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The Linguistic Act

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Noam Chomsky suggests in his essay in this volume that inquiry into language should proceed as it would for any body organ or system. This suggestion should meet a receptive audience in psychoanalytically trained psychiatrists and psychologists who daily use language as a self-contained system of communication. After all, psychotherapy is for all practical purposes a linguistic discipline and so has much to gain from a deepened understanding of what language is all about.

As a biologist steeped (Pribram and Gill, 1976) in Freud's *Project for a Scientific Psychology* (1895), I feel at home with both Chomsky's and Freud's approaches to language. Freud's experience and insights (*On Aphasia*, 1953) into the disturbances of language produced by brain injury were the cornerstone of the portions of the Project devoted to thought, speech, and language (Forrester, 1975). Chomsky treats the brain as the locus of origin of the organ of language, and most of my life has been devoted to studying brain function. I want, therefore, to anchor the discussion of the relationship between language and psychoanalysis by reviewing the relevant facts about brain function, and will do this according to the outline for inquiry provided by Chomsky: function, structure, physical basis, development in the individual, evolutionary development.

Language and Cognition

First, let us inquire whether it is appropriate to treat language as a separate functional system. Might it not be preferable to think of language as the ultimate development in cognitive ability? Freud, in the Project, does in fact treat speech in this fashion:

> The biological development of this extremely important . . . [kind of] association also deserves consideration. Speech-innervation is originally a path of discharge for ψ, operating like a safety-valve, . . . it is a portion of the path to *internal change,* which represents the only discharge till the *specific action* has been found. This path acquires a secondary function from the fact that it draws the attention of the helpful person (usually the wished-for object itself) to the child's longing and distressful state; and thereafter it serves for *communication* and is thus drawn into the specific action. At the start of the function of judgement, when the perceptions, on account of their possible connection with their wished-for object, are arousing interest, and their complexes (as has already been shown) are dissected into an unassimilable component (the thing) and one known to the ego from its own experience (attribute, activity)—what we call *understanding*—[at this point] two links emerge in relation to utterance by speech. In the first place, there are objects—perceptions—that make one *scream,* because they arouse pain; and it turns out as an immensely important fact that this association of a sound (which arouses motor images of one's own as well) with a perceptual [image], which is composite apart from this, emphasizes that object as a hostile one and serves to direct attention to the perceptual

> [image]. When otherwise, owing to pain, one has received no good indication of the quality of the object, *the information of one's own scream* serves to characterize the object. Thus this association is a means of making memories that arouse *unpleasure* conscious and objects of attention: the first class of *conscious memories* has been created. Not much is now needed in order to invent speech. There are other objects, which constantly produce certain sounds—in whose perceptual complex, that is, a sound plays a part. In virtue of the trend towards *imitation*, which emerges during judging, it is possible to find the information of movement attaching to this sound-image. This class of memories, too, can now become conscious. It now still remains to associate intentional sounds with the perceptions; after that, the memories when the indications of sound-discharge are observed become conscious like perceptions and can be cathected from ψ.
>
> Thus we have found that it is characteristic of the process of *cognitive* thought that during it attention is from the first directed to the indications of thought-discharge, to the indications of speech. [*S.E.*, 1 : 366–67; Freud's italics, translator's brackets]

And again: "*Thus thought accompanied by a cathexis of the indications of thought-reality or of the indications of speech is the highest, securest form of cognitive thought-process*" (*S.E.*, 1 : 374; Freud's italics). This treatment of language in the Project is consistent with Freud's analysis in his book *On Aphasia*. The book was written in protest to the naïve localization of psychological functions in the brain so popular in the latter part of the nineteenth century. Freud emphasized the relationship between cortical areas in the construction of functional systems, a view later es-

poused by Liepman and currently by Geschwind (1965).

Thus, if we accept the psychoanalytic metapsychology uncritically, we cannot proceed with the inquiry as Chomsky has proposed. If language is simply the tip of the cognitive iceberg, we had better look to cognitive processes as a whole—to the development of intelligence rather than of language—as the subject matter of our analysis.

Two facts argue against identifying language with cognitive ability. First, although Freud correctly argued against naïve localizationism, it is untrue that brain damage, cognitive deficit, and language disturbance occur indiscriminately and pari passu with one another. Freud was, in fact, responsible for naming the agnosias (cognitive deficits—disabilities in "gnosis" or knowing) and distinguishing them from aphasias, disabilities in speaking. Every neurologist, including Freud, knows that the agnosias come in a variety of sensory-related modes (stereognosis, visual agnosia, and so forth) and that the brain loci for injury to one or another gnostic system are different from the loci that result in language disturbances. I believe Freud took these distinctions for granted and emphasized the development of the audiovocal process and its disruption because he had already made the distinction between audiovocal agnosia—that is, aphasia—and other forms of agnosia. But I may be mistaken in this belief, and Freud may well have considered the audioverbal, visuoverbal, tactiverbal functions—and thus the aphasias, alexias, and agraphias—as part and parcel of the brain's cognitive mechanism. Such a view would not, in itself, be contrary to the data on the localization of language functions in the brain. (For review, see Pribram, 1971, chap. 19).

There is a second piece of evidence, however, in support of Chomsky's approach, and this one is less ambigu-

ous. Anyone who has visited an institution that houses the mentally retarded cannot but be impressed by the verbal fluency of so many of the retardates. Despite severe cognitive limitations, these patients are able to speak and communicate readily. There are some, in fact, whose mathematical language ability is so well developed that they are known as "idiot savants"—they can often outperform simple computers in speed and accuracy of computation. Whatever the brain mechanisms for cognition and language, they are separately affected in these patients—language fluency often remains intact despite severe cognitive retardation. Thus, language cannot be just the tip of the cognitive iceberg, the ultimate expression of cognitive ability.

Language and Communication

Having disposed of this initial problem concerning the separateness of the human linguistic system, we are now ready to proceed seriously with Chomsky's suggestions for analysis. What is the function, structure, and physical basis for language? I have elsewhere presented my views on these topics (Pribram 1971, 1973, 1975, 1977) and the reasons for them, but they bear reviewing in the context of the psychoanalytic frame. Further, linguists, neurolinguists, and psycholinguists continue to be active in exploring these questions, so new relevant data are continuously being brought to bear on the hypotheses put forward.

Human language appears to be used for two purposes: communication between individuals and communication within an individual (that is, thinking). However, interindividual communication can take place without the use of language (as by eye contact, simple gesture, distancing, and the like); and thinking can use imagery, be devoid of the rules that define ordinary language, or, for that mat-

ter, be devoid of any other discernible structure. Interpersonal communication and thought thus do not define human language; they only describe its functions. The situation is a familiar one in physiology: the main function of breathing is respiration, but respiration encompasses oxygen and carbon dioxide transport by red blood cells, membrane properties, and so forth, as well as breathing. The definition of a process is ordinarily given in terms of its structure, that is, its components and their arrangement. The function of a process relates it to a larger domain (much as relativity relates mechanistic laws to larger universes).

Language and Information

In short, the function of language is communication—inter- and intrapersonal. The next question to be answered, therefore, is how is the function accomplished—how does language communicate? The contemporary answer to this question given by behavioral and neuroscientists is in terms of information-processing. This answer can easily mislead one, however, if the definitions of "information" and "processing" are not clearly delineated.

The term *information* is used by scientists in three distinct ways. One way is akin to the common definition that information conveys meaning. This is the "semantic" definition. Second, communication scientists speak of information as the amount of uncertainty reduced when a message is transmitted. This measure on information has been related to its novelty and to the reciprocal of entropy, a thermodynamic concept that defines the efficiency with which energy is organized (Brillouin, 1962). This second definition of information is its "transmission" definition. Third, control engineers use the term *information* to denote the amount of match or mismatch between a setpoint and the input/output to that setpoint in a feed-

back loop. Here "information" becomes synonymous with "error." This, then, is the "control" definition of information.

The distinction between information as "novelty" and as "error" was initially recognized by Shannon and Weaver (1949), who labeled them "good" and "bad" information. Ashby (1960) also recognized the distinction, pointing out that error reduction was in fact different from uncertainty reduction—error reduction enhances redundancy rather than providing novelty.

During the nineteen-fifties and early sixties, information scientists failed to perceive the distinction between error-processing by closed feedback loops and the processing of messages conveying novelty—that is, instructions—by computer programs which are hierarchical open-loop (helical) constructions. This failure in part accounted for difficulties in applying information concepts to problems in the behavioral sciences, including psycholinguistics.

However, once the distinction between the two types of processes is achieved, information concepts become extremely helpful. For instance, it is clear that the psychoanalytic concepts of primary and secondary process are based in large part on such a distinction. Primary processes are defined by Freud in the Project as those in which neuronal discharge takes place. Such discharge can lead to muscular contraction, chemical secretion, or neural association—all primary processes which are subject to feedback regulation via the environment, neural sensitivities to the chemicals secreted (or others stimulated by the secretions), and reciprocal innervation. Freud clearly distinguishes such primary from secondary or cognitive processes, which are hierarchically organized by a variety of carefully described neural mechanisms. (See Pribram and Gill, 1976, for review.)

As noted, Freud places speech at the top of the secondary-process, cognitive hierarchy, whereas Chomsky considers language as a separate system. Are these two views incompatible? The answer to this question cannot be given in functional terms. We must, therefore, now turn to linguistic structure and its physical embodiment to pursue the question posed by this difference between Freud and Chomsky.

Language, Sign, and Symbol

Note that Freud discusses speech, while we have been discussing language. Perhaps herein lies the key not only to any possible differences between Freud's approach to language and Chomsky's, but to the larger problem of what makes human language human.

We have already encountered the fact that interpersonal communication can occur nonverbally through gestures and the like. Communication is also established by artifacts, and it is only by way of such artifacts that prehistoric man communicates with us. Whether such cultural artifacts are to be considered a "language" is a moot point. Certainly they are representations, and their communicative use is specified by rules. If we agree that communication by gestural signs can constitute a language (as claimed by those using American Sign Language to communicate with apes—for example, Gardner and Gardner, 1975), then why not communication by cultural artifacts?

Artifacts as language have an advantage over gestures and speech not only in that they are palpable, but in that they allow us to view in slow motion, as it were, the biological processes involved in their construction. These processes, as we shall see, are the same as those that characterize gestural and verbal languages; but because artifacts are less temporary, their construction and communicative impact can be analyzed at leisure.

Artifacts are of two sorts—both representations of occurrences, that is, of objects and events. One type of artifact attempts to portray the object or event as faithfully as possible, recording it for subsequent use. The other type of artifact is an arbitrary token whose meaning is locked in the rules of usage. The record type of artifact depends on the stability of the physical universe for its interpretation; the arbitrary token demands social stability for decoding.

Different brain mechanisms are responsible for the two types of representations. Records are constructed by way of the posterior convexity of the cortex, while arbitrary tokens involve the functioning of the fronto-limbic forebrain (Pribram, 1971, chaps. 17 and 18).

The distinction between record and token has also been used to analyze verbal communication (Peirce, 1934), where the term *sign* is often used to indicate a record while *symbol* stands for a token. Thus, the letters *a*, *c*, and *t* are signs that invariably denote letters of the alphabet in many languages, while "act" and "cat" place these letters in symbolic combinations, "words," whose meaning (that is, usefulness) depends on the particular language and the sentences of that language in which the "words" are found.

Computer scientists also distinguish between constructions that are sensitive only to the local context—a figure-ground relationship—and those that depend on more general contextual structure for meaning. The figure-ground type of record is ordinarily called context-free to contrast it with more generally context-dependent constructions. The organization of context-free constructions is by way of categorization and is therefore hierarchical. The organization of context-dependent constructions is by way of interweaving graph structures, more weblike than treelike.

There is every reason to believe that the brain organization involved in the construction of context-free signs is categorical and hierarchical, while that of context-dependent symbolic representations is weblike and often paradoxical. I have elsewhere (Pribram, 1971, 1974a, 1974b, 1974c, 1976) detailed the evidence for these two types of neural mechanisms, proposed some mathematical tools by which to describe them, and delineated the problems they raise for understanding human verbal propositional language. Before reviewing some of these facets of the issues, however, let us return to artifacts as communicative representations and discuss the more general problem of human action as a representational process.

Language and Action

The analysis of what constitutes an "act" must take into account the difference between the structure of a process and its function, discussed earlier. There are three levels to be considered: The anatomical (structure), the physiological (process—which maps structure into function), and the behavioral (function). The anatomical substrate of action is the neural motor mechanism with its muscle effectors. The physiological process of that mechanism concerns movements, that is, patterned muscle contractions and relaxations. The behavioral function engaged by the neuromuscular system is an environmental consequence of those movements. The levels are distinct and what is known about each poses problems for the others to explain.

Thus, anatomically, the motor system displays a precise topographical relationship between muscle and brain cortex. Functionally, however, this topographical relationship becomes organized into patterns centered on joints. The question arises as to how this is accomplished. Further, at the behavioral level equivalences become

manifest—the same act can be performed by a variety of movements (one can write with one's left hand, toes, or teeth if one has to—and experience with these uncommonly used effectors is not essential).

I have suggested that the mapping of topographical precision into movement and movement into action occurs by virtue of the inhibitory interactions among the topographically distinct pathways; that mathematically, the frequency domain best describes these inhibitory interactions; and that equivalences are accounted for by the sensitivities of the frequency domain to the environmental consequences of movements rather than to the pattern of movements or the singular muscle contractions (or relaxations) per se. Thus, the reactivity of cortical motor neurons reflects the force exerted on or by the muscles rather than the extent of their isotonic or isometric contraction. The evidence for these suggestions has been reviewed in some detail (Pribram, 1971, chaps. 12 and 13; 1974c).

The important point here is that an explanation is possible and that it involves making the distinction between the structure of a physical organ or substrate, and the process by which that substrate is mapped into a behavioral function. It is most important not to confuse the process with the behavioral function engaged by the process. The organization of the neuromuscular mechanism is not the same as the pattern of movements it produces. Nor are patterns of movements the same as the acts (such as cultural artifacts) that are organized by them. Freud in the Project carefully makes these distinctions and adheres to them subsequently, and though most psychologists refer to responses as acts (Skinner once pointed out that behavior is the set of responses recorded on a cumulative chart to be taken home and studied), they do so implicitly rather than explicitly. By contrast, ethologists and other

more biologically oriented behaviorists identify responses with the patterns of movements elicited from the organism by environmental stimuli. Is it any wonder, therefore, that psychologist and biologist fail to understand one another, despite the fact that both are studying "the behavior of organisms"?

When we extend this analysis to communicative acts, to the construction of signs and symbols (and to combining them into statements—see below), we attain a new perspective. Motor *acts* (as contrasted to movements) involve environmental consequences and can thus be sensed as such. In fact, the entire motor mechanism operates in large part by regulating the sensitivities of muscle receptors (through the γ efferent neurons). The thermostat, with its feedback organization, becomes the model for action, rather than a stimulus-response arc. George Miller, Eugene Galanter, and I (1960) proposed the Test-Operate-Test-Exist (TOTE) as the elementary representation of this process. Powers (1973) has developed our proposal into a theory which emphasizes that *all behavior* is undertaken to satisfy some *perceptual* requirement. And George Miller and Philip Johnson-Laird (1976) have applied the same principle to the study of language—especially the meaning of words. So let us take a look at the relationship between perception and language as it pertains to the construction of signs, symbols, and statements.

Language and Perception

Artifacts as records and tokens can be processed at leisure. By contrast, gestures and voiced articulations are fleeting, and their sense must be processed rapidly for communication to occur. Still, the neural mechanism for *generating* gestures and voiced articulations cannot differ in kind from the motor mechanism described in the pre-

vious section: The generative process must be built by control over receptor processes that sense *consequences,* not the muscular contractions in fingers or in the vocal apparatus.

Again, let us take an intermediate step to see how this might be accomplished. Consider first a musical instrument interpolated into the communication between fingers and audience. According to the principles outlined above, the guiding representation in the brain of the musician would be that of the consequences of fingering the instrument (keyboard, strings, or stops), rather than that of the contractions of the finger muscles.

Now consider a voiced articulation. Here the vocal apparatus becomes the instrument, and the representation must consist of the effective *use* of that apparatus, not of the individual contractions of vocal cords, palate, tongue muscles, and so forth. In this instance, as in the case of the musical instrument, use is registered via hearing—but other modalities may become involved as well. Use, therefore, constructs a multimodal representation in the motor mechanisms of the brain, a representation of the effect muscular contractions have on altering a variety of *sensory* inputs. Communication occurs when a match is established between these sensorimotor representations in the communicants.

The point of this analysis is that though we perceive acts, including communicative acts, the communication is a form of action, *not* perception. Action is different from perception. Perceptions generate brain representations of occurrences, that is, of objects and events in the perceiver. Communications can also be said to involve "perception," but this broad use of the term obscures the fact that an entirely different process is described. Occasionally, the term *perception* is used in this broad sense to also denote feelings—in which instance brain bio-

chemical states are "perceived" and labeled. In its more restricted sense, the term *perception* refers only to the process of imaging and categorizing objects and events—while the term *feeling* is used to refer to our awareness of internal states. In the same manner, actions describe yet another process, distinct from perceptions and feelings. Actions denote the generation of environmental representations. When the act is communicative, the environment in which the representation is generated is another brain. Thus, a communication occurs when act and percept fuse in both actor and perceiver.

Language and Feelings

Language thus derives from action but *generates* perceptions and feelings. When language generates perceptions, signs are constructed. When language describes feelings, symbols result (Langer, 1972, p. 400).

By what process, then, does language generate perceptions and feelings? Return once again to artifacts. Artifacts are external, environmental representations of the internal, neural, sensorimotor representations that generate the artifacts. The artifacts can be *made* to resemble some object or event. However, as a representation it resembles the object or event, it does not reproduce it (*we* paint a picture of an orange; only orange *trees* reproduce oranges). On the other hand, the artifact can be made to generate a feeling—a feeling of familiarity or novelty, of comfort or effort, of feasibility or infeasibility, and so forth. The artifact as token is so constructed that its use reevokes a feeling rather than an occurrence per se. (A religious symbol is a token of shared feelings.) Of course, an artifact can be both record and token, a duality that enhances its communicative power.

When communication is less stable, as by gesture and speech, the duality of record (sign) and token (symbol)

becomes processed in a variety of ways. In human language, making significant and symbolic representations is called making statements. Ordinarily, statements symbolize *feelings* about the significance of objects and events. "The boy is running away." The statement is one about a belief regarding "boy," "running," and "away." "Boy," "running," and "away" record (signify) occurrences; "is" serves as a token (symbol) for the belief (feeling of familiarity and feasibility) that the statement is representative.

Several levels of sign and symbol construction can be identified in human language. Two have already been used as examples: (1) *a, c, t* as signs vs. *act* and *cat* as symbols, and (2) the just-completed analysis of the statement "The boy is running away." How did human language develop such an intricate and involved organization of statements composed from the same two always distinct brain processes, those generating signs and those generating symbols, processes that are repeatedly fused in level upon level?

As both Freud and Chomsky suggest, the answers to this question must come from looking at the development of the human organism, both in history and as an individual.

Language and Thought

An important discovery has recently (Marshack, 1975) emerged from the study of prehistoric human art and artifact: Beyond any reasonable doubt, some such artifacts are symbols depicting feelings, not just signifying occurrences, and symbolic art and artifact can be found whenever and wherever the genus *Homo* existed. Early man thus molded sign into symbol in order to communicate his feelings. It is, of course, equally clear that the beginning of the historic period is characterized by the significant use of symbols—arbitrary tokens representing the

familiar are combined *according to shared rules* (feasibilities) into *words* that signify occurrences.

It is unlikely that words were first generated in man's haptic-visual (written) competences; in fact, there is evidence in the body of prehistoric legend that "in the beginning was the word"—that is, that the significant use of symbols was initiated by the vocal-auditory apparatus, perhaps as early as the making of symbolic artifacts. But the evidence is not conclusive. Two distinct stages in the development of human communication—and thus culture—may well have occurred. During the first stage, artifacts and gestures predominated. The competencies that developed during this period were primarily haptic and visual. Gestures were used to denote occurrences, while other nonverbal, though not necessarily nonvocal, means were used to express and communicate feelings. Only in artifacts were the two processes combined—environmental representations could signify both an occurrence and its symbolic evocation of feelings.

The second stage of development of human communication appears to have centered on the use of the vocal-auditory apparatus. Either the dramatically increased vocal-auditory competence occurred early but remained latent, or because of the environmental impermanence of the representations it generates, there is no early record of the exercise of this competence. In any case, by the time of the legendary period of prehistory, vocal-auditory communication had been honed to a high level of sophistication. By the end of this period, the vocal-auditory competence had become sufficiently well developed so that expressions of feelings—symbols—could be used to denote occurrences; shared rules had been developed—that is, logical thinking had taken place. However, in order that such rules could be formulated and formally transmitted, a new cultural tool (artifact)

was invented that gave permanence to the vocal-auditory achievements. This tool combined the vocal-auditory and haptic-visual competencies in the act of writing and ushered in the historic period.

The significant use of symbols—best exemplified by mathematics—manipulates tokens according to shared rules that allow the symbols to be used as signs, provided the frame of rules remains inviolate. Logic thus depends on establishing axioms, frames, or contexts—symbolic constructions representing familiarities and feasibilities. Within the context of these frames, symbols can be used as signs; ordered manipulation of the content of the representation can take place. In short, the organism can think logically.

The vocal-auditory competence and the haptic-visual competence thus differ in emphasis. When art and artifact are generated, significance, that is, record, is essential to the representation. The sign can then be used as a token to represent a feeling—but this becomes a secondary use. Vocalization, by contrast, is used by all primates to express feelings, thus the vocal-auditory competence is primarily and initially a symbolic competence. How that competence came to be used to signify occurrences remains the main question to be answered regarding the evolution of man.

Language and Learning

A few tentative answers to this question are beginning to emerge from studies of the relationship of the development of the brain and the development of language in individual human beings. In most of us vocal-auditory competence—speech—is located in the left hemisphere. Its cortical representation, as might be expected, is centered on the termination of tracts bringing signals from the cochlea and the origin of others that control the vocal

apparatus. Phylogenetically the ear developed from the gill slits of fishes; thus, both peripherally and centrally, ear and vocal apparatus are juxtaposed—there is no long route to traverse from throat to ear or from auditory sensory cortex to vocal, sensory, and motor cortex. Our vocalizations directly influence the cochlea, and there is overlap between secondary auditory and secondary sensory areas receiving input from the vocal mechanism.

One of the most pervasive attributes of human existence is the long period of dependency of human infants, children, and juveniles. During this period the normal brain cortex becomes programmed by its input. Thus, in individuals who for one reason or other are born without arms (for example, the thalidomide babies) only a rudimentary cortical representation of arms develops. Or, if animals or humans are deprived of normal patterned visual input (as in squint or congenital cataract) during this developmental period of plasticity, the cells of the visual cortex fail to develop and even deteriorate in their innate competence to resolve patterns (Wiesel and Hubel, 1965; Hirsch and Spinelli, 1970; Westheimer, 1972). And we all know how easily and flawlessly children can learn second languages until puberty, after which much greater difficulty is experienced and "accents" cannot be erased.

This extended period of plasticity of the human brain is perhaps best illustrated by the well-known fact that entire hemispherectomies—even of the hemisphere in which the language representation has been initiated—can be performed before the ages eight to ten with remarkably little permanent damage (Smith, 1966, 1972).

More recently a subtle finding has emerged. When the brain is damaged during childhood in and around the auditory cortex, it is frequently possible for other portions of the same hemisphere to be recruited to take over the language competency. When, however, damage

occurs in the sensorimotor representations of the vocal apparatus, the development of language competence invariably shifts to the opposite hemisphere (Milner and Rasmussen, 1976). This suggests that the vocal aspect of the vocal-auditory competency is the more pervasive and primary of the two—that the act of vocalization is the origin of the competence.

Remember once more, however, that an act is constituted by making an *environmental* representation—in the case of vocalization this would mean a representation in the vocal apparatus that produces an invariant input to the auditory portion of the vocal-auditory mechanism.

The process so described calls up an image of a primitive young person—perhaps even an infant—vocalizing for the pure joy of being able to produce recognizable sounds. The babbling stage of modern man, which quickly leads to holophrases, is the contemporary equivalent. Having generated these identifiable sounds by virtue of this characteristically human competence, the primitive person begins to attach these vocal-auditory artifacts to the haptic-visual ones that his humanness has already generated. It is only a step then to use the vocalizations to denote the occurrences that the artifacts were meant (used) to represent. Symbolic expressions of joy (familiarity, effort, feasibility, and comfort) are being used as signs. Thought has occurred. Speech has developed and human communication by statements of symbolic significance become possible.

Conclusion

In concluding, let us return to Freud and Chomsky and the question of a separate linguistic competence—a separate organ of mind for language. As noted, Freud considers speech to be useful in generating representations with a minimal expenditure of energy. In the quo-

tation from the "Project," Freud emphasizes the role of somatic experience in the genesis of thought judgment. It is perhaps for this reason, as well as for the obvious fact of the written word, that Freud views language as a part of a more pervasive process. Yet, the clinical and psychometric facts do distinguish between linguistic and other cognitive competencies and even between various linguistic competencies—such as composing music or poetry or computer programs or mathematical models. Perhaps herein lies the solution to the puzzle: The human brain is composed of a variety of cognitive organs, *each* of which is graced with linguistic competence. Freud is right—language is the highest development of the cognitive mechanism.

But Chomsky is also right—there are a variety of cognitive processes, each with its own form and structure. The transformational aspects of only some of these cognitive structures are recognized as a form of human "language"; musical composition, poetry, mathematics, logic, and ordinary communicative language are among these. Gestural communications, musical melody and harmony, geometry and topology, the know-how of motor skills (for example, skiing, auto repairing, sculpture), we may be less inclined to call "language"—and the reader may have had his doubts about admitting the cultural artifacts that were used as examples in this essay as instances of the expression of any linguisticlike competence. But I hope that the analysis will not be scuttled because we are not yet agreed as to just which type of structure we shall admit to the category "linguistic." Such a definition should arise out of understanding, not be imposed on it.

In short, sociobiological and neuropsychological evidence and analysis suggest that in a sense both Freud and Chomsky are correct. Certain identifiable systems have developed in man's brain that make cognitive processing

possible to an extent not found in other primate brains. The enhanced cognitive processing of several of these systems—not just one, as Chomsky suggests—partakes of characteristics that we may comfortably identify as linguistic. They thus form the tips of cognitive icebergs, as Freud suggests; but contrary to Freud, we might not be comfortable in identifying all cognitive tips as linguistic. Currently, a great deal of attention is being centered on hemispheric specialization of brain systems. The left hemisphere in ordinary right-handed persons is specialized for processes that we commonly call linguistic. The right hemisphere is also specialized, for other cognitive processes, also peculiarly human—musical and manipultive abilities, for example—but not commonly called linguistic.

The problem remains, therefore, to distinguish the commonality among processes that we are willing to label "linguistic" and to determine whether one brain mechanism is responsible for them.

Sequentiality and stimultaneity are good candidates as the critical dimensions involved. Analysis of sequence is necessitated by the evanescence of the representations formed by vocal-auditory acts, while simultaneity is fostered by the structure of the gestural-visual mechanism. Thus, in the end we may well want to subscribe to Chomsky's suggestion and opt for a linguistic organ (or group of organs)—an organ derived from the operation of the vocal-auditory apparatus. As noted, Freud and all subsequent neurologists have defined vocal-auditory agnosias as aphasias—disturbances of language.

I, for one, am willing at this time to leave open the question of what constitutes a language. Written forms of the vocal-auditory act—with its phonemes, and so forth—constitute the prototype of linguistic communication today. But perhaps with the advent of television, the ges-

tural enactment of drama and the visualization of occurrence will become organized into a cultural communicative process that derives its structure more from gestural-visual generation of artifacts than from the vocal-auditory apparatus. Whether in the long run we shall call this structure "linguistic" remains to be seen. We are already concerned with "body language"; perhaps other "language" based on tonicity and mime are in the offing.

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4

What Is the Psychoanalyst Talking About?

MARSHALL EDELSON

> . . . the whole question of adapting language to psychology, after all the ages during which it has been adapted to bad logic, is so difficult that I can hardly do more than indicate some of its problems.
>
> Bertrand Russell

The psychoanalyst as a scientist expresses in theoretical sentences propositions about the mind. This paper considers some ways we might answer the question: What do the sentences making up the scientific theory of psychoanalysis mean?

The analysand also formulates expressions. The psychoanalyst tries to understand what these expressions mean. The psychoanalyst also tries to understand what the analysand means by these expressions. These two uses of 'mean' are not synonymous. The latter use of 'mean' implies such questions as: What does the analy-

Professor Ruth Marcus, Yale University Department of Philosophy, with whom I have studied philosophical issues in logic, did not discuss this paper or its contents with me throughout the writing of it. She is therefore in no way responsible for any errors; for my exposition or application of symbolic logic; or for any of my formulations or conclusions. However, any clarity in the paper regarding logic and philosophical issues in logic should be attributed to her. I owe a great debt to her for the stimulus and example of her thinking, which manages to be at the same time rigorous and precise, elegant, truth-seeking, and completely lucid.