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On the German Locative: A Study in Symbols*

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The internal structure of the locative predicate-complement form-class in German is described within the framework of a generative grammar consisting of a phrase-structure (PS) *component, a semantic* (S) *component, and a transformation (T) component. The S-component is interposed between the PS-component and the T-component. The PS-component generates the deep internal structure of the locative form-class as a function of the metaelement* "irgendwo," *assigning hierarchical relationships and groupings in the process. The S-component translates the "irgendwo"-quantified syntactic patterns of the P-marker into their corresponding semantic denotational patterns, resulting in an S-marker, and then returns the derivation to its P-marker at the level of the locative class symbols. The T-component then operates on this level, if necessary, to obtain the derived P-marker and thus the surface grammar. The metaelement* "irgendwo" *proves to be more than a syntactic filter assigning locative structure. It proves to be a semantic filter that reveals the indexical symbolic nature of the locative adverbs and their symbolic relationships to each other as well as to the locative prepositional phrase.*

Introduction

Grammars of German [1-11] have thus far neglected the internal structure of locative expressions. Though the very same functions are assigned to both the locative adverb and the locative prepositional phrase, it is generally not explicitly stated that these locative elements belong to the same functional form-class or classes and thus could be generated within the same complex of grammar rules. Indeed, the user of these grammars, occasionally forced to look in different parts of the text, must discover their functional equivalence on his own. Some grammars, it is true, list locative combinations. Usually these are adverb combinations and only occasionally adverb-phrase combinations. Again the structure of these combinations is for the most part left to the user to discover. A few grammars suggest structural descriptions, but these prove to be inadequate or else are so general as to be insignificant. Thus, as Chomsky has already pointed out, such grammars are defective in that they fail to describe regularities [12, p. 5].

One scholar in particular [13, pp. 134-35] has openly expressed doubts as to whether it is even possible to describe formally the syntax of co-occurring adverbs. In this instance, appeal must, according to him, be made to meaning. Thus, the adverb, once assigned syntactic functions, is simply and finally classified as a particle.

That the locative adverb satisfies the same syntactic functions as the locative prepositional phrase; that it is both syntactically and symbolically related to the latter, inasmuch as it not only co-occurs with it, but also entails it; that syntactically the locative adverbs behave toward one another in nearly the same way that they behave toward locative prepositional phrases—all these linguistic phenomena suggest that a formal description is possible. Moreover, the very interesting and significant analyses of the locative adverb by scholars [14-17] outside the field of linguistics also indicate that further linguistic investigation is necessary and possible.

Aims of Present Paper

The present paper offers a structural description of the form-class of locative strings, within the framework of a generative grammar [12, pp. 8-9]. It thus represents a preliminary intraclass study of the internal syntax of locative strings (single locative elements—adverb or prepositional phrase—or combinations of these), all the elements of which can be assigned to a single external grammatical function proper to the entire locative form-class [18, 19].

One of the chief goals of this paper is thus to demonstrate that the internal structure of the locative form-class is both recursive and hierarchical. It is recursive in that the generation of its locative members results from an iterative process involving definition and redefinition of the metaelement "*irgendwo*" within the PS-component of the grammar (the adverb *irgendwo* raised to the metalevel is set in quotation marks); it is hierarchical in that it can be either adverb or phrase

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dominated within the PS-generative scheme, independent of the surface ordering of the terminal locative elements. (Applied to the internal grammar of the locative form-class, the term "dominance" is used to describe priority of generation. Thus, one locative class [adverb or prepositional phrase] generated as an optional expansion of an already generated locative class [adverb or phrase] is dominated by the latter.) The proper surface grammar results within the T-component of the grammar.

It is also the aim of this paper to demonstrate that the syntactic relationships internal to the locative form-class can be translated into corresponding semantic denotational relationships by a semantic (S) component interposed between the PS-component and the T-component. As Chomsky [12, p. 75] has stated, "A linguist with a serious interest in semantics will presumably attempt to deepen and extend syntactic analysis to the point where it can provide the information concerning subcategorization, instead of relegating this to unanalyzed semantic intuition, there being, for the moment, no other available proposal as to a semantic basis for making the necessary distinctions." Moreover, there is the additional hope that the syntactic description will shed some light on the symbolic nature of the locative adverbs.

General Syntactic Considerations

The clause structure

$$\text{Det} + \text{Net} + \text{Vsein} + \text{LOC} \qquad (1)$$

provides the basic environment for our study of locative strings. Here the symbol LOC denotes the predicate-complement form-class of locative strings. The finite verb is limited in our discussion to the verb *sein.* The noun phrase (NP) of the subject is defined as definite determiner (Det) plus a noun (N) of the class of concrete-thing (ct) nouns *(konkrete Dingwörter).*

Given the subject-complement co-occurrence pair Nct and LOC, the verb *sein* assumes a classification characterizable by the verb *sich befinden.* It is then the subject-locative complement co-occurrence pair that determines the classification and meaning of the verb *sein.* (For a more detailed discussion of the significance of the subject-complement co-occurrence pair for the verb *sein,* see chap. ii of item 20 of the References.)

Preliminary Locative Grammar Rules

A survey of present-day German grammars permits us to construct an initial *composite* description of the locative predicate-complement form-class. They seem to imply that the various locative strings could be generated by PS-rules of the form:

(i) LOC → (A) (B) (C)
Choose at least one

(ii) C → Ploc + Det + Nct

(iii) Det → Det3/Ploc____

(iv) Nct → Nctm, Nctn, Nctf

(v) A → *hier, da, dort*

(vi) B → *oben, unten, vorne, hinten, aussen, innen, draussen, drinnen, drüben*

(vii) Ploc → *an, in, auf*

(viii) Det3 → {*der*/__Nctf, *dem*}

(ix) [Nctm, Nctn, Nctf] → [*Garten, Hof, Schrank, Berg*; *Haus, Schiff, Beet*; *Wohnung, Gartenstadt, Kiste, Stadt*]

The symbols undefined as yet are to be interpreted as follows: Ploc = preposition locative; Det3 = definite determiner dative; the lowercase letters appended to the symbol Nct denote gender: m — masculine, f = feminine, n = neuter.

Only the locative has been formulated here in rewrite rules. They are to be interpreted as follows: The symbol → is a rewrite symbol meaning "rewrite the symbol on the left-hand side of this rule as the symbol (s) on the right-hand side." A symbol on the right-hand side of a rule can be selected or not, whenever it is enclosed in parentheses. If all the symbols on the right-hand side appear in parentheses, then at least one must be selected. The notation "choose at least one" has been appended here to facilitate execution. Items on the right side of a rule are separated by commas or are set in braces, whenever an exclusive choice is involved. Brackets, like braces, are used to conflate rules. The items within the brackets on the left are all ct-nouns; they differ only in respect to gender. Thus, the top item in brackets on the left, Nctm, must be rewritten as the top item on the right, the second on the left as the second on the right, and so forth. Rules (iii) and (viii) are context-sensitive rules, the permitted environment (abbreviated "envir") being given after the slash bar. For example, rule (iii) is to be read, "Rewrite Det as Det3 in the environment Ploc ," the position of Det being indicated by the underlined open slot. In any derivation, only one symbol can be rewritten at a time.

Ordering within the formulation of rule (2i) reveals locative subclasses. Its application, amounting to a left-to-right sweep, will generate the following locative strings:

(a)	*(b)*	*(c)*	*(d)*
A	A + B	B + C	A + B + C
B	A + C		
C			

Application of the remaining rules will generate terminal strings such as:

(a) *hier*
oben
in der Kiste
(b) *hier draussen*
hier in dem Garten
(c) *draussen in dem Garten*
(d) *hier draussen in dem Garten.*

Any of these strings will function as predicate complement of the verb *sein* and in so doing may come as a response to a question of the form:

Wo + Vsein + Det + Nct + ?

where the interrogative locative adverb *wo* functions as the triggering symbol for the locative form-class.

The inadequacies of this description will be exhibited in the following sections of the paper and suitable revisions offered.

Inadequacies of Preliminary Locative Grammar Rules

According to the description offered in the preceding section, the sole syntactic property characterizing the linking of locative elements within the locative predicate-complement form-class is the left-to-right ordering of these elements. Thus, the surface and deep grammars are equivalent, since there is no string that is not characterized by this left-to-right "yes/no" selection of locative classes. This in no way reflects upon the adequacy of the rules, unless it can be demonstrated that there exist ambiguities on the terminal level that actually have structural correlates within the locative form-class. That is to say, the locative rules above are to be regarded as inadequate, should the terminal locative strings reveal cases of constructional homonymity [21, p. 86] that are traceable to different structures internal to the locative form-class and beyond the descriptive power of the given grammar rules.

There is, indeed, evidence to indicate that homonymous constructions do occur within the context of a single locative form-class and that these are due to the indexical aspect of the locative adverb as a linguistic symbol. Homonymous constructions thus arise whenever locative adverb and locative prepositional phrase co-occur in a string. This difference in the basic nature of the two classes of locative symbols (locative adverb as indexical symbol versus complex definite prepositional phrase symbol) has its syntactic representation in the deep grammar, being expressed in terms of the variable priority of generation assigned to each of the given locative symbols, coupled at times with different possible groupings (or bracketings) of elements. (The indexical nature of the locative adverb is discussed below in the section entitled "Syntax to Semantics.")

Let us examine the significance of these observations. Consider the passage: *"Und er sass hinten auf dem Schiff und schlief auf einem Kissen"* (Mark 4:38). In the locative string *hinten auf dem Schiff* we have a doublet of the form B + C. The apparent left-to-right ordering of the surface grammar does not correspond uniquely to the deep grammar, for the string lends itself to two interpretations, each with its own deep grammatical structure. The first is *auf dem Schiff und zwar hinten,* meaning *auf dem hinteren Teil des Schiffes,* while the second is *hinten und zwar auf dem Schiff,* meaning *in dem hinteren Raum und zwar auf dem Schiff.* Both interpretations are regarded as being within the context of a single locative predicate-complement form-class.

The first interpretation certainly does not involve a left-to-right ordering in both its surface and deep grammar. The phrase *auf dem Schiff* must be generated first, for it is not possible to generate a terminal string corresponding to *wo auf dem Schiff* until the environment *auf dem Schiff* has first been generated. The second interpretation, on the other hand, does exhibit a left-to-right ordering in both its deep and surface structures.

The first structural interpretation represents what might be called a "partitive locative construction," while the second represents semantically what has been called in the past a general-to-specific ordering. As will be shown below, both can be formally described and differentiated.

The grammar rules of (2) are also inadequate for a number of additional reasons, all relating in some way or another to the locative prepositional phrase. As formulated, the rules cannot generate more than one prepositional phrase. Thus, there is no iteration of Class C, though locative strings of more than one definite locative phrase occur, some of which can be described within the context of a single form-class. This is a problem, whether an adverb is present in the string or not. It assumes additional complexity in those strings in which adverbs also occur, since the problems of grouping are then involved.

The rules as formulated also fail to provide any insight into the question of whether there is a difference between a definite locative prepositional phrase (e.g., *in dem Haus)* and an indefinite locative prepositional phrase (e.g., *in einem Haus)* or whether the latter should even be incorporated into the locative form-class. The question is not completely resolved in our discussions below, but it will be demonstrated that a definite locative prepositional phrase relates in a different syntactic way to certain locative adverbs than does an indefinite one and that if the latter is to be incorporated into the locative form-class, it generally must be the last class generated.

Let us now turn to a reformulation and description of the locative predicate-complement form-class such that the variant structural patterns become evident and

can be generated with appropriate structures assigned to each token of the form-class.

The Metalinguistic Quantifier "Irgendwo"

The locative adverb *irgendwo* holds the key to the internal syntax of locative strings and indeed to certain aspects of their semantics as well. Raised to the level of the metalanguage [22, p. 3], it lends itself well to the role of a metalinguistic quantifier of the potential structure of the locative form-class. The term "quantifier" is thus applied to the metaelement "*irgendwo*" to describe its role as a filter within the locative form-class, a filter that measures the symbolic representation and structuring of space. How can the meta-adverb "*irgendwo*" be used to quantify a locative string that has been evoked by a single *wo?* We ask ourselves the following question: Can we substitute a single "*irgendwo*" (which we will call an i-singlet, i-substitute, or i-singlet substitute) in place of an entire terminal locative string of the object language [22, p. 3] or only in place of a locative element or elements within the string? (We understand *element* here as a member of Class A, B, or C.) If the latter is the case, note must be taken of (1) how many "*irgendwo's*" are substituted before the locative string is reduced to a string of i-singlets, (2) how many and which locative elements correspond to each i-singlet, and (3) the order of i-substitution.

Thus, a token of the locative form-class will be interpreted here as a string, the structure of which can be expressed in terms of a string of ordered i-singlets. The internal grouping of the locative elements within the string results from i-correspondence: Which elements correspond or reduce to which i-singlet? The ordering of the i-singlets obtained from the recursive process of i-substitution mirrors the internal hierarchy of the locative string. We attach the following significance to this ordering: If there is only one i-singlet, then there is no question of an i-hierarchy. If the locative string corresponds to more than one i-singlet, then the lowest level of the locative hierarchy is represented by the string segment corresponding to the initial i-substitute, the next higher level by the string segment corresponding to the second i-singlet, and so on until i-substitution is no longer possible.

Beyond a single i-singlet, it is possible to translate the ordered i-singlets into "dominated locative element" and "dominating locative element." The locative string segment corresponding to the first i-singlet substitute represents the dominated element, while the locative string segment corresponding to the second i-singlet substitute represents the dominating element. Moreover, the dominating locative may in turn be dominated if there is a third i-singlet substitute. The locative element corresponding to the last i-singlet substitute is then the initially dominant one within the given locative string.

Description of the structure of locative strings in terms of i-singlets within the context of a single functional form-class is best accomplished within the framework of a generative grammar. Here the order of the i-singlet substitutes is inverted and the inverse order now becomes the order of generation, mirroring the hierarchy from top to bottom, from a higher level to a lower level, as represented in a tree diagram. Syntactic dominance is thus mirrored in the order of generation of the respective "*irgendwo's*" and thus correspondingly in their non-terminal and terminal expansions as well. The metalocative adverb "*irgendwo*" becomes an integral part of the PS-rules, functioning there as a locative filter through which the various locative elements are generated and thereby structured.

Syntactic dominance is not solely a function of ordered i-quantification, since it can also become evident within a doublet of the form A + C, which may correspond to only an i-singlet. Here the element A (e.g., *hier)* dominates (or precedes) the element C (e.g., *in dem Garten)* in the generative scheme because of symbolic precedence. In syntactic terms, this means that the power of expansion resides in Class A to expand itself in terms of Class C without the mediation of another "*irgendwo.*" Class C as described does not possess this potential. Thus, the dominating element of the doublet entails (is expandable in terms of) the dominated element, but not the converse. This syntactic pattern is only valid subject to the constraint of an i-singlet.

Finally, the syntactic hierarchy revealed in the generative scheme through i-quantification can be translated into a semantic quantification scheme, wherein the locatively characterized referent denoted by the dominated locative element is spatially contained (or included) in that denoted by the dominating locative element. This is also a representation of the notion of general to specific. On the other hand, locative elements in doublets corresponding to a single *"irgendwo"* denote the same referent, and thus the same locatively characterized object.

The i-Singlet A + C

Let us begin our i-quantification by considering strings of the form:

$$\textit{Die Flasche ist} \begin{Bmatrix} \textit{hier} \\ \textit{da} \\ \textit{dort} \end{Bmatrix}.$$

Here the braces indicate exclusive choice: Any one of the adverbs of Class A may function externally as the predicate complement of *ist* in response to a question of the form, *Wo ist die Flasche?*

Our i-quantification reveals that we can substitute a single "*irgendwo*" for any one of the adverbs selected

as the predicate complement. Each adverb thus corresponds to an i-singlet. Expansion, however, of the locative string to

$$\left\{\begin{matrix} hier \\ da \\ dort \end{matrix}\right\} \; auf\ dem\ Tisch$$

and reapplication of our i-quantification also reveal that the string, now a doublet according to rule (2i), *may* still correspond to an i-singlet. That is, we can substitute a single "*irgendwo*" for the entire string, despite the fact that we have two locative classes:

$$\left[\left\{\begin{matrix} hier \\ da \\ dort \end{matrix}\right\} \; (auf\ dem\ Tisch)\right]_{i} .$$

Brackets set off the string as an i-quantum; the inferior index appended to the brackets denotes that it is an i-singlet. The entire i-quantified locative string corresponds to an i-singlet. The locative element *auf*

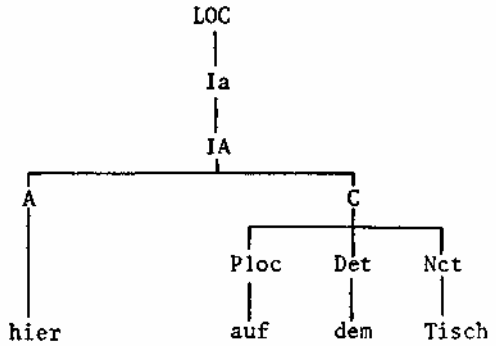


FIG. 1.—Adverb-dominated i-singlet

dem Tisch is enclosed in parentheses to indicate that it may be covert.

Though rule (2i) will generate the co-occurrence pair A + C, it does not motivate their co-occurrence in a manner any different from the generation of A + B. On the other hand, i-quantification supplies this very motivation, though it does not provide the structural description internal to the i-singlet. The generation precedence evident here happens to coincide with that of (2i). The question remains, however, as to whether we can attach a stronger motivation to this generation precedence.

To determine this, we appeal here to symbol dominance. Class A precedes and dominates Class C for the following reason: A member of Class A always entails, overtly or covertly, a member of Class C, while the converse does not hold. Syntactically this means that within the context of an i-singlet, Class A can always be *optionally* expanded to include Class C, that is, A + C, while again the converse is not true. The term *optionally* only involves the question of the overtness or covertness of Class C. Class A entails Class C, whether the latter is overt or covert. The basic syntactic significance of this claim is the following: The choice of C is not made within the over-all ordered generation scheme of the locative form-class as in (2i), but as a function of Class A.

To express this syntactic pattern, we revise (2i) to read:

$$\begin{array}{lll} \text{(i)} & \text{LOC} \rightarrow & \text{Ia} \\ \text{(ii)} & \text{Ia} \rightarrow & \text{IA} \\ \text{(iii)} & \text{IA} \rightarrow & \text{A (C)} . \end{array} \qquad (3)$$

Here we interpose the metasymbol I as our *"irgendwo"* filter. The symbol Ia represents an i-singlet. We attach the lowercase descriptor to I to indicate that it is to be rewritten as an adverb category. It is then rewritten as IA, thereby designating the i-singlet as A-dominated. The symbol IA is regarded as a unit symbol. Class C is then generated as an optional expansion within the context of IA and without the mediation of an additional i-singlet. A derivation using these rules and those of (2) is represented in Figure 1. The I-prefixed symbols will be translated ultimately into a semantic denotational structure in the S-component of the grammar. We have, nevertheless, retained them for the moment, though they will subsequently be deleted (see section below on "Syntax to Semantics").

One co-occurrence dependency remains to be discussed—the co-occurrence dependency existing between the adverbs of Class A and the determiner of the noun phrase.

To combine with (i.e., to be entailed by) a given adverb of Class A and thereby to participate in an i-singlet, the prepositional phrase must meet certain constituent requirements. We regard an i-singlet of this form to be a responsive counterpart to *wo.* As an indexical symbol, the interrogative adverb *wo* possesses two components: an interrogative locative component systematically related in a prompting role to each and every potential affirmative locative expression and an interrogative welch-component also systematically related in a prompting role to all potentially uniquely locatively characterizable nouns. The adverbs *hier, da,* and *dort* contain both these components from the affirmative *definite* side and are thus able to satisfy the respective interrogative components of *wo.* As symbols, the locative adverbs possess these components in a definite, unique way. They are thus able by themselves to denote uniquely in a locative symbolic manner an extralinguistic object (or denotatum). If for some reason the adverb fails in its denotational role, there is a linguistic device at hand to render explicit the two components and thereby accomplish the denotation. This device is expansion of the adverb by juxtaposition (appositional positioning) of a definite prepositional locative phrase. The i-singlet constraint is the formal requirement for fulfilment of this denoting. To accomplish this task linguistically, the prepositional phrase must have a potentially appropriate locative preposi-

tion, a definite determiner, and an appropriate noun, that is, one that is locatively characterizable. If these requirements are not met, the co-occurrence pair A + C will not reduce to an i-singlet, whereby the adverb's denotatum cannot be given linguistically. (Sütterlin [11, p. 370] had some interesting insights into this structure, yet failed to develop them.)

Our especial interest must now center on the co-occurrence dependencies existing between the adverb and the definite determiner of the noun phrase. These dependencies stem from the fact that both are indexical symbols—symbols, however, that do not share the same components of *wo.* Whereas the adverbs share both components, the determiner realizes only the affirmative definite counterpart of *welch-*. The *welch-com*ponent can thus be satisfied by both the adverb and the determiner. The latter, however, does not contain the locative component.

The members of Class A and the definite article of the element C are symbolically compatible. They co-occur, with the definite article being neutral as regards the adverb. This is not the case with the demonstrative determiners *dies-* and *jen-*. The adverb *hier* is symbolically compatible only with the demonstrative *dies-,* again subject to the constraint of the i-singlet. That is to say, the expansion potential of the adverb *hier* is satisfied or closed by a prepositional phrase containing the determiners *d-* or *dies-,* so that, other requirements being met, the adverb-phrase combination corresponds to an i-singlet. The co-occurrence of *hier,* however, with a locative prepositional phrase containing *jen-* would force us to interpret the co-occurrence pair as an i-doublet (i.e., two "*irgendwo's")* for the adverb *hier* would still remain open to expansion by a prepositional phrase with a compatible definite determiner. On the other hand, the adverbs *da* and *dort* are only compatible with *jen-.* Thus, the determiner *jen-* satisfies the expansion potential of *da* and *dort,* with a resultant reduction to an i-singlet.

Hence we have the following co-occurrence dependency between the adverbs and the definite determiners:

$$\begin{bmatrix} \{hier\} \\ \{da \\ dort\} \\ \\ \{da \\ dort\} \\ \\ hier \end{bmatrix} \text{Ploc} \begin{bmatrix} d \\ \\ jen \\ \\ dies \end{bmatrix} \text{Nct}\,.$$

The above string represents the i-singlet A + C. Here *d* is the stem of the definite article and *jen* and *dies* the stems of the demonstratives. Brackets are used here as abbreviators (their role in generative grammar rules) to express co-occurrence dependencies. Braces indicate exclusive choice, as usual. Case and number are not indicated.

The co-occurrence dependencies afford evidence for the claim that phrases of the form Ploc + dies + Nct are able to entail the adverb *hier* and that phrases of the form Ploc + jen + Nct are able to entail the adverbs *da* or *dort.* Hence, we really have to do with bi-entailment here. We have, nevertheless, incorporated only one type of entailment into our grammar (viz., phrase-entailment by a member of Class A) since we want the phrase element C to cover all definite phrases, most of which cannot entail the adverbs of Class A.

Class B-Dominated i-Doublets

Let us now consider the following passages:

(4)

(a) Ich bin Assistent an der Staatsbibliothek und wohne *hier draus*sen *in der Gartenstadt in einem Eckhaus* [Goes].[23]

(b) ... und wohne *hier draussen* [in der Gartenstadt] *in einem Eckhaus* [Goes].[23]

(c) Wir mussten die Auffahrt hinuntergehen, Bertholds Wagen stand *draussen auf der Strasse* [Nossack].[24]

(d) In einem jämmerlichen Versuch, zu trösten, sagte ich: "Vielleicht ist er nur *draussen irgendwo?"* [Rinser].[25]

(e) Das ganze Haus lag in tiefer Ruhe, da alles *draussen* war [Hesse].[26]

(f) Bernd dachte schaudernd: "Dann sind sie zwischendurch abgestiegen, haben *irgendwo* gesessen und haben . . ." [Kramp].[27]

Each of the locative strings in the above passages functions as a predicate complement. We regard the verbs *stehen, sitzen,* and *wohnen* as particularizations of the verb *sein.* As particularizations of *sein,* these verbs may include the symbolism of *sein,* while rendering an added attitude symbolism of their own [20, chap. ii].

The locative string of *(a)* is repeated in *(b),* with the definite prepositional phrase's possible covertness being indicated here by parentheses. The locative strings have been ordered so as to mirror the stepwise development of our substitution or reduction procedure. That is to say, the metadescription that we will undertake here is already inherent in the very object language itself.

Retaining the above order, we have the following locative strings:

(a) hier draussen in der Gartenstadt
(b) hier draussen [in der Gartenstadt]
(c) draussen auf der Strasse
(d) draussen irgendwo
(e) draussen
(f) irgendwo.

Here we ignore for the moment the indefinite locative string.

Applying our i-quantification to these strings, we obtain:

(a) *(hier)* i_1 + *(draussen)* i_2 + *(in der Gartenstadt)* i_1
(b) *(hier)* i_1 + *(draussen)* i_2
(c) *(draussen)* i_2 + *(auf der Strasse)* i_1
(d) *(draussen)* i_2 + *(irgendwo)* i_1
(e) *(draussen)* i_1
(f) *(irgendwo)* i_1.

Here the subscript i again denotes an i-singlet; that is, the locative element corresponds or reduces to a single "*irgendwo.*" The numeral appended to the i-subscript denotes the order of the given i-substitute in the over-all i-quantification of the locative string of the object language. Strings *(a), (b), (c),* and *(d)* each reduce to an i-doublet (two i-singlets); strings *(e)* and *(f)* each reduce to an i-singlet.

Our initial i-substitution in *(a)*, *(b),* and (c) is prompted by the metapattern already evident in the object language string of *(d);* our second i-substitution in these same strings is prompted by the metapattern evident in *(f).* Our procedure thus amounts to a downward reduction first to the pattern in *(d)* and then finally to that in *(f).* Whether regarded as an object-language symbol or a metasymbol, the adverb *irgendwo,* being the affirmative counterpart to *wo,* also contains the locative and the *welch*-component. They differ in that whereas *wo* asks for definite responses, *irgendwo* affirms that one is not available or forthcoming. They both, however, stand potentially open to particularization by any definite locative element. The strings *hier in der Gartenstadt, auf der Strasse,* and *draussen* thus come as definite particularizations to *irgendwo* or as definite responses to *wo.* The point is that in the process of i-quantification they do not respond to or particularize the same *wo* or *irgendwo.* For the string *draussen irgendwo* of *(d)* corresponds, on the affirmative side, to the interrogative string *wo draussen,* while the string *irgendwo* of *(f)* corresponds, again on the affirmative side, to the simple interrogative *wo.* The i_1-singlet of *(a), (b),* and *(c)* thus comes as a response to the *wo* of *wo draussen* or as a particularization of the *irgendwo* of *draussen irgendwo.* The i_2-singlet, on the other hand, must be regarded as a response to a *wo* posed earlier or as particularization of an earlier *irgendwo.* Thus, in our procedure we work *irgendwo* by *irgendwo,* or *wo* by *wo,* back or down to the ultimate *irgendwo* or *wo.*

Our i-quantification justifies and lends significance to the subclassification of (2i). By inverting the sequential numbering of the i-singlets obtained from i-quantification (but not the strings corresponding to the i-singlets), we obtain the order of generation. In essence, we begin in our generation scheme with *(f)* and work up to *(a).* This inversion is described by the following inversion format:

$$\begin{bmatrix} B_{i_2} \\ \{B \\ I\}_{i_1} \end{bmatrix} + \begin{bmatrix} \{A(C) \\ C \\ I\}_{i_1} \\ \phi \end{bmatrix} \underset{\Rightarrow}{\text{INV}} \begin{bmatrix} B_{i_1} \\ \{B \\ I\}_{i_2} \end{bmatrix} + \begin{bmatrix} \{A(C) \\ C \\ I\}_{i_2} \\ \phi \end{bmatrix}.$$

Here the brackets are used to indicate the co-occurrence pairs; braces again indicate exclusive choice; parentheses indicate optional choice. The left-hand side represents the i-quantification of the object-language strings, now expressed in class symbols. The right-hand side represents the order of generation obtained from the inversion. Here the i-singlet subscripted as 1 precedes in generation that subscripted as 2. The symbol I denotes the adverb class containing only the adverb *irgendwo.* The other class symbols are the same as in (2). The symbol ø is used here only to indicate an open slot. It will not appear in our rules below. The order of precedence of generation obtained here agrees in part with that of (2i), but not for the same reason. In contrast with (2i), the over-all generation order is now motivated, no longer being based simply on the ordering of classes in the surface string.

The internal locative structure imposed by i-quantification within the context of a single locative form-class demands a stronger syntactic property than simply that of precedence of generation, one we called "syntactic dominance," above. This means essentially that the second i-singlet, namely, A(C) or C or I, cannot be generated simply as an added element as in (2i). Rather it must be generated, just as in the case of IA, as an optional expansion of the class that enjoys generation precedence. In contrast with the rule IA $\rightarrow$ A (C), however, generation in this case must be mediated by another i-singlet, for B does not entail these elements, since they do not reduce to a single "*irgendwo.*" We must, therefore, formulate the rule in the form IB $\rightarrow$ B (i_2-singlet), so that the i_2-singlet (to be defined ultimately as A(C), C, or I) will be generated within the context of IB, an i-singlet already defined as B. Hence, the expansion of IB as B + i-singlet will generate a string with the deep structure of *draussen irgendwo.* To account also for the passages in *(e)* and *(f)*, we enclose the i-singlet in parentheses and thereby indicate that its generation is optional.

Before further revising rule (2i), we have yet to discuss the indefinite locative string of passage (4a). It is highly questionable whether such a phrase can be regarded as a "pure" locative. The reason apparently lies in the role of the indefinite article, for it does not

satisfy the *welch*-component of *wo.* If we pose the question that would have elicited the locative string of (4a), namely, "*Wo wohnen Sie?*" the reply "*Ich wohne in einem Eckhaus*" would come as a strange response. In other words, we would be tempted to ask again "*Aber wo?*" or at least "*In welchem Eckhaus?*" in which case we would be attempting to pinpoint the location of the *Eckhaus* and thereby infer the location of the addressee.

There is additional evidence to justify these observations, for given our original passage, we find that we can insert another *irgendwo* and obtain "*Ich wohne irgendwo hier draussen in der Gartenstadt in einem Eckhaus.*" Here the *irgendwo* corresponds to an i_3-singlet and is thus dominated by only the definite locative elements. Its particularization by a definite locative element could give us a string such as "*Ich wohne hier draussen in der Gartenstadt in dem weissen Hochhaus in einem Eckzimmer.*" Thus, it is always possible to insert another definite locative element in a string before coming finally to the indefinite locative element.

The final solution will ultimately depend upon complete analysis of the indefinite determiner and other general syntactic considerations involving kernel sentences and predicate structures.

The above structural analysis ignores the inherent syntactic potential of Class B adverbs to expand in terms of (i.e., to entail) their proper locative prepositional phrase within the context of a single "*irgendwo.*" In our description, we begin with an adverb of Class B, relate it immediately to its extralinguistic denotatum, and completely ignore in the process the proper entailed phrase that would symbolically describe more definitively this denotatum. The chief reason for bypassing this potential structure is its infrequency. Thus, we have yet to explore it fully. Yet, we can say that each adverb of Class B entails its own proper locative prepositional phrase. The phrase is regarded as proper when it contains the preposition from which the given adverb is derived, as, for example, in "*Taube, die draussen blieb ausser dem Taubenschlag,*"[28] or when it contains the adjective counterpart of the given adverb, as, for example, in "*[Er sass] hinten auf dem Schiff . . . auf dem Schiff und zwar auf dem hinteren Teil.*"

In the first example, Rilke carries out his own entailment; in the second, we have carried out the inherent entailment. But it is just as true that each phrase in turn can entail its proper adverb, so that there is a bi-entailment. Indeed, in the end we might choose to generate each adverb of Class B by transformation from either of these two types of phrases. Our final decision will turn most likely on the semiotic motivation that we attribute to the indexical symbols within the language.

Let us now turn to the revision of (2i) and (3).

The rules for the generation of the locative strings in (4) can now be formulated as:

PHRASE-STRUCTURE RULES

(5)

(i) LOC → Ia

(ii) Ia → { IA / IB/except in the envir B___ / II }

(iii) IA → A(C) { II / Ip }

(iv) IB → B { Ia / Ip }

(v) Ip → IC, ID

(vi) II → I

(vii) IC → C (Ip)

(viii) ID → D

.
.
.

(x) I → *irgendwo*

The remaining PS-rules are those of [2]; D, the class of indefe prepositional phrases, is fully defined in the rules of [7]).

TRANSFORMATION RULES

Tob: Locative adverb permutation

B + A (C) (I) ⇒ (I) A + B (C)

T: Locative adverb permutation

A (C) I ⇒ I + A (C)

Obligatory if C is present, otherwise optional.

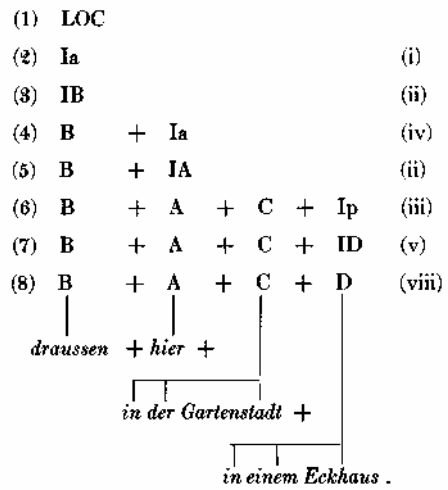
The I-prefixed symbols (Ia, Ip, IA, IB, IC, ID, II) continue to be regarded as unit symbols, with the I denoting an i-singlet and the second uppercase letter the class that will represent the i-singlet. The classes Ia and Ip represent a breakdown into adverb and phrase classes. Note should be taken that the rules as formulated will not generate a phrase-dominated locative string, since the expansion potential of LOC is restricted to Ia. The classes Ia and Ip provide recursion within the PS-rules. We will have more to say about recursion below. Classes Ia and Ip occur as optional elements in the expansions of IA and IB. Thus, the original expansion potential of IA has been extended to include an optional i-singlet represented by II or Ip.

In rule (5ii) we make the choice of IB context-sensitive in order not to generate the ungrammatical string *B + IB and hence *B + B. The asterisk indicates that the string is not grammatical. This applies only to the locative form-class as described here. Ultimately we will have to account for strings such as *irgendwo hier hinten aussen am Schiff.* This would require a recursiveness not yet present in our description, though one not totally different from that already present.

We introduce our first transformation rules. Both permute the order of the adverb classes A and/or I. The transformation labeled "Tob" is obligatory and must be carried out, given the proper structural description. The transformation labeled "T" is either obligatory or optional, depending upon the presence or absence of a certain element, C in this case. A description of the structural change intended by the transformation follows the T designation.

The conventions for applying the rules remain the same. The above rules, however, are only partially ordered. They are characterized by a special type of recursion that results from the necessity of recursively defining the metafilter "*irgendwo.*" Thus, in any derivation an I-prefixed symbol must be expanded ahead of a simple uppercase symbol (A, B, C, D, I), even though the latter is open to further expansion. Each level of a derivation will contain no more than one I-prefixed symbol. When no further such symbol appears, we arrive at a single uppercase letter or a string of uppercase letters, which can then be expanded. This level, the level of strings containing only uppercase symbols, forms the domain of all our transformations.

As an example of the application of the above rules, let us derive, at least in part, the locative string of (4a):



Here the numbers on the left denote the levels of the derivation, while those on the right indicate the rule used to derive the given level. We have not included the levels between (8) and the terminal string. It is immediately evident that the I-prefixed symbols are always expanded ahead of the simple letter symbols. Thus, rule (ii) was used twice: to obtain level (3) and to obtain level (5). In levels (6) and (7) the symbols Ip and ID are expanded, while the other symbols of the string B + A + C remain unexpanded. The I-prefixed symbol is therefore not used in any context-sensitive way, but only as a vehicle for introducing another i-singlet. Once level (8) is reached (that is, once every I-prefixed symbol has been expanded), the rules can be carried out in ordered fashion.

Note should be taken of the choices inherent in level (6). Here it is possible to generate a string in level (7) of the form

(7) B + A + C + IC (v)

by selecting IC instead of ID. We can then go on to derive level (8) as

(8) B + A + C + C + Ip (vii)

by rule (vii), whereupon we might end up with

(9) B + A + C + C + ID (v)

and

(10) B + A + C + C + D. (viii)

Theoretically, recursion within the context of rule (vii) has no constraint set on it. Transformation of *draussen hier* would result in *hier draussen.*

Level (8) of the PS-derivational history of (4a) represents the domain of the permutation necessary here to obtain the correct surface order. It permutes the order of the string B + A to A + B. The P-marker and the derived P-marker are represented in Figure 2. Here the only surprising and significant feature in the derived P-marker that deserves comment is the deletion of the I-elements. This deletion is not the result of the transformation in question but results from the semantic component that we will interpose between the PS-component and the T-component. In deleting the I-elements, we have anticipated the action of the S-component, which removes the i-quantification from the P-marker, the very process that we began with in this investigation. We thus obtain the surface structure with only the locative classes present in the derived P-marker. The S-component will be discussed below and inserted in our grammar then.

Phrase-dominated i-Doublets

We come now to a phrase-dominated locative string. To demonstrate this structure, we have chosen the following passages:

(6)

(a) *Unten in unsrer Wohnung* waren Mutter und Kind zu Hause, *dort* wehte harmlose Luft; *hier oben* wohnten Macht und Geist, *hier* waren Gericht und Tempel und das "Reich des Vaters" [Hesse].[26]

(b) "Ach," sagte ich so ruhig, dass es unnatürlich klang, "sie wird *irgendwo im Garten* sein" [Rinser].[28]

(c) Ich stand *am Fenster* [Hesse].[26]

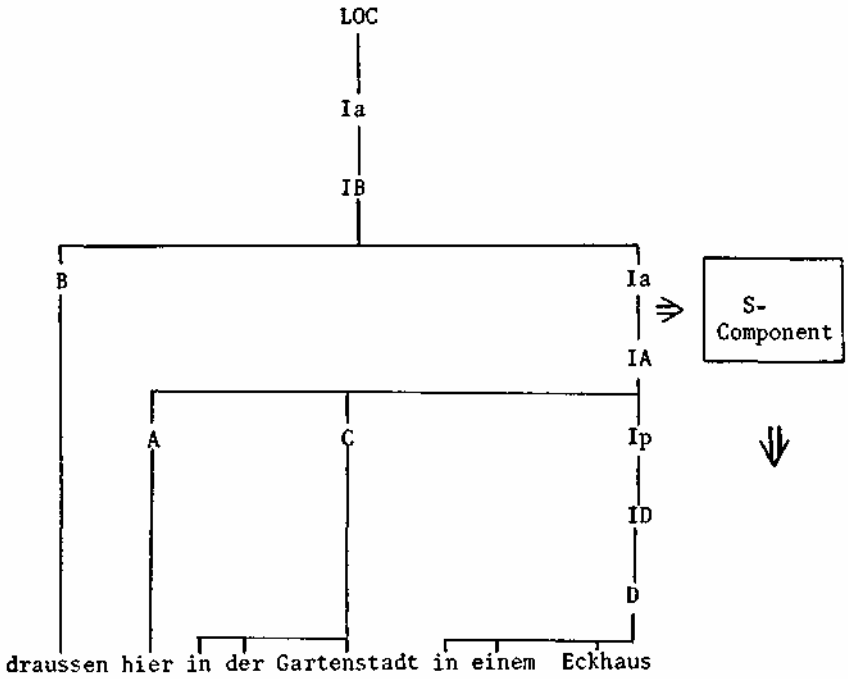


FIG. 2.—An adverb-dominated i-triplet

(d) Bernd dachte schaudernd: "Dann sind sie zwischendurch abgestiegen, haben *irgendwo* gesessen und haben . . ." [Kramp].[27]

The locative strings *unten in unsrer Wohnung* and *hier* of passage (6*a*) function as predicate adjunctivals. (By predicate adjunctival, we mean an element that modifies the predicate string V + complement.) We have selected them, nevertheless, since they have the potential to function also as predicate complements. Moreover, the entire passage with its various locative classes permits us to discuss them all within the context of the same form-class. We have again ordered the locative strings in a manner that will mirror our substitution procedure.

Retaining the above order, we then have:

(a) *unten in unsrer Wohnung*
dort
hier oben
hier

(b) *irgendwo im Garten*

(c) *am Fenster*

(d) *irgendwo.*

Ignoring for the moment the simple adverbs of *(a),* we proceed with our i-quantification and obtain:

(a) $(unten)_{i_1} + (in\ unsrer\ Wohnung)_{i_2}$

(b) $(irgendwo)_{i_1} + (im\ Garten)_{i_2}$

(c) $(am\ Fenster)_{i_1}$

(d) $(irgendwo)_{i_1}$.

Strings *(a)* and *(b)* correspond or reduce to an i-doublet, strings *(c)* and *(d)* to an i-singlet. Here, in contrast to the B-dominated doublets, we make our first i-substitution for the adverb.

Following the metapattern evident in *(b),* we can substitute *irgendwo* in *(a)* and obtain *irgendwo in unsrer Wohnung,* whereupon we can regard *unten* as the definite particularization of the substituted *irgendwo.* Moreover, we can regard *unten* as a definite response to a question of the form *Wo in unsrer Wohnung?* Deletion of *irgendwo* gives us the phrase *in unsrer Wohnung,* whereupon substituting *irgendwo* for this phrase we arrive at the ultimate string of *(d).* The locative string in *(a)* is now completely i-quantified.

We can now return to the adverbs *dort, hier oben,*

and *hier* of passage *(a).* We first encounter *dort* and assign to it the same referent as that assigned to the element *unten.* Being an indexical symbol, the adverb *dort* can entail the adverb *unten,* having its referent or denotatum mediated by the latter, without the intervention of another i-singlet. This can be substantiated structurally in that, if prompted, we would expand dort to *dort unten.* Both strings, however, correspond to only a single "*irgendwo,*" thereby indicating that they have the same denotatum; that is, they denote the same object locatively.

This description is further suggested by the string *hier oben (in unsrer Wohnung)* in (6*a*) and its subsequent reduction there to *hier,* with *oben* becoming covert. The phrase *in unsrer Wohnung* is already covert; we indicate this by parentheses. The justification for this lies in the fact that we interpret the string *hier oben* in terms of the covert phrase. Both are dominated by this phrase.

Given the format *irgendwo in unsrer Wohnung,* we have in (6) the following definite particularizations of the adverb *irgendwo:*

$$\left\{\begin{matrix}unten\\dort\ (unten)\\hier\ oben\\hier\end{matrix}\right\}_{i_1} + (in\ unsrer\ Wohnung)_{i_2}$$

each of which can be regarded as being equivalent to an i-singlet and as corresponding to the first i-substitute.

We now set up our inversion format:

$$\left[\begin{matrix}\left\{\begin{matrix}A(B)\\B\\II\end{matrix}\right\}_{i_1}\\ \\ \phi\end{matrix}\right] + \left[\begin{matrix}C_{i_2}\\ \\ \left\{\begin{matrix}C\\II\end{matrix}\right\}_{i_1}\end{matrix}\right] \underset{\Rightarrow}{INV} \left[\begin{matrix}\left\{\begin{matrix}A(B)\\B\\II\end{matrix}\right\}_{i_2}\\ \\ \phi\end{matrix}\right] + \left[\begin{matrix}C_{i_1}\\ \\ \left\{\begin{matrix}C\\II\end{matrix}\right\}_{i_1}\end{matrix}\right]$$

where the right-hand side of the formula represents our hierarchical order of generation.

The above structure is beset with restrictions as soon as an adverb is selected. These stem for the most part from adverb-preposition co-occurrence dependencies. Some of them, however, also extend to the choice of a particular noun class. These permissible co-occurrence patterns thus attempt to mirror our structuring of space. Of all the prepositions, *an, in,* and *auf* seem to give rise most readily to these restrictions. Thus, while admitting that the present study is only a preliminary one, we can propose at this time the following co-occurrence dependencies existing between adverb and preposition:

$$\left\{\begin{matrix}oben\\unten\\vorne\\hinten\\aussen\\innen\end{matrix}\right\}\ an + \text{Det} + \text{Nct} \qquad (a)$$

$$\left\{\begin{matrix}oben\\unten\\vorne\\hinten\end{matrix}\right\}\ in + \text{Det} + \text{Nct} \qquad (b)$$

$$\left\{\begin{matrix}oben\\vorne\\hinten\end{matrix}\right\}\ auf + \text{Det} + \text{Nct.} \qquad (c)$$

Patterns *(a)* and *(c)* generally relate to our structuring of a surface, while pattern *(b)* is intended to mirror our structuring of a three-dimensional area. All particularize the underlying pattern

$$irgendwo\ \left\{\begin{matrix}an\\in\\auf\end{matrix}\right\}\ \text{Det} + \text{Nct}$$

and thus share the peculiar transformation potential involving phrase-entailment by the Class B adverb. Thus, our string *unten in unsrer Wohnung* transforms to "in unsrer Wohnung und zwar in dem *unteren* Raum." Here we have italicized the adjective counterpart to the adverb *unten.*

We have excluded the adverbs *draussen, drinnen,* and *drüben* from this pattern, but only for the time being. Examples of the participation of these adverbs in this structure are indeed rare. We can only offer *draussen auf dem Meer* as an example, but there are certainly others.

Let us now turn to grammar rules that will generate the above structure:

LOCATIVE PHRASE STRUCTURE RULES

(7)

(i) LOC → Ia, Ip

(ii) Ia → {IA; IB/except in the envir B___; II}

(iii) Ip → IC, ID

(iv) IA → A ({B/C___; C}) ({II; Ip})

(v) IB → B ({Ia; Ip})

(vi) II → I

(vii) IC → C ({Ia/except in the envir C___; Ip})

(viii) ID → D

(ix) B → {Ba; Bb/C(A)___}

(x) C → Ploc + Det + Nct

(xi) D → Ploc + En + Nct

(xii) Det → Det3/Ploc___

(xiii) En → En3/Ploc___

(xiv) Ploc → Ploc1, Ploc2, Ploc3

(xv) Ba → Bo, Bu, Bv, Bh, Bd1, Bd2, Bd3

(xvi) Bb → {B1/Ploc1 + X___; B2/Ploc2 + X___; B3/Ploc3 + X___}

(xvii) [B1; B2; B3] → [Bo, Bu, Bv, Bh, Ba, Bi; Bo, Bu, Bv, Bh; Bo, Bv, Bh]

(xviii) Net → Netm, Netn, Netf

(xix) I → *irgendwo*

(xx) A → *hier, da, dort*

(xxi) [Bo, Bu, Bv, Bh, Ba, Bi, Bd1, Bd2, Bd3] → [*oben, unten, vorne, hinten, aussen, innen, draussen, drinnen, drüben*]

(xxii) [Ploc1, Ploc2, Ploc3] → [*an, in, auf*]

(xxiii) Det3 → {*der*/____Netf, *dem*}

(xxiv) En3 → {*einer*/____Netf, *einem*}

(xxv) [Netm, Netn, Netf] → [*Garten, Hof, Schrank, Berg*; *Haus, Schiff, Beet*; *Wohnung, Gartenstadt, Stadt*]

LOCATIVE TRANSFORMATION RULES

(xxvi) Tob: Locative Permutation

$$X + C \begin{bmatrix} I \\ B\ (I) \\ A\ (B)\ (I) \end{bmatrix} \Rightarrow X \begin{bmatrix} I \\ (I)\ B \\ (I)\ A\ (B) \end{bmatrix} C$$

where X ≠ A.

(xxvii) Tob: Locative Deletion

$$C + B + A\ (C)\ (I) \Rightarrow B + A\ (C)\ (I)$$

(xxviii) Tob: Locative Permutation

$$B + A\ (C)\ (I) \Rightarrow (I)\ A + B\ (C)$$

(xxix) T: Locative Permutation

$$A\ (C)\ I \Rightarrow X + I + A\ (C)$$

Obligatory if C is present, otherwise optional.

Our rules are now complete within the framework of the goals of the present investigation. The conventions for application of the rules are the same as above. In the light of the locative structure just investigated, rules (vii) and (ix) are the most significant. In rule (vii), we have extended the expansion potential of IC to include a dominated adverb. In this expansion scheme lies also the potential generation of a string of definite locative prepositional phrases of any length. This has also forced us to subclassify Class B into Ba and Bb, the latter being chosen in the phrase-dominated locative structure generated by rule (vii). We have added two transformations, (xxvi) and (xxvii). Both are obligatory. Three of the four transformations relate to permutation. Transformation (xxvii) deletes the dominant element C whenever the dominated element IB expands ultimately to B + A (C). The output of this transformation represents one more input for transformation (xxviii).

The diagram in Figure 3 represents the P-marker and the derived P-marker of the locative string *hier unten in der Wohnung,* with the phrase element dominating the adverb pair.

Syntax to Semantics

The generation of the various strings of the locative form-class as a function of the metaelement "*irgendwo*" has a twofold semantic significance. First it provides us with a formal basis for understanding the symbolic nature of the various locative elements. Second, it provides us with formal syntactic patterns that can be translated immediately into corresponding locative semantic denotational patterns. In this section, we will treat both of these semantic aspects, though in less detail than is desirable.

We regard the locative adverb as an indexical symbol. In this, we follow Burks [17] and Jakobson [29] and thus indirectly Peirce [14]. Accordingly, the locative adverb is a symbol in that it designates or signifies an object, a denotatum, to an interpretant by virtue of a conventional rule within the language system. (Burks [17, p. 673] writes, "The interpretants are, in each case, the minds understanding the sign.") As a symbol, the locative adverb thus possesses a predictable designatum (meaning). The same symbolic properties that we attribute to symbols such as *rot* and *Mann* and the like we also attribute to the locative adverbs. Applying Peirce's type-token distinction, we can label each occurrence of a symbol, for example, the symbol *rot* or *Mann* or *hier,* a "token" of the given symbol. The class of all tokens of any one of the given symbols we then call its "type." Though each token of a symbol occurs in space and time, its meaning is independent of the space-time context in which it is used. Thus, the meaning of each token is equivalent to that of its type.

The locative adverb, however, also differs from the symbols *rot, Mann,* and the like in that it is at the same time an index. That is to say, it contains a "built-in" indexical or definite-determiner component, in addition to its locative component. Each time that the locative adverb is used, it is uniquely referential, linked immediately to its denotatum, the extralinguistic object that it denotes. For this reason, the locative adverb was earlier mistakenly considered a *pure* index, whose meaning *shifted* with each occasion of its use. Actually it is only its denotatum that shifts, for locative it remains with its fixed designatum. Jespersen [30, p. 123] emphasized this feature when he named such symbols "shifters." The shift in the denotatum, however, may be true of certain other symbols as well, for example, the noun and the verb. The significant difference between the locative adverb and these symbols lies in the fact that the latter do not possess a "built-in" indexical or definite-determiner component. If the need arises for the noun to become uniquely

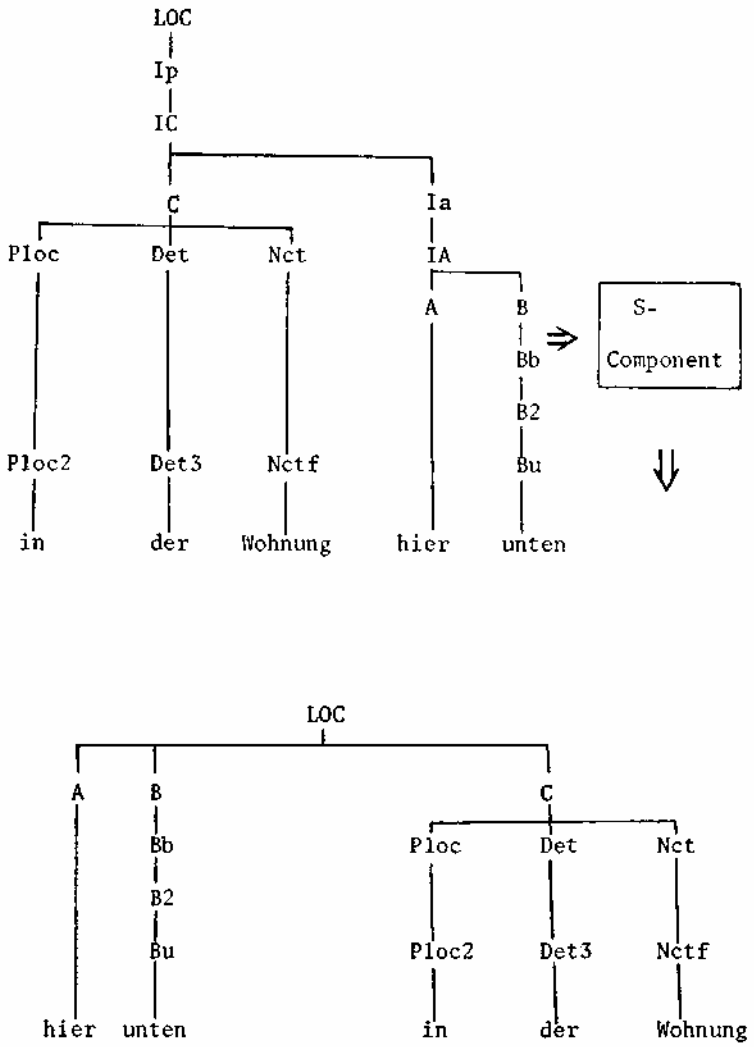


FIG. 3.—Phrase-dominated i-doublet

referential, this can be accomplished by an accompanying definite determiner. We have already seen this above with respect to the co-occurrence of the definite determiner with the noun in the prepositional phrase. One should also recall that it is the function of tense (an indexical symbol, too) to provide referential indexing for the verb.

The German locative adverb is in a categorical sense semantically equivalent to a compound symbol, namely, a definite locative prepositional phrase. Each adverb entails its proper definite locative prepositional phrase. This entailment potential is inherent in a grammar rule of the language. The formal representation of this entailment is thus realized in the syntactic potential of a locative adverb to expand in terms of its proper phrase, with the resultant adverb-phrase doublet corresponding to a single "*irgendwo.*" The semantic significance of this syntax is that the locative elements-adverb plus definite prepositional phrase—have the same denotatum, that is, they denote the same extralinguistic object. Thus, for any two locative elements in the form-class to have the same denotatum, they must correspond to a single "*irgendwo.*" This is not to claim that the two locative elements have the same designatum. Overt expansion of the adverb is optional, for the entailed phrase may remain covert. In this case, the locative adverb is related directly to its denotatum by a convention of the language in the light of its designatum. On the other hand, the language also provides the symbolic device, whereby the denotatum of the indexical symbol may be established and described linguistically through the entailed phrase, so long as the pair corresponds, of course, to a single "*irgendwo.*" This is the test.

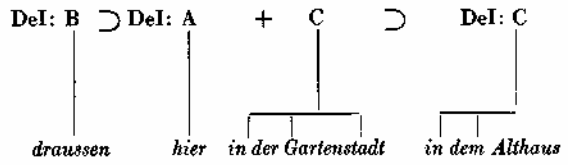
As formulated, our grammar rules only generate the entailed phrase proper to the Class A adverbs. Here the restrictions relate to (1) the choice of the preposition, namely, it must be one that can govern a noun and make it locative, and (2) the choice of noun, namely, it must be accompanied by a definite de-

terminer and be locatively characterizable. We have incorporated rules, however, in which a member of Class A may also entail certain members of Class B. Though we have not fully examined entailment by Class B adverbs, we can say that the phrase entailed by any of these Class B adverbs is also entailed by the Class A adverbs.

We aim at a translation of our locative syntactic structures into semantic denotational structures. Thus, between the phrase-structure and the transformation components of our locative grammar, we wish to interpose a semantic denotational component (our S-component) that will carry out this translation. Before doing this, however, we have yet to discuss the semantic significance of locative strings of i-tuplets.

In our syntactic study of the locative form-class, locative strings consisting of more than one i-singlet exhibited what we chose to call i-dominance: The first i-singlet generated dominates the next one generated, and so on. The notion of i-dominance has its counterpart in the semantic notion of i-inclusion. Subject to our claim that the locative symbol or symbols (A, B, C, D, I) generated as a function of an i-singlet have but one denotatum, a string of n-number i-singlets and their class representatives will correspondingly have n-number denotata (DeI). We further state that the denotatum denoted by the dominant locative symbol will *spatially include* the denotatum denoted by the dominated symbol.

Given the terminal PS-string *draussen* + *hier* + *in der Gartenstadt* + *in dem Althaus,* we express the relationship of i-inclusion in this string as:



Here the symbol DeI stands for "the locative denotatum"; the colon is to be read "is denoted by the locative class symbol(s) (and its [their] terminal derivation)"; the horseshoe is to be read "spatially includes (or contains)." Thus, we read the above formula as: "The locative denotatum denoted by the symbol B spatially includes the locative denotatum denoted by the symbols A + C, which spatially include the locative denotatum denoted by the symbol C." Here the symbols A + C have the same denotatum. The relationship of i-inclusion is transitive, since the denotatum denoted by the last C is included in the denotatum denoted by A + C, which is in turn included in the denotatum denoted by B, the first class symbol.

Let us now turn to the step-by-step procedure for deriving the semantic scheme of the above example. Given the following PS-derivational history:

(1) LOC
(2) Ia (i)
(3) IB (ii)
(4) B+Ia (v)
(5) B + IA (ii)
(6) B + A + C + Ip (iv)
(7) B + A + C + IC (iii)
(8) B + A + C + C , (vii)

we convert levels (2) through (8) to the linear form:

Step 1:

Ia + IB + B + Ia + IA + A + C + Ip + IC + C

so that each symbol appears once in the linear representation of the derivation. Though we omit the derivational levels below level (8), they are nevertheless present and are carried along as in a transformation. In our linear conversion, we therefore proceed no lower in the PS-derivation than the level at which the last i-singlet is rewritten as a locative class or classes. This linearization is illustrated in Figure 4.

We thus project the PS-tree derivation to the stated level to its linear representation, while not destroying the remainder of the derivation, and obtain the initial S-marker.

Given the linear representation of Figure 4, we transform it to:

Step 2:

Ia + IB + B + Ia + IA + A + C + Ip + IC + C ⇒ DeI + B + DeI + A + C + DeI + C ,

substituting the symbol DeI for the I-pairs. We then insert a colon after each symbol DeI in place of the plus sign:

Step 3:

DeI + B + DeI + A + C + DeI + C ⇒ DeI: B + DeI: A + C + DeI: C .

Next we substitute the inclusion symbol, the horseshoe, for each plus sign appearing immediately before a DeI symbol, with the exception of the first one:

Step 4:

DeI: B + DeI: A + C + DeI: C ⇒ DeI: B ⊃ DeI: A + C ⊃ DeI: C .

We have now completed our semantic denotational interpretation of the syntactic structure.

The final step of the S-component involves the deletion of the semantic symbols and operators:

Step *5:*

DeI: B ⊃ DeI: A + C ⊃ DeI: C ⇒ B + A + C + C,

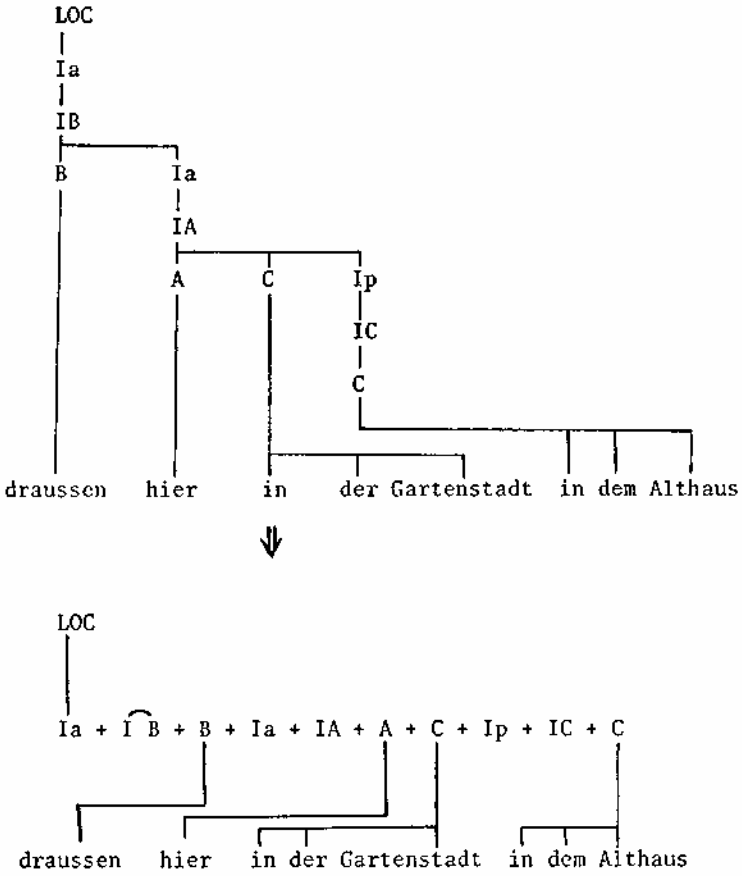


FIG. 4—Linearization of P-marker

whereby we return to the P-marker at the level of derivation of the class symbols. In essence, we have removed the i-quantification process from the P-marker —indeed, the very process with which we began our description of the locative form-class. The level of the class symbols in any derivation represents the possible domain of operation for the T-component of the grammar.

Steps 2 through 5, representing a continuation of Figure 4, are illustrated in Figure 5. The derivation to the terminal level has been left out for the sake of brevity. The last level depicted in Figure 5 is the domain on which the T-rules operate.

We can now formulate the above steps of the S-component in terms of the following S-transformations, which we will call ST-rules and which we will interpose between the PS-rules and the T-rules:

SEMANTIC TRANSFORMATION RULES

STob: Left-to-right linear representation of P-marker down to and including class symbol level of derivation in the order of their generation.

STob: DeI-substitution

$$X \begin{Bmatrix} Ia \\ Ip \end{Bmatrix} \begin{Bmatrix} IA \\ IB \\ IC \\ ID \\ II \end{Bmatrix} Y \Rightarrow X + DeI + Y.$$

STob: Colon substitution: Denotation operator

$$X + DeI + Y \Rightarrow X + DeI: Y.$$

STob: Inclusion-symbol substitution: Inclusion operator

$$DeI: X + DeI: Y \Rightarrow DeI: X \supset DeI: Y.$$

STob: Inclusion-symbol deletion and plus-sign substitution

$$DeI: X \supset \Rightarrow DeI: X +.$$

STob: Denotation-symbol deletion

$$DeI: X \Rightarrow X.$$

The above rules are recursive and are to be applied and reapplied until the left side of the given rule cannot be identified with any segment of the linear deriva-

tion representation. The symbols X and Y are cover symbols. The last two transformations represent the operations carried out in step 5 above.

Summary and Conclusions

It is peculiar to the internal grammar of certain form-classes that their structure can be described in terms of a unique metaquantifier. Such is true of the locative predicate-complement form-class. The adverb *irgendwo* raised to the role of a metalinguistic quantifier and so incorporated into a generative grammar becomes a syntactic filter that assigns internal structure to locative strings in terms of i-grouping and i-dominance. Moreover, this very filtering role can be extended so that the syntax of locative strings structured by i-quantification can be translated into a semantic denotational formalization of i-inclusion. Here i-grouping and i-dominance is transformed into a semantic formula that assigns denotata to the respective i-quantified locative groups and expresses the semantic i-inclusion relationship existing between these groups and their respective denotata. The traditional semantic notion of general-to-specific ordering of locative elements is represented by i-inclusion. Beyond this, i-quantification and i-inclusion coupled with the expansion potential of the various adverbs should offer a basis for the classification of the adverbs themselves, a problem that has been the center of interest to a number of linguists (in particular Erben [4], Glinz [6], Sütterlin [11], Schmidt [31], and Admoni [32]). Finally, i-quantification provides some quantitative measure of locative information, since a locative string can be measured in terms of how many i-singlets it contains.

The development of the S-component within the locative form-class must be extended to other form-classes that are so describable. This is not to say that the denotational type of S-component is everywhere applicable nor that it is the only semantic scheme possible. Moreover, the extension of the locative denotational scheme must ultimately involve denotata that are not locatively symbolized extralinguistic objects, but symbols that not only mediate but also permit subsequent contextually possible referencing. Such studies must, therefore, be coupled with a general investigation of all indexical-symbol categories as well as of symbolic processes in general.

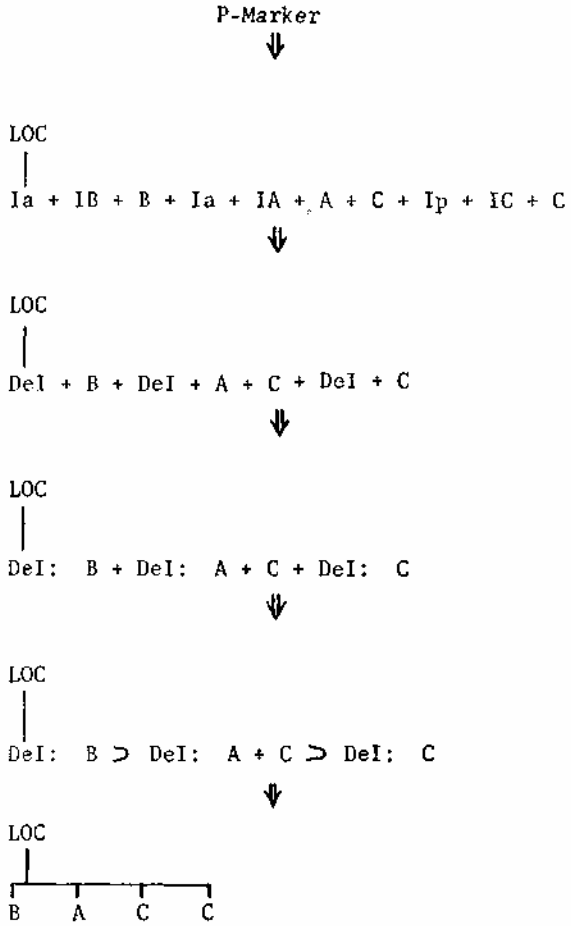


FIG. 5.—Final derivation of S-marker and return to P-marker (continuation of Fig. 4).

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