

## ON THE ASTONISHING CLINICAL IRRELEVANCE OF NEUROSCIENCE

The clinical work of psychoanalysts can be thought of in both a narrow and a broad sense. In the narrow sense, it refers to what is commonly thought of as psychoanalytic technique, the methods analysts use to understand their patients and to convey that understanding to them. In the broad sense, it refers to the entirety of their work as clinicians: the content of understanding, as well as such things as diagnosing, estimating analyzability, recommending therapy, and prescribing medication. The current enthusiastic expectation that neuroscience will have an immediate and direct impact on clinical work in the narrow sense is misguided, but neuroscientific discoveries, it is argued, will have a major impact on psychoanalytic theory in the not too distant future. The resulting changes in metapsychology will ultimately have reverberations on clinical work in the broad sense, although psychoanalytic technique, the analyst's basic approach to patients, will remain essentially the same.

**L**et me begin with a word about my title. Judging from the laughter and rolled eyes I encounter when I read the title to my friends, I suspect that it might be a little controversial. However, I like controversy, and, having had long experience with the soporific effect of plenary addresses, I wanted to be sure that at least in the beginning I had everybody's attention. Those of you who are hoping to hear a diatribe against neuroscience are, I'm afraid, going to be disappointed. This is a pro-neuroscience paper. My overall aim is threefold. First, I want to temper some of the overexpectation that tends to be stirred up by the neuroscientific papers appearing these days in the analytic literature. These papers often imply that neuroscience will in some way change our daily psychoanalytic technique, an implication I consider

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unwarranted. That part of the paper, if not quite a diatribe, can legitimately, I think, be called a polemic. Second, I want to describe the crucial role that neuroscience is playing in modifying some aspects of psychoanalytic theory by forcing us to make choices between competing psychoanalytic hypotheses. Finally, I want to describe some of the areas in which those choices are being made, and how ultimately they will have an important impact on the way we understand our patients.

2 The irrelevance I refer to in my title regards a *specific aspect* of our clinical work: our methodology, our technique. It does not apply to our clinical work in general. This distinction is important, but I seem to have difficulty in getting it across clearly to my colleagues. “Wait a minute!” they exclaim. “You say neuroscience is clinically irrelevant, but then you say that it will have important bearing on our theories, and thus on our understanding of our patients. Doesn’t that make it clinically relevant?” My reply is, “No, because I am using the word *clinical* in a very specific sense. I use it to refer to the *way we are* with patients, to our clinical methodology, our technique, our way of listening, our timing, our psychoanalytic attitude.” In its broader sense, of course, the word refers to everything we do in the clinical situation. In that sense it refers to such things as our general understanding of our patients, the content of our interpretations, our evaluations, our recommendations of therapy, and our prescription of medications. But my claim here is that neuroscience is irrelevant to only the way we go about working with patients—to our psychoanalytic technique, not to our understanding.

At the risk of belaboring the point, I will illustrate the distinction. We all recognize that the various schools of psychoanalysis differ mainly in the content of their theories. Some emphasize drives, others object relationships, still others the maintenance of self-esteem. In recent years analysts, stimulated perhaps by Wallerstein’s classic papers (1988, 1990), have explored what these schools have in common. Their common ground seems twofold. They share a set of very basic theoretical assumptions, such as the existence of unconscious mental functioning and the operation of various defenses. In addition, they share some basic technical approaches, such as the use of free association and the analyst’s intent to understand the patient and to convey that understanding. The variation in technique that seems to occur at times between the schools is not related to variation in their theories. This holds true also for changes in technique within the schools. When,

for example, classical theory held that neurosis results from unresolved oedipal conflict, we understood our patients primarily in oedipal terms. As theory (aided, of course, by clinical observation) recognized the importance of preoedipal factors, the way we understood our patients changed, but our technique did not. To be sure, our technique *has* changed over the years, but not as a result of the kind of theoretical change influenced by neuroscientific contributions. The changes in technique that have attended changes in theory are related to changes in *clinical* theory, an aspect of psychoanalytic theory to which neuroscience contributes little. A prime example is the striking change in technique that has occurred over the past few decades in consequence of the move from a one- to a two-person psychology. This move was a change in clinical theory, not in the more abstract conception of the mind that we think of as metapsychology.

In brief, I maintain that neuroscience has the potential to significantly influence our general theory of mind and to affect the way we understand our patients, but that it has very little relevance to our technique. Neuroscience enthusiasts, unfortunately, do not make this distinction. I believe we are in the midst of a great neuroscience bubble, a time of irrational exuberance (forgive me, Alan Greenspan). I write with the aim of bringing our hopes for neuroscience down to reality. We, who have lived through the idealization of psychoanalysis in the past century and the disillusionment that followed, should know the dangers of overexpectation. A more realistic view of how neuroscience will affect our discipline will, I hope, be of service to both the psychoanalytic and the neuroscientific communities.

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### THE IRRELEVANCE OF NEUROSCIENCE TO PSYCHOANALYTIC TECHNIQUE

I can best explicate the irrelevance part of my thesis by saying a little more about how I came to write this paper. I have always been interested in the sciences, neuroscience in particular.<sup>1</sup> After all, understanding the mind is my profession, and doesn't the mind exist in the brain?

<sup>1</sup>Some use the term *neuroscience* to include all sciences (usually excepting psychoanalysis) that study the mind and/or the brain. Others include only those sciences whose methodology is basically nonpsychological. In this paper I deal mainly with the brain, that is, with such disciplines as neuropsychology, neuroanatomy, neurophysiology, molecular biology, and neuropsychopharmacology. I will not use the term to refer to those fields that deal mainly with the mind, such as

I have read with eagerness and enthusiasm the tide of recent papers on advances in neuroscience. Of late, however, I have found myself reading psychoanalytic presentations on neuroscience with a growing sense of disappointment. Gradually I have come to realize that this feeling arises from the fact that these presentations, fascinating as they are, seem to have little relevance, if any, to my daily clinical practice. In contrast, my usual psychoanalytic reading has always made me think about my patients and how I work with them. Admittedly, the neuroscience papers have at times seemed to influence how I *understood* certain patients, and I at first took this effect to be an original contribution to psychoanalysis. On closer examination, however, even this proved an illusion. Almost always, the apparently new understanding that neuroscience seemed to provide was merely a reformulation or confirmation of what I already knew from my psychoanalytic experience.

4 Take, for example, my experience with the therapy of trauma. Many, perhaps most, of our patients have suffered traumatic episodes that play an important part in their psychopathology. For many years I had approached such patients with the conception that the memory of these episodes had been repressed. One of my therapeutic goals was to help my patients recover those traumatic memories. It will come as no surprise that some of those patients did recover those memories, and some did not. My patients always realized, of course, what I was looking for. Those who did not clearly recover memories felt, as did I, that although in many ways the analysis was helpful, in this one respect it had failed. Over the past few decades, cognitive and neuroscientific descriptions of explicit and implicit memory systems have led me to realize that memory organization is much more complex than our topographical model implied. Many of the traumatic memories I was searching for were not coded explicitly, and so were unrecoverable as memories *per se* (for a discussion, see Yovell 2000). Once I realized this, I began conveying to patients that, while they might be able to remember these traumatic episodes, they might also gain access to them only through their less direct appearance in dreams, bodily sensations, and fantasies. They might, that is, gain a conviction that these things had happened, even if they could not explicitly remember them. I explained that such an inability is due to the nature of the mind, and

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child observation, the cognitive sciences, behavioral neurology, and evolutionary psychology, although much of what I say will apply to those disciplines also. Indeed, later in the paper I will subsume the cognitive sciences under the rubric.

that this kind of memory recovery is just as useful as the explicit kind. My change in attitude changed the tone of some of my analyses, sometimes subtly but at times dramatically. I at first enthusiastically attributed this change to my reading in neuroscience. Soon, however, I realized that this same ambivalence about traumatic memories was present within psychoanalysis itself, almost from the beginning, and certainly far earlier than any neuroscientific findings. Two theories about the therapy of trauma coexisted in the psychoanalytic literature, one advocating recovery of memories, the other recognizing that reconstruction of the trauma is often all that is possible or necessary.<sup>2</sup> Neuroscience has made it clear that insistence on the recovery of explicit memories of trauma is untenable, and the latter approach to traumatic memory is now the accepted one. This confirmatory role of neuroscience, the role of helping us decide between competing psychoanalytic theories, is typical.

Is it true that overenthusiasm is a problem? One can certainly find a few psychoanalysts knowledgeable about neuroscience who seem to share my skepticism. Kunstadt (2001), for example, summarizes a recent conference on psychoanalysis and neuroscience in which the spirit of skepticism ran rampant. Nowhere in his summary is there any assertion that neuroscience has had an impact on psychoanalytic technique. Kunstadt himself, talking about the relation between neuroscience and psychoanalysis, comments, “Yours truly made some comments that are too pessimistic to put into print” (p. 11). I believe, however, that most psychoanalysts writing about neuroscience either claim or imply that neuroscience has been very useful in their daily practice. Let me give two illustrations of this. I hope the authors I cite will forgive me for singling them out. I do so because their writings are so influential.

*Regina Pally.* One of our clearest writers, Pally (2000) makes no bones about her feeling that neuroscience has clinical utility: “it soon became clear that neuroscience has a lot to offer clinical work . . .” (p. v). Neuroscience, she insists, “has much to teach us about the workings of the mind and about why people think, feel, and behave as they do”; she regards neuroscience “as an *additional tool* for

<sup>2</sup>I believe that my attempts to recover explicit memories of trauma arose mainly from my immersion during the first year of my training in Freud’s very early work and, of course, from my failure to keep up with the psychoanalytic trauma literature. This probably has shaped my deep opposition to teaching psychoanalysis purely historically, but that is another paper.

understanding patients and helping patients understand themselves” (p. vi). One gets the strong impression that Pally feels that her neuroscientific knowledge helps her to work differently in the analytic situation. In fact, Pally’s book provides a lucid, concise exposition of recent findings in neuroscience as they relate to the mind. She gives many examples of the ways in which those findings support psychoanalytic understandings. But examples of how they lead us to a different method of working with patients are conspicuous by their absence.

6 *Morton Reiser.* One of the foremost exponents of linking neuroscience and psychoanalysis, Reiser (1997) provides an instructive example of the difficulties of this linkage when it comes to psychoanalytic technique. In an appealing paper on the psychobiology of dreams, Reiser, in a section on technique, advances only one technical principle. He implies that most analysts follow Freud’s advice in *The Interpretation of Dreams* and simply request associations to isolated dream elements (e.g., “What comes to your mind about the tattered canvas?”). He advocates instead that we try to interest the patient in the relation of dream images to present problems (“Is the tattered canvas related in any way to your concern about promotion?”). Reiser cites neuroscientific findings about the relation of dreams to current conflicts that support this approach. In fact, however, this focus on current problems is but one of many approaches that contemporary analysts take to the investigation of dreams. The contributions of neuroscience are congruent with this focus, but they do not rule out other approaches, and they tell us nothing we did not already know.

These examples are typical of attempts by enthusiasts to show how neuroscience influences their clinical technique. To cite paper after paper in which authors fail in their attempts to show that neuroscience throws new light on technique would be tiresome. But rather than take my word about this, interested readers can examine Brickman 2000; Brockman 1998; Frosh 1989, 1997; Galatzer-Levy 1995; Galatzer-Levy et al. 2000; Gedo 1991; Grigsby and Stevens 2000; Kaplan-Solms and Solms 2000; Levin 1991, 1997; Olds and Cooper 1997; Panksepp 1998; Richards 1990; Schore 1997; Schwartz 1990; and Solms 1998. Those wishing to read everything published on the topic through 1999 can find it at [http://www.neuro-psa.com/complete\\_bib.htm](http://www.neuro-psa.com/complete_bib.htm). If my experience is typical, the reader will not learn very much about psycho-

analytic technique, but he will certainly learn a lot about other ways in which neuroscience is relevant to psychoanalysis.

When I first noticed this absence of clinical data regarding the technical utility of neuroscience, I was sure I was missing something, so I began talking to these authors, asking them for clinical examples. How did their neuroscientific knowledge change the way they worked with patients? All of them were pleasant and cordial. All of them referred me to papers they had written or conferences that were about to take place. But I had already read those papers to no avail, and attendance at the conferences was no more fruitful.<sup>3</sup> I decided I could make a stronger claim.

### **NEUROSCIENCE CAN IN PRINCIPLE CONTRIBUTE NOTHING TO PSYCHOANALYTIC TECHNIQUE**

Let's begin with a rather simple, commonsense exposition. It goes like this: The understanding of the mind that we strive for in psychoanalysis takes place within a relationship. "Technique" is simply a way, perhaps too mechanical, of talking about one part of the analyst's role in that relationship. It refers to various ways in which the analyst attempts to optimize the atmosphere of the relationship to gain as much understanding as possible. That atmosphere is created by the interaction of the complex personalities of patient and analyst. The ability to foster an analytic attitude develops over time as the analyst is taught, reads, learns, and works with patients. This development depends to a large degree on the analyst's ability to understand his or her own experience, as well as the patient's, and the effect they have on each other. But individual subjective experience (let alone the intricacies of the interaction of two subjectivities) has so far almost completely eluded neuroscience, which is just beginning to recognize its importance and has yet to develop an approach to studying its impact on brain function. It is hard to imagine a way in which analytic technique will be influenced by what the analyst knows about the functioning of the brain.

To put this in a slightly different way: The goal of the analyst is to pursue and communicate understanding, and the purpose of

<sup>3</sup>My search is exemplified by two discussion groups on neuroscience I attended at the very meeting at which I was to deliver this address. In each I asked for clinical examples that refute my position. The question provoked heated discussion but no examples. (I must say that I did this with no little anxiety, since I had already written the paper.)

psychoanalytic technique is to facilitate that goal. If there is a single overarching principle that governs our behavior in the analytic situation, it is that we attempt to understand our patient's individual, specific motivations,<sup>4</sup> particularly as they are manifested in the analytic relationship, and to help the patient understand them. We deal, that is, with the specific contents of the patient's mind and the specific processes he or she uses to regulate them. Neuroscience clarifies the anatomical and physiological substrates from which those motivations arise. It may also say something about the general functioning of those motivations, but by its very nature it can say little about the meaning they have for an individual.

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By way of illustration, let us assume that the brain functions like a huge, complicated computer.<sup>5</sup> It is clear, I think, that the most detailed understanding of the way a computer is wired (its hardware) will tell us nothing about what the computer is "thinking" (its software and the way we use that software). Similarly, knowledge of the structure and function of the brain as dealt with in neuroscience tells us little about what the mind is experiencing, and experience is at the core of psychoanalytic technique. Further (and this has been the downfall of strong approaches to Artificial Intelligence), there are convincing arguments that the brain does not operate only as a computer. Fodor (2000) and Searle (1997) demonstrate the impossibility of reproducing all of the functions of the mind by computational means—that is, by computers. The argument is that the semantic function of the mind, the understanding the mind achieves, can never adequately be modeled by the rule-governed syntactic operations by which logical expressions combine, and that such operations are all that is in principle possible for even the most complex computers. It is true that *some* functions of the mind are computational. We can add two plus two, and usually we get four. But other functions, such as the production of conscious experience, are not. Humans experience; computers do not. We know nothing about how

<sup>4</sup>The concept of motivation should not be limited to motives we think of as arising from the drives: sex, aggression, and the like. Anything, conscious or unconscious, that moves a person to behave in a certain way is a motivation. If I boost my self-esteem by identifying with my powerful father, that is a motivation. If I defend against anxiety by staying away from social interaction, that is a motivation. We are a web of interlocking, tangled, idiosyncratic motivations, and these form the central focus of our analytic technique.

<sup>5</sup>This metaphor is flawed. There is a growing feeling among neuroscientists and philosophers that the brain is not entirely comparable to even the most complex computers. But there is enough similarity to make the metaphor useful in conveying my point.



the brain produces experience, but if we ever discover the wonderful mechanisms involved, we will be no closer to describing in neuroscientific terms the content of those experiences for the individual, except in the crudest way. And it is precisely on the affective and cognitive content of experience that psychoanalytic technique is designed to operate.

### THE RELEVANCE OF NEUROSCIENCE TO PSYCHOANALYTIC THEORY

I turn now to the second major point of my paper: the astonishing *relevance* of neuroscience to psychoanalytic *theory*. It might seem that I am now following the advice of the eminent Oxford philosopher J. L. Austin (1962), who, when asked about the structure of a scientific paper, said, “Well, there’s the bit where you say it, and the bit where you take it back” (p. 2). But I hope it will become clear that I am not taking anything back. It is true that I have been attempting to dampen any wild hopes that neuroscience might revolutionize our way of working with patients, but I hope I have also implied that it is deeply relevant to our metapsychology.

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I must emphasize again that the major relevance of neuroscience to psychoanalysis is that it helps us choose between competing psychoanalytic theories. It does not generate new ones. Despite this limitation, the hypothesis-testing role of neuroscience<sup>6</sup> is an important one, since we often seem ineffective in making such choices using only our own findings. There are many ways in which neuroscientific findings influence our choice of theories. I will discuss a few of them.

*Theory of motivation.* Our initial assumption (based, of course, on Freud’s drive theory) was that all motivation arises from the id and is in some way either sexual or aggressive. The term *drive* came to be synonymous with motivation. This misattribution persists to the present day, even though convincing doubts about drive theory had been raised early on. Melanie Klein emphasized the importance of object relationships in motivation, Bowlby the importance of attachment, Anna Freud of defense, and Kohut of narcissism. In the heyday of ego psychology, psychoanalysis went through a series of intellectual gyrations trying to make drive and energetic theory work via such concepts as

<sup>6</sup>From this point on, for purposes of exposition, I include the cognitive sciences in the term *neuroscience*.

neutralization, fusion, and sublimation. When this approach failed, theoretical discussion of motivation moved in different directions. Some (Holt 1981; G. Klein 1976) abandoned the search for a metapsychological theory of motivation entirely, advocating that we simply stick with clinical theory. Others tried to reconcile the fact that there are motivations other than drives by broadening the definition of drive to include all motivations (Opatow 1989, 1993; Peskin 1997; Schore 1994). Today most analysts simply ignore the entire question. When forced to confront it in their teaching, they fall back on drive theory (a surprising statement, perhaps, but just look at the courses on motivation given in our institutes). Change, however, is in the wind. The clear demonstration by neuroscience of specific motivational systems in the brain is having an impact. These systems include such motivations as sexuality, aggression, social attachment, maternal devotion, hunger, thirst, and safety, as well as a more general seeking system (Panksepp 1998) responsible for the feeling of desire (in drive theory called pressure) that accompanies all motivation. We are beginning to integrate these findings into our own hypotheses. A few brave souls—Lichtenberg (1989), for example—have advanced comprehensive motivational theories based on these systems. Their attempts have not yet caught on, but we are moving in the right direction.

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*Affect theory.* We have long since abandoned the concept of affects as the discharge products of instinctual drives, and are moving toward a psychoanalytic theory that views affects as complex motivational entities having psychological, physiological, and neurophysiological components. Affects arise developmentally from the nine basic affects (interest-excitement, enjoyment-joy, surprise-startle, fear-terror, distress-anguish, anger-rage, “dissembl,” disgust, and shame-humiliation), a classification first proposed by Tomkins (1962, 1963). This theory is congruent with extensive neuroscientific research (Damasio 1994, 1999; LeDoux 1996; Panksepp 1998). The psychoanalytic implications, which were foreshadowed by Schafer’s classic clinical paper on affects (1964), have been beautifully elaborated by Emde (1980, 1983, 1991, 1999).

*Structural theory.* Long under attack, structural theory shows promise of rising from the ashes in a form congruent with current concepts in neuroscience. The id has been alluded to above. The ego, a hodgepodge of functions and processes described at various levels of abstraction, has no promising replacement on the horizon, but one can envision in the distant future a system perhaps to be called the Executive

System. It will amalgamate, in a more organized form, all of the functions currently lumped together in the ego. Further, it will be congruent with the neuroscientific research now taking place in such areas as perception, representation, planning, reasoning, memory, learning, consciousness, self-awareness, empathy, emotional modulation, decision, and the organization of conceptual knowledge (see Gazzaniga 2000). The superego, conceptually our most satisfactory structure, will probably persist, incorporating neuroscientific work on regulatory functions. It will, I fear, be renamed something like the Regulatory System, but behind psychoanalytic doors it will always be thought of as the superego.

Our topographical description of the mind, which we now crudely designate as *conscious*, *preconscious*, and *unconscious*, will be refined to be congruent with the many different ways in which mental functioning relates to the varieties of consciousness, an area just beginning to be investigated by neuroscience. This is adumbrated in the current neuroscientific interest in consciousness itself, now the darling of everyone's curiosity. No one has even the glimmer of a satisfactory idea about the answer to "the hard question" (Chalmers 1996): Just how does such an exquisite entity as consciousness arise from the mere interaction of neurons? But easier questions about the *functions* of consciousness are now being explored in important ways that must become integrated with psychoanalytic theory.

Neuroscience is hard at work in many other areas of psychoanalytic import, among which are evolutionary psychology, sleeping, dreaming, nonverbal communication, medication effects, and mechanisms of therapeutic action. In addition to providing a fascinating glimpse into the heretofore inscrutable brain, all of these studies have enormous implications regarding the functioning and structure of the mind. Psychoanalysis cannot afford to ignore them.

## DISCUSSION

### *The Proper Relationship between Psychoanalysis and Neuroscience*

Philosophers would say that both the content and the methodology of the two sciences are different, and that the information they deal with are in different, noninterpenetrable domains (see Bickle 1998; Fodor 2000; Palombo 1999; Searle 1997; Solms 1998; Wilson 1998; and, particularly, Edelson 1986, 1988, 1989). I have taken both points

as self-evident. The two fields not only use different methodologies, but have different approaches to hypothesis formation and justification. Each has developed its own theories. But each also deals with the mind and the brain, even if from very different perspectives, and it must be that they bear some relationship to each other. What might that relationship be? This is the old mind-brain problem, and philosophers have advanced many different approaches to its solution. I simplify them into four overall strategies.

*Reductionism.* This approach claims that all understanding of the mind can ultimately be expressed in statements about the brain. Controversy over this position has been going on for centuries. The debate continues (Bickle 1998), but the advent of chaos and complexity theory has by and large settled it in favor of the antireductionists (Galatzer-Levy 1995; Kauffman 2000; Palombo 1999), in practice, at least, if not in principle. The complexity of the brain boggles the mind. Holderness (2001) brings it home to us by calculating that the number of possible wiring diagrams of synaptic connections between neurons in the brain is  $10^{10^{13}}$  times larger than the number of quantum “grains of sand” that make up the entire expanse and history of the universe to date. It is unimaginable that this complexity will ever allow us to give a meaningful description in neuroscientific terms of a state of mind at any particular moment, let alone compare it to a state of the same mind at any moment before or after.

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*Consilience.* A less extreme position has been called *consilience*, a term first used by Whewell (1858), and popularized by Wilson (1998) in his brilliant, if flawed, *Consilience: The Unity Of Knowledge*. Consilience means the interlocking of causal explanation across disciplines. It advocates reductionism without insisting on its completeness. It has all of the problems of reductionism, with very few advantages, and the concept has never caught on.

*Dualism.* Dualists believe that the domain of the mind can in no way be conceived of in terms of the brain.<sup>7</sup> They imply that neuroscience should in essence be ignored. Aside from its violation of common sense, this position leaves psychoanalysis as a science with no relation to the rest of the world. It does violence to the very idea of science itself, and is deeply unsatisfactory.

<sup>7</sup>Some of my best friends are dualists. See, for example, Frattaroli (2001), who has written an excellent book for laypeople about psychoanalysis—excellent, that is, except for his postulation of a soul unconnected to the brain.

*Congruence.* The fourth position, to which I adhere, holds that the explanations of psychoanalysis must at the very least be compatible with (congruent to) the explanations of neuroscience. Conceptualizations and observations in different fields must be presented in language that permits logical comparison, and must be logically compatible with one another. Both within psychoanalysis (Rubinstein 1980; Shevrin et al. 1996) and within neuroscience (Kandel 1998, 1999), the call for congruence is becoming louder. These calls are based on scientific grounds, which, for fields that consider themselves sciences, is certainly the determining factor. But the ultimate advantages of a psychoanalytic science based in the real world do not rest solely on intuitive, aesthetic, or even purely scientific grounds. There are practical advantages. We decry our relative ostracism by the scientific world, but many of us are reluctant to adopt a view that would bring us back in. The need for congruence seems inescapable. It seems a modest request to make of two sciences, but psychoanalysis and neuroscience are just beginning to respond to it.

***Why Has There Been Such a Gap between Psychoanalysis and Neuroscience?***

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Congruence between individual sciences would seem to be a cardinal principle of all science. From a practical standpoint, however, the need for congruence varies according to the relatedness of the objects on which two sciences focus. There is very little need, for example, for any congruence between astrophysics and botany; their domains are too distant from each other. The mind and the brain, however, are so closely linked that one would expect psychoanalysis and neuroscience to be closely linked also. But, of course, they aren't. Many (e.g., Solms and Saling 1986, 1987) have yearned for such closeness, or even for a kind of unity. We see such yearnings in the name of the new journal *Neuro-Psychoanalysis*. In general, however, there has been relatively little effort, on the part of either neuroscientists or psychoanalysts, to achieve congruence between their fields. At best, the attitude on either side might be called indifference; at worst, active antagonism. The reasons for this are complex. Historical factors are important. The state of neuroscience during early psychoanalysis was such that Freud, after the failed 1895 Project, explicitly gave up any attempts at integration, at least for the moment. Other factors perpetuating the gap between the two sciences include differences in methodology and terminology,

and confusion about just what constitutes contemporary psychoanalytic theory.<sup>8</sup> Clinical factors also play a role, as is apparent in the fear of many psychoanalysts (e.g., Yorke 1995) that the growing interest in neuroscience will lead to the misapplication or actual abandonment of crucial aspects of the psychoanalytic clinical method. Cultural differences between psychoanalysts, who are primarily clinicians, and neuroscientists, who are primarily academicians, are also operative. And, finally, we must admit to issues of priority, always a sticking point in the sciences, even when Nobel prizes are not involved. For a more detailed (and wickedly witty) discussion, I refer readers to Whittle (1999), who discusses in detail the reasons for a similar gap between clinical and experimental psychology. Given all of these alienating factors, closing the gap is not going to be easy. But it is necessary and inevitable.

***What Is the Remedy?***

14 If it is truly important that neuroscience and psychoanalysis become congruent with each other, we are left with the perplexing question of how to achieve such congruence. Of the many things that need to be done by each field, I will focus on the one that I consider most important for psychoanalysis: the education of future psychoanalysts. In a sense, I have given up on our current generation. Our attitudes are shaped, but our students are more open. We owe it to them to get across a sense of the deep relevance of neuroscience by including it in their training from the very beginning. It is not likely that this will happen in their personal analyses, and not much more likely that it will happen in supervision. But their didactic training presents a golden opportunity. Courses on neuroscience, such as the one given by Galatzer-Levy et al. (2000), may be useful, but I think we need to be even more imaginative. One approach that holds promise is being explored by the Psychoanalytic Center of Philadelphia. Under the creative chairmanship of Salman Akhtar, our Curriculum-Faculty Committee is examining every course in the curriculum with the aim of identifying those in which neuroscientific findings have some relevance. We hope to have at least one

<sup>8</sup>These stumbling attempts at communication can be seen in the issue of *Neuro-Psychoanalysis* on affects, in which many of the analyst contributors (e.g., Yorke 1999), and the editors themselves (Solms and Nersessian 1999) describe current psychoanalytic affect theory as essentially the same as Freud's. This was soon put right by Krause (2000), and a congruent affect theory is currently emerging.

session in each such course devoted to the correlation of neuroscientific and psychoanalytic findings. The segment will be co-taught by the course leader and either a neuroscientist or an analyst with neuroscientific expertise. We hope to demonstrate a sense of the importance of neuroscience not just to candidates, but to the teaching faculty. This is a complicated undertaking, but it seems worth a try. Many other approaches are possible, and I hope individual institutes will experiment with them. Neuroscience and psychoanalysis need each other. With concerted organizational and individual effort, a rapprochement between the two fields is within our grasp.

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