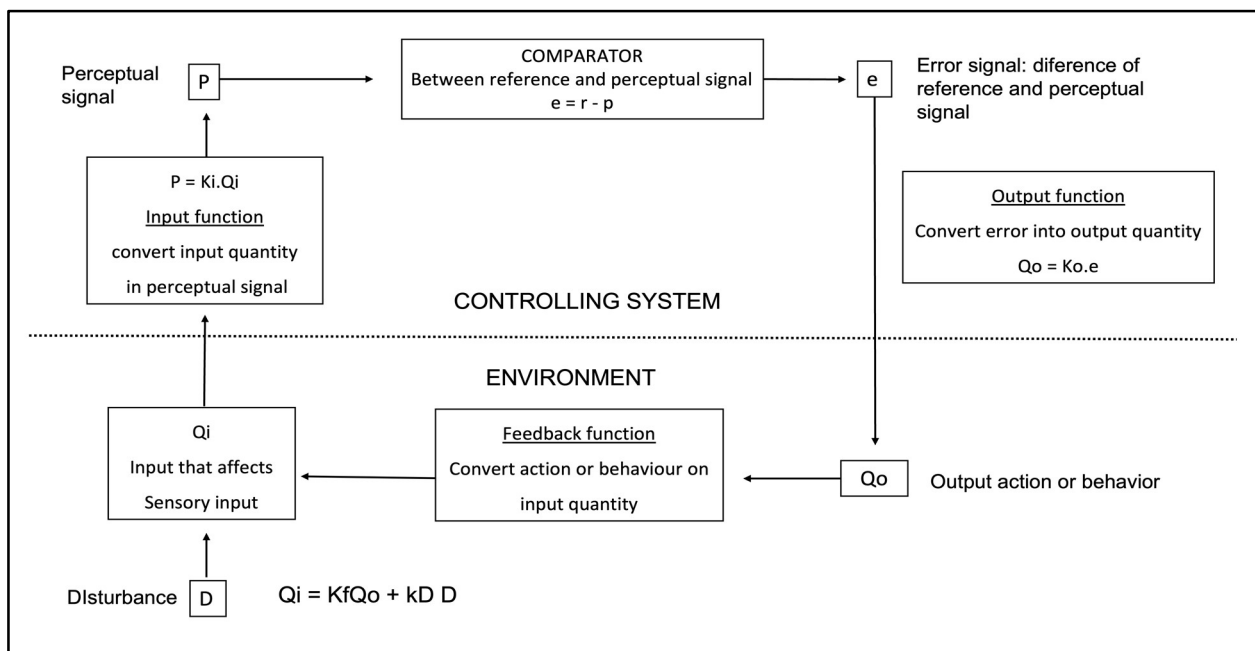
Williams T. Powers observed that the methods and concepts of systems control engineering could be applied to biological systems. The novelty of the Power trip is that the variable that is controlled is not the response to the stimulus, on the contrary, the stimulus was controlled thus creating the theory of perceptual control. (TCP).

This theory is based on negative feedback. Perceptual control theory has shown that organisms control their own behavior, not environmental variables, but their own, perception of those variables. In this way the functions detected and transformed in the entrance (stimulus) appear to consciousness as perceived aspects of the environment.

This theory contradicts the classical notion of linear causation of behavior by stimulus, in which the stimulation of the environment would cause a behavior of the response mediated by cognitive processes.

A simple, isolated negative feedback system can be represented by two parts: 1) one showing the variables of the environment, and 2) the functions and variables of the controlling organism (See Scheme 1).

*Scheme 1*



There are two independent variables: the reference signal and the disturbance. In the steady (stable) state these two variables are conserved constant.

In the scheme 1:

$p$  = perception

$r$  = reference

$e$  = error

$Q_i$  = amount of stimulus

$Q_o$  = amount of response

$D$  = disturbance and

$K$  = in each case  $K_i$ ,  $K_o$ ,  $K_f$ ,  $K_d$  is the constant of conversion of the amount of stimulus to quantity of response.

We represent following the closed loop of input output in each box:

$p = K_i Q_i$  input function

$e = r - p$  comparator

$Q_o = K_o \cdot e$  output function and

$Q_i = K_i Q_i + K_d D$  feedback and disturbance function.

When the disturbance and the reference are constant the system is stable, and the balance can be found by solving the simultaneous equations for variables of interest. Solving for the perceptual signal  $p$  by successive substitutions we arrive at

$$P = K_i K_o K_f (r - p) + K_i K_d D$$

The Product  $K_i K_o K_f$  is the "gain" loop representing how much the signal affects itself by the feedback loop. Substituting  $G = K_i K_o K_f$  we get:

$$P = G / (1 + G) \cdot r + K_f K_d D / (1 + G)$$

This is the most important equation in the theory of living control systems. When  $G$  is equal to infinity, then  $p=r$  the reference signal determines perception and disturbances have no effect.

It should be noted that for Marken and Mansell (2013 and 2015), propose that this theory provides a completely new perspective on psychological science and describe a range of advances in neuroscience, animal behavior, social processes, and mental health.

In the upper cycle, when the reference is the self itself, the stimulus of the question by the mime I leads to the reference and the stimulus being equal, the gain is then infinite and the perturbations have no effect as Power explains, but it does not highlight the most important thing: that for that it is necessary that the feedback is made at an infinite speed, I mean, it's instantaneous. And this can only occur according to quantum physics in one field, an informational, spiritual field.

This fact was explained in a previous work on the evolution of the human mind and its attractors (Yunes, 2013) and interprets what the creator of experimental psychology, Brentano, stated and was very well presented by Kriegel (2003), which explains: "When I have an auditive experience of a distant bagpipe: the consciousness of experience is a structure that implies an awareness of the sound of the bagpipes, and at the same time a self-awareness of being listening to the bagpipes, at the same time. Thus, we perceive the sound of the bagpipes and the one that perceives.

Better yet Zahavi (1998) states that if one examines the phenomenon once again, no one will deny that occasionally we are aware of the act as it happens. As we listen to the

tone we are feeling to hear it. We do not have two physical acts, as Brentano claims tone perception is so intrinsically and intimately linked with the awareness of tone perception that they constitute a simple, and only a simple physical phenomenon.

That is why self-perception is like a screen that is not observed while the scenes, emotions, feelings, doubts etc. of our life occur, but the screen is clearly visible in the background of a movie.

This definitively demonstrates the existence of a spiritual soul, and hence we are "image and likeness" of God.

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