Chapter 2
What Is Neuropsychoanalysis?

Mark Solms and Oliver H. Turnbull

Abstract The authors examine the historical, philosophical, and scientific foundations of what they term the “inter-discipline” of neuropsychoanalysis. With the support of historical evidence, they unravel how the traditional strict separation of psychoanalysis and the neurosciences, as still practiced by certain scientists in both fields, is grounded in a misreading of Freud: Rather than advocating such a separation on principle, Freud developed his purely psychoanalytical method for pragmatic reasons—neuroscience in his time simply was not advanced enough to yield fruitful results. While psychoanalysis continued to use subjectivity to explore the internal perception of the mental apparatus, neuroscience developed tools to study the physical realization of the mental apparatus in the brain. The authors argue that a position of correlation between the two modes is likely to yield stronger results than a single-track focus. Far from constituting a new school of psychoanalysis, neuropsychoanalysis provides a link that integrates research being conducted along the psychoanalysis/neuroscience boundary.

Keywords History of neuropsychoanalysis • Clinico-anatomical method • Neuroscientific technology • Dual-aspect monism • Metapsychology

The first formal use of the term ‘neuropsychoanalysis’ was in 1999, when it was introduced as the title of the journal Neuropsychoanalysis. Plainly the relationship between psychoanalysis and neuroscience is much older than the term. In the dozen years since the word ‘neuropsychoanalysis’ was first used, it has been employed in a number of different ways, for different purposes, by different people. This chapter serves to briefly survey some of this complexity and in the process to sketch out the intended scope of the field.

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There are two major limitations to this account. The first is that we can speak only for ourselves, and thus describe what we think ‘neuropsychoanalysis’ is—and ought to be. Nevertheless, we may claim a certain privilege in this respect by virtue of us having invented the term. Secondly, we aim to speak only of the absolute basics of the discipline, to address only the foundational issues. There is much that is both pertinent and interesting that we will not even attempt to address here.

We will address the question “what is neuropsychoanalysis?” under four headings: (1) the historical foundations of neuropsychoanalysis, (2) its philosophical foundations, (3) its scientific foundations, and lastly (4) we will discuss what neuropsychoanalysis is not.

2.1 Historical Foundations of Neuropsychoanalysis

When we speak of the historical foundations of neuropsychoanalysis, we must, of course, begin with Freud. In doing so we are also addressing the question as to whether or not neuropsychoanalysis is really a legitimate part of psychoanalysis. The alternative view is that it is somehow a foreign body in our midst, perhaps even something fundamentally anti-psychoanalytical.

In relation to this question, Freud’s attitude to the issue is of paramount importance. If neuropsychoanalysis is legitimately part of what Freud conceived psychoanalysis to be, it places the inter-discipline of neuropsychoanalysis in a strong position with respect to its parent discipline. It was Freud, after all, who invented psychoanalysis. Happily, his view on the matter was very clear and also consistent throughout his life. He was, of course, a neuroscientist and a neurologist for the first two decades of his professional life (Solms 2002; Solms and Saling 1986). Throughout this later psychoanalytic work he had a specific scientific programme in mind, largely continuous with his earlier neuroscientific work, albeit shaped by the limitations of the scientific methods and techniques available to him at that time (for more on this topic see Solms and Saling 1986; Solms 1998; Turnbull 2001).

Freud’s programme was to map the structure and functions of the human mind, and naturally he recognised that these were intimately related to the structure and functions of the human brain. However, as regards these relationships, he consistently argued that the brain sciences of his time did not have the tools (in both conceptual and technical terms) necessary for exploring them. He therefore shifted to a purely psychological method—a shift that he reluctantly saw as a necessary expedience. Just a few quotations illustrate this position. In his essay On Narcissism/Zur Einführung des Narzißmus (1914) he discussed the eventual possibility to discover the “organic substructure” of psychological functions:

[W]e must recollect that all our provisional ideas in psychology will presumably some day be based on an organic substructure […]. We are taking this probability into account in replacing the special chemical substances by special psychical forces. (S.E. XIV, 78)
And six years later in *Beyond the Pleasure Principle*/*Jenseits des Lustprinzips* (1920) he speculated upon the meaning of the chemical substances. He imagined that a biological answer to his questions would emerge “in a few dozen years”. This estimation was not far from the truth:

The deficiencies in our description would probably vanish if we were already in a position to replace the psychological terms by physiological or chemical ones. [...] Biology is truly a land of unlimited possibilities. We may expect it to give us the most surprising information and we cannot guess what answers it will return in a few dozen years to the questions we have put to it. (S.E. XVIII, 60)

There are many such statements throughout Freud’s work. All reveal, firstly, that he viewed the separation of psychoanalysis from neuroscience as a pragmatic decision. Secondly, he was always at pains to clarify that progress in neuroscience would have the inevitable result that at some time in the future the neurosciences will advance sufficiently to make the gap bridgeable.

What were the methodological limitations that Freud encountered at his time? The main neuroscientific tool then available was the clinico-anatomical method, based on the clinical investigation of patients who had suffered focal brain lesions (Finger 1994); that is to say, studying how different functions of the mind were altered by damage to different parts of the brain. It was effectively the only method available for studying mind-brain relationships (though Freud’s later years did briefly overlap with early developments in psychopharmacology; see Finger 1994).1 However, Freud regarded the clinico-anatomical method as unsuitable for his purposes, despite having used it himself in his pre-analytic work. Freud set out his arguments against clinico-anatomical localization in his 1891 book on the aphasias, which demonstrates how sophisticated his mastery of that method was and also its limitations (see Shallice 1988, 245–247, for a modern appreciation of Freud’s early neuropsychological investigations).

Within five years Freud rejected neuropsychology altogether (Solms 2001), as he made the transition into psychoanalysis. He did so for several reasons. Firstly, he recognised that the mind is a dynamic thing. It was Freud’s emphatic view, even as a neurologist and as author of his critical work *On Aphasia/Zur Auffassung der Aphasien* (1891), that the mind [Seelenvermögen] was not made up of static modules or boxes connected by arrows. Instead, he saw the mind as comprising dynamic, fluid processes. Secondly, Freud observed that the mind consisted in far more than consciousness; there was, beneath consciousness, a vast invisible sub-structure, the workings of which had to be explored and understood and exposed before they could ever be ‘localized’—before we would ever be able to make sense of the volitional brain. The aim of psychoanalysis then became to develop a method, and ultimately to derive from that method a theory (and a therapy), which would enable science to expose the dynamics of the unconscious mind. It is widely known that Freud then proceeded to use this purely clinical method free from neuroscientific constraints from around 1895 until 1939. This pioneering work left us a great legacy,

1“‘The future may teach us to exercise a direct influence, by means of particular chemical substances, on the amounts of energy and their distribution in the mental apparatus’” (S.E. XXII, 182).
including a series of theoretical models of the basic organisation of the mind, which we now refer to as ‘metapsychology’.

For Freud, this was a necessary first step toward a future neuropsychology of mental dynamics:

The psychical topography that I have developed […] has nothing to do with the anatomy of the brain, and actually only touches it at one point. What is unsatisfactory in this picture – and I am aware of it as clearly as anyone – is due to our complete ignorance of the dynamic nature of mental processes. (S.E. XXIII, 97)

Some psychoanalysts, failing to recognize the neurological underpinnings of Freud’s ideas and thus misreading his work, argue that the theoretical work of psychoanalysis must continue to remain aloof from neuroscience forever. They claim we must avoid using neuroscientific methods of any kind, no matter how far these advance, and cling to our exclusively clinical, psychological approach. These are authors who question “whether the study of [neuroscience] contributes in any way to the understanding or development of psychoanalysis as theory or practice” and “whether neuroscience is of value to psychoanalysis per se” (Blass and Carmeli 2007, 34). The proponents of this view appear to form a diminishing minority—fortunately so in our opinion (British Psychoanalytical Society 2008). But we must acknowledge that there are still some colleagues who believe that psychoanalysis has nothing to learn from neuroscience in principle. (Oddly, however, they do seem to think that neuroscience has something to learn from psychoanalysis!)

Independently of this theoretical, or ideological, question, there remains the technical question as to whether neuroscience has developed sufficiently as a discipline to allow it to make an adequate contribution to psychoanalytic theory, which is to say whether the methodological limitations (and the related limitations of neuropsychological knowledge that Freud referred to) still remain. Stepping back, it is clear that there have been huge technical and methodological advances in the neurosciences over the last several decades. Here is but the briefest historical summary:

Electroencephalography (EEG) was introduced in the 1930s (Berger 1929), though it was not fully exploited until after the war. This represented the beginning of a capability, initially rather crude, to measure and observe dynamic aspects of brain activity under changing functional conditions. The later development of event-related potentials (ERPs) in the 1960s (Sutton et al. 1965; Sutton et al. 1967; Walter et al. 1964; see Luck 2005) offered substantial advances over the basic EEG technique by virtue of experimental control and averaging procedures. The recent development of magnetoencephalography (MEG) represents a further substantial advance, allowing us to study the neural dynamics associated with mental events at the millisecond level and with increasing anatomical precision.

In another domain, after the Second World War, there were tremendous developments in neuropsychology, involving the lesion method in a new way, which adapted its inherent limitations to the dynamic nature of the mind. Alexander Luria, in particular, developed a method known as ‘dynamic localisation’ (Luria 1966, 1973; 2

2Freud was referring here to the conscious part of the mind, to what he called the system Pcept.-Cs.
see Kaplan-Solms and Solms 2000, 39–4; see also Solms and Turnbull 2002, 64–66). This method permitted the investigator to identify constellations of brain structures that interact to form dynamic functional systems, where each structure contributes an elementary component function to the complex psychological whole. On this basis, modern neuropsychology has a well-developed understanding of most mental functions. This applies especially to cognitive functions.

Further enormous technical advances followed the advent of computerised tomography in the 1970s, which made it possible to identify the precise location of a brain lesion while the patient was still alive. This was followed by Magnetic Resonance Imaging (MRI). And from the 1990s onward, functional neuroimaging (functional Magnetic Resonance Imaging [fMRI], Position Emission Tomography [PET] and Single Photon Emission Computed Tomography [SPECT]) made it possible to directly observe neurodynamic processes under changing psychological conditions. It is now also possible to deliver temporary, short-acting ‘lesions’ to neurologically intact research participants, either through sodium amytal injection (which was first introduced in the 1940s) or through magnetic pulses delivered to the outside of the skull via Transcranial Magnetic Stimulation (TMS; which has been readily available since the 1990s). Innumerable other technologies also exist, ranging from stimulation of the cortical surface in neurosurgical operations (Penfield 1952), to deep brain stimulation (DBS; Mayberg et al. 2005), and to psychopharmacological probes (Ostow 1962), to mention only the most obvious examples.

Even this brief summary demonstrates that we do now have neuroscientific methods that enable us to study the dynamic nature of the mind and to identify the neural organisation of its unconscious substructure. Each of these methods has its limitation, as all methods do, and there are undoubtedly many future advances to come. But the landscape of scientific enquiry in this domain has, certainly, radically changed since Freud’s lifetime. For this reason, it seems entirely appropriate to reconsider whether we might now attempt to map the neurological basis of what we have learnt in psychoanalysis about the structure and functions of the mind, using neuroscientific methods available to us today. Freud, in our opinion, would have considered this a welcome and wholly legitimate development of the work that he pioneered.

2.2 Philosophical Foundations of Neuropsychoanalysis

If we are to correlate our psychoanalytical models of the mind with what we know about the structure and functions of the brain, we are immediately confronted with the philosophical problem of how mind and brain relate, i.e., with a difficult aspect of the ‘mind-body problem’. This opens huge philosophical questions. Are we reducing the mind to the brain, are we explaining away the mind, or are we merely correlating mind and brain? And if we are merely correlating them, what is the causal basis of this apparently compulsory correlation? Is the relationship hierarchical, whereby psychoanalysis studies mere epiphenomena of the brain? Or is the mind an
emergent property of the brain? (See Solms 1997a or Solms and Turnbull 2002, 45–66 for a basic review of these issues.) It is, of course, terribly important in this field to be clear about one’s conceptualisation of the relationship between the mind and brain. We favour a conceptualisation (shared by Freud) which we think neuro-psychoanalysis as a whole may be based upon. We call this approach ‘dual-aspect monism’ (see Solms 1997a or Solms and Turnbull 2002, 56–58). In what follows we will explain this concept in relation to Freud’s ideas.

In Some elementary lessons in psychoanalysis (1938) Freud says, very clearly in many places, that the actual nature of the mind is unconscious (see Solms 1997a for review). He uses the phrase “the mind [...] in itself” [das Psychische an sich] (S.E. XXIII, 283, transl. mod.), sometimes, as in The Unconscious (1915), referring directly to the philosophy of Kant (S.E. XIV, 171). For Kant, our subjective being, the thing we perceive when we look inwards, is not the mind in itself; the mind in itself cannot be perceived directly. We can only know the mind via our phenomenal consciousness, which provides an indirect and incomplete representation of the mental apparatus and its workings. The actual ontological nature of the mind is something epistemologically unknowable; it necessarily lies behind (and generates) conscious perception. We can, of course, infer its nature from our conscious observations, and thereby ‘push back’ the bounds of consciousness, which is what the psychoanalytical method seeks to do. Ultimately, however, we can never directly know the mind itself. We must therefore have recourse to abstractions, derived from inferences and built into figurative models: in a word, metapsychology (see S.E. XXIII, 158–159).

Similar epistemological limitations hold for the theoretical abstractions of other branches of psychology to the extent that they too attempt to describe the inner workings of (any aspect of) the mind. This applies to even highly developed theories such as, for example, dual-route reading models (Coltheart et al. 1993), models of multiple memory systems (Schacter 1996; Schacter et al. 1998), models of divergent visual systems engaged in perception and action (Milner and Goodale 1993), and so on. All of theoretical psychology is ultimately just model-building of one sort or another. It is only the scale of Freud’s metapsychology that distinguishes it in this respect, from the more narrowly focussed models of cognitive psychology and neuroscience. It is also (partly) for this reason that Freud’s metapsychology lacks some of the specificity of modern cognitive models. But that has no bearing on their ultimate epistemological limitations.

In Some elementary lessons in psychoanalysis, Freud not only argued that the mind is epistemologically unknowable, but also that it is ontologically no different to the rest of nature (S.E. XXIII, 283). Kant’s view was that everything in the world as we know it, including the contents of our external awareness, is only an indirect representation of reality. What scientists do is probe beyond this perceptual data to try to get a better picture of what Freud in his Outline of psychoanalysis called “the real state of affairs” (S.E. XXIII, 196). This approach, we note, is common to all the natural sciences—often with the use of artificial perceptual aids such as microscopes and telescopes and spectroscopy machines. They are ultimately all reduced to building models of our natural universe, and in this way, the mind in itself exists
on the same ontological plane as the rest of nature; it is just one of the things that we perceive.

It is unquestionably significant that selective evolutionary pressures advantage organisms that develop better, that is, more accurate models of reality. In a world without vision, the first animals to evolve organs of sight would be highly advantaged. Those that develop better vision, for example, binocular viewing capabilities, a lens with adjustable focus, low light detection capacities for twilight conditions, etc., are further advantaged (Dawkins 1998). Moreover, those organisms that develop multiple sensory organs, each probing and sampling (and ultimately representing) a different aspect of the world around them are still more favoured. Considered across evolutionary time, organisms have, on this basis, developed successively better perceptually derived models of reality. Thus, the human mental apparatus (if functioning normally) delivers remarkably effective capabilities for perceptually guided locomotion, action, navigation, attentional selection, object identification and object recognition. However, the fact that the perceptual systems offer only representations of the world can readily be demonstrated by the remarkable errors seen in visual illusions, as well as in psychotic hallucinations and dreams.

Freud (1938) argued that the model-building of physics is no different in principle to what we do in psychoanalysis: We begin with perceptions of our inner state and then we make inferences about the true nature of the things that determine those perceptions. Our phenomenal consciousness gives us the impression that things are (from an external perspective) visual or auditory, or that things make us (from the internal perspective) sad or hungry, but these things are all merely qualities of consciousness. Our science, like all others, then strives to abstract ‘the real state of affairs’ that lies behind them. Freud formalised all of this in his conceptualization to the effect that consciousness has both internal and external ‘perceptual surfaces’ (Solms 1997a; Solms and Turnbull 2002, 18–31). The difference between psychoanalysis and the physical sciences is merely the perceptual surface that we use.

Behind both perceptual surfaces lies something else (‘reality itself’), of which we can only build abstract models. Forming better models of reality itself constitutes the goal of all science, including psychoanalytic science. This may come as a surprise to those who have forgotten the origins of psychoanalysis, but for Freud his discipline had always been a natural science, identical in principle with the other basic sciences of physical reality, such as physics and chemistry. The mind in itself is therefore not ontologically different from, and not distinct from, the rest of the universe. In sum, Freud was a monist from 1900 all the way through to 1939. But his philosophical position can perhaps best be described as that of a dual-aspect monist (Solms and Turnbull 2002, 56–58) because he recognised, in Some elementary lessons in psychoanalysis, that “[t]he psychical, whatever its nature may be, is in itself unconscious and probably similar in kind to all other natural processes of which we have obtained knowledge” (S.E. XXIII, 283). He was also a follower of Spinoza (cf. Damasio 2004), and, indeed, in his correspondence he speaks highly of Spinoza (see Damasio 2004, 260 for an accessible survey), while in his published work he regularly describes his position in Kantian terms (see Solms 1997a, 687–689).
If the mind, in itself, is unknowable, and we can only describe it with abstract models, such as Freud’s model of the ‘mental apparatus’ [Seelenapparat], then we must take full advantage of the fact that our mental apparatus can be perceived in two different ways. If we look at it with our eyes (via the external perceptual surface), we see a brain: wet, gelatinous, lobular, and embedded within the other tissues of the body. If we observe it with our internally directed perceptual surface, introspectively, we observe mental states such as thirst and pleasure. If we accept this philosophical approach, it naturally follows that we would want to make use of both points of view when it comes to our object of study. Why would we want to exclude, a priori, a full half of what we can learn about the part of nature that we are studying? In psychoanalysis, we adopt the viewpoint of subjectivity because there are things that one can learn about the nature of the mental apparatus from this perspective, which one can never see with one’s eyes, no matter how much scientific instruments might aid them. The philosophical position taken by some other scientists (see Solms 1997a for the opinions of Francis Crick, Daniel Dennett and Gerald Edelman, for example) does exclude this subjective perspective. But feelings exist. They are no less real than sights and sounds and represent a fundamental part of the mind. They can also teach us a great deal about how it works. To exclude them tout court makes no sense at all.

When we study the mental apparatus in its physical manifestation (i.e., the brain), the information we can glean with our external sense organs is, of course, no less important. From a scientific point of view, there are a great many advantages connected with the study of physical objects. Some of our psychoanalytic colleagues (e.g. Blass and Carmeli 2007) hold a contrary and exclusionary position that we struggle to understand, not least because it seems irrational to deny oneself a source of useful data. Moreover, we ought to remind ourselves that the singular, fleeting and fugitive nature of conscious states bestows distinct disadvantages; the more stable properties of the physical brain are more amenable to the requirements of scientific method. Nevertheless, we reiterate that if one correlates subjective experiences with the ‘wetware’ of neurobiology, we are in a much stronger position to develop an accurate model of the mental apparatus itself. Thus, as with the moral of the blind men and the elephant, viewpoint-dependent errors are minimised. Neuroscience offers a second perspective on the unknowable ‘thing’ that we call the mental apparatus, the thing that Freud attempted to describe for the first time in his metapsychology.

To be sure, some people in the field of psychoanalysis have become anxious about how they might need to change their theories and perhaps even their practice due to advances in knowledge that stem from these neuropsychoanalytic correlations. As the saying goes, there are none so blind as those who will not see. Paradoxically, however, the interest for us personally has always gone more in the opposite direction. In our early careers as neuroscientists, we became frustrated with how little we were able to learn about the essential nature of the mental apparatus and the lived life of the mind with methods and theories from cognitive neuroscience that were available to us in the early 1980s. At that time, neuroscience appeared to be blind to the fact that the brain was also a sentient being capable of experiencing itself with
feelings, will power and a sense of agency. The fact that these brain ‘mechanisms’ are endogenously driven and motivated, that they arise out of the embodied nature of the subject, substantially affects the way the apparatus operates. We feel that these are not epiphenomena, or details, or nice-to-haves, they are fundamental characteristics of how the brain works; they are what distinguishes the brain from the lung.

2.3 Scientific Foundations of Neuropsychoanalysis

The empirical basis for the discipline logically follows from the facts described in the first section of this article and from the fact that Freud lacked confidence that neuroscience would be capable of responding to questions posed by psychoanalysis in his time.

What has changed in the last few dozen years? First, there have been many technical and methodological advances in neuroscience that we reviewed here already. These in turn led to major advances in our understanding of the mind and its workings, most notably in the wake of abandoning behaviourism and the use of cognitive models. Thus, the last half-century has seen a dramatic advance in our understanding of episodic memory (Scoville and Milner 1957), visual attention (Posner et al. 1982), executive control (Shallice 1988) and visually guided action (Milner and Goodale 1993), to mention but a few relevant examples. However, as we have suggested elsewhere (Turnbull and Solms 2007, 1083–1084), these findings in cognitive neuroscience have limited implications for psychoanalysis. Of potentially greater importance are developments in the last two decades in the domain of affective neuroscience (Damasio 1994, 1999, 2011; Le Doux 1996, 2000; Panksepp 1998; Panksepp and Biven 2012; Turnbull and Solms 2007, 1084–1085). Significant advances in neuropsychology have also been very important, the outstanding example being the discovery of ‘mirror neurons’ (Rizzolati et al. 1999). Finally, one should not overlook the many developments in psychoanalysis itself in the last century. Probably the most important of these is the line of ‘ethological’ work on attachment, separation, and loss, beginning with Donald Woods Winnicott (1960), then through Harry Harlow (1958) and John Bowlby (1980), to Mary Ainsworth (Ainsworth et al. 1978) and Peter Fonagy (Fonagy et al. 1991; Fonagy and Target 1996).

Still, individual developments in either of neuropsychoanalysis’ ‘parent’ disciplines do not themselves bridge the divide between the fields. There have been a number of bold attempts at such bridging through the decades. The work of Paul Schilder (2007), Mortimer Ostow (1954, 1955; see also Turnbull 2004) and Edwin Weinstein (Weinstein and Kahn 1955) serve as beacons in this regard. Unfortunately, none of these earlier attempts flourished into the full-fledged inter-discipline we enjoy today, in part, perhaps, because each of these early attempts ran into the same difficulties (of means, motive and opportunity) that Freud encountered (see Turnbull 2001 for an interview with Ostow on this topic).
In retrospect, one of the most central limitations may have been the lack of a well-developed dynamic neuropsychology. As Freud wrote, both as a neurologist and a psychoanalyst, what the localizationist neuropsychology of his time lacked was any understanding of the dynamic nature of the mental process (see Solms and Saling 1986). This only fully emerged in the 1970s, especially through the efforts of Luria (1966, 1973; see Kaplan-Solms and Solms 2000, 26–43 or Solms and Turnbull 2002, 25–27 for review). The second transformational shift occurred with the development of affective neuroscience in the 1990s (Panksepp 1998; Damasio 1994, 1999), which finally aligned neuroscience with topics that are of fundamental interest to psychoanalysis. This change allowed the disciplines to share findings not merely in relation to cognition but also in the core psychodynamic domains of emotion and instinctual drive.

The bridge-building work that catalysed our own present work in neuropsychoanalysis began with us conducting relatively conventional psychoanalytic investigations on neurological patients (Kaplan-Solms and Solms 2000). Why did this prove to be such a seminal approach for neuropsychoanalysis? In the first place, it involved a clinical method, which picked up directly from where Freud left off. The method requires relatively modest changes in working practice, and little additional training on the part of a psychoanalyst, and yet it gives direct access to the subjective mental life of the (neurological) patient in precisely the same way that psychoanalysts traditionally gather data about psychiatric (or ‘normal’) patients. This ensures that we can make direct observations concerning the neural correlates of metapsychological concepts in a methodologically valid setting. All of our metapsychological concepts and theories about the structure and functions of the mind are operationalised in a clinical psychoanalytical setting. Analytic work with neurological patients is therefore an ideal way of ensuring that we are studying the same ‘things’ that Freud studied, albeit from a neurological perspective.

We would like to add a further reason why clinical work in neuropsychoanalysis is best performed with neurological, rather than psychiatric patients. This is due to the methodological advantage of working with patients with focal brain lesions. Firstly, such patients are pre-morbidly ‘typical’ examples of humanity. As a population, they have none of the potentially confounding issues of aberrant development attached to psychiatric disorders (Bentall 2003, 2009). Secondly and most importantly, it enables us to correlate our psychoanalytic inferences with definite neuroscientific ones. Structural neurological lesions provide infinitely more precision than do psychopharmacological manipulations, given all the interactive vagaries of neurotransmitter dynamics. Moreover, by virtue of advances in structural imaging, it is possible to identify the neural basis of the clinically observed phenomena in neurological patients with a high level of scientific accuracy—a method well-suited for establishing clinico-anatomical correlations (Heilman and Valenstein 1979; Kertesz 1983; Kolb and Whishaw 1990; Lezak et al. 2004). In sum, having researched small populations of neurological patients (Kaplan-Solms and Solms 2000), we have developed a method that offers a respectable degree of experimental control, a reasonable degree of neuroanatomical localization, excellent
construct validity and a direct observational window into the subjective life of the brain in a fairly naturalistic setting.

On the basis of this approach, we have been able to build a preliminary picture of how our most basic metapsychological concepts might be correlated with brain anatomy and with all that we know on the functional organisation of the brain. To take one example, in the book Clinical Studies in Neuro-Psychoanalysis (Kaplan-Solms and Solms 2000) we describe psychoanalytic observations on a small series of patients with right parietal lesions. They exhibited a remarkable degree of self-deception, in that they were paralyzed (on the left side) but insisted that they were not paralyzed. In some cases, they explained away their paralysis through transparent rationalisations (“I tired the arm out this morning doing exercises”), or they developed more complex delusions, such as claiming that the paralyzed arm does not belong to them but to the examiner or to a close relative (for examples see Aglioti et al. 1996; Feinberg 2001; Ramachandran and Blakeslee 1998). Cognitive neuroscientists have traditionally explained these remarkable clinical phenomena in terms of simple cognitive deficits (i.e., damage) to inferred cognitive ‘modules’ (for review, see Nardone et al. 2007; Turnbull et al. 2002, 2005). When we studied these patients psychoanalytically, however, we observed a pattern of psychological phenomena that was not at all modular in nature, and which was not by any means accurately defined as ‘deficit’. What we observed were dynamic interactions, in which the primary forces clearly revolved around emotional states. Moreover, these emotionally determined dynamics rendered important aspects of the cognitive processes unconscious. By psychoanalytically intervening in these dynamics, it was possible to reverse the dynamic process in question and return the repressed cognitions to consciousness. This empirically demonstrated the validity of our conclusions and required students of this clinical phenomenon to radically reconceptualise its nature. As Ramachandran once humourously said: ‘Of course anosognosia is a defence; it is just that neuroscientists were in denial about it’!

Our conclusion was that self-deception in right parietal lobe damage was attributable to narcissistic defensive organisations, such that the patients avoided depressive affects by using a range of primitive defence mechanisms. This regression to narcissism appeared to be attributable to a loss of capacity for whole object relationships (Kaplan-Solms and Solms 2000, 148–199). These patients also appeared to have disrupted cognitive processes that nevertheless represent space correctly, as acquired through normal development. These findings therefore confirmed the relationship between realistic spatial representations (of self/object boundaries) and the maturation of object relationships. It also established the neural correlate of what we call ‘whole object’ representation, the metapsychological foundation of mature object love.

However, while this approach of applying clinical psychoanalytic methods to the study of neurological patients has many strengths, it also has limitations. Because clinical observations necessarily involve limited experimental control and are open to confirmation bias (Kahneman 2003), it is a relatively weak method for determining the precise causal mechanisms involved. Experimental studies based on these purely clinical observations were thus employed to provide fuller empirical support and
refinement of the above hypotheses. A series of publications (Fotopolou et al. 2004, 2008a, b; Nardone et al. 2007; Tondowski et al. 2007; Turnbull et al. 2002, 2005) have now conclusively demonstrated the powerful influence of emotions and unconscious cognitions (and associated defensive processes) in the neurodynamics that underpin the false beliefs of right parietal patients. These lines of work have been an important contribution to behavioural neurology, taking forward the ideas generated in neuropsychoanalysis beyond our own sphere of interest. As a result of these efforts, a psychoanalytical point of view is now included in conceptualisations of these phenomena in mainstream neuroscientific journals, and the influence and contribution of psychoanalysis to the neurosciences are spreading, apparently for the first time in history.

Simultaneously, psychoanalytical observations on how the mind is altered by damage to different parts of the brain has enabled us to begin to build up a coherent model of how the mental apparatus, as we understand it in psychoanalysis, is manifested in anatomy and physiology, providing what we might call a new ‘physical’ point of view in psychoanalytic metapsychology. By using multiple converging methods, we have made especially remarkable progress with regard to the psychoanalytic theory on dreams (Solms 1997b, 2000, 2011). For example, we have demonstrated that dreams are motivated by instinctual mechanisms and appear to protect sleep (see Solms 2001). It has been gratifying to rediscover the Freudian conception of dreams in the neurodynamics of the sleeping brain. Indeed, in 2006, at the ‘Science of Consciousness’ Conference in Tucson, Arizona, a formal Oxford-Rules debate (Solms vs. Hobson) on the contemporary scientific validity of the Freudian conception of dreaming resulted in a two to one vote in our favour. While such renewed demonstrations of confidence in our most basic theoretical propositions may be regarded as merely sociological phenomena, they are significant for the future viability of our discipline.

2.4 What Neuropsychoanalysis Is Not

Up to now we have described what neuropsychoanalysis is in terms of its historical foundations, philosophical premises and empirical underpinnings. We turn now to what neuropsychoanalysis is not by defining some boundary conditions.

The first boundary is a methodological one. We have especially recommended the clinico-anatomical method of making direct psychoanalytical observations on patients with focal brain lesions in a clinical setting. However, this is just a starting point. We have pioneered an example of how such clinical observations can be extended by using experimental neuropsychological tools. We have also already alluded to the multiple converging methods that were used to establish the neural organisation of dream psychodynamics. But numerous other approaches are possible. Thus, to take a relatively extreme instance, one might manipulate different neuropeptides in research participants who are themselves psychoanalysts and then have them describe their subjective states, using their expertise in doing so.
(i.e., with reference to the theoretical concepts that we use). Approaches such as this are rather radical, but have huge potential, and appear to be remarkably underappreciated. To take a less radical example, why do we not have systematic psychoanalytical studies on the manipulations of the different classical neurotransmitters that psychopharmacologists regularly tinker with in conventional psychiatric settings (c.f. Kline 1959; Ostow 1962, 1980; Ostow and Kline 1959)?

Other psychoanalytically informed neuroscience comes from the use of neuroimaging methods, for example, for the study of Freud’s theory of mourning (Freed et al. 2009), psychodynamic aspects of confabulation (Fotopolou et al. 2004, 2008a, b; Turnbull et al. 2004a, b) or tests of Freud’s dream theory (Solms 1997b, 2000). We might wonder, of course, whether work of this sort can legitimately be called ‘neuropsychoanalysis’, given that the data collection occurs using merely neuroscientific and psychological, rather than psychoanalytic, methods. Such work might best be described as psychoanalytically informed neuroscience. But who cares? On balance, we prefer to take the ‘broad church’ approach to this issue, such that neuropsychoanalysis represents all work that lies along the psychoanalysis/neuroscience boundary; it may at times involve psychoanalytically inspired neuroscience (which uses purely neuroscientific methods to test psychoanalytically informed hypotheses) and at other times the direct psychoanalytical investigation of neurological variables (brain injury, pharmacological probes, deep-brain stimulation, etc.). What unites these approaches is that they are attempts to do neuropsychoanalytic research, as opposed to another way of doing ‘neuropsychoanalysis’ that relies entirely on speculative imaginings, transpositions and guesses. The classic instances of this arise from psychoanalysts who read something about the latest developments in the neurosciences and observe that the new findings are vaguely reminiscent of such and such a phenomenon or theory in psychoanalysis. They then claim that this or that neuroscientific finding discloses the biological correlate or underpinning of some aspect of psychoanalytic theory. In our view ‘armchair’ speculation such as this does not represent the way forward for our field. The last century saw more than enough speculation in psychoanalysis, which resulted in the formation of multiple ‘schools of wisdom’ but remarkably little scientific progress. There is only one way to decide between theories and that is to test them against reality in such a way that the alternative predictions can be either confirmed or refuted. His Project for a Scientific Psychology/Entwurf einer Psychologie in 1895 was a notable early instance of such speculative guesswork, which is why Freud himself so strongly resisted its publication, describing it as an ‘aberration’ [Abirrung] (S.E. I).

One further instance of what neuropsychoanalysis is not deserves mention here. Neuropsychoanalysis not, in our opinion, a ‘school’ of psychoanalysis in the way that we currently speak of Freudian, Kleinian, Intersubjective and Self Psychology schools. Neuropsychoanalysis, we feel, is far better conceptualised as a link between all of psychoanalysis and the neurosciences. Otherwise, it might be described as an attempt to insert psychoanalysis into the neurosciences, as a member of the family of neurosciences, namely, the one that studies the mental apparatus from the subjective point of view.
Lastly, we would like to make it clear that neuropsychoanalysis (or neuroscience in general) is not a final ‘court of appeal’ for psychoanalysis. Psychoanalysis cannot look to any other science to tell it what errors it may have made in its methods, theory and practice. This is not to say that neuroscience brings no information to bear on what may have been erroneous or misleading paths in psychoanalysis. To take one powerful example, there is abundant evidence in neurobiology for the existence of what we refer to as ‘drives’ (Panksepp 1998; Pfaff 1999; Rolls 1999). For some students of psychoanalysis, drive theory has been rejected as outmoded and inappropriate (Kohut 2009; Siegel 1996). Do these neuroscientific observations invalidate this conclusion in psychoanalysis? They may not, but they are highly relevant. It may be that the term ‘drive’ is used in a quite different way by the psychoanalytic and neuroscientific communities (Fotopoulou et al. 2012). Or it may be that the concept of drives is more relevant to some aspects of mental life than others. Or perhaps it may be that it is only the psychoanalytic taxonomy of the drives that needs revision. Other interpretations are also possible. Nevertheless, it seems appropriate that the psychoanalytic community looks at the data again that led it to reject Freudian drive theory and investigates whether drives may play a more substantial part in mental life than it had previously thought. But this is not the whole story; it is merely the beginning. Once we have started to ask ourselves these questions, based on our reading of the current state of drive theory in neurobiology, we must test their conclusions using our own psychoanalytic techniques. This is bound to lead to new observations, not only of psychodynamic phenomena or continuities that we had not noticed before but also of possible limitations or errors in the neuroscientific conceptions at issue. It is, after all, more than possible that behavioural neuroscientists might have missed something important about the drives, deprived as they are of almost all the data of subjective experience.

Thus, in our opinion, the interface between psychoanalysis and neuroscience is a rather dialectical one. As analysts, we may learn something new about the brain that seems relevant to psychoanalysis. We may think about it, keep it at the back of our minds, entertain the possibility, but above all we test it psychoanalytically as well as investigate its clinical usefulness. In this way, the final court of appeal for psychoanalysis remains the psychoanalytic setting—psychoanalytic observations made on real human beings in the conventional clinical situation. A similar argument might, in principle, apply to the neurosciences, though, of course, they should and would never look to psychoanalysis as their final court of appeal. The risk of reductionism always seems to go in the direction of the physical, which is itself an interesting neuropsychoanalytical phenomenon. But neuroscientists today are looking to psychoanalysis for interesting observations and theories, which they are increasingly applying to their work. They also quite naturally adopt them where they seem appropriate (Feinberg 2001; Fotopolou et al. 2004, 2008a, b; Ramachandran and Blakeslee 1998; Turnbull et al. 2002, 2004a, b) and then move on.
2.5 The Future

In the sciences there is a long history of remarkable creativity at the boundaries between disciplines as for example in molecular biology (Watson and Crick 1953) or in cognitive neuroscience (Bowman and Turnbull 2009). Consistent with this, our interdisciplinary field has already opened rich veins of new enquiry. Doubtless this will continue to occur and do so in unpredictable ways. Nevertheless we would like to sketch a general outline of how we hope the field will develop.

Our vision involves the collaborative investigation of phenomena that have a common interest and are approached using a level of rigour associated with all good scientific enquiry. But these investigations must also respect the methodological tools (with all the advantages and disadvantages) associated with each distinct field. It would be a shame if neuropsychoanalysis were to become an armchair activity or a field based on speculation rather than empirical work, a field in which the acquisition of knowledge is unidirectional (i.e., neuroscience only informs psychoanalysis and not vice versa), a discipline that studies scientific phenomena that are only nominally psychoanalytic but lacks the deep respect for the subjective perspective, which is the hallmark of psychoanalysis.

We are confident that this will not happen. For, as Freud told Einstein 83 years ago, “There is no greater, richer, more mysterious subject, worthy of every effort of the human intellect [menschlichen Intellekts], than the life of the mind [das Seelenleben]” (Freud 1929, 110).

References


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