

From Mathematics to Psychology: Lacan's missed encounters

Introduction

Throughout the entire length of Jacques Lacan's corpus there runs an ongoing enquiry into the relationship between psychoanalysis and science. This enquiry addresses two interconnected issues:

- (a) The sense in which psychoanalysis may be considered a science;
- (b) The nature of science in the light of psychoanalysis.

There is a potentially problematic circularity involved here concerning the legitimacy of making pronouncements about science from the perspective of a discipline that wonders whether or not it itself should be considered a science. Of course not all circles are vicious—some of them turn out to be virtuous. In this essay we shall be examining the nature of this circle for Lacan.

Members of the Vienna Circle had encountered a similar circularity: If the only sentences that are meaningful are either particular observation statements (e.g., "I perceive at this particular time that particular shade of blue in this particular part of my visual field") or general scientific laws that are reducible to a set of such particulars, the rest being contentless analytic truths or meaningless metaphysical chatter, under which category were their own writings to be classified? Either their brand of philosophy was to be counted as part of the empirical sciences, or it was merely the logical consequences of tautologies and definitions, or else it was to be dismissed as meaningless. The grounding that scientific knowledge enjoyed did not seem to be available to the study of that grounding. One of the most influential American philosophers, Willard Quine, extracted himself from this bind by arguing that philosophy ought to become *naturalised*, i.e., to become an integral part of science itself. But in so doing he denied that science was founded on a base of certain empirical knowledge, but rather that it took the form of a web of beliefs on which the world could impinge only indirectly. This, together with Thomas Kuhn's portrayal of the history of science as the rise and fall of a sequence of incommensurable world views, encouraged a relativism towards science which forms the battleline for much of Anglo-Saxon philosophy of science today.

The Logical Positivism of the Vienna Circle did not prevail in France, where a vision of science held sway which was informed by the likes of Alexandre Koyré, the historian/philosopher of science Lacan most closely followed. For Koyré the defining aspect of the revolutionary rise of European science during the seventeenth century was the injection of mathematics into the natural sciences, inspired by a radical change in the philosophical climate towards a Platonist rationalism after centuries of Aristotelianism. Koyré was notable for his forthright rejection of empiricism ("c'est la théorie qui constitue la science"), arguing,

for example, that Galileo's "experiments" were most likely never carried out and in all probability would not have worked. Historical analysis and contemporary reruns of these experiments have revealed this view to be wrong, but without lending support to the extreme empiricism of the Vienna Circle and the Anglo-Saxon philosophers they inspired. Again, Koyré's representation of seventeenth century science as arising out of a radical philosophical break with Scholasticism has been challenged by historians who have found clear evidence of continuity with the past in the writings of Galileo, Descartes and Newton. These findings (see Redondi (ed.) 1987) should prompt us to question those aspects of Lacan's philosophy of science he held in common with Koyré.

Lacan's enthusiasm for mathematics will be the subject of the first part of this essay, where I shall discuss his claim that science aims at the *Real* by means of mathematisation, along with the further claim that psychoanalysis can do likewise. In the process I shall adopt a critical position towards Lacan's attempts to introduce various formalisms into his psychoanalytic theory. One might respond to this by granting the justice of such criticism while making little of it by taking the mathematics to be a side-show, a minor distraction from a wealth of rich clinical intuitions and important theoretical insights. However, the ingrained nature of this mathematising tendency suggests that, at the very least, were one to ignore it, the task of extracting a systematic theoretical position from Lacan's work rather than a fragmented collection of ideas will be made all the harder.

It is no easy task to attain a clear overview of Lacan's philosophy of science. One approach would be to trace Lacan's intellectual debts in order to fit him into a sustained line of argument. However, for whatever reason, his intellectual ancestry has yet to receive the requisite scholarly treatment. Having said this, though, along with Koyré one should certainly also mention Émile Meyerson. For Meyerson scientific theorising achieves some kind of destruction of reality. Put more prosaically, science flourishes without there being an awareness that what is essentially real about the world is that which evades scientific explanation.¹ Read liberally, we might take Lacan to be arguing along similar lines with his idea that science involves a form of denial, a *not-wanting-to-know*, which he likens to the psychotic's *foreclosure*. Lacan suggests that a condition of the success of the natural sciences is this not knowing. But what then of a scientific psychology? Having the *psyche* as its object, mustn't it take into account the conditions under which it produces itself as knowledge, and yet as a part of science not care to know them? For Lacan psychoanalysis succeeds where

¹ See Meyerson 1932. The two Anglophone philosophers of science most sympathetic to Meyerson are perhaps Thomas Kuhn and Elie Zahar. Kuhn (1977: 11) recommends that one read Meyerson for his historical material but not for his philosophy, while Zahar (1987) reconstructs this philosophy in a more empiricist light, allowing a much stronger link between theory and physical reality. Even so, one would have to place Zahar at the rationalist end of the spectrum of Anglophone philosophy.

psychology fails as only psychoanalysis reintroduces the *Name-of-the-Father* into scientific consideration. In the second part of the essay I shall explore this cluster of themes.

Lacan's attempt to mathematise psychoanalysis

It is clear from reading his papers of the 1950s that Lacan intended his version of Freudianism to be a science, one which took its lead from a vision of science as mathematised rather than as experimental. From these papers, 'The Rome Discourse' in particular, you can sense his excitement that at last it was the turn of the human sciences to allow for formalisation. Lacan retained the widely held distinction between the human and natural sciences, preferring the epithet 'conjectural' to that of 'human',² but in so doing he was not to follow the tradition, which has led from Dilthey to Habermas, where the human sciences are seen to produce explanatory and descriptive narratives, in contrast to the formal models for control and prediction created by the natural sciences. Instead, we find calls to mathematise psychoanalysis, as indicated by the following claim:

...the mathematical formalization that inspired Boolean logic, to say nothing of set theory, can bring to the science of human action the structure of intersubjective time that is needed by psychoanalytic conjecture if it is to ensure its own rigour. (1966/70, 75)

Psychoanalysis, at this point in the early 50s, was to be the science of intersubjective time,³ serviced by the new mathematical branches of stochastics and game theory. And when 'intersubjectivity' departs from the scene during the late 50s with the introduction of the *objet a*, the drive to mathematise remains and if anything strengthens through the rest of Lacan's career. This persistent belief in the relevance of mathematics to the human sciences has not been widely shared.

An enormous amount has been written on the status of the sciences, so that one can only touch on a few aspects of the debate. In the Anglophone world, most philosophers of science have held up physics as the quintessential science, the core of what they hope will turn out to be a unified science. Physics at its best is seen as achieving radical reconceptualisations of its domain, after which a common outlook is brought about by weight of evidence. In this regard, disciplines such as sociology, characterised by major disagreements over fundamental concepts, do not fit the bill at the present time. This lack of consensus makes the human sciences problematic even for a thinker like Thomas Kuhn who, at his most radical, notoriously challenged the view that theory selection in natural science is a rational affair. At best, then, the human sciences are taken as sciences-to-be.

² According to Karl Popper, one of psychoanalysis's many critics, all of *natural* science is conjectural, i.e., one never has certain knowledge.

³ The idea that intersubjective time as distinct from ordinary clock time is the one appropriate to the unconscious was behind Lacan's decision to introduce variable length sessions.

Continental philosophers, on the other hand, have not taken physics as the paradigm for all valid forms of knowledge, but have maintained a sharp distinction between what is to be hoped for from the natural and human sciences. Prior to the outbreak of postmodernism their strategy had often been to leave the methodology of the natural sciences to one side as unproblematic, while seeing it as having limited scope and as being unsuited to the study of human concerns. Foucault distinguished the human sciences from mathematics, cosmology, and physics, which he describes as “noble sciences” where, unlike with economics or philology,

one can observe in their history the almost uninterrupted emergence of truth and pure reason. (1970, p. ix).

Habermas (1970) distinguishes between a ‘causality of nature’ and a ‘causality of fate’, reserving the latter term for the type of causal connection to be found in the human sciences, of which psychoanalysis is a key example. While natural scientists can employ the causal links they have discovered and knowledge of the causing event to control material bodies or predict physical phenomena, to operate in the realm of the human sciences is to provide an understanding of the relevant determining mechanisms with a view to bringing about an emancipation from them. Rather than act on the cause of suffering, psychoanalyst and patient strive to dissolve by interpretation the causal links themselves which have produced the latter’s symptoms.

There thus emerged a curious consensus among a majority of Anglo-Saxon and Continental philosophers as to the largely unproblematic nature of the acquisition of knowledge in the physical sciences, while disagreement about the epistemological status of the human sciences. However, important work in the social history of science since then has prompted various philosophers to play down the sharpness of the dichotomy. From this recent perspective, explanatory narratives occur in the natural sciences and confirmable predictions may occur in the human sciences. Mary Hesse, for example, argues that each side has exaggerated the differences and favours a continuum (Hesse 1980, Ch. 7). This suggestion becomes plausible when one considers the more descriptive natural sciences such as palaeontology, and the more predictive human sciences such as economics. The human sciences, archaeology especially, also rely on many techniques borrowed from the natural sciences.

Even if physicists are not straightforwardly uncovering the truth, the use they make of mathematics in their field is unparalleled. Indeed, a large amount of the mathematics we have today was and continues to be motivated by problems arising in physics. Applications of mathematics come with a kind of ranking, where the use of statistics is counted as low level, qualitative modelling via a system of differential equations (as, for example, in animal

population studies and in economics) belongs to an intermediate level, and the highest level is reserved for, say, the use of algebraic geometry in code-making or of differential topology in theoretical physics. Other uses of high-level mathematics occur in engineering disciplines and theoretical computer science. While there is a general desire that branches of science will climb this ladder, hopes for the mathematisation of, for instance, biology, have only partially been realised. For sociology and psychology, little seems to have been achieved beyond the statistical stage and even this achievement is questioned by those who see artificial quantification occurring. What then, we may wonder, gave Lacan the right to imagine that he could ‘jump the queue’, as it were, and model the dimensions of our being as the components of a Borromean link?⁴

The desirability of mathematising psychoanalysis followed, for Lacan, from his idea that, because mathematical discourse was void of meaning, only in this way could psychoanalytic theory become wholly transmissible.⁵ Mathematics, etymologically linked to the verb ‘to learn’, was to provide the means for an uncorrupted transmission of the radical elements of Freud’s discovery of the unconscious, which had gone unrecognised or been distorted by successive psychoanalysts.

It is true that mathematics is indispensable to physics and that no deep understanding of physics is possible without a solid grasp of the relevant mathematics. But where any proposed mathematical modelling of a portion of physical reality must submit itself to a very demanding examination, no indication was given by Lacan as to when the introduction of particular pieces of mathematics into psychoanalytic theory might be counted as warranted. Lacan’s topologized psychoanalysis may be thought of as ‘bold’, but this is certainly not in Karl Popper’s sense of the word. Popper’s advice to scientists was to produce bold, precisely formulated conjectures, i.e., ones which could be subjected to severe testing. While Popperian falsificationism has few adherents today, philosophers of science have not strayed so far away that, if they came to look at Lacanian theory, they would not concern themselves with what to count as evidence for the idea that the dimensions of our being are tied in Borromean fashion.

It is possible that the conjectural scientists’ attempts to schematise mathematically their domain should be judged differently from those of the natural scientists. But if so, then how? The problem here is that, leaving aside the infelicitous use of mathematical language drawn to

⁴ For Lacan the Borromean link, three circles linked together in such a way that no two alone are linked, represents the relationship between the three dimensions: the Real, Symbolic and Imaginary.

⁵ “...nous l’apprécions [mathematical discourse] au plus haut degré de ce qu’il ne signifie rien.” (1966: 892), (we admire mathematical discourse to the utmost degree in that it does not mean anything.) and “La formalisation mathématique est notre but, notre idéal. Pourquoi? - parce que seule elle est mathème, c’est-à-dire capable de se transmettre intégralement.” (Lacan 1975: 108) (Mathematical formalisation is our goal, our ideal. Why? Because it alone is matheme, that is, able to transmit itself wholly.)

our notice by Sokal & Bricmont (1997), with no clear-cut successes to ponder, no criteria to decide what constitutes a successful formalisation have been established. Contrary to Koyré's position, the natural sciences are characterised by an interlocking multiplicity of established methodological styles, mathematisation counting merely as one. These styles of research have been made to work to date in situations where aspects of the piece of reality being investigated display sufficient stability and are not overly effected by the actions of the investigator.⁶ Transporting these styles to new domains of enquiry requires either an argument as to why a straightforward transferral might be expected to be successful or an explanation and justification of any modifications introduced. Certainly much of academic psychology may be faulted for an over-enthusiastic use of laboratory-based methodologies which fail to pay due attention to the effects on experimental subjects of their interpretations of the situations in which they are placed, but so may a human science which provides no rationale for its importation of mathematics.

Can one say there has been any success for Lacan's mathematics: the topological spaces of signifiers and jouissance; the golden ratio as demonstrating the incommensurability of the *objet a* and the unary trait; or, the projective plane as the union of the moebius strip and disc, modelling the relation between subject and object in the phantasy? The only prospects of support for a mathematised psychoanalysis lie in shared confirmational clinical experience or in the provision of some kind of theoretical coherence. Both of these are attended by unresolved difficulties: The language in which one might hope to express shared clinical experience seems far removed from that of abstract theory, and the self-confirmatory nature of theoretical coherence has often blinded a theory's proponents to a lack of external support.

The physical sciences are in much better shape. In the 1970s, knot theory, the branch of mathematics inhabited by the Borromean link, had no applications of any note in the natural sciences. Yet only three years after Lacan's death a significant discovery by a mathematician named Vaughan Jones connected knot theory to statistical mechanics, sparking great and continued interest in some quarters of the theoretical physics community. Today there are chemists synthesising knotted molecules, physicists investigating polymer formation, and molecular biologists interpreting braided strands of DNA in knot theoretic terms. Chemists "see" the knots through electron microscopes. Physicists explicate measurable properties of polymers in terms of knotted random walks. While, in the case of the biologists, if knot theory does not help them understand how replicated DNA chains are unlinked by the cutting and

⁶ Quantum mechanics does not present itself as a counter-example to this claim as the interaction between a quantum system and a macroscopic device has been well-modelled theoretically and is controllable, as so many of our technological devices demonstrate.

splicing actions of enzymes, with the promise of a possible mechanism for blocking cancerous growth, their interest will soon diminish.

It is plainly the case that none of Lacan's mathematical gambits has succeeded in the ways they have for natural scientists. A paradigmatic example of the predictive success of mathematical natural science relates to the discovery of the planet Neptune in 1846. Uranus, then thought to be the outermost planet of our solar system, was behaving badly from the point of view of Newtonian mechanics. This deviation from prediction allowed two options. One was to modify the basic laws of the theory. However, by the nineteenth century Newtonian mechanics had been so well confirmed that it was not to be given up so lightly. The second option was to alter the auxiliary hypotheses, that is, everything that needed to be assumed before Newton's gravitational theory could be made to work. One of these suppositions was that there were just seven planets revolving about the sun. Hence two astronomers, Adams and Leverrier, speculated that Uranus' trajectory was being influenced by the attractive gravitational force produced by the presence of an unknown planet. Calculations were made as to the likely whereabouts of this new celestial body and astronomical observations quickly confirmed its existence less than one degree way from the expected spot.

In more radical cases not just new instances of a known type of entity are discovered but new types themselves. A classic example of this arose from Paul Dirac's construction of a field equation for the electron in around 1930. When 'negative energy' solutions to this equation were found, Dirac postulated the existence of companion particles to the electron, bearing an opposite charge. The tracks of these *positrons*, recognised by their being the mirror image of those produced by electrons, were duly produced in bubble chambers by experimentalists. What we find here is the mathematical modelling of an area followed by the opportunity to lean on the mathematics to produce consequences whose interpretation is not known prior to the modelling.

There is a lesson to be learnt from an earlier attempt to model the soul using knot theory. In the 1870s the mathematical physicists Peter Tait and William Thomson (later Lord Kelvin) propounded their idea that atoms were knotted vortex tubes of ether. Both had hopes that the success of their atomic theory would provide ammunition against the encroaching atheistic materialism of that era. For his part Thomson argued that it would require an all-powerful, intelligent Being to set the vortices spinning in the perfect fluid, while Tait prepared a cosmology complete with stratified universe and Holy Spirit organising the life present in each layer. Entities in each layer were composed of vortex tubes of the fluid present in the next higher layer. As he describes in *The Unseen Universe*, souls dwell in layers higher than the one we perceive as reality.

Several prominent clergymen were taken with Tait's vision, but, alas, knot theory could secure no grip on atomic reality. In physics models can survive only so long without success, especially at a time when experimental data was flowing quite so freely as it was in atomic physics in the late nineteenth century. Without that margin of support provided by a plausible physics, the Biblical support for the cosmology was too tenuous to prevent interest in *The Unseen Universe* waning. A fellow physicist James Maxwell gently teased his friend Tait by composing an ode in the manner of Shelley:

My soul's an amphicheiral knot
Upon a liquid vortex wrought
By intellect in the unseen residing,
...⁷

Sadly there was no associate of Lacan's in Paris in the 1970s with sufficient wit to have composed a similar poem in the manner of Aragon, a favourite poet of his.

We can approach the same issue by turning now from psychoanalysis seen as a science to science as seen by psychoanalysis. For Lacan, physics and mathematics with their 'little letters' aim at the Real, the dimension beyond reality, which for him was to be seen as a blend of the Imaginary and the Symbolic orders.⁸ The early discussions of this concept stressed the Real as the ungraspable beyond to symbolisation, i.e., that which resisted symbolisation. The Real was described as *immonde* (not-of-the-world), and also as the 'impossible'. Lacan must here have been drawing to some extent on the idea of Koyré that physics is dealing with the impossible, in the sense that the conditions outlined in the antecedents of scientific laws are never completely satisfied.⁹ For example, Newton's laws may talk about bodies continuing their motion in a straight line at a constant speed if they are not acted on by a net force. However, bodies are never subject to a precisely constant zero net force.

Lacan later refined this notion by differentiating between a pre- and a post-symbolic Real. Not only is there that which resists symbolisation, there is also a Real at the other side of the Symbolic, produced by the advent of the Symbolic order. This idea Lacan illustrated in the field of mathematics by his reading of the incompleteness results of Gödel, where the introduction of a formal language for arithmetic produces the impossibility of a demonstration of its consistency, and in psychoanalysis by the idea of the redistribution of libido brought about by the assumption of the signifier in the body. Enjoyment is drained from the body,

⁷A knot is *amphicheiral* if it is continuously deformable into its mirror image. Hence, the figure-eight knot is amphicheiral, while the trefoil knot is not.

⁸ See Evans (1996) for a discussion of these and other aspects of Lacan's terminology.

⁹ Cf. Koyré 1957.

while at the same time regions of surplus are produced. This latter notion allowed him to propose that psychoanalysis too aims at the Real.

Lacan claimed that mathematicians symbolise the imaginary of the real.¹⁰ This, however, is only the first half of the story. The key issue here is that the process of theory development can be seen to include the completion of a cycle. No doubt the point may be made without recourse to the Lacanian apparatus of the dimensions, but we could say that what follows on from symbolisation may be phrased as the regaining of the imaginary of the real caused by this symbolic. As with Dirac and his positrons, in mathematics and physics there are times when all you have to rely on are the possibilities and impossibilities introduced by your formalism, when the intuitions that guided you to this formalism can no longer assist you. Ideally, a new imaginary grasp will emerge through a developing familiarity with the symbolism.¹¹ Unlike in mathematics and physics, however, this capacity to rely on the symbolism has not yet become possible with the kinds of reduction of psychoanalytic theory to little letters we have seen to date. Lacan never reached the point where his symbolisation could support itself in the absence of an imaginary grasp. It could never provide sufficient guidance to further theory construction. The symbolisation never put up any resistance to its author's intentions, and so his theory has not been able to achieve the kind of liberation from authorship we see in the mathematical sciences. Of course this is not to say that it is necessarily the case that nothing will come out of his *mathemes*, but people should realise that their chances of going beyond the 'useful prop for the imagination' stage are slim.¹²

A branch of mathematics which some psychologists suggest offers an opportunity to model aspects of the mind is dynamical systems theory.¹³ This field has also been on the receiving end of several questionable gestures made by philosophers keen to stress the limitations of modernist science's supposed reliance on linear differential equations. In the field which concerns us, Slavoj Žižek, who has done so much to make intelligible the Lacanian corpus, borrows from the language of non-linear dynamics to describe the *objet a* as a strange attractor (1991: 38). In so doing, however, one should of course not rely merely on the semantic resonances of such a term, which was devised for reasons bearing little relation to the reasons why *objet a* may be thought of as strange or as an attractor. Any proper use should identify a potentially relevant *phase space* and the dynamic equations governing the trajectory of a point in this space. The fact that Žižek then proceeds in a book published the

¹⁰This claim may be found in the unpublished seminar XIX *...ou pire*.

¹¹This point implicitly underlies a paper of mine concerning the limitations of Imre Lakatos's philosophy of mathematics (Corfield 1997).

¹²The efforts of analysts such as Bernard Burgoyne (cf. his chapter in this volume) to do so are still much to be preferred to the unconstrained reproduction and recombination of symbols (J, A, a, \$, Φ, etc.) and arrows which others engage in.

¹³See Port and van Gelder (eds.) (1995).

following year (Zizek 1992) to liken the *objet a* to a photon of light, an impediment, the materialization of the curved structure of the space of desire and a reflectionless vampire, gives the impression that we can expect nothing sufficiently precise from this mathematical allusion.

If, as I am suggesting, Lacan placed too much faith in his little letters, he is not alone. There are countless cases of people being seduced by mathematical symbolism from Cabbalism and numerology to the group theory that never took Lévi-Strauss far in his analysis of kinship structures. A strong case can also be made that Anglo-Saxon analytic philosophy has been similarly seduced, this time by mathematical logic, when, for example, it chooses to pursue its examination of metaphysics through the lens of modal logic. Mathematicians are highly suspicious of such activities as they like to think they know what constitutes a good use of a formal language. One, Gian-Carlo Rota, while ‘doing a Sokal’ on analytic philosophy, likens the situation to watching someone pay for their groceries with monopoly money (Rota 1991).

Psychoanalysis has featured frequently as the target of attempts to demarcate science from pseudo-science. Indeed, it became the subject of a dispute between two prominent philosophers, Karl Popper and Adolf Grünbaum, as to the correctness of each other’s demarcation principles. Each accused the other’s principles of being so weak that they allowed even psychoanalysis to be called a science, when their own of course did not. After such assaults on the standing of their theories from philosophers of science, analysts have been keen to improve the credentials of their discipline. Flirtations with mathematics have been uncommon. Instead, such negative attitudes have prompted many attempts to bolster confidence in psychoanalytic theories by forging links with one or other approach to psychology, deemed to possess some extra degree of scientific credibility. The Lacanians have opted out of this game, maintaining the purity of their master’s message. Let us now consider whether they are preventing the development of useful interdisciplinary research by doing so.

Psychoanalysis, psychology and the Name-of-the-Father

réintroduit

...la psychanalyse est essentiellement ce qui dans la considération scientifique le Nom-du-Père...
(Lacan 1966, 874-5)

During the 1950s, Lacan frequently engaged in his weekly seminars with the writings of other psychoanalysts, whom he continually criticised for their lapses into psychologism. As a psychoanalytic theorist of that time he alone took seriously the idea of Freud’s, outlined in *Totem and Taboo*, that there had occurred a momentous event in mankind’s past. Freud’s recapitulationist beliefs have him putting into correspondence the point early in our species’

history when young males joined forces to overthrow the father of the primal horde, thereby inducing the establishment of law and culture, with the point in the life of the child when the Oedipus complex declines. Naturally, Lacan ignored the phylogenetic aspect of Freud's fantasies, but he did take up the connection between the Oedipus complex, the advent of language and the establishment of the Law and encapsulated it in his theory of the Name-of-the-Father, where, after the establishment of the paternal metaphor, nothing is the same for the child.¹⁴ This led him to take the stance that all the analyst has when dealing with a patient is her speech—there is no other access to any pre-verbal phase of development.

Lacanianism was thus distinguished from many currents in Anglophone psychoanalysis. Then, and even more so today, American and English schools have turned their attention to investigating pre-verbal flaws in the construction of the self. Links have been made to the work of developmental psychologists and in particular their observational studies of mother-infant interaction (cf. Stern 1985). It is claimed, for example, that misattuned responses on the part of the mother to the infant's gaze-soliciting overtures will lead to structural deficits in the self long before language comes into play. Some of the more phenomenological approaches to this theoretical embracing of pre-verbal subjective positions, such as those of Thomas Ogden and James Grotstein, are accompanied by a rich structuring of the child's coming-into-language and thus, at first glance, may appear to be not totally incompatible with Lacanianism. However, the advice from Ogden to analysts to attend closely during sessions to "bodily sensations that seemingly have nothing to do with the analysand" (Ogden 1994: 94) will sound alarm bells for the Lacanian with its suggestion of a reliance on a kind of non-verbal communication.

Stern's attempt to connect psychoanalysis to a branch of academic psychology is not an isolated one. Various analysts have attempted to align their theories with those of, among others, cognitive psychology, evolutionary psychology and neuropsychology.¹⁵ What then of the Lacanians' decision to stand out against this trend?¹⁶ Could there not be some gain for them in accommodating alternative strands of research, perhaps even those emerging from developmental neuroscience? After all, there is evidence that the pattern of maturation in the cortical hemispheres introduces temporary instabilities and correlates to the changing structure of childhood thinking, and that such changes may be profound. Who can doubt that were Freud alive today he would link the discovery of the relatively late myelination of portions of the left prefrontal cortex during the child's sixth year to the onset of the latency period?

¹⁴ See Evans (1996).

¹⁵ A good indication of the range of this work may be found in Barron *et al.* (eds.) (1992).

¹⁶ One can find very occasional exceptions to this rule.

The gulf between neuroscience and Lacan's phenomenology may appear too wide to bridge, and yet an unexpected neurological confirmation has recently occurred of a thesis of Martin Heidegger. Heidegger asserted that prior to any propositional knowledge of an object, such as a tool, it is *ready-at-hand* and that it will only emerge as *present-at-hand*, that is, as a 'thing' with properties, when there is a disruption to the act of using it. Compare this idea to the theory of Melvyn Goodale (1995) which distinguishes two streams of visual processing, a ventral stream concerned with visually guided motor behaviour, and a dorsal stream for "identifying objects in the visual world and attaching meaning and significance to them." (p. 176). Subjects with a lesion interrupting the dorsal stream cannot recognise even the most familiar of objects, yet are able "to grasp that object under visual control as accurately and as proficiently as people with normal vision." (p. 169). For instance, one victim of anoxia could not recognise a pencil when she saw one, yet could still pick it up and draw with it. For her, it did not exist as an identifiable object, yet it was ready-at-hand.¹⁷

What we find here is empirical support for an idea of someone considered laughable by the Vienna Circle. Indeed, Rudolf Carnap took Heidegger to be one of the worst perpetrators of the crime of writing meaningless metaphysics, mocking such statements as 'The Nothing itself nothings'.

From those opposed to any alliance to empirical psychology one often hears a line of argument that portrays psychoanalysis in an almost Kantian light, in that they claim that the Lacanian theory of the signifier reveals the conditions under which any form of knowledge is possible. Even were this the case, however, this would not constitute a reason why some of the findings of psychologists could not be profitably accommodated into psychoanalytic theory. Lacan himself in the 1940s, before developing an obsessive interest in a thinned version of Saussurean/Jakobsonian linguistics, relied on a fair dose of ethology, made the occasional gesture towards Gestalt psychology, and even made reference to the cortex as the 'mirror of the mind'. If Lacanianism was to appeal to the outside so many decades later, we may wonder which vision of science would underlie the psychology to be taken on board.

Early in the study of animal behaviour a division arose between the Behaviourists, who wished to control for all the environmental variables determining the performance of an animal on a laboratory task, and the ethologists, who urged the importance of studying animals in their natural habitat. A similar debate has occurred in psychology between advocates of the laboratory experiment, accused by their critics of forcing the intention of the experimenter to

¹⁷ Cf. Heidegger in *Being and Time*: "The less we just stare at the hammer-thing, and the more we seize hold of it and use it, the more primordial does our relationship to it become, and the more unveiledly is it encountered as that which it is—as equipment." (1962, p. 98).

frame the actions of the subject, and advocates of a more naturalistic approach, for instance, the phenomenological psychologist's in-depth interview, accused in turn of being too subjective. An example of the former kind of criticism, one of artificiality, has been levelled at the use of the *Strange Situation* test by attachment theorists, where an infant is studied as to how it will react to its mother's comings and goings in an unfamiliar place. Well-adjusted children are supposed to recover quickly on their mother's return and get on with the job of playing. While we can agree that there are problems with this test, any attempt to declare as void the use of an 'unnatural' situation will have to be resisted by the Lacanian. After all, what stranger a situation than to find yourself lying on a couch in the presence of someone you know little about, who, although sitting out of sight of you, you imagine to be listening to your outpourings, when suddenly you say something and are shown the door?

So while at first glance one might imagine that the Lacanian would incline herself to thinking in more naturalistic terms, the consulting room might be considered closer to the sensory deprivation chamber than to the living room. It is worth considering this point in greater detail. One of the biggest shifts in recent Anglophone philosophy of science has seen a move away from a total immersion in issues of theoretical representation and confirmation to a consideration of the importance of experimental intervention, instrumentation and laboratory practice. An example of this pragmatic slant is given by Martin Krieger (1992) where he employs metaphors of the factory and the theatre to portray what experimental physicists do. In a sense natural scientists had a lucky break in that they were presented with a non-trivial, yet tractable, problem on which to get started, namely, the motions of the planets. The element of good fortune is that here is a situation in which the motion of a system is largely caused by a single force, the inter-planetary attractions producing only very minor perturbations in planetary orbits. Thus at first we did not have to 'stage' the phenomena, by screening out unwanted effects. As science has progressed, however, this situation has dramatically altered as, for example, when particle physicists stage collisions in the accelerators at CERN. One could argue that, as far as psychoanalysis is concerned, the equivalent tractable phenomena in the human sciences are not the ordinary speech and actions of the millions, but the dialogues staged in the consulting room and also the dramas staged in the theatre and cinema, purified realms of human desire, where a clearer presentation of the human condition is available to researchers. This would provide a rationale for the work of Leader (1997) and Žižek (1992).

Among naturalistic approaches, one could imagine an alliance of Lacanianism with Vygotskian psychology. After all, both share the idea that language massively restructures the child's world. On the other hand, Vygotsky was rather too up-beat about the benefits of this restructuring brought about by the 'loan of consciousness' of the parent or teacher, to mesh

with Lacan's more negative outlook. Perhaps more promisingly, over the past twenty or so years a new approach to social psychology has been vigorously developed. Eschewing the laboratory and the carefully controlled experiment, discursive psychologists have gone forth, tape recorder in hand, to collect people's talk—their everyday conversation, their court-room defences and their marriage counselling sessions. Defendants, journalists, politicians and the man-on-the-street all find their every statement, trope, correction, and hesitation picked apart for subtle intent. This new style of psychology is presented as a break with the past for its understanding of language not as a tool to represent but as one to excuse, to justify, to cajole, to blame. What more natural a human activity than engaging in argument? Reality is not being accurately depicted by words. Rather, versions of reality are being constructed which need to be sufficiently robust since they are sure to be contested.¹⁸

This *discursive psychology* claims as one of its sources the *conversation analysis* of the sociologist Harvey Sacks. His invention of conversation analysis owed much to the idea he had that the social sphere was 'holographic'—contained within the briefest social exchange could be found traces of many of the forces which make society tick. It could be argued that Sacks' examination of the way identity is 'done' in speech situations is reminiscent of Lacan's discussion of the identificatory effect of declaring "You are my wife". Further indication of a possible connection comes from the fact that both Billig (1987) and Lacan in the *Rome Discourse* discuss the work of rhetoricians such as Quintilian and Cicero. Then again there is the common assumption that our discourse is comprised of snatches of already enunciated discourse. While perhaps the psychoanalyst may find more time for familial discourse and the discursive psychologist that of the cultural milieu, both might be thought to be calling attention to its coming from the outside, from the Other.

On the face of it, then, one might take this as a sign that psychology, or at least social psychology, is moving towards Lacan's outlook. Indeed, now we even have the recent advocacy of a constructive dialogue between discursive psychology and psychoanalysis by Ian Parker (1997) and Michael Billig (1997).¹⁹ Parker is especially concerned by the unsatisfactory notions of subjecthood prevailing in his field, an area where psychoanalysis might be of assistance. If the Lacanians were to agree to this partnership, however, they would require the focus to be placed on particular types of discourse. Until now, if discursive psychologists have studied the transcripts of psychotherapy sessions they have tended to opt for what could be included under the banner of 'counselling', covering practices with which the Lacanian would not want to bracket her own. A key difference between the Lacanian analyst and the counsellor is that the former is attempting, often by silence, to disrupt the 'empty speech' of

¹⁸For how a psychology would run along discursive lines, see, for instance, Edwards (1997).

¹⁹ Billig, however, is not at all favourably disposed towards Lacanianism.

their interlocutor. Taking this point together with the suggestion of Lacan (1966/70: 169) that the tropes and styles of rhetoric correspond to the ego defences, one could argue that what these psychologists have been studying is precisely the ego's talk.

Reading his papers of the late 1940s and early 1950s one can easily gain the impression that Lacan gave up on a fascinating research programme when he turned to his theory of the signifier. Integrating the process of the construction of the self with the subtle linguistic theory of the rhetoricians would surely have been a task worth pursuing. One might argue in Lacan's defence that he had realised that this was not the central domain of psychoanalysis in that the point was to understand the structure of the unconscious, not that of the agency of misrecognition. Even were this the case, it is hard to believe that the analyst should not be greatly interested in the composition of the ego. Even if the ego is such an agency, it is surely important to understand its ways thoroughly.

What then of Lacan's 'full speech'? What would a discursive psychologist make of the transcript of sessions with a Lacanian analyst? How would the failures of the turn-taking of an ordinary conversation, the subtle mechanisms of which have been revealed by conversation analysts, explain the shape and rhythm of the analytic conversation? It seems that a function of language central to Lacan's outlook has been ignored. Curiously enough, this function is nowhere better displayed than in one of the experiments that psychologists of a discursive stripe consider with dismay. This takes us back to the laboratory.

When you read accounts of the traditional social psychologist's experiments, you can only wonder at what people will do in the name of science. Volunteers are asked to do the most unlikely things, a surprising number of which involve the use of electricity. Perhaps we may relate this to the fact that the heartland of social psychology is America, home of Franklin's conducting kite string, Edison's light bulb and the electric chair. Indeed, electricity plays the starring role in what must be the best known of all social psychological experiments. In the early 60s, Stanley Milgram (1965) induced over a thousand volunteers, or 'subjects' as they are known, to deliver what they thought to be potentially lethal doses of electric current to supposed fellow subjects, in the guise of a learning experiment. Unknown to them it was all a con. Lots had been rigged so that a subject thought he had been chosen by chance to be a teacher, while a confederate of Milgram was chosen to be the learner. Teachers were then given a shock of 45 volts to give them an idea of what they would be inflicting on the learners and were warned of the dangers of high voltage shocks. They knew that one of 450 volts might kill.

As is well known, a majority of subjects were prepared to deliver the maximum shock, even while they could hear the (fake) screams of the learner in the next room and even after they had heard him lapse into silence, presumably unconscious. A large number were still prepared to do likewise when they were required to force the learner's hand onto a plate to apply the shock. And so a disturbingly widespread trait of excessive obedience had been uncovered in the Land of the Free. However, as always happens in social psychology, experiments were soon devised to cast doubt on any generalisation arising from this piece of research. When, for instance, the experiment was taken to Australia in the 1970s, 'only' 17% complied fully. So cultural variation had been found, and time was then spent rectifying the model of obedience to account for this. But this, I believe, is to ignore the central lesson of the Milgram experiment, which stands out as a particular moment, not as part of a general law.

To help us understand this experiment, we should turn to a rather odd detail in the paper in which Milgram wrote up the experiment. There in the first paragraph we find a reference to the Danish theologian, Søren Kierkegaard, who, wishing to demonstrate the centrality of obedience to the human condition, took the example of Abraham's willingness to go through with the sacrifice of Isaac at God's command. On the face of it, the parallel is straightforward. The experimenter (God) is requiring of the subject (Abraham) that he perform an inhuman act towards the learner (Isaac). And just as God has no intention that Isaac be hurt, so Milgram knows his confederates will be unharmed. God deceives Abraham and Milgram deceives his subjects.

But there is another way of reading the situation which we can arrive at by considering what Kierkegaard was trying to convey with this biblical example. Milgram does not expand on this allusion to the Danish theologian, but what was at stake for Kierkegaard was his idea that the passage to the religious stage requires the suspension of the ethical. 'By virtue of the absurd', Abraham elects to depart from the domain of moral decency governed by universal laws to become an exception. Kierkegaard presents this movement from the ethical to the religious as corresponding to the emergence of a Christian obedience from a Jewish one. While in the Jewish tradition God may be required to participate in an argument, as we see in the Talmud when God is made to argue his case before Moses and when He confesses that 'My children have over-ruled me',²⁰ in the Christian tradition the maker of the Law is exempt from such scrutiny. The Christian is not one to question the sayings of Jesus. She may debate what interpretation to put on them, but Jesus is not to be invited as a debating partner and then judged by the quality of his arguments.

²⁰ See Billig (1987: 60).

Returning to the experiment, precisely at the point where the subject is resolving to disobey—“I cannot go on with this. I don’t want to be responsible. We must stop the experiment. There is no money in the world that will make me hurt another individual.”—the reply from the experimenter is not “I must ask you to do so”, but rather “The experiment requires you to continue”.²¹ Now, devotees of Freud’s case studies will surely be reminded of the moment in the Ratman case when the patient is pleading to his analyst that he be excused from describing the horrific rat torture. In reply Freud does not say “I know it’s painful, but I’d like you to tell me all the same”. Instead, he tells us,

I assured him that I myself had no taste whatever for cruelty, and certainly had no desire to torment him, but that naturally I could not grant him something which was beyond my power. He might just as well ask me give him the moon. The overcoming of resistances was a law of the treatment, and on no consideration could it be dispensed with. (1909: 166)

Despite this denial of responsibility, the Ratman addresses Freud as Captain, confusing him with the officer who had told the Ratman of the torture. In other words, Freud is identified by the Ratman as one who is inflicting cruelty. So analogously we should see Milgram as the Abraham figure. He is the one required to inflict senseless pain, in this case not on his own son but on a thousand men from Bridgeport and New Haven. That they might have been damaged he is all too aware, and that he sought reassurance that the risk was worthwhile is demonstrated by the appearance of a curious footnote to the effect that the vast majority of his subjects claimed to have been glad to have been involved, and to have found it “enriching”, despite the fact that one experimental run had to be stopped for fear of the after-effects of the subject’s seizure (Milgram 1965: 244). Milgram’s readiness to accept his subjects’ gratitude had even blinded him to what should have been the obvious explanation of this response for any social psychologist. Only a few years earlier Festinger had proposed the theory of *cognitive dissonance*, a theory whose popularity has not diminished. This would have predicted that out of the subjects’ awareness would run the thought: “I’ve been through hell and I’ve only been paid \$4.50, so it must have been a good thing”, and hence the favourable response.

So, if Milgram is Abraham and the subject is Isaac, then what plays the role of God? The only answer to this question is *science* itself. Obedience to God’s command outweighs such aesthetic considerations as the pleasure gained from his child and such ethical considerations as that of putting his son’s life before his own, so obedience to the scientific imperative overrides the discomfort of a ‘painful alteration’ made in Milgram’s thinking from experiencing how

[w]ith *numbing* regularity, good people were seen to knuckle under the demands of authority and perform actions that were callous and severe (Milgram 1965: 261, my emphasis),

²¹ It is a pity that Milgram does not provide more of the subjects’ speech.

and the breach of humanity involved in inflicting such torment on his fellow man. What then of the parallel in the deception, what now corresponds to Milgram's deception of the subject? Well, Abraham does deceive Isaac by replying to his question as to what they were to sacrifice, 'My son, God will provide himself a lamb for a burnt offering'. The subjects resist, just as you might imagine poor Isaac might have while being tied down to the slab. It is Milgram who does not question the authority of the experiment and it is science which, unlike the God of Abraham, does not stop his hand before the act. While we see exposed the subjects' encounter with the command, what passes unspoken is Milgram's relation to the scientific imperative. At the point where, one might say, science approaches closest the super-egoical effects of the installation of the paternal metaphor, there is still something of a 'wanting to know nothing about it' (*elle n'en voudrait-rien-savoir*) on its part.²²

Rabbinical commentaries on this episode suggest that the lesson of the sacrifice story was to bring about the end for the Jewish people of the practice of human sacrifice. Similarly the Milgram experiment, along with the later Zimbardo experiment,²³ brought about the end of the suffering of victims of such stressful social psychological experiments. Greater controls were introduced as to what subjects might be exposed. Social psychology thus was returned to an ethical stage of development.²⁴

What I want to claim here is that this experiment shows something about speech that discursive psychology has largely ignored. It lends support to Lacan's claim that what language is first and foremost about is the command. The analyst's role, he maintained, was to adopt a position the inverse of that of the master: by refusing to take up the master's powers, the analyst reveals the senseless (the 'by virtue of the absurd') aspect of the process by which the patient became a subject. In a sense, where an object relations analyst such as Cashdan (1988) can suggest to the analyst that she watch her counter-transferential response to discover the position the patient is driving her into so as to determine the nature of the patient's principal projective identifications, the Lacanian analyst need not bother as she knows that she is dealing quite simply with power. If the Milgram experiment reveals

²² Cf. Lacan (1966: 874) for this science-psychosis link. It should be recalled that Lacan treated the sacrifice story in the first and only session of his intended 1963 seminar series *Le Nom du Père*. Note also that Chap. 3 of Žižek (1992) discusses at length issues arising from Kierkegaard's treatment of Abraham. Žižek (1992: 101-2) presents Marx, Freud and Lacan there as thinkers you follow through a transference developed towards them rather than because of their arguments. This relates to the issue we considered earlier of the possibility of building on other theorists' work and the independence of scientific ideas from their authors. I think that perhaps it is less fair to include Freud here than Lacan. For Freud (1910: 165) there was a renunciation of pleasure involved in science, but the benefits of his 'strictly scientific treatment' of love, which would allow for communal theory construction, were to outweigh the reduction in the yield of pleasure compared to that provided by artists' idiosyncratic treatments of love.

²³ This was where a group of subjects were randomly assigned to act either being guards or prisoners. Due to the brutality of the guards' treatment of the prisoners the experiment had to be stopped.

²⁴ Lacan's sense of the ethical is closer to Kierkegaard's notion of the religious.

something of the superegoical consequences of the establishment of the paternal metaphor in a clear, albeit brutal, fashion, psychoanalysis according to Lacan is the careful exploration of the aftermath of the subject's encounter with the Name-of-the-Father. While the consulting room is often a painful place in which to be, it is at least sometimes a humorous place as well. Laughter too could be heard in Milgram's laboratory. Indeed, 71 out of a batch of 160 subjects showed signs of nervous laughter, he tells us (Milgram 1965: 25). Of these 15 suffered "full blown, uncontrollable seizures" and one a "seizure so violently convulsive that it was necessary to call a halt to the experiment." There are ways and means to cause the division of the subject.

Conclusion

The achievement of the physical sciences is not merely to have learned enough about the world to be able to explain, predict and manipulate parts of the physical world. It is also to have learned how to learn. In the process a powerful collection of methodological practices has emerged, each of which continues to be refined semi-autonomously by the various communities of theorists, experimentalists and instrumentalists. While these communities have distinct identities, they are able to achieve forms of satisfactory partial communication in what the historian of science Peter Galison (1997) calls "trading zones". By comparison, in the social sciences we find little evidence of effective stratification of the research enterprise, but more often fundamental disagreements about the way to proceed. Interaction between research communities is more likely to work through colonisation than through mutually agreed exchange. It is worth contemplating the possibility that this is due to fact that social and psychological phenomena do not lend themselves to being understood in the same way as physical phenomena. Electromagnetism just is much simpler to study than obedience.

Lacan's methodological approach presents a stark contrast to that of the traditional academic psychologist. The latter derives from a desire to become one of the mature natural sciences, yet proceeds from a distorted empiricist picture of how they operate. But even the accurate imitation across disciplines of a successful methodology has no guarantee of success, and this is as true for rationalist methodologies as it is for empiricist ones. At present there is little prospect of the human sciences, and psychoanalysis in particular, being able to emulate those portions of the natural sciences which have benefited from mathematical modelling. Nor has any clear idea emerged as to what novel forms of successful mathematisation might occur there. That strand of Lacan's philosophy of science which saw the use of mathematical discourse as the only way to allow for the integral transmission of knowledge may well have acted as a hindrance to the furthering of his ideas. His mathematisation of psychoanalysis has acted more as a form of mystification than as a way of freeing a theory from remaining too closely tied to its author. On the other hand, non-mathematical sciences, have managed to

accumulate a body of consensual knowledge compatible with their neighbouring fields. Palaeontologists, for instance, work on the basis of extensive shared background knowledge and expect their theories to gel with geology and evolutionary theory.²⁵

Where Lacan's philosophy of science may cast more light on the production of scientific knowledge is the issue of the place of the scientist in relation to that knowledge. Subjecthood enters into Anglo-Saxon philosophy of science's treatment of the production of knowledge in a somewhat naïve way. For example, a popular way of encapsulating the subject's relation to scientific knowledge involves the idea of quantifying an agent's degree of belief in a scientific statement in terms of the betting odds at which one is willing to enter into a wager on its truth.²⁶ A revival of the more sophisticated treatments of the epistemic subject made by the philosophers of science who inspired Lacan is now overdue,²⁷ and Lacan's own views on the formation of scientific knowledge may prove important in this respect. If anywhere, Lacanian theory should help illuminate what is at stake in experimental psychological studies where subjects respond to their introduction into the framework of the psychologist's desire. One need only read the following lines –

Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior.

– and hear of his experiments in inducing phobias in infants to question the desire of a psychologist such as J. B. Watson.

Lacan's form of mathematical rationalism owed much to Koyré, who tied it in with a rejection of any significant element of empiricism. Such a rejection finds its echo in Lacan's writings, where, after the early years, few appeals are made to supporting evidence beyond that arising from a shared clinical experience. Whether the recent use of Lacanian theory to understand the worlds of politics, the novel and the cinema by his interpreters comes to be considered as a sufficiently robust and unproblematic form of support remains to be seen. Whatever the case, the more substantial the range of connections that can be made with bodies of knowledge gained by independent methodologies the better. In view of the extreme complexity of the human mind, to withhold from making contact with other forms of psychological enquiry would appear to be a self-defeating strategy. This is not a period for isolationism. However,

²⁵ Although, see Bak (1997) (in particular Chap. 8) for an indication of how mathematical modelling might work in palaeontology.

²⁶ Cf. Howson & Urbach 1993.

²⁷ Despite Kuhn's doubts about the value of Meyerson's philosophy of science mentioned in footnote 1 above, he also remarks that '...the early models of the sort of history that has so influenced me and my *historical* colleagues is the product of a post-Kantian European tradition which I and my *philosophical* colleagues continue to find opaque. In my own case, for example, even the term "hermeneutic," to which I resorted briefly above, was no part of my vocabulary as recently as five years ago. Increasingly, I suspect that anyone who believes that history may have deep philosophical import will have to learn to bridge the long-standing divide between Continental and English-language philosophical traditions.' (Kuhn 1977: xv).

one should never underestimate the difficulties in establishing 'trading zones' between such disparate disciplines as neuroscience and psychoanalysis.

Bibliography

- Bak P. (1997). *How Nature Works: The Science of Self-Organized Criticality*. Oxford: Oxford University Press.
- Barron J., Eagle M. & Wolitsky D. (eds.) (1992). *The Interface of Psychoanalysis and Psychology*, Washington DC: American Psychological Association.
- Billig M. (1987). *Arguing and Thinking: A Rhetorical Approach to Social Psychology*. Cambridge: Cambridge University Press.
- Billig M. (1997). 'The dialogical unconscious: Psychoanalysis, discursive psychology and the nature of repression', *British Journal of Social Psychology* **36**, 139-159.
- Cashdan S. (1988). *Object relations therapy: using the relationship*. New York: W.W.Norton & Co.
- Corfield D. (1997). 'Assaying Lakatos's Philosophy of Mathematics', *Studies in History and Philosophy of Science* **28**, 99-121.
- Edwards D. (1997). *Discourse and Cognition*. London: Sage.
- Evans D. (1996). *Introductory Dictionary of Lacanian Psychoanalysis*. London: Routledge.
- Foucault M. (1970). *The Order of Things: An archaeology of the human sciences*. London: Tavistock.
- Freud S. (1909) 'Notes upon a Case of Obsessional Neurosis', Standard Edition **10**, 155-175.
- Freud S. (1910) 'A Special Type of Choice of Object Made by Men (Contributions to the Psychology of Love I)', Standard Edition **11**, 163-175.
- Galison P. (1997). *Image and Logic: A Material Culture of Microphysics*. Chicago: The University of Chicago Press.
- Goodale M. (1995) 'The Cortical Organisation of Visual Perception' in *Visual Cognition, An Invitation to Cognitive Science* (2nd ed.) Vol. **2**, S. Kosslyn and D. Osherson (eds.), MIT Press, Cambridge MA.
- Grünbaum A. (1984) *Foundations of Psychoanalysis: A Philosophical Critique*. University of California Press.
- Habermas J (1970) *Knowledge and Human Interests*. Cambridge, Mass.: MIT Press.
- Heidegger M. (1962). *Being and Time*, translated by J. Macquarrie and E. Robinson. New York: Harper and Row.
- Hesse M. (1980) *Revolutions and reconstructions in the philosophy of science*. Brighton: Harvester Press.
- Howson C. & Urbach P. (1993). *Scientific Reasoning: The Bayesian Approach* (second edition). Chicago: Open Court.
- Koyré A. (1957). *From the Closed World to the Infinite Universe*. Baltimore: John Hopkins Press.

- Krieger M. (1992) *Doing Physics: How physicists take hold of the world*. Bloomington: Indiana University Press.
- Lacan J. (1966). *Écrits*. Paris: Éditions du Seuil.
- Lacan J. (1966/70). *Écrits: A Selection*, translated by A. Sheridan. London: Tavistock Publications.
- Lacan J. (1975). *Le Séminaire de Jacques Lacan, livre XX: Encore*. Paris: Editions du Seuil.
- Leader D. (1997). *Promises lovers make when it gets late*. London: Faber.
- Meyerson E. (1932). *Identité et Réalité*. Paris: F. Alcan.
- Milgram S. (1965). 'Some Conditions of Obedience and Disobedience to Authority', in I. Steiner and M. Fishbein (eds.) *Current Studies in Social Psychology*, 243-262. New York: Holt, Rinehart & Winston.
- Ogden T. (1994). *Subjects of Analysis*. London: Karnac Books.
- Parker I. (1997). 'Discourse Analysis and Psychoanalysis', *British Journal of Social Psychology* **36**, 479-495.
- Port R. and van Gelder T. (1995). *Mind as Motion: Explorations in the Dynamics of Cognition*. Cambridge Mass.: MIT Press.
- Redondi P. (ed.) (1987). 'Science: The Renaissance of a History', *History and Technology* **4**(1-4).
- Rota, G.-C. (1991) 'The Concept of Mathematical Truth', *Review of Metaphysics* **44**, 483-494.
- Sokal A. & Bricmont J. (1997) *Impostures intellectuelles*. Paris: Éditions Odile Jacob.
- Stern D. (1985) *The Interpersonal World of the Child*. New York: Basic Books.
- Zizek S. (1991). *Looking Awry: An Introduction to Jacques Lacan through Popular Culture*. Cambridge, Mass.: MIT Press.
- Zizek S. (1992). *Enjoy your symptom!: Jacques Lacan in Hollywood and Out*. London: Routledge.