

TOWARDS A CONCEPTION OF LINGUISTIC COMPETENCE UNDERLYING DIVERSE MODES OF LINGUISTIC PERFORMANCE[1]

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Abstract: Linguistic competence is construed as a multidimensional space, its three basic dimensions (axes) being the denomination, decomposition and generalization functions of linguistic sign. Each axis has its own set of levels. Among them, expression and content as levels (planes) of denomination are supplemented by the plane of structural sign values. Linguistic performance is seen as traversing this space by a certain route. Variable routes afforded by the three-dimensional space structure account for variability of performance modes, such as poetic performance vs. communication in specific situations vs. text-to-text transfer; grammar- vs. lexicon-oriented linguistic processing models; constituent- vs. valency-based ones, etc.

Keywords: philosophy of language, linguistic competence, linguistic performance, linguistic sign, linguistic levels

1. INTRODUCTION

Differentiation of linguistic competence and linguistic performance has been commonly accepted ever since N.Chomsky (1966) used these terms to specify F. de Saussure's opposition of "langue", "parole" and "langage". Considering this differentiation, however, one has to bear in mind that in actual linguistic reality the "competence" and "performance" aspects of natural language do not exist independently of one another. Linguistic description involves, therefore, not only constructing models of linguistic competence, on the one hand, and those of linguistic performance, on the other, but also developing an overall conception of linguistic reality as a "meta-model" embracing both types of models and determining their interplay within its framework.

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The need for such an integrated view of linguistic reality is accentuated by the fact that the authors of concrete systems designed for specific linguistic applications tend to choose (and argue) ways and methods of arranging and representing linguistic knowledge in their systems with regard to the ways and methods of manipulating this knowledge when used in the applications in question. In other words, there is a marked tendency for concrete models of linguistic competence to reflect, more or less directly, the models of linguistic performance simulating the functioning of natural language in specific communicative situations.

Thus, in machine translation systems, descriptions of the source and target languages are often constructed differently, with a view to optimize, resp., analysis and generation procedures. This is the case, e.g., with the THALIA-3 (Okashi, et al., 1986) and ATHENE/N (Kaji and Okajima, 1985) Japanese-English systems, with the English-Japanese system described by Tanaka and Mizoguchi (1985), etc.

When a linguistic description is constructed as "symmetrical" with respect to analysis and generation, i.e. equally suitable for both directions of linguistic performance, its dependence on the way it is supposed to function in text processing is less apparent. However, it can still reveal itself as the assumption that dissending models simulating the same direction of linguistic performance (e.g., different models of analysis or different models of generation) stem from disagreement about linguistic competence as such, so that asserting one of such models in preference to another can serve as an argument in favour of a certain conception of linguistic competence. This assumption is felt, for instance, in the argumentation for and against generative and interpretive semantics in (Bever, et al, 1977).

A close interconnection between the competence and performance models can be seen in the "Meaning-Text" model (Mel'chuk and Zolkovskij, 1970). This model is known to be arranged as a sequence of levels of linguistic description, their order in the sequence in question presumably corresponding to their respective proximity to content and expression. Accordingly, each "lower" level in this sequence is supposed to reflect linguistic semantics to a greater extent and peculiarities of linguistic expression to a lesser extent than all "higher" levels. This is clear, e.g., from the definitions of the surface and deep sub-levels of each level. Obviously, such arrangement of linguistic competence directly suggests just one essential model of linguistic processing for the purpose of text analysis and just one model of processing for the purpose of text generation. In both cases the required processing would consist in mapping the units under consideration into their representations at the levels envisaged in the model of competence, switching from level to level in their "downward" order for analysis and in their "upward" order for generation.

However, in a broader framework of simulating linguistic reality as a whole, such a straightforward correspondence between the type of linguistic competence and the nature of linguistic performance seems unjustified. Communicative situations can be extremely varied, and it is reasonable to assume that humans are sufficiently flexible to be able to adapt the ways and methods of their linguistic performance to each specific situation, taking into account its external conditions, its main and subsidiary goals, etc. On the contrary, a person's linguistic competence (apart from the situations of language acquisition) is expected to be basically stable and independent of the circumstances in which it may be required to function. To be adequate within this broader framework, a model of linguistic competence, therefore, should be based on some independent foundations having no direct bearing on any concrete manner of using this competence in specific communicative situations. Moreover, it seems essential that such a model

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of competence should have inherent properties that would make it compatible with (and thereby provide justification and foundation for) multiple modes of linguistic performance adapted to various specific situations.

One way of visualizing a model of linguistic competence of this type is to turn for its desired independent foundations to the concept of linguistic sign per se and to its general semiotic properties. The most fundamental of these are three basic linguistic functions: *denomination, decomposition,* and *generalization,* each establishing its own class of relations between linguistic objects and/or characteristics. Types of such objects and characteristics distinguished by their positions in the hierarchy dictated by the relations corresponding to one of the three functions, appear as levels of linguistic description constituted by this function. It has been repeatedly argued that no one of the three functions, however closely interwoven with the others, can be completely reduced to either or both of them (see, e.g., (Daneš, 1971; Shalyapina, 1982, 1988)). Insofar as this is the case, the classes of relations underlying specification of the corresponding hierarchies of linguistic levels may be viewed as different axes of linguistic description. *An overall model of linguistic competence* determining a unified system of levels for such a description *may thus be visualized as a* ***multi-dimensional linguistic space,*** its three basic dimensions being the axes mentioned.

The resulting three-dimensional model of linguistic competence would clearly answer our first requirement in that it does not depend for its definition on considerations related to linguistic performance. *Linguistic performance,* in its turn, *can be conceived on this basis as* ***traversing the space of linguistic competence*** *by some route or other,* seeking to obtain a satisfactory mapping of an utterance into all levels required by the given communicative situation. The three-dimensional structure of the linguistic space implies that in the general case the mapping required could be reached by a *variety of routes,* which fulfils out second requirement.

Below, we will consider the major linguistic levels that may be defined along each axis of the three-dimensional model of linguistic competence outlined above, some implications and complications concerning its general composition, and the main aspects of this model that contribute to variability of the models of linguistic performance it can underlie.

2. THREE BASIC AXES OF LINGUISTIC COMPETENCE

2.1. The axis of denomination.

The role of the denomination axis in the model of linguistic competence is to reflect the essentially bilateral nature of linguistic sign as an integral unity of its expression and content, by connecting the two corresponding linguistic planes. The two basic levels on this axis are thus *the plane of expression* and *the plane of content.*

To complete the axis of denomination, however, a third denomination level seems to be called for, supplementing the two classical ones. It is ***the plane of structural sign values,*** corresponding to the notion of "valeur" introduced by F.de Saussure (1931), and serving as a connecting link between the two other planes. Linguistic objects of this plane may be pictured as nodes resulting from "tying together" the threads leading to certain entities of expresion with those leading to certain entities of content, and specifying thereby linguistic signs as bilateral

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entities. To use a mathematical simile, denomination may be considered as a function over two arguments, an object of expression and an object of content, while the value of this function would be an object of the intermediate structural value plane we have postulated.
With respect to the sign as such, each object of the structural sign value plane plays a twofold role. On the one hand, it is a constituent component of a linguistic sign, the one serving to transform a simple juxtaposition of the two other basic components of the corresponding sign, an entity of expression and that of content, into the sign itself as an entity of an essentially different, semiotic nature. From this viewpoint, it is a linguistic object in its own right which should be distinguished from the sign as unity (an aggregate, an integrated set) of all its components. On the other hand, being in one-to-one correspondence with the sign it serves to specify, a sign value object can be used in linguistic description as a formal identifier of this sign and, hence, as its substitute. In this sense, it can also be referred to as "sign", which necessitates differentiation of two meanings of this term: *sign in a broad sense,* as an aggregate unity of its components, and *sign in a narrow sense*, i.e. *sign value* as one of these components, namely, the one supplying the linkage between the two others.

Based on this linking function of structural sign values, the corresponding plane is *interposed* in the overall model of linguistic competence between the planes of expression and content. Within it, each linguistic object is specified by its individual position in the language syntagmatic and/or paradigmatic structure, differentiating it from all the other linguistic objects of the same plane regardless of whether or not they have any elements of expression or content in common. So if we consider objects of the sign value plane per se, disregarding their relations with the corresponding objects of the two other planes, they appear as purely differential entities, thus bearing out F.de Saussure's definition of language as a system containing nothing but distinctions.

This leads, among other things, to a reformulation of the classical principle of the asymmetric duality of linguistic sign (Karcevskij, 1929). While the planes of expression and content are characterized by many-to-many correspondence between their respective objects, an object (elementary or complex) of the structural sign value plane can be mapped, except for cases of free variation or complementary distribution, into just one object (elementary or otherwise) of each of the two other planes. The inverse mapping is, in the general case, of the one-to-many type, so it is primarily the correspondence between the adjacent planes of the denomination axis that is asymmetric with respect to its direction.

Correspondingly, some traditional linguistic oppositions, such as *homonymy* vs. *contextual polysemy* or *synonymy* vs. *variation of expression,* can be interpreted as referring to different "portions" of the denomination axis. Indeed, homonymy is concerned with situations where one object of expression corresponds to more than one object of the structural value plane (and hence to more than one object of content), as illustrated schematically in Fig.1(a). In contrast, contextual polysemy (being much closer to semantic vagueness) refers to the correspondence of one structural value object (whether homonymous or not) to more than one object of content, as in Fig.1(b).

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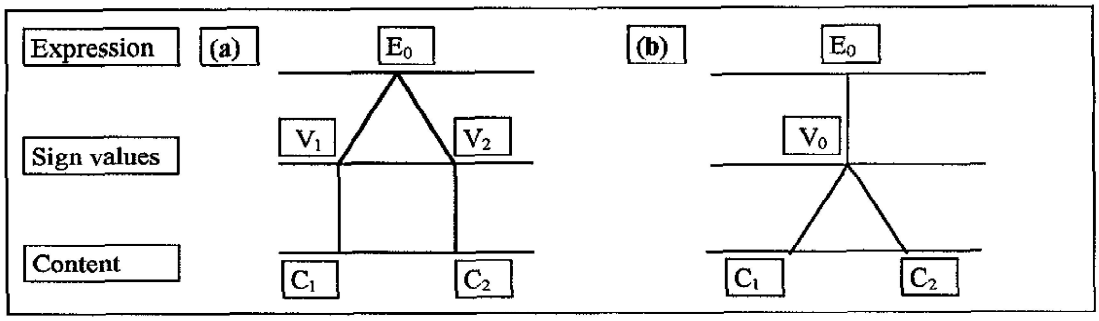
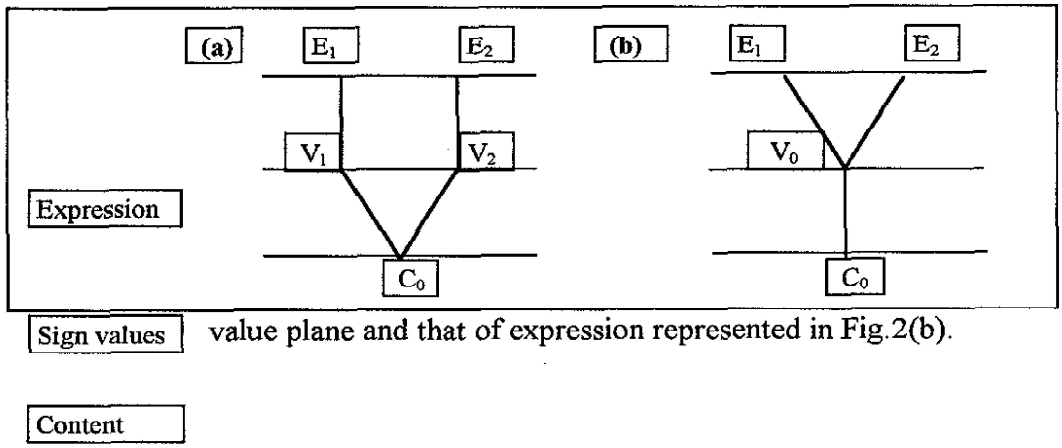


Figure 1. Homonymy **(a)** and polysemy **(b)** with reference to the planes of denomination

Likewise, synonymy deals with cases of the one-to-many correspondence between the plane of content and the plane of structural sign values diagrammed in Fig.2(a), while variation of expression (e.g., *will not* vs. *won't*) is confined to similar correspondences between the structural



value plane and that of expression represented in Fig.2(b).

Figure 2. Synonymy **(a)** and variation of expression **(b)** with reference to the planes of denomination.

Diagrams given in Fig.1-2 explicitly show, among other things, that homonymy is compatible with polysemy of some or all of the homonyms, and synonymy is in the same way compatible with variation. They may also serve as convenient illustrations for the processes of linguistic change involving such phenomena. E.g., if one of two synonyms is, in its turn, homonymous or polysemous, as V_2, resp., in Fig.3(a) and Fig.3(b), the obvious way of simplifying the resulting network is by dispensing with the value V_3 in the former case, and with the edge E_2-V_2-C_1 in the latter one. The result is an ideal situation shown in Fig.4. This may be an explanation, e.g., of the evolution of the Russian lexemes *parovoz* ("a steam locomotive") and *parohod* (initially, "any means of transportation powered by a steam engine", i.e. either "a steam locomotive" or "a steamship"; in the present-day Russian only the latter interpretation has remained).

Interestingly enough, objects of an intermediate status similar to that of structural sign values appear to be indispensable for simulating the "unity" of linguistic signs in computational linguistic models. Indeed, the obvious interpretation of such unity is locational, i.e. as a contiguous position of all components of the same sign in the computer memory. However, it cannot be attained in a straightforward way owing to homonymy and synonymy. If the descriptions of linguistic signs are arranged around their expressions, i.e. the contents of all signs with the same

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expression are listed after the expression itself, the effect is that the contents of all but the first sign in this list are locationally separated from their common expression by the content(s) of their homonym(s). In descriptions based on content, the same

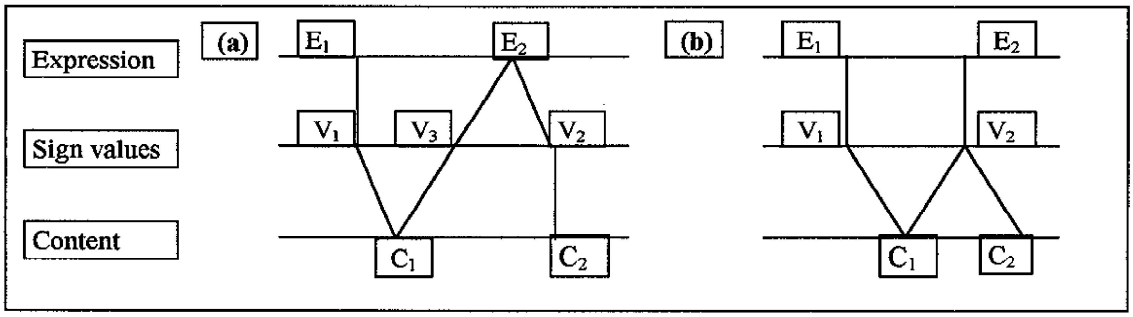

Figure 3. Interplay of synonymy with homonymy **(a)** and polysemy or semantic vagueness **(b).**

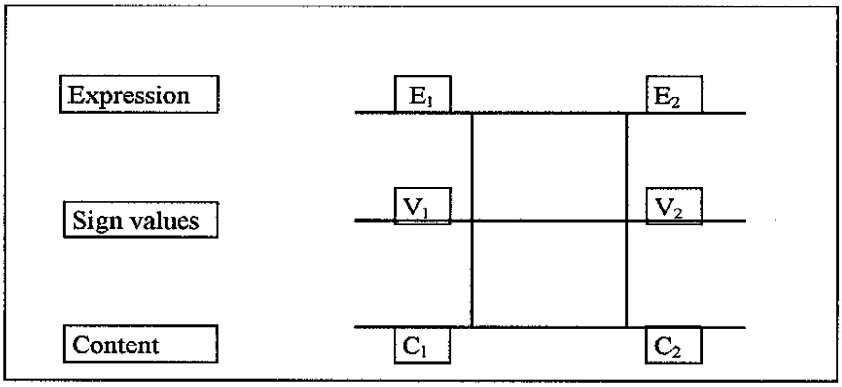

Figure 4. Ideal correlation of linguistic objects with respect to the axis of denomination.

would occur on account of synonymy. We could, of course, duplicate the objects of expresion/content each time they are required for another sign. This,however, would result in multiplication and, hence, loss of unity of the corresponding objects of expression or content themselves.

On the other hand, if a third element is introduced for each linguistic sign, acting as its identifier, and this identifier is used as the pivot of the description, the desired (locational) unity of linguistic sign is readily achieved. It is sufficient to enumerate separately all objects of expression, all objects of content, and all identifiers of linguistic signs, providing each of the latter with pointers to its corresponding expression and content (as well as to descriptions of all other properties and attributes relevant to this sign). The sequence of a sign identifier and the pointers attached to it would form just the kind of locational unity required to simulate linguistic sign as an integral unity of its components. Generally, such an identifier is simply the address (or the reference number) of the list of pointers relevant to the sign in question. Some computational models, however, use even more explicit identifiers. Thus, the AMPAR system for English-Russian machine translation (Marchuk, 1979) envisages special "numeric equivalents", each

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determining a separate linguistic unit and accompanied within the representation of a text by all kinds of linguistic information pertinent to this unit.

Another point worth mentioning in connection with the intermediate status of the plane of structural sign values is that it seems to be intermediate, among other things, in the degree of "linearity" involved in simulating different language planes in computational models. While expression is completely linear (with the only complications caused by prosodic phenomena) and content is usually described in terms of semantic networks with no apriori restrictions on the number and distribution of links with respect to nodes, units of the sign value plane are mostly represented on the basis of tree-like structures, i.e. structures of intermediate complexity. So the "non-linearity" of linguistic units increases as we approach content and decreases in the opposite direction.

2.2. The axis of decomposition.

The "part-whole" type of linguistic relations established by the function of decomposition has always commanded the attention of linguisticians. Description and classification of linguistic units as regards their internal structure and composition, on the one hand, and their co-occurrence characteristics determining their capability to form part of larger units, on the other, is one of the most traditional areas of linguistic research. Some issues, however, still remain controversial.

Thus, in stratificational models of linguistic description, decomposition and denomination relations are often integrated to form a single sequence of levels. One of the first explicit theories striving to justify such integration was proposed by B.Trnka (1966), who suggested that the communicative *stat pro* (= denomination) relationship exists between any grouping of linguistic units that forms the internal structure of some larger unit, and this larger unit itself. E.g. "words as component signs of the morphological plane stand for the higher unit, the sentence" (p.37). So the four basic linguistic levels he considers, phonology, morphology, syntax, and supersyntax (supersyntactical units, or utterances, being in *stat pro* relationship with extralinguistic states or events), are all "planes", i.e. should be positioned along the denomination axis.

A drawback of this conception is that the relation between expression and content as such, i.e. denomination proper, falls out of the scope of linguistics, for the plane of content is discarded in favour of extralinguistic phenomena. Other stratificational models circumvent this problem by introducing the level(s) of semantics. But even so, there is still no direct relationship between *signifiant* and *signifié*. Specifically, morphological units are related to semantics only through the level of syntax, so that the traditional definition of morph as the smallest meaningful unit of language becomes insufficient. Moreover, linguistic signs, with the only exception of utterances, turn out to be essentially different from other types of signs. For "normal" signs, what they stand for is independent from the sign itself and from its signifier (= expression), so that it continues to exist even in case of their elimination. An extralinguistic event .will still exist even if all mention of it is suppressed. On the contrary, elimination of words "standing for" a sentence (or of morphemes "standing for" a word), means wiping out the corresponding sentence (resp., word) itself. So with this definition of "stat pro" relationship, human linguistic competence appears to be essentially different from human semiotic ability in general, which is hardly reasonable.

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All of these problems, however, are avoided if the axis of decomposition is specified as separate from that of denomination and its levels determined independently, without direct correlation of the resulting hierarchy of levels with the opposition of linguistic expression and content. To emphasize their difference from linguistic *planes* as levels of denomination, levels of decomposition proper will be here referred to by the term ***tier*** introduced in a similar sense by I.Vardul (1977).

Fundamentally, the criteria serving to specify levels of decomposition are concerned with the comparative "size" of the linguistic units that constitute the tier involved and are considered within it as separate wholes with explicitly established boundaries[2].

From these considerations, tiers as levels of decomposition may be specified within each of the three denomination planes separately, and their inventories, as well as the boundaries of specific levels in one plane do not necessarily correspond to those in the others. Thus, the tiers established within the plane of expression may be exemplified by those of phoneme - syllable - phonetic word - accentuation entity - intonation entity, etc. For written language, one may postulate such tiers of expression as those of separate graphic symbols - graphic syllables (defined, e.g., on the basis of hyphenation) - graphic words (as units between the adjacent blanks or punctuation marks) - graphic phrases (separated by punctuation marks and, in the general case, including blanks) - graphic sentences (separated by full stops or indentations), paragraphs, text fragments between adjacent headings, etc. Within the plane of structural sign values, tiers may be differentiated as levels of structural representation of linguistic objects, beginning with the level of morphemes and proceeding to those of words (word-forms) - phrases - sentences - supersentential entities, up to pre-text objects (those introduced by titles, special metatext structures, like "*We are coming now to the question of ...*" or "*Let us take up first the case...*", etc.), and to the "highest" (or, rather, "largest") level of text structures. Within the plane of content, one could distinguish tiers of elementary and progressively more complex concepts and situations, from the minimal elements of meaning to concepts to situations to situation complexes (like scenarios), etc.

On the other hand, one can use "inter-plane" decomposition criteria as well, taking into account the denomination relations of the objects under consideration to those of the contiguous plane(s). In the plane of expression, one of such "inter-plane" tiers would be that of *morphs* (specified, in full accordance with their traditional definition, as the minimal units of expression having sign value correlates). The symmetrical tier in the plane of content would be the tier of *signifiés* correlative with elementary sign values. Among "inter-plane" tiers that can be specified in the structural sign value plane with respect to the plane of content, are those of idiomatic phrases, set expressions, proverbs, etc. Based on correlations between structural sign values and their expressions, one could specify a peripheral tier of sign values with syncretic expressions (for Russian, it would include, e.g., the grammatical categories of case, gender, and number), and so on.

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[2] One such criterion for differentiating adjacent levels of decomposition by a recursive procedure has been outlined and exemplified in (Shalyapina, 1986) in connection with differentiation of morphology and syntax in Japanese.

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2.3. The axis of generalization.

The axis of generalization is responsible in linguistic description for relations of the "genus-species" ("general-particular") type. For differentiation purposes, levels of this kind, in contrast to *planes* of denomination and *tiers* of decomposition, may be termed ***spheres***. With respect to more concrete units, a unit of a more general sphere is a linguistic abstraction obtained by their classification and generalization. Accordingly, each general unit specifies the class of the more concrete units it generalizes, these units being related to it as its instantiations.

As with decomposition, spheres of generalization may be specified within each of the three denomination planes, with greater or lesser regard to the denomination relations existing between the units being generalized and those of the contiguous plane(s). Similarly, generalization relations may be established within various tiers of decomposition.

In the plane of expression, the simplest example of generalization relations is the opposition of "etic" and "emic" units: phone vs. phoneme, syllable vs. syllabeme, intonation of a concrete phrase vs. intoneme, etc. Further generalization of these within the same plane results, resp., in the spheres of differential phonological features, rhymes, alliterations, intonation types, etc. The major generalization spheres of the sign value plane are the sphere of structural representations associated with concrete occurrences of linguistic units, the more general sphere of lexicon, and the still more general sphere of grammar (or, rather, a set of grammatical spheres of various degrees of generality). In the plane of content, generalization relations underlie the oppositions of concrete referents vs. encyclopaedic notions vs. linguistic significations vs. semantic primitives as the most abstract semantic features.

Generalization of primarily "inter-plane" nature is basic to the notions of expression variants (classed together on account of their common sign value), homonyms (as units of the sign value plane related by their common expression), synonyms (specified in the same plane with regard to the plane of content), etc. A less obvious case of "inter-plane" generalization can be seen in the oppositions of "surface" and "deep" sub-levels of each of the basic levels envisaged in the "Meaning-Text" model. Indeed, the definition given in (Zholkovskij and Mel'chuk, 1967, p.183) of deep syntax as one of such sub-levels requires that it should reflect content relations, disregarding distinctions in grammatical form as well as those between different lexemes interpreted as values of the same lexical function. This, however, involves a sacrifice of some semantic information. E.g., lexemes *switch on* and *build* in the phrases *switch on a lamp* and *build a fire* both correspond to the lexical function CausFunc_0, so that in the deep syntactical representation of these phrases each of the two lexemes should be replaced by the identifier of the function itself (the abstract verb CausFunc_0). This means, however, that the information carried by these lexemes as to the mode of the corresponding actions will be no more present in the representation in question and could only be restored from the background knowledge. As this information is evidently part of the signifiés of the lexemes under consideration, the deep syntactical representation is evidently achieved ***by abstraction*** based on denomination, rather than by denomination proper.

Generalization spheres can also be based on denomination and decomposition sumultaneously, taking into account both the "inter-tier" characteristics of the linguistic objects in question and their "inter-plane" correlations. An example is the sphere of morphonology which is specified

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within the tier of elementary expression units with regard to their position in units belonging to the adjacent tier of morphs, the latter being itself specified from inter-plane considerations (see §2.2). Other spheres involving "inter-tier" generalization are those of submorphs, analytical word-forms, "deep cases", etc.

Of special interest is the interplay of generalization and decomposition in the structural sign value plane, where it is at the heart of the interrelationship between lexicon and grammar. As argued in (Shalyapina, 1991), some major distinctions between linguistic approaches, primarily those between phrase-structure and entity-based models, may be accounted for by variations as to which of the two axes is chosen in favour of the other one at different steps of linguistic description.

To be more explicit, in phrase-structure grammars, units of each tier of decomposition are generalized primarily by classification, so that the grammatical categories obtained fall within the scope of the same tier. The categories are then described with respect to the internal structure of the corresponding units, i.e. on the axis of decomposition, but still in terms of generalized categories. Lastly, when a point is reached where further decomposition is not feasible, the categories obtained are instantiated, i.e. related to the units of lexicon. The latter units being, in their turn, of generalized nature as compared with their concrete occurrences, lexicon appears as the result of two opposite processes conducted along the axis of generalization: instantiation with respect to grammar and generalization with respect to concrete occurrences of text elements. Schematically, this type of correlation between text, lexicon, and grammar may be represented as shown in Fig. 5.

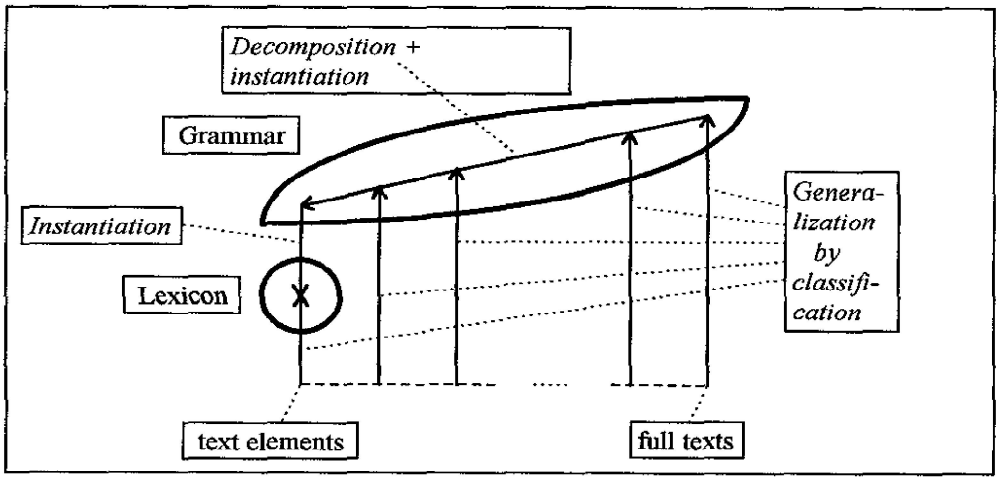

Figure 5. Generalization underlying linguistic descriptions of the phrase-structure type.

On the contrary, the entity-based approach to linguistic description (as this term is used in (Shalyapina, 1996)) relies above all on "inter-tier" generalization. In this type of generalization, common properties of non-elementary units having a common component C_1 are viewed as the properties "induced" in them by this component. They can be associated, therefore, with component C_1 itself, even though they characterize units of a "higher" tier T_0, while C_1 belongs to a "lower" tier T_1. If the component C_1 is, in its turn, a non-elementary unit, the process is continued. I.e, C_1 is considered with respect to its own components, and for each of its

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components C_2 (belonging to the next "lower" tier T_2), the properties common to the units of tier T_1 containing this component, are generalized as the properties of C_2. As some of these properties may have been "transferred" to C_1 (as well as to the other units of the class under consideration) by previous "inter-tier" generalization, the resulting properties of C_2 may be concerned both with tier T_1 and tier T_0. This goes on until, eventually, properties of all non-elementary tiers of decomposition, insofar as they allow generalization of this type, are associated with elementary linguistic entities (hence the term to denote the approach in question). The next step of generalization can only consist in classification of these elementary entities (already carrying multi-tier information) into units of lexicon, the latter further classified and generalized into grammatical categories. The whole process is represented schematically in Fig.6.

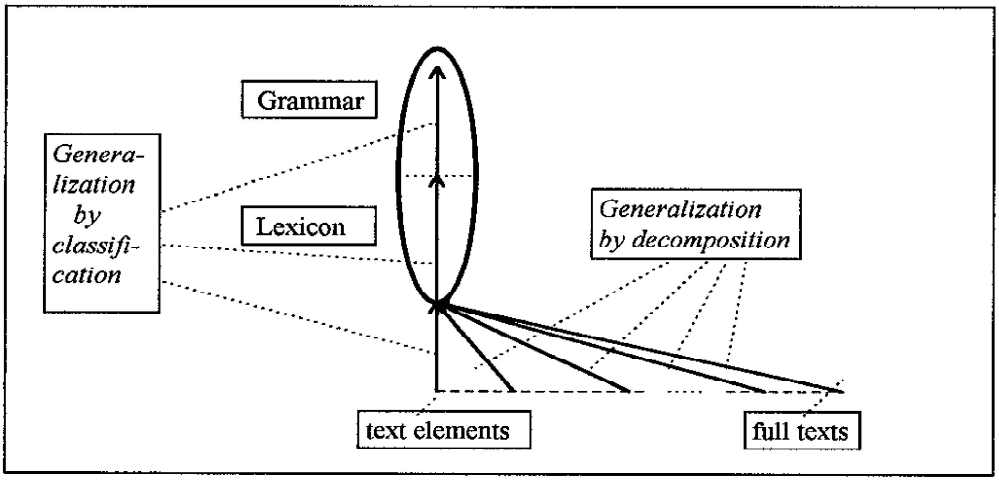

Figure 6. Generalization underlying entity-based linguistic descriptions.

If we consider the composition/decomposition properties of linguistic units as they may be generalized on the basis of the components these units may have in common, it is readily seen that one of the most obvious types of such properties is that concerning the structural positions available in the units being generalized in the presence of their common components, along with the characteristics of the other components of these units that can occur in these positions. Accordingly, the basic linguistic tool for "inter-tier" generalization is the notion of *valency*, or slot, which can be extended to cover both attributes and adjuncts, as well as co-reference, semantic compatibility and other sorts of co-occurrence relations, thus providing a universal means of describing these relations in any of the three linguistic planes.

Such an extended conception of valency, coupled with a special, "summing-up" type of inheritance relations between units of lexicon and grammar, seems to have first been suggested as a unified basis for a formalized linguistic description in (Shalyapina, 1974). Essentially the same approach (though based mostly on a different inheritance type known as inheritance by default) is embodied in the numerous models exploiting the notion of knowledge frames suggested by M.Minsky (1974); see, e.g., (Tomita and Carbonell, 1986; Nyberg and Mitamura 1992; Takeda, *et al.*, 1992). True enough, most of such models are confined solely to semantic and extra-linguistic information, while morphological, syntactical, and other types of what is

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believed to be linguistic knowledge proper is described by other means; e.g., M.Tomita and J.G.Carbonell (1986) use an LFG-type grammar for this purpose. Our research has shown, however, that the entity-based approach may form a reliable foundation for representing all kinds of linguistic knowledge and for simulating involved interplay of "rules" and "exceptions" at various levels of linguistic description, see (Shalyapina 1991; Modina and Shalyapina, 1995).

3. A THREE-DIMENSIONAL SPACE OF LINGUISTIC COMPETENCE: IMPLICATIONS AND COMPLICATIONS

An overall picture of linguistic competence as a linguistic space formed by the axes of denomination, decomposition, and generalization, is displayed below in Fig.7.

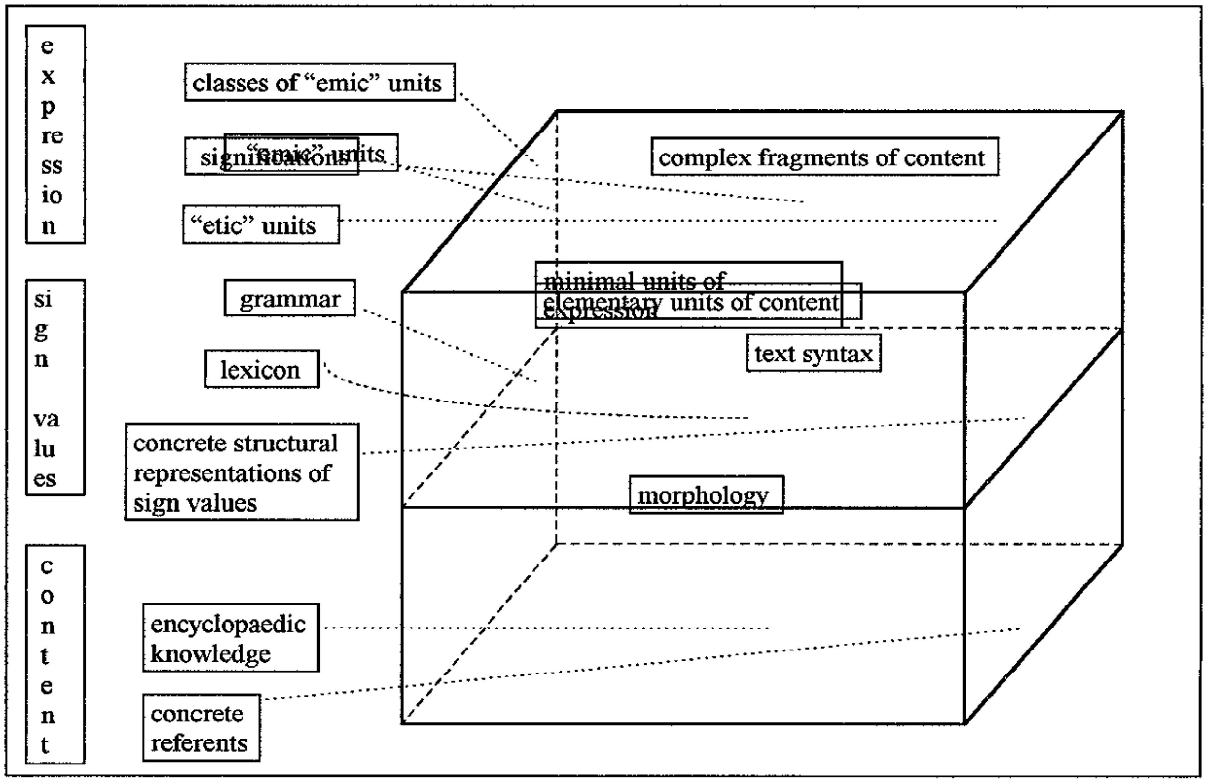

Fig. 7. General picture of linguistic competence

Looking at it this way opens up a number of interesting lines of thought. The above discussion has already shown various possibilities for interpretation in these terms of some classical linguistic oppositions and controversies. Another thing worth pointing out is that the framework obtained presents a way for reconciling the three-component structure of Chomskian language theory with the multilevel composition of stratificational-type linguistic conceptions, beginning with the "Meaning-Text" model. Moreover, this seems to be possible without subjugating one approach to the other or sacrificing assets of either. Indeed, Chomskian phonetic - syntactic - semantic components are readily interpretable as the three levels of the

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denomination axis ("syntax" corresponding to the plane of structural sign values), while the "additional" linguistic oppositions envisaged in stratificational models have been demonstrated to lie along the decomposition and/or generalization axes.

It is also worth mentioning that, due to distribution of decomposition and generalization levels over three different denomination planes, the three-dimensional space of linguistic competence naturally accomodates a number of accepted linguistic levels that are left outside the more conventional "one-dimensional" models, and can be easily extended to include any supplementary levels, if desired. This, in turn, suggests an idea that might be worthy of investigation. Namely, there are no obvious grounds for assuming linguistic competence of different speakers (either of the same or of different languages) to be exactly alike with respect to the overall inventory of levels it comprises. Some of these may be more fundamental, while others may develop as a result of experience or special training. Thus, it would seem plausible that the space of linguistic competence of a professional writer or translator may be more "tightly packed" with different levels and inter-level relations than that of a person whose everyday functions do not require constant linguistic activity. Should this be the case, the possibilities offered by the three-dimensional structure of linguistic competence for accomodating new levels would clearly count in its favour.

However, even with its three axes, the linguistic space as it has been schematized in Fig.7 remains too straightforward to directly represent a number of aspects of linguistic reality. We would like to mention some of these aspects showing that the general shape of the linguistic space is rather more elaborate than the initial simplified diagram may suggest. The point is that in drawing up this diagram, we have disregarded, for illustration purposes, the actual interplay of denomination, decomposition and generalization relations, and displayed the three axes of our model as mutually independent (perpendicular). This assumption, however, would only be justified if we made sure that one could not envision a point (level) of *intersection* between any two sides or faces of our geometry, or, to put it differently, that the *distance* between them is the same at all the levels they may be thought to contain. Yet, this can hardly be proved in any conclusive way.

On the contrary, if we interpret intersection, say, of different denomination planes as a point where their units are *indistinguishable*, it seems that such a point could in principle be found on the axis of generalization if it were extended in the direction of more concrete units beyond the confines of language proper, to the sphere of the initial perception of objects and phenomena of real world. Until a person recognizes some of his acoustic, visual or other images as instantiations of elements of expression of some linguistic signs, these images are obviously in no way different from all those that, linguistically, can only serve as subject matter of an utterance and would be represented as such within the plane of content. The process of such recognition is known to be far from trivial, as evidenced, on the one hand, by such means of linguistic expression as, say, Chinese characters or Arabian ligatures which an inexperienced person can easily take for parts of abstract ornamental patterns[3], and, on the other hand, by letter-like patterns found on the wings of some butterflies (where they could not be suspected of carrying any linguistic information). Moreover, even if an image may be identified as an element of linguistic expression, it does not necessarily follow that it would be considered as such in a concrete instance (bearing in mind that natural language can function as its own metalanguage).

[3] Such situations are often played up in oriental fairy tales.

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The inference is that *the three planes of denomination may be considered as non-parallel along the axis of generalization,* being wider separated at the more abstract linguistic levels and coming within shorter distances of each other at the levels of more concrete units.

The same conclusion can be reached if we interpet the "distance" between denomination planes in terms of more or less immediate correlation between their respective units, reflected in comparative complexity of the processes responsible for transition from one plane to another in linguistic performance. At the level of concrete occurrences of text units, transition from expression to content or vice versa occurs as part of everyday human linguistic activity in understanding or generating utterances, requiring (but for initial language acquisition) no special training. At the level of lexicon as a more abstract sphere of generalization, such transition involves describing contents and expression of lexical units with due regard to their homonymy, synonymy, polysemy, semantic vagueness, etc., which clearly calls for specialized linguistic education and experience. As for more general linguistic objects, e.g., part of speech categories, specification of their content or expression remains for the most part highly conjectural.

There seem to be grounds for considering *denomination planes non-parallel along the decomposition axis as well.* Though larger context is often instrumental in disambiguating smaller linguistic objects, the latter can generally be interpreted "by default" even without such context. There is, however, no way to interpret a larger linguistic object if one cannot identify, at least partially, the smaller units it is composed of. So the three denomination planes may be visualized as coming closer to each other at the levels of more elementary linguistic units of the decomposition axis as well.

Further complications may be introduced into the spatial model of linguistic competence to account for such phenomena as the inherent asymmetricity of the processes of transition from one denomination plane to another and the variations in their comparative complexity stemming from the opposition of linguistic "center" and "periphery".

Denominational asymmetricity of linguistic processes is due, in part, to the asymmetric duality of the linguistic sign as applied to the aggregate of the three planes under consideration. Indeed, it has already been mentioned that in the general case, each sign value unit can be mapped into just one unit of expression or content, exceptions only due to free variation and complementary distribution. As free variation can safely be ignored for most communicative purposes, it is complementary distribution alone that remains to be dealt with in transition from the sign value plane to any of the two other planes of denomination. On the other hand, transition from either expression or content to the sign value plane would require handling the far more intricate phenomena of homonymy and synonymy. However, even more essential in contributing to the asymmetricity of the transition processes in question is the fundamental countability, or enumerability, of the set of linguistic signs or, what amounts to the same thing, the set of sign value units. By contrast, each of the planes of expression and content is primarily a continuum. And breaking down a continuum into enumerable fragments is unquestionably a more complicated process than that of merging expressions or contents of separate signs into an eventually continuous fragment of the corresponding plane.

The overall effect is that *transition from the sign value plane to any of the others appears to be less of a problem than the reverse transition.* This seems to be confirmed by the experience of computational linguistics in analysis and generation procedures. In simulating generation of a

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surface expression from a given structural representation, it is possible to make do, for the most part, with the simpler types of linguistic and mathematical apparatus, like finite automata, whereas switching from a text to its structural representation in analysis tends to require much more sophisticated tools, involving construction and evaluation of numerous hypotheses, backtracking, parallel or suspended processing, etc. Generating an articulate structural representation from a continuous representation of content is an even more challenging task, as demonstrated by Yu.S.Martem'yanov and his disciples, see, e.g., (Martem'yanov, 1973; Moskovoy, 1978).

With the spatial model of linguistic competence, this type of performance asymmetricity may be envisioned as a sort of ***"gravitational"*** properties manifested in the linguistic space. The two centers of gravitation are the planes of expression and content, so that *"ascending"* from any of them to the plane of structural sign values requires more effort than *"descending"* from it in either direction.

Adding still more complexity to this "gravitational" aspect of linguistic competence is the opposition of the ***"center"*** and ***"periphery"*** of the language, as it can be interpreted on the basis of *linguistic redundancy with respect to denomination*. From this standpoint, the "central" layers of the language differ from the "peripheral" ones in that they feature greater redundancy in this respect. Accordingly, within the linguistic center, units of different planes linked by denomination relations are highly correlative in their composition/decomposition and classification/instantiation potentialities. E.g., "phonetic words" specified in the "centre" of their respective tier of the expression plane mostly correspond to separate lexemes in the plane of structural sign values; the "central" lexemes belonging to the same syntactic class tend at the same time, as argued, e.g., by I.Sh.Kozinskii (1979), to fall into a common semantic category, as well as to feature common (or, in any case, regular) morphological properties; lexical co-occurrence restrictions in the "centre" of the structural sign value plane are, for the most part, semantically regular, etc. At the "periphery" of various spheres or tiers of each plane, such correlation is not nearly as noticeable, if not entirely absent; cf. the relationships between units of expression and those of sign value plane in cases of syncretism, those between sign values and concepts at the level of phraseology, etc.

The "central" units of different planes are thus in a more direct correspondence along the denomination axis than the "peripheral" ones, which means that *switching from one plane to another is facilitated within the centre of a language* (where many operations can either be dispensed with or performed by default), while it would require more effort at its periphery (due to the necessity for manipulating more detailed syntagmatic and paradigmatic information, carrying out non-trivial structural transformations, etc.). This constitutes another aspect of the *"non-parallelism"* of the denomination planes, as far as performance complexity goes. Moreover, it indicates their *"non-flatness"* as well, suggesting that contiguous planes are "closer" to each other in the centre of each level of decomposition or generalization, and more "distant" at the periphery of each of them.

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4. LINGUISTIC PERFORMANCE IN THE SPACE OF LINGUISTIC COMPETENCE

4.1. Performance modes as routes in the three-dimensional linguistic space

As has already been mentioned in the Introduction, the spacial model of linguistic competence suggests visualization of linguistic performance not as direct transition from content to expression or vice versa, but rather as ***traversing*** this space, from level to level, in an attempt to obtain a mapping of the utterance under consideration into all levels relevant to the given mode of performance. This would involve, among other things, calculating or hypothesizing, if necessary, all those elements or aspects of this mapping that may be absent from the initial data of the performance act in question, thus accounting both for "analysis by generation" and for "generation by analysis".

Owing to the three-dimensional structure of the space to be traversed, the desired mapping can be obviously reached in each instance ***by diverse routes***. In principle, each point of this space allows transitions in any of its three dimensions and there are no built-in restrictions on the order of such transitions. To get from one point to another, it is possible to move through various planes, tiers, and spheres in various order, bypassing some of them, returning to some others more than once, etc. In the final analysis, whether a route suitable for a given performance mode should lie through a certain level or not, is determined by the communicative situation, the source data, and the specific linguistic knowledge contained in (or absent from) one's actual linguistic competence, rather than by the general structure of the linguistic space.

For instance, if the given variant of linguistic competence contains a direct correspondence between a certain sequence of phonemes (or graphemes) and the morpheme indicated by this sequence, transition from the plane of expression to the sign value plane for the purposes of analysis does not seem to require tracing the relations between the phonemes in the sequence in question and their corresponding morphonemes. Thus, a student of a foreign language coming across a word-form new to him may just look it up in the dictionary as a separate entry. If the dictionary search is successful and the entry found gives the sign value sought for (as, e.g., in the case of the German form *wurde* which is included in most student's dictionaries of German with the comment that it is the Imperfect of the verb *werden*), one may give no more thought to the morphonology of the word-form involved.

This, however, is no reason to conclude that the level of morphonology is superfluous in all modes of analysis (or in the overall model of linguistic competence). Quite the reverse, if the desired word-form is *not* found in the dictionary, as, e.g., in the case of *erhob*, there would be no way out but to resort to one's knowledge of morphonology (or to its description in the grammatical reference books available). Thus, if we know that among the morphonological (or, rather, morphographical) alternations specific to German are *ie/o*, *au/o*, *ö/o*, *e/o*, etc., we can try to use these alternations, one by one, repeating the dictionary look-up over and over again, until we find what we are looking for (with *erhob*, it would be *erheben*). Notice that if our competence of German included no level of morphonology, we would not be able to cope with such a situation and so would fail in our linguistic performance.

Actually, the more levels are defined in the space of linguistic competence along each of its axes and the more inter-level relations are established between them, the more scope there is for variation of the possible routes of linguistic performance and, thus, the more possibilities for

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choosing the one best suited to the situation in hand. In this sense, there is hardly any point in demanding "non-redundancy" or "cost-effectiveness" of linguistic competence. On the contrary, the fuller, *the more redundant is the available model of competence, the more reliable it would be as the foundation for linguistic performance.*

It is quite another matter with performance itself. Here, the *"labour-saving"* principle would be most appropriate. Moreover, a likely assumption is that, depending on the concrete communication intentions and situations, it is not the whole linguistic competence that is activated in each instance of linguistic performance, but rather a fragment of this competence chosen for its sufficiency in realizing the given communicative tasks and intentions efficiently and non-redundantly. The various ways of choosing such fragments of the overall linguistic competence, as well as selecting one's routes through the fragment chosen is what accounts in our approach for diverse modes (and models) of performance.

Much of this diversity seems to be due to linguistic redundancy characteristic of the language centre as opposed to its periphery. As discussed above in §3, within the linguistic centre, objects of different language planes that correspond to each other along the denomination axis are also highly correlative in their composition and class relations. So one is led to conclude that their processing could be adequate even if limited to just one of these planes, while the other two could be used for amplifying and refining the results by handling peripheral phenomena specific to those planes only.

The axis of denomination being formed, as argued above, by three planes, this suggests ***three basic models both for analysis and for generation,*** models differing in whether the plane to be used for the bulk of the operations involved in processing the decomposition and generalization aspects of language is that of expression, structural sign values, or content. If our three-plane view of denomination represents the facts, each of these three fundamentally different models of performance should correspond to some actually distinguishable type(s) of human linguistic activity. So there is a chance to prove or disprove the validity of our theoretical assumptions. Let us consider therefore each of the three models and see whether there can be found any plausible correlations between them and linguistic reality.

4.2. *Performance based on the plane of expression.*

The plane of expression could be conceived as a basis for performance procedures primarily in situations where the focus of attention is expression itself. The obvious association is with *poetry*. Here, expression may even constitute the starting point for generation. Taking into account that text objects generated in poetic performance have to meet exacting requirements on their superificial form (rhyme, rhythm, alliteration, etc.), it is reasonable to suppose that at least some of these objects may be initially chosen and/or constructed directly in the expression plane, while the plane of sign values and that of content are used to verify and expand, by test and trial, the hypothetical expression patterns thus formed.

This means that the process of generation cannot be seen in such situations as unidirectional movement from content to expression, but should also involve transition from expression to content, which would be necessary, e.g., in the search for words or word combinations to fit the given constraints on the phonetic composition or accentuation characteristics of the text to be generated; or in specifying a content structure that could incorporate in its expression the words

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or word combinations chosen from considerations of their surface form and, at the same time, would be compatible with the overall conceptual framework of the poem. When deciding whether the linguistic units constructed primarily on the basis of expression are acceptable with respect to their sign values and content, different authors may rely on more or less rigorous criteria, depending on their general approach, their professional level, etc. This would explain, among other things, the "poetic licence", both in grammar and in semantics, that characterizes, as often as not, texts of this kind[4].

In analysis, the plane of expression can be expected to function as the basis for linguistic performance mainly in the situations of incomplete understanding, like those of mechanical repetition or copying of incomprehensible words or sentences, learning by rote, carrying out some auxiliary linguistic operations, like correcting the proofs, compiling a concordance without specifying meanings of the words included in it, etc.[5]

4.3. Performance based on the plane of content.

The situations where the bulk of analysis or generation procedures could be performed in the plane of content are of a diametrically opposite nature. Of this type may be communication within a specific situation directly perceivable by each of its participants (say, when a cook talks to his helpers in the kitchen; or when a researcher experimenting with an intelligent robot tells it which objects among those available it should move, and where). Another example are situations where the subject matter of the communication falls within a limited and well-structured domain supposed to be known to all of the participants.

The distinguishing property of analysis in this case is that one can rely on one's knowledge of the domain or situation in question as part of the source data. So for grasping the meaning of an utterance, it may be sufficient to establish only some minimal fragments of its sign value structure, primarily the presentive words that can be used to "jump over" to the plane of content. The relations between the content elements obtained can thereupon be determined from the logic of the situation itself, so that complete syntactic analysis within the sign value plane turns out to be largely superfluous[6].

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[4] Cf. the opinion of a contemporary author: "... poets often follow in their creations those unexpected and even queer ideas that are brought to life ... by the rhyme itself. And it is only in case the resulting idea is absolutely ... incompatible with the poet's basic world outlook that he may have the strength to give it up" (Konetskii, 1980).

[5] An experiment is known to have been conducted by the Moscow State University research group for new technologies of language acquisition that could be accounted for as an instance of expression-based mode of linguistic processing. The goal was acquisition of English by students with no prior knowledge of this language. They were given a tape recording of some English dialogues, the written text of these dialogues, and their parallel Russian translation, and they had to listen to the tape with the text and translation before their eyes for some weeks running, five days a week, several hours at a time. By the end of that time, all the students know the dialogues by heart and could read and recite them with excellent pronunciation. They could also translate them both ways, starting from any arbitrary point. What they could not do, however, was paraphrase the utterances occurring in the dialogues, or use the words or phrases from them to generate utterances of their own.

[6] This type of linguistic performance is probably the one underlying the conception of linguistic sign as a means of "hinting at a meaning" or "reminding of a meaning", proposed by G.P.Melnikov (1978).

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This is a sort of "understanding by guessing" with all its assets and limitations. The main asset is that it allows faster response to the message communicated, especially if it is extralinguistic response that is required. One may not even need to listen to the end of an utterance before reacting to it. Cf.: *"**The milk!** <is on the verge of boiling over, so you should take it off the stove immediately>"*. Moreover, relying on the plane of content contributes to robustness of the communication process, ensuring that various "slips of the tongue", wrong accentuation, partial lack of syntactic agreement, etc. do not present an insurmountable barrier to comprehension.

A technician going over texts related to his specific sphere of interest is likely to rely for the most part on such content-based analysis, focussing his attention chiefly on special terms and other concept words and giving little if any consideration to peculiarities of the surface expression employed in the text, or to the completeness and grammaticality of its sign value structure. In this way, even if the text in hand lacks a portion of its structural characteristics, one can, as borne out by experiments on post-editing the results of "word-for-word" machine translation, furnish an adequate version of the lacking structure "by default", drawing on one's own notions concerning the subject.

However, the limitations inherent in this type of analysis are also significant. Among them, the most important is the risk of overlooking some of the information communicated if there is no room for it in the apriori "world model" available to the addressee of this communication. If, e.g., the text under consideration presents an unconventional approach to a familiar issue, the content-based analysis may lead to gross misconceptions. As argued by A.L.Pumpyanskii (1974, p.9), this is one of the worst problems in translation of technical and scientific texts.

Content-based generation is expected to be characteristic of the same situations that invite content-based analysis and, besides, of all situations where the information to be communicated is (or is considered by its author to be) so novel that it has no "ready-made" correspondences in the structural sign value plane. The distinguishing characteristics of this generation type stem from the "gravitational" asymmetricity of the processes of transition between these two planes (see §3). The main aspect of this asymmetricity is that, similarly to expression-based analysis, generation of a sign value structure from the "chunk of content" (Chafe, 1977) it should correspond to has to be performed by test and trial, rather than by more straightforward procedures. Roughly, this test-and-trial method may appear as follows.

To begin with, the author searches within the desired "chunk of content" for components that have sign value counterparts directly traceable through the inter-plane correspondences available in the author's linguistic competence. As soon as a sufficient number of relevant sign value objects are found, the author switches to the level of the sign value plane itself and proceeds to build up tentative structures incorporating these objects, moving along the decomposition and generalization axes within this plane. Each time a more or less complete structure is produced, it is mapped back into the plane of content and the result is checked against the initial "chunk of content". If the two contents coincide, the structure in hand is used to form the corresponding unit of expression, and the generation process is over.

Otherwise (and it is almost always "otherwise" in this mode of generation), one has five choices: (1) one may ignore the semantic discrepancies present, considering them immaterial in the given communicative situation (especially if there is a strict time limit) and proceeding as if they did not exist; (2) one may discard the structure under examination as entirely unsatisfactory and look for alternative structures; (3) one may try to modify this structure using the periphrastic facilities of

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the sign value level, in the hope that this may help to neutralize the discrepancies detected (or at least to reduce them to an acceptable minimum); (4) one may come to a conclusion that the content represented by the structure under consideration is even more appropriate in some respects (more consistent, more revealing, etc.) than what was initially intended, and modify one's own knowledge or conceptions accordingly; (5) one may decide that the inventory of sign value objects and their characteristics provided by the language in question is insufficient for adequate representation of the content to be communicated, and proceed to supplement or modify this inventory, either adding new sign value units or using those already available in a non-conventional manner. It is easy to see that cases (4) and (5) correspond to the two possible directions of interaction between language and thought: language influencing one's way of thinking in case (4) and the process of thought causing changes in language, in case (5).

This seems to be the mode of generation primarily responsible for the "throes of expression", when the content required by the author defies being fitted into the Prokrustean bed of linguistic sign structures. It is probably also the chief source of ungrammaticalities abundant in oral speech, as well as of semantically elliptical utterances typical of professional jargons.

4.4. Performance based on the plane of structural sign values.

The linguistic space "gravitating", as indicated above, from the structural sign value plane to the planes of expression and content, it follows that in situations where a detailed sign value structure is available at some phase of the communication process, linguistic performance would be more efficient if focussed predominantly on this structure, i.e. carried out for the most part in terms of structural sign values. This kind of situations occurs principally in various ***text-to-text*** communication modes, like translation, revising, summarizing, re-telling, paraphrasing (synonymous or non-synonymous), etc. Even deductive reasoning as it is simulated in artificial intelligence amounts mostly to transformations of the initial structure at the level of the sign value plane, i.e. to a sort of paraphrasing.

The basic method of analysis based on the sign value plane consists in forming hypotheses for the sign value structure underlying the utterance being analyzed, in much the same way as in the process of constructing such a structure in the content-based generation mode. That is to say, one tries to break down the expression of the utterance into components that can be identified as expressions of sign values, seeking to arrive at a set of sign values combinable into a structure that can be assessed as "plausible" in the sense in which this term has been introduced by G.S.Tseytin (1979). The basic criteria for deciding whether a structure is "plausible" or not seem to be twofold. Firstly, we have to know whether transition from this sign value structure to the plane of content yields a content that is acceptable and meaningful with respect to the communicative situation. Secondly, it is important whether transition from the structure in question back to the plane of expression will yield the initial utterance, rather than any other expresion sequence; if not, the structure under consideration is likely to be spurious. The basic line of reasoning in this case is: "If the author of the text under analysis had meant *X*, the expression to be used for it would have been *Y*, rather than the *Z* occurring in this text".

When the sign value plane is used for generation purposes, the emphasis is placed on the means of synonymous and quasi-synonymous paraphrasing available in the language in question at the level of sign value structures. As in content-based generation, such paraphrasing is an important

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part of the interplay of language and thought, since transformations of a sign value structure, even when the resulting structure can be considered as equivalent to the initial one, still tend to involve modifications in the content associated with this structure. The effect is that switching from one structure to another is instrumental, along with specifying the wording of the content intended, in getting a clearer insight into the content itself. This may be considered the major raison d'être for editorial corrections, as well as for the process of self-revising as an important phase of text generation.

On the other hand, if one does not pay sufficient attention to phenomena peripheral to the plane of structural sign values (especially if the sign value structure in question has not been verified as to its linguosemantic or encyclopaedic adequacy), the result of performance based on this plane may be semantically erroneous. This is not an uncommon case in translations, interviews, annotations, etc. Cf. the over-literal translation of the French *J'ai peur que cela **ne** vous incommode* as *I am afraid that this will **not** be a nuisance to you*. Sometimes the effect is even more striking, as in the following English rendering of a Russian dialogue: *"Some more tea?" - "Thanks, later." - "Later there will be **soup with cat's meat**: we are leaving soon"*. In the original Russian text, the last remark contains a rhymed idiomatic combination: *"potom budet sup s kotom"*, which is a joking way of saying: *"Later this opportunity will be no more available'*.

4.5. Interplay of decomposition and generalization in diverse performance modes

Variations in the direction of traversing the axes of generalization and decomposition provide another source of diverse modes of linguistic performance. Here we can fit in, among other things, the different models of language acquisition and representation associated with the opposition of relation-based vs. entity-based linguistic approaches mentioned in §2.3, as well as different computational methods of analysis and generation compatible with each of these approaches.

The methods of analysis using ***relation-based*** linguistic descriptions are broadly classified as *top-down* and *bottom-up* ones. With the former, the composition/decomposition axis is followed principally in the decomposition direction, i.e. from compositionally complex units, beginning with those of the sentence tier, to their representations in terms of their successively smaller constituents, down to the tier of lexemes and grammatical categories. The axis of generalization is simultaneously traversed in the direction of instantiation, from the most general S category through more concrete phrase categories to parts of speech and, finally, to concrete lexical units. The bottom-up analysis models imitate the opposite direction of following each of the two axes. Similar alternatives are possible in generation, though the main generation mode seems to be that of decomposition-cum-instantiation, i.e. the top-down one. In all cases, it is primarily *grammar-oriented* processing.

Entity-based descriptions are best suited to the *bottom-up* kind of linguistic processing. The processor starts from the lowest tier of decomposition, i.e. from the smallest entities carrying valency-type information on the structural positions expected in the larger entity they form part of, and employs this information to construct/hypothesize representations of subsequently more complex entities, ideally up to the overall structure of the text being analyzed or generated. The generalization axis is followed, at least at the initial stages of such processing, in the generalization direction. Thus, in processing based on the sign value plane, one proceeds from concrete instances of lexical and grammatical morphemes through their entries in the lexicon to their class categories, the most universal of these being parts of speech. On the whole, the same

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is true of relation-based analysis as well; unlike it, however, entity-based analysis models may vary as to the level of generalization chosen for the bulk of operations involved in moving along the composition/decomposition axis.

One way is to begin with *grammar-oriented*, or "purely syntactic", parsing that takes into account primarily the most general co-occurrence properties associated with the class categories of the entities at hand, and forms all variants of the desired structural representation(s) that are suggested by these properties. The next step would consist in going back to the concrete entities instantiating the class categories processed, and "filtering out" the false variants using semantic and lexical co-occurrence information associated with these concrete entities. This step may be seen as moving back ("down") the decomposition axis as well, for the initial data here includes structures of complex linguistic units, while the result of their processing involves specification (e.g., disambiguation) of their component parts. Different versions of such "filtre-based" parsing, first suggested in (Lecerf, 1960), have been implemented, among others, by O.S.Kulagina (1979) and Yu.D.Apresyan, *et al.* (1989).

On the other hand, entity-based descriptions are a natural foundation for *lexicon-controlled* linguistic processing exploiting the *inheritance mechanisms* that determine the basic organization of linguistic knowledge in such descriptions. This kind of processing relies, first and foremost, on the information assigned to the most concrete entities included in the description in question, primarily, lexemes and inflexional morphemes, while information given in the entries for more general (classifying) linguistic entities is only invoked (inherited) if the same type of information supplied for the more concrete ones is absent, insufficient or unsatisfactory in some respect. Concrete versions of this processing mode may further vary in the types of relations between linguistic entities chosen as the basis for inheritance (e.g., they may be limited to the class-instance relations only or use the part-whole relations as well), in the methods and scope of multiple inheritance, in considering information of the same type inherited from multiple sources as conflicting or "adding up", in the criteria used for dealing with conflicting information, etc. E.g., the JaRAP experimental system of Japanese-Russian automatic translation (Modina and Shalyapina, 1994; Kanovich and Shalyapina, 1994) features a version of lexicon-controlled analysis and generation using some special types of inheritance (primarily, the "summing-up" type of multiple inheritance and the "supplanting" inheritance as an extension of the conventional inheritance by default), based both on class-instance and part-whole relations between the source of inheritance and the heir.

6. CONCLUSIONS.

Above, we have outlined an overall model of linguistic competence as a three-dimensional linguistic space formed by the axes of denomination, decomposition, and generalization. Among them, the denomination axis has been assumed to include, besides the universally recognized planes of expression and content, a third, intermediate plane of structural sign values. The linguistic space thus defined compares favorably with more straightforward models of linguistic competence in that it naturally accomodates a broad spectrum of linguistic levels related to various aspects of language, including levels of intersentential and text-size objects. Within this framework it also becomes possible to reconcile the three-component structure of N.Chomsky's language theory with the multilevel composition of stratificational-type linguistic approaches, as well as to account for some traditional linguistic oppositions, like homonymy vs. contextual

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polysemy or synonymy vs. variation, by referring their members to the parts of the denomination axis on the opposite sides of the structural value plane.

It has also been shown that the three-dimensional model of linguistic competence is comprehensive enough to underlie a wide diversity of modes of linguistic performance, thus accounting for admitted adaptability of such performance to its initial data, goals, and other variables of the communicative situation. In particular, we have argued that linguistic redundancy characteristic of the language centre makes it possible to rely for the bulk of linguistic processing on any one of the three denomination planes, which seems to give an insight into distinctions between modes of performance typical for poetry, for communication within specific situations directly known to each participant, and for text-to-text communication. The latter is felt to be focussed on the plane of structural sign values, which is probably why translation seems to be best simulated by transfer-based MT systems, the level of transfer being essentially that of the structural value plane. More scope for diversity of performance modes is provided by variations in the direction of following the axes of decomposition and generalization within each of the three denomination planes.

In conclusion, it might be well to mention two more points. First, the opposing types of linguistic performance we have specified can hardly be expected to be as clearly delineated in linguistic reality as in our general sketch. Rather, they are likely to occur in varied and, probably, quite involved combinations and superpositions, thus giving rise to still more numerous distinctions within the basic oppositions touched upon. Second, even though translating the above outline into a concrete linguistic description that would effectively serve as a universal basis for all conceivable modes of linguistic performance could be taken as some ultimate ideal, it can hardly be proposed as a feasible task. Moreover, for practical purposes a model of such an ideal type would probably be less than efficient: practical systems being designed usually for pre-specified linguistic tasks, there is simply little sense in having them include information that would be completely (or almost) ignored when these tasks are performed. Developers of lingware for such models are quite justified in constructing it in each case as *a reduction of the universal model of linguistic competence, tailored for the specific performance model* preferred and, conceivably, integrated in part with this model. Still, it may be useful to keep in mind the idealized universal model of linguistic competence as a basis for comparing its various reduced versions, so that one could recognize the extent of the reductions made in each case and assess the "cost" of the resultant economy in terms of amplifications and modifications that would be necessary if one wished to augment the original areas of application.

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