

Non-Linear Cognition: the quantitative neuroscience of the defensive and associative processes.

Cognitive neuroscience is a burgeoning and specific discipline, with much to offer. Based on cognitive psychology, it seeks to explain the neural biological underpinnings of our mental processes and organization within the context of an information processing paradigm, much akin to that of cognitive psychology (Gazzaniga, 2009). In this new discipline, many specific and demonstrable pieces of information have become available to us, information which is undoubtedly sound in many cases, based as it so often is on such trustworthy experimental paradigms as that of double dissociation, which proves the particulars hypothesized with great certainty. The great advantages of cognitive neuroscience, are advantages which Freud would have been the first to applaud, so well trained in neuroscience as he was. Indeed, a pure physiologically based psychology was not at all a foreign aspiration to him, one of his earliest efforts being just such an attempt at a biologically justified view of psychological processes (Freud, 1895). Although the physiological knowledge was not available in his time, it is today, and now, his vision may at last become a reality.

However, cognitive neuroscience seeks a certain sort of information processing, and I say seeks, because each scientific paradigm "assumes itself" in its methods, and seeks to confirm the same. Like the scientists who conceived her, this paradigm is logical and linear. It will, of course, uncover linear truths about cognition. These are useful and valid truths, truths about the exact brain regions which are used to process and recognize places, the so called parahippocampal place area, or faces, the so called fusiform face area, or potential tools in the left ventral premotor cortex (Gazzaniga, 2009 p. 235, 519; Gerlach et. al., 2002; Kellenbach et. al., 2003), and a host of other fascinating and valuable pieces of information spanning many areas, including social cognition (Gazzaniga, 2009, pp. 599-633). However, I propose that we often miss the underlying point of cognition to look at it in a linear fashion, and indeed, all of psychoanalysis is based on the assumption proved countless times in the demonstration of psychoanalytic therapeutic efficacy, that mental processes are predominantly non-linear, that is, predominantly *associative and defensive* in nature. In keeping with the language of cognitive neuroscience, I will refer to the combined associative and defensive functions in their composite, as: *non-linear cognition*.

Non-linear cognition has been the cornerstone of effective psychoanalytic practice, and is best understood by way of contrast to linear cognition. In free associative technique, we discard the linear, and find the underlying processes of the mind, which are associative and defensive in nature, then become available to us. From the interpretation of dreams:

"We must aim at bringing about two changes in him: an increase in the attention he pays to his own psychical perceptions and the elimination of the criticism by which he normally sifts the thoughts that occur to him." (Freud, 1900, p. 133).

We discard the logical and inhibitive restrictions of analysis and higher mental functioning, and are rewarded with a chain of associations which at their final end, pierce

the associative (and compromise censorship/distortion with conscience agencies (Freud, 1900)) defenses, to yield the hidden meaning of a symptom, and/or, reveal its contributing determinants, that is, those topics and ideas which in combination give the notion its affective force and meaning. This demonstrates the "primary process" and other rules describing unconscious organization and dynamism in action. The primary process and other descriptive rules of unconscious operation, which are associative and non-linear are:

"The cathectic intensities [in the *Ucs.*] are much more mobile. By the process of *displacement* one idea may surrender to another its whole quota of cathexis; by the process of *condensation* it may appropriate the whole cathexis of several other ideas. I have proposed to regard these two processes as distinguishing marks of the so-called *primary psychological process*." . . . "exemption from mutual contradiction, primary process (mobility of cathexes), timelessness, and replacement of external by psychological reality" (Freud, 1915e, p. 186-187).

Indeed, the psychoanalytic viewpoint soon makes *purpose* of our mental illnesses, which appear to a linear viewpoint as chaotic imbalances, but are in fact purposeful efforts at defense. The citations to support this would fill a page, so I request you read the Freud, from the early Neuro-psychoses of Defense (1894) forward through to the end of the twenty-three volumes to substantiate this point countless times. The implications of this are clear: what we may assume from a linear perspective is a function of systemic imbalance, may in fact, be purposeful and structured non-linear cognition. Non-linear cognitive processes are not organized by the same rules, so, they must be assessed and understood within a proper non-linear definitional context: as defense. E.g., if I forget a name, it may not be a function of systemic inefficiency or error, it may instead, be a non-linear function of defense, as I am in fact unable to remember the name because it reminds me by way of association of some unpleasant topic. The forgetting is functional, a repression, a purposeful symptom doing a job in a structured way, a piece of non-linear cognition insulating me from a dissonant feeling.

Likewise, we can assess the extreme case, the delusions of the psychotic (Freud, 1911pp. 1-82; 1924b p. 151), and the less extreme alike, will follow the same pattern of defense, each in a different way, as shades of a similar ink. As one might then expect, we can detect in the case of the normal person as well, hints of the underlying associative organization upon which our logical facade is so delicately perched. The techniques of free association and Freudian dream analysis reveal with equal ease the unconscious operations in the normal healthy subject as they will in the ill. So if both healthy and pathological manifestations of personality are based in non-linear cognitive processes, the primary processes, how can we test and assess them? To test and assess is a linear proposition. How might one demonstrate by linear means, a nonlinear topology of defense?

The problem might be best addressed with a piece of neuropsychological engineering. That is, we should be able *quantitatively assess* the situation, *if* the data is rightly understood as expressing in its neural intra-systemic dynamism, patterns of non-linear

cognitive organization. To make that assessment, we might borrow a piece from psychoanalysis, and in turn, apply this knowledge as a physicist might, so as to simplify a complex problem. As Freudian psychoanalysis has been curing for over a century, what are often today considered chronic afflictions, such as OCD, we can by way of its long proven instrumental efficacy, utilize Freudian metapsychology as a scientifically valid initial *perturbation theoretic* "guess" in physics (Greene, 1999, pp. 289-294), and assess the complex systemic dynamism we reveal in this known context of defined non-linear operation. The patterns of complex dynamic non-linear neural activity associated with healthy and unhealthy conditions alike, should, if the approach is rightly constructed, be defined as to their purpose and point of operation, even before the data is collected. As the psychology is long known and proven, the non-linear system is defined in its operations and their intention, even before the complex mathematical data sets which give expression to those operations are accrued. It is through this marriage of long proven and efficacious psychological theory and practice, along-side the newest quantitative technologies, that the pathway to linear understanding and demonstration of our non-linear cognitive basis may be established. The theoretical specifics of this intricate union are spelled out in the following paper: *The Quantitative Unconscious: A Psychoanalytic Perturbation-Theoretic Approach to the Complexity of Neuronal Systems in the Neuroses* (Norman, 2013). I propose that by broadening the explanatory province of cognitive neuroscience, to include the defensive and associative aspects of *non-linear cognition*, that this new discipline will become a tool of the greatest specificity and inclusive depth, and thus, prove itself the worthy future, the successor of a profound lineage and inheritance which had begun to tread these same steps, now looking back—over some hundred years past.

—Rich Norman © 2013

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