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Self-Awareness in research: From its functional constituents to investigation models

Autoconsciência em pesquisa: dos constituintes funcionais aos modelos de investigação

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Abstract

Objective
The present theoretical study aimed to describe the functionalist origins of self-awareness construct and its importance in grounding an empirical investigation agenda within psychological scientific literature.

Method
We first conceptually analyzed William James definitions for self-related processes and then examined its repercussion for empirical self-awareness research in personality and cognitive neuroscience literature.

Results
Initial challenges of the field to put forward investigations that encompassed both dispositional and situational aspects of self-awareness were found. Moreover, progress observed in different trends of self-awareness investigation, in the last 20 years, were approached in its connection to technological advances evidenced in science.

Conclusion
The need for more integration between different levels of evidence and research fields are discussed as a mean to build an effective full understanding of self-awareness.

Keywords: Concept formation; Metacognition; Self report.

Resumo

Objetivo
O presente estudo teórico teve como objetivo descrever as origens funcionalistas do construto autoconsciência e sua importância na fundamentação de uma agenda de pesquisas empíricas na literatura de psicologia científica.

Método
Inicialmente analisamos conceitualmente as definições de William James para processos autorreferentes e depois examinamos suas repercussões para a pesquisa empírica de autoconsciência nas literaturas de personalidade e neurociências cognitivas.

Resultados
Desafios iniciais do campo para definir investigações que abrangessem tanto aspectos disposicionais como situacionais da autoconsciência foram encontrados. Além disso, progressos observados em diferentes tendências de investigação da autoconsciência, nos últimos 20 anos, foram abordados em sua conexão com os avanços tecnológicos evidenciados nas ciências.

Conclusão
A necessidade de maior integração entre diferentes níveis de evidência e campos de pesquisa é discutida como uma forma de construir uma efetiva compreensão global da autoconsciência.

Palavras-chave: *Formação de conceito; Metacognição; Autorrelato.*

The empirical and systematic investigation of self-awareness goes back to the early writings of modern psychology. Examples that have driven this endeavor range from essays such as Chauncey Wright's (1873) on the evolution of self-consciousness among animals, to William James's (2007/1890) functionalist descriptions of the self, extending to the phenomenological versions of self-appearance in phenomenology (Gallagher & Zahavi, 2021). In this article, we assume the scope of a self-awareness science from the functionalist research tradition. Initially, the philosophical contribution to the subject is addressed based on William James' conceptual formulation on the self and its repercussions for the models of empirical investigations of self-awareness that followed. In a second stage, the developments of empirical studies on self-awareness in the 1970s and 1980s are assessed. Subsequently, examples of paradigms of self-awareness investigation in psychological research in the last 20 years are presented. Finally, the challenge of the operational integration of the concept is discussed in the midst of the plural empirical investigation of self-awareness in the last century.

Self-Awareness and Human Nature: Early Research in Psychology

According to Mora (2008), consciousness and awareness can be understood in Western philosophy in two broad senses. Either as the recognition of qualities, objects and situations that are external to the self, or as the perception of internal changes experienced by the self. The second definition presented by Mora is identified with the contemporary denomination of self-awareness. Mora further mentions that in modern philosophy the broad definition of consciousness could be unfolded in a psychological, epistemological and metaphysical sense. It would be specifically in the psychological sense that consciousness would present a meaning of perception of the Self by the self itself, that is, self-awareness.

In the 20th century, Gallagher and Zahavi (2015) identified a relative conceptual convergence, between representatives of different epistemologies, regarding the postulation of a model of levels of self-awareness. The literature, over this broad period, has defined a spectrum of self-awareness that ranges from pre-reflective, self-aware and implicit forms to complex forms of narrative and evaluative self-awareness. At the pre-reflective level, the self-conscious process would be tacit and implicit and the self would not reach the status of a conceptual object. Pre-reflective self-awareness could be represented by the statement "to whom the experience belongs", giving it the status of a self-aware first-person experience, associated with a sense of agency and bodily ownership (Seghezzi et al., 2019). On the other hand, at a level where one reflects about the self, the

notion is of objective thinking about self-awareness. This reflective self can be understood from an external perspective, even if put into action by the individual himself, performing a reflective activity or having a third-person experience of himself (Rochat, 2018). Even though the understanding of self-awareness from a leveled spectrum has been shared between theories (DeVignemont & Alsmith, 2017), it was the functionalist version that forwarded a science of self-awareness guided by instruments of self-reported self-consciousness and a cognitive science of self-awareness (Carver & Scheier, 1985; DaSilveira et al., 2015; Fenigstein, 1979; Morin, 2006; Silvia & Duval, 2001).

This perspective is based on the specific formulation of self-awareness by William James (1842-1910), who listed three points for a research agenda on self-awareness (James, 2007/1890). Psychology investigations should start with the constituents of the self, then move on to feelings and emotions about the self (self-feelings), and finally to the actions toward which self-consciousness turns (self-seeking and self-preservation). Out of the points indicated by James, the descriptive taxonomy of the constituents of the self stands out. In this taxonomy the material self, the social self, the spiritual self and the pure ego would be included. The material self concerns a subject's body, clothes, family and home, which function as a material extension of the Self. The social self indicates others' recognition of self, or the image of self from the perspective of others. In this constituent, multiple selves could coexist according to the number of established social relations. The spiritual self, in turn, deals with psychic dispositions, subjective life, self-reflection or objective and abstract attention to one's own thinking.

The constituent "pure ego" is highlighted in this model, as it refers to the pre-reflective aspect from which a self-awareness objective science will derive conclusions over the course of the 20th century. James (2007/1890) attributes the status of a core self to the pure ego, recognizing its abstract aspect, but at the same time, objectively experiential for the "self of selves". According to James (2007/1890), the recognition of the pure ego would objectively consist of the collection of peculiar movements in the head or between the head and the throat. The pure ego would not be limited to that, but this set of movements would be the most intimate portion of the activity of the Self of which the self would be self-aware. This core part of the self, intermediate between ideas and obvious acts, would be a collection of physiological activities, indistinguishable in essence from obvious acts. James proposed to divide physiological acts into adjustments and executions, with the core self being identified with collectively apprehended adjustments and the less intimate self associated with the mutations of movements in the execution of actions. In this model, both the adjustments and the executions would be of the reflex type, primary reactions of the organism to the environment.

In the 1890 writing, James proposed a dual character for the relationship between the experience of the self and the experience of the world, stating that the primary reactions of the pure ego would be central and interior compared to the external matter for which these reactions occur (James, 2007/1890). However, the adjustments and executions of the pure ego would have a decisive and arbitrating position, different from the other constituents of the self. In the pure ego, the conclusions and the starting point of the actions would be born, which indicates a strong mediations base of cognition or experience of the action for the author. James identified the pure ego as the locus of direct experience where in the stream of thought that experience would not be directly reflected but felt abstractly. Its matter would be between the physical phenomenon and the reflected postulate of consciousness.

Later, James developed what he called the project of Radical Empiricism, in which he advocated consciousness as a function and not as a psychological entity (James, 1996/1904). In this writing, James indicated that consciousness would be the name given to the function of "knowing"

in experience, this function being observed in the chain of thought. James argued in the Radical Empiricism that consciousness would be necessary to explain the fact that things are known and reported. Therefore, it could not merely be discarded without having a substitute that explains how the knowledge function takes place. In this perspective, thoughts are real, but this reality would consist of the same matter as the reality of things in the world, and the flow of thought would be primarily the flow of breath. James moved away from the dual-matter version he developed in the 1890s, anchoring the reality of thought and self-awareness in the reality of the organism in 1904. This means that thoughts flowing over oneself would be on a par with breathing and its movement. Thus, thoughts would be a synonym for living matter, directing Radical Empiricism towards a monism based on the direct experience of the world.

The consequences of James' formulations on self-awareness were held in abeyance until functionalist scientific interest in self-awareness resurfaced in the mid-1970s in the literature of experimental social psychology and personality (Morin, 2006, 2011). At that time, the most notorious developments of this theory for self-awareness research in this tradition were not oriented towards the constituent of the pure ego, but towards the second level of the model that deals with emotions and feelings reflected on the self (self-feelings), besides a combination of scope interests between the social self and the spiritual self.

In a broader outlook, studies on consciousness gained new impetus from the discussion on the reality of subjective experience and the difficulties to study it systematically and rigorously. Essays such as those by Nagel (1974) and Chalmers (1996) have boosted research about consciousness, and hence into self-awareness, by signaling an explanatory gap between the functional and physiological descriptions of conscious experience and the very justification to discover why human beings have a conscious subjective experience. Based on different theories of consciousness (Baars, 2001; Rosenthal, 2004), the science of self-awareness progressed as a fruitful endeavor of investigations around the functions of self-awareness, along the lines of what James had predicted in his works.

Operationalized Self-Awareness: Trait or State?

Before the consciousness functionalist science issues were raised, Duval and Wicklund (1972) were the first 20th century authors to specify a consistent empirical research agenda for self-awareness (Carver & Scheier, 1985; Fenigstein, 1979; Morin, 2006; Silvia & Duval, 2001). The authors rescued the subject in the field of experimental social psychology, formulating the Theory of Objective Self-awareness and proposing its test in experimental contexts. The Theory of Objective Self-Awareness predicted that stimuli, internal or external, could lead to directing attention to the self, which would lead to the comparison of this self to internalized standards and values. This comparison usually showed a distance between the perceived self and the ideal, leading to one of three possible behaviors: changes in attitude, changes in internalized patterns, or escape from the self-aware state. Self-awareness was defined in theory as attention directed to the self, when the self is the object of consciousness itself (Duval & Wicklund, 1972). The model, clearly functionalist in inspiration, remains close to the scope of the social and spiritual selves described by William James in 1890. More incisively, the theory of Duval and Wicklund inspired the investigation of the feelings and emotions field reflected by a subject on his/her own self (self-feelings).

Although the Theory of Objective Self-Awareness recognized the existence of latent or pre-reflective components of the self, which they called subjective self-awareness; these aspects would not be the focus of investigation. Latent components would only affect mental conditions and have effects on behavior when conscious attention would turn to them and take them as

objects (Wicklund, 1979). In this case, the model does not conceive that the pre-reflective level has an autonomous action on behaviors or personality without prior attention to the self occurring at the objective level of reflective self-awareness. Such a premise had direct consequences on the type of self-awareness that subsequent empirical literature on the subject ended up accessing.

The evolution of the scientific study of self-awareness from the 1970s on was marked by a series of conceptual developments and refinements of constructs of objective self-awareness. Fenigstein et al. (1975) operationalized a division between private and public aspects of self-focus attention on a self-report scale. Private aspects referred to intimate thoughts and internal characteristics of the self, while public aspects would be related to traits of the self observable by third parties, such as appearance and behavior. These authors established a distinction between self-consciousness and self-awareness for research purposes. As it is a dispositional scale of stable individual traits, Fenigstein et al. (1975) enhanced a conceptual break between a situational modality of self-awareness, not assessed by their instrument, and a self-conscious trait modality assessed by the scale, which was already foreseen in the theory of Duval and Wicklund (1972).

The refinement of the self-reported measures of self-consciousness produced subdivisions of the construct along with self-awareness scales counterparts (Table 1), which were evaluated primarily in a dispositional way (Morin, 2011). These instruments treated self-consciousness as one or more personality traits and investigated its relationship, for example, with the individual's metacognitive tendencies (Trapnell & Campbell, 1999) and with personality disorders (Cicero et al., 2021).

Table 1
Examples of self-consciousness and self-awareness scales and their factors

Dimension/Scale/Author	Factors
Dispositional Self-Consciousness	
Self-consciousness Scale (SCS) (Fenigstein et al., 1975)	- Public self-consciousness - Private self-consciousness - Social anxiety
Self-reflectiveness and Internal State Awareness Scale (SRISAS) (Burnkrant & Page, 1984)	- Self-reflexivity - Internal state awareness - Public self-awareness - Social anxiety
Rumination and Reflection Questionnaire (RRQ) (Trapnell & Campbell, 1999)	- Self-rumination - Self-reflection
Self-reflection and Insight Scale (SRIS) (Grant et al., 2002)	- Self-reflection - Insight
Self-absorption Scale (SAS) (McKenzie & Hoyle, 2008)	- Private self-absorption - Public self-absorption
Situational Self-Awareness	
Self-consciousness Scale (Sedikides, 1992)	- Situational self-awareness
Revised Self-Consciousness Scale (Wiekens & Stapel, 2010)	- Private situational self-awareness - Public situational self-awareness
Situational Self-awareness Scale (SSAS) (Govern & Marsch, 2001)	- Private situational self-awareness - Public situational self-awareness - Environmental awareness

The proliferation of self-consciousness instruments based on self-reports was at one point criticized for its disconnection with a unified theory of self-awareness that would enable the efficient formulation of hypotheses (Silvia & Duval, 2001). The central point of these criticisms, focusing dispositional modalities and the creation of self-awareness subfactors, was that statistical studies ended up being the main responsible for the creation of new constructs that were not always based on a basic theory.

While dispositional self-consciousness measures have been adapted and validated in several languages and populations, research on situational self-awareness, which is more transitory and linked to the pure ego experience, has not advanced to the same extent. In some cases, measures of dispositional self-consciousness have tried to be adapted and used to investigate the situational transient self-awareness state (Sedikides, 1992; Wiekens & Stapel, 2010), but without success. Apparently, the concept of situational self-awareness, due to its current and transitory nature, presented difficulties in measuring reliability and statistical reliability when evaluated using self-report scales.

Despite their importance, self-report scales on self-consciousness derive from a "social/personality" model, as defined by Morin (2006). As such, it presupposes the emergence of the self and the possibility of self-consciousness as a result of the process of social interaction and the introjection of an external perspective or speech. This perspective of self-consciousness is necessarily reflective, as the self-conscious process involves taking the self as an object of consciousness (Morin, 2011). However, as observed in James (1996/1904) functional model and in the specification of situational self-awareness by Duval and Wicklund (1972), a fundamental part of the definition of self-focused attention is its implicit nature, linked to pre-reflective processes, transitory and functionally associated with the subject's interactions with the world. In this case, the scientific assessment of self-awareness in self-report instruments would be ignoring an essential part of the actual definition of the construct in the functionalist tradition of the term.

Along this line, the technological progress observed in the last 20 years, added to a greater dialogue between Psychology literature, had a radical impact on the way self-awareness investigations progressed.

Self-Awareness Science: Contemporary Models and Measures

In the last two decades, scales and measures of dispositional self-consciousness continued to be used with greater prevalence in the literature, in combination with the investigation of different psychological aspects. More notorious examples are found in the research on the relationship between self-consciousness and symptoms of depression and anxiety in clinical and non-clinical populations (Burns et al., 2019; Panayiotou et al., 2020; Senín-Calderón et al., 2017). In addition, many investigations have focused on examining the psychological variables in relation to a specific facet of self-consciousness, as in the case of the relationship between aggressive behavior and private self-consciousness (Sohn et al., 2019), between public self-consciousness and alcohol consumption among college's students (Davies & Paltoglou, 2019), and the relationship between social anxiety and driving behavior among bus and taxi drivers (Huang et al., 2018).

However, this period was also marked by technological advances along three specific lines of investigation: 1) the search for neural and physiological correlates of self-awareness, 2) the development of verbal ecological and situational self-awareness protocols, and 3) the incorporation of reaction time measures for the interpretation of self-consciousness profiles in connection with basic psychological processes investigation. It is important to note that during this period important theoretical notions, such as "neural complexity" and "information integration", indicated the theoretical-methodological insufficiency of previous models in the search for isolated causal structures of self-awareness (Doerig et al., 2019). As a result, the implementation of new experimental paradigms and combinations of methods for the investigation of different levels, forms and content of conscious experiences as psychological phenomena were observed (Seth, 2018).

From the fragmentation of the self-awareness construct into different experiences and self-referential responses, it was possible to identify with greater precision the scope and overlapping of the neurofunctional substrates. Current neuroscience literature highlights two main neurological correspondence foci with phenomena of situational self-awareness. The first focuses on the existence of a high-level multisensory and premotor processing center in the central insula that interconnects several networks, such as those related to the sense of agency, sense of self-ownership, decision-making and body schema (Badoud & Tsakiris, 2017; Gogolla, 2017; Pfeiffer et al., 2013; Seghezzi et al., 2019). The second focuses on the correspondence between structures of the medial prefrontal cortex, posterior cingulate cortex and precuneus with executive functions of self-regulation, such as self-reflection, body image, theory of mind and autobiographical memory (Hardwick et al., 2018; Heatherton, 2011; Northoff, 2016).

This distinction between two neural and phenomenal foci of self-awareness can be better understood in the simultaneous and complementary definition of a minimal and pre-reflective self-awareness, and a narrative and phenomenal one, which require the alliance of first and third person methodological perspectives for more fruitful efforts in psychological research (Lou et al., 2017). In this connection, the recent research scenario has sought to combine traditional techniques, such as neuroimaging and self-report questionnaires, with more phenomenological and/or ecological designs in combination with physiological measures.

In the methodological line of verbal self-awareness protocols, two investigation fronts can be observed. The first seeks to relate the content and frequency of self-talk, which is the activity of talking silently to oneself (Morin, 2006) about everyday events. An example of the methodological application of this model is the request for a brief retrospective report of situations in which individuals perceive themselves to be thinking about themselves (Racy et al., 2020). The collection of these data takes place in an open format, in contrast to the self-report scales, where participants describe in a few words the events and contexts in which they perceived talking to themselves.

The second form of ecological inquiry seeks to access situational self-awareness through strategies of experience sampling methods. In such model, participants produce an account or assessment about their current conscious experience by intermittently collecting data over a specified period of days or weeks. Two examples stand out. In the first strategy called Descriptive Experience Sampling participants are asked to vocalize open descriptions of the conscious experience throughout the day for a few days and their verbal record is taped using portable equipment such as micro recorders or smartphones (Brouwers et al., 2018). In the second strategy called Experience Sampling Method, participants, in their routine, respond repeatedly and randomly over time to structured questions about their emotional state, activities they are carrying out, or even about their current interaction framework (van Os et al. al., 2017). The difference between the methods is the structure of evoking experience. While in Descriptive Experience Sampling the description is more spontaneous and without a direct guidance than what should be described, in Experience Sampling Method the evocation of the experience takes place through more structured questions.

A third line of research in the last two decades has sought to incorporate measures of self-awareness into experimental protocols for investigating basic psychological processes. Along this line, self-awareness was approached both as a dispositional trait variable and as a variable of immediate awareness of an occurrence in the experimental setting. As a dispositional variable, it is possible to find examples of research that crossed measures of private self-awareness with performance of experimental decision-making tasks (Silvia et al., 2011), the sense of motor agency (DeCastro & Gomes, 2011), and together with out loud verbalization in body movement tasks (Uiga

et al., 2020). In such cases, dispositional self-consciousness operates as an indicator of stable trait or style of engagement in deliberative, reflective, or motor activities.

On the other hand, as a variable of immediate conscious experience of stimuli, several measures used in experimental research, primarily of visual attention and perceptual discrimination, are identified (Samaha et al., 2017; Siedlecka et al., 2019). Evidence in this field has indicated a direct relationship between motor action thresholds and the level of self-awareness and confidence about one's own experience of a stimulus (Gajdos et al., 2019), as well as a relationship between accuracy feedback in cognitive performance tasks and levels of conscious judgment about one's own performance (Siedlecka et al., 2021).

This literature focuses on three general measures of self-conscious experience: discriminative perception, confidence in performing a task, and estimates regarding future occurrences based on current conscious decision-making experience (Sandberg et al., 2010). Such measures would be respectively evaluated by the Perceptual Awareness Scale, which is a self-report measure on the degree of clarity of the visual experience of a stimulus (e.g. Mazzi et al., 2019), Confidence Ratings, which are tools that measure the degree of confidence in the response given about a given experience (Bonder & Gopher, 2019), and Post-Decision Wagering which measures the extent to which subjects bet on the correction of a given future perception based on their conscious decision-making experience (Moreira et al., 2018). The choice of one measure over another would end up obeying more the methodological design of the study and the nature of the basic psychological process under investigation. Even offering interesting potential for crossing evidence between basic psychological processes and the first-person situational conscious experience, such measures can be questioned as to their actual capability to measure the self-conscious experience (Michel, 2019).

Conclusion

The study of self-awareness and the early stages of psychological science overlap chronologically. Both have their origins rooted in classical philosophy and progress as new technologies and philosophies develop. William James was one of the first to theorize in modern psychology about the process, and elements of his taxonomy of the self find parallel situations in several theories of the self and self-awareness.

The predominance of a less hypothetical-deductive theory of science at the beginning of the 20th century led to a temporary abandonment of the investigation of self-awareness in Psychology. The topic was considered more suitable for an introspective investigation, considered a scientifically non-ideal tool at that time. The emergence of new theories and measures of self-awareness from the 1970s onwards signaled a resumption of research. The use of self-report scales and manipulations of self-conscious states were important in this resumption of investigations. Initiatives in experimental social psychology and personality psychology, however, have focused mainly on the reflexive aspect of self-awareness, disregarding the influence of more basic levels of the self on action and cognition.

More recent formulations define self-awareness as a complex and multilevel phenomenon. As such, they require the articulation of different levels of evidence. Studies of physiological, especially neural, correlates of self-consciousness indicate a possible perspective for the study of the material bases and the pre-reflective functioning of the self-conscious phenomenon. Performance measures on experimental and ecological tasks offer opportunities for testing theories of self-awareness at an implicit level or at least more associated with the performance of organism

action. The self-awareness scales had, in this context, a role in the delimitation of self-awareness constructs and in the distinction between individual dispositions. Finally, as evidenced by freer self-report measures, where respondents themselves define the categories to classify their conscious experience, first-person data can provide evidence that does not place excessive limitations on the expression of self-conscious experience.

If psychology wants to follow up on the research project of self-awareness formulated by William James and inherited from philosophy, the investigation of the constituent elements of self-awareness, at all levels, will be important. Elevating excessively a single level of evidence, be it neurological, social or cognitive, causes a risk of delaying the advancement of new discoveries in the field. Thus, a more integral epistemology for this field of investigations would be desirable. The study of self-awareness is interdisciplinary by necessity, because self-awareness is not a single-level entity.

Additionally, a science with good predictive power is understood to go beyond categorization of individuals into specific types of self-awareness. This requires exhaustive work to integrate evidence and methods, in order to account for the complex relationships inherent in the phenomenon of self-awareness. Technological and methodological advances offer, today, a wealth of research possibilities and data on self-awareness. The integration of these methods and evidence is the main challenge facing researchers in the field.

The relevance of the theme is not anecdotal, as can be seen in the history of modern Psychology itself. James Mark Baldwin (1861-1934) published an essay where he stated that the history of Psychology was the history of science's attempts to reflect on the human mind. Therefore, concluded Baldwin, the history of psychology is the history of systematic attempts to reflect on self-awareness (Baldwin, 1913). To that extent, even though it is an arduous task to precisely identify why self-awareness exists, it is the task of science to accurately describe the properties and mechanisms of certain realities. Self-experience seems to be an irrefutable reality.

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The first two authors conceived the paper theoretical purpose. All four authors contributed to the writing and revision of the material.