

Levels of consciousness and self-awareness: A comparison and integration of various neurocognitive views [☆]

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Abstract

Quite a few recent models are rapidly introducing new concepts describing different levels of consciousness. This situation is getting confusing because some theorists formulate their models without making reference to existing views, redundantly adding complexity to an already difficult problem. In this paper, I present and compare nine neurocognitive models to highlight points of convergence and divergence. Two aspects of consciousness seem especially important: perception of self in time and complexity of self-representations. To this I add frequency of self-focus, amount of self-related information, and accuracy of self-knowledge. Overall, I conclude that many novel concepts (e.g., reflective, primary, core, extended, recursive, and minimal consciousness) are useful in helping us distinguish between delicate variations in consciousness and in clarifying theoretical issues that have been intensely debated in the scientific literature—e.g., consciousness in relation to mirror self-recognition and language.

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1. Introduction

The notion of “levels of consciousness” has been around for quite some time. More than a century ago, two of the most influential theorists in psychology were already examining this notion—Sigmund Freud (1905/1953), with the unconscious, preconscious and conscious, and William James (1890/1950), with the physical, mental, and spiritual selves, and ego. Other related proposals pertaining to the concept of consciousness and its various possible degrees have been offered since then (see Armstrong, 1981; Block, 1995; Nagel, 1974; Natsoulas, 1978; Rosenthal, 1986). There has been a major resurgence of this issue in the scientific literature

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over the past few years. New terminology and models describing levels of consciousness are being rapidly introduced, e.g., reflective, primary, core, extended, recursive, and minimal consciousness.

While carefully and clearly defining “consciousness” is certainly desirable (Natsoulas, 1983), this avalanche of new concepts is proving to be fairly confusing (Antony, 2001, 2002). Some theorists formulate their models without making reference to existing views, redundantly adding unnecessary complexity to an already complicated problem. The goal of this paper is to present and compare nine recent models of levels of consciousness to extract points of convergence and divergence. In order for the task at hand to be manageable, I will exclusively focus on neurocognitive (and to some extent developmental) theories and deliberately neglect more philosophical ideas. It will be proposed that most of these views can be parsimoniously integrated into a more general and already-existing theoretical framework, some models being easily assimilated by this structure, others adding subtle—and yet important—nuances to it. Current models reviewed here suggest that two dimensions of a superior form of consciousness, called “self-awareness,” are particularly important: time and complexity of self-information. That is, examining past and future aspects of the self and being capable of acquiring more conceptual (as opposed to perceptual) self-information indicate higher levels of self-directed thought. To this, three additional variables shaping levels of self-awareness will be addressed: frequency of self-focus, amount (or accessibility) of self-related information, and accuracy of self-knowledge. Considerations about levels of consciousness in relation to mirror self-recognition and language will also be briefly discussed.

2. Theoretical framework

The basic theoretical background used here to contrast and integrate recent “levels of consciousness” proposals rests on the classic distinction established first by Mead (1934), and then by Duval and Wicklund (1972), between focusing attention outward toward the environment (consciousness), and inward, toward the self (self-awareness). This framework has been very popular in experimental social psychology and personality, and has guided empirical research for more than three decades (for reviews, see Carver, 2002; Silvia & Duval, 2001). One appealing quality it possesses is parsimony. Note that my main objective here is *not* to use this theoretical structure (herein called the “social/personality” model) to absorb and dissolve various recent views; instead, it will simply serve as a common guideline, or point of reference, to compare them.

It is assumed that to direct attention outward or inward, an organism first needs to be awake; if not, the term “unconsciousness” is used to designate the state in which there is no processing of information, either from the environment or the self. Examples of unconscious conditions are coma and sleep. When awake and “conscious,” one will process information in the environment and respond to stimuli. In that state, an organism will directly experience perceptions, sensations, thoughts, etc. *without* being aware that such perceptual and mental events are taking place. The organism will be totally immersed in experience—an unreflective actor in one’s environment. In this perspective, most—if not all—animals possess “consciousness.” Humans, too, arguably spend a large amount of time in a state of consciousness, interacting with objects and persons, talking, walking, or coherently thinking, without monitoring these activities. I would argue here that Block’s (1995) notion of “phenomenal consciousness,” that is, what it is like to experience mental events in reaction to external stimulation, such as seeing, smelling, tasting, or having pains, somewhat represents consciousness as defined above. Note that although this definition emphasizes an awareness of external stimuli, and not the self, a minimal consciousness of self is required for the organism to move in, and interact with, the environment. This has been termed “first-person perspective” or “subjective perspectivalness” (Vogel & Fink, 2003); it involves a diffuse, implicit body awareness allowing articulate spatial self-navigation.

“Self-awareness” refers to the capacity to become the object of one’s own attention. It occurs when an organism focuses not on the external environment, but on the internal milieu; it becomes a reflective observer, processing *self*-information. The organism becomes aware that it is awake and actually experiencing specific mental events, emitting behaviors, and possessing unique characteristics. A language-competent creature may thus verbalize “I feel tired,” “I’ve been working for three hours,” or “I am a good-looking, intelligent person.” Here, another classic distinction proposed by Fenigstein, Scheier, and Buss (1975) is useful. In a state of self-awareness, an organism may focus on private or public self-aspects. Private self-aspects consist of externally unobservable events and characteristics such as emotions, physiological sensations, perceptions, values, goals,

motives, etc.; public self-aspects are visible attributes such as behavior and physical appearance. Although this distinction has been criticized (see Wicklund & Gollwitzer, 1987), past research reliably shows that people differentially focus on private and public self-characteristics, leading to distinct motivational, cognitive, social, and behavioral effects (see Buss, 1980; Carver & Scheier, 1981). [The same observation applies to consciousness and self-awareness: both states produce unique effects, suggesting that these two terms should not be equated.] It will be proposed below that being knowledgeable about one's private self-aspects ("private self-awareness") represents a higher form of self-awareness compared to attending to one's public self-dimensions ("public self-awareness"), because that kind of self-information is more conceptual (i.e., abstract) than public self-aspects. Various self-referential processes are implicated in self-awareness; some are integral parts of the general activity of being self-aware (e.g., retrieval of autobiographical memory, self-description, self-evaluation, and self-talk), while others represent consequences, or by-products, of self-reflection (e.g., self-recognition, Theory-of-Mind [TOM], self-esteem, and self-regulation).

One last level of consciousness is "meta-self-awareness"—being aware that one is self-aware (Morin & Everett, 1990). It basically represents a logical extension of the previous stage; whereas a verbally competent and self-aware organism could vocalize "I feel angry," the same organism in a state of meta-self-awareness could say "I'm aware of the fact that I'm angry," or "I'm currently analyzing my emotional state of feeling angry." The following "mirror analogy" can be used to illustrate the difference between self-awareness and meta-self-awareness. A person could position himself or herself very close to a mirror and examine a specific public self-aspect (e.g., a small skin discoloration, a pimple), or move backward and look at the total reflection in the mirror. In the first case, the individual would become aware of a specific self-dimension (self-awareness), whereas in the second situation, the person would become aware that he or she is engaged in self-observation (meta-self-awareness).

Both self-awareness and meta-self-awareness involve knowing that we are the same person across time (self-history), that we are the author of our thoughts and actions (self-agency—cf. de Vignemont & Fournier, 2004), and that we are distinct from the environment (self-coherence) (Kircher & David, 2003). Both forms of higher consciousness also result in the insight that one exists as an independent and unique entity in the world, and that death represents the unavoidable correlate of life (death awareness).

3. Models readily compatible with the proposed framework

In this section, I review four perspectives on degrees of consciousness that fit well into the aforementioned theoretical model. Fig. 1 shows how various forms of consciousness position themselves in relation to the social/personality model.

Of all the views examined in this paper, Brown's (1976) four-level model of consciousness is the oldest. The lowest level, "sensorimotor cognition," is similar to unconsciousness as defined above, but more specifically consists of "deep" unconsciousness, e.g., states of dreamless sleep or coma. The second "limbic stage" refers to what might be called "light" unconsciousness, e.g., dreaming, where there is mental activity but still no processing of internal or external information. This is followed by the "neocortical level," consisting of attention directed outward and leading to perception and action in the world (consciousness), and the "symbolic level," which represents a consciousness of self, or an "...objectivization of intrapersonal content" (Brown, 1976, p. 77). This last level clearly imparts self-awareness, most possibly the private type, since Brown's definition implies that the focus of attention is on *intrapersonal*, and thus, non-public, contents.

More recently, Schooler (2002) presented a model that is also highly consistent with—but simpler than—the one outlined above. Schooler defines "non-consciousness" as an absence of consciousness, "consciousness" as experiencing sensations, perceptions, emotions, thoughts, etc., and "meta-consciousness" as explicitly re-representing consciousness; this latter term also refers to an awareness of one's own conscious experiences. It appears that Schooler's first two labels are synonymous with the social/personality model's definitions of unconsciousness and consciousness respectively, and that "meta-consciousness," because it is limited to a reflection on one's internal and invisible experiences, designates private self-awareness.

Farthing's (1992) view also resembles the social/personality framework presented earlier. In Farthing's terminology, the lowest level of consciousness is the "non-conscious mind." It consists in mental processes not currently in consciousness, i.e., sensory inputs registered but not attended, declarative knowledge in long-term

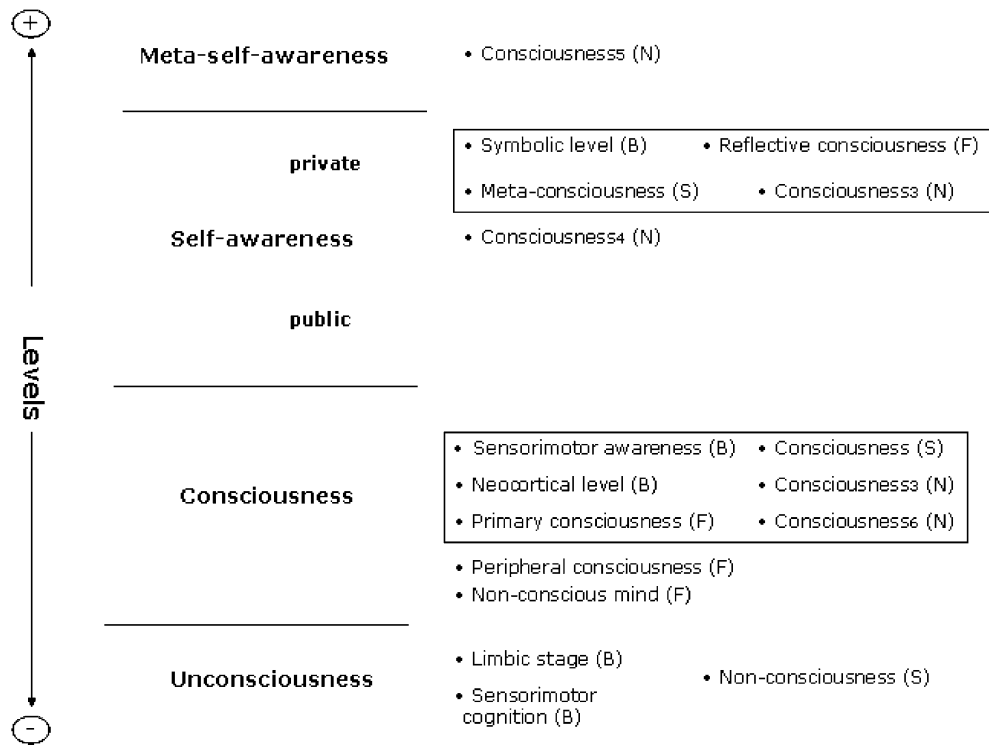


Fig. 1. Various types of consciousness in relation to the social/personality model. (Note. B, Brown; S, Schooler; F, Farthing; N, Natsoulas).

memory, automatic cognitive and sensory-motor programs, and non-conscious motives. Obviously, in that state the organism is *awake* (thus this does *not* represent the equivalent of unconsciousness), but it is not “directly” experiencing mental events. It would consequently be more accurate to suggest that the non-conscious mind is actually part of consciousness, but this first level must nonetheless be distinguished from “primary consciousness,” where the organism directly experiences percepts, feelings, thoughts, and memories. This would be genuine consciousness, where attention is directed outward with the agent immersed in sensations and perceptions non-reflectively felt. “Primary consciousness” basically means “consciousness” in Schooler’s model. Farthing also postulates the existence of an intermediate level between “non-conscious mind” (lower consciousness) and “primary consciousness” (higher consciousness): “peripheral consciousness,” where mental contents are on the fringe of entering primary consciousness. The highest level, where the organism generates thoughts about its own conscious experiences per se, is labelled “reflective consciousness.” Clearly, this level represents the equivalent of private self-awareness, because the focus of attention is one’s subjective experience, as opposed to one’s public characteristics. Thus far, it appears that “symbolic level” (Brown), “meta-consciousness” (Schooler), and “reflective consciousness” (Farthing) are very closely related.

By carefully examining various possible definitions of the term “consciousness,” Natsoulas (1978, 1996) has identified six meanings for it; four are pertinent here. (But see Natsoulas, 1997a, 1998; for an extensive discussion of “consciousness2” in relation to self-awareness.) “Consciousness6” signifies being awake (consciousness). “Consciousness3” means being aware of anything—external objects or mental occurrences. If the object of attention is external, “consciousness3” is synonymous with consciousness as defined earlier; if attention focuses on mental events, then it signifies private self-awareness (but see Natsoulas, 1997a). “Consciousness4” involves a recognition by the thinking subject of its own acts and affections; an awareness of an inward psychological fact; and/or intuitively perceiving knowledge of something in one’s self. Natsoulas (1997b) specifies that consciousness4 is immediate (as opposed to retroactive) and unmediated (i.e., not the result of inferential processes). I submit that this kind of consciousness refers to self-awareness—both private (psychological facts) and public (acts). Finally, “consciousness5” refers to the totality of the impressions, thoughts, and

feelings which make up the person’s conscious being; perceiving the whole set of one’s mental episodes. It is tempting to suggest that “consciousness5” constitutes (private) meta-self-awareness, because there is a perception of the totality, the whole set, and the perception is of internal events (impressions, thoughts, and feelings).

4. Types of self-information and levels of consciousness

One way to look at the issue of levels of consciousness is to take into account what type of self-information organisms have access to—the *nature* and *complexity* of the information. Some researchers have proposed the existence of various forms of self-representations, some being more sophisticated than others. It is assumed that processing rather “crude” types of self-information is done at a lower level of consciousness, and that accessing refined forms of self-information occurs at a higher level. One popular distinction opposes perceptual to conceptual self-representations (Legerstee, 1999). Perceptual (or sensory) information refers to products of one’s direct experience with oneself (e.g., the body) or environmental stimuli (e.g., other persons, mirrors) that identify the self; conceptual (symbolic) self-information designates data about the self that is not available to immediate perceptual experience and that somehow has to be mentally represented—that is, processed, transformed—suggests cognitive work performed at a higher level. In this perspective, it is tempting to propose that most private self-aspects represent conceptual self-information, and public self-aspects, more perceptual self-information. Thus, an individual having access to his or her own opinions, values, goals, and self-memories, for instance, could be said to have a higher level of self-awareness, in comparison to a person exclusively focusing on physical characteristics and behaviors. Fig. 2 schematically illustrates this idea and presents an exhaustive list of self-aspects (see Ben-Artzi, Mikulincer, & Glaubman, 1995).

Related to this view is Neisser’s (1997) five-level model of consciousness (also see Leary & Buttermore, 2003, pp. 366–369). At the lowest level we have the “ecological self,” where processing of self-specifying information (e.g., visual, auditory, and kinesthetic cues) takes place. This processing gives direct awareness of self with respect to the physical environment (i.e., position and movement). The ecological self would presumably give rise to the subjective perspectivalness mentioned by Vogeley and Fink (2003). Since it involves a basic

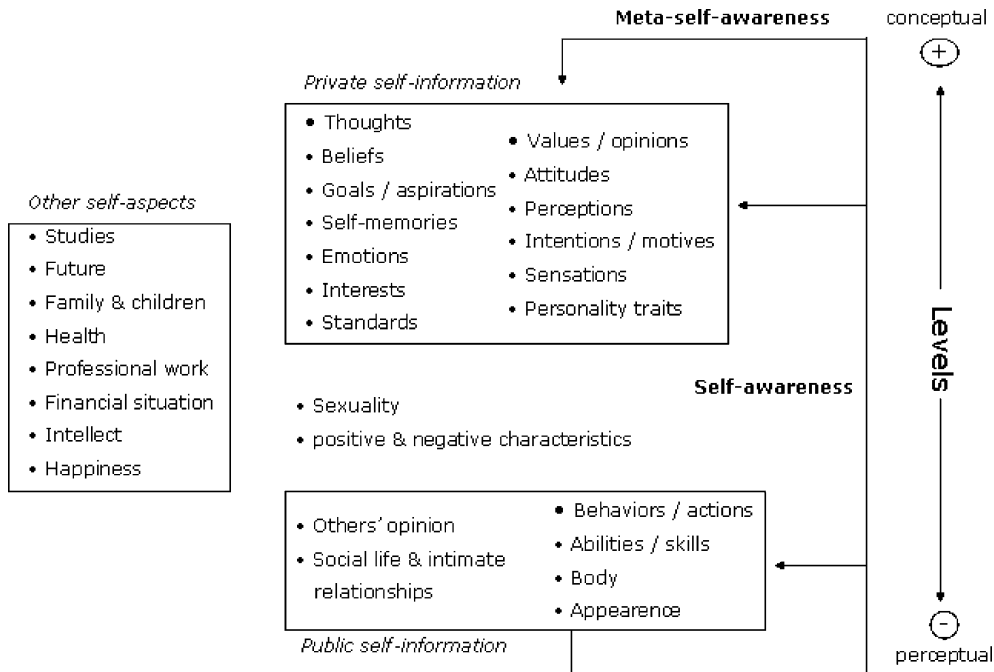


Fig. 2. Private (conceptual) and public (perceptual) self-information and levels of self-awareness.

form of bodily awareness, or primitive knowledge about one's body in relation to the environment, the ecological self is, in a sense, self-aware. However, as discussed earlier, that self-awareness is so diffuse and implicit that one is justified in locating it within consciousness, although probably very close to self-awareness. But the ecological self, because it is based on a direct knowledge of oneself, consists of perceptual self-information and thus represents a "lower" form of (self-) consciousness. A second level of consciousness is labelled "interpersonal self," a raw awareness of one's engagement in social interactions here and now, allowing one's actions to mesh with those of others. This stage represents the emergence of basic social (and thus public) self-awareness and also consists of perceptual self-information. The "extended self" (third level) can reflect on itself over time—it can generate thoughts about itself in the past and in the future. We thus have genuine self-awareness here, with an emphasis on time perspective but, in my understanding, no explicit focus on mental states or personal characteristics (private self-awareness), or visible features (public self-awareness)—or both. Self-information at the next two levels is conceptual in nature. The "private self" (fourth level) can process private self-information—e.g., thoughts, feelings, and intentions; this fourth level refers to private self-awareness. And the "self-concept" (fifth level) is made up of abstract and symbolic representations of oneself—e.g., role, identity, traits, personal characteristics, autobiography. This ultimate level of consciousness represents a full-blown private and public self-awareness, where the organism most probably can also engage in meta-self-awareness.

Newen and Vogeley (2003; Newen, 2004) also present a model in terms of complexity of self-representations. Like Neisser's (1997) view, their proposal pertains mainly to self-awareness and has little to say about unconsciousness and consciousness. Newen and Vogeley start with the premise that human beings use five different levels of cognitive capacities to represent the external world and the self: (1) recognition of states in the present, (2) classification of objects and properties, (3) categorization of events and complex scenes, (4) first-order propositional attribution of attitudes, and (5) second-order propositional attribution of attitudes. The model then proposes that since we employ five essentially different levels of representation (based on the five cognitive capacities), we also develop five different levels of self-consciousness.

The lowest level (based on recognition of states) is labelled "phenomenal self-acquaintance" and is defined as non-conceptually representing one's bodily states. This first degree is similar to Neisser's "ecological self." A second level (using classification of objects and properties) is called "conceptual self-consciousness," where the organism conceptually represents itself, including its mental states. Newen and Vogeley further indicate that at this level, one (conceptually) represents oneself as an object with varying properties different from other objects. I suggest that "conceptual self-consciousness" can be compared to self-awareness; although the exact nature of the properties the organism may represent about itself at that level is unclear, private self-awareness is involved because of an access to mental properties. Another higher level (based on categorization of events and complex scenes) is termed "sentential self-consciousness." At that level, the individual propositionally represents himself or herself as participating in complex events—e.g., a birthday party. A fourth level (using first-order propositional attribution of attitudes) is "meta-representational self-consciousness"; it consists of constructing a mental model of oneself and of other people (TOM), and includes access to autobiographical knowledge. Thus, it appears that this level basically constitutes an extension of conceptual self-consciousness, where self-information (among which autobiographical knowledge) acquired through private (and possibly public) self-awareness, is integrated into a coherent framework (a mental model). Furthermore, on the basis of one's knowledge of one's mental events, one can infer the existence of similar experiences in others (Gallup & Platek, 2002) and develop a mental model of other people's inner lives.

The highest level in Newen and Vogeley's proposal (2003), based on second-order propositional attribution of attitudes, is "iterative meta-representational self-consciousness"—the act of constructing mental models of others' models about oneself. The individual now tries to imagine what other people think of him or her, attempts to construct a model of the models other people have developed about himself or herself. Said differently, it is the development of a TOM about others' TOM of the self. This definitely represents a sophisticated kind of self-awareness involving complex conceptual self-representations. The notion of "iterative meta-representational self-consciousness" is difficult to fit into the social/personality framework used so far, but I venture to suggest that because of its very large scope, this last level most probably encompasses meta-self-awareness.

5. Time and levels of self-awareness

In this section, I discuss three views that stress the importance of time in self-awareness. In a sense, Neisser’s (1997) position already introduced this idea by postulating the existence of an “extended self” that can reflect on itself over time. Fig. 3 presents various levels of self-awareness proposed by Zelazo (2004), Stuss, Picton, and Alexander (2001), and Damasio (1999); Neisser’s levels, as well as Newen and Vogeley’s view, are also included. As in Fig. 1, Fig. 3 shows how these different concepts locate themselves in relation to the social/personality model.

Zelazo (2004; Zelazo & Sommerville, 2001) adopts a developmental perspective and examines how five degrees of consciousness gradually emerge in infants and children. The “Level-Of-Consciousness” model (LOC) is based on the assumption that a functional mechanism of recursion takes place at each level, whereby the contents of consciousness are fed back into consciousness so that they can become accessible to consciousness at a higher level. The LOC model implies that with each higher level of consciousness, mental experiences become qualitatively richer and easier to recall, and conscious control of behavior increases.

The lowest level (first year of life) is “minimal consciousness,” which basically represents consciousness, where the infant unreflectively experiences stimuli in the present. Past events cannot be recalled, and future anticipated states cannot be mentally represented. The second stage (9–12 months) is “recursive consciousness”: minimal consciousness refers to itself by combining its contents at one moment with the contents at another time via labelling. For example, a 12-month-old infant could look at a giraffe and say “[I see a] giraffe”; in doing so the toddler associates his or her perceptual experience with a description of it from memory. When there is simultaneous access to the perception (the actual giraffe) and the label (“Giraffe”), the perception becomes an object of conscious experience. At this stage the toddler not only undergoes mental events such as seeing an animal—he or she becomes aware of experiencing them. Zelazo specifies that the child is not yet reflecting on his or her mental events *as such* (e.g., seeing). In other words, the phenomenological

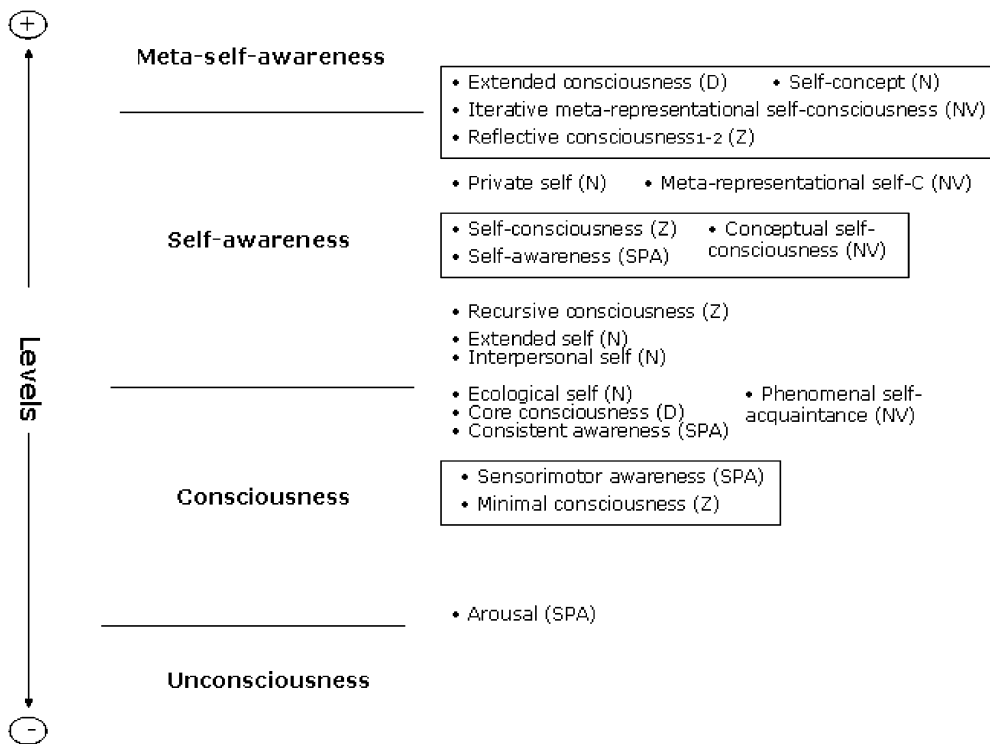


Fig. 3. Additional forms of consciousness in relation to the social/personality model. (Note. N, Neisser; NV, Newen & Vogeley; Z, Zelazo; SPA, Stuss et al.; D, Damasio).

content of consciousness remains the giraffe, and *not* thoughts about seeing the giraffe. The giraffe need not be present in order for it to become the phenomenological content of consciousness. Past experiences and future-oriented states now can be represented, but these are not connected to what the child is experiencing in the present—the child is still incapable of perceiving the self Now. “Self-consciousness” is the term used by Zelazo (2004) to indicate that the 18-month to 2-year-old child can engage in additional reflection on the contents of recursive consciousness. At this level the child is able to relate a description of an experience (e.g., “That is a giraffe”) not only to the experience described (seeing the animal) but to another description (e.g., “Yesterday I went to the zoo”). At this point the child can think about descriptions of past or future events in relation to a present experience (e.g., “Today I’m home with Mommy but yesterday I was at the zoo”). In other words, the child is fully conscious of Now (“Today I’m home with Mommy”) and can link this description to another one that refers to a past event (“Yesterday I was at the zoo”) or future episode (“Tomorrow I will play with my friends”). This third level of consciousness does not fit well into the social/personality model but nonetheless constitutes a higher level of self-awareness because the child gains the subjective experience of self-continuity across time.

Zelazo presents two additional degrees of consciousness that can likewise be considered higher types of self-awareness: “reflective consciousness1” (3 years of age), where the child can become simultaneously aware of two experiences occurring at different times, and “reflective consciousness2” (4 or 5 years of age), where the child can consider the entire content of reflective consciousness1 in relation to other self-descriptions. Both levels involve the child being able to take an increasingly temporally decentered perspective (i.e., relativizing one’s own perspective in space and time; psychologically distancing oneself from oneself) and culminate with a differentiation between the history of the world and the history of the self. This in turn leads to an understanding of oneself as displaying both continuity and change in time. As for “self-consciousness,” it is difficult to establish clear links between the concepts of “reflective consciousness1-2” and the social/personality model of levels of consciousness. This suggests that Zelazo’s view introduces nuances that are original and non-reducible to any other model. I would nonetheless propose that these last two forms of self-awareness can be associated with the highest forms of private and public self-awareness, and with meta-self-awareness.

Whereas Zelazo’s LOC model is developmental in essence, the next two views originate from neuropsychology and neurobiology. Stuss, Picton, and Alexander (2001; also see Stuss & Anderson, 2004) present a hierarchy of modular processes that construct an increasingly complex model of the world. The brain would create such a model to interact more efficiently with the environment; the model would help simplify, regulate, and accelerate subsequent encounters with, and responses to, the external and internal milieu. At the lowest level of consciousness, “arousal,” there is no internal modeling of information; the organism makes simple behavioral responses to incoming stimuli. This is basic consciousness. A second stage is labelled “sensorimotor awareness”; this still is part of consciousness, but an analysis of incoming sensory information (including bodily signals) takes place and leads to the construction of complex motor activity. As a result, the organism emits more sophisticated responses in the environment. At the “consistent awareness” level of consciousness, the organism creates a larger world-model consistent with reality; there is mediation of executive functions that integrate the information provided by the sensory systems, as well as the organization of voluntary goal-directed behavior. One can speculate here that “consistent awareness” still represents consciousness as defined in the first section: although this level is more refined than the previous one, there is no mention of any form of self-directed analysis, and the organism basically keeps focusing attention on the environment and processing incoming external stimuli. The last level is named “self-awareness”; the organism now builds a *self*-model which requires planning, judging, and self-monitoring. Furthermore, it considers information from the viewpoint of a personal history, remembering from the past and projecting into the future. Access to autobiographical information and the construction of a self-concept (self-model), arguably made up of private and public self-information, suggest that this highest form of consciousness refers to self-awareness in the social/personality model. The “self-awareness” level put forward by Stuss et al. (2001) closely resembles the concept of “meta-representational self-consciousness” posited by Newen and Vogeley (2003). The emphasis on personal history at this level indicates that a perception of self in time constitutes an important factor in self-awareness.

This last remark is consistent with Damasio’s view (1999) as well. He proposes the existence of two levels of consciousness: “core” and “extended” consciousness. “Core consciousness” presupposes wakefulness and

consists in an implicit sense of self here and now. I suggest that “core consciousness” be located right in between consciousness and self-awareness as defined throughout this paper, because on the one hand it refers to being aware of one’s environment and experiencing mental events (consciousness), and on the other hand, to possessing diffuse information about the self (self-awareness). One could propose that “core consciousness” is somewhat similar to “phenomenal self-acquaintance” (Newen & Vogeley, 2003) and the “ecological self” (Neisser, 1997). “Extended consciousness” represents a more elaborate sense of self and identity that includes one’s past and anticipated future, as well as personality characteristics and other comparable private and public self-dimensions. Dennett’s (1991) concept of “narrative self,” with its idea of self-perception *in time*, essentially means Damasio’s “extended consciousness” (see Gallagher, 2000) and can be linked to Neisser’s (1997) “self-concept” and Brown’s (1976) “symbolic level.” Seen as such, “extended consciousness” represents a refined form of self-awareness; since Damasio specifies that extended consciousness possesses many grades, it may also include an awareness that one is self-aware—meta-self-awareness.

In closing I want to briefly draw attention on two additional views that also consider perception of self in time as a key ingredient in consciousness and self-awareness. Carver and Scheier (1981) distinguish between “low levels” and “high levels” of meaning of self. Low levels refer to a narrow, concrete, and temporally limited awareness of one’s movements and sensations in the immediate present; this would represent consciousness. High levels imply an examination of the self over time (e.g., implications of one’s behavior in the future), the use of broad standards to self-regulate, and attributions of meaningful traits that go beyond the present moment; this could consist in private and public self-awareness, and even possibly meta-self-awareness. Abreu et al. (2001) focus on self-awareness deficits following brain injury and observe that patients can have three forms of awareness of their disorder—or lack thereof. At the “intellectual awareness” level patients possess a basic understanding that a deficit (e.g., speech pathology) exists. At the “emergent awareness” level patients develop a more detailed awareness of the deficit as they are engaged in performing a given task (e.g., a verbal IQ test); this is accompanied by the possible realization that they might not be capable of performing the task. And at the “anticipatory awareness” level there is an ability to reflect on future consequences of the deficit (e.g., not being capable of adequately expressing oneself during an upcoming family reunion).

6. Other dimensions

The plain fact that people differ in the time they spend observing the self allows the introduction of another realm to levels of consciousness that is typically neglected: *frequency* of self-awareness. When people are exposed to environmental stimuli that remind them of their object status for others (e.g., “self-focusing stimuli” such as mirrors, audiences, and videorecordings of the self), self-attention results (Buss, 1980; Carver & Scheier, 1981; Davis & Brock, 1975). Thus, some people (famous individuals for instance—see Schaller, 1997) who frequently get exposed to self-focusing stimuli are likely to engage more extensively in self-observation. Studies within personality psychology further extend this idea to include individual differences in self-awareness. Questionnaires have been designed to measure the natural and stable disposition people have to focus on the self more or less frequently (e.g., Fenigstein et al., 1975). This personality trait is relatively free of environmental influences.

It seems reasonable to assume that people who engage more frequently in situational or dispositional self-observation are likely to attain higher levels of self-awareness compared to individuals who do not. Indeed, habitually self-aware individuals can describe themselves more rapidly and generate more self-descriptive adjectives than infrequently self-aware individuals (e.g., Gibbons, 1983, 1990; Turner, 1978a, 1978b). Thus, a second additional dimension to levels of consciousness is the amount, or *quantity*, of self-information that people possess. Individuals can be self-aware more or less frequently; they can also acquire various quantities of self-information. In this perspective, a person who knows about his or her thought processes, beliefs, perceptual experiences, attitudes, and personality traits could be said to be more self-aware than another individual whose self-knowledge would limit itself to his or her beliefs and personality traits.

Of course, quantity (frequency of self-examination) does not mean quality (accuracy of self-information). A large and diversified body of literature suggests that although people *think* they know themselves well, in actuality *they do not*. In extreme cases, such as brain injury where patients persist in believing that there is no deficit despite ample evidence to the contrary, causes for inaccurate self-knowledge are clearly organic (e.g., Abreu

et al., 2001). In other situations, the reasons are motivational: people engage in a wide variety of self-serving bias (e.g., self-enhancement, self-inflation) to protect their self-esteem (Fiske & Taylor, 1991; Gardner, Gabriel, & Hochschild, 2001; Sedikides & Gregg, 2004). Some studies indeed find large disparities between people's self- and peer-reports on personality traits (e.g., Fiedler, Oltmanns, & Turkheimer, 2004). Furthermore, although it makes sense to believe that self-awareness *in itself* should sharpen self-perception and produce more accurate self-knowledge, empirical evidence to this effect is inconsistent (Silvia & Gendolla, 2001). One possible reason for this can be found in Trapnell and Campbell's work (1999). These researchers propose that people actually engage in two forms of self-focus: self-reflection and self-rumination. The former is defined as a genuine curiosity about the self, where the person is intrigued and interested in learning more about his or her emotions, values, thought processes, attitudes, etc. Self-reflection has been linked to healthy psychological functioning (Joireman, Parrott, & Hammersla, 2002) and is precisely the type of self-attention that can potentially lead to greater and more accurate self-knowledge. Self-rumination, on the other hand, represents anxious attention paid to the self, where the person is afraid to fail and keeps wondering about his or her self-worth. Here, frequency of self-focus is indeed high, but characterized by constant "beating around the bush," re-evaluation, questioning one's behavior and appearance, etc. Self-rumination has been associated with psychological distress and maladjustment (Mor & Winquist, 2002), and does not result in more accurate self-knowledge. Two persons could frequently self-focus and possess a comparable amount of self-information, but not present similar levels of self-awareness.

7. Self-recognition, language, and levels of self-awareness

Conceptualizing consciousness and self-awareness in terms of degrees is advantageous. Below I provide two examples of how that can help clarify theoretical issues that have been intensely debated in the scientific literature.

The first problem concerns non-human consciousness. Gallup (1985, 1998; Gallup et al., 2002) and others (e.g., Keenan, Falk, & Gallup, 2003) have been claiming that chimpanzees and orangutans are self-aware because they can recognize themselves in mirrors. The reasoning behind this assertion is that to recognize oneself in a mirror indicates that one can become the object of one's attention; it also presupposes a self-concept because one first has to know who one is in order to self-recognize. As stated earlier, there is little controversy about the fact that animals, including primates, possess consciousness and even self-awareness. The question rather is: What *kind* of self-awareness does self-recognition imply? Gallup insists that to self-recognize one needs to have access to one's mental states, so that *private* self-awareness would underly the ability for self-recognition. In this perspective, the following forms of self-awareness would also be involved in self-recognition: the symbolic level (Brown), meta-consciousness (Schooler), reflective consciousness (Farthing), consciousness³ (Natsoulas), the private self (Neisser), and meta-representational self-consciousness (Newen & Vogeley). However, Mitchell (1993, 1997, 2002) points out that there are two main difficulties with this view. First, all that is needed for a non-human animal to recognize itself in a mirror is a kinesthetic representation of its own body. The primate "matches" what it sees in the mirror with an internal image of its own body and concludes that the mirror image is the self. The organism does not need to have any awareness of its mental experiences. Besides, it remains unclear which mental states should be observed for the animal to recognize itself in the mirror. There is no perceptible link between being aware that one is sad, or happy, or intelligent, and recognizing oneself in a mirror. Conversely, there *is* a connection between having an internal kinesthetic representation of one's body (that one can compare to what one sees in the mirror) and mirror self-recognition.

If Mitchell and others (e.g., Heyes, 1998; Morin, 2003) are correct, it means that self-recognition only requires the possession of a somatic representation of one's body and constitutes an ability only superficially related to genuine, fully mature human self-awareness. It would be more adequate to state that self-recognition involves a lower form of self-awareness, or a higher level of consciousness—that is, phenomenal self-acquaintance (Newen & Vogeley), core consciousness (Damasio), or an ecological self (Neisser).

A second issue concerns the role played by language in consciousness. Again, there seems to be no debate about the fact that language *does* intervene in consciousness. However, to either state that consciousness is only possible with language (McCrone, 1994), or that language is not involved at all in consciousness (Keenan

et al., 2003, p. xxiii), is too simplistic. The question rather is: At what *level* (or levels) of consciousness is language required? Damasio (1999, p. 109) makes it very clear that consciousness (as defined by the social/personality model) does not entail language:

In every instance I know, patients with major language impairments remain awake and attentive and can behave purposefully. More importantly, they are quite capable of signaling that they are experiencing a particular object, or detecting the humour or tragedy of a situation, or picturing an outcome that the observer anticipates.

In this view, the following levels of consciousness reviewed in this paper would not require language: sensorimotor awareness (Brown), consciousness3–6 (Natsoulas), primary consciousness (Farthing), sensorimotor awareness (Stuss et al.), minimal consciousness (Zelazo), as well as lower forms of self-awareness (i.e., interpersonal and extended selves [Neisser], recursive consciousness [Zelazo]). Thus, according to Damasio, language is not essential for core consciousness. But for extended consciousness it is. A growing numbers of researchers (e.g., Briscoe, 2002; Carruthers, 1998; Dennett, 1991; Morin, 2005; Stamenov, 2003; Steels, 2003) maintain that more complex types of self-awareness necessitate language, and more specifically, inner speech. Self-talk can replicate and extend social mechanisms producing self-awareness; in addition, when one talks to oneself one can verbally identify, process, and store information about one's current physical and mental events, as well as past or present behaviors (Morin, 1993). Zelazo (1999) proposes that language is required for recursive consciousness and plays a similar role at higher levels of consciousness in his LOC model. To these I would add the self-concept and private self (Neisser), meta-representational and iterative meta-representational self-consciousness (Newen & Vogeley), consciousness3–5 (Natsoulas), the symbolic level (Brown), and reflective (Farthing) and meta-consciousness (Schooler).

8. Conclusion

In an effort to reduce the growing confusion associated with a proliferation of new models and terms describing various levels of consciousness and self-awareness, I have outlined and compared nine recent neurocognitive proposals while using as a theoretical background the well-known social/personality model. The analysis offered here strongly suggests that many new concepts recently introduced to describe various levels of

Table 1
Summary of the analysis presented in the present article

Levels	Definition	Related concepts
Meta-self-awareness	Being aware that one is self-aware	<ul style="list-style-type: none"> • Consciousness5 • Extended self
Self-awareness	Focusing attention on self; processing private & public self-information	<ul style="list-style-type: none"> • Consciousness4 • Extended & private self • Symbolic level • Meta-representational self-consciousness • Conceptual self-consciousness • Self-concept • Reflective, recursive, self and meta-consciousness
Consciousness	Focusing attention on the environment; processing incoming external stimuli	<ul style="list-style-type: none"> • Non-conscious mind • Ecological & interpersonal self • Neocortical level • Consciousness3–6 • Sensorimotor awareness • Core, peripheral, primary & minimal consciousness
Unconsciousness	Being non-responsive to self and environment	<ul style="list-style-type: none"> • Consciousness6 • Non-consciousness • Arousal • Limbic stage • Sensorimotor cognition

consciousness are closely related. Table 1 presents a summary of this review. On one hand, we have numerous terms that basically refer to a common underlying level of consciousness, thus creating unwanted redundancy. For example, the following notions all mean consciousness as defined as being awake and focusing attention on the environment: the neocortical level, consciousness3–6, core, primary and minimal consciousness, and sensorimotor awareness. On the other hand, some other notions introduce fine nuances that should not be overlooked. For instance, both iterative meta-representational self-consciousness and extended consciousness are located between self-awareness and meta-self-awareness on the social/personality model, but each notion possesses a distinct flavour, the former emphasizing TOM, the latter, time. Thus these two terms refer to slightly different forms of (meta) self-awareness and should not be equated. Overall, many new expressions are useful in helping us distinguish between delicate variations in consciousness and self-awareness.

As stated previously, it must be stressed here that the present review of literature is by no mean exhaustive. Quite a few models and concepts have been strategically left out of this analysis, either because their scope is rather limited (e.g., Rochat's six levels of self-awareness [2003], that specifically apply to self-recognition in infancy) or the domain to which they apply lies outside psychology (e.g., Salzen's ethological four-level model [1998]; Rosenthal's philosophical concepts of "creature" and "state" consciousness [1986]). A great deal of effort still needs to be deployed in order to examine and compare additional consciousness-related concepts such as "meta-cognition", "higher-order thought," "autonoetic," "visceral," "first-order consciousness," and "immediate self-awareness."

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