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Phantoms in the Voice: A Neuropsychanalytic Hypothesis on the Structure of the Unconscious

Ariane Bazan (Brussels)

Abstract

Several clinical case fragments show how a reading of the subject's symptoms at the level of the signifier gives access to its underlying unconscious logic. Freud's "splitting of consciousness" model is proposed to have a neurophysiologic counterpart in LeDoux's model for the processing of emotional stimuli. The language fragments in these dynamics are considered as material phoneme vectors, corresponding to Freud's word-presentation and to Lacan's signifier. Accordingly, neurolinguistic research has uncovered a specific, well-organized lexical brain area in which the words are phonologically encoded. In line with Lacan, psycholinguistic research has shown how the linguistic train always has an ambiguous structure, transiently and unconsciously activating its different meanings, followed by inhibition of the contextually inappropriate meanings. Neurophysiologic research also shows how language is always a motor event. Imminent articulatory intentions that remain without effective execution will therefore give rise to articulatory or phonemic phantoms, searching for relief in substitutive signifiers. A neurophysiologic mechanism for Freudian repression is thus proposed, leading to the return of the repressed in symptoms with a similar phonemic structure though with a radically different meaning. The phonemic phantoms thereby organize the structure of the unconscious by functioning as attractors for the subject's mental energy in its (linguistic) action space.

Keywords

efference copy; false connection; phantom; repression; signifier; unconscious

Clinical and everyday psychopathology

The departure point of this research is a clinical observation that occurs frequently both in clinical and in everyday psychopathology. The principle of this observation is beautifully illustrated in Freud's case study of the "Rat Man" (Freud, 1909). This case study tells the story of a young man who consulted Freud because he suffered from a great obsessive fear. While in the army, he had heard an officer telling the story of a certain torment implying a rat: a pot containing rats was turned upside down on the buttocks of the victim and they bored their way into the anus. After having heard the story, the Rat Man feared that either his father or a girl he fancied would be subjected to this torment. The fact that his father had died a couple of years earlier shows the nonsensical character of his fear. Still, the idea repeatedly imposed itself on the Rat Man, mostly as a threat. He felt the compulsion to produce some behavior in some precise ways lest his fear would come true. If we consider this episode of his life as an isolated event, it is almost impossible to understand. When we consider the obsessive fear in the context of his life history, we can make some sense of it. A central preoccupation of the Rat Man at that time was related to a pending choice between two possible spouses. Indeed, while already in love with another lady, the Rat Man's mother had informed him, shortly after his father's death, that one of her cousins had declared himself ready to let the Rat Man marry one of his daughters. The Rat Man therefore found himself confronted with a dilemma concerning whom to marry, a problem that also directly referred to the Rat Man's father. Indeed, shortly before his father got acquainted with his mother, the father had made advances to a pretty but penniless girl of humble birth. The Rat Man's father finally exchanged this girl for his mother, who was brought up in a wealthy family. The actual dilemma of the Rat Man was therefore similar to that which had been his father's: the choice between his love and the wishes of his family. The marriage problem confronted the Rat Man with a number of

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crucial existential questions: what was my father's desire for my mother, and more generally: what's a woman to a man?

Now, the German word for the verb "to marry" is Heiraten. It appears that the crucial part in the Rat Man's obsession is "rat", not the meaning of the word referring to a rodent, but the signifier "rat"—that is, a fragment of speech considered from the point of view of its formal or material aspects, such as its phonology (see below). Indeed, during the course of the analysis another crucial reading of the signifier "rat" also became clear. At one point, the Rat Man relates how, as a child, he had a governess with whom he took a lot of liberties: "When I got into her bed I used to uncover her and touch her, and she made no objections" (Freud, 1909, p. 161). He also remembers that a little later she got married to a Hofrat (a title indicating a certain status), and from that point on she was addressed to as Frau Hofrat. Here again, the signifier "rat" appears at a nodal point of a similar existential question—namely, the enigma of a woman's (sexual) desire. Further on in the Rat Man's analysis it will appear that the signifier "rat" also refers to a financial debt of his father due to gambling [Spielratte]. Moreover, tellingly, the Rat Man had the habit of internally counting the money he had to pay for the sessions as "Eine Rat, Zwei Raten, . . ."

In the series of meaningful life events reported in analysis, a constant factor progressively appears and repeatedly reappears. However, this factor does not manifest in the form of a semantic constancy but does so as a signifier. The Rat Man's obsession with the rat torment indeed seems to make sense if the "rat" is not understood in its semantic reading, referring to a rodent, but as a signifier—a phonological speech fragment that is able to refer to different semantic realities but then endows these realities with the same, or reciprocal, emotional qualities regardless of the context. The coherence of the different life episodes, which at first glance might seem completely unrelated, is accounted for by their organization around this one specific signifier: rat. Every story the Rat Man tells Freud has a certain coherence given by the meaning of the story. There is one story, however, the meaning of which is completely unclear to the Rat Man himself: his great obsessive fear, and this fear precisely arises at this very junction at which these different life episodes come together (Van Bunder, Knockaert, Van De Vijver, Geerardyn, & Bazan, 2002; see also Bazan & Van Bunder, 2005).

Not infrequently it is objected that the logic of this clinical case is tied to the geographical and historical specificities of the transference encounter between Freud and the Rat Man and that for this reason it has no universal dimension. However, the particular attention to language regularities in mental symptoms is present throughout Freud's works and has been elaborately conceptualized by Jacques Lacan (1957), precisely with the introduction of the concept of the signifier. In many of the examples in *The Psychopathology of Everyday Life*, starting with the forgetting of the name "Signorelli", the unconscious logic of the parapraxes is given by its signifier structure. As a professor of psychology at the university where I teach, I had first-year students analyze a parapraxis of their own according to the logic of the unconscious such as they had understood it from their reading of Freud (1901). Among the many fragments I received, here is a particularly beautiful one, given in a context totally unlike Vienna in 1910—namely, Brussels in 2010:

"For six months now a good friend of mine has lived in Alkmaar in the Netherlands. While I had visited him already twice, I noticed how I systematically forgot the name of this city. The first time that I tried to reflect on the reasons for this forgetting, I focused on the second part of the word, namely "maar". Because she was still frequently present in my mind, this immediately made me think of "Marianne", whose first name starts with the same syllable. This girl has been my only serious relationship, and she left me after two years. My lack of engagement in our relationship was the main cause of our breaking up. I had a really hard time, and for a long time I remained focused on her, but without seeing her,

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however. I also noticed how I often forgot words containing the syllable “-mar-”. But the forgetting of the word “Alkmaar” struck me with much more insistence; indeed, I had to ask the help of my roommate three times after searching for it myself for a long while. Writing down “Akmaar” (At that time I thought this was the spelling of the city’s name), I noticed that the two first letters of the word had a very important meaning to me: AK corresponds to a combination in a poker hand. Indeed, A stands for “ace” and K for “king”. It is one of the strongest hands and therefore it’s one of the most played. I’ve been practicing poker on the internet for three years. Even if today I succeed in limiting the number of hours I play a day, I have in the past, including during my relationship with Marianne, spent more hours playing poker than I spent on sleep. I often refused to go out with her, so that I could continue playing. In other words, my addiction to the game was then almost complete, and this was the major reason for our splitting up. This association within the same word might explain my inability to retain it in memory, since this word concentrates on one the two major aches of my past and of my present.”

Notice how the interplay between the two parts of the words is also very meaningful here: this guy lost his “strong hand” with Marianne—he is no longer her king nor her ace. His forgetting of the word “Alkmaar”, again, is not due the semantics of the words, referring to the city or to his friend in that city, but has everything to do, as he convincingly analyses himself, with the signifier “Alkmaar” and how the material form of the word, independently of its semantics, has a proper unconscious logic. Now, a critic could still object that my class of (500) first-year psychology students was under collective hypnosis of my suggestive influence and exactly produced what I was looking for. Let us therefore end with a last example coming from someone who, of all people, cannot be suspected of being in a transferential alliance with Freud or Freudian theories—namely, the well-known neuroscientist and dream specialist Allan Hobson. In a strikingly sincere first-person account, Hobson (2002, pp. 386–387) reports one of his first dreams when dreaming gradually came back while he was recovering from a lateral medullary infarct in 2001. Here is a fragment:

“It took place in a foreign country. . . . Lia [Hobson’s wife] and I were on a trip. . . . We had plans to stay in an old-fashioned inn. There was already some discomfort and difficulty finding each other as we got the boat near to the shore. I caught glimpses of her. She was talking to someone else, a man. At one point, either before or just after we got off the boat, I noticed that she had given or sold to him a half-inch bit used with my large brace to drill holes in wood in Vermont. I was very surprised and somewhat hurt by this. I noticed also that the bit had been used to make a very perfect hole in the shoulder bag, which the man wore. It was a shoulder bag very much like mine. In the dream, Lia explained to me that she had sold the drill but would give me the money. It still seemed to me odd that she would give a stranger one of my most precious tools without asking me. I was feeling very vexed and apprehensive. . . . [S]he made it clear to me that she needed to have a secret life. When I was asking her about this man, it was clear that she meant that she needed to be free to have an affair with him if she wanted to. I found that very odd and very disquieting and tried to express my concerns. When we finally got to what appeared to be the inn, there was a strange scene in which she was again difficult to find. But I found her in what looked like a kitchen and she was preparing to cook some food, which struck me as odd, since this was such a flimsy excuse. I asked her when she would be finished and she looked at her watch and she said 45 min, to which I agreed, knowing that this was all the time she would need to make love with whichever stranger she had selected.”

The rest of the dream is also very interesting, but focusing on this first part, it seems clear, as Hobson (2002, p. 386) himself admits, that “the drill bit and the hole in my shoulder bag make only Freudian sense”. That the bit has a phallic meaning seems rather undeniable, but, probably unsuspected by Hobson himself, this is not only so in the Freudian “symbolic” reading on the level of the semantics of

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the bit (a drill, with an elongated piece which bores holes) but also in a Lacanian reading on the level of the signifier. Indeed, it is important to underscore that Hobson is in Nice in France when he has this stroke and that when recovering from it, he is cared for in a hospital in Monaco surrounded by a French-speaking staff. The “bit” in his dream, when read on the level of the signifier, is almost identical both in spelling and in sound to the French word “bite” [pronounced with the same “i” sound as in the English “bit”], which is a common slang word for, precisely, “penis.” It seems that Hobson’s dream process had made sure there should be no ambiguity on the true nature of “one of his most precious tools” . . . These various clinical fragments all show how a reading of the subject’s “symptoms” at the level of the signifier, rather than or next to a semantic level, gives access to its underlying unconscious logic.

False connections

Going back to the Rat Man, Freud would say that there is a false connection between the word-presentation “rat” and the affect of fear and threat. In 1894 Freud says :

If someone with a disposition [to neurosis] . . . in order to fend off an incompatible idea, sets about separating it from its affect, then that affect is obliged to remain in the psychological sphere. The idea, now weakened, is still left in consciousness, separated from all association. But its affect, which has become free, attaches itself to other ideas which are not in themselves incompatible; and thanks to this “false connection”, those ideas turn into obsessional ideas.” (p. ???)

In other words, Freud proposes that an idea can be experienced without its original affective valence such as when there is indifference to important and often traumatic life events. In parallel, that affective valence can become autonomous and attach itself to other, seemingly unimportant representations, causing them to become obsessional; alternatively, it can be invested in the body, causing conversion symptoms, for example.

One of the first moments of reconsideration of Freudian theories among neuroscientists came in 1994 with the publication of Joseph LeDoux’s work on the processing of emotional stimuli. His key finding is that incoming stimuli are treated by two quite autonomous pathways and that this “split” occurs at the level of the thalamus. One pathway—“the low road”—processes the affective valence and crucially involves the amygdala, a limbic structure that is able to register memory traces for affective conditioning. This pathway is subcortical, fast, evolutionarily old and ontogenetically early. The other pathway—“the high road”—processes the scenic or declarative content of the stimulus and involves the neocortex, which enables a rational analysis of the situation. This pathway is slow, evolutionarily recent and ontogenetically late. LeDoux (1994) himself indicates that this organization explains how important life episodes can be recalled without the expected affective load on the one hand and that affective activation can be relived without the declarative contents that could account for it on the other hand. If we make the further hypothesis that the affective activation can attach itself to other ideas, we have here a neuroscientific rationale for the mechanism of false connections and, in its wake, for obsessional symptoms. (See Figure 1.)

The consequence of this logic would be that, when confronted with neurotic symptoms, we also pay attention to the literal language used by the subject to describe his or her experience and to its possible alternative meanings. Indeed, the signifier structure of the symptom might reveal part of its etiology. On a more conceptual level, the mechanism of false connection implies that language is considered as a material substrate of the mental apparatus.

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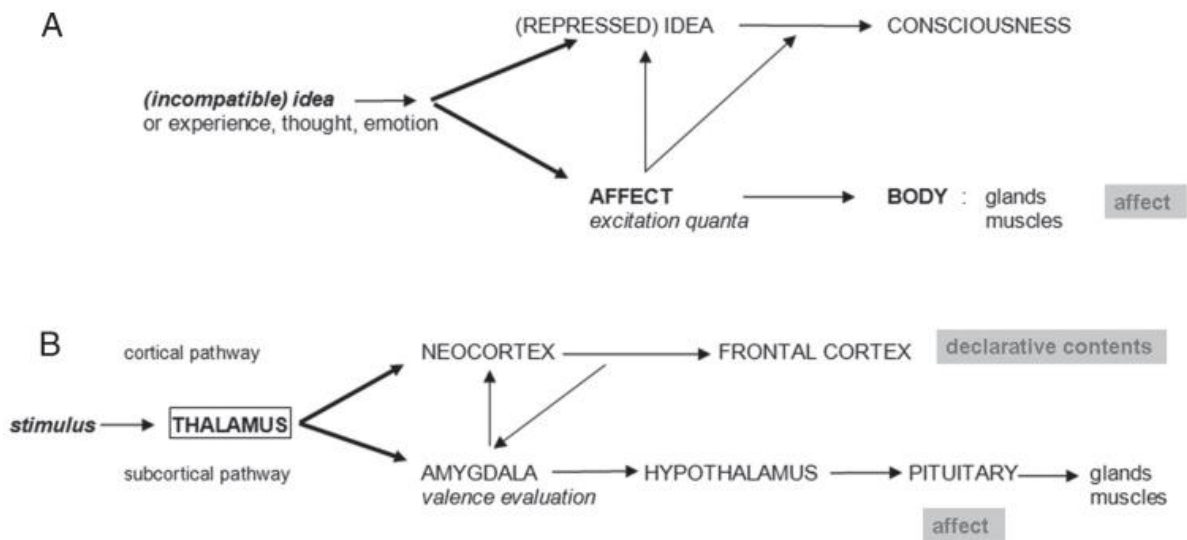


Figure 1. A comparison of Freud's 1894 model of the splitting of consciousness (A) and LeDoux's 1994 model of the processing of emotional stimuli (B).

The material of language

This material substrate is the word-presentation, according to Freud. In his model (see Figure 2), Freud (1891) adheres to the classical view that the objects of the world are encoded in the brain through the perceptual a this is the object-presentation level. He then makes the logical assumption that a word is, in the first place, no lesser an object to a brain than any other object and that there is no reason to believe it would be encoded differently than through its proper perceptual and motor characteristics—namely, through its sound image and its articulatory program: this is the word-presentation level. The linguistic reference function of language is constituted by the connections between the word- and object-presentation levels and motor experience we have of these objects:

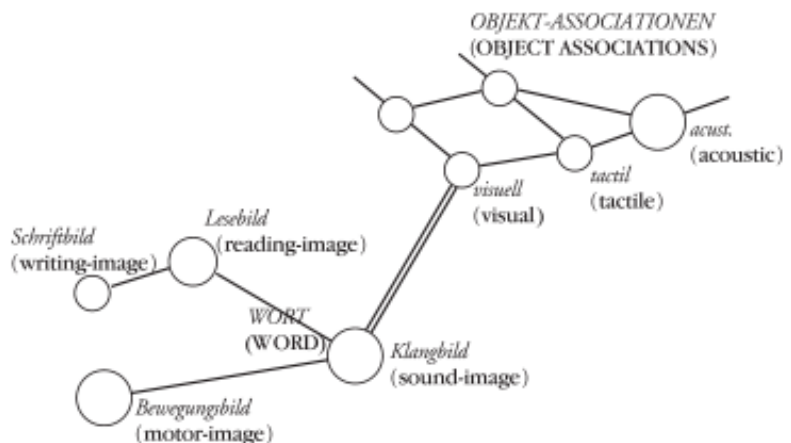


Figure 2. Freud's (1891) linguistic model: "The word, then, is a complicated concept built up from various impressions, i.e., it corresponds to an intricate process of associations entered into by elements of visual, acoustic and kinesthetic origins. However, the word acquires its significance through its association with the 'idea' (concept) of the object [*Objektvorstellung*, or object-presentation], at least if we restrict our considerations to nouns. The idea, or concept, of the object is itself another complex of associations composed of the most varied visual, auditory, tactile, kinesthetic and other impressions" (pp. 77–78). (See also Freud, 1915, p. 214.)

In 1996, Hannah Damasio and colleagues published a paper in *Nature* that combined neuropsychological and brain imagery methods to show that there is a specific, organized brain circuitry for language in the left inferotemporal lobe and that this circuitry needs to be distinguished from the distributed bilateral hemispheric fields that encode the semantic properties of objects (Damasio, Grabowski, Tranel, Hichwa, & Damasio, 1996). Although this account is not shared among all psycholinguists (see below), Damasio et al. (1996) thereby make an essential distinction between a

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semantic level and a lexical level of language processing. While the semantic level is concerned with all experiential characteristics of the object world, encoded in various occipito-temporoparietal areas of both hemispheres, there seems to be a clearly distinct lexical level, that is concerned with naming and is encoded exclusively in the left temporal lobe (see also Tranel, Damasio, & Damasio, 1997). The distinction becomes apparent in anomia, when the patient, while clearly indicating the characteristics and the use of a pictured object, is nevertheless incapable of naming it (Kay & Ellis, 1987). These so-called pure anomias are to be distinguished, both clinically and neuroanatomically, from word-retrieval deficits due to the degradation of semantic knowledge (Antonucci, Beeson, Labiner, & Rapcsak, 2008). Pure anomia thus reflects a disconnection between intact semantic knowledge and phonological word forms (see also Damasio et al., 1996; Foundas, Daniels, & Vasterling, 1998; Raymer et al., 1997).

The one crucial observation in the work of Damasio et al. (1996) is that this lexical level has its own organization: lexical entities seem to be grouped by object category. Damasio et al. (1996) distinguish three classes: animals, tools, and unique persons. The grouping of these lexical systems is confirmed by the observed correlation between the site of focal lesion in aphasic patients with category-specific anomia and the site of PET (positron emission tomography) activation in healthy volunteers doing a naming task on objects of the corresponding category. Other authors found comparable grouping criteria in selective naming deficits such as living and nonliving things (Pouratian, Bookheimer, Rubino, Martin, & Toga, 2003; Tippett, Glosser, & Farah, 1996) or living things, plants, and man-made artefacts (Gainotti, 2000). Naming impairments have also been found selectively for proper names (Fukatsu, Fujii, Tsukiura, Yamadori, & Otsuki, 1996), animals (Sartori, Miozzo, & Job, 1993), fruits and vegetables (Farah & Wallace, 1992; Hart, Berndt, & Caramazza, 1985) and tools (Cappa, Frugoni, Pasquali, Perrani & Zorat, 1998). Although the finegrained organization of lexical entities remains contentious (e.g., see Caramazza & Mahon, 2003), even very specific impairments have occasionally been reported such as, for example, for flower names (Gazzaniga, 1985, pp. 114–117), medical terms (Crosson, Moberg, Boone, Gonzalez, & Raeymer, 1997), and country names (McKenna & Warrington, 1978).

Caramazza and Hillis (1991) show that there is also a specificity for the grammatical status of a word. Work by his group (Caramazza & Hillis, 1991; Hillis & Caramazza, 1995; Miozzo & Caramazza, 1997) and by others (De Renzi & di Pelligrino, 1995) show a similar observation in agrammatical patients: focal lesions correlate with selective deficits for particular grammatical classes such as verbs and nouns. A woman with a specific aphasia for verbs, for example, is not able to read the sentence “Don’t crack the nuts” since she can’t recognize the verb to crack, but the sentence “There is a crack in the mirror” is not a problem since, in this instance, “crack” is a noun (see also Caño et al., 2010).

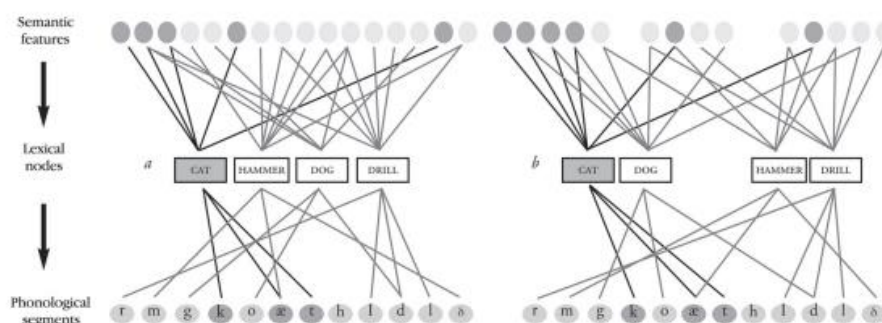


Figure 3. The neurolinguistic model of Caramazza and Damasio (see text) showing the three levels of representation of word knowledge necessary for speech production. Caramazza (1996) gives this example for the word “CAT”: semantic features (carnivorous, furry, domesticated, pet) activate lexical nodes (the word CAT), which in turn activate their corresponding phonological features (k, æ, t). In model *a* (left) words are represented as distributed representations, while in model *b* (right) there is an organized lexical level. Caramazza (1996, p. 485) indicates, citing Damasio et al.’s work (1996): “The neural system for conceptual information consists of a distributed network involving structures in both left and right hemispheres. These networks are connected to lexical representations in the left temporal lobe which are organized by semantic category—animals in the inferior temporal (IT) lobe, tools in the posterior regions of the IT lobe and the occipito-temporo-parietal junction. The selected lexical representation in turn activates its associated phonological features for speech production.”

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These various results are important because they indicate that there is, in humans, an organized brain circuitry that is specifically concerned with words, with language as such. Indeed, in his introductory commentary upon Damasio et al.'s 1996 *Nature* article, Caramazza (1996) proposes a linguistic model in which an organized lexical level mediates between a phonological system, which is concerned with the motor organization of the articulation, on the one hand and a semantic system, which is concerned with the objects properties, on the other (see Figure 3). In other words, according to this model, there is a word level—the lexical level—that is materially present in the brain and is to be distinguished from the object level or the semantic fields. This model is very similar to Freud's original model in which words are materially present as the "word-presentations". It also distinguishes human language from any other communication system in animals: only in humans are words localized material elements organized in a specific lexical area in such a way that their status comes with "lexical labels" informing on their semantic and grammatical category.

As indicated, however, it should be noted that whether or not words are represented in the brain independently of phonology and semantics is a contentious issue (e.g., see Plaut, McClelland, Seidenberg, & Patterson, 1996). A number of authors (McClelland, 1992; McClelland & Rogers, 2003; Seidenberg & McClelland, 1989), indeed, privilege phonological over lexical representations and a distributed connectionist view over a localized word region. In this approach, words emerge continuously from the mapping of phonological combinations in a triangular model of language comprising phonology, orthography, and semantics, with no real status for an established lexical level. Before addressing the possible contradictions between these models, let us concentrate on what they all have in common—that is, the constitutive importance of phonology. Indeed, an essential common characteristic of Freud's word-presentation and Damasio's lexical unit is also that it is phonologically encoded (see Figure 3). Moreover, this is also the case for Lacan's signifier. Lacan (1957), benefiting from de Saussure's structural linguistic theory, formalized Freud's ideas and introduced the concept of the signifier. In Saussurean semiotics, a signifier refers to the "sound-image" (or other form of vehicle) that conveys the signified or meaning (de Saussure, 1915). Though the emphasis in this definition seems to be at the level of the perceptual characteristics of language, the central element introduced by de Saussure is the "phoneme." De Saussure (1915) defines phonemes as "speech sounds distinguishing meaning." In this definition, the crucial point is the distinction between "phones" or continuously varying speech sounds and "phonemes" or more or less arbitrarily but categorically contrasting classes of speech sounds (speech is special—Liberman, 1982; see also Skoyles, 1998).² It is important to know that phoneticians classify and characterize phonemes nearly entirely in terms of how they are articulated and not in terms of how they sound—that is, in motor and not in perceptual terms. It thus appears that phonemes, the smallest units we can hear in words, link to articulatory and not auditory-related invariants (Liberman, Cooper, Shankweiler, & Studdert-Kennedy, 1967; Liberman & Mattingly, 1985). In that sense, this is also what Lacan (1957) refers to with the signifier: "Now the structure of the signifier is, as it is commonly said of language itself, that it should be articulated. This means that . . . these elements, one of the decisive discoveries of linguistics, are phonemes" (p. 168). In summary, the signifier refers to the materiality of language, which include its motor aspects predominantly (articulation, but also probably writing) as well as its perceptual aspects (the sound pattern and orthographic appearance).

Language ambiguity

In spoken language there are no pauses between the words, continually creating ambiguity. The famous psycholinguist Ann Cutler shows, for example, how a simple sentence such as "We stop begging" transiently though unconsciously activates a range of intermediate words such as "east" between "We" and "stop", "top" in "stop" and "egg" in "begging" (Cutler, Demuth, & McQueen, 2002).

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An abundance of psycholinguistic research (e.g. Onifer & Swinney, 1981; Seidenberg, Tanenhaus, Leiman, & Bienkowski, 1982; Swinney, 1979) has shown that polysemic words such as “bank” activate all their various meanings independently of the context, such as in this case the bank of a river or the money institute. This exhaustive activation lasts for about 100 milliseconds, which is too transient to become conscious, after which only the contextually correct meaning is selected. While consciously we only select the appropriate meaning, this does not mean that unconsciously all the meanings cannot continue to thrive for a while. This was shown by a subliminal priming study by Howard Shevrin’s group (Klein Villa, Shevrin, Snodgrass, Bazan,, & Brakel, 2006). Not only can words activate their different meanings, but they also activate their phonological associates, such as their palindrome in the present study (e.g., “dog” primes “god”), and their meaning (“dog” primes “angel”). Highly anxious people show activation of the palindrome meaning. Interestingly, low anxious people did not show an absence of this effect, but an inhibition of palindrome priming—that is, they choose palindrome-associated meanings significantly less than chance.

Inhibitory mechanisms are constitutive for language. Psycholinguistic research shows that disambiguation only happens through an active, energy-costing inhibitory mechanism (Faust & Gernsbacher, 1996; Gernsbacher & Faust, 1991; Gorfein, Berger, & Bubka, 2000; Paul, Kellas, Martin, & Clark, 1992; Simpson & Kang, 1994). For example, when I have correctly disambiguated the word “match” in the sentence “He lit the match” and immediately following upon this I encounter the new sentence “He won the match,” I will display a measurable delay of comprehension (Gernsbacher & Robertson, 1995). In other words, the first encounter with “match” causes inhibition of the inappropriate meaning (here: the meaning of “game”), and this inhibition spills over when I subsequently need this previously inappropriate meaning. Note that this sequence bears similarity with the forgetting of the word “Signorelli” by Freud (1901): this forgetting is due to a spill-over of the inhibition of the inappropriate meaning associated with “Herr”.

If we now know that these disambiguating inhibitions take place neocortically, and are more precisely executed by the left prefrontal cortex (Atchley, Keeney, & Burgess, 1999; Burgess & Simpson, 1988; Chiarello, 1985), while subcortical affective activation is not subject to inhibition (affect activation is mandatory and not subject to repression; De Houwer & Eelen, 1998; Fazio, 2001), we have here a mechanism that allows us to understand how language processing can elicit emotional reactions out of their original context. Strong affective activation will urge the subject to rationalize the functioning emotion of the present context, thereby leading to false connections.

Primary and secondary language processes

Let us now go back to the apparent contradiction between the lexical and the distributed views on words in the brain/mind. It is important to see how inhibitory mechanisms enabling correct disambiguation of contextually appropriate meanings make use of lexical status (e.g., see Deacon, 1997; Poldrack et al., 1999; Thompson-Schill, D’Esposito, Aguirre, & Farah, 1997)—that is, of the “lexical labels” as we have called them. For example, a substantive group as a subject in a sentence is more likely to be followed by a verb, or a sentence starting with “we go to . . .” is more likely to be followed by a place name. The lexical level, then, is constitutive of a dynamic inhibitory organization. How can we reconcile this requirement for language comprehension with the necessity to understand phonology at the same time as being unbound by lexical restraints and thereby free to acquire affective valence by false connection? As proposed previously (Bazan, 2006, 2007b), we suggest that language functions simultaneously on a primary- and a secondary-process level.⁴ That is, language should be considered ultimately as a motor activity, and linguistic action, like any other action in Freud’s model of the mental apparatus, is subject to both primary- and secondary-process dynamic organization. Thus, signifiers are proposed to be simultaneously lexical units and phonemic fragments.

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On a secondary-process level, the lexical unit prevails, and inhibitory mechanisms are functional and allow for socially adapted disambiguation of meaning. However, on a primary-process level—and thus, most of the time, unconsciously—phonological fragments are not restricted by word boundary inhibitions or lexical constraints, and thus they thrive, possibly leading to false connections.

Linguistic action

But there is more. Considering language at the primary-process level as a motor action not tied to rational disambiguation might also lead to a physiologic understanding of repression through the concept of “phonemic phantom.” To develop this concept, we must first show how language is always also a motor act. Both Freud when considering the motor components of the word-presentation and Lacan when considering the articulatory structure of the signifier assume that language is action. Neurolinguistic research shows that language—be it spoken, received, or imagined language—always implies motor activation, varying in degree from the activation of neuronal motor intention pathways to full-blown articulatory movement.

For spoken language, Studdert-Kennedy (2000) argues that speaking involves the repeated combining of the discrete actions or gestures of six functionally independent articulators: lips; tongue blade, body, and root; velum; and larynx. The phoneme or gesture segment is, however, not the only type of speech motor organization. Studdert-Kennedy (Studdert-Kennedy, 1991; Studdert-Kennedy & Goodell, 1995) sketches a development sequence for the origin of segments, proposing the holistic word as the initial unit of linguistic action. The word is said to be holistic because its composing gestures are not yet represented as independent phonetic elements that can be marshaled for use in an unbounded set of other contexts (Studdert-Kennedy, 2000, 280). As an automatic consequence of sorting and stacking phonetically similar words, it is then thought that independent gestures eventually emerge. Davis and MacNeilage (1995) present the syllable, or “frame”, as an early fundament in the shaping of speech, as characterized from an articulatory point of view by the opening and closure of the mandible. MacNeilage (1998) argues that frames may derive from ingestion-related cyclicities of mandibular oscillation associated with chewing, sucking, and licking, which took on communicative significance as lip-smacks, tongue-smacks, and teeth-chatters.

For perceived language, there seems to be large agreement that phonemic identification does involve motor areas situated either prefrontally in the Broca area (Hickok & Poeppel, 2000) or subcortically—that is, involving basal ganglia and/or cerebellar pathways (Ivry & Justus, 2001). This observation therefore gives weight to Liberman’s “motor theory of speech perception” (Liberman & Mattingly, 1985; Liberman et al., 1967). This theory, based on phonological research, holds that the basis of speech perception is not the actual sound of speech, but, rather, the “articulatory gestures” made by the speaker. It argues that listeners identify spoken words through using that information to access their speech motor system. Zatorre and colleagues (Zatorre, Evans, Meyer, & Gjedde, 1992; Zatorre, Meyer, Gjedde, & Evans, 1996) have indeed shown that the mapping of the incoming speech stream onto the linguistically relevant units, which are thought to be the corresponding articulatory gestures, activates Broca’s area. The mirror neuron findings appear as a neural instantiation of this motor theory. Rizzolatti and Arbib (1998) report that in monkeys a part of the premotor cortex (F5) contains neurons that discharge both when the monkey grasps or manipulates objects and when it observes the experimenter doing similar actions. Of particular importance is the fact that these authors note that area F5 in the monkey is the probable homolog of Broca’s area in humans. They also show that there are neurons in F5 in the monkey’s brain that respond both when the animal makes lip-smacking movements and when it observes them in others. Callan et al. (2002) have shown that the presence of such mirror neurons in human speech motor areas of the brain may explain why lipreading enhances the intelligibility of what a person is saying. There is some parallel argumentation, especially coming

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from Corballis (1999), that the origins of human language might be situated in manual gesture rather than in vocalization. This finding adds strength to the argument that human speech evolved from a primitive gestural system of communication (including lip-smacks, tongue-smacks and teeth-chatters), rather than from simple vocalizations. For all these reasons, Rizzolatti and Arbib (1998) propose that the development of the human speech circuit is a consequence of the fact that the precursor of Broca's area was endowed, before speech appearance, with a mechanism for recognizing actions made by others.

This idea of a perception–action linkage was already central in Freud's "Project for a Scientific Psychology" (1950 [1895]) :

While one is perceiving the perception, one copies the movement oneself—that is, one innervates so strongly the motor image of one's own which is aroused towards coinciding [with the perception], that the movement is carried out. Hence one can speak of a perception having an imitation-value. . . . Thus judging, which is later a means for the cognition of an object that may possibly be of practical importance, is originally an associative process between cathexes coming from outside and arising from one's own body—an identification of information or cathexes from Φ [the perception] and from within."5 [pp. 333–334]

More generally, this suggests that external stimulation only makes sense for the brain if reprocessed into something self-initiated. In his study on aphasia, Freud (1891) then suggested that in language this movement might be thought of as articulation:

Understanding of spoken words is probably not to be regarded as simple transmission from the acoustic elements to the object association; it rather seems that in listening to speech for understanding, the function of verbal association is stimulated from the acoustic elements at the same time, so that we more or less repeat ourselves the words heard, thus supporting our understanding with the help of kinaesthetic impressions. A higher measure of attention in listening will entail a higher degree of transmission of speech heard on to the tract serving the motor execution of language. [pp. 91–92]

For imagined language, several studies have found evidence for the activation of Broca's area in linguistic tasks that do not involve any overt speech (e.g., Friedman et al., 1998; Ryding, Bradvik, & Ingvar, 1996; Wise et al., 1991). McGuire and colleagues (McGuire, Shah, & Murray, 1993; McGuire et al., 1996) provide evidence that, in normal subjects, inner speech activates Broca's area. Data also show that auditory hallucinations in schizophrenics are related to the subvocal production of speech (Bick & Kinsbourne, 1987; Green & Preston, 1981; Liddle et al., 1992) as if they were in fact producing speech and misattributing its origin (e.g., David, 1994). Moreover, brain activity recorded during verbal hallucinations is similar to that observed during production of inner language and auditory verbal imagery in normal subjects (Cleghorn, Franco, & Szechtman, 1992; Silbersweig et al., 1995).

Efference copy model

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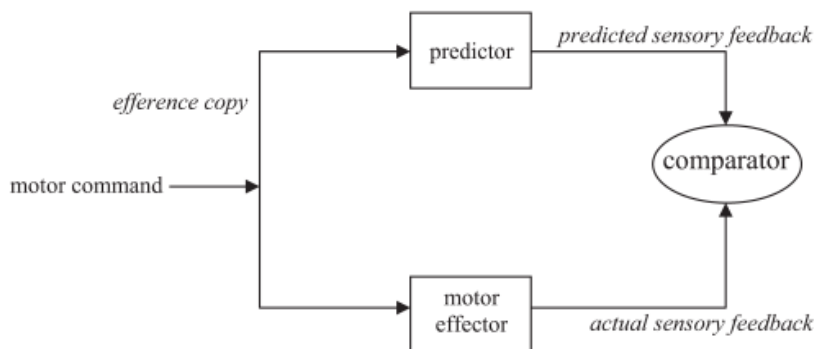


Figure 4. The efference copy model (Blakemore, Wolpert, & Frith, 1998; Georgieff & Jeannerod, 1998; Sperry, 1950; van Holst, 1954).

There is one fundamental model of voluntary movement at the intersection between the physiological and the psychic, and this is the efference copy model (Blakemore, Wolpert, & Frith, 1998; Georgieff & Jeannerod, 1998; Sperry, 1950; van Holst, 1954) (see Figure 4). Whenever a command for a voluntary movement is sent to the striated muscles of the body, two sources of feedback are received back in the brain as a consequence of this motor command. On the one hand, the command will go to the muscle or motor effectors and cause a contraction, which will be registered locally by proprioceptive receptors. These receptors will send back information to the somatosensory cortex: this is the actual sensory feedback. On the other hand, a copy of the given command or efference copy is used in an emulation (or simulation) algorithm in the brain itself. This process calculates the anticipated changes in the body as a consequence of the command. This information is also sent to the somatosensory cortex: this is the predicted sensory feedback. The efference copy indicates the intended movement, and the proprioceptive information indicates the actual movement. The two feedbacks can balance each other out at the level of the somatosensory cortex. It is important to add that the movement intention is enough to generate efference copies and, thereby, activation at the level of the somatosensory cortex. In other words, the movement intention is enough to generate some kind of perception. Jeannerod (1994) says that “If the goal were not reached, the sustained discharge would be interpreted centrally as a pure representational activity and give rise to mental imagery” (p. 201). Note that here we switch from (motor) physiology to psychology. I propose to make a logical distinction between two species of mental images: representations on the one hand, which arise as the result of motor intention not exhaustively met by motor execution, and phantoms on the other, which arise as the result of sustained motor activation that is systematically not met by actual execution. Representations, as proposed, are the kind of motor imagery that arises as the result of motor activation not exhaustively met by actual execution—that is, in the gap between intended and executed movement. In other words, representations arise to the extent that our movements do not correspond perfectly to our intentions. When a perfect match is reached, the representation is annulled. This can be verified in the experience of semantic satiation—that is, the curious observation that the sustained repetition of a group of syllables or a word results in the experience of a “semantic void”, the experience of losing grasp of the meaning of a word. The phenomenon of semantic satiation was first reported in the laboratory of Titchener (Severance & Washburn, 1907). The linguist Osgood (1980) describes the phenomenon as follows: “semantic satiation—where rapid seeing/saying repetition of a word, like canoe-canoe-canoe . . . produces a loss of meaningfulness, but repetition of a nonsense overt response having the same shape, nuka-nuka-nuka . . . does not” (p. 25). The explanation proposed in the present context is that the sustained rearticulation results in a nearly perfect meeting of articulation intention and execution, thereby annulling the representation of the

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phonological action as well as the possible semantic interpretation that this representation could have elicited.

Phantoms, then, arise as the result of sustained motor activation that is systematically not met by actual execution. This systematic not-meeting may be due to the fact that there is a missing limb, such as in phantom limbs. For the understanding of these phantom limb experiences, especially those implying “vivid gesticulation and other spontaneous movements”, Ramachandran (1994, p. 314) posits that “the sensations arise from reafference signals derived from the motor commands sent to the phantom”, where “reafference” is actually to be understood as the efference copies, since they are derived from the motor commands. Accordingly, it is also thought that the sustained activation of secondary motor area neurons due to a right frontomesial lesion in patient E.P. (reported by McGonigle et al., 2002) is the cause of her intermittent experiences of a supernumerary “ghost” left arm in her so-called action space. These phantom observations are crucial since they show how the sustained intention to move alone can create a perceptual experience invested with reality (including pain) qualities.

The distinction between representations and phantoms is important in the proposed model as it is suggested that they enable a distinction between different dynamics of repression. On the one hand, representations are continuously produced in mental life, their conscious experience being at the cost—as we saw previously—of the inhibition of other representations, thereby possibly inducing false connections with greater or lesser ability to disturb one’s conscious mood. This inhibitory mechanism is the condition for “normal” language processing and comes at the expense of some misinterpretation or confusion of affect of lesser or greater consequence. On the other hand, some mental images will be more systematically targeted by inhibition, with an (unconscious) intention to prevent them from conscious investment. Following the logic spelled out above, these mental images will not produce representations but might lead to the emergence of phantoms, which will nevertheless manifest their presence through exerting motor pressure. As will be described below, it is proposed that this intentional barrier has more profound consequences, leading to the instatement of mental traces or vestiges—the so-called phantoms—which will then influence the organization of conscious mental life. To understand how this might be the case, we will now apply the principles of motor physiology to Freud’s model of the unconscious.

A neuropsychanalytic model of the Freudian unconscious

The starting point is the drive. Freud (1915c) says: “The nucleus of the Ucs. consists of representatives—Vorstellungsrepräsentanzen—of the drive which seek to discharge their cathexis; that is to say, it consists of wishful impulses” (p. 186). A state of need of the internal body, such as cell dehydration, is the source of a drive. While the drive might still be conceived of as a tension of the internal body, it is proposed that the representance⁷ or *Vorstellungsrepräsentanz* is the first real mental or psychic breakthrough. To this representance, we ascribe a content value in response to the need. In the present example, the content might be “thirst” or “wanting to drink.” It is then this representance, or this content, that gets represented. These representations are very concrete action plans. For example, the content of “thirst” might get represented by the baby with a cry if his mother was able to interpret the cry more or less satisfyingly by feeding the baby. Or it might get represented by the idea of taking a glass of water or by a question addressed to someone asking for a drink, and so forth. These representations are thus very concrete action plans adapted to the subject, his actual state and the context. These representations might correspond to the new final configurations of the (external) body designated by Jeannerod (1994) in his definition of intention: “these neurons encode final configurations (of the environment, of the body, of the moving segments, etc.) as they should arise at the end of the action, and . . . they remain active until the requested configuration has been

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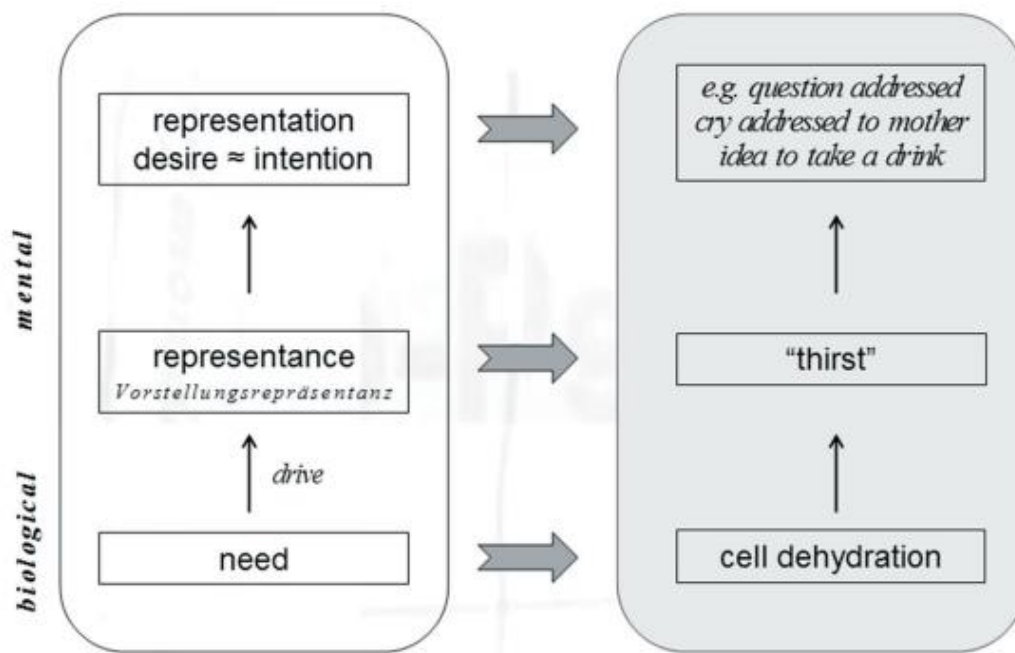


Figure 5. Logical distinctions between drive and representation (action plan) and the shift from biological to mental.

obtained” (p. 201). In other words, while the representance strives for an alleviation of thirst, responding in content to the drive arising from the inner body, the concrete representations of the representance strive for a new external body configuration, such as the right position of the head toward the breast, or the right position of the arm and hand for grasping a glass, and so forth (see also Figure 5).

Freud’s dynamic unconscious is dynamic because it results from repression; this repression can be considered as the consequence of a conflict between the drives on the one hand and social constraints on the other. The drive in itself cannot be repressed—only the “wishful impulses” can. Repression implies that the representations of the representance are prevented from being executed or spoken. Freud (1915c) says: “A presentation which is not put into words, or a psychical act which is not hypercatheted, remains thereafter in the Ucs.” (p. 202). Without these representations, the subject loses the means to become aware of this drive; this content then remains unconscious. To prevent effective action upon the representation, there is a systematic barrier between motor intention and motor execution. Accordingly we expect that, through this systematic barrier, repression leads to the emergence of motor phantoms the form of which will be equivalent to the motor form of the repressed movement. For linguistic intentions, the phantoms would then be phonemic phantoms. Freud (1915b) adds: “quite as important is the attraction exercised by what was primarily repressed upon everything with which it can establish a connection” (p. 148). In other words, the phonemic phantoms search for ways to release their activation. In addition, “repression does not hinder the instinctual representative from continuing to exist in the unconscious, from organizing itself further, putting out derivatives and establishing connections” (p. 149).

Indeed, the withdrawal of cathexis at the level of certain representations implies the overinvestment of associated “substitutive” representations: “If these derivatives have become sufficiently far removed from the repressed representative, whether owing to the adoption of distortions or by reason of the number of intermediate links inserted, they have free access to the conscious” (Freud, 1915b, p. 149). One important way for the derivatives to become sufficiently far removed is through

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an association with their phonemic form. Indeed, were the association to be realized through the semantics, this association would be as threatening as the repressed representation. In the case of the Rat Man, the substitutive representation of the rodent rat is at the same time associated with and far removed from the originally repressed representations, Frau Hofrat and Heiraten. But action upon these phonemic substitutes is unable to alleviate the drive tensions, which will continue unabated, while the subject has no means of becoming knowledgeable about what it is that moves him. This, then, is Freudian *répression*.

Phantoms in the voice

Finally, let us illustrate this model with a clinical case study.⁸ F. is a young man aged 22 who is a resident psychiatric patient.⁹ He has sister, Sofie, who is four years younger than he is. When he was 7, a new-born baby, Stefanie, was adopted, but the adoption was not done in legal terms, and several months later the birth mother took her child back. When he was 9, a new sister, Steffie, was adopted. The family structure of the patient is further characterized by numerous incestuous relations, between his mother and her father and between brothers and sisters on the mother's side. After several months of work, F. relates a number of incestuous episodes with his sisters, which he obviously feels very guilty about. He then announces that he will not speak further on this topic. In one of the following sessions, F. produces this seemingly incoherent fragment:

"Nature determines everything. Everything comes from nature. Everything has an effect. . . . Colors have an effect. . . . Metals don't bend, inox [stain less steel] bends. It has effects due to circumstances. A guy and a girl have an effect on each other. This is the meaning of life, the affection, this is perfect. When done with effect, it is very well done. The teacher says it is perfect. . . . Everything has an effect. Proteins, all of them, from one to twelve, they have an effect. To eat [Fretten]. Djezus. To eat [Fretten]. »

What is remarkable in this fragment is the repetition of the phonemes /ef/. It is suggested that this is correlated with the repetition of this phoneme in both his own first name and that of his sisters, Sofie, Stefanie, and Steffie. Indeed, one way to understand the organization of this speech fragment is to suppose that F. has reinstated a repression on the theme of his sisters. On the other hand, his desires are triggered by the frequent visits of one sister who has a lot of tender feelings toward him. We might say that the theme of his sisters is highly invested with intentions but is also radically blocked from actual execution, leading to the emergence of the phantom of Ef. This phantom of Ef finds ways to relieve its cathexis by substitute representations such as effect, perfect, affection, etc.

The substitutive representations allow the temporary relief of some tension without forcing F. to hear, or become aware, of his actual desires. At the end of the excerpt something happens: the word "fretten" strikes him, as though he had never heard it before: he says in Dutch, "Fretten. Miljaarde. Fretten", starts to laugh, and is finally silent after this.¹¹ It is as if suddenly F. fully consciously hears the sounds that make up the word "fretten" and is struck by this.¹² The radical disconnection between intention and execution is momentarily broken, and representational, semantic, associations are activated and create confusion. At the same time, the phantom subsides.

Conclusion

A hypothetical neurophysiologic model of the Freudian unconscious, organized along motor neurophysiology principles, is proposed. A major premise for this model is that language—spoken, received, or imagined—is always a motor event. Important neuroscience developments over the last decade have shown how motor intentions give rise to mental imagery. An insisting intention systematically prevented from execution gives rise to a particular species of mental imagery called phantoms; these are organized on the basis of their motor form and induce motor pressure to search

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for relief. When linguistic activation would lead to threateningly high body tensions, it is proposed that the corresponding articulatory intention can be prevented from execution in a systematic way—that is, it can be repressed. Consequently, articulatorily structured or phonemic phantoms are thought to emerge. Due to the structurally ambiguous nature of language, these phonemic phantoms, in contrast to phantom arms or legs, can find relief in language fragments with several radically different significations but with an identical motor pattern. These phantoms can be said to “organize the structure of the unconscious” by increasing the probability of linguistically structured action involving the substitute meaning; in other words, these phonemic phantoms thus function as attractors for the subject’s mental energy in its (linguistic) “action space.” Since these meanings differ from the content of the drive representance from which the intention originally arose, acting on the substitute signifiers is, however, structurally unable to alleviate the underlying drive tension. The drive tension thus prevails, while, with a “falsely connected” and often seemingly irrational or absurd symptomatology, the subject has at the same time lost the conscious means to become knowledgeable about what fundamentally moves him. Reading the symptoms linguistically, and in particular phonemically, may, however, provide clues as to their etiology, as Freud so often showed.

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