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Foundations of an Information Based Psychology †

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† Presented at the IS4SI 2017 Summit DIGITALISATION FOR A SUSTAINABLE SOCIETY, Gothenburg, Sweden, 12–16 June 2017.

Published: 9 June 2017

Abstract: The science of psychology has become fragmented due to its multiple roots, diverse methodologies and premises. Using simple information related notions like input and output, combined with recursive systems' view a powerful theory is presented, based on what classic psychology notions like self, consciousness or emotions are re-defined and are brought to a common ground. If accepted by the research community, the approach could also grow into a unifying thinking frame for social sciences (sociology, history, political sciences, economics etc.). In addition to cognitive science's efforts it aims to integrate our knowledge about both cognition and groups, personality, genders etc.

Keywords: recursive systems; input/output; processing; consciousness; self; unified information theory; morphological computing; adaptation; grid automaton

1. Introduction

Psychology as a science has many roots, e.g., psychoanalysis, behaviorism etc., which examine the same object—the human being—using parallel existing philosophies and preconceptions. All schools and branches developed their own model on the human being but these are not connected in a general paradigm. This shortcoming hinders scientific efforts to establish a unified theory aimed to allow the integration of our knowledge about ourselves.

A simple, information focused model will be presented that is able to integrate the knowledge gathered so far in psychology and offers a thinking frame where co-operation with other human related sciences like biology, sociology, political sciences or economics can be started.

2. Results and Discussion

2.1. Complex Adaptive Systems (CAS)

In the presented model human beings are viewed as living, complex and adaptive systems [1], which as grid automatons [2] process inputs and create outputs in order to increase their chances for survival. In the range spanning from cell to society it is up to our decision which level of biological complexity we focus on.

If we choose the human being we realize that information processing is driven and done by his/her sub-systems, the so called cognitive schemas (notions, theories, memories, facts, mental maps etc.) [3]. The cognitive schemas show a recursive structure being built by lower-and-lower level schemas/systems, down to the lowest schemas that are built by neurons.

In contrast to cognitive science within psychology we can focus also on more complex structures as the couples, groups or society, entities that are also CASs, and try to adapt by optimally processing the available information from their environment.

2.2. Rapid, Repeated Restructuring (RRR)

In most CAS the adaptation shows the same pattern, what we call Rapid, Repeated Restructuring (RRR), a concept reminding us of morphological computation [4].

A system's output depends on its internal structure. Internal structure is how its sub-systems connect. In order to achieve a desired output, this internal structure continuously changes until a specific connection pattern of the sub-systems produces it. RRR is similar to the trial-error learning or the genetic algorithms in that manner, that the restructuring continues until an expected outcome is reached.

The "Rapid" term within the name is relative and is compared to the observers' time perception and emphasizes the competitive advantage of fast calculation cycles.

The "Repeated" term comes into the picture since usually one modification is rarely sufficient, and even if it leads to an acceptable output, this might be sub-optimal therefore changes are repeated.

When is RRR needed? When should a system stay unchanged and just process the inputs, and when should it start to restructure?

To understand this, the notion of suspension is introduced. When (a) a system's outputs do not fit to the environment or (b) a system does not produce output at all, the system's chance for survival decreases. In order to stay alive, the system has to re-start producing outputs: (a) those sub-systems that are involved in producing the bad output are suspended and a re-structuring starts; (b) the whole system is suspended and starts a full re-structuring.

2.3. The Indicator and the Key Pattern

Complex systems are characterized by an indicator (a measure or metric) that reflects their adaptive capacity by counting their non-suspended sub-systems. One extremity is when everything goes optimal: all sub-systems are up and running. The other extreme is when it is close to die and almost all sub-systems are down. Usually the non-suspended sub-systems' number vary between these two states and there is an additional situation; when a system connects to another system and so, the number of working systems grows above 100%. As they become a part of a bigger entity (a super-system) their chances for survival increase. This is why systems strive to connect to other systems. A further advantage of joining a super-system is that this way the production of off-springs becomes possible.

When there's a misfit between a system and the environment, the following happens (see Figure 1.):

- The misfit itself is a conflict between the information coming from two different sources that are expected to produce the same results (Time = 0). For example information coming from the environment does not match with those calculated from within the system.
- The sub-systems participating in creation of the unfitting result are suspended (Time = 1). A restructuring is starting in the hope that in a new setup a result will be achieved that fits to the other input.
- When all high level sub-systems are suspended, the suspension continues at their sub-sub-systems, on lower-and-lower levels affecting exponentially more systems (Time = 2, 3, 4).
- If there is a solution that can be reached based on the available sub-systems, and enough motivation and resources fuel the ongoing restructuring process, a good setup will emerge (Time = 5). This emerging solution changes the direction of the process; from this point the suspended sub-systems are re-enabled.
- The new setup also results achieving a new skill or knowledge and this increases both the number of good connections and the chances for survival.
- The process continues, as the system is part of a greater system and it tries to increase its super-system's chance to survive (Time = 6, 7, 8, 9). So it hands over the acquired knowledge to the fellow systems that it is connected to. (In humans this phenomenon fuels the publication of new thoughts and the communication in general).

- While spreading and using the new solution, a peer system-assisted validity testing is performed. (Time = 10–20)

turn off (suspend)	0	-1	-4	-9	-16															
turn on						25	16	9	4	1	0									
Number of available sub-systems	**100**	**99**	**95**	**86**	**70**	**95**	**111**	**120**	**124**	**125**	**125**	**125**	**125**	**125**	**125**	**125**	**125**	**125**	**125**	**125**
Time	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

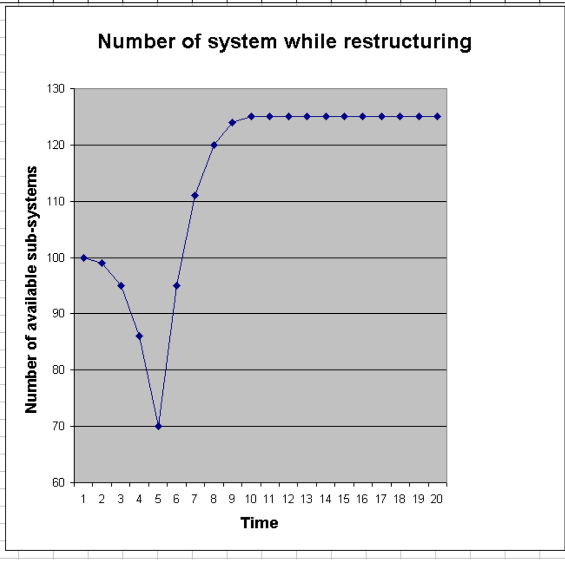

Figure 1. Changes in the number of available sub-systems during an adaptation process.) After a successful restructuring (Time = 5) the sub-systems' activity is re-enabled. This (re-)activation is spreading like an epidemic but in a reverse order. The parent system now includes the newly connected sub- system (in our case additional 25)

2.4. Examples of Using the New Approach in Psychology

- It is quite plausible, that the faster a person performs the restructuring the more successful is in his/her everyday life or profession. Taking into account the speed of restructurings and other specifics of the manipulation chamber we can get closer to understand the difference between high and low IQ people.
- Feelings, a topic usually seen as rather distant from information handling, can be also defined using our model. Self is the super-system that contains all our cognitive schemas, and the positive or negative changes in the Self's indicator level is what we perceive as (positive or negative) feelings.

3. Conclusions

A theory was outlined by presenting a straightforward and simple model that is not built on complex notions or theories. As human beings and their super-systems (society, countries, parties, markets etc.) play key role in most social sciences, the presented model can be generalized in this direction. In [5] herewith we present the use of this more general model with examples on organization theory. The theory can be refined to increase its robustness; first by formalizing the concept; then experiments could be carried out to catch the theory in action.

Conflicts of Interest: The author declares no conflict of interest.

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