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FOR A FLUENT AND COHESIVE PSYCHOPATHOLOGICAL EXAMINATION: A CONSTRUCTION BASED ON THE FLOW OF INFORMATION THROUGH MENTAL FUNCTIONS

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Abstract: The psychopathological examination is an indispensable component of the psychic examination and, therefore, of the psyche and behavioral sciences. Thus, a structure that is capable of objectifying the study of the psyche and bringing a common language in this exam is essential, making it capable of identifying patterns and having semantics for discussions, generalizations, comparison and analysis of evolution. Jaspers (1979) in his studies pointed to the need for this structure, as well as drew attention to the care not to fall into simply didactic, practical and mnemonic proposals in which the perception of the essence is lost. However, he also exposes a line of continuity regarding the development of new orderings of the method and places his work as a starting point for the development of new attempts, calling attention not to become petrified in existing classifications. In neuroscientific studies, Kandel *et al.* (2014) present a perception that the result of neuropsychological functioning is a constant flow of information, involving the sense of perception, its processing, the production of memories, the sense of Self and the generation of new information. Thus, this article proposes the elaboration of a structure for psychopathological examination based on the flow of information through psychic functions. To this end, an original article was constructed using the qualitative method of conceptual analysis (Marconi, Lakatos, 2022), which established the main structuring works of modern psychopathological-phenomenological thinking as the axis of analysis, and resorted to concepts developed in neuroscientific works and widely circulated epistemological studies. 18 functions are described, divided into 3 groups of 6, by nature in common, following an architecture of the development flow of psychic information. It was intended not only to establish a powerful tool for the construction of the exam, but also to encourage discussion about the state of the art of psychopathology and its updating.
Keywords: Psychopathology; psychic examination; neuropsychology of information.

INTRODUCTION

As with any medical training, psychiatry requires observation of phenomena and systematic interviews, with anamnesis and specific tests, generating diagnoses, statistics and specific therapies. In specific propaedeutics, in addition to the usual physical and complementary examinations, the physician is seen as a technological device responsible for observing the mental structure, its functioning and changes in psychic functions. This is the psychic examination, which when based on elements of the psyche researched by Psychopathology, can be called a psychopathological examination. The set of dysfunctions generates a pattern that can be named and then given an opinion. This, associated with the signs collected in the anamnesis and examinations, makes it possible to formulate diagnostic hypotheses and think of nosological groups. This is how psychodiagnosis occurs, which is typical of Psychiatry.

There are also other proposals for psychopathological examination. For example, the psychoanalytic and the cognitive-behavioral. However, when this examination is cited in Psychiatry, it is presumed to be of a Phenomenological nature. This is an indispensable component, therefore, to the sciences of psyche and behavior.

According to Schneider (1968), an analysis structure is essential that is capable of objectifying the study of the psyche, making it possible to identify patterns that express the state of the individual and have semantics for these clinical discussions and generalizations, for comparison between observers and for analysis of the evolution between mental

conditions. Part of this structure are the mental functions as they are considered today by most contemporary authors.

Karl Jaspers (1979) had also already pointed out the need for this structure, as well as drawing attention to the care not to fall into simply didactic, practical and mnemonic proposals in which the perception of the essence is lost. However, it is careful not to become petrified in classifications that prevent the understanding of new characteristics, functions or morbidities of the subjects. He also exposes a line of continuity regarding the development of new orderings of the method and presents his work as a proposed starting point for the development of new formulation attempts.

Sadock, Sadock, Ruiz (2017) emphasize the importance of this method ordering. These, as well as other authors, propose topics for the analysis of psychic functions, their respective changes and, based on these, the characterization of mental disorders currently conceived. Just as the functioning of organs in organic systems is analyzed, the analysis of psychic functions becomes an essential resource for the psychiatric clinic.

Neuroscientific studies, as expressed in Kandel *et al.* (2014), perceive that in the psychic functioning through neural circuits there is a constant *processing of information.* They even talk about the production of a *sense of Being,* also called *I,* as a result of this processing.

Thus, it is latent to conceive a method of analysis of mental functions, of a psychic structure and of a psychiatric clinic associated with this information processing. Not just establishing relationships between symptoms and neuronal action potentials, but observing that there is a system of its own functioning.

In this search, a perception is identified that the result of psychic functioning through neural networks is a constant flow of information, going through capturing the world, processing it, producing a sense of Being, even producing memories or the generation of new information abroad. However, not many efforts are observed in the current state of the art of structured analyzes of this movement of representations in the brain, associating this flow to the functioning of its nuclei and circuits and to the characteristics of mental functions

OBJECTIVE

It was proposed the elaboration of a psychopathological examination structure based on the flow of information through psychic functions, aiming at fluency, discernment and cohesion in the logical work of its construction.

METHODOLOGY

The present work is an original article constructed through the qualitative method of conceptual analysis (Marconi, Lakatos, 2022). The main structuring works of modern psychopathological-phenomenological thought, *Clinical Psychopathology* (Schneider, 1968) and *General Psychopathology* (Jaspers, 1979) were established as the axis of analysis, through a comparative analysis with the *Principles of Neurosciences* (Kandel et al. 2014) and with the *Compendium of Psychiatry* (Kaplan and Sadock, 2017) to establish groups and categories of psychic functioning. As a parameter, the search for the lexicons *psychic function, information, processing, consciousness, I, communication, circuits, representation, language, logic* and its derivatives was used, and their resulting concepts as discriminators. In comparative analysis, the converging, similar or complementary concepts had their content considered. In case of conflicts, the content was deleted.

To structure this content, we also used some concepts already present in manuals

among the most used in the study of Psychiatry in Brazil, being chosen: *Evolutive Psychopathology* (Assumpção Jr., 2007), *Compendium of Psychoanalysis* (Person, Cooper, Gabbard, 2007), *Principles of Neuroscience* (Kandel *et al.* 2014), *Evolution of the brain: psychology and psychopathology from an evolutionary perspective* (Dalgalarrondo, 2014), *Psychodynamic Psychiatry in Clinical Practice* (Gabbard, 2016), *Compendium of Psychiatry* (Sadock, Sadock, Ruiz, 2017), *Psychopharmacology: neuroscientific bases and practical applications* (Stahl, 2017), *Examination of mental functions: a guide* (Nogueira, 2017), *Manual of Psychopathology* (Cheniaux, 2018) and *Psychopathology and Semiology of Mental Disorders* (Dalgalarrondo, 2019).

Also, epistemological support was sought in other works, one aimed at learning philosophical bases, *Philosophizing: Introduction to Philosophy* (Martins, Aranha, 1993), and others related to information science, *Introduction to Computing Theory* (Sipser, 2005), *Communication Theory Manual* (Serra, 2007) and *Introduction to computing: hardware, software and data* (Carvalho, 2017).

RESULTS

Psychic functions, keeping their specific attributions and knowing that they all occur at the same time, influencing each other, can be organized in a logical sequence. As for this sequence, in analogy to a factory, the processing of information by the mind would resemble not an assembly line, but a robotic production yard. In this comparison, *psychic functions* would be like the machines of mental functioning – similar to organs, these being the machines of organic systems.

Meanwhile, a *function* is understood as a chained sequence of operations capable of relating ordered groups of information – as a function of the second degree capable of relating numbers of perpendicular axes through a parabola, or as a function of Newton's second law capable of relate a mass to its acceleration through a force.

Thus, looking at every type of physical stimulus that reaches an organism, the following can be observed:

1) Everything that reaches the body, which is translated into organic stimuli (nervous or biochemical) and propagates to the brain is information: here we have an INPUT FLOW of this information;

2) Coming to the brain, it allows this information to interact with each other, be stored or transformed and generate consequences: the brain can be seen as an INFORMATION PROCESSOR;

3) After this processing, all that is generated is new information, which is externalized in new measurable physical events, which can generate new organic stimuli: here we have an OUTPUT FLOW;

4) While this flow of information occurs, the individual is able to *Do* and *Observe what he is doing*. With the arrival of new events, it adjusts its procedures, being at the same time a viewer and a director of its operation (consciously or unconsciously): there are then the functions defined as CO-PROCESSING OF INFORMATION, that is, that "process what is being processed".

With these conceptions, analyzing the psychic functions characterized in the works of Schneider (1968) and Jaspers (1979), and the flow of information through these functions, what is described in the graph below is developed, being interested at this moment only the physiological occurrence – without discussing its pathological alterations or the concept of each function, which can be easily seen in the psychopathology manuals cited in the methodology and references.

It is worth mentioning previously that the absence of delimited areas of the Neurosensorial

System responsible for each function or for a certain result was observed, thus being the frustration of some scientific journeys, especially neurosurgical ones. Whether the assimilation, processing or response of information, they occur simultaneously in various regions of this system, and together. That said, we can describe 18 functions, divided into 3 groups of 6, by nature in common, following an architecture of the development flow of psychic information, as shown in the following table:

1st Group: vector flow of information (Communication) – each function formed by vectors (physical stimuli that carry information), occurring "from outside (of the organism) to inside", or Input Flow (E), and "from inside to Out", or Outflow (S)	**2nd Group: Information Processing by the Self (Self, in psychoanalysis – who processes the information itself) – the information 1) fixes itself, 2) structures, 3) moves, 4) understands and 5) imagines (rationally or 6) affective)**	**3rd Group: the Co-processing of information by Self-direction (Ego in psychoanalysis, a "Multiple Intelligence" human) – "1) who am I, 2) how I am, 3) where I am, 4) what I want, 5) how I judge and 6) how I perform"**
(E) Sensoperception: sensation, perception and apprehension	1) Memory (evocation or fixation): very short term ("cache"), short term ("potential") and long term (" *hard-disk* ")	1) Self-consciousness: activity, boundary, unity, and identity (or autopsychic orientation) of Self
(E) Consciousness: capture, conservation, tuning, filter and noise reduction	2) Language: symbols with coherence, cohesion and chaining	2) Self-Functioning Awareness: integrity (association-dissociation between Self and Ego), uniqueness (sovereignty of Ego-conversion of Self) and functionality (function-dysfunction/ morbidity of Self)
(E) Attention: regulation of the state of consciousness (tenacity and mobility)	3) Thought: conscious flow (with course, form and content)	3) Orientation: allopsychic (in time and space)
(S) Psychomotricity-Speech: actions and their states	4) Intellect: association, logic (identification, relation and inference) and abstraction	4) Volition: wills and desires (with object, intensity and conation)
(S) Attitude: vector-resulting from actions at the moment	5) Imagination: intend representations in consciousness	5) Pragmatism: face reality, judge it critically and decide based on it
(S) Presentation: result of actions in the past and physiological reactions	6) Affectivity: affects, i.e. feelings and emotions (with their peculiar processing), and mood	6) Prospecting: builds plans, executes and adapts execution to solve problems

DISCUSSION

To arrive at this conception of *Information Flow,* a conceptual analysis of the works mentioned in the Methodology was carried out and the findings were organized, which can be presented based on their need, in order to understand this flow of information.

It starts from the assumption that all physical reality is composed of matter and energy on its surface (which can be perceived by the sense organs or by instrumental techniques) and in its content there is information (capacity to organize a system): an unfolding from the studies of mathematicians Claude Shannon and Norbert Wiener, and biologists Ronald Fisher (Sipser, 2015) and Tom Stonier (Capurro, Hjorland, 2007). Thus, the flow of matter and energy in the universe is also a flow of information.

Physical events generate stimuli perceived by the sense organs and the individual's actions generate physical events, all carrying information. So these physical events in relation to a living being are also a flow of information. One of the flows as an input vector and the other as an output vector (of information). Inside the organism, the information of reality can be *stored and processed* when it interacts with its structure, being then modified and returned to reality, in a dialectical and mutual way: the organic systems modify the information (process it), and the information modifies the systems organic (store new information) during physicochemical interactions of action and reaction.

This way, the organism, divided into organic systems, can be analyzed according to its own ways of processing (instructions) and storing the information of each system. Thus, according to the mathematician and father of modern computing Alan Turing (Serra, 2007), invested with storage (memory), instructions (state) and processing (transitions), the organism as a whole can be seen as a computer: of processing, targeting (norms of) and storage of information. Similarly, each organic system itself is a computational system.

The human being as a whole can be approached through this conception (only one possible and useful way of approach), carrying complex information exchange systems (Communication): Neurosensorial (as an *input* vector), Neurophysiological and Neuromotor (as input vectors). output) and Neurological (specific to carry and process this flow – between systems or with the outside -, integrated with other systems of directed information flow, such as endocrinology or cell signaling). This *human computer* (with its unique particularities and, according to Nicolelis and Cicurel (2015), a Relativistic Computer, which cannot be simulated by a Turing machine itself, electromechanical) has neural circuits (Kandel, 2014), whose surface (matter and circulating energy) can be seen as the *hardware* and the content (information) as the *software.* This *software* has no *defined place* (in three-dimensional space), being the result of *logical operations* (external or internal information interactions) corresponding to the flow, processing and storage of information. The place of logical operations is *virtual,* and so is the place of this *software.*

Part of what Science, Medicine and above all Psychiatry has done over the years is to study the *domain* (*communication)* and the *object* (conscious psychic phenomena) of Descriptive Psychopathology (Jaspers, 1979). That is, the flow of information through what emerges from the *psyche* (soul, mind, content) of the individual, in relation to what is known and can be accessed in this psyche in a direct/ intentional way (Consciousness). So, it can be concluded that Psychiatry has studied the flow of information in the mind, and this mind has a virtual place (in the *software)*. In this conception, it makes no sense to look for

the (physical) location of psychic functioning, as this exists in the virtual environment and, thus, is the result of several and different possible interactions in the *hardware*. Meanwhile, this *hardware* is composed of neural circuits, making it possible to seek an understanding of their interactions and what they represent in logical operations. These circuits have a physical structure, whose content (*information)* will correspond in a complex way (by multiple relations) a *logical structure*.

About this logical structure, there are traditional conceptualizations. The Sciences, through their Epistemology (branch of intersection with Philosophy) define that the relationship that is established between individuals and objects of the real world generating in those a relationship with these (that is, a Record, while it is present), is called Knowledge. The result of this relationship in the individual's Consciousness is called *Representation*: that is, objects, while registered, generate representations in the mind. The norms through which these representations relate are called *Language*. Meanwhile, Logic deals with the possible interactions between these representations according to Language. (Martins, Aranha, 1993) Thus, looking at the structure of the organic computational system (Storage, Norms and Processing), and using the formal conceptualization, the logical structure, or Mental Structure, is formed by representations, *language* and *logic* (Memory, State and Transitions). Psychodynamics uses this conceptualization of representations, language and logic (Gabbard, 2007 and 2016). Thus, the structure formed by the flow of information, or Mental Structure, is found.

Processing, seen from the perspective of the flow itself (of movement), rather than the structure (static), continues in this conception of the Flow of Information to be called Processing, a term used by Neurosciences (Kandel, 2014) *and* by Evolutionary Science (Dalgalarrondo, 2014). Studying this movement of information and its product (new information) also involves understanding the work that generates this product, therefore its operation (Latin *functio,* work). With this, in new studies it is possible to analyze the functioning of this Mental Structure and its relationship with the Psychic Functions already studied by Psychopathology.

CONCLUSION

A line of continuity was introduced regarding the formulation systems of Psychopathology, built from an epistemological, psychodynamic and descriptive perspective, based on neuroscientific evidence.

In this line, as techniques, understandings, concepts and clinical applications evolve, new classification systems and ways of thinking are emerging. The development of hard technology is fundamental in this sense, and the advances in science as a whole bring us new ways of seeing reality. New formal and applied theories that produce other concepts and possibilities of establishing relationships between organic structures, neural circuits, and the already existing knowledge.

The concept of *software* in a virtual environment, for example, is much more sophisticated than the concept of a virtual image in a mirror and, before the concepts of Optical Physics, thinking about something virtual was even more difficult, making ideas like those of Plato cause a mystical or, as his own school is called, an idealistic impression.

Experimental advances in Computer Science, Quantum Physics and Linguistics have brought confirmation of hypotheses and theories, the formulation of models and, with these, emerge concepts that currently bring us the ability to think of an Information Science with key elements to become understand the relationships between material and energy,

real and virtual, *hardware* and *software*. Thus, today it would be possible to speak of the existence of in a Psychic System with virtual occurrence, but with real existence.

In a logical extrapolation, when perceiving the Co-processing of information by self-direction functions (a Multiple Intelligence), generating a sense of I, it is as if there were "something more", "information of information". An awareness of Consciousness, which we could call "*conscienseware*". Nothing anachronistic, as something similar is already produced in Artificial Intelligence experiments: computers with processors intended exclusively for the co-processing of information.

However, this does not mean that when studying this conscienseware we could reproduce it, because the characteristics of this other level of processing, whose core is identified by the Ego and where the Personality operates, as well as the other processings, occur in a relativistic scope. (Nicolelis, Cicurel, 2015)

The important thing is to verify that there is *a new paradigm for the human psyche* (Cesarotto, 2009), as some authors have tried. With this, new ways of structuring the psychopathological examination are possible, of understanding mental functioning and, from this, better understanding the clinical evolution and human suffering.

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