The Neurobiology of the Aware Ego:

Redefining the Self

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Summary

The traditional ego has been redefined. A new conceptual theory developed by Hal and Sidra Stone suggests that instead of the traditional Freudian ego of self-psychology, humans may utilize an "aware ego", or executive choice maker. Modern neuroscience suggests that as we move our center of operation and "choice making" to the aware ego, we make increasing use of the anterior cingulate cortex. Recent studies in our laboratory utilizing PET brain imaging suggest that patients with Alzheimer's disease and anosognosia (lack of self awareness) also have a defect of the anterior cingulate cortex. Through such research efforts, modern neuroscience is beginning to contribute to the understanding of the basic physiologic principles of the self.

Keywords

Aware Ego, Executive Choice Maker, Anterior Cingulate Cortex, Alzheimer's disease, PET Brain Imaging.

Advances in modern neuroscience are making it possible to investigate the neurological and anatomical substrate of traditional psychological concepts. PET scans (positron emission tomography), for example, are being used to visualize (in vivo) the metabolic substrate of executive attention (located within the anterior cingulate cortex) as well as other attentional and psychological states.

There has, also, been a progressive and dramatic evolution of long-held psychological principles. For example, many authors have redefined the traditional Freudian concept of ego. A new conceptual theory developed by Hal and Sidra Stone Ph.D. has made a major contribution to the development of this redefined ego (Stone & Stone, 1993). The Stones suggest that instead of the traditional Freudian concepts of superego/id and its controlling ego of self-psychology, humans operate with multiple subpersonalities or selves. These subpersonalities are divided into primary selves who control our world and with whom we identify. The primary selves are frequently developed to protect the vulnerable child. These selves may be conscious or unconscious. According to the Stones, the traditional Freudian concepts of ego is represented by the multiple primary selves, with which we are identified. Because of this identification with the constellation of primary selves the traditional ego does not have access to an active choice maker. Examples of primary selves often include the rational mind, pleaser, and inner critic. In contrast the disowned selves are subpersonalities, which we repress and condemn, or project onto others. Examples might include the emotional self, the rebel, vulnerable child, and the shamed child. For every primary self there is an opposite disowned self or selves. Examples of these opposites might include the rational mind and the emotional self or the pleaser and the rebel.

Psychology of the Selves and the Aware Ego

The Stones, however, postulate the existence of an Aware Ego. The Aware Ego is an active choice maker, which experiences the primary and disowned

selves and is capable of viewing the process from a position of awareness. The Aware Ego is not identified with the primary selves. The Aware Ego has access to both the emotional and higher cognitive "energies". The Aware Ego has awareness of the experiences of the selves (primary and disowned) and often stands between these opposites. These selves may, in fact, represent an "energetic gift" to be used by the Aware Ego. The Aware Ego is an executive choice maker and does not judge the primary or disowned selves. With facilitation (through a process called voice dialogue), the "Aware Ego Process" can result in a strengthening of awareness and a progressive separation from ones identification with the selves.

Recent neuropsychological studies have done much to elucidate the anatomical and physiologic substrate of this executive choice maker. Neuroimaging studies by Posner and Raichle have demonstrated that executive attention (selective attention) is mediated in the anterior cingulate cortex (Posner & Raichle, 1998). They have found that the anterior cingulate cortex has complex and rich inputs from both the emotional brain and higher cortical centers. They demonstrated that the Stroop test clearly and reliably activates the anterior cingulate cortex. The Stroop test requires that one make careful discernment when one is confronted with incompatible or incongruent color stimuli.

Selective Attention—Higher Control Areas and Emotion

In addition, Heilman (1997) in his review of the anterior cingulate cortex points out that conflict monitoring, response selection and initiation of action are all critical components of the function of the anterior cingulate cortex. Profound apathy and even akinetic mutism may represent severe clinical pathological states involving the anterior cingulate cortex. He also suggested that the anterior cingulate cortex (ACC) represents a convergence zone for the limbic emotional brain and other higher cortical (more rational) structural areas. According to Hielman, there are rich inputs into the ACC from the hippocampus (non emotional memory) the amygdala (emotional memory) the periaqueductal gray (primitive emotion) as well as higher cortical areas.

Allman and associates (2002) suggest that the ACC appears to be a specialization of neocortex rather than a more primitive stage of cortical evolution. They stress that the ACC may be central to intelligent behavior and is closely associated with emotional self-control, focused problem solving, error recognition, and adaptive responses to changing conditions. They have identified a unique class of spindle shaped neurons in the anterior cingulate cortex that appear to be found only in humans and the great apes. They suggest that these cells may represent a recent evolutionary specialization and that they emerge postnatal (after birth). They speculate that these cells may be important in adult competence and may be critical for emotional self-control and problem solving capacity.

Spindle Cells (Human ACC)

In our laboratory, we have attempted to further elucidate the nature of the anterior cingulate cortex by studying patients with Alzheimer's disease and anosognosia (Michon, Deweer, Pillon, Agid & Dubois, 1994). Anosognosia is defined as the inability to recognize the state of illness in one's own organism. Patients with Alzheimer's disease and anosognosia lack the ability to identify their own, often profound, memory or other cognitive deficits. Anosognosia appears to be present in approximately 40% patients with Alzheimer's disease.

The mechanism of anosognosia for cognitive deficits remains unknown. Early studies on Alzheimer's disease (AD) focused on denial as being the primary cause of a patient's lack of insight. One of the earliest empirical studies investigating AD and anosognosia was performed by Reisberg and colleagues (1985). The study reported significantly less awareness of cognitive deficits in moderate to severe AD cases when compared to mild cases. The researchers proposed that anosognosia might be a result of a defense mechanism that attempts to protect the individual from knowledge of their illness and thereby avoiding possible depression.

To explore this idea, there have been numerous attempts to examine the correlation between severity of Alzheimer's disease and depression. Feher (1991) reported a weak correlation between anosognosia and depression, while in contrast Sevush and Leve (1993) reported a significant correlation. A study by Reed and associates (1993), however, found no significant correlation between depression and anosognosia in Alzheimer's disease patients.

Recent studies have shown that Alzheimer's patients with anosognosia have significantly more severe deficits on frontal lobe related neuropsychological tests (Heilman, Barret & Adair, 1998; Heilman, 1997). This research supports the idea that the appearance of anosognosia within AD may have an underlying biological construct. Furthermore, it suggests that anosognosia may have special relevance to phenomenal consciousness because it may represent a clinical pathologic state in which there is a fundamental alteration or distortion of the personal self.

Because of the conflicting results in past anosognosia research, we developed a new anosognosia instrument (Cole Anosognosia Scale for Alzheimer's disease or CAS-AD) (Licata, de Leonni-Stanonik & Doughterty, 2002). The primary difference in our instrument is the use of questions, which pertain specifically to frequently observed Alzheimer's symptoms. The CAS-AD is composed of 43 questions relating to 3 different cognitive domains: executive functioning, memory, and behavior. The instrument was designed to measure a patient's lack of awareness on a continuum that allowed us to identify individuals who were suffering from pronounced anosognosia.

Results of Anosognosia PET Study

To investigate the biological and structural nature of anosognosia we performed PET scans (positron emission tomography) measuring focal brain

metabolic activity in Alzheimer's patients with and without pronounced anosognosia as measured by the CAS-AD (Dougherty, de Leonni-Stanonik & Licata, 2001). The study used 18FDG as a metabolic tracer to identify areas of increased or decreased glucose utilization in the brain. Of specific interest to us was the nature of selective attention (executive attention) and its relationship to anosognosia. A variation of the Stroop test, called the Counting Stroop, was used in order to produce metabolic activation in the ACC. Our study suggests that patients with Alzheimer's disease and pronounced anosognosia have an abnormal decrease in glucose utilization within the anterior cingulate cortex when compared to patients without anosognosia. We conclude that anosognosia in Alzheimer's disease may represent a deficit in the ability of focusing selective attention on one's self and this may result in a functional abnormality in the Aware Ego.

These studies suggest that the executive choice maker (aware ego) appears to be associated specifically with the anterior cingulate cortex and may represent a unique human capacity for informed decision making. In addition, borderline personality disorder and other psychological states have recently been associated with pathology of the anterior cingulate cortex (Posner and assoc, 2002). Is it possible that the "aware ego process" results in increased numbers or increased connectivity of spindle cells in the anterior cingulate cortex?

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Biography

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