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What's so Uncanny about Neuroscience?

»Indeed, I should not be surprised to hear that psychoanalysis, which is concerned with laying bare these hidden forces, has itself become uncanny to many people for that very reason.«
Sigmund Freud, *The Uncanny*

Over a twenty-year period, from 1877 to 1897, Sigmund Freud published more than twenty original papers in the biological sciences. Working in the laboratories of the neuroanatomist and psychiatrist Theodor Meynert and the Physiological Institute of the neurophysiologist Ernst Brücke, Freud developed a novel histological method for staining nerve tracts, was one of the first to describe fibers in the medulla oblongata, worked on the spinal ganglia of *Ammocoetes*, anticipated the Neuron doctrine and penned a significant treatment of childhood cerebral paralyzes.¹ He worked for nearly two decades as a neuroanatomist, neurophysiologist and neurologist before developing the more psychodynamic approach that would underpin psychoanalysis. But Freud never renounced his final belief in mechanico-physical explanations. As late as *Beyond the Pleasure Principle* (1920), a year after *The Uncanny*, Freud would write about depth psychology in terms of a neurophysiologic horizon: »The deficiencies in our description would probably vanish if we were already in a position to replace the psychological terms with physiological or chemical ones.«² As James Strachey was the first but not the last to note, the cerebral anatomy, neurophysiology and theoretical biology of »[t]he *Project* or rather its invisible ghost, haunts the whole series of Freud's theoretical writings to the very end.«³ All of Freud's later psychical constructs, whether the unconscious, repression or primary defense, are elaborated in the context of mechanical, physical and

chemical constraints, what Freud repeatedly calls »learning from biological experience« in the *Project for a Scientific Psychology*.⁴ Freud productively utilized the limitations imposed by neurobiological substrate to imagine the possibilities of psychic processes. For example, the differential conductivities and resistances of neurons and the spaces between them (contact barriers or synapses) allowed Freud to imagine differences between primary and secondary functions while facilitation and lateral inhibition gave rise to defense mechanisms and resistance. In what follows, I want to consider Sigmund Freud's contribution and commitment to brain science as a way of more thoroughly understanding his theory of the mind as it was shaped by and continues to shape neuroscientific discourse and theory. In particular, the figure of the uncanny reveals compelling points of contact between unconscious mental life in psychoanalysis and neuroscience.

While »undoubtedly related to what is frightening«⁵, Freud acknowledges that the uncanny and its associated feelings are difficult to define. After tracing etymologies and closely reading E. T. A. Hoffman's story *The Sandman*, he provisionally offers the class of infantile complexes, with the castration complex being a privileged and special class, as exciting the feelings associated with the uncanny. However, as is often the case with Freud, he further complicates his initial proposition, and it is with his secondary definition of the uncanny, its relationship to surmounted beliefs, that I find myself most interested: »These themes are all concerned with the phenomenon of the ›double‹, which appears in every shape and in every degree of development. Thus we have characters who are to be considered identical because they look alike.«⁶ He extends this interest in the double through a move from external to internal experiences, »one possesses knowledge, feelings and experience in common with the other. Or it is marked by the fact that the subject identifies himself with someone else, so that he is in doubt as to which his self is, or substitutes the extraneous self for his own. In other words, there is a doubling, dividing and interchanging of the self.«⁷ It is these very processes of substituting, dividing and becoming a stranger to oneself that I want to explore as constitutive elements of both psychoanalysis and the neuroscientific project. While initially resistant to many of the fundamental

concepts of psychoanalysis, during the course of the twentieth and twenty first centuries, mainstream neuroscientific consensus has accepted and experimentally verified two central psychoanalytic hypotheses: that the self is divided, capable of endless substitutions and is a stranger to itself, and that the vast majority of mental life is not known to the conscious self. Neuroscience has itself become uncanny to many people.

Sensory Substitution or Plasticity

Plasticity is the cornerstone on which the house of modern neuroscience has been built. Plasticity or neuroplasticity refers to the brain's ability to respond to both external and internal stimuli by fundamentally altering its synaptic and neuronal form. Neuroplasticity constitutes the basis for all modern theories of learning. But like the uncanny, its etymologic roots suggest a radical irconcilability. Derived from the Greek *plastikos* or *plastos* meaning molded or formed, plasticity refers both to that which is resistant to change (i.e. formed) and that which can be changed (i.e. deformable). This ambivalent feature of neuronal tissues is central to Freud's speculation in the *Project* of three distinct neuronal types or systems in the brain (ϕ , ψ , ω). They are distinguished by the degree to which their »contact-barriers« (the term *synapse* to describe these junctions would be coined two years later by Foster and Sherrington), resist and allow the flow of Quantity:

We cannot off-hand imagine an apparatus capable of such complicated functioning; the situation is accordingly saved by attributing the characteristic of being permanently influenced by excitation – to one class of neurons, and, on the other hand, the unalterability – the characteristic of being fresh for new excitations – to another class.⁸

Freud distributes these antithetical meanings of plasticity across two groups of neurons. The first set are sensory neurons which are permeable and return to their prior state after excitation; the second are impermeable and are susceptible to permanent alteration. If memory, self-consciousness *and* learning are requirements