GREAT DESCRIPTION OF FRONTAL LOBE DYSFUNCTION

(EXCERPTED FROM THE BOOK "THE ECOLOGICAL VALIDITY OF NEUORPSYCHOLOGICAL TESTING") 327
Ecological Validity of Neuropsychological Testing

Emotional Changes

Emotional reactivity. Brain injury can produce modulations in the magnitude of experiences emotional responses. These changes can affect all forms of emotional response equally, or some more or less than others. They are distinct from modifications of emotional communication described below.

Decreased emotional reactivity. The person with a brain injury may have a reduced emotional reactivity, giving the impression of indifference. This is particularly true with lateral dorsal frontal lobe injury. Most often all forms of emotional response are diminished (e.g., joy, sorrow, lust, fear, anger). Such "flatness" may look like depression, but most often the individual feels little emotion, including depression. This reaction may also resemble the psychic numbing sometimes resulting from a post-traumatic stress disorder (Blummer & Benson, 1975; Prigatano, 1992; Stuss & Benson, 1986; Stuss, Gow, & Hetherington, 1992).

Increased emotional reactivity. Some individuals with brain injury may tend to be emotionally over-reactive. This can take many forms including the following:

1. **Agitation** – people in the acute stages of injury, or emergence from coma, or in the later stages of progressive dementias sometimes become agitated. The may be restless, or abusive, or even assaultive in their poorly directed struggle to escape the threats they perceive from their disorientation (Corrigan & Mysiw, 1988).
2. **Irritability/Impulsive anger** – This is one of the most commonly reported and problematic personality changes resulting from brain injury. Persons with brain injury often experience and express anger more readily than previously. These reactions are often quite brief and surprising to both the

person experiencing them and to those present. The "explosions" may occur following relatively trivial events and may not serve any purpose, Such reactions often are exacerbated by concrete thinking or memory deficits preventing the person from seeing past or current solutions or perspectives (Miller, 1993; Prigatano, 1992).

3. **Labile affect** – Some persons with brain injury have rapid and intense fluctuations in many types of emotional reactions, sometimes going from intense joy to fear to rage to sorrow within a few minutes (Prigatano, 1992). This is particularly likely to occur when emotional reactions are unmodulated by recent memories or any ability to maintain ongoing plans.
4. **Catastrophic reactions** – Severe frustration, coupled with over stimulation or a sense of being overwhelmed, and an inability to perceive alternatives can lead to a catastrophic reaction. There is an intense desire to escape, and there may be features of a panic attack (Goldstein, 1952).
5. **Personality changes** associated with temporal lobe epilepsy – Although controversial, it appears that a small minority of persons with temporal lobe epilepsy, or partial complex seizures, may demonstrate a variety of complex changes in personality (Bear & Fedio, 1977). These include hypermoralism, emotionality, sexual changes, religiosity, hypergraphia, persistence, and exaggerated sense of personal destiny, etc. These may reflect abnormal discharge from the limbic system, yielding an exaggerated emotional valence being attached to benign experiences.

Changes in emotional communications. Brain injury can produce dissociations between internal emotional experiences and outward manifestations of those experiences. These dissociations can often be discovered through interview or observation of verbal or emotional behaviors.

Decreased emotional communication abilities. These impairments can be expressive or receptive:

1. Flat affect (impaired emotional expressiveness) – Brain injury, particularly right frontal lobe damage (Borod, 1992; Cancelliere & Kertesz, 1990; Ross, 1981, 1993) or Parkinson's Disease (Blonder, Gur, & Gur, 1989), may lead

to difficulty with emotional expression through tone of voice, facial expressions, and gestures, even through internal feelings may be every bit as intense as previously experienced. As with decreased emotional reactivity, this lack of emotional communication ability can be mistaken for depression.

2. Impaired emotional comprehension – Persons with damage tot eh posterior portions of the right hemisphere are often found to have difficulty understanding or interpreting the emotions in others' tone of voice, facial expressions, etc. (Borod, 1992; Ross, 1981, 1993).

Increased involuntary emotional communication. The most common involuntary emotional expressions are the following:

1. Reflex crying and laughing – Persons with various kinds of brain injuries, but particularly with focal damage to the pyramidal portion of the motor system sometimes develop reflex crying or laughing (pseudobulbar affect, emotional incontinence) (Lieberman & Benson, 1977; Ross & Stewart, 1987). This crying and laughing is a response, which is usually appropriate in type but out of character and out of proportion to the situation and the person's actual emotions. Again, the crying can be mistaken for depression.
2. Automatic cursing of aphasia and Tourette's Syndrome – Severe aphasics sometimes have a preserved ability to curse, through by some to be due to right hemisphere mechanisms. This cursing is often involuntary, and can be mistaken for changes in personality. Involuntary cursing is also sometimes seen as part of the tics of Tourette's Syndrome (Devinsky, Bear, Moya, & Benowitz, 1993).

Executive Function Impairments

Impairments in executive functions or the processes of behavioral self-regulation can be conceptualized both as cognitive impairments and as changes in personality. They are most commonly associated with damage to the frontal lobes. Executive functions include the ability to select an undertaking, make a plan,

initiate the undertaking, recognize and correct for errors or unexpected events (plan repair), recognize completion, and evaluate outcome (Lezak, 1983). Disturbances in these abilities can occur in various forms and combinations.

Conceptually, experientially, and neuroanatomically, the executive functions stand at the interface of cognition and personality. For example, one executive function impairment is concreteness (see below). Cognitively, this condition includes a loss of ability to shift one's point of view or consider another perspective. In the realm of personality, this is often experienced as a lack of empathy (Grattan & Eslinger, 1989). The neuroanatomical manifestations of this interface are seen in the frontal lobe projections. The frontal lobes have rich reciprocal connections with the posterior cortex, associated with many major cognitive functions, as well as with the limbic system, strongly associated with emotions.

Lack of awareness of deficits (anosognosia). Persons with brain injury often have difficulty recognizing acquired neurological impairments or limitations in their abilities. They may not recognize the presence of a limitation such as a hemiplegia, or they may recognize it but be unable to take it into account when planning even such common activities as standing up. They may have difficulty recognizing when they make mistakes and correcting those mistakes, resulting in impairments in plan repair. Their lack of awareness may be reinforced by a psychological reaction of denial, but the two are also independent processes, which can be dissociated (Prigatano & Schacter, 1991).

Disturbances of activation. Disturbances of initiation. Initiation may be inadequate or excessive as follows:

1. **Insufficient initiation** – Certain types of brain injury, particularly Parkinson's Disease and damage to the basal ganglia or to the dorsolateral frontal lobes, can produce difficulties in initiating movement, activities, and ideas (Prigatano, 1992; Stuss, Gow & Hetherington, 1992). People so affected often show little spontaneity and may be content to follow along with activities suggested or initiated by others. This impairment may also be mistaken for depression.

2. **Excessive initiation** (Disinhibition/Impulsivity) – Disinhibition is a common problem following brain injury, with impulsive, embarrassing, offensive or even dangerous behavior resulting. Such individuals will often be distractible and stimulus-bound, reacting to the immediate environment without regard for future consequences or social perceptions. They may be offensive to others in come circumstances, or may be more vulnerable to exploitation. Rarely, some overly inhibited individuals become more appropriately assertive. Disinhibition is seen particularly with damage to the orbital frontal cortex (Struss & Benson, 1986; Stuss, Gow, & Hetherington, 1992).

Disturbances of termination. The ability to end activities appropriately can also take place insufficiently or excessively as follows"

1. **Inadequate termination (Perseveration)** – Inappropriate repetition of an action, wor4d, or idea may take place over intervals from a fraction of a second up to several hours. The phenomena of perseveration range from stuttering to obsessive-compulsive symptoms, and may represent several distinct entities (Hotz & Helm-Estabrooks, 1995; Sandson & Albert, 1984).
2. **Excessive termination (Impersistence)** – Some individuals have difficulty appropriately maintaining an activity once started (Lopez, Becker, * Boller, 1991). The phenomenon may be due, at least in part, to attention impairments or fatigue.

Impaired planning and judgment. Some persons with brain injury have difficulty planning a complex task or sequence of activities (Stuss & Benson, 1986; Stuss, Gow, & Hetherington, 1992). They may have difficulty thinking of the different possible ways of doing something, what problems may arise, or in what order something needs to be done. They may be poor at evaluating risks and benefits or considering alternatives. Such difficulties often include limitations in social judgment. These impairments can be difficult to detect with structured cognitive tests. Even when verbal judgments are measured to be normal, for example, on the Comprehension subtest

of one of the Wechsler Intelligence scales, the person's actual behavior may not reflect the use of good judgment.

Concreteness. Persons with brain injury are often less able to think abstractly (Goldstein, 1952). They may have difficulty understanding the significance of metaphors and stories, or generalizing an experience from one setting to another.

Lack of empathy. Because they have difficulty changing perspectives or points of view, some people with brain injury have difficulty in empathizing with other people, or understanding other people's feelings (Grattan & Eslinger, 1989). They may be seen as self-centered, stubborn, or selfish. This lack of empathy can be particularly devastating to a spouse or other close person, being perceived as a loss of love, yet it may be less apparent to others with whom they may be able to maintain superficial, polite relationships.

Confabulation. The combination of impairments in new learning abilities and disinhibition can produce a tendency to make up memories (Prigatano & Schacter, 1991; Shapiro, Alexander, Gardner, & Mercer, 1981; Stuss, Gow & Hetherington, 1992). Persons with this difficulty often talk about recent events that did not happen, sometimes insisting on their version of events. They can be perceived as lying and unreliable. They may be particularly susceptible to misinterpreting events to suit their own emotional needs.

Impaired communication pragmatics. Persons with executive function deficits or right hemisphere damage are likely to have difficulty in the efficacy or social appropriateness of their communication (McDonald, 1992; McDonald & VanSommers, 1993). There may be disturbances in body language, eye contact, tone of voice, or their assumptions about what the listener knows. They may talk too much or too little, interrupt or fail to respond, not listen, or have difficulty staying on topic.

Cognitively Mediated Changes of Personality

Various cognitive impairments may create false impressions of indifference, deception, or lack of cooperation. For example, the

person who, due to attention impairments, does not answer questions, strays from the topic of conversation, or cannot stick with a task is often seen as not caring or as uncooperative (Weber, 1990). The person who cannot remember what they are told or what has happened may be seen as uncooperative, passive-aggressive, or unloving. Sometimes they are thought to be lying.

Aphasics are impaired in one of the major channels by which we manifest personality. It can be more difficult for sometimes impossible for them to communicate how they feel, what they want, that they think, etc. Many people fatigue more easily following brain injury (Lezak, 1978; Weber, 1990). When fatigued, their brain injury symptoms emerge more readily. They may be seen as inconsistent or unreliable. Others may come to regard their symptoms as not real because they are inconsistently present.

Interactions

With so many different factors influencing personality following brain injury the possibilities for combinations and interactions of features are enormous. It cannot be presumed that the various components of personality in an individual with a brain injury can be observed and measured independently, and that their effects will be simply additive. What follows is just a few typical interactions among the three major categories.

A fairly common syndrome among persona with right middle cerebral artery occlusion involves a left hemiplegia, left neglect, impaired emotional communication including monotone speech and decreased facial expression, reflex crying, a lack of initiation, disinhibition, a lack of awareness of deficits, and distractibility (Gordon et al., 1991). There may be difficulty sleeping due to difficulty turning in bed, decreased sexual activity due to motoric difficulties, and a decreased interest in some foods because facial weakness makes them ore difficult to eat. Social disinhibition can lead these individuals to make inappropriate jokes about death. Outside observers may interpret these changes as signs of depression (e.g., disturbances of sleep, appetite, and libido; decreased concentration, interest, and energy; flat affect; increased crying; and suicidal ideation). The outside observer may also reason, “I would be depressed if I had all of those problems.” While some such persons are depressed, many are not, as a careful interview can

reveal. As the anosognosia resolves itself, the reactive depressions that outside observers initially projected may well emerge. Embarrassment over reflex crying and other behavioral changes may lead to social withdrawal.

Someone with a mild to moderate head injury may manifest irritability, impaired planning and judgment, mild impairments in memory and attention, and fatigability. Familiar activities such as work or handling money may result in frustration and perplexity. Memory impairments may make the immediate past less accessible, while planning impairments make the future less accessible. Immediate frustration, magnified by fatigue and irritability, can lead to embarrassing and severe (catastrophic) emotional reactions. For example, one previously very competent woman who had such a head injury described planning a trip downtown with four errands in four shops in sequence. However, the first shop was closed. Not knowing what to do (although the other errands did not depend upon the first on), she sat down on the sidewalk and cried, and then went straight home. Evaluating such interactions accurately presents a daunting challenge both to the experienced clinician and to the developer of tests.

This description of possible reactions and changes in the individual with a brain injury represents only the major and most common features which have been observed influencing personality. More subtle features or rare phenomena and rare interactions are not described. Doubtless this classification will not survive intact the tests of empirical verification and clinical usefulness. However, as a provisional organization of these features it can help in guiding the search for attempts at systematic evaluation.