

A neuro-socio-cognitive model of self-awareness with an emphasis on inner speech¹

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While past research has mainly focused on the effects and consequences of self-awareness, a more basic issue pertaining to the specific mechanisms underlying self-attention has been neglected. In this article I present a model of self-awareness that proposes the existence of three sources of self-information. The social milieu includes self-relevant feedback (reflected appraisals), a social comparison mechanism leading to perspective taking, and the presence of other persons observing the self. The physical environment contains self-focusing/reflecting stimuli such as mirrors and video cameras. The self can reflect upon itself with double sensory stimulation, imagery, and inner speech; furthermore, self-awareness is mediated by the prefrontal lobes. The crucial importance of inner speech is emphasized by reviewing past mentions to a relation between self-talk and self-awareness and by examining key connections it establishes between different parts of the model. Empirical evidence supporting the role of inner speech in self-reflection is also presented.

With increasing interest in the study of consciousness, as exemplified by the recent creation of numerous scientific journals and international associations specifically dedicated to its study,² research on self-awareness is stronger than ever. Current work in this area is looking at brain mechanisms and areas mediating self-awareness (e.g., Johnson et al., 2002), mental health issues in relation to excessive self-focus (Ingram, 1990), animal self-recognition and self-awareness (Gallup, 1998; Povinelli, 1998), and measurement techniques (Eichtaedt & Silvia, in press). Past assumptions about self-awareness, self-consciousness and self-evaluation in social experimental psychology are being qualified with recent empirical studies (e.g., Mor & Winquist, 2002; Silvia & Duval, 2001; Trapnell & Campbell, 1999). Psychologists are examining related abilities such as modeling others' mind ("Theory-of-Mind" development—e.g., Astington & Jenkins, 1999; Frith & Happe, 1999). And philosophers are carefully describing different types of higher conscious states and uncovering the thought processes that make them possible (e.g., Prinz, 2002; Rosenthal, 2002).

While these efforts are mainly aimed at identifying short-term effects and long-term consequences of self-awareness, as well as its biological foundations, a more fundamental question pertaining to the precise mechanisms and processes underlying self-awareness has been largely neglected. *How*, exactly, do we become self-aware and acquire self-information used to form a self-concept—as opposed to *what* takes place when we become self-aware? Furthermore, past investigations have mainly examined isolated neurological or social factors involved in self-awareness (see Burns & Engdahl, 1998; Stuss, Picton & Alexander, 2001). In this paper I attempt to integrate all known variables into one coherent view and thus present a neuro-socio-cognitive model that takes into account brain regions, social influences, and cognitive processes leading to self-awareness. One such factor is inner speech, and its crucial importance will be emphasized notably by examining the key connections it establishes between different parts of the model.

¹ I would like to thank Petra Kamstra for her helpful editorial comments on previous versions of this paper.

² Some representative examples—journals: Self and Identity, Journal of Consciousness Studies, Consciousness and Cognition, The Journal of Mind and Behavior, Dynamical Psychology: An International, Interdisciplinary Journal of Complex Mental Processes, Science and Consciousness Review, Psyche. Associations: The Center for Consciousness Studies, Association for the Scientific Study of Consciousness, International Society for Self and Identity, Canadian Research Network on Human Consciousness.

The term “self-awareness” first needs to be carefully defined because the model proposed here only applies to this sophisticated form of consciousness. “Self-awareness” in this paper refers to the capacity to become the object of one’s own attention (Duval & Wicklund, 1972), where the individual actively identifies, processes and stores information about the self. It is an awareness of one’s own mental states (such as perceptions, sensations, attitudes, intentions, emotions, etc.) and public self-characteristics (which include behaviors and general physical appearance). Psychologists argue that self-awareness is important because it enables the development of uniquely human qualities, among which self-regulation. Our ability to self-monitor and change our current behaviors and thought processes largely depend on our capacity to objectively examine the self (Carver & Scheier, 1981). Quite a few closely related notions and variations of self-awareness can be found in the literature: private and public self-consciousness, meta-consciousness, meta-cognition, higher-order thought, auto-noetic or extended consciousness, second-order consciousness, reflective awareness, access consciousness, and narrative self (see Gallagher, 2000; Schooler, 2002). Lower forms of consciousness that the present model does not address are immediate self-awareness, visceral, first-order and phenomenal consciousness, and the minimal self.

In what follows I will first provide an overview of the model, which will include an analysis of various social and environmental variables producing self-attention. Although all factors are seen as important contributors to self-awareness, the main focus of the paper will be the self, within which two aspects in particular will then be underlined: the importance of the prefrontal lobes (neurological dimension) and inner speech (cognitive dimension) for self-reflecting activities. Recent brain studies will be reviewed to identify known biological substrates of self-awareness. The exact nature of a relation between self-talk and self-awareness will be carefully examined, and empirical evidence supporting this emphasis on inner speech will also be presented. I will conclude by presenting a summary of the model and its various links.

THE MODEL³

Figure 1 depicts three main sources of self-awareness: the social environment (1), the physical world (2), and the self (3). Italic numbers and letters in the text refer to elements of the model in Figure 1. Solid lines connect the two first sources of self-awareness to the self, as well as the self to itself. The social milieu comprises self-relevant feedback that the individual receives from other persons (reflected appraisals [1.1]), a social comparison mechanism leading to perspective taking (1.2), and the presence of other persons observing the self (audiences [1.3]). The physical environment contains self-focusing/reflecting stimuli such as mirrors, video cameras and photographs of the self (2.1), and also, by extension, written material printed in books and articles, as well as various media sources—e.g., television programs and news, the internet, and movies (2.2). And finally, the self can reflect upon itself by using double sensory stimulation (3.2) and cognitive processes, especially inner speech (3.3) and imagery (3.4). In addition, self-awareness requires the participation of specific brain structures, mainly the prefrontal lobes (3.1). Broken lines correspond to different links (e.g., A, B, C...) that can be established between all these various sources of self-information.

³ Less elaborated versions of this model (minus the neurological dimension) have been presented in Morin, 1992, 1993; Morin & Everett, 1990; Morin & Joshi, 1990.

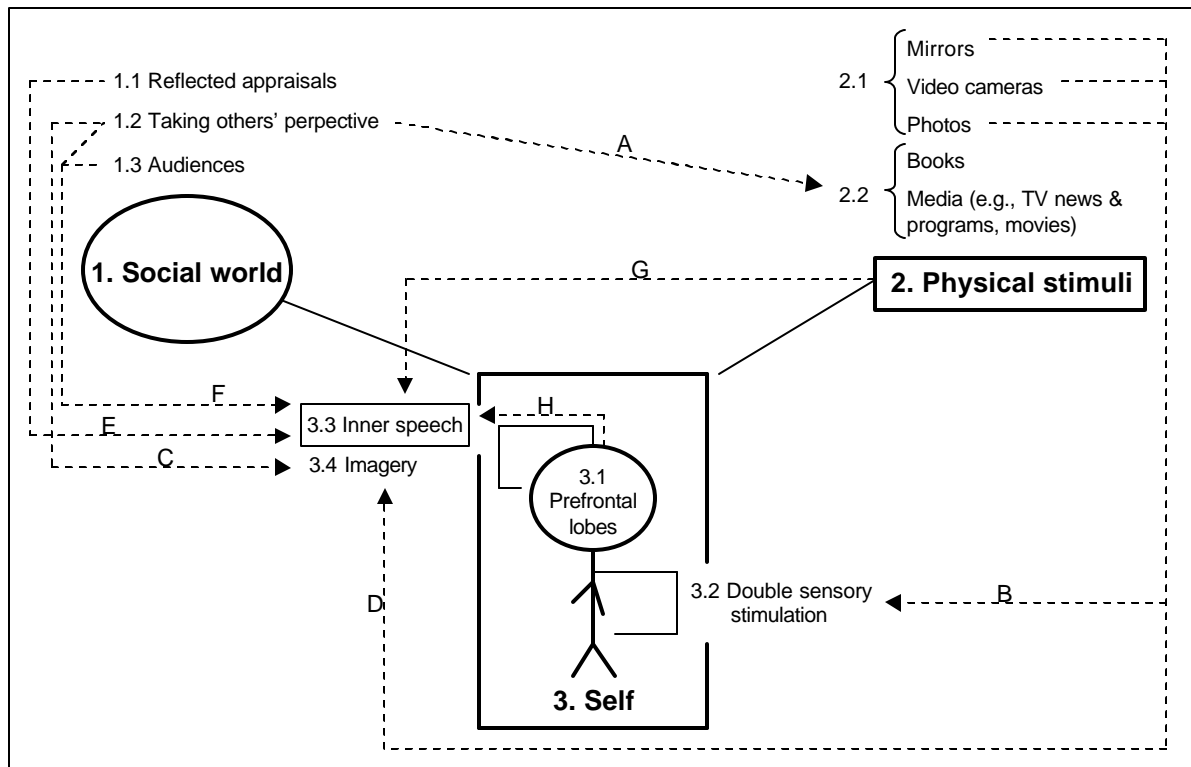


Figure 1—Three sources of self-awareness

Social environment

The social environment (1) represents a rich source of self-information and can in different ways initiate self-focus. Two theorists explored this notion in detail: Charles Horton Cooley and George Herbert Mead. Their overall view is known as “symbolic interactionism”. Cooley (1912; also see MacCall, 1977) basically proposed that people regularly comment on (verbal feedback), or react to (non-verbal feedback) our personal characteristics and behaviors. These reflected appraisals (1.1) allow us to learn about ourselves and can also induce self-awareness. For instance, family members, coworkers, a mate, or friends can claim “You are very intelligent... or vain, good-looking, distant, hard-working, selfish”, etc. People may say to us: “I’ve been observing you lately—you seem depressed”... or happy, anxious, busy, sick, etc. We can also engage in sophisticated conversations with significant others and discuss our personality characteristics and typical behavioral patterns. (On some occasions we may actually have to sit and reluctantly listen to a lecture about various personal shortcomings.) This feedback can also be non-verbal: you engage in a supposedly reprehensible action and one looks at you with disbelief and shame—thus you conclude that what you just did is bad. People smile at us, look angry at us, or ignore us; we use this information to develop a self-view.

Some key factors will determine up to what extent people will accept or reject others’ feedback as being self-relevant and incorporate it—or not—into their self-image. We have a tendency to readily accept rather non-important and positive feedback and to reject important and negative self-information (Eichstaedt, Leppé & Rivers, 2002). People with low self-esteem and low tolerance to ambiguity tend to acknowledge others’ appraisals more easily (Fletcher & Baldry, 2000). Despite such qualifications, the fact remains that reflected appraisals represent a potentially important source of self-information that can be

used to extend our existing self-schemas. Social feedback can also trigger self-observation, especially when the information does not fit our current self-concept. For example, if someone tells you that you're lazy because you did not produce a given job on time, and yet, by focusing on yourself and analyzing the situation, you observe that the delay was actually caused by some external and uncontrollable factor, you will question the person's conclusion and discard it. Also note that being directly asked how one is currently feeling or thinking will induce self-focus (Buss, 1980).

Mead (1912/1964, 1934, 1982)⁴ suggested a different social mechanism for self-awareness (1.2). Confrontations with others would force the individual to take others' perspectives in order to gain an objective point of view on himself or herself. Once in this position, the individual would become self-aware and could acquire self-information. Said differently: in our social environment we are constantly presented with other ways of thinking, feeling, or behaving; we perceive differences between these elements and what we typically do, think or feel. This motivates us to take other persons' perspective and to develop an objective vision of ourselves and to examine our own intellectual, emotional, and behavioral patterns. Thus in essence this phenomenon represents a form of social comparison. To illustrate, let's suppose you are invited to a party. You decide to go, thinking you will enjoy a relaxed evening with friends. As soon as you arrive you readily notice the guests' clothing—everyone is wearing formal attire (confrontation). That observation is likely to make you focus on your own clothing and observe that you are not dressed formally (taking others' perspective, gaining an objective view of the self, and being self-aware); you will then conclude that you are not appropriately dressed for this situation (acquisition of self-information). Another example could be this: you are at the store waiting in line to get to the cashier. Someone in front of you has a moment of inattention, and another (impatient) customer takes this opportunity to sneak in and steal that person's place in the line. This behavior strikes you as being rude (confrontation) and makes you realize (perspective taking and self-awareness) that you would never engage in such a behavior. You conclude that usually, at least in that kind of situation, you are patient and polite (acquisition of self-information).

This social process of perspective-taking and self-awareness can apply to most self-aspects—some more public (e.g., behavior, appearance), others more private (e.g., personal opinions and views, emotions, thought processes, values, motives). Being exposed to very different cultural customs and practices, as when one travels to foreign countries, is likely to enhance this process. By the same token, being part of a distinctive group, being different and unique, will also intensify the phenomenon of social comparison. This refers to "individuation"—the amplification of one's sense of identity and self-awareness because one is distinct from others (Diener & Wallbom, 1976). For instance, famous individuals have been shown to be more self-aware than ordinary people (Schaller, 1997). Celebrity, or being handicapped, would represent fairly salient personal characteristics. Differences can be more common and still lead to increased self-focus—e.g., being the only female in a group of males (or vice-versa), or having an accent. ("Deindividuation" takes place when people in a group share many common characteristics and behaviors. In such a context, e.g., the army, individuals temporarily lose self-awareness, self-criticism and concern for others' evaluation.)

Again, one way to explain the effects of individuation is by proposing that outstanding differences between the self and its social surroundings trigger more often the perspective-taking process described earlier. Another possible account is that being different attracts attention on the self, which in turn increases *self*-attention and thus self-awareness. In other words, attention on the self caused by distinctiveness reminds one of his or her object status for others and induces self-observation (Duval & Wicklund, 1972). This second view allows the introduction of yet another important component of the social world: audiences

⁴ Also see MacKay, 1979, Markova, 1990, and Natsoulas, 1985; Piaget (1924; cited in Rimé & Lebon, 1984) also offers a similar account of self-awareness.

(1.3). Research indicates that being in front of people who are actively observing the self fosters self-focus (Carver & Scheier, 1978; Diener, 1979; Diener, Lusk, DeFour & Flax, 1980). Actually, being scrutinized by only one person is enough to produce self-awareness (Buss, 1980). Giving a speech in front of a class, being the target of attention as one enters a room full of people, or being observed by one's boss at work, represent typical examples.

Physical stimuli

A second main source of self-awareness is the physical world (2), because it contains stimuli that can, like audiences, remind the person of his or her object status. Physical items such as mirrors, video cameras, recordings of one's voice, and pictures of the self (2.1) are called "self-focusing stimuli" because they generate self-awareness (Carver & Scheier, 1981) and thus have been extensively used in research to experimentally manipulate self-focus. Small mirrors seem to induce a state of private self-awareness (i.e., paying closer attention to covert aspects of the self, such as emotions and thoughts), whereas large mirrors or video cameras would instead lead to public self-awareness (i.e., focusing on visible self-aspects such as physical appearance) (Buss, 1980).

These stimuli can also be conceived of as self-*reflecting* devices. Looking at oneself in the mirror or seeing oneself on video provide us with important information about the public self—facial features and expressions, mannerisms (e.g., way of walking, talking, smiling), tone of voice, body height and weight, skin tone and complexion, hairstyle, etc. Such characteristics are significant because they (partially) define our personal identity (see Cole, 1999), and without self-reflecting stimuli we would not have access to that public self-information. (Olowu [1984] suggests that some tribal groups in Nigeria actually impede self-awareness development in children by preventing them to manipulate mirrors for superstitious reasons. Also note that mirrors have been extensively used to test self-recognition in primates, infants and mentally ill people; see Gallup, 1985.)

Another set of physical stimuli that can produce self-awareness is written material found in books and articles, the media (again, written material such as newspapers, as well as television programs and news), the internet, radio, CD's, and movies (including videotapes and DVD's) (2.2). Here a link between the social world and the physical environment needs to be drawn (see A in Figure 1). The aforementioned stimuli present a host of views and behaviors (and indirectly at least, underlying motives, values, attitudes, emotions, etc.) that are potentially different from our own current beliefs and actions. As proposed by Mead, such confrontations are likely to trigger perspective-taking and self-observation. Thus physical stimuli (i.e., their content) could extend a phenomenon which at first is purely social. For example, you are reading a book on abortion. Your own personal view on this issue is fairly vague, yet overall you believe that abortion is wrong whereas the author is pro-abortion. This difference in opinion (confrontation) will motivate you to carefully define yours better (perspective taking and self-awareness), leading to a clearer understanding of your own anti-abortion view (acquisition of self-information).

We can imagine the same process being at work in many situations and for various physical stimuli: observing real people or fictive characters emitting what we think are unusual behaviors on the news and in movies, being exposed to extreme views and at times bizarre information on the internet, or even listening to song lyrics that make us reflect on our own feelings. Provided that what we perceive is different enough from what we believe we are, the result will be the same: increased self-awareness.

THE SELF

A third main source of self-awareness proposed by the model is the self (3). The self can become the object of its own attention, reflect upon itself, and thus becomes a precious source of self-information to which it has privileged access. As mentioned earlier, within the self one can identify a non-cognitive, fairly primitive mechanism participating in the

acquisition of kinesthetic information and in the development of a body image (double sensory stimulation—3.2). In addition, the self can engage more elaborate cognitive operations (self-talk [3.3] and imagery [3.4]), making it possible for it to communicate with itself. Neuropsychological processes (the prefrontal lobes—3.1) are also postulated to mediate self-awareness. I start with the latter.

The prefrontal lobes

New brain imaging techniques have significantly increased our knowledge of the neural correlates of consciousness. Although structures within the reticular formation have been linked to levels of wakefulness for quite some time now, more recent proposals are being put forward concerning the exact nature and location of neural processes associated with various states of consciousness: 40 Hz oscillations in the cortex, intralaminar nuclei in the thalamus, reciprocal signaling in thalamocortical systems, certain neurochemical levels of activation, and much more (see Atkinson, Thomas & Cleeremans, 2000). A recent hypothesis suggests that (visual) consciousness (in primates) would be the result of activity of single neurons or small groups of neurons, i.e., shifting coalitions of neurons (Crick & Koch, 2003; also see Mutalik, 2003).

That diverse brain areas would participate in consciousness can of course be explained by the fact that different types of consciousness are possible. Also, considering the complex nature of the phenomenon at hand, it would be naïve to expect finding only one single brain area connected to it. Another potential account is that studies employ a great variety of measurement techniques, participants, and tasks, leading to inconsistent results in the neurocognitive literature. These observations apply very well to the search for the neural correlates of self-awareness. Different types of self-awareness and related abilities exist (see below), and experimental tasks used to induce self-awareness vary greatly. Participants can be healthy volunteers, patients suffering from many possible forms of brain injury that can be difficult to circumscribe with accuracy, or psychiatric populations (e.g., autism, schizophrenia). And at least three functional brain imaging techniques are available to researchers (Kolb & Whishaw, 2003), making it highly problematic to establish comparisons between studies and to isolate common brain areas involved. The fact that a different terminology can be used to designate similar brain areas (e.g., “inferior” or “orbital” frontal “cortex” or “region” or “lobe”) complicates matters even more. (See Stuss & Alexander, 2000, for a discussion of methodological problems specifically associated with the study of the frontal lobes.)

Despite these obstacles, neuropsychological assessments of patients suffering from brain damage, together with studies of psychiatric conditions and brain-imaging experiments all strongly support the notion of an important involvement of the prefrontal cortex in self-awareness (3.1); higher forms of self-reflection would implicate more anterior areas of the prefrontal lobes (Stuss et al., 2001). To illustrate, Frith (1987) proposes that schizophrenia leads to a disturbance of self-monitoring, which includes impairment of the experience of ownership (e.g., thought insertion), the loss of the experience of being the agent of one’s own actions, and depersonalization. Vogeley, Kurthen, Falkai & Maier (1999) indicate that schizophrenic patients suffer from a decrease in metabolic rate in the prefrontal regions bilaterally. Stuss and his team report numerous examples of neurological insults in human patients, among which is the case of a patient with bilateral frontal damage (more extensive on the right side) who had Capgras Syndrome. This rare self-awareness disturbance involves the belief that an imposter has taken the role of a significant other (Stuss & Alexander, 2000). Most patients with prefrontal lesions exhibit some form of self-awareness deficit (Stuss et al., 2001)—e.g., lack of awareness of the implications of the disorder, cognitive detachment from self, dissociations between knowledge and the realization of personal relevance of that knowledge, and capacity to consider the self’s extended existence throughout time. (Results from brain imaging studies will be presented below.)

The overall neuroanatomic picture gets more complex when one considers the many possible components, or dimensions, of self-awareness. It is still unclear up to what point the involvement of the prefrontal cortex is bilateral or unilateral. Self-recognition appears to be mainly associated with right hemispheric activity (Keenan, Nelson, O'Connor & Pascual-Leone, 2001). The left prefrontal lobe would be engaged in encoding of autobiographical memory, whereas the right prefrontal lobe would play a role in retrieval of that same self-information (Wheeler, Stuss & Tulving, 1997). Use of the body image would involve activation of the right parietal region and the prefrontal cortex, especially the ventromedial parts (Vogeley et al., 1999). Patients' lack of awareness of their deficits frequently implicates bilateral (primarily right-sided) prefrontal damage (Ownsworth, McFarland & Young, 2002). Neural mechanisms underlying first-person perspective (the subjective experiential multidimensional space centered around one's own person, e.g., spatial self-navigation and perspective taking) would comprise medial parietal and posterior cingulate cortical structures, including anterior medial prefrontal, medial parietal and posterior cingulate cortex (Vogeley & Fink, 2003).

Another ability closely related to self-awareness is modeling the mental states of others—developing a “Theory-of-Mind” (TOM). The exact nature of the relation between self-awareness (thinking about the self) and TOM (thinking about what others might be thinking or feeling) is currently debated in the literature (see Vogeley et al., 2001). One central view states that TOM requires self-awareness but is relatively independent of it. That is, one cannot possibly conceive of others experiencing mental events (TOM) if one cannot self-reflect—self-awareness would be a prerequisite for TOM. However, being actively engaged in TOM does not mean that the person will simultaneously be self-aware. In this perspective, it is unlikely that the brain areas functioning during TOM will be identical to those mediating self-awareness. However, an overlap is to be expected: studies in which patients are asked to infer visual experience and deception in others reveal impaired performance for focal frontal lesions, especially on the right side (Stuss, Gallup & Alexander, 2001). Results obtained by Vogeley et al. (2001) with comparable tasks but using fMRI, are more specific and point toward activation of the anterior cingulate cortex, also with a right hemispheric dominance.

Brain imaging studies explicitly designed to identify regions involved in “genuine” self-awareness report discrepant results, again indicating that the (prefrontal) bilateral neurological nature of self-awareness is uncertain. Craik et al. (1999) measured brain activity with PET scans in eight normal subjects working on a self-referential encoding task. Participants were asked to judge how well personality traits described them by pressing response keys while relative regional cerebral blood flow was being measured. Control tasks consisted in three non self-referential exercises: judging how well trait adjectives described a public figure, how socially desirable the trait adjectives were, and how many syllables there were in each adjective. Results show that the self-awareness task led to increased activity in the left medial aspect of the superior frontal gyrus and the left inferior frontal gyrus, as well as in either medial or right frontal locations.

In another study using fMRI (Johnson et al, 2002), 11 healthy volunteers were also invited to evaluate the self-relevance of personality traits in addition to abilities and attitudes by pressing “yes” or “no” buttons. In the control condition participants were asked to do the same for non self-relevant questions. An activation of the right anterior medial prefrontal lobe was observed in five subjects; three exhibited more activity in the left anterior medial prefrontal lobe, and three in the anterior medial prefrontal lobes. And finally, Kjaer, Nowak & Lou (2002) asked seven normal participants to orally describe their personality traits and physical attributes while PET scans were being performed. Control tasks included orally reflecting on the personality and appearance of a public figure. Results reveal precuneus, bilateral temporoparietal, and left orbitofrontal activation; in this experiment no right hemispheric bias was noted.

What are we to conclude at this point? Again, an observation made earlier about the neuronal substrates of consciousness applies to self-awareness as well: we are dealing here

with a multidimensional, very complex form of mental activity made up of many different yet interrelated sub-abilities. Each is probably associated with the activation of specific left and right prefrontal areas. Furthermore, reciprocal connections between the prefrontal lobes and other cortical and subcortical structures should be taken into consideration (Wheeler et al., 1997). Obviously, additional studies using more comparable tasks, imaging techniques and participants need to be conducted. Finally—and this is a self-evident yet important point—, we must keep in mind that the prefrontal lobes do not “create” or “generate” self-awareness; instead, they *sustain* it. At the risk of using a potentially problematic analogy, one might say that the “hardware” (prefrontal cortex) is required for self-awareness to take place, but a “software” (more psychological mechanisms, i.e., imagery and inner speech, as well as the content of self-reflection) is also necessary. This should become clear with the analysis to be presented below.

Double sensory stimulation

One significant aspect of self-awareness is body awareness, which most likely develops in somatic proprioception (3.2). When one touches oneself one simultaneously feels that he or she touches and is being touched. Every tactile experience is both exteroceptive and proprioceptive and thus allows for an awareness of the distinction between self and non-self. This contributes to the construction of a kinesthetic self-representation which gradually becomes part of the self-concept (Bermudez, 1998, cited in Zahavi, 2002). This double sensory stimulation mechanism is nonconceptual (i.e., it does not require cognition) and is already present from birth or shortly after in human infants and animals. It can be postulated here (see Link *B* in Figure 1) that self-reflecting objects present in one’s environment (2.1) also participate in the formation of body awareness. Repeatedly seeing oneself in the mirror, on video camera, or on pictures, most likely offers additional information about one’s body that could be combined with somatic information previously acquired with double sensory stimulation.

Imagery

Still within the self, more sophisticated (cognitive) processes are likely to participate in self-awareness. Take imagery (3.4) as a point in case. Imagery represents the phenomenon of visual experiences in the absence of any visual stimulus from the outside world. Mental images play a significant role in numerous basic psychological activities such as memory, learning, initiating action, reverie, perception, motivation, creative imagination, and emotion (Morris & Hampson, 1983). The fact that one can have “autosopic imagery” (i.e., images of the self) suggests that this cognitive process could lead to self-awareness. Empirical evidence is sketchy at best, yet Turner, Scheier, Carver and Ickes (1978) note that highly self-conscious people (individuals who frequently engage in self-reflection) report using imagery as a means of introspection.

A more specific proposal is that imagery can internally reproduce and expand social mechanisms responsible for self-awareness (Morin, 1998). This idea is schematically illustrated with Link *C* in Figure 1. One social mechanism is the opportunity to see oneself as one is seen by others (Mead’s thesis of perspective taking [1.2]), which leads to an objective vision of oneself. Imagery internalizes this social mechanism because mental images empower us to literally see ourselves acting (or having behaved) in given ways as others would see (or have seen) us acting. When one mentally sees oneself behaving in a given fashion, one is self-aware. Furthermore, when one reflects on past behaviors by using mental images, one can deduct aspects of one’s past functioning from what is internally seen—that is, one can acquire self-information and build a self-concept. As Mead puts it (cited in Meltzer, 1991, p. 24), “Individuals are able to view themselves as objects only by imaginatively taking the role, or standpoint, of others and viewing themselves ‘through the eyes of others’.” Clearly imagery can accomplish this. For example, as one is on the verge of emitting some inappropriate behavior one “sees” oneself acting in a foolish fashion, thus becoming aware of the potential behavior. Or one can remember how one acted in a given

situation by using mental images of the self, e.g., “seeing” oneself behaving nervously after having been pulled over by the police for speeding. In both examples one is “reflecting” on the self with imagery and acquiring self-information about current or past behaviors (and feelings).

Another social mechanism potentially reproducible by imagery is being confronted by an audience (1.3). Let’s suppose that you just gave a conference in front of 200 people; as previously stated, research suggests that the conference situation itself probably induced self-awareness (Carver & Scheier, 1978). Then on your way home you start visualizing members of the audience and “see” specific individuals paying attention to you. By looking at yourself now as these persons did during the conference, you can observe yourself (in imagination) saying this or that, walking slowly or nervously onstage, feeling at ease or anxious, etc. Obviously you are actively examining yourself and processing self-information—you are self-aware.

Imagery most certainly has limits as far as self-awareness is concerned. Although some say that “one picture is worth a thousand words,” it is logical to suppose that imagery is somewhat powerless in conveying more abstract self-aspects such as emotions, values, beliefs, motivations, or sensations. That is, one cannot “see” an emotion or a sensation; words (inner speech—see below) would be ideal to capture conceptual self-information. Imagery is probably more adequate in making a person aware of public self-aspects (e.g., observable behaviors and visible physical characteristics), as opposed to more private ones (moods, motives, mental processes, desires, etc.).

For imagery to be functional as a self-representational process, it must have in its content a decisive ingredient: one’s facial features and other physical characteristics (Morin & DeBlois, 1989). Without a clear mental picture of oneself to contemplate, there is no need to suggest the possibility of oneself internally seeing the self acting or having behaved in a particular fashion. Here again our experience with self-reflecting devices (2.1) must be crucial in acquiring this critical ingredient. By repeatedly observing the physical self in mirrors or on videotapes one can form a mental picture of oneself and then use it for introspection purposes. This idea is represented by Link *D* in Figure 1.

INNER SPEECH

Theoretical background

As already stated in the introduction, consciousness is gaining increasing attention in psychology. The question of the role played by language in consciousness is also becoming popular.⁵ Although philosophers and psychologists have seldom connected inner speech—as opposed to language *per se*—to consciousness in the past (Blachowicz, 1999; Kinsbourne, 2000), one can find some allusions to such an association in the literature. Table 1 presents a sample of past and current mentions to a link between language (and in some cases inner speech) and consciousness, including higher forms of it (i.e., self-awareness). Note that a new emerging field in psychology, Narrative Theory, specifically examines the role of language in the construction of the self (see Budwig, 2000; Davies & Harre, 1997; Shotter, 1997).

Source	Citation or main idea
Saint-Paul (1927)	Consciousness of self is the activity in which intelligence reacts upon intelligence, as though seeing itself in a mirror. In man this mirror function is exercised through the nervous mechanism of language.
Wallon (1931)	The development of imagery and language is an

⁵ For example, the *Association for the Scientific Study of Consciousness* held a conference on consciousness and language in Barcelona in May and June 2002; The *Towards a Science of Consciousness* Conference (July 6–10, 2003) proposed a workshop on the same theme.

	important part of the process of self-awareness.
Mead (1934)	One function of private speech in early childhood would be to make young speakers aware of their actions and of their own separate existence.
Sokolov (1972, p. 1)	"Inner speech [is] a rather important and universal mechanism in human consciousness and psychic activity."
Dewitt (1975, p. 42)	"The presence of language marks the difference between the presence of self-consciousness and the complete absence of any awareness of self."
Brown (1976, p. 86)	"The initial distinction of world from self leads, through language, to a distinction of self from the world. The separation of the world leads only to a consciousness of the world and of self QUA object in that world. Self-awareness requires a further differentiation within self—language fulfills this need."
Popper & Eccles (1977, p. 553)	"The origin of the self-conscious mind somehow goes together with the origin of language."
Dimond (1980; cited in Miller, 1991, p. 224)	"Human mental life is normally dominated by an ongoing interior monologue that is closely linked to the productive capacity for language and forms the basis for the generative mechanism of self."
Berger & Schuch (1981)	At the end of the first year of life, significant prerequisites of self-consciousness have evolved. The influence of language on this process is crucial.
Kaufman & Raphael (1984)	One relates to the self with inner dialogue.
Gazzaniga (1985)	The "interpreter" represents a left-hemispheric [verbal] cognitive sub-system which is responsible for explaining our own behavior [self-awareness].
Jaynes (1986, p. 137)	"How can you know yourself [self-awareness] unless you have an analog 'I' [inner speech] narrating in a mind-space and reminiscing or having episodic memory about what you have been doing and who you are?"
Gillett (1987; cited in Natsoulas, 1991)	Propositional attitudes [language, inner speech] are necessary for a full [self-] consciousness.
Nurius & Majerus (1988)	One can rethink the self in self-talk.
Dennett (1991)	The self is a "center of narrative gravity"—a [verbal] autobiography.
Miller (1991, pp. 227-8)	"The left-hemisphere verbal autoarticulatory capacity [inner speech] operates... both to guide behavior and to appraise feedback from that behavior's impact on the physical and social worlds. In this way is self-knowledge progressively developed and an identity hewn from the emotion-perception activity melange of successive daily experiences."
Flanagan (1992, p. 194)	"Being self-conscious requires that we engage in a temporally extended soliloquy."
Carruthers (1996)	"Much of the stream of human consciousness is occupied with inner speech, or with imaged sentences (spoken or heard) of natural language."
Weiskrantz (1997)	Patients with self-awareness deficits can no longer "comment" on [talk to themselves about] their defective skills.
Simonov (1999, p. 380)	"The communicative origin of consciousness is the source of the capacity to hold a meaningful dialogue with oneself, i.e., it produces self-awareness."
Briscoe (2002)	"While some contend that language is important for higher states of consciousness, [I propose] that it is not language <u>per se</u> that is essential, but rather inner speech, our ability to converse with ourselves."

**Table 1—Some references to a relation
between self-awareness and language/inner speech**

Inner speech (3.3) is usually defined as the activity of silently talking to oneself (Zivin, 1979). Other equivalent expressions found in the literature are self-talk, subvocal speech, internal dialogue or monologue, utterances, self-verbalizations, and self-statements. The term “private speech” refers to speech for self verbalized out loud by adults (Flavell, 1966), whereas “egocentric speech” was used by Piaget (1926/1923) and Vygotsky (1962/1934) to designate children’s overt self-verbalizations emitted in social situations without any preoccupation of being understood or of trying to adapt their discourse for others. Like imagery, inner speech serves many functions. It has been shown to be involved in verbal self-guidance and self-regulation, problem-solving, planning, and memory; some psychological problems such as anxiety and depression would be mediated by dysfunctional self-talk (for a review, see Kendall & Hollon, 1981).

One potential function of inner speech is its role in self-awareness and the acquisition of self-information (Morin & Everett, 1990). When one talks to oneself one can verbally identify, process and store data about one’s current physical and mental states as well as past or present behaviors. (This idea will be thoroughly developed in the next section.) One view of consciousness (e.g., Carruthers, 1998) suggests that a person becomes aware of a mental state when the individual generates a higher-order thought about that state. This position is congruent with the present proposal: we become self-aware when we engage in self-talk (higher-order thought) about our current mental states and personal characteristics. Although in what follows I will exclusively examine the notion that inner speech leads to self-awareness, one should keep in mind that this relationship most likely is bidirectional (Morin, 2001). Inner speech itself also depends upon self-awareness, or at least consciousness: one has to be awake and conscious in order to talk to oneself. Moreover, without a conscious subjective experience the self would not have much to talk about.

Mead (1912/1964) extensively wrote on inner speech and self-awareness (again, see below). A more recent analysis which bears semblance to the one presented here has been proposed by Burns and Engdahl (1998b):

The naming of states—and language-based conceptualizations of states—play a key role [in self-awareness] (p. 176); through a process of labeling, categorizing, and engaging in language-based modes of representation [inner speech], a person not only represents internal states and experiences (sentience) but acquires the capacity to reflect on them (p. 179). Reflections can be communicated and discussed with self in inner dialogues as well as with others. ... Without language [internal monitoring remains] relatively primitive, vague, unelaborated. (p. 171)

Key links between inner speech and other components of the model

The question then becomes: In what way exactly does talking to oneself give access to self-information? What is the nature of the relation between inner speech and self-awareness? Key links in the model provide a partial answer to these questions.

Links *E*, *F*, and *C* suggest that cognitive processes such as inner speech and imagery can reproduce social mechanisms leading to self-awareness (see section on imagery). Interpersonal modes of acquisition of self-information can become *intrapersonal* means of self-communication (Morin, 1993). As Burns & Engdahl (1998a) state, “The activity of talking about and reflecting upon oneself, while socially generated, becomes an individual, subjective experience” (p. 70). With inner speech we can engage in verbal conversations with ourselves and replicate comments emitted by others [Cooley’s mechanism, 1.1, Link *E*] or internalize others’ perspective [Mead’s mechanism, 1.2, Link *F*]. Luria (1978) proposed that the organization of the brain higher functions has been shaped by the social environment in which it evolved. In this perspective, it can be suggested that the social world is a necessary but insufficient condition for the emergence of self-awareness. For example, our motivation to communicate with others might very well be social in origin, but it has to be mediated by cognitive (linguistic) processes in order to manifest itself effectively. By the same token, once initiated by the social environment, self-awareness would then need to be taken over and extended by cognitive processes. Without these mental operations reproducing what is taking place in the social world (i.e., if we were only

to have social interactions as a source of self-information), we could hardly become self-aware outside social situations (Morin & DeBlois, 1989).

Again, Link *E* connects feedback provided by the social milieu (1.1) to inner speech (3.3). People understand themselves better when they talk to others about themselves and get reactions and advice about their behaviors, emotions, thought processes, goals, etc. Similarly, people acquire enhanced self-knowledge when they talk *to themselves* about themselves. By extension, we develop a more sophisticated self-concept when we frequently engage in self-talk (Morin, 1995a). Link *E* also indicates that with self-talk we can reproduce for ourselves appraisals we get from others. People constantly detect personal characteristics in others and verbalize these—e.g., “You get anxious easily!”, “Why did you do this?”, “You take yourself way too seriously!”, “You are depressed, aren’t you?”. Such comments (observations and inferences about one’s thoughts, feelings and behaviors) made by others might imprint on one’s own inner speech a propensity to address to oneself such remarks. As stated earlier, a mode of transmission of self-information that was originally interpersonal (verbal comments made by others about ourselves) would gradually become *intrapersonal* (verbal comments about ourselves that we address to ourselves). Examples of such self-statements could be: “I get anxious easily!”, “Why did I do this? Because...”, “I take myself way too seriously!”, “I am depressed”. Note that sometimes we can also talk to ourselves as if we were conversing with another person (hence the term “*internal dialogue*”)—i.e., “*You* get anxious easily!”, “Why did *you* do this? Because...”, etc. The result most certainly is the same: an identification of self-information.

As observed before, social feedback can sometimes be inaccurate, in which case the individual is likely to resist incorporating the information into the self-concept. This process of self-questioning very probably requires inner speech. Actually (see the example below), it is difficult to see how this rejection of incorrect self-information could be accomplished *without* self-talk. Eichstaedt et al. (2002) note that “(...) incoming information about the self is initially comprehended and believed ... and results in positive or negative affect consistent with the valence of the trait information. This minimally cognitive stage is followed by *reflective scrutiny* involving comparison with a multi-faceted self-concept ...” (p. 290; italics added). This reflective scrutiny almost certainly means talking to oneself. For example, a co-worker leaves the following phone message on your answering machine: “You were supposed to pick me up at eight this morning to give me a lift to work. You never showed up, and as a result I had to take the bus. Needless to say, I was late! *Where* were you? You didn’t even call me! I find this very impolite! I would even say that this was rude!” Of course, such a remark could indeed apply to the person, which would suggest that he or she is inconsiderate—he or she lacks respectfulness. However, it is also possible that the person could not meet his/her commitment for a good reason (e.g., one might have been sick and asleep in bed). That is when the reflective scrutiny mentioned by Eichstaedt et al. would be initiated: “No way! I’m not uncaring—I was sick in bed!”

So people can observe others and convey what they perceive back to them. Inner speech can then redirect this mechanism of acquisition of self-information toward itself, verbally communicate with itself, and share with itself what is being monitored about the self. In addition, inner speech can probe the truthfulness of social feedback and accept, qualify, or reject this information. The crucial importance of inner speech and the relative role of the social world in self-awareness can best be appreciated if one considers the overall process of self-concept formation (Morin & Joshi, 1990). The self-concept has been defined as a unified, coherent, and complex multidimensional system which involves a hierarchic organization of self-perceptions (L’Ecuyer, 1975). Obviously, it is much more than a simple *accumulation* of self-information gained with social feedback. While people in our environment can—and do—comment on our personal characteristics, their access to more private, unobservable self-aspects is limited. Only the individual himself/herself has direct contact to one’s own attitudes, values or beliefs. Significant others could, possibly with a lot of work and persistence, deduce from repeated observations of behavior the probable

psychological motives underlying one's actions, but the person is in a much better position to engage in that type of deductive activity—most probably by talking to himself/herself.

In addition, even if we do accept the notion that significant others could take the trouble to very closely examine one's behavior and inferring more abstract self-aspects, we must keep in mind that these analyzes most always concern *specific* self-dimensions. Again, the self-concept represents much more than a simple collection of particular self-information. Its development requires that one *simultaneously* apprehends an impressive quantity of diverse self-aspects and articulates all this into a logical, sophisticated structure. Clearly no one but the self (through extensive self-talk) can perform that type of work adequately since other people do not possess all the necessary self-information to produce such a synthesis. Besides, people are already very busy building their *own* self-concept.

Link *F* ties perspective taking (1.2) and audiences (1.3) supplied by the social environment to inner speech (3.3) and implies that with self-talk we can also reproduce these mechanisms and become self-aware. Mead (1934) proposed that talking to oneself could initiate a fictional dialogue where verbalizations of an objective, and thus different point of view about ourselves could be possible. We sometimes engage in self-talk in which we state to real or imaginary persons our motives for behaving in a given fashion or for having some personal characteristics. When, in response to the expected reactions of others, we explain our actions or describe ourselves in self-talk, we take others' perspectives into consideration and thus gain a relatively objective view of ourselves. For example, you might say to yourself: "X might wonder why I didn't show up to the restaurant last evening [objective vision of oneself produced by the anticipation of the response of another person]. Why didn't I show up? Well, the plain fact is that I didn't want to spend time with X. We had a nasty fight two days ago and I still feel hurt and angry at him/her [acquisition of information about one's emotions]." Another example could be: "People will certainly wonder why I decided to quit my job [perspective taking caused by the possible reaction of an imaginary group of persons—the *generalized other* of Mead]. Whatever they think, the reason is because I believe that the company's philosophy is unethical. Besides, I was tired of doing the same thing all the time, and I felt used." Through inner speech the person is able to identify three self-aspects: a value (believing that the company is engaging in unethical practices implies that one knows what ethical conduct should be), a behavior (repeating tasks endlessly at work), and an emotion (feeling exploited).

Link *F* connects inner speech to audiences—this social mechanism leading to self-awareness can also be reproduced by self-talk (and imagery). To use an already familiar example: you recently gave a conference and on your way home you start talking to yourself and say: "How did I look when I gave this speech? I remember seeing X [a colleague] looking at me. I wonder what he/she thought about it [perspective taking and objective vision of oneself]. Overall it went well. I was nervous at first, but I gradually became more at ease and I even came up with a couple of jokes [acquisition of self-information]."

I will present one last example to illustrate the fact that inner speech can *simultaneously* combine and replicate both social mechanisms proposed by Cooley (1.1) and Mead (1.2). You are driving in heavy traffic and a significant other "X" tells you: "Look at you! You are impatient again! There is no need to get all agitated and angry! Please calm down—we could have an accident!" Such social feedback (1.1) informs you that in that type of situation you feel annoyed (emotion) and are edgy, frantic and careless (behavior). A few days later you find yourself in a similar situation (this time alone) and engage in self-talk: "Look at me! I'm impatient again! [social feedback reproduced by inner speech / acquisition of self-information] As X would point out [Mead's perspective taking (1.2)], I'm all agitated and angry! [more self-information] I should calm down!"

Link *G* in the model, which associates elements of the physical world (2) with inner speech (3.3), provides yet another view of the role it plays in self-awareness. Self-talk is very much likely to be activated when one is exposed to self-reflecting devices (2.1) and intently examines the public self: "I look very good today", "My skin is pale—I need sun",

“I’m gaining weight”, “My hair is...”, “These clothes look...”, “When I walk I have this tendency to...”, etc. One can propose that *verbally describing* the physical self, as opposed to simply *seeing* the self in a mirror, on video, or on a photograph, allows for a better perception of the information and integration of it into the self-concept. It is true that inner speech is not very good at capturing non-verbal, pictural information like colors and shapes (Schooler, 2002). (As mentioned previously, imagery is probably better suited to deal with that type of data, as opposed to more conceptual material, which would be more easily grasped by inner speech.) This limit of inner speech has been coined “verbal overshadowing” and means that people tend to lose or distort information that is inherently difficult to put in words when using language. For example, participants who are asked to view and verbally describe a photograph of a face will show poorer recognition than participants who engaged in unrelated verbal activity. But that type of tasks hardly compare to looking at oneself in a mirror. For instance, in this situation the person is *combining* the activity of viewing the self with verbalizing about it, and the acquisition of (visual) self-information takes place in the present—there is no recognition involved. Consequently it is unlikely that the phenomenon of verbal overshadowing applies.

Link G also postulates a connection between the media (2.2) and inner speech (3.3). We talk to ourselves when we contrast our own behavior, values, attitudes, emotions, etc. to those presented in books, on TV, and in the news. Recall that Link A indicates that being confronted to different values, emotions or behaviors shown in the media (2.2) produces perspective taking and self-awareness (1.2). This process then would activate inner speech. For example, one might verbalize to oneself: “That’s bizarre, this character [in a TV series or movie] started having an affair just a few months after getting married. I would never do that—I’m way too much in love with X [one’s partner] and besides, I’m the faithful type.” Or: “This person [in the news] put his life in danger to save a drowning puppy—that’s amazing! I would never do that—I’m too coward!”

Nature of the relation: Additional views

Links C, E, F and G examined in the previous section partially explain how inner speech enhances self-reflection and self-knowledge. The following three complementary analyzes can also clarify the nature of the relation between self-talk and self-awareness.

Johnstone (1970, p. 106) states that:

A subject completely immersed in experience would not be conscious of it. It is a platitude that we are indeed unconscious of most of the background noises, pressures, luminosities, odors, and visceral sensations that impinge upon us at any given moment. We are unaware of them not because they are remote but because they are too near. There is no distance between us and them.... a person can be conscious of something only if a wedge has been inserted between him and it.... In complete immersion in experience there is no sense of ownership.

What this citation suggests is that an observation is possible *only if* there exists a *distance* (a wedge) between the observer and the observed thing. By extension, *self-observation* is possible only if there exists a gap between the individual and any potentially observable self-aspect. With perspective taking (1.2) people can operate a backward movement and create a (mental) distance within the self. Inner speech can also produce a *redundancy* of self-information, and this redundancy in turn generates a distance within the self (Morin, 1993). The term “redundancy” implies that some already existing information is brought under a new form (Robert, 1973). To illustrate—a person might experience an emotion of anger; this mental state represents a potential bit of self-information. Then the person might verbally analyze this occurrence and say: “I am really mad!” Here a replication of the emotion takes place (the person is simultaneously *feeling* anger and *talking* to oneself about it), so that the information (raw emotion) is brought under a new form (verbal description). The individual, before the redundancy, was *immersed* in his or her subjective experience; after the redundancy created by self-talk, he or she now has access in his or her perceptual field to a self-information to which he or she did not have access to previously. The distance produced by the redundancy, itself caused by self-talk, is what would make self-observation and the acquisition of self-information possible. The

individual not only is experiencing anger—he or she *knows* that this experience is taking place.

A second way to look at the role played by inner speech in self-awareness is to conceive the process of self-reflection as being a problem-solving task, and self-talk as being a cognitive tool the individual uses to reach a “solution” to this “problem” (Morin, 1995b). In other words, the self can be seen as a question to be solved (i.e., Who am I? What characterizes me? What behavior did I emit?), where the solution represents self-knowledge, and self-information, the data needed to work out the problem. Past research on inner speech clearly indicates that talking to oneself while trying to solve any type of problem significantly facilitates the process. For instance, Kendall and Hollon (1981) proposed four categories of self-statements that assist the process of problem-solving: (1) self-verbalizations allowing the formulation of a clear definition of the problem (“OK. What’s the problem? What I am suppose to do?”), (2) self-verbalizations promoting an effective approach to the problem (“I should find a strategy to solve this problem.”), (3) self-verbalizations enhancing focus on the problem (“No, that’s not important. I must focus on *this* instead.”), and (4) evaluative self-statements to praise oneself when a solution is reached (“Good! I did it!) or when one needs to readjust one’s strategy (“No, that’s no the way to go. That’s OK—I must try again and do *that* instead.”)

Talking to oneself about oneself using these four categories of self-statements is likely to increase self-awareness (the “problem”). For example, a person might engage in the following soliloquy: “How did I react [in a given situation] [clear definition of the problem]? I should try to remember exactly what happened and everything I did [effective approach to the problem]. The first thing I did was Z. Then X happened, and I reacted by saying W. Good! I’m getting somewhere! [reinforcing self-verbalization] I don’t need to take G [a given event] into consideration because it’s not important. What’s important is how I reacted [focus of attention on the problem]. OK. So I said W. What did H [another person] say? No! That not pertinent—I need to take my time and think more [readjustment of one’s strategy].”

A third possible view of the nature of the relation between inner speech and self-awareness is that language allows to verbally label self-aspects. This would greatly facilitate the identification of self-information, especially more abstract and conceptual material (Morin, 1995b). A weak version of this idea states that talking to oneself and naming self-dimensions make these more salient and visible. Without language, emotional responses, physiological sensations, values, attitudes, goals, etc. would still be perceptible but more “diffuse” or “out of focus.” In other words, one could be aware of feeling hungry without having to say to oneself “I am hungry”, but one would perceive hunger more acutely (and possibly more intensely) if one would talk to oneself about this physiological sensation. A stronger account proposes that one could simply not be aware of some self-aspects without naming them. Indeed, how could one realize that one is holding anti-semitic opinions or hedonistic values without having to verbally label these by saying to oneself “I believe in antisemitism / hedonism?”

Language also makes it possible to use a rich vocabulary about oneself and to better differentiate between subtle self-aspects. One can say to oneself “I feel tired”; but one can also utter “I don’t simply feel tired—I feel sleepy, drowsy and exhausted,” in which case one’s subjective experience will be significantly deepened by the use of a sophisticated vocabulary about oneself. One can describe oneself as being “intelligent”, or one can employ adjectives such as “quick”, “sharp”, and “clever” to portray oneself; better self-understanding is likely to be the result.

Supporting evidence

Given the emphasis put here on inner speech, a review of current supporting evidence for its role in self-awareness is in order. Although more than thirteen years ago Morin and Everett (1990) proposed a host of possible ways to empirically explore the hypothesis of a causal relation between inner speech and self-awareness, very little research has actually

been conducted. Evidence is limited and correlational in nature—at present no experimental data is available to confirm that inner speech leads to heightened self-awareness.

One can start by demonstrating that the notion of a link between self-talk and self-awareness is logically plausible. By definition, one can state with confidence that if one is talking to oneself *about oneself* one is focusing attention on the self—one is self-aware (Morin, 1992). That is, if a person utters “I feel happy”, this person is the object of his or her own attention and is actively identifying information about the self—the very definition of self-awareness. The establishment of this logical plausibility would gain more strength if one could show that it is possible to substitute typical self-awareness expressions found in the literature for self-verbalizations. If such a conversion was very difficult or impossible to accomplish, the logical plausibility of the hypothesis would be questionable. However, as Table 2 shows, this is indeed simple to achieve—the Table presents a “translation” of such terminology into self-talk.

Self-awareness expression	Inner speech
To scrutinize one's behavior	"That's funny, each time I find myself in that type of situation I always do the same thing. I suppose I'm the type of person who possesses [this or that personality trait]."
To attend to a self-trait	"I guess I'm a pretty hard-working person."
To figure oneself out	"What is important to me? What are my values and goals in life? What do I want to become?"
To self-blame / to self-criticize	"I should never have done that!"
To evaluate oneself	"I'm pretty happy with myself! I set this goal for myself and reached it!"
To recognize one's attributes / to rate oneself on a self-dimension	"I'm really at ease in my relationships with others."
To find shortcomings within the self	"I'm not very punctual..."
To judge the correctness of a self-aspect	"I like my new haircut."
To be aware of the way one's mind works	"That's interesting. I just realized that when I [solve a problem, write, listen to music, etc.] what takes place in my mind is [this or that process]."
To worry about making a good impression	"I wonder what these people think of me... I hope they have a good opinion of me..."
To examine oneself / to reflect about oneself / to focus upon oneself / to think about oneself / to introspect	"I feel bizarre today... Why is that? Where does this feeling come from?"

Table 2—Translation of typical self-awareness expressions into inner speech

Link *H* in the model suggests that inner speech gets activated when some areas of the left prefrontal cortex are functioning. One such structure is the inferior frontal gyrus (Craik et al., 1999), and inner speech is precisely associated with activation of that area. For example, the inferior frontal gyrus is more active in participants who are asked to silently articulate sentences (McGuire, Silbersweig, Murray, et al., 1996) or single words (McGuire, Silbersweig, Wright, et al., 1996). Since portions of the left prefrontal lobe are both associated with self-reflective activities and inner speech, then it supports the notion that the latter participates in self-awareness (Morin, 2002). If there was *no* activation of areas sustaining inner speech during any type of self-awareness tasks, obviously an important aspect of the model would not be empirically supported. The fact that some *right* prefrontal areas (not associated with inner speech) are also active in self-reflection illustrates the multifactorial nature of self-awareness, as suggested by the model.

It comes as no surprise then that loss of inner speech following brain damage leads to self-awareness deficits. Moss (1972), a clinical psychologist who suffered from a stroke but recuperated from aphasia, relates his experience:

The second week [at the hospital] I ran into a colleague who happened to mention that it must be very frustrating for me to be aphasic since prior to that I had been so verbally facile. [I] later found myself why

it was not. I think part of the explanation was relatively simple. If I had lost the ability to converse with others, I had also lost the ability to engage in self-talk. In other words, I did not have the ability to think about the future—to worry, to anticipate or perceive it—at least not with words. Thus for the first four or five weeks after hospitalization *I simply existed*. So the fact that I could not use words even internally was, in fact, a safeguard. (p. 10; italics added)

And Ojemann (1986, p. 161), who treated patients suffering from cortical damage, observes: “As recovery occurs, conscious experience returns as well. It seems to return in parallel with the phenomenon of inner speech. Inner speech may be limited, restricted, concrete, foggy, not normal after these kinds of lesions, but at least conscious experience has come back.”

Five independent studies using various measures of self-talk and self-awareness support the hypothesis of a correlation between these two mental activities. Overall, they suggest that the more one focuses on the self the more one talks to oneself (about private self-aspects), and vice-versa. In an exploratory study, Morin (1992) asked French-speaking participants to fill-in questionnaires assessing inner speech and private self-consciousness. Whereas self-awareness is more situational in nature, self-consciousness is relatively free of environmental influences and represents a stable personality trait. It is the disposition to focus on the self more or less frequently (Fenigstein, Scheier & Buss, 1975). Private self-consciousness is thus defined as one’s more or less important propension to examine covert self-aspects; it can be measured with the Private Self-Consciousness Subscale (PrSC) of the Self-Consciousness Scale (SCS) (Fenigstein et al., 1975). Two representative items of the PrSC are “I’m generally attentive to my inner feelings” and “I reflect about myself a lot.” Although the SCS has been shown to have good discriminant validity and reliability (see Carver & Glass, 1976), many variations of the original scale have been constructed over the years (e.g., Burnkrant & Page, 1984) and the PrSC has recently been reconceptualized by Trapnell & Campbell (1999) into self-reflection and self-rumination (see below).

In Morin’s study (1992) PrSC was measured with a validated French version of the SCS (Rimé & LeBon, 1984). Inner speech was assessed with a French pilot questionnaire evaluating various functions of self-talk—e.g., memory, problem-solving, imagination, verbal self-regulation, and self-observation. Translated examples of items of this scale are “I verbalize to myself what I feel inside” and “Before leaving home I produce a verbal list of things I need to take with me.” A significant correlation of .46 was found between inner speech and private self-consciousness. In a second study, Morin, Everett, Turcotte, and Tardif (1993) again measured private self-consciousness with the French version of the SCS mentioned before and used a validated questionnaire to assess inner speech. More specifically, Morin et al. (1993) developed the Self-Observation Auto-verbalizations Inventory (SOAI), explicitly designed to measure the activity to talk to oneself *about oneself*. Thus the SOAI offers a direct operationalization of self-talk used for introspection purposes; as well, it possesses sound psychometric qualities. Translated examples of typical items are “I feel (jealous, arrogant, sensitive, insecure, etc.). What’s making me feel like that?” and “Why did I behave that way?” Here too a significant .46 correlation was observed between the SOAI and the PrSC. Rivest and Khawaja (unpublished manuscript) replicated this study and found the exact same correlation.

Siegrist (1995) developed a German self-talk scale measuring inner speech about the self, e.g., “I often talk to myself about happenings or experiences that are crucial to me.” Preliminary results indicate that the Scale for Inner Speech (SIS) has good internal consistency. Siegrist also measured PrSC with a validated German version and obtained a significant correlation of .48 between the PrSC and the SIS. In another study, Schneider (2002) assessed inner speech with a shorter version of the SIS and private self-consciousness with a validated German translation of Burnkrant and Page’s measure of self-reflection (1984). Self-reflection represents a non-anxious, healthy form of private self-consciousness—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-rumination consists in a more negative form of private self-

consciousness; it is anxious attention paid to the self, where the person is afraid to fail and keeps wondering about his or her self-worth.) Schneider observed a significant .51 correlation between inner speech and self-reflection.

CONCLUSION

In this paper I offered a multidimensional view of self-awareness. The model portrays self-attention and the resulting acquisition of self-information as complex, multifaceted phenomena shaped by a host of neurological, social, and cognitive processes. The self can reflect upon itself by communicating with itself through the use of inner speech and imagery; self-awareness requires functional prefrontal lobes. The self can also learn about its body with double sensory stimulation and by being exposed to self-reflecting devices found in one's environment. These also inform one about more public dimensions of the self. People, the media, and self-focusing objects in one's surroundings can convey self-information and/or initiate self-observation.

Table 3 summarizes the different links proposed by the model. The fundamental importance of inner speech can be appreciated by noting that half of the links pertain to it. Without inner speech many parts of the model would be isolated and its internal consistency would greatly suffer. Inner speech can internally reproduce and extend social and physical sources of self-awareness. If we did not have the capacity to talk to ourselves, self-awareness would only be possible in the presence of others or when confronted to physical stimuli. Even then, most perceived self-information could not be cognitively processed. One could compare inner speech to a flashlight used to find one's way through a dark room (Morin, 2001). Without the light one will still be capable of approximate perception (and one can use touch to discern furniture and objects [self-information] in the room); but perception (self-awareness) will be much more vivid and precise if one puts the flashlight on.

A: Physical stimuli (2.2) extend perspective taking (1.2).
B: Self-reflecting devices (2.1) participate in the formation of body awareness (3.2).
C: Imagery (3.4) can internally reproduce social mechanisms (1.2, 1.3) responsible for self-awareness.
D: Experiences with self-reflecting devices (2.1) are crucial in acquiring autoscopic imagery (3.4).
E: Inner speech (3.3) can reproduce social feedback (1.1) and redirect it toward the self.
F: Inner speech (3.3) can internalize others' perspective (1.2).
G: Self-talk (3.3) is activated when one is exposed to self-reflecting devices (2.1).
H: Inner speech (3.3) is activated when some areas of the left prefrontal cortex (3.1) are working.

Table 3—Links proposed by the model

But again, the model makes it clear that inner speech is not the whole story. Social influences, physical stimuli, as well as somatic proprioception, imagery, and the prefrontal cortex all participate in self-awareness. As Leary & Tangney (2002) point out, self-attention is central to our understanding of the self and related constructs (e.g., self-efficacy, self-schema, self-presentation, self-adaptation) because these all involve thinking reflectively about oneself. One can get a comprehensive—and thus more realistic—picture of this experience only by simultaneously considering all the possible mechanisms and processes leading to it and by looking at their multiple and complex interactions. This in turn will hopefully increase our knowledge of what makes us uniquely human.

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