The Phoneme: Paradigmatic and Syntagmatic Dimensions of Contextualization

The Phoneme in Relation to the Linguistic Sign: Preliminary Observations.

In Saussure's account, *langue,* or the language system, comprises the two orders of difference – phonic and conceptual – which have the potential to combine in the making of signs. The combination of terms from these two orders "*produces a form, not a substance"* (CLG: 157; emphasis in original). The phonic and conceptual orders of difference semiotically construe the analog domains which Saussure designates as "sound' and "thought" (CLG: 155-7), respectively. The system of phonic terms comprise values such as, for example, [+ nasality]. This system constitutes a "network of preferences" (Bateson 1987 [1951]: 176) in which certain differences are recognized as semiotically salient in a given language system and others are not. In this way, the system of phonic terms in a given language system helps to determine the speaker-listener's perception of concrete speech sounds. These values have no phenomenal-material status or substantive properties. Instead, they are schematic attributes which specify the parameter values for both the articulation and the perception of a given sound sequence. According to one widely held view, however, the signifier is a form which merely conveys a meaning which is external to it. Form, so defined, has no shaping influence on meaning. Rather, symbolic form represents a world which is pre-given and external to it.The arguments which I shall develop in this lecture reject this view.

In Saussure's conception, the separability of the two orders of differences means that there is no fixed, univocal relation between signifier and signified in any given sign relation. The sign, rather than representing reality, *produces* it. "Reality" in this view is not a pre-defined world unto itself, but a field of emergent possibilities which are produced by the value-producing distinctions internal to our systems of interpretation of the world. Thus, pre-semiotic, amorphous "sound" and "thought" constitute a potential in relation to which our experience and knowledge of the world are constructed through the interaction of our systems of interpretance with these two dimensions. For Saussure, the combining of terms from the two orders of difference is a semiotic *activity.* The sign is neither predetermined nor an isolable elementary unit. Rather, it is an emergent property of the global system of reticular connections which constitute a given network of values. The terms – phonic and conceptual – in the two orders are elementary parameter values which operate in specific local environments, or associative groups. These associative groups are not the product of a single, centralized principle of organization in the mind-brain of the individual. Instead, the global nature of the system of values is comprised of a heterogeneous mosaic of subsystems, or associative groups, comprised of multilevelled hierarchies of terms which are not related as a whole system by any single unifying principle. What matters are the connections which are built up over time by the processes of selective contextualization: if a given number of terms are, typically, activated together, then the global connections among them are reinforced. In this way, typical syntagmatic relations – typical patterns of combination – can be identified on both the phonological stratum of teh signifier and the lexicogrammatical stratum of the signified.

Both components of the sign in Saussure's theory are constitutive of and internal to language form. They are both meaning-making. A further consequence of this point is that neither signifier and signified nor form and

substance are simply opposed to each other. The relation between signifier and signified and between form and substance is not dichotomous. On the other hand, Saussure's theory is a relativistic and contextual one of the relations between these two pairs of theoretical constructs. I shall now explain what this means.

The combination of terms from the two orders of difference is an act of meaning-making. It is the construing of a term or set terms from one order of difference in relation to a term or set of term terms from the other order. This is how signs are made. This process of combination is one of selective contextualization. A term combines with some, but not all, of the terms from the other order. In so doing, it enters into some meaningful relations but not others. Meanings and, hence, signs are only possible when not all possible combinations of terms from the two orders are equally likely. The combinations that give rise to forms in the language are, therefore, selective. The forms which result from these combinations entail principles of order, information, regularity, context, and meaning. Here is an early formulation of Saussure's which pre-dates CLG:

Le signifié seul n'est rien: il se confond dans une masse informe. De même le signifiant. Mais le signifiant et le signifié contractent un lieu en vertu des valeurs déterminées, qui sont nées de la combinaison de tant et tant de signes acoustiques avec tant et tant de découpures qu'on peut faire dans la masse del la pensée.

(Saussure 1969 [1894-5]: 49)

Now, the notion that the signifier is merely the bearer of a meaning which is external to it has tended to skew the definition of meaning in terms of a purely conceptual one. However, Saussure's definition of phonological form (the signifier) requires that this view be adjusted. The sign interfaces with material-phenomenal processes along both dimensions of its internal structure in acts of social semiosis. That is, the signifier has meaningful relationships with phonic substance in ways that exactly parallel the relationships between the signified and thought-substance on the conceptual side of the sign-relation. The sign is a complex layering of both phonological *and* conceptual meanings. These are analytically, but not constitutively, separable in the overall sign-relation.

In this lecture, I will focus on the meaningful relationships between phonological form – the spoken signifier – and phonic substance. Phonological form, I shall argue, is the interface between the language system and the acoustico-articulatory domain of the vocal tract and the speech sounds this produces. In this way, phonological form selectively contextualizes this domain as semiotically formed phonic substance. This is no less an act of meaning-making in the overall sign-relation than are the 'conceptual' relationships which are construed by the interface between signified and thought-substance on the other side of the sign-relation.

Thought-substance is the interface between the information about the world which is picked up by our perceptual systems (hearing, sight, touch, and so on) or simple imagined and its reconstrual as instantiations of the conceptual categories which are internal to the signified. In exactly parallel fashion, phonic substance is the interface between the acoustico-articulatory information which is encoded by the bodily processes of articulation and its reconstrual as instantiations of the phonological categories which are internal to the signifier.

The linguistic sign, in Saussure's basic account of this concept, is comprised of the two-way and reciprocal relationship between a signifier and a signified. Signifier and signified are the two strata of the sign-relation. The relationship between these two strata is an interstratal, or semiological one. Saussure used the term *signification* to refer to this relationship.

The two strata in the sign-relation each involve a different kind of minimal unit. The minimal unit of the signified is the lexicogrammatical unit called the morpheme. The minimal unit of the signifier is the phoneme in the spoken language system and the grapheme in the written language system. The minimal units on the two strata combine to form still larger units of, respectively, lexicogrammatical and phonological or graphological organization. Morphemes combine to form words, groups, clauses, and so on. Phonemes combine to form syllables, stress groups, and so on. Each stratum has its own units with their own principles of combination. There is no isomorphism between the units and the structural relations they enter into on any one stratum and those on the other. In early notes on morphology which have been collected and edited by Robert Godel, Saussure makes the following pertinent observations:

It is obvious that phonetics, while concerned entirely with sounds and in order to do so, is obliged in the first place to concern itself with forms. Sounds are not transmitted from one generation to another in an isolated state; sounds exist, live and change only through the bosom of words. **(Saussure 1969 [1894-5]: 26)**

Morphology is the science which treats units of sound corresponding to a part of an idea, and of groupings of these units. Phonetics is the science

which treats these units of sound to be established according to physiological and acoustic characteristics. **(Saussure 1969 [1894-5]: 28)**

In this lecture, the focus will be on Saussure's definition of the phoneme. The phoneme is the smallest unit on the stratum of the signifier which can enter into constituent structures in the phonology of a given language system. Phonemes are comprised of simultaneous configurations of what Saussure called phonic terms. Phonic terms derive from the phonic order of difference in *langue.* Saussure's analysis of the phonic terms which combine to form particular categories of phonemes is based on paradigmatic principles. Later linguists variously referred to these same principles of analysis as componential or feature analysis.

Phonic terms such as the 'presence' or 'absence' of, say, nasality do not have a constituency structure of their own in the phonology. Only phonemes and the still higher-order units (syllables, etc.) that are built up from these have a constituency structure of their own. Phonic terms, in Saussure's analysis, are linguistic glosses on specific acoustico-articulatory parameters. As we shall see in section 6, these are *topologically,* rather than typologically, defined.

Phonic terms do not stand in a one-to-one relationship with phonemes. The analysis of a given phoneme into the phonic terms, or features, that comprise it specifies the minimal criteria that differentiate one phoneme from another in some paradigmatic set. This is the basis for the categorical description of the phoneme (see section 5). There is no phoneme [nasality] in English phonology. The 'presence' or 'absence' of nasality is a phonic term. The phoneme 'p', for example, is a realization of the configuration of phonic terms [complete closure, – laryngeal vibration, – nasal vibration] in

Saussure's analysis. There is, then, a one-to-many relationship between a given phoneme and the phonic terms that constitute it. A given set of such terms specifies what Saussure calls the "factors at play in the production of the sound" (CLG: 69). Saussure bases his analysis on the act of phonation: " … all phoneme types will be determined in identifying all acts of phonation" (CLG: 69). This means that a given set of phonic terms correlates with a given state of the organs of articulation. The phoneme category which is established in this type of analysis thus defines the state of the organs of articulation that is required for the production of a sound of a given type. Saussure's analysis thus anticipates the hypothesis of the categorical and quantal based nature of the relationship between state of the articulators and sound produced (e.g., Stevens 1972).

Phonic terms do not occur separately or independently of one another. That is, phonic terms are interdependent on both the articulatory and perceptual (acoustic) levels. It is this interdependence of phonic terms which organizes the organs of articulation in a particular way for the production of a sound of a given type. This means that a given act of phonation rarely, if ever, corresponds to a single phonic term. More generally, it is a set of such terms which determines the structure of the articulatory act. For example, a given sound may require the movement of tongue, lips, and larynx, and in ways in which all these factors reciprocally determine each other.

Saussure's definition of the phoneme is an integral part of his overall conception of the sign. The place of the phoneme in this conception remains fundamental for understanding the role of the phonological pole of the sign-relation in social semiosis. The present lecture will endeavour to locate Saussure's definition of the phoneme in this broader conceptual framework.

In order to achieve this goal, I shall begin by discussing the significant differences between Saussure's definition and the pre-structuralist or substance-based approaches that Saussure reacted against, as well as the structuralist or form-based approaches that succeeded Saussure's own endeavours.

Saussure's Phonological Theory and the Modern Distinction between Phonetics and Phonology.

In his phonological theory, Saussure proposes a more abstract level of analysis than that which had hitherto characterized the study of speech sounds. Saussure (CLG: 77) cites the "English phoneticians" as an example of those studies which concentrated on the minute description of the individual sounds of language. Such descriptions are founded on an ontology of the autonomy of phonic substance. They are concerned, Saussure points out, "almost exclusively with the act of phonation, that is, with the production of sounds by the organs (larynx, mouth, etc.), and neglect the acoustic side" (CLG: 63).

Saussure's analysis of speech sounds also differs from that of the later, structuralist analysis of phonemic oppositions (Trubetzkoy, Jakobson, Chomsky, Halle) in a number of fundamental ones. Most commentators either overlook the significant divergences between Saussure and his structuralist successors, or they simply elide the Saussurean analysis with these. The chief difference is that the structuralist phonology of Trubetzkoy and Jakobson, in contrast to the first approach, is based on the ontological priority (and autonomy) of phonological form with respect to phonic substance. In this view, phonemes are based on logico-combinatorial permutations of purely abstract distinctive features.

The problem, then, is how to overcome this dichotomy without at the same time simply reducing the logical and purely relational categories of the second, structuralist view to a set of naturalistically defined and purely immanent properties of the physical-material act of articulation (see also Petitot-Cocorda 1985: 96). In my view, Saussure's phonological theory represents a major attempt to overcome the antinomy of phonic substance and phonological form. Hodge and Kress (1988: 28) point out that Saussure's analysis of the sounds of language seemingly goes against one of his own foundational principles. This is the principle that language is a form, not a substance. In so doing, Saussure admits a material basis into his theory of speech sounds. But what is the significance of this orientation ?

In this lecture, I shall argue that Saussure's phonological theory cuts across the distinction between phonetics and phonology which is current in modern linguistics. The crucial question for Saussure is not the ontological priority and/or autonomy of either phonic substance or phonological form. Rather, the central question is concerned with how the categories of phonological form enable a semiotically formed phonic substance to emerge from the acoustico-articulatory continuum. Thus, Saussure points out that: "The delimitation of the sounds in the spoken chain cannot then rest on the acoustic impression alone ; but for their description one must go further. It can only be done on the basis of the articulatory act for the acoustic units taken in their own chain are unanalysable" (CLG: 65). In making this claim, Saussure shows why his theory of phonology belongs to *parole,* rather than *langue.* Articulatory movements do not constitute the language system : " … when one has explained all the movements of the vocal apparatus necessary for producing each acoustic impression, one has explained nothing of the problem of the language system. This is a system based on the psychic opposition of these acoustic impressions, … " (CLG: 56). The fact that phonology in Saussure's definition makes

reference to the materiality of the articulatory act is the reason why it is said to be an "auxiliary discipline" belonging to *parole.* It is in *parole* that the semiotic and the material cross-couple with each other to produce a semiotically formed phonic and conceptual substance. *Langue* is pure form rather than substance. For this reason, Saussure's definition of phonology does not belong to *langue.* A number of important consequences derive from this distinction. First, Saussure provides a bodily basis for the acoustic signifiers of speech. These cannot be defined as acoustic impressions alone. Rather, there is a reciprocal contextualizing relation between acoustic impression and articulatory act. The one construes or mutually defines the other. Secondly, the classification of all the various types of articulatory act does not in itself explain the workings of the language system, which is based on the "psychic opposition" of the acoustic impressions these give rise to. Saussure's point is that the "psychic oppositions" are the basis of the combining of particular signifiers with their signifieds in the making of signs. This can only happen through the workings of a higher order social-semiological system which specifies which particular combinations of signifiers and signified regularly occur in a given speech community. Thirdly, and consequent upon points (1) and (2), the psychic nature of the oppositions in *langue* is only established on the basis of the meanings which are embodied in the brain of the language user. These have no physical-material existence. From the point of view of the individual in possession of a *langue interieure,* the combining of signifiers and signifieds in the making of signs is a psychic, rather than a material, activity *per se* which takes place in the consciousness of the individual. The individual's *langue interieure* exists solely as neural activity. It constitutes his or her potential for combining signifiers with their signifieds in contextually relevant ways. It is on the basis of a shared *langue interieure* that speaker and listener are able to reconstruct in their brains the meanings of the acoustic impressions perceived. The individual's *langue interieure* is not, however, a simple repository or

storehouse of fixed, predetermined signs comprising the individual's past experiences of the language and which are then recalled when needed. It is, above all, a memory which enables the language user to *predict* future users of the language on the basis of past uses. The *langue interieure* which is stored in the individual's brain simulates and predicts future courses of (linguistic) action in contextually appropriate ways. (see CLG: 179).

Saussure makes it clear that individual "choice" and intention are not in themselves central organizing principles which govern the speech activity of the speaker. Instead, the various associative groups in memory constitute a set of not necessarily harmonious potentialities from which specific linguistic choices emerge. Rather than hypothesising a conscious "ego" as the central organizing principle for language activity, Saussure suggests that the former is itself organized by the continual forming and reforming of the reticular connections among the associative relations that exist unconsciously in the speaking subject'ss memory. The associative relations in memory constitute a virtual system of oppositions which is continually rearticulated as the brain simulates and predicts specific courses of linguistic action in response to ever changing contextual requirements along the historical-biographical trajectory of the individual.

What, then, of the status of the reciprocal contextualizing relation between articulatory act and acoustic impression that I referred to above? How is this important for Saussure's theory of the signifier? In my view, the fact that meanings are constructed or made in dyadic interaction rather than "transmitted" lies at the core of Saussure's conception. I shall explain this as follows. From the perspective of the individual, meanings arise through the psychic activity of associating a signifier with a signified in the individual's brain. Yet, this does not mean that meaning-making is the province of the individual *per se.* For a start, the language system which

exists globally in the brain of the individual is a socially based system which serves to link the individual with others who share the same system. However, there must also be physical-material means of coordinating the interactions between individuals so that shared acts of meaning making can take place. In my view, this is the best explanation of the place of the speech circuit in Saussure's overall theory (see Thibault 1997: chap. 6). Thus, the acoustic information which the act of articulation projects into the ecosocial environment of speaker and listener does not "transmit" a message or a "thought" from A to B. Rather, it affords social semiotic interaction with suitably equipped others in the same ecosocial environment, where "suitably equipped" means, above all, to be in possession of the same language system stored in their brains. In Gibson's (1979) terms, the speaker's vocal tract gestures are an environmental event and the sounds produced constitute the energy medium which, in stimulating the listener's perceptual organs, provides the listener with information about that environmental event.

There are two important aspects to this point. First, the reciprocal relationship between articulatory act and acoustic impression means that acoustic impressions construe socially relevant information about the body of the speaker. That is, the vocal gestures produced by the speaker project information into the environment concerning the presence of an embodied and interacting subjectivity. Secondly, the projecting of this information into the ecosocial space-time of the speech circuit is other-oriented or dialogic. It provides a matter-energy and information base whereby the interactants are mutually coordinated for the purposes of dialogic exchange. Saussure's emphasis on the psychic, or intentional, character of the acoustic impressions perceived by the listener shows that speakers and listeners actively orient to each other as well as to the environmental information which speech sounds provide interactants. The articulatory acts of the speaker are vocal tract gestures (and postures ?) which function to bring

about the mutual coordination and orientation of interactants in ecosocial space-time. There are at least three dimensions to this space-time, all of which contribute to the mutual orientation of the interactants. These are: (1) the visual information which the visible (facial) dimension of the articulatory act presents to the listener in the form of visible lip movements, and so on; (2) the acoustic information which the speaker projects into the environment; and (3) the somatic information which our body provides as it physically orients to the visual and acoustic information projected by the speaker. This cannot occur on the basis of processes which take place in the brains of the individuals *per se.* The vocal gestures which the speaker produces and the sounds these project into the environment have both a corporeal and an extra-corporeal dimension. In the first case, they are perceived by the internal senses of the individual and felt as localized in the speaker's body (proprioception); in the second, the vocal gestures and the sounds produced are a phonologically motivated extension of the speaker's body into an extra-corporeal space-time of potential interaction with the other. From the speaker's perspective, they are perceived as going beyond his or her body. If the first perspective is concerned with the intra-personal space defined by the speaker's body, the second is directed towards and constitutes the inter-personal space-time of social interaction.

The phonological information which the listener extracts from the chain of heard speech is based on a system of phonic differences deriving from the phonic order of difference in *langue.* Further, the indissoluble and two-way nature of the link between "sound" and "sense" in Saussure's theory means that from the perspective of a given language system the psychic oppositions of the acoustic impressions which are perceived in the speech chain provide speaker and listener with a systemic basis for the associating of these impressions with their signifieds in contextually appropriate ways. Within a given language system, the selective nature of the possibilities for cross-coupling the two orders of difference means, in effect, that speaker

and listener are constrained to assign only some concepts (signifieds) to the particular combinations of acoustic impressions that the phonological system of a given language allows. They are not free to assign any concept to any given sequence of phonemes. Rather, the possible cross-couplings of phonic and conceptual terms in a given language are systemically constrained. This is an important dimension of Saussure's concept of arbitrariness. Phonologically patterned combinations of acoustic impressions in the linear stream of heard speech thus constitute a first-order contextualizing relation on the basis of which second and higher-order relations of signifieds may be built up. The descriptive variables on this first level – the acoustic impressions – do not "cause" their signifieds to come about. The point is that they provide a system of constraints whereby signifieds are associated with them in language specific ways.

In terms of a revised theory of Aristotelian complex causality (Salthe 1993: 10-13), we may revisit Saussure's phonological theory to show how the modern distinction between phonetics and phonology represents a dichotomous pairing of material and formal causes at the expense of efficient and final causes. Thus, modern phonology constitutes principles of organization (formal causes) which enable speech activity to take place, whereas phonetics may be seen to refer to the physical-material means whereby a given speech event occurs (material causes). In Saussure's account, all four causal factors in Aristotle's account come into play, viz. material, formal, efficient, and final causes. Efficient causes refer to the articulatory acts – the vocal tract gestures – which result in the production of a given speech sound (CLG: xx). Material causes are the patterns of acoustic impressions which are allowed and recognized by a given language system. Material causes may also include the energy media – the air – which enable the information about the environmental event (the speaker's vocal tract gestures) to reach the sensory systems of the listener. Thus, material causes include the sound waves and energy media which

function as ecosocial affordances for dialogic interaction. Formal causes are the psychic (intentional) activities in and through speakers and listeners organize the production and perception of speech sounds as constituting semiotically salient differences on the basis of which meaning is made. Final causes are the socially shared meanings which are the ends or purposes of social interaction.

Various commentators such as Culler (1976: 31) and Harris (1983: xiv) have failed to understand the very different notion of phonology that Saussure proposes with respect to modern theory. Both of these scholars have read Saussure's phonological theory in terms of the latter day distinction between 'phonology' and 'phonetics'. To be sure, both Culler and Harris recognize that Saussure does not use these terms in their modern sense. But what they both fail to grasp is the important theoretical issue which is at stake in Saussure's quite different understanding of speech sounds. This has profound implications for our understanding of the concept of 'binary relation' in Saussure's phonological theory. I shall discuss this notion in section 3 below. But first, a few words on the quite different use of this notion in the phonological theory of Trubetzkoy and Jakobson.

The Structuralist Re-contextualization of Saussure's Phonological Theory: Trubetzkoy and Jakobson.

In his pioneering study, the *Principles of Phonology* (1969 [1939]), Trubetzkoy explicitly formulates the distinction between phonology and phonetics in the modern sense. In so doing, Trubetzkoy (1969 [1939]: 4) quite explicitly distances himself from the Saussurean position. According to Trubetzkoy, Saussure attached little importance to "the distinction

between the study of sound pertaining to *parole* and the study of sound pertaining to *langue"* (1969: 4). On the basis of this distinction Trubetzkoy, Jakobson and Karcevskij, were the first to distinguish between phonetics and phonology in the modern sense at the First International Congress of Linguists in the Hague in 1928 (Trubetzkoy, 1969: 5). In so distancing himself from Saussure's position, Trubetzkoy based his own theoretical position on the concept of the phonological opposition.

There are, then, important differences between Saussure's definition of the phoneme and the structuralist phonology of Trubetzkoy *et al.* In Trubetzkoy's definition, the phoneme is a distinctive opposition in sound which distinguishes the lexical meaning of two words. For example, the difference between the English words *pin* and *bin* is explainable in these terms. As I shall show in the course of this lecture, Saussure's distinction between a science of phonological types and a 'combinatory phonology' which is concerned with how phonemes are combined in the spoken chain cuts across the distinction between phonetics and phonology as it is now generally established in the study of speech sounds.

In this section, I shall examine the structuralists' definition of the phoneme so that Saussure's quite different conception may be made clearer in the sections that follow the present one.

While there is no single universally agreed upon way of defining the distinction between phonetics and phonology, it is generally accepted that the phonetic study of speech sounds is naturalistically based and independent of questions of meaning, function, and value. Phonetics, in this definition, is concerned, above all, with "typical articulatory positions and sounds […] taken from the articulatory and sound continuum" (Trubetzkoy 1969: 13).

Phonology takes these as "data", but is concerned with the "systemic study [of distinctive sound oppositions] and the study of combinations". These are, Trubetzkoy concludes, "quite independent of phonetics" (1969: 14). Phonology, according to this view, is concerned with the functions of distinctive sound oppositions from the point of view of the language system (Trubetzkoy 1969: 2-3).

Trubetzkoy transforms the crucial Saussurean concept of binary *relation* into one of opposition. This is a significant change. In so doing, he also abstracts this from the phonic substance in relation to which phonological forms are categorically construed. Phonologically distinctive oppositions are those oppositions of sound which distinguish the meaning of one word from some other word in the same language. Trubetzkoy (1969: 31) calls these meaning-differentiating functions of sound. Not all oppositions of sound are distinctive in this way. Those which are not are said to be phonologically nondistinctive.

In English, for example, the opposition between the phonemes / n / and / n' /, as in the words *sin* and *sing,* is phonologically distinctive. A further example is the phonological opposition between the singular and the plural morphemes / U / and / i: / in the words *foot* and *feet.* On the other hand, the phonological oppositions among the phonemes / z /, / iz /, and / s /, which realize the plural morpheme in words such as *bananas, horses,* and *cats,* are phonologically nondistinctive. Each of these occurs in phonologically distinct groups, but they all realize the same morpheme of 'plurality' on the stratum of the signified. For this reason, they are not meaning-differentiating in the Trubetzkoy analysis. Thus, / iz / occurs after sibilant and affricate consonants; / s / after voiceless consonants; and / z / occurs in all other possible phonological environments, i.e., after voiced sounds.

Each member of an opposition is what Trubetzkoy defines as a *"phonological (or distinctive) unit"* (1969: 33-4; emphasis in original). The smallest phonological unit is the phoneme. However, Trubetzkoy's definition of this term is different in a number of important respects from Saussure's. The phoneme cannot be further analysed into still smaller distinctive units. Trubetzkoy (1969: 35) points out that phonemes are not the "building blocks out of which individual words are assembled". Rather, a word, which is a phonic entity, is a Gestalt. It is a functionally defined configuration in which phonemes are the distinctive marks.

Trubetzkoy's framework is a structural-functional one. The concern is with the distribution of phonetic forms in phonemic (structural-functional) configurations. The distributions of these phonemes in particular configurations are a function of the phonological system of that language. Trubetzkoy's concept of the phoneme means that this is a kind of phonological category. Thus, regularities in the phonetic organization of the language differentially realize phonological categories.

Following Saussure, a phonological category is defined along two dimensions. These are the paradigmatic and the syntagmatic axes. Phonologists use the first of these to specify the nature of the phonetic regularities which realize a given phoneme. This is where the concept of binary opposition is important. Structural phonologists say that a given phoneme either has or does not have a given feature. They specify the presence or the absence of a feature by using the '+' and '-' signs. For example, the notation [+ consonantal] means that a given phoneme is consonantal; the notation [+ tense] means it is tense, as opposed to lax. Vowels are non-consonantal. The feature [+ tense] means, acoustically speaking, that the "steady-state portion of the sound" is lengthened, as opposed to reduced [+ lax] (see Jakobson and Halle 1956).

Phonologists in the structuralist tradition use the concept of the binary opposition in this type of feature specification. There is, for example, a binary opposition between the presence and the absence of the feature [consonantal]. In other words, this is the contrast between the features [+ consonantal] and [+ vocalic]. Phonologists developed a matrix form of representation in order to represent the interaction of the paradigmatic and the syntagmatic dimensions. The paradigmatic dimension is represented by a series of vertical rows.

The syntagmatic dimension is represented horizontally. This dimension specifies the actual sequence of phonemes as they occur in a word. These are the the functionally related parts which make up the whole Gestalt, i.e., the word.

Chomsky and Halle (1968: 165) use the matrix representation to analyse the English words *inn* and *algebra* in this way. Chomsky and Halle indicate degree of stress with a number. In their analysis, this expresses the stress contour of a word. The first vertical row shows the binary specification of features for the initial phoneme / i / in the word *inn.* The phoneme comprises the configuration of features which is specified. Phonologists specify these features as a binary opposition between the presence or absence of that feature (see above). Thus, the phoneme / i /: (1) is non-consonantal; (2) is vocalic; (3) has second degree nasality; (4) is non-tense; (5) has first degree stress; (6) is voiced; (7) is continuant.

The Chomsky-Halle analysis, which follows in the tradition first proposed by Trubetzkoy and Jakobson, does, on the other hand, have a theoretical basis in the material reality of phonic substance. That is, Chomsky and Halle also refer to articulation in their description of phonological features, although they also recognize perceptual and acoustic correlates of these. It is a purely abstract representation which is based on the perceptual reality

of the (idealized) speaker-hearer. In the same tradition of transformational-generative phonology, Postal argues that the phonetic features are mental instructions which specify how the articulatory act is to be executed (1968: 273). In the Chomsky-Halle analysis, phonetic features such as "nasal", "voiced", and so on specify various aspects of the articulatory act according to a physical scale of values which has, in my view, its roots in a realist conception of phonetic features as existing independently of the categorical salience these have in some system of phonological values.

Jakobson and Halle (1956) make a clearcut distinction between the semantic level of language, and what they call its "feature level". The first involves meaningful units of varying degrees of complexity. These range from morpheme through to discourse. The feature level, on the other hand, is the phonological level. On this level, the units and their combinations serve merely to differentiate and to 'cement' or 'partition' or otherwise highlight the meaningful units on the semantic level. They have no meaning of their own. A number of observations are in order.

First, Jakobson and Halle follow the structuralists' separation of the phonology from the materiality of phonic substance (cf. phonetics). Secondly, they make a clearcut distinction between the semantic level and the feature, or phonological, level. They do not see this level as also contributing a layer of specifically phonological meaning to the overall sign-relation. Thirdly, they suggest that distinctive features on both of these levels – the phonological and the semantic – entail a choice between the two terms of some binary opposition.

The Jakobson-Halle account presents us with a number of significant departures from Saussure's position. Saussure did not project the binary principles of organization which he discovered in the signifier on to the stratum of the signified. Further, Saussure considers both signifier and

signified to be meaning-making (value-producing) in relation to each other. Thus, the structuralists' account of binary oppositions, as witnessed in the work of some of its key exponents, involves a radical recontextualization of Saussure's conception.

In the structuralists' account, this entailed: (1) a clearcut distinction between form (phonology) and meaning (semantics). This is not the same as Saussure's conception of the relationship between signifier and signified, which Saussure envisaged as a single meaning-making complex; and (2) the projection of the principle of binary oppositions from the phonology on to the semantics. This move has important consequences for the subsequent development of this principle.

Unlike the structuralists, Saussure does not privilege the ontological autonomy of form over substance. For this reason, structuralist phonology obscures the way in which the material-phenomenal domain of phonic substance is itself semiotically organized in relation to phonological form. According to the structuralist phonologists, the phoneme is an abstract distinction in phonological form. It has a purely relational (phonological) value. It has no basis in the material-phenomenal domain of the acoustico-articulatory processes involved in speech production and perception. Instead, phonological form is treated as if it has an independent ontological status of its own. It is the allophones of this, with their acoustic, perceptual, and physiological properties, which instantiate the phoneme in phonic substance. Allophones, accordingly, belong to *parole* in this view.

Saussure's conception, on the other hand, does not bracket out the material. However, in order to understand how phonic substance and phonological form relate to each other, Saussure proposes quite a different model. This is the semiological, categorical and topological one which I shall now explore in sections 4, 5 and 6 below.

The Semiological Basis of the Phoneme.

Roy Harris argues that it is possible to read Saussure's concept of the phoneme "as allowing that a human *faculté de langage* which presides over the culturally determined patterns of bi-planar correlation between sounds and concepts will 'naturally' (that is, biologically) choose certain modes of physiological articulation, irrespective of the circumstances of cultural history" (1987: 50). I do not think that it is a simple matter of biology presiding over culture. Nor do I think that Saussure's account of the 'interface' between the cultural and the biological is the "fairly naive version" that Harris (1987: 51) suggests. To clarify why I think this is so, it is important to bear in mind that, in Saussure's theory, phonological units are established on the basis of acoustic impressions:

The acoustic given already exists unconsciously when one tackles phonological units; it is by means of the ear that we know what a b, a t, etc. is. If one could reproduce by cinematographic means all the movements of the mouth and larynx when executing a chain of sounds, it would be impossible to discover the subdivisions in this sequence of articulatory movements; one would not know where a sound begins, where the other ends. How can it be affirmed, without the acoustic impression, that in fal [with an accent "-" over the a], for example, there are three units, and not two or four? It is in the chain of heard speech [la chaine de la parole entendue] that one can immediately perceive whether a sound remains the same or not; as long as one has the impression of homogeneity, the sound is the same. What matters is not so much its duration in quavers or semiquavers (cf. fal [with an accent "-" over the a] and fal [with an accent "u" over the a]), but the quality of the impression [la qualité de

l'impression]. The acoustic chain is not divided in equal temporal units, but in homogeneous ones, characterized by the unity of the impression, and that is the natural point of departure for phonological study. **(CLG: 63-4)**
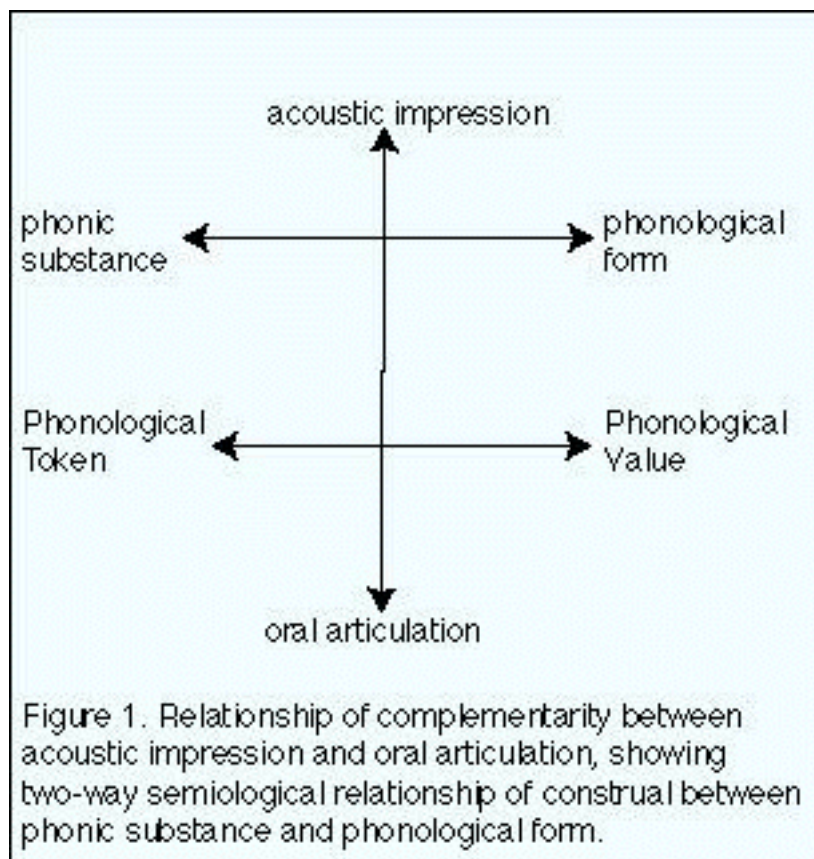
Phonological units are established on the basis of acoustic impressions. However, acoustic impressions are not the same as raw acoustic stimuli in the objectified and physicalist sense. Rather, they refer to the qualitative information which the ear extracts from the acoustico-articulatory flux. There is no one-to-one correspondence between phonemic categories and the information in the acoustico-articulatory flux. The 'impossibility of discovering the subdivisions in the sequence of articulatory movements' refers, on the other hand, to the analog continuum of the acoustico-articulatory flux. The 'impossibility' that Saussure refers to has to do with the fact that phonemes are not simply and directly encoded in the sound sequence. The sound sequence is not a cipher or a spoken alphabet whereby each sound encodes a phoneme on a one-to-one and strictly linear basis. Instead, the sequence of articulatory movements encodes complex configurations of phonic terms in the acoustic flux.

In Saussure's definition, the phoneme is based on the sum of "acoustic impressions and articulatory movements" (CLG: 65; see below for discussion). The phonic terms which are encoded in a given phoneme may be interwoven and distributed in the chain of speech across more than one segment of speech sound. Indeed, a given phonic term may participate in the contextualizing of more than one phoneme in the spoken sequence. From 'below', phonic terms index features of the sequence of articulatory movements. From 'above', they are reconstrued as instances of phonemes. That is, phonic terms necessarily face two ways. They are an interface between the lower stratum of the acoustico-articulatory continuum and the

higher one of the phonological categories in relation to which a semiotically formed phonic substance emerges. The "impression of homogeneity" is qualitative: the layering of phonic terms in the spoken chain gives rise to acoustic impressions which the ear selectively reconstrues as the complex unity of principles (articulatory and acoustic) which Saussure defines as the phoneme (see section 5).

The "homogeneity of impression" whereby phonemes are identified is not based on the principle of "equal temporal units" because there is, as I pointed out above, no one-to-one relationship between articulation and phoneme. The "homogeneity" Saussure refers to is both qualitative and semiological. If there really were a simple, one-to-one correlation between sound and phoneme, then the relationship would be unilinear and causal, rather than semiological. This is one reason why the phonology does not function like an alphabet. The phonology cannot, for this reason, be treated in the same way as the written language system.

Phonic substance (the phonetics, in the modern sense) of a given language emerges from the analog continuum of what Hjelmslev called expression-purport. Phonic substance is reconstrued as instances of specific phonological categories by the system of phonological forms. The phonological system of a given language is the system of interpretance in and through which a phonic substance is motivated both from the articulatory and perceptual points of view. This occurs on basis of the acoustic impressions that the ear perceives. The acoustic images which are stored in the brain constitute a repertoire of sensori-motor schemas which organize both the execution (articulation) and perception of speech sounds even before any sensory experience has occurred. In this way, semiological values are assigned to the unity that arises from the complementary relationship between oral articulation and acoustic impression. This is shown in Figure 1:

Figure 1. Relationship of complementarity between acoustic impression and oral articulation, showing two-way semiological relationship of construal between phonic substance and phonological form.

The general semiological principle which relates the various levels, or strata, of this relation (i.e., phonic substance and phonological form) is analogous to the stratal relationship between signifier and signified in the overall sign-relation. From the point of view of the phonological pole of the sign-relation, this principle may be stated as follows: The movements of articulation a, b, c redound with phonic terms p, q, r, which are perceived as semiotically salient informational values in the acoustico-articulatory flux. In turn, configurations of these categorically construe some phoneme x. It is not the case, however, that there are two separate causal series: the synergy of articulatory movements [a, b, c] does not 'cause' the

configuration of phonic terms [p, q, r]. Nor does this, in turn, 'cause' phoneme x. Rather, there is a semiotic, or interstratal, relation of metaredundancy between these various levels. Thus, phoneme x redounds not with the phonic terms [p, q, r], but with the redundancy of the configuration of phonic terms [p, q, r] with the complex of articulatory movements [a, b, c]. A given configuration of phonic terms does not stand, realist fashion, in direct correspondence with the mechanical movements of articulation in the vocal tract. Rather, the latter are interpreted as values, or configurations of salient information that have a categorical significance. On this basis, the brain is equipped with the means of both evaluating and anticipating the motor and perceptual activities of speaking and listening.

This explains why sounds in the spoken sequence do not stand in a direct relationship with phonemes. Phonemes are realized by configurations of phonic terms. But the phonic terms are reconstrued for realization as the articulatory movements [a, b, c]. In other words, a given phoneme x is realized by the realization of the phonic terms by the sequence of articulatory movements. In other words, ((phoneme x (phonic terms [p, q, r] articulatory movements [a, b, c])). It is in this sense that instances of phonemes, or phonological types, emerge from the 'lower' level acoustico-articulatory continuum. In this way, the continuum of analogic differences is selectively digitalized as phonological values in relation to the psychic orientations of speaker and hearer in the speech circuit.

Saussure's understanding of the categorical basis of the perception of speech sounds also explains why his definition of the phoneme is dually based on both articulatory movements and acoustic impressions. In incorporating both of these dimensions, Saussure's definition, as I pointed out in sections 2 and 3, cuts across the standard distinction between phonetics and phonology: the phonological categories in the language system control and contextualize material occurrences of speech sounds

as instances of these categories in phonic substance. Unlike de Courtenay, who was the first linguist to theorize the notion of the phoneme, Saussure does not intend by this term an *a priori* mental idealization of the sound in question, i.e., one which is separate from the phenomenon – speech sounds – that it controls and regulates. Instead, Saussure's notion is dually grounded in the act of articulation and in the acoustic impressions perceived by the ear The phoneme is an emergent property of the dynamical behaviour of the system as a whole. Rather than claiming that some idealized *a priori* mental construct causes or programs speech sounds, Saussure's analysis emphasises that speaking is an embodied activity or movement that takes place in a wider ecosocial context. In such a view, the emphasis is on the reciprocal and mutually determining nature of the relations among all of the variables that are involved. The acoustic images that are stored in the brain do not function as *a priori* programs that control articulation. Similarly, phonic terms, or features, do not cause discrete articulatorily movements that unfold in a linear sequence in the uttering of a given speech sound. The acoustic image is an equifinal characteristic which is determined by the dynamic parameters – the emergent phonic detail, specifiable as configurations of phonic terms in a topological space – that define the organization of the articulatory act in relation to its ecosocial environment. In such a view, the phoneme does not have a structure which is independent of the space-time of the ecosocial environments in which it is spoken and heard. Rather, it is an emergent property of the ways in which the organs of articulation are entrained and coordinated for the accomplishing of particular acts.

In this respect, the ear has a vital contextualizing role to play. The ear introduces a digital and intentional (psychic) orientation to the analog continuum of differences (the information) in the acoustico-articulatory flux. This provides the information to which the ear selectively orients. The ear functions as the interface or the boundary between the analog continuum of

this acoustico-articulatory information and the digital distinctions made in phonological form. These digital distinctions are the phonological categories of a given language system. Hearers do not perceive speech sounds in a direct or unmediated way. They do not perceive 'raw' acoustic stimuli in the physicalist sense. Instead, Saussure emphasises the active and contextualizing role of the ear, which discriminates on the basis of salient patterns of difference. That is, the ear selectively contextualizes the chain of heard speech on the basis of semiological criteria which assign phonological values to the perceived patterns of sameness and difference in the spoken chain. This is what Saussure means by the "quality of the impression": the ear selectively contextualizes on the basis of semiotically salient, rather than naturalistically defined, patterns of difference.

Saussure's Categorical Theory of the Phoneme.

Saussure's explanation of the perception of speech sounds is a categorical one. The categorical basis of specifically phonetic perception was investigated in the pioneering research of phoneticians such as Studdert-Kennedy, Liberman, Harris, and Cooper, 1970) and Repp and Liberman (198?). Phonetic categories are defined as follows:

Other things being equal, stimuli belonging to the same phonetic category are more difficult to discriminate than stimuli on opposite sides of a phonetic boundary. This phenomenon has long been known as "categorical perception". **(Repp and Liberman 198?: 89)**

In the same paper, Repp and Liberman argue that the categorical perception of speech sounds is not absolute, but graded or "flexible". This represents a correction of the earlier stance of these same researchers that categorical perception can only occur "in absolute terms" (1970). The important point is that phonological types (phonemes) constitute the means whereby discontinuities or digital distinctions in the analog continuum of phonetic stimuli are construed. Thus, the "impression of homogeneity" that Saussure refers to in the above citation represents a categorizing judgement concerning the way in which sounds in the phonetic continuum are perceived as belonging to distinct classes of phonological categories (phonemes).

In the first instance, Saussure bases his analysis on what he calls the "articulatory act" *[l'acte articulatoire]* (CLG: 65). What is at stake for Saussure is an important descriptive principle – acoustic units *per se* cannot be the basis of phonological description. These must be linked to what Saussure refers to as the "chain of movements in phonation" (CLG: 65). At this point, Saussure makes a decisive claim:

The delimitation of the sounds in the spoken chain can only rest, then, on the acoustic impression; but for their description, one must go further. It can only be done on the basis of the articulatory act, for the acoustic units taken in their own chain are unanalysable. One must have recourse to the chain of movements in phonation; one notices therefore that to the same sound corresponds the same act: b (acoustic moment) = b' (articulatory moment). The first units which one obtains on segmenting the spoken chain are composed of b and b'; they are called phonemes [phonémes]; the phoneme is the sum of the acoustic impressions and of the articulatory movements, of the unit which is heard and that which is spoken, the one

conditions the other: thus it is already a complex unit, which has a foot in each chain. **(CLG: 65)**

With the term "phoneme", Saussure intends, therefore, quite a different descriptive unit from that which modern phonology recognizes. For Saussure, the complex unit which he establishes is, as I argued in section 4, based on an interstratal relation between articulatory moment and acoustic moment in phonic substance and phonological form. This important principle will be further developed below. Saussure proposes that the description of "the spoken chain" be conducted on the basis of a complex unity of principles. It is a unity which the separate subdisciplines of phonology and phonetics, in the modern sense, subsequently kept apart.

The point of this unity is to show that both oral articulation and acoustic impression are necessary for the description of the phoneme. There is a reciprocal or two-way relationship between the two in Saussure's account. In other words, they are part of the one overall phenomenon. The complementarity of oral articulation and acoustic impression means the information which is present in one makes it possible to predict the information in the other. The complementarity of the two makes the variability of the whole which Saussure designates as comprising b and b' less than the variability of the two components, taken separately. That is, b and b' are contexts for each other's interpretation. The one constrains the possibilities of interpretation of the other. In the language of metaredundancy which I introduced in section 4, b is redundant with b' (see Lemke 1984: 35-6).

The relationship between b and b' is a first order redundancy relation, rather than a contextualizing relation in the proper sense. This relationship

is represented in the formalism of metaredundancy as (b/b'), where the single slash indicates the first-order redundancy of b with b'. Saussure's solution to this problem is to propose the phoneme as the unit which derives from the "sum" of b and b'. On segmenting the spoken chain, the question has to be asked as to why the linguist obtains b and b', rather than, say, b and x. The relationship between b and x may be a sound pattern which is not recognized by the phonological system of a given language. The recognition of b and b' requires a context for its correct interpretation. That is, it requires a second-order redundancy relation which specifies the context for the interpretation of b and b'. It tells us the context in which b and b' are related to one another. It is the phoneme which fulfills this function for Saussure. The context in question is the system of phonological forms of a given language. The phoneme is a second-, and, hence, higher-order contextualizing relation which contextualizes the relationship between b and b'. This is so in the sense that the phoneme is a schematic (systemic) category belonging to phonological form. The full contextualizing relationship is formalized as ((b/b') // c), where the phoneme is the second-order metaredundancy relation represented by c. This says that c is redundant with the redundancy of b and b' (Lemke 1984: 36). There is, as I pointed out in section 4, an interstratal and semiological relationship between phonic substance and phonological form. Oral articulation and acoustic impression belong to the material-phenomenal domain of phonic substance. The phoneme is the higher-order contextualizing relation which construes meaningful relationships between the events b and b' as a phonologically motivated phonic substance.

Saussure's theory of phonological types is concerned with specifying the contextualizing relations that relate phonological form to phonic substance. That is not the same, as we shall see in section 9, as specifying the ways in which these contextualizing relations are used in the spoken chain.

How do speakers and hearers construe phonological order in the flux of the acoustico-articulatory continuum? To answer this question, it is necessary to pose two prior questions: (1) how is a particular phonic event recognized as an instance of a phoneme of a given type or a sequence of such phonemes by the users of the language?; and (2) what are the structurally stable phonological forms (phonemes) of the language system? In actual fact, these two questions are no more than two different perspectives on the same overall problem. The difference between the two perspectives is one of delicacy, or degree of specificity, of description.

The first question is concerned with the very many slightly different material manifestations of a sound of a given type. For example, individual differecens of pronunication, and so on. The second perspective is that of the general category of sound to which specific, material instances are assignable. The first perspective refers to the allophones; the second to the more schematic phonemic categories, or phonemes. The difference between the two perspectives is not just one of levels of abstraction, but also of degree of delicacy, or specificity. In other words, the relation between the two perspectives is one of variable degrees of delicacy whereby specific instances may be related to the type along a graded continuum. The American linguist, Ronald Langacker, in his theory of 'cognitive grammar', refers to this relationship as one of "schematicity":

In a relationship of full schematicity, the participating structures are fully compatible in their specifications; hence they must occupy the same general region of semantic space. The schema and its instantiation represent the same entity at contrasting levels of specificity: the schema is a coarse-grained representation showing only gross organizational features, whereas its instantiation delineates the entity in precise, fine-

grained detail.
A schematic relationship reflects a categorizing judgment based on comparison. The overall comparison between a schema and its instantiation summarises over an indefinite number of local comparisons between corresponding substructures." **(Langacker 1987: 91)**

The phoneme, as a categorical type of phonological form, determines what speech sounds will be construed as corresponding to the categorical judgments embodied in the more schematic category. Such a judgment is always an act of comparison. A given instance in phonic substance is always compared to the more schematic representation – the phoneme – which the schema entails. The schema is criterial. A given instance can be said to instantiate the schema up to some specifiable level of delicacy, or specificity. Beyond this, a given instance may display differences which are non-criterial, sub-distinctive, or not salient.

Every material occurrence, or instance, of a given phoneme category is unique at some level of delicacy, or specificity. From this point of view, no two instances are ever exactly identical. This is so for a variety of reasons. These may range from the physiological characteristics of the individual speaker, to the physical channel (face-to-face, electronic, and so on), and to other material factors in the context. In so far as a given occurrence can be said to instantiate some categorical schema, it is possible to say that it has a relationship to a specifiable phonological SYSTEM of relations. That is, a material instance of a phoneme can be placed in a SYSTEM-INSTANCE relationship to the schematic category. This is one of the dimensions along which semiosis occurs in the making of signs. In this sense, phonological types, as Saussure defines them, are categorical.

The Topological Basis of the Sounds of Language.

Saussure's overriding concern is to establish general principles of analysis. He is not concerned with the phonological description of specific language systems. The general principles that he seeks leave aside those acoustic "nuances" which do not make a categorical difference (CLG: 66), so as to discover the underlying mechanisms of the sound system. On this basis, Saussure proceeds to subdivide the vocal apparatus into a number of different regions. Initially, these are the nasal cavity, the oral cavity, and the laryrnx (CLG: 66-7). Saussure then further subdivides these into a number of subregions. But, Saussure observes, it is not enough to enumerate the "factors of sound production" in order to determine the "differential elements of the phonemes" (CLG: 68-9). Saussure is less interested in what these phonemes consist of, positively speaking. Instead, he is more interested in those "negative factors" which have a "differentiating value" (CLG: 69).

Initially, Saussure proposes four principles for specifying the differentiating values of phonemes. These are: expiration, oral articulation, vibration of the larynx, and nasal resonance (CLG: 69). Saussure then excludes expiration on the grounds that it is a "positive factor", which is present in all acts of phonation. Consequently, it has no "differentiating value". This means that the remaining terms all have differentiating value. Initially, Saussure puts aside the category of oral articulation and proposes the schema of the possible variations which is shown in Figure 1.

Thus, the symbols in Saussure's notation serves to indicate whether the sound is larygneal (~), or not ([]); whether there is nasal resonance (…..) or not ([]) (CLG: 69). Thus, the four vertical columns indicate whether the four types of sound, as classified by the four columns, are differentiated by the features [+ laryngeal vibration] or [- laryngeal vibration] and [+ nasal vibration] or [- nasal vibration]. Each of these pairs of phonic terms constitutes what Saussure calls a 'binary group' (CLG: 78).

A binary group is a relation between two differentially defined phonic terms. The two terms in a given group constitute the two extremes of a graded continuum between, say, 'presence of nasal vibration' and 'absence of nasal vibration'. A binary relation of this kind is not an all-or-nothing distinction. Rather, there are degrees of, say, nasality. The relation between the two extremes of the binary relation is a continuous and graded one, rather than an absolute and categorical one. The binary difference between, say, 'presence of nasality' and 'absence of nasality' belongs to the continuum of analog differences in articulation, rather than to categorical, or digital, distinctions between phonemes in phonological form. As I said above, each term is a semiotically salient value in some language system. A great deal more information impinges upon the speaker-listener's receptor cells than is necessary for the recognition or prediction of a given phonological "figure." As Bateson points out, the information which is coded in, say, a given term is always multiplicative (1987 [1951] : 175). The binary character of phonic terms, which are the elementary informational values, simultaneously asserts the presence of some articulatory feature at the same time that they deny its opposite, or assert its absence, in the relevant acoustic-articulatory environment. Thus, the term [+ nasality], in asserting the presence of this feature, also denies or excludes some other feature(s), as suggested by the term [- nasality]. Instead of just one we have two "bits" of information. And it follows, as Bateson explains, that "when we have two such "bits" of information the gamut of possible external events to which the

information may refer is reduced not to half, but to a quarter of the original range" (1987 [1951]: 175), and so on.

Saussure (CLG: 70) notes that sounds were generally classified according to the "place of their articulation" *[lieu de leur articulation]* in the vocal apparatus. This is the substance-based approach that I referred to above. According to the physical realism of this approach, articulation 'causes' speech sounds.

Saussure proposes a different and far more general schema. He bases this, in the first instance, on the principle of oral articulation. First, Saussure notes that all speech sounds are classifiable in terms of the binary relation between "complete closure and maximal openness" *[l'occlusion compléte et l'ouverture maximale]* (CLG: 70 ; see also Fowler 1986: 4). The binary relation between these two terms constitutes the two extremes of a topological region in relation to which Saussure posits seven very general classes of sounds. Thus, "it is only within each category", Saussure claims, "that we distribute the phonemes into diverse types according to their own place of articulation" (CLG: 70).

The basis which Saussure proposes for the categorization of phonetic stimuli as discrete types of phonemes is *inter-,* rather than intra-, categorical (see Petitot-Cocorda 1985: 21-2). Two phonetic stimuli which occur on either side of a given digital boundary are necessarily categorized as belonging to phonemes of two distinct types. At this level of abstraction, Saussure's analysis seeks to affirm the close relationship between universal principles of phonetic perception and categorization and the principles of phonological classification specific to a given language system (Petitot-Cocorda 1985: 253).

How do the categories of phonological form 'analyze', as Hjelmslev would put it, the acoustico-articulatory continuum? The seven categories which Saussure proposes do not amount to a simple taxonomic classification of already existing and autonomous 'entities'. These are not founded on objectified and substance-based criteria, seen as being independent of phonological form. Saussure is very clear on this point. In the following passage, he quite explicitly rejects those classifying practices which take as their starting point some predefined and already identified 'entity' – in this case, what Saussure calls the 'place of articulation' of sounds:

Generally sounds are classified according to their place of articulation. Our point of departure will be different. Whatever the place of articulation is, it always presents a certain openess, that is to say, a certain degree of openess between two extreme limits which are: complete closure and maximal openess. On this basis, and on going from minimal openess to maximal openess, sounds will be classified into seven categories designated by the figures 0, 1, 2, 3, 4, 5, 6. It is only within each of these that phonemes are divided into different types according to their own place of articulation. **(CLG: 70)**

Thus, the two extremes of 'complete closure' and 'maximal openess' do not correspond to predefined and autonomous 'entities'. Saussure clearly rejects the realist approach in adopting this view (see above). Rather, they are domains in a topological space whose 'outermost' parameters are defined by the two extremes of "complete closure" and "maximal openness". Saussure, in the paragraph which follows the one just quoted, is quite explicit about the topological basis which underpins his criteria of

classification. To be sure, he does not use the mathematical term 'topological'. Nevertheless, it is clear in the above quotation that the seven categorical distinctions which he makes are paradigmatically organized value-producing distinctions. These do not, as I said, classify an already given phonic substance. Saussure's proposal is far more radical: the paradigmatic basis of the seven categories enables these to emerge from the material-phenomenal domain of the acoustico-articulatory continuum.

In departing from taxonomic principles of classification, tied as these were to a predefined and autonomous 'place of articulation', Saussure undertakes a truly radical step. In dividing the palate into "a certain number of areas" *[un certain nombre d"aires],* Saussure no longer focusses on a set of discrete and objectified 'places of articulation'. He no longer privileges criteria such as the specificity or uniqueness of phonological categories. Instead, he transforms these into a topological region. Saussure defines this according to the relations among the various subregions in the palate.

Each category is defined in relation to a standard or idealized subregion within the overall topological region. A given category is defined by the local intersection in a particular subregion of a number of value-producing phonic terms. In this way, each local category is defined by multiple criteria. These criteria may be more or less independent of each other. Two phonemes may be closer to each other in one dimension and further apart in some other. The phonic terms specify the criteria – the acoustico-articulatory parameters – that define similarity and difference along each dimension.

A given local domain is a schematic category in relation to which particular instances may be positioned. Those instances which most closely resemble the type-criteria, i.e., the prototypical instantiations, as established by the categorical judgments entailed by the schema, are

placed closer together. Those which are in some way less criterial are placed further away from the schema.

The topological basis whereby the acoustico-articulatory continuum is 'analyzed' is systemic, or paradigmatic. This point will now be developed in the next section.

The Paradigmatic Basis of Phonological Types.

Saussure's topological analysis is based on paradigmatic principles. Consider the phoneme 'p'. This phoneme belongs to Saussure's first class of phoneme, which Saussure designates as class A phonemes. Phonemes in this class are classified as 'zero aperture: stops' (CLG: 71). The phonemes which belong to this general class are obtained by "complete closure, the hermetic but momentary obstruction of the vocal cavity" (CLG: 71). Saussure further distinguishes three main subtypes of stop: labials (p, b, m), dentals (t, d, n), and gutturals (k, g, n). In particular, the phoneme /p/ is a labial because it is articulated with the two lips. Figure 2 reproduces Saussure's own diagram representing the class A phonemes:

LABIALS			DENTALS			GUTTURALS		
p	b	(m)	t	d	(n)	k	g	(n)
αOa	αOa	αOa	βOa	βOa	βOa	γOh	γOh	γOh
[]	~	~	[]	~	~	[]	~	~
[[	[]	.....	[]	[]	.....	[]	[]	.....

Figure 2: Saussure's class A phonemes (borrowed from CLG: 72).

Figure 2 shows that Saussure's first class of sounds is a specific subregion in the palate. Class A phonemes (zero aperture: stops) are produced in the subregion which Saussure identifies as the oral cavity. This is the region labelled A in Saussure's diagram of the vocal apparatus (CLG: 67). The oral cavity is a global topological region. Saussure subdivides this into the three subregions of labials, dentals, and gutturals. These are the three main subtypes of stop, which, Saussure argues, are defined according to their point of articulation:

The first [labials, PJT] is articulated with the two lips; in the second [dentals, PJT] the extremity of the tongue is applied to the front of the palate; in the third [gutturals, PJT] the back of the tongue is in contact with the rear of the palate. **(CLG: 71-2)**

Each of these subregions is then further subcategorized as a local category on the basis of a particular configuration of phonic terms. The local categories are the phonological types (phonemes). Phonological types are schematic with respect to their instantiations in phonic substance (see section 7).

The notation in Figure 2 tells us that class A phonemes are produced by specific groupings of phonic terms. In the case of the phoneme /p/, the phonic terms in question are: complete closure (O), by pressing the bottom lip (à) and the top lip (a) together; absence of both layrngeal vibration and nasal vibration. The phonic terms listed here are selected from the following binary groups: [open] or [closed], [presence of layrngeal vibration] or [absence of layrngeal vibration], and [presence of nasal vibration] or [absence of nasal vibration].

Saussure's description of the phoneme is, perhaps, the first explicit formulation of the item and paradigm approach in linguistic description. His description of the seven classes of phonemes is a componential analysis of the paradigmatic features – the phonic terms – that constitute the various phoneme classes. The analysis in Figure 4 classifies the phonemes according to the following criteria: [aperture], [laryngeal vibration], and [nasal vibration]. The phonemes Saussure analyses are either [open] or [closed], [+ layrngeal vibration] or [-layrngeal vibration], [+nasal vibration] or [-nasal vibration]. In Figure 4, the three phonemes belonging to the subregion 'labial' are specified as having the following configurations of phonic terms:

[complete closure, -laryngeal vibration, – nasal vibration] / p /

[complete closure, +laryngeal vibration, – nasal vibration] / b /

[complete closure, +laryngeal vibration, + nasal vibration] / m /

Saussure's paradigmatic analysis shows how phonemes may be specified in terms of distribution classes of phonic terms. In showing how the presence or absence of, for example, the phonic term [laryngeal vibration] distinguises the phoneme /p/ from the phoneme /b/, Saussure shows how the phonological meaning of these terms is motivated by criteria pertaining to phonological form. The difference between the phonological values designated by the forms /p/ and /b/ is motivated by the 'presence' or 'absence' of [laryngeal vibration]. This means that the paradigmatic system of phonic terms which constitutes one of Saussure's two 'orders of difference' has consequences for the specification of particular phonological patternings. The relationship between particular configurations of phonic terms and the phoneme is a semiological, or interstratal, one. That is, configurations of phonic terms on the 'lower' stratum are semiologically reconstrued as categories of phonemes on the 'higher' stratum of phonological form, as shown in section 4.

The synergy of the movements of articulation "complete if momentary close of the vocal tract", "absence of laryngeal vibration" and "absence of nasal vibration" thus correspond to the configuration of phonic terms [+ closure, − laryngeal vibration, − nasal vibration], seen as informational variants and invariants in the acoustico-articulatory flux. In turn, this configuration of phonic terms is a sensori-motor schema stored in the brain which, in assigning values to the sensorial context, anticipates the production and perception of the phoneme /p/. Phoneme /p/ redounds not with the phonic terms [+closure, -laryngeal vibration, − nasal vibration but with the redundancy of this configuration of phonic terms with their corresponding articulatory movements and/or acoustic impressions.

This interstratal relationship may be specified as follows: Phoneme 'p' is realized by the realization of the phonic terms [+closure, -laryngeal vibration, − nasal vibration] by the sequence of the articulatory movements

these correspond to. That is, ((phoneme /p/ (phonic terms [complete closure, – laryngeal vibration, – nasal vibration] corresponding articulatory movements)). The phonic terms are not substantive properties of the particular articulatory act which produces the sound in question. Rather, they are a set of parametric values – a schema – which constrain the particular ways in which a given coordinated movement of the muscles involved in articulation is produced. The particular cluster of phonic terms I have placed between square brackets thus constitute a frame or a schema whereby the movements which occur in the given act of speaking are interpreted. Phonic terms, or features, such as, for example, [- nasal vibration] are not, then, substantive properties of these muscular movements. Instead, they are values which are assigned to particular aspects of the articulatory act. Further, these values are not defined individually as "things" on their own. Rather, they derive from a system of topologically defined relations. A particular clustering of phonic terms, as shown in the square brackets in the above example, represents an equivalence class of articulatory act. It defines the parameters in terms of which any given instance of this act may conform to or differ from the schematic criteria specified by the phonic terms and yet remain an instance of a particular equivalence class rather than some other. The phonic terms are then functional values which are assigned to a given articulatory act. The fact that a given coordinated act of articulation may conform to a greater of lesser degree to these values means that the muscular movements involved in articulation are able to be modulated to some extent by intentional factors.

A local domain is the paradigmatic set of phonic terms which define the articulatory parameters of a particular phonological type. A given phonic term is a stable informational variant which specifies a particular articulatory parameter. The phonic terms define the boundary conditions of the local articulatory domain corresponding to a given phoneme. For

example, the phonic terms shown in Figure 4 classify /p/ as a consonant of the superordinate class 'stop'. The phoneme /p/ is a schematic category in relation to which specific material instances (allophones) are categorized. A given binary group specifies which phonic terms from the phonic order of differences configure in order to produce a specific category of sound, or phoneme. They refer to the specific combinations of acoustico-articulatory features which are salient for the articulation of a given phonological type. A particular group of phonic terms specifies the parameters of a given phoneme. This means that a particular phonological value is assigned to a given configuration of phonic terms. In other words, a given configuration of phonic terms signifies a given phoneme.

Each subdomain – for example, the phoneme /p/ – is distinguished from the others by the fact that it digitalizes the analog continuum of the palate as a subdomain which is bounded (digitalized) in relation to the other subdomains. Thus, the phoneme /b/, in comparision with /p/, digitalizes the analog continuum of the palate differently in so far as 'b' has laryngeal vibration (~), whereas /p/ does not. That is, the presence of the phonic term [+ laryngeal vibration] in the phoneme /b/ digitalizes the analog continuum differently with respect to the absence of this term in /p/. This difference between the phonemes /p/ and /b/ means that two discrete localized subdomains of the oral category are digitalized in the two cases. The difference between presence or absence of laryngeal vibration means that the subregion [LABIAL] is subcategorized into the three local domains represented by the phonemes /p/, /b/ and /m/.

The phonemes /p/ and /b/ differ along just the one parameter of 'presence' or 'absence' of the phonic term [laryngeal vibration]. The difference between 'presence' or 'absence' of [laryngeal vibration] in the phonemes 'p' and 'b' designate stable informational invariants at the level of the articulatory act. The transition from 'absence' to 'presence' of this feature

indexes a transition from one stable region of articulation to another in the oral cavity. A given region is not reducible to purely quantitative criteria in the abstract physical sense. Rather, it refers to a qualitative difference in the informational invariants which correspond to stable articulatory regions. The transition from the stable informational invariant 'absence' to 'presence' of [laryngeal vibration] entails a categorical transition from one phonological category to another.

This explains why Saussure assigns a central role to the process of audition. Such information is actively oriented to the ear of the hearer. The ear is not a passive receptor of physical stimuli. Instead, the ear is actively oriented to the informational variants and invariants which distinguish one stable region of articulation from another. The ear 'amplifies' an informationally significant difference in the analog continuum of the acoustico-articulatory flux as a categorical distinction in phonological form. In this way, the phoneme is grounded in phonic substance.

The Topological Region is an Analog Continuum.

Saussure, as I pointed out above, observes that, phoneme categories are intra-categorical (CLG: 70). I should like to make two observations here. First, the topological region is an analog continuum defined, in the first instance, in relation to the two categorical extremes of complete closure and maximum openess. There are no discrete boundaries in this analog continuum. However, the introduction of discrete boundaries in the process of the categorical reconstrual of specific regions of the overall space as instances of the phonological types in a given language system digitalizes the analog continuum of articulatory (bodily) processes (Wilden 1980 [1972]: 122).

The analog continuum of the bodily processes involved in articulation is replete with a rich and indeterminate continuum of (phonetic) meaning potential. The digitalization of this continuum means that the richness and indeterminacy of the material-phenomenal domain is 'simplified' in terms of a small number of digital categories. Phonological categories introduce digital distinctions into the analog continuum of acoustico-articulatory processes. These type-categories are necessarily discrete and well-defined with respect to each other. The differences between phonological types are digital distinctions. This does not mean, however, that the analog continuum of the oral cavity is undifferentiated. Rather, it is based on analog differences between, say, the presence or absence of openness or closure.

Analog differences are based on degrees of organization, intensity, and so on, rather than on discrete categorical distinctions. The binary groups which Saussure postulates on the basis of the articulatory act are binary relations which specify parameter values in a continuum of analogue differences rather than digital (categorical) distinctions. The point is that the articulatory processes produce a continuous flux of acoustic-articulatory information which is not reducible to the digital distinctions between the higher-order phonological categories in langue. The macroscopic information – the analogue percepts – so produced is potentially meaningful to an observer who is equipped to interpret it through the digital categories of some higher-order system of interpretance. Saussure's discussion of the oral cavity is a good illustration of this point:

As for the oral cavity, it offers a very varied play of possibilities: one can increase the length of the [oral] canal by means of the lips, swell or relax

the cheeks, contract and even close the cavity by means of the infinitely diverse movements of the lips and tongue.

The role of these same organs as producers of sound is in direct proportion to their mobility: the same uniformity in the functioning of the larynx and the nasal cavity, same diversity in that of the vocal tract.

The air expelled by the lungs first passes over the glottis, where the production of a laryngeal sound by proximity to the vocal cords is possible. But it is not this play of the larynx which can produce the phonological types thereby allowing the sounds of the language to be distinguished and classified; in this connection, the laryngeal sound is uniform. Directly perceived, that which is emitted by the glottis appears to us more or less invariable in quality … […]

But to enumerate these factors of sound production is still not to determine the differential elements of the phonemes. In order to classify the latter, it is much less important to know what they consist of than what distinguishes one from the other. Thus a negative factor may be more important for classification that a positive factor. For example, expiration, a positive element, but which is found in all acts of phonation, has no differentiating value; whereas the absence of nasal resonance, a negative factor, will serve, just as much as its presence, to characterize phonemes. **(CLG: 68-9)**

The play – the synergy – of the speech organs in the production of speech sounds is not equivalent to the categorical distinctions between phonological types. This "play" refers to physical-material processes in an analog continuum. Thus, the "very varied" possibilities for increasing the

length of the vocal canal by means of lip protrusion, the "infinitely diverse movements of the lips", and so on refer to a graded continuum of binary relations, rather than to discrete categorical distinctions. This has its basis in the continuous and emergent nature of the self-organizing processes involved in the production of speech sounds. The vocal tract gestures that result from this synergy of factors constitute a material event in the ecosocial environment of the speaker and a potential listener who are suitably linked by informational media (e.g. air) which are the source of information about this event to a suitably equipped perceiver. The information in this perceptual array are macroscopic or morphological forms which have substantive properties. It is these which selectively cross-couple with the perceptual systems of the organism and guide its perception and action. On the other hand, the negative and differentiating values of the phoneme have no substantive properties. Phonemes and the configurations of phonic terms these are comprised up are nonsubstantive parameter values which provide an organizational frame for both the play of the organs in the vocal tract and their perception (Fowler et al 1980: 386). Importantly, there is no direct relation between the substantive properties of the speaker's vocal tract gestures and the information in the perceptual array, on the one hand, and the parameter values of the phonic terms, on the other. Saussure's semiological conception of the Ear as the contextualizing organ – the Third – which actively orients to and interprets the array tells another story. That is, the Ear, in imposing digital categories on an analogue world enters into a semiological relation with the infiormation in the acoutic-articulatory flux. It is NOT a question of a direct, causal relationship between nonsubstantive values (phonic terms) and the substantial properties of the array.

Articulation involves the continuous, if episodic, entraining of matter, energy, and information flows in the acoustico-articulatory flux. This occurs relative to the ecosocial environment of the speaker and listener in which

semiological values are assigned to differences in this analog continuum. The assigning of a semiological value entails, in other words, a categorizing judgement as to the conformity or otherwise of some difference to a given phonological type. In this way, a digital distinction is made in the analog continuum. That is, the act of assigning a given instance to a digital category represents a categorizing judgement as to its potential significance in the speech chain.

The system of value-producing distinctions *(langue)* does not, then, refer to a predefined set of intrinsic factors, positively defined. Instead, it provides the systemic resources for construing this space as a series of regions which correspond to structurally stable and perceptible phonological forms or categories. The latter, as I have already remarked, emerge in and through these processes of construal. They do not preexist it. Secondly, the value-producing categorical distinctions construe differences negatively. The basis for this is the initial distinction which Saussure made between the two extremes of "complete closure" and "maximum openess". Thus, differences are always inter-categorical. It is only "within each category", as Saussure puts it, that positive, or intra-categorical, factors such as 'point of articulation' are admitted (Petitot-Cocorda 1985: 43).

Saussure's Combinatory Phonology: Functional Values in the Spoken Chain.

In the chapter which follows the above analysis, Saussure resumes his discussion of the general theoretical principles which are at stake. The main thrust of Saussures' proposals is directed against a phonological science which takes single, isolable sounds as its point of departure (CLG: 77). Saussure observes that his theory is concerned, on the other hand, with "relations of internal dependency" (CLG: 78) between sounds in a

given sequence. But when two sounds are combined, these relations of internal dependency entail reciprocal constraints whereby "there is a limit to the variations in one with respect to the other". This implicates more general "relations and rules", which it is the business of the linguist to discover. There is, then, as Saussure argues, a place for "a science which takes as its point of departure the binary groups and sequences of phonemes" (CLG: 78).

Such a science, Saussure continues, will consider such binary groups to be "like algebraic equations; a binary group implicates a certain number of mechanical and acoustical elements which reciprocally condition one another". Saussure's analysis of the sounds of language is concerned to establish the categorical and the contextual principles which anchor these both to the materiality of the phonic substance from which they emerge, as well as to the principles of their articulation and perception. This is quite a different structuralist enterprise in some important respects from the one which was subsequently launched by Trubetzkoy and Jakobson.

In the chapter of CLG entitled 'The phoneme in the spoken chain', Saussure moves beyond the study of phonological types, which was the focus in the chapter on 'Phonological types' *[Les Espèces Phonologiques].* The study of the phoneme in the spoken chain entails the analysis of the syntagmatic relations among the phonemes in some spoken sequence. At the beginning of this chapter, Saussure makes the following observations on the 'phonology of types' which was the focus in the previous chapter:

On one point the method of this phonology [of types, PJT] is particularly faulty; it too easily forgets that in the language system [la langue] there are

not only sounds, but stretches of spoken sounds; it does not pay enough attention to their reciprocal relations. In fact, it is not this which is given to us in the first place; the syllable presents itself more directly than the sounds of which it is composed. It has been seen that certain primitive writing systems have marked syllabic units: it is only later that one arrived at the alphabetic system. **(CLG: 77)**

It is important to note here that Saussure's perspective is that of the language system *[langue].* The problem which concerns Saussure here is the way in which phonological types are related to typical syntagmatic patterns in the language system:

Along side the phonology of types, there is then a place for a science which takes as its point of departure binary groups and the sequencing of phonemes [la consécutions de phonèmes], and that is a completely different matter. In the study of isolated sounds, it is sufficient to note the position of the organs; the acoustic quality of the phoneme is not in question; it is fixed by the ear; as for articulation, one is completely free to produce it as one likes. But from the moment that it is a question of pronouncing two sounds in combination, the matter is less simple; one is obliged to take account of the possible discordance between the effect sought and the effect produced; it is not always in our power to pronounce what we wanted. The freedom to connect phonological types is limited by the possibility of connecting the articulatory movements. In order to take account of what happens in the groups, a phonology needs to be established in which this would be considered like algebraic equations; a binary group implicates a certain number of acoustic and mechanical

elements which reciprocally condition each other; when one varies, this variation has on the others a necessary repercussion which can be calculated. **(CLG: 78-9)**

In contrast to the science of phonological types, Saussure proposes a science of the ways in which phonemes combine in the spoken chain. The description of phonological types relates configurations of phonic terms to the phonemes that realize these. Saussure's 'combinatory phonology', on the other hand, is concerned with relating phonological form to function in the spoken chain. In order to do so, it is necessary to specify: (1) how functions are inserted into phonological structures; and (2) how elements of phonological structure are sequenced.

Phonological types, as Saussure defines them, are analogous to formal class items such as noun, verb, adverb, and so in the grammar, i.e., on the stratum of the signified. That is, a given phoneme specifies the phonological analogue of a grammatical class item. A phoneme, in other words, is a *phonological class item.* A phonological type such as /p/ does not, therefore, specify the function which the phoneme has in the spoken chain. Saussure distinguishes phonological form from function in his discussion of syllabic boundaries and vocalic peaks:

"The terms vowel [voyelle] and consonant [consonnes] designate, as we have seen on p. 75, different types; sonants [sonantes] and adsonants [consonantes] designate on the contrary functions in the syllable. This dual terminology allows us to avoid a confusion which has reigned for a long time. Thus, the sound type I is the same

in fidèle ('faithful') and in pied ('foot'); but it is a sonant in fidèle and an adsonant in pied. The analysis shows that sonants are always adductive and adsonants are sometimes adductive (for example i in the English boi, written "boy"), and sometimes abductive (for example y in the French pye, written "pied"). This only confirms the distinctions established between the two orders. It is true that in fact e o and a are regularly sonants; but this is a mere coincidence: having a greater aperture than all the other sounds, they are always at the beginning of an adductive chain. Inversely for stops, which have minimal aperture, and are always adsonants. In practice, it is phonemes of aperture 2, 3, and 4 (nasals, liquids, and semi-vowels) that play one or the other role according to their surroundings and the nature of their articulation". **(CLG: 87-8)**

Vowels and consonants are phonological types. Sonants and adsonants, on the other hand, are phonological functions. They designate the phonological value which a particular phoneme has according to its place in relation to other phonemes with which it co-occurs in the spoken chain.

The term adsonant has been traced back to Herbert D. Darbishire's *Relliguine Philologicae* (1895), as documented by Abercrombie (1967: 170 n 15). As Saussure's analyses of *fidèle* and *pied* show, the different syllabic environments in which the sound type I occurs result in its having different functions according to its relations to the other units which surround it in the syllable in which it occurs. In these two examples, the sound type I has a different phonological function in these two words.

Saussure's analysis suggests, then, that the signifier is internally stratified. Saussure does not spell this out at any stage in CLG. However, this seems to be a logical consequence of the distinction which Saussure draws

between "the two orders" mentioned in the above passage. The two orders in question are: (1) the phoneme as a formal class, or phonological type, defined independently of the spoken chain in which it occurs; and (2) the function the phoneme performs, or the semiological value it has, in relation to the other phonemes in the spoken chain. The point is that the phoneme as a phonological type has a certain potential to enter into certain kinds of functional relationships, i.e., phonotactic relationships in modern terminology. This depends on the phonological context in which it occurs. This phonological context is defined, as Saussure's discussion shows, both 'from below' by "the nature of their articulation" and 'on their own level' by "their surroundings".

The relationship between phoneme and the configuration of phonic terms that signify it is an interstratal one. In this case, the stratum of phonic substance is related to that of phonological form. The "surroundings" of a phoneme, on the other hand, refer to the relationships among phonemes on the same stratum. Such relationships are intrastratal. The phonological stratum (the signifier) is composed of units and structures that are specific to that stratum. This stratum is not comprised of phonemes, or phonological types, per se. Instead, the phonological stratum is comprised of phonological structures, their constituent functions, and the distribution classes of phonological forms that fulfill these functions in structure. The syllable, for instance, is a phonological structure which has phonemes as its constituent parts. In the structure of the syllable, these constituent parts have specific phonological values or functions.

In making the distinction between the study of phonological types and the study of how phonemes combine in the spoken chain, Saussure distinguishes between the formal (systemic) and the contextual meaning of phonemes. The formal meaning of the phoneme refers to the paradigmatic systems of phonic terms that relate phonological form to phonic substance.

The first-order contextual meaning of the phoneme is the phonological function (value) it has in its syntagmatic context on the stratum of the signifier.

On the phonological level, these observations suggest an analogy with Saussure's critique of the view of language as a nomenclature. Saussure's critique shows that the signified does not simply 'label' or 'refer to' natural categories in the 'real-world' in a direct and unmediated way. The same argument also applies to speech sounds. There is no direct, unmediated relationship between an objective world of physical sounds and the speaker-hearer's perception of these. Rather, phonological form entails categorizing judgements concerning the semiological values which phonological units have both in the language system to which they belong and in the spoken sequence in which they occur. The psychic basis of the acoustic images stored in the brain means that these function as a repertory of sensori-motor schemas whereby speakers and listeners organize both articulation and audition even in the absence of sensory information. That is, these schemas which are stored in long-term memory are a virtual resource which enables speakers to predict and simulate speech activity according to specific contextual requirements rather than to recall a stock of static and context-free sounds which must then be translated into articulatory activity.

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