The Enduring Scientific Contributions of Sigmund Freud

JOHN E. GEDO

Psychoanalysis as a Natural Science

The Freud Exhibition organized by the Library of Congress marks the centenary of the birth of psychoanalysis. Its sole parent, Sigmund Freud, has been dead for over sixty years—indeed, he was born before the American Civil War, relatively early in the reign of Queen Victoria—yet his contribution to modern civilization has been so profound that his work has stayed in the center of attention (whether to be praised or denigrated) throughout the twentieth century. The current exhibition therefore provides a suitable opportunity to reappraise Freud's achievements in all their multiplicity.

One way to summarize his life's work is simply to state that he invented a new scientific discipline that has steadily grown for over a hundred years and in every part of the developed world—an intellectual and organizational feat of some magnitude. His scientific writings (in English translation) comprise 24 volumes (Freud, 1886–1957) and continue to be read, not only by professional psychoanalysts. In fact, so great has Freud's prestige been in educated circles that, even today, two to four generations after its original publication, his oeuvre is commonly equated with the conceptual world of psychoanalysis.

In recent years discussions of Freud's work aimed at the general public have tended to focus on those of his hypotheses that have been invalidated by a variety of scientific advances. Because Freud unequivocally adhered to the conception of psychoanalysis as a branch of biological science, he attempted to correlate his observational data with the biology of his own time—specifically with the prevalent theories of contemporary neurophysiology. Brain science was in its infancy a hundred years ago, and the concepts Freud (1895) borrowed from his neurological and physiological mentors—Wilhelm Brücke, Theodor Meynert, Josef Breuer—have not stood the test of time. In the most general sense, the

functions of the central nervous system were then conceptualized in power engineering terms (as if the brain were an electrical apparatus), a paradigm that turned out to be incorrect (Toulmin, 1978). Most of Freud's scientific errors followed from these invalid neurophysiological assumptions.[1]

It has taken psychoanalysis half a century (and the availability of valid neurophysiological information)[2] to overcome the conceptual difficulties caused by Freud's mistaken assumptions. It is very odd that commentators who would not dream of dismissing current brain science because of the inadequacies of that discipline at the end of the nineteenth century often try to discredit contemporary psychoanalysis because it relied on the very same hypotheses, applied to mental life. Such critics appear to ignore one of the cardinal methodological principles of science as a whole, that progress in knowledge can best take place through the disproof of existing hypotheses. It is to Freud's credit that he generally stated his speculative propositions in such a manner that they could be invalidated by subsequent scientific findings.

Another way to put this point is to reemphasize that Freud placed his new discipline on *scientific* foundations—meaning that it did not spring from his head fully formed as a doctrine; rather it was a first attempt to explain a broad array of novel observations, subject to continuous modification in the light of further experience. The *Standard Edition* of Freud's psychological works is still deserving of careful study, for it contains important observational data and sophisticated thinking about them, but it is not a currently acceptable exposition of the valid knowledge that constitutes psychoanalysis.

Readers unfamiliar with contemporary psychoanalysis—the current consensus as well as the ongoing controversies within the field—may have difficulty in evaluating Freud's writings in terms of which of his propositions continue to have scientific validity, which have been invalidated although they attempted to answer important questions (and therefore possessed great heuristic value), and which of them turned out to be useless because the problems they were supposed to address were misconceived. In this respect, however, Freud's contributions are no different from those of other authors in the biological sciences who wrote 60 to 100 years ago.

Development of the Analytic Observational Method

In my judgment Freud's most lasting and valuable scientific contribution was not conceptual; hence it tends to be overlooked by nonspecialist historians. This achievement was the development of a novel observational method through which

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[1] For detailed discussions of these complex issues, see Rosenblatt and Thickstun, 1977; Holt, 1989; Dorpat and Miller, 1992; and Rubinstein, 1997.

[2] The relevant findings are reviewed by Levin, 1991 and Schore, 1994.

it became possible for the first time to gain reliable data about man's inner life. From about 1890, when he began to practice the "talking cure" invented by Breuer, it took Freud roughly twenty years to standardize a "psychoanalytic method" that permitted independent observers to collect such data. It is these unprecedented observations about mental functions and the control of human behavior that have defined the boundaries of psychoanalysis as a scientific domain. In other words Freud accomplished a methodological breakthrough whereby, single-handedly, he founded a new discipline.

It is difficult to discern whether Freud himself fully realized that his method was no mere pragmatic tool to be used therapeutically. His most extensive exposition of the procedure was given in his "Papers on Technique" (Freud, 1911–1915), written shortly after he stopped modifying it. The context there was entirely pragmatic. Nor have subsequent commentators emphasized the *scientific* importance of Freud's observational method. I suspect that the clumsy attempts of some psychoanalysts to rebut critics by claiming that those who have not been in analysis have no way of assessing the truth value of psychoanalytic data were inadequate efforts to point out that the standard psychoanalytic situation permits the collection of information that is simply not observable in other settings.

A psychoanalytic situation requires periods of observation ("analytic hours") almost every day—at any rate, as frequently as possible; in the course of these, the analysand must make good-faith efforts to free associate, while the analyst has to act as an empathic witness of the resulting productions, as well as of the analysand's concomitant (nonverbal) behaviors. Free association differs from ordinary human discourse, which is almost always guided by social rules and the speaker's interest in preserving the privacy of much of his or her inner life. Its precondition of total candor, promoted by the reciprocal guarantee of complete discretion on the part of the analyst, tilts the associative process in the direction of veracity, authenticity, and the emergence of mental contents most people even prefer to keep out of their own awareness. The resultant observations reveal aspects of mental functioning otherwise hidden from the view of the analysand, not to mention others.

Not only does the psychoanalytic situation yield data inaccessible to the nonanalytic observer, but such data also almost never become available through private introspection. This is true partly because we tend to view ourselves through the distorting lens of strong emotional bias and partly because hardly anyone is able to persevere with the introspective effort in the face of intense shame, guilt, or anxiety. The presence of an empathic witness serves to challenge the analysand's prejudices and to push for perseverance despite emotional discomforts.

Because the manifold schools of psychoanalysis have disagreed about the significance of the data of observation they share, it has not been sufficiently

recognized that they have few disagreements about the nature of those data. Albeit there seems to be widespread agreement about the fact that the analyst's therapeutic activities are bound to affect the subsequent emergence of fresh material, it has become fairly clear how particular interventions tilt the field of observation in various specific directions. The simplest illustration of this tendency is that analysands generally focus their thoughts on matters that seem to interest the analyst (and to neglect those to which the analyst appears to be unresponsive). In other words intersubjective factors influence the emergence of the observational data in particular settings, but this circumstance does not compromise the relevance of those observations for the analysand's mental life. In summary Freud succeeded in devising a procedure that has led to the reliable collection of previously unobserved data about the human mental condition. Psychoanalysis is the science that has attempted to explain the significance of these novel observations.

The Significance of the Unconscious

Only one of Freud's conclusions on the conceptual level can approach the scientific value of his methodological discovery—that is his realization that human mentation proceeds predominantly outside of subjective awareness (Freud, 1900, chapter 7). Freud was not the first to record that unconscious mentation is possible; his great discovery was that conscious thinking (reflection) is the exception rather than the rule. By placing this insight at the center of his conceptual system, Freud differentiated the discipline he created from the science of conscious mental states; that is why psychoanalysis is also called "depth psychology." By correctly discerning the topography of mental life, Freud went beyond the expansion of our understanding of the control of behavior—he made possible the improvement of that adaptive system by way of psychological intervention.

From this perspective a large array of psychological therapies that have rejected various other Freudian propositions (such as the schools of the early secessionists from psychoanalysis, C. G. Jung and Alfred Adler) owe their genesis to Freud's discovery of the true significance of unconscious mentation.[3] It is important to note that Freud's hypothesis was a biological proposition that awaited validation within neurophysiology. Such proof became available with the development of PET-scan techniques for the visualization of the activities of the brain. These have amply demonstrated the validity of Freud's view on the relative significance of both conscious and unconscious mental life (Lassen, 1994). Thus psychoanalysis was built on the valid assumption that, in order to understand

[3] For dispassionate examination of these controversies, consult Homans (1979) and Stepansky (1983).

vital aspects of behavior, we have to discern the effects of what has hitherto been unconscious thought.

From such a "topographic" perspective, Freud (1926) reached another crucial conclusion: certain mental contents that had previously been conscious may arouse sufficient shame, guilt, or anxiety to set in motion a variety of mental processes that either render them entirely unconscious or deprive them of their emotional charge, disavow their significance, or shift responsibility for them to someone else. Arguably, Freud's description of these defensive operations—repression, disavowal, projection, and so on—may have gained wider public acceptance than any of his other scientific contributions.[4] In recent years brain science has made sufficient progress to explain the neurophysiological basis of a number of these defense mechanisms (Levin, 1991).

The scientific importance of the conceptualization of a system of defenses against the experience of painful emotions is that it has illuminated both the adequate and the maladaptive organization of behavior. Both the failure of defense and the need to suppress vital aspects of one's true self through continual defensive operations constitute psychopathology, although of course there are many other types of maladaptation (Gedo, 1988). Freud's insight about the great frequency of conflicts between aspects of personal motivation and the need to avoid painful emotions has made it possible to intervene therapeutically (not only by means of analytic treatment proper but also through a variety of psychotherapies based on psychoanalytic principles) in a manner that may establish effective defenses without stifling the individual.

The Compulsion to Repeat

The third major Freudian achievement was the insight that human behavior is characterized by a variety of automatic repetitions. Freud observed that analysands were never aware of any motive for these behaviors, nor could an observer discover any in every instance; hence Freud (1920) rightly concluded that there has to be a fundamental biological basis, inherent in the organization of the central nervous system, for the tendency to repeat. The first type of repetition he discerned (Freud, 1912) was that of patterns of behavior and attitudes initially experienced in relation to the primary caretakers of childhood. Freud observed that analysands reexperienced these patterns vis-à-vis the analyst—a process he named "transference." He proposed (Freud, 1914a) that transference repetition takes place in lieu of the recollection that might make it possible to transcend persisting childhood mental dispositions that lead to intrapsychic conflict.

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[4] The most complete review of these mental operations is that of Anna Freud, 1936. See also Gedo and Goldberg, 1973.

From the clinical perspective, the conceptualization of transference made it feasible in most instances to transcend therapeutic difficulties caused by analysands' seemingly irrational emotional reactions to the analyst through interpretation of their significance as repetitions of aspects of the past (Freud, 1915). Transference interpretation is the therapeutic tool that has made it possible to conduct long-term analyses in the course of which the voice of reason may gain a hearing despite any initial distress caused by its message.

Freud (1920) eventually observed the obligatory occurrence of repetitive behaviors that produce neither pleasure nor profit; as he put it, these compulsive repetitions are "beyond the pleasure principle" that governs most unconsciously motivated activities. These were the instances for which Freud was never able to discover any motive, so that he was forced to provide a purely biological explanation for them. His commitment to an energetic model of mental functions led him to the mistaken conclusion that the compulsion to repeat is caused by the operation of entropy (that is, the loss of organization). Because this hypothesis turned out to be unacceptable to most psychoanalysts, the important observations it was meant to explain were for some time neglected. In recent years theoretical biology has emphasized the need to perpetuate the organization of complex living systems; this overriding biological principle provides a rationale for the automatic repetition of existing patterns, even if in current circumstances they violate the pleasure principle (Gedo, 1979, 1988; Modell, 1993). Thus Freud's twin discoveries, of transference and the repetition compulsion, turn out to be crucial components of adaptive behavior.

The Genetic and Structural Viewpoints

The last Freudian scientific discovery of major import (Freud 1900, 1909, 1923, 1926) is the role of early childhood vicissitudes (the traumatic consequences of stressful experiences, of illness and, above all, of unfortunate family relationships) in personality development and pathogenesis. This concept is called the "genetic viewpoint" of psychoanalysis (Rapaport and Gill, 1959). For the most part, Freud was able to reconstruct these traumatic events only if they occurred during the era he labeled "oedipal"— roughly between the ages of three or four and five or six; it remained for some of his successors to postulate the pathogenic consequences of even earlier vicissitudes.[5] The exceptions to this generalization demonstrate that his conception of a genetic point of view was, however, potentially broader than the period to which he applied it. For instance he described the devastating effects of congenital abnormalities on character formation as a result of early injury to self-esteem (Freud, 1916).

[5] For an overview of these developments, see Gedo, 1986, 1999.

A close corollary of the conceptualization of a genetic viewpoint was Freud's (1918) realization that the long-term effects of early experience imply that it has left behind affect-laden memories that continue to act as structured mental dispositions, that is, enduring functional propensities. From this functional perspective, insight into the enduring effects of the (childhood) past constitutes the "structural viewpoint" of Freudian theory. It is the concurrent use of the motivational (dynamic), the topographic, the genetic, and the structural frames of reference that qualifies Freudian psychoanalysis as the most comprehensive attempt to characterize the regulation of human behavior (Rapaport and Gill, 1959). Freud conceived all these metatheoretical viewpoints from a biological perspective, but that commitment is clearest in the case of the structural point of view, because it refers not to the *contents* of mind but to the manner in which those contents are processed (Freud, 1923). In other words it was the structural viewpoint that provided Freud's psychological theory with its connection to neuroscience.[6]

Primary and Secondary Processes

Freud has rightly been dubbed a "biologist of the mind" (Sulloway, 1979), for the foregoing list of his important and lasting scientific contributions (including the development of a novel observational method) can properly be characterized as valid biological discoveries. Paradoxically his fame was not to be based on any of the contributions I have thus far discussed. The popular imagination was captured by Freud's reports of the conflictual mental contents he typically encountered in his clinical work. Because he was ever trying to find human universals, Freud's necessarily limited clinical experience was seldom sufficient to yield universally applicable conclusions about intrapsychic conflicts, so that most of his hermeneutic claims have subsequently proved to be of limited applicability. In other words, in the infinitely variable territory of mental contents, Freud's overly ambitious efforts to generalize turned out to be based on sampling errors.

Nonetheless, Freud (Freud, 1900, chapter 7) made one discovery of universal import about the contents of human thought, that of the distinction between the consensual language of adult discourse and the language of dreams, neurotic symptoms, parapraxes, and jokes (Freud, 1900, 1901, 1905a; Breuer and Freud, 1893–1895). He gave these distinct languages the designation of secondary and primary processes, respectively. Much of Freud's magnum opus, *The Interpretation of Dreams*, deals with a detailed description of how the primary process

[6] Freud tried to amplify that connection by postulating a complementary "economic viewpoint" that dealt with putative vicissitudes of psychic energy. His ultimate statement on this subject (Freud, 1940) continued to maintain this concept. The hypothesis of psychic energy has become untenable as a result of more recent knowledge about the operations of the central nervous system.

operates and how it may be translated into rational discourse. Freud himself believed that his decipherment of the language of dreams was the greatest of his accomplishments. If there is no general agreement about that judgment today, such an alteration in the appreciation of Freud's masterful clinical discovery has come about because he tried to fit his observations into the metapsychological (psychoeconomic) framework that has been invalidated by subsequent scientific findings, thus obscuring their significance.

The Yield from Invalid First Thoughts

The foregoing list of Freud's lasting scientific contributions is by no means exhaustive, but from a contemporary perspective these are his observations and conclusions that continue to have the greatest value in explicating human behavior and its regulation. By contrast a valid proposition such as Freud's (1905b) assertion that human beings are ever bisexual has not, for the moment, found a prominent role in explaining these matters. In my judgment, however, through the development of a novel observational method, Freud discovered a universe of fresh data that for the first time permitted proper appreciation of the role of childhood experience in structuring mental dispositions of crucial import for adult adaptation, gave rightful emphasis to the dominant role of unconscious mental processes as well as of primary process thinking, and highlighted the essential part played by the automatic repetition of old behavioral patterns in health and disease. These contributions alone would justify Freud's reputation as one of the foremost scientists of the past century.

The assessment of a scientist's stature should not, however, be based on the number and importance of valid hypotheses alone; it should include contributions to scientific progress through raising crucial questions and/or proposing hypotheses that may miss the mark but subsequently promote fruitful inquiry. Freud put forward too many heuristically useful ideas that are no longer regarded as entirely valid to allow me to discuss them all in this essay; rather I hope to convey the importance of such "first thoughts" about scientific puzzles by focusing on a few examples.

When the clinical experience of the early psychoanalytic circle began to broaden, they encountered character types who did not develop the kind of transference Freud had initially observed in his work with patients who only suffered from well-defined neurotic symptoms. This new finding confronted Freud with the inadequacy of the theory of motivation he was then espousing, one based on the concept of instinctual drives. He was not ready to scrap that theory because of a single "anomaly"; instead he amended it (Freud, 1914b) by postulating another form of drive, that of "narcissism." (Later investigators were able to discern specific transferences displayed by "narcissistic" personalities [see Kohut, 1971], thus substantiating that through this concept Freud had come to grips

with a real psychological entity.) In contemporary psychoanalysis, narcissism is no longer understood as the product of an instinctual drive (Gedo, 1979)—in other words Freud's initial contribution on the subject was in large measure invalid. Yet the notion of narcissism was of such heuristic value that it has truly suffused modern views of humanity, and all students of human behavior have had to tackle the behavioral correlates of narcissism: selfish ruthlessness, arrogance, vanity, and ingratitude. Thus the conceptualization of narcissism turned out to be one of Freud's most fruitful scientific notions.

The Freudian concept of psychic trauma has had a similar fate. Originally the idea was borrowed from neuropathology (Breuer and Freud, 1893–1895); when Freud gave up on the effort to base his work on the brain science of the 1890s, he retained the notion without specifying the physiological mechanisms it involves. Clinical observation has amply confirmed the reality of traumatic states—psychoanalysts encountered them in pure culture, so to speak, in numerous casualties during both world wars (Abraham et al., 1919). There is no controversy about the observation that psychological traumata suffered in early childhood may lead to maladaptive consequences. Late in his career, however, Freud (1926) offered an explanation of trauma on an untenable psychoeconomic basis that has now been abandoned by most psychoanalysts. Despite this invalid hypothesis, recent views of psychopathology (e.g., Modell, 1993) have frequently been centered on the concept of trauma (now understood as the disorganization of established structure), so that this early Freudian idea has proved to have led to illuminating theoretical progress.

I shall have to content myself with offering only one additional example of a partially misconceived notion that led to fruitful results. Clinical experience led Freud to the realization (Freud, 1914a) that correct interpretation of the analysand's mental contents did not by itself produce behavioral change. He postulated that, beyond interpretation, a process of "working through" is needed in order to master the affects previously warded off by defensive operations. There is universal agreement about the necessity of working through to achieve therapeutic success. It is not widely understood, however, that such a process is not merely a matter of mastering the unpleasure of facing the truth: behavioral change is contingent on the establishment of new neural networks (through novel activity patterns), thus disestablishing automatic reliance on those previously available (Gedo, 1996). Although Freud's understanding of working through was inexact, the concept forever altered the technique of treatment by putting an end to unrealistic expectations that rapid change should follow "insight."

The Freudian Legacy

Within psychoanalysis, Freud's prestige remained enormous well beyond his lifetime. As the founder of the discipline so many of whose ideas proved to be

valid and/or fruitful, for many he exerted an aura approaching infallibility. Happily, such unrealistic attitudes of idealization have gradually disappeared; in contemporary psychoanalysis each of Freud's specific contributions can generally be assessed on its particular merits. (Those psychoanalysts who cannot dispense with an idealized *Meister* can choose among a number of more recent contributors to put on a pedestal.) I believe psychoanalysis is now ready to give Freud credit *only* where credit is due.

Whether the general public can forgive Freud for not having been infallible remains to be seen. It is not unusual for great contributions to go into temporary eclipse with a change in intellectual fashions, and the postmodern era has not been conducive to introspection—for that matter, to the *vita contemplativa* as a whole. Yet Dark Ages are generally followed by a Renaissance.

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