

Chapter 3

Information structure and the partition of the sentence

The term *information structure* was introduced by Halliday (1967b, 200). It informally describes the organization of a spoken sentence, which is independent - and sometimes even orthogonal to - syntactic constituency:

Any text in spoken English is organized into what may be called 'information units'. (...) this is not determined (...) by constituent structure. Rather could it be said that the distribution of information specifies a distinct structure on a different plan.

This level is motivated as the functional correlate of the intonational phrases of an utterance, which are Halliday's "tone groups" (see section 2.3):

The distribution into information units represents the speaker's blocking out of the message into quanta of information, or message blocks. Each information unit is realized as one tone group, in the sense that the information structure specifies the boundaries of the tone group to within certain limits (...). (Halliday 1967b, 202)

This description of information structure as blocks or units of information is the most neutral one in the literature. So far, information structure is defined by (i) the general concept of information units and (ii) by correlation to intonational phrasing.

Halliday himself adds further aspects to this concept, such as a *thematic organization* and the primacy of a division into two parts. The combination of these two additional aspects yields the common picture of information structure as a dichotomy of the sentence: The information structure of a sentence consists of two parts, one more informative and one less informative. The contrast is either marked by word order or by intonation. For example, the more informative part is generally believed to follow the less informative part (often referred to as *theme-rheme* or *topic-comment* structure). Or the most prominent intonational feature, the pitch accent, is correlated with the most informative part, while the rest of the sentence is less informative (often referred to as *focus-background* partition).

During the last 100 years a confusing proliferation of terminology has been used to capture this dichotomy. Most of the terms are used by different theories in different ways. To list only a few:

(1) Terminology for informational dichotomy

<i>psychological subject</i>	
<i>-psychological predicate</i>	(von der Gabelentz 1869, Paul 1880)
<i>theme-rheme</i>	(Ammann 1928: Thema-Rhema, Mathesius 1929, Prague School (Daneš, Firbas), Halliday 1967b)
<i>topic-comment</i>	(von der Gabelentz 1869, Reinhart 1982)
<i>topic-focus</i>	(modern Prague School: Sgall & Hajičová & Benešová 1973)
<i>presupposition-focus</i>	(Chomsky 1971, Jackendoff 1972)
<i>background-focus</i>	(Chafe 1976 for contrastive focus, Jacobs 1982)
<i>old/given-new</i>	(Halliday 1967b, Chafe 1976)
<i>open proposition-focus</i>	(Prince 1981)
<i>notional subject-notional predicate</i>	(É. Kiss 1995)

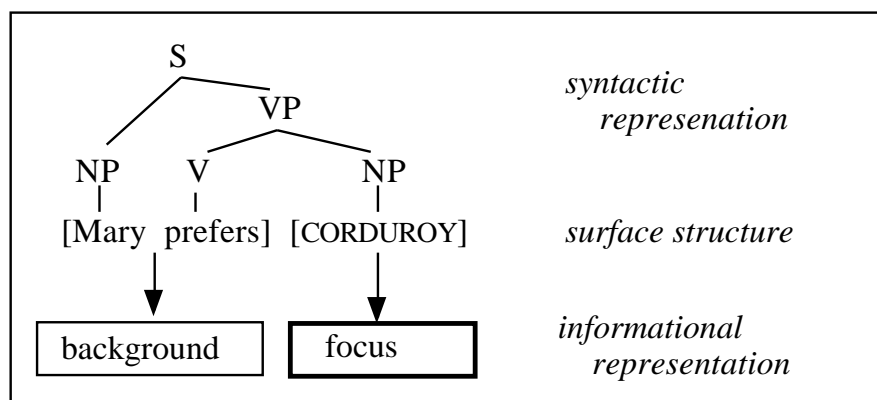
In general, it is assumed that this dichotomy of the sentence constitutes an independent level of description. However, there is no agreement where to locate this level. For some researchers, this dichotomy belongs to pragmatics and text linguistics, for others it is part of the psychological states of the participants in a conversation, and others integrate it into grammar proper. What most researchers agree on is that the defining criteria for the partition is a contrast in informativeness. The evaluation of informativeness has at least two aspects: The information given in a sentence can be evaluated with respect to either the sentence or the textual environment or the discourse. In the sentential aspect, informational units are described as the part *the sentence is about* and the part *what is said about it*. In the discourse aspect, the contrast is expressed in *already known* or *given* vs. *not known* or *newly introduced*. I will refer to the two aspects as *aboutness* and as *discourse anchoring*. The former dichotomy is often described in terms of an additional subject-predicate structure, while the latter is treated under categories of *givenness*. The effect of the interaction of informational units with the embedding discourse is often illustrated by anaphoric relations. Furthermore, discourse anchoring often leads to a *scale of givenness*, rather than to a binary distinction between given and new. Finally, the concept of *informational prominence* is understood in two contradictory ways: In the sentence perspective, information can be prominent because it is new and most informative; in the discourse perspective, information is prominent if it is already established or activated, i.e., if it licenses anaphoric relations. Prominent information in the latter sense would be expressed in the non-prominent part of the sentence in the former sense.

Theories differ in whether they distinguish aboutness and discourse anchoring or not, and whether they treat both aspects or only one, or whether they mix them. The pairs *theme-rheme* and *topic-comment* are typically used to refer to the aspect of aboutness, while the pairs *presupposition-focus*, *background-focus*, *open proposition-focus*, *old/given-new* are typically used to refer to the aspect of discourse anchoring.

The terms *topic-focus*, *psychological subject-psychological predicate* are not determined with respect to this distinction. There are cross-classifications of these two aspects, which lead to other categorizations, like Vallduví's (1990) *link-focus-tail*.

Nevertheless, the general picture can be illustrated with figure (2). The surface structure of the sentence *Mary prefers CORDUROY* receives a constituent structure at the level of syntactic analysis, and an informational representation as *background* and *focus*. Here, I use *background* as a neutral term referring to the complement of the *focus*. The term should not indicate any commitment to a particular theory of information structure. The partition reflects the idea that the focused phrase is more informative or provides new information, a fact which also seems to be reflected in the phonological prominence of the focused phrase *corduroy*. Furthermore, it is obvious that the information structure (following the phrasing of the sentence) does not correspond to the constituent structure.

(2) Information structure



In the following sections, I discuss three groups of theories of information structure: (i) the early approaches from the end of the 19th century, (ii) the Prague School, and (iii) the structuralist approaches following Halliday. In the course of the presentation of these theories, I try to make several implicit assumptions explicit. In particular, most approaches rely more or less on the following four poorly defined or scientifically obsolete notions: (i) the "Aristotelian" subject-predicate structure, (ii) the simplistic dichotomy of *figure-ground* from psychological gestalt theory, (iii) the one-to-one relation between intonational highlighting (stimulus) and informative content, and (iv) the communicative basis of linguistic methodology. These four unexpressed assumptions are discussed in section 3.1 while presenting the early models of information structure, which were expressively influenced by the contemporary psychological theory. It will be shown that none of the four mentioned assumptions is compatible with modern linguistic methodology or theory. Then I present the development of information structure in the course of this century: The Prague School redefined the psychological background into a configurational one. Halliday

reformulated it into an informational basis, Chafe anchored it in terms of consciousness, while Chomsky intended a semantic definition of these concepts in terms of inference, which eventually lead to semantic theories of focus presented in chapter 4.

3.1 Early models of information structure

3.1.1 Subject-predicate structure

The contrast between subject and predicate is not only a linguistic distinction, it also plays an important role in traditional philosophical disciplines such as epistemology, logic, and metaphysics, i.e. ontology, and in more recent fields such as psychology or information theory. The nature of the contrast is still very controversial and confusion only arises in the attempt to define the concepts at one level, more often confusion is caused by relating the distinction of one level with the distinction on another level. In what follows, I present some of the main concepts of the subject-predicate structure in linguistics, epistemology, logic and metaphysics.¹

The *linguistic* use of predicate and subject as constituents in a sentence goes back to Plato and Aristotle. The two categories indicate two different functions in the sentence and they are often associated with the noun and the verb in a simple sentence. Since typological research showed that subject and predicate are not universal categories, some linguists have proposed to replace this contrast by the contrast between *topic* and *comment*.² However, topic and comment cannot be regarded as purely grammatical, i.e. syntactic, categories since they have more to do with the knowledge or understanding of the participants of what is being discussed, i.e. the aboutness aspect mentioned before, than with the constituent structure. Problems in the definition of a sentence in terms of subject-predicate structure caused the abolishment of these concepts in syntactic theory proper.³ However, the basic notion survived in the generative rule of expanding a sentence to an NP and a VP (S → NP VP). The present situation in linguistics can be summarized by saying that subject and predicate are useful descriptive terms, but they do not have a clear grammatical definition.⁴

¹ The presentation of the subject-predicate structure in these four fields are motivated by the lexicon article of Garver (1967).

² There is an extensive literature on the categorization of a language as topic-prominent or as subject-prominent (cf. Li 1976).

³ Ries (1894) gives a very critical evaluation of traditional and logical definitions of the sentence. Ries (1931) collected more than 140 definitions for a sentence and showed that none of them can be used as a basic tool for defining syntax.

⁴ Keenan (1976) undertakes a linguistic definition of subject by listing more than 30 features that a subject prototypically has.

In *epistemology*, the contrast between subject and predicate is defined in terms of which part of the sentence serves to identify what is being discussed, and which part serves to describe or to characterize the thing so identified. Often the grammatical and epistemological subject and predicate are identical, in particular in simple sentences. However, there are several instances in which they differ, e.g. passive constructions, sentences with dummy subjects etc. More complex sentences, in which a relation between two objects is described, cause other problems for the epistemological view of the sentence structure. In the sentence *Bill was hit by John* the context has to decide which is the epistemological subject. In other words, the epistemological view is as context dependent in its determination as the use of topic in linguistic theory.⁵

In *logic*, there are two main conceptions of sentence structure: (i) the traditional subject-predicate view, which goes back to Aristotle's pioneering work, and (ii) Frege's view of the functor-argument structure of the sentence. The Aristotelian or traditional view assumes that subject and predicate are both general terms (i.e. *concepts* or *predicates* in the modern view) connected by the copula, schematically as *S is P*. The sentence asserts a quantificational relation between the subject and the predicate, which is expressed in the copula *some...is*, or *all ... are*.

- (3a) Some Athenian is big. (A is B for some A)
 (3b) All Athenians are Greeks. (A is G for all A)

This view treats the subject and the predicate symmetrically and allows the inversion of the expression for certain inference rules (*Some big person is Athenian, Some Greeks are Athenians*). However, this view was criticized since (i) the symmetry does not hold with negation, (ii) there is no simple way to describe sentences with singular terms, and (iii) multiple quantification, as in *Every Athenian hates some king*, is not possible.

Frege's new view is based on the concept of the *atomic sentence*, which consists of a functor and an argument: *F(a)*. Singular (or atomic) sentences like (4a) are represented by the application of the predicate to the argument, while general sentences are represented by complex sentences with quantifiers as in (4b):

⁵ Chafe (1976, 29), who uses the term *cognitive* instead of *epistemological*, lists several non-linguistic notions of subject: "But it might also be held that the grammatical subject performs some sort of cognitive function. Perhaps it is a conditioned stimulus (...), the figure of a figure-ground relation or an 'interest-object' (...), the 'conceptual focus' (...), the most prominent or important element in the sentence (...), the focus of attention (...) and so on. Perhaps some of these characterizations are more appropriate to the psychological than the grammatical subject, and perhaps, in fact, the grammatical subject is only a syntactic phenomenon, lacking in cognitive significance altogether. The only thing that seems clear is that the syntactic considerations (or at least some of them) are easier to sort out and agree on. The cognitive considerations lead us into a morass of uncertainty from which psychological experiments have not yet, at least, succeeded in extricating us."

- (5) Frege's view of the logical and ontological structure of a sentence
- | | |
|---|---|
| (i) traditional description | subject-predicate |
| (ii) Frege's logical form
corresponds to | argument-function
singular term-general term |
| (iii) ontological type | saturated-unsaturated |
| (iv) extension | individual-class of individuals |

It was only Frege's definition of the sentence structure as function-argument structure that gave the fundamental semantic definition of a sentence. Since this definition is not dependent on syntax, pragmatics or psychology, semantics was able to establish its own research domain.

To sum up, subject and predicate are useful descriptive terms for describing sentence structure. However, there is no clear definition of these concepts, but rather a bundle of historically related claims from as different fields as syntax, epistemology, logic, and metaphysics. In particular, the Aristotelian concept of subject-predicate in grammar has created more problems than it has solved. These two points, the vagueness of the notion of the subject-predicate structure, and its highly problematic use in linguistic theory, should be borne in mind when this concept is transferred to or used in other domains such as psychology or information theory. In other words, it does not help the understanding to apply the notion of subject-predicate at any level, but it rather adds more confusion.

3.1.2 The early psychological model: Hermann Paul

During the course of the last century, psychology became the epistemological basis for linguistics. Hermann Paul's "Prinzipien der Sprachgeschichte" is not only one of the most influential books on general linguistics, but also one of the nicest examples of the influence of psychological theory on general linguistics and linguistic foundations. Since the first edition of the Prinzipien from 1880, there were repeatedly new editions, which however did not change the overall view of Paul's system.

Paul (1880, 121) defines the sentence as the linguistic expression that connects several (psychological) concepts or groups of concepts in the mind ("Seele") of the speaker. Furthermore, the sentence is the tool to generate these concepts and their connection in the mind of the hearer:

Der Satz ist der sprachliche Ausdruck, das Symbol dafür, dass sich die Verbindung mehrerer Vorstellungen oder Vorstellungsgruppen in der Seele des Sprechenden vollzogen hat, und das Mittel dazu, die nämliche Verbindung der nämlichen Vorstellungen in der Seele des Hörenden zu erzeugen.

In his extensive discussion of sentence structure, Paul (1880, ch. 15-16) introduces most of the relevant aspects of the relation between the psychological subject-predicate structure and the grammatical subject-predicate structure:

- (6) The main aspects of Paul's conception of sentence structure
 - (i) the psychological fundamentals of linguistics
 - (ii) the partition of the sentence into two parts
 - (iii) the question test as criteria for thematicity
 - (iv) the observation that thematic structuring can even effect one single semantic component of a word
 - (v) the relation between thematic structure and intonation
 - (vi) the Thematic progression
 - (vii) the treatment of neutral elements with respect to the thematic structure
 - (viii) the discourse anchoring of thematicity

(i) The psychological fundamentals of linguistics

The terms *psychological subject* and *psychological predicate* had been introduced by von der Gabelentz (1869), who compared the sequence of thoughts or psychological concepts with the sequence of linguistic expressions in a sentence. He then distinguished two levels: the grammatical level and the psychological level of composition. Von der Gabelentz defines the psychological subject as "that about which the hearer should think", and the psychological predicate as "that what he should think about".⁸ It is interesting to note that the distinction between the two parts is defined with respect to the mental or cognitive state of the hearer. Paul (1880, 263) adopted the terminological distinction easily, since he conceives every grammatical category on the basis of a psychological one: "Jede grammatische Kategorie erzeugt sich auf Grundlage einer psychologischen."

(ii) The partition of the sentence into two parts

One of the main assumptions of Paul is that the sentence is divided into (at least) two parts. Paul (1880, 124) says that each sentence consists of at least two elements. These elements are not equal but differ in their function. They are termed *subject* and

⁸ Von der Gabelentz (1869, 378): "Was bezweckt man nun, in dem man zu einem Andern etwas spricht? Man will dadurch einen Gedanken in ihm erwecken. Ich glaube hierzu gehört ein Doppeltes: ersten, daß man des anderen Aufmerksamkeit (sein Denken) auf etwas hinleitet, zweitens, daß man ihn über dieses Etwas das und das denken läßt; und ich nenne das, woran, worüber ich den Angeredeten denken lassen will, das psychologische Subject, das, was er darüber denken soll, das psychologische Prädicat." Compare also the quotation of Jespersen (1925) - cited in section 0.1 - where Jespersen translates a paragraph from von der Gabelentz (1901, 369) using the metaphor of a telegraphic apparatus.

predicate. These grammatical categories are based on a psychological relation. We have to distinguish between psychological and grammatical subject and predicate because they do not always coincide. But the grammatical relation is always formed on the grounds of the psychological relation.

Jeder Satz besteht demnach aus mindestens zwei Elementen. Diese Elemente verhalten sich zu einander nicht gleich, sondern sind ihrer Funktion nach differenziert. Man bezeichnet sie als Subjekt und Prädikat. Diese grammatischen Kategorien beruhen auf einem psychologischen Verhältnis. Zwar müssen wir unterscheiden zwischen psychologischem und grammatischem Subjekt, respektive Prädikat, da beides nicht immer zusammenfällt, wie wir noch im Einzelnen sehen werden. Aber darum ist doch das grammatische Verhältnis nur auf Grundlage des psychologischen aufbaut.

(iii) *The question test as criteria for thematicity*

The clearest test for the psychological predicate is the constituent question. As already quoted in section 1.6, Paul illustrates this with the simple assertion (7), which can be the reaction to the different questions (7a)-(7d). Depending on the question, the psychological predicate of the sentence differs, while the grammatical structure remains the same. In (7a) the psychological predicate is the locative *Berlin*, in (7b) it is the time adverbial *morgen*, and in (7d) it is the grammatical subject *Karl*:

(7)	Karl fährt morgen nach Berlin.	"Karl goes to Berlin tomorrow."
(7a)	Wohin fährt Karl morgen? Karl fährt morgen nach BERLIN.	"Where does Karl go tomorrow?"
(7b)	Wann fährt Karl nach Berlin? Karl fährt MORGEN nach Berlin.	"When does Karl go to Berlin?"
(7c)	Wie reist Karl nach Berlin? Karl FÄHRT morgen nach Berlin.	"How does Karl travel to Berlin?"
(7d)	Wer fährt morgen nach Berlin? KARL fährt morgen nach Berlin.	"Who goes to Berlin tomorrow?"

The question test is still one of the most fundamental tests for information structure. However, it is not clear whether the question test illuminates the information structure in its sentential or its discourse aspect. For Paul, who does not distinguish these two aspects, there is no difference between the *aboutness* and the *discourse anchoring* of the psychological predicate. In more recent approaches, the question test is generally associated with the *focus*, i.e. with the new information given in a discourse.

(iv) The observation that thematic structuring can even effect one single semantic component of a word

Paul notes that the thematic structure of a sentence can single out even a semantic feature of a word. In (7c), the corresponding question focuses on the mode of transportation; it is asked *how* Karl traveled to Berlin (walking, driving, riding, etc.), i.e. only one semantic feature of the verb of transportation is the psychological predicate. Although neither Paul nor other researchers have worked on this observation, it is very important. It shows that the thematic structure does not effect the expressions proper, but their parts. This observation should be kept in mind if a mapping from the surface form onto a level of information structure is assumed as in (2). The mapping, however, does not effect (only) words but must effect their lexical representation, which can consist of a complex of smaller elements. In other words, information structure is not only another way to organize the sequence of words in a sentence, but it is also a way to organize the smallest elements of the representation of sentences in a different way.

(v) The relation between thematic structure and intonation

Von der Gabelentz (1869) introduced the terms psychological subject and predicate in order to distinguish between the sequence of thoughts or psychological concepts and the sequence of linguistic expressions in a sentence. Paul used the terms, but interprets them differently, since he defines the psychological predicate not only by position or word order (as von der Gabelentz), but also by intonational signaling. The psychological predicate is separated most clearly from the rest of the units. It is the most important, and it contains the essential communicative content of the sentence. Therefore, it receives the strongest tone: "Am schärfsten von den übrigen Gliedern des Satzes sondert sich zunächst das psychologische Präd. ab als das wichtigste, dessen Mitteilung der Endzweck des Satzes ist, auf welches daher der stärkste Ton fällt" (Paul 1880, 283).⁹

(vi) The thematic progression

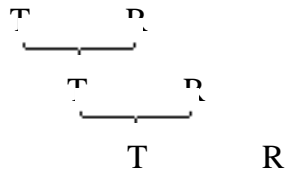
In cases where the whole sentence is new, Paul seems to suggest that the thematic relation is incrementally built up by processing the sentence bit by bit. For example,

⁹ Von der Gabelentz (1901, 376) claims the primacy of the psychological order or the element, and states that intonation (stress) does not play a role for word order: "Nicht die Betonung, sondern die psychologischen Subjects- und Prädicatsverhältnisse entscheiden über die bevorzugte Stellung der Satzglieder, und das seelische Verhalten, das sich in der Betonung äussert, hat mit jenem Verhältnisse nichts zu tun." Von der Gabelentz (1901, 373) observes that the psychological subject as the theme (in its non-technical sense) (also) receives emphasis: "Denn erstens ruht natürlich ein gewisser Nachdruck auf demjenigen Theile der Rede, der als ihr Thema vorangestellt wird, als auf dem psychologischen Subjecte."

sentence (7) uttered out of the blue (or as a reaction to the general question *What happened*) could be understood as having increasingly larger thematic domains:¹⁰

(8) Incremental thematic structure in a sentence

Karl fährt morgen nach Berlin



Thematic progression is generally associated with texts, but not with sentence internal structure. This, again, is an interesting remark that deserves some attention.

(vii) *The treatment of neutral elements with respect to the thematic structure*

Paul (1880, 293ff) discusses cases in which a linguistic expression belongs to neither the psychological predicate nor the psychological subject. They are neutral with respect to the thematic relation. He terms them *connection words* ("Bindeglieder"), and defines them as words that express a relation between two concepts. Such a word is not independent and therefore receives a secondary status. A typical instance is the copula, which defines the relation between subject and predicate.

(viii) *The discourse anchoring of thematicity*

Besides the question test (see (iii)), Paul (1880, 283) also mentions that the psychological subject is that part which is already known in a discourse. Since Paul does not distinguish between the sentential and the discourse aspect of information structure, he mixes both aspects.

To sum up, Paul discusses the notion of psychological structure vs. grammatical structure very informally. However, it was shown that he already recognizes most of the relevant aspects of information structure. In the course of this chapter it will be illustrated that even most of the more recent theories do not overcome the informality of Paul's presentation. For if they were more explicit, they would have to acknowledge that the basic concepts like subject-predicate are not linguistically well defined.

¹⁰ This particular point is discussed in Eroms (1986, 6).

3.1.3 The communicative model

At the beginning of this century, the interest in the communicative (or social) function of language had increased, which was most obviously manifested in the "Cours de linguistique générale" of Ferdinand de Saussure (1916). The meaning of a sentence is evaluated with respect to its contribution to the communication between the participants.

For example, Ammann (1928, 2) focuses on two points: first that a sentence is primarily a message ("Mitteilung"). Due to its nature, a message consists of two parts, which closely correspond to the sentence organization into subject and predicate.¹¹ Ammann then argues that the informational structure of the message is the basis for dividing the grammatical structure into subject and predicate, rather than assigning primacy to the dichotomy of psychological subject and predicate. Thus, he notes that it is not important that psychological structure does not always coincide with the grammatical structure, but what counts is that it is the information unit that causes the dichotomy of subject and predicate.

Daß psychologisches und grammatisches Subjekt, psychologisches und grammatisches Prädikat nicht immer zusammenfallen, ist unwesentlich; worauf es allein ankommt, ist, daß der Begriff der Mitteilung an sich schon auf etwas hindeutet, wovon die Rede ist (Subjekt) und auf etwas, was davon gesagt wird (Prädikat) — auf Gegenstand und Inhalt der Mitteilung. (Ammann 1928, 2)

In order to distinguish between the grammatical structure of the sentence, the psychological structure of concepts or ideas, and the informational structure of the message, Ammann introduces a new pair of terms: *theme* and *rheme* ("Thema" and "Rhema"). Rheme is borrowed from the Greek grammatical tradition, where it refers to the verb, in contrast to *onoma* which refers to the name or subject. Ammann (1928, 3) concludes that these terms do not carry any connotations since the classical concepts are only used in the Latin translations.

Auf einen früher von mir eingeführten Ausdruck zurückgreifend, werde ich den Gegenstand der Mitteilung im Folgenden gelegentlich auch als 'Thema' bezeichnen; das Neue, das was ich dem Hörer über das Thema zu sagen haben, könnte man entsprechend mit dem (scheinbaren) Reimwort 'Rhema' belegen. Da der antike Gegensatz ὄνομα — ῥήμα uns nur in der lateinischen Übersetzung geläufig ist, scheint mir diese Neuerung terminologisch unanstößig zu sein.

Thus, Ammann refers with theme and rheme to the ontological structure of the message that is conveyed by the sentence. Eventually, Ammann (1928, 123ff) introduces an additional cognitive level of structure in his theory of judgment for

¹¹ Ammann (1928, 2): "Und in der Tat läßt sich aus dem Begriff der Mitteilung heraus auch eine Deutung jener Zweiheit gewinnen, die wohl am engsten mit dem Begriff des Satzes zusammenhängt: der Zweiheit von Subjekt und Prädikat — wie dies zuerst wohl G. von der Gabelentz getan hat."

which he uses another pair of terms borrowed from the Greek tradition: *hypokeimenon* and *kategoroumenon*. Both terms were used in grammatical theory and translated into Latin as *subject* and *predicate*.

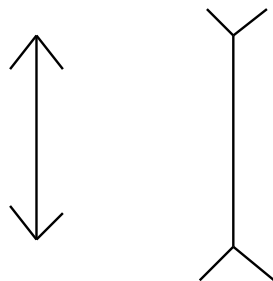
Ammann and others have recognized that the sentence is organized not only by syntactic structure, but also by other principles. However, they were unable to locate this organizational level in linguistic theory proper. Instead they referred to other fields like psychology and information theory. One reason may have been that semantics as a proper subfield of linguistics was not yet established. It was only the work of Frege, Russell, Carnap, Montague and their followers that established semantics as one of the core disciplines of linguistics with independent levels of representations, abstract objects, and rules operating on them.

3.1.4 Linguistics, psychology, and information structure

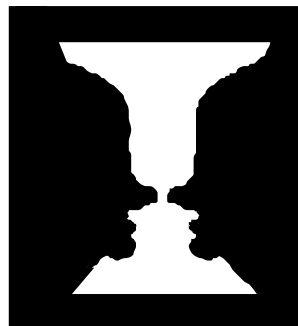
In the course of the last century, the syntactic definition of the sentence became more elaborate. At the same time it became obvious that the syntactic description does not cover all aspects of sentence meaning. Differences in the presentation of the sentence content were attributed to an underlying psychological structure (as the contemporary epistemological basis for language function). The meanings of words were assumed to be psychological concepts or mental ideas, and sentence meaning was understood in terms of operations on those ideas. In particular, the dichotomy of the sentence was understood as expressing a dichotomy of mental ideas. If conjoined they would yield the content of the sentence as their product.

One important movement in psychology was the so-called *Gestalt theory*. According to this school, perception functions as a whole gestalt and not by constructing something out of small units. The gestalt perception includes two different parts: *figure* and *ground*. The figure is recognized only against the ground, which is the principle for many optical illusions as in (9), where one and the same stimulus (the line) is perceived differently depending on the ground. In (10), one and the same stimulus is structured differently into figure and ground, giving rise to two ways of conceiving it. Here, we can either see a chalice or two faces, but not both at the same time.

(9)



(10)



Another feature of Gestalt theory is the direct relation between stimulus and perception. There is no intermediate level of representation. Even though Gestalt theory was mainly developed on vision, it was also used for the explanation of other perceptual channels, such as speech. Thus the idea of the dichotomy of the sentence organization not only found additional support in this psychological movement, it also inherited the terms *figure* and *ground* from it. The figure represents the prominent or highlighted part, while the ground represents the given or less informative material of the sentence. The idea of a direct correspondence between stimulus and function was instantiated by the direct correspondence between intonational highlighting and communicative highlighting.

Later, communication and information theory replaced psychology as the epistemological background for linguistic research.¹² Sentences are analyzed with respect to their communicative functions. However, the dichotomy of figure and ground was adopted and the idea of highlighting and of the direct relation between intonational prominence of an expression and its information content were inherited from the earlier psychological treatments. This one-to-one relation is assumed without any more abstract level or representation. Hirst & Di Cristo (1998, 28ff) summarize the situation and draw the connection to the Prague School as follows:¹³

¹² Another more recent epistemological basis for linguistics is the theory of databases, which are held, for example, by Blok (1991, 156): "So, if the topic-focus partition is not the distinction between what is semantically presupposed and what is not, nor the distinction between 'old' and 'new' information in a more pragmatic sense, what kind of function does it have? I think it should be stated in terms of **search-strategies** rather than in terms of information content. The databases of my conversational partner and me are conceivably rather big, if I state something, there are two possibilities: either I assume that my partner does not have any opinion on the matter, or I assume that he or she has one opposed to mine. In the latter case, I will help my partner to find this opinion opposed to my utterance in his or her database by means of intonation, sentential construction, or in general by means of the topic-focus articulation."

Compare also the recent volume *Focus: Linguistic, Cognitive, and Computational Perspectives* by Bosch & van der Sandt 1999, where the computational processing is stated as an additional background interest.

¹³ The concept or the metaphor of *figure-ground* is very pervasive in several disciplines such as linguistics and philosophy, to name only the most relevant for this study:

Givón (1982, 128) uses it for describing his understanding of language: "The central fact that epistemology must eventually contend with, I believe, is the rise of temporary, illusive but nevertheless 'real' islands of relative firmament and order out of the inherently chaotic universe of experience. Ultimately, I believe, figure-ground pragmatics – the idea that the picture is stable and 'real' only as long as the frame remains fixed – must play a central role in such an enterprise."

Reinhart (1984, 779) explains the structure of narration with this concept: "The distinction between foreground and background in narrative has for its counterpart the figure-ground distinction proposed in gestalt theory."

Dretske (1972, 411) uses this metaphor in his description of contrastive focus (see also section 6.2 for the context): "What distinguishes contrastive statements is that they embody a dominant contrast, a contrastive focus, a featured exclusion of certain possibilities. Something similar to a figure-ground distinction is at work in these statements."

The basic idea behind all work in this area is that communication takes place against a background of shared knowledge so that the way a listener interprets an utterance will be partly dependent on the (situational) context in which the utterance occurs.

This idea follows a more general principle which had been proposed in the beginning of the century by the Czech psychologist Wertheimer [1886-1943], one of the founders of the Gestalt School of psychology, according to which the perception of a stimulus, particularly in the case of vision, generally consists of attributing a structure in which one part of the stimulus, called the **figure**, seems to stand out against the rest of the stimulus, called the **ground** (...). Under different conditions, the same stimulus can be structured differently into figure and ground, giving rise to a number of familiar optical illusions.

The first person to apply a similar idea to language was another Czech, the linguist Mathesius [1882-1945], founder of the Prague Linguistic Circle, whose theory of **Functional Sentence Perspective** was taken up and developed by other linguists of the Prague School such as Daneš and Firbas." (...)

3.2 Classical models of information structure

3.2.1 The Prague School

At the end of the last century the psychological foundation of sentence structure led to an additional level of descriptions for the organization of the sentence using contrasts like *psychological subject* and *psychological predicate* (von der Gabelentz 1869). Paul (1880) developed this contrast and Ammann (1928) shifted the point of interest from psychology to communication and introduced the terms *theme* and *rheme*. At the same time, Mathesius (1929) used these terms for describing word order phenomena in Czech and other Slavic languages. Unlike the approaches discussed so far, the Prague School integrated the distinction between theme and rheme into the grammatical system. The most characteristic feature of the Prague structuralists, in contrast to other structuralist schools, was the functional approach. Language is understood as a tool for communication and the information structure is important for both the system of language and for the process of communication.¹⁴

And finally Caffi (1997, 437) employs this notion to illuminate the structure of presupposition (see section 6.4 for the full quotation): "In order to clarify the concept of presupposition, some authors have compared speech with a Gestalt picture, in which it is possible to distinguish a ground and a figure. Presuppositions are the ground; what is actually said is the figure.

¹⁴ There is, however, a certain connection between a psychological and a purely communicative and linear ordering. The psychological subject is often identified with the "just-heard", while the psychological predicate is identified with the "expected" (von der Gabelentz 1901, 369): "Offenbar ist es dies, dass ich erst dasjenige nenne, was mein Denken anregt, worüber ich nachdenke, mein psychologisches Subject, und dann das, was ich darüber denke, mein psychologisches Prädicat, und dann wo nöthig wieder Beides zum Gegenstande weiteren Denkens und Redens mache."

Mathesius reformulates the contrast between the grammatical subject-predicate and the organization of the message of a sentence in his *functional sentence perspective*. Weil (1844) had already noted that the sequence of words and the sequence of thoughts do not always correspond. Thus, Mathesius working on word order in Slavic languages proposes the *thematic structure* of a sentence as a linguistic level of analysis, which is independent of the subject-predicate relation. The functional sentence perspective was further developed by a series of researchers. Firbas (1964), argues that information structure is not a dichotomy but rather a whole scale, or hierarchy, or what he calls *communicative dynamism*. Similar scales were later developed under the headings of *Scale of Familiarity* (Prince 1981), the *Givenness Hierarchy* (Gundel & Hedberg & Zacharski 1993) or the *Accessibility Marking Scale* (Ariel 1990).

Daneš (e.g. 1970) extends the thematic relation of the sentence to one of a text, and the newer Prague School (Sgall & Hajičová & Benešová 1973) and Sgall & Hajičová & Panevová (1986) uses the contrast of *topic* and *focus* and gives an account of how to integrate this structure into a grammatical model. Peregrin (1995) attempts a formalization of the topic-focus articulation in terms of structured proposition and dynamic logic. Hajičová & Partee & Sgall (1998) give a comparison between the Prague School and the semantic tradition since Montague. It was Halliday (1967b) who introduced the Praguian distinction of theme and rheme into American structuralist linguistics (see next section).

For lack of space, I cannot present an adequate discussion of the Praguian theory of functional sentence perspective of the topic-focus-articulation. Excellent overviews and comparisons with contemporary grammatical theory are presented in Sgall & Hajičová & Benešová (1973), Sgall & Hajičová & Panevová (1986) and Hajičová & Partee & Sgall (1998). Here, only two aspects should be touched upon: first the two sides of information structure, the sentence internal aspect and the textual aspect; and second the extension of the theme-rheme structure to texts.

Daneš (1970, 134) describes the two faces of information structure or what he calls "utterance organization" or "utterance perspective":

- (1) Taking for granted that in the act of communication an utterance appears to be, in essence, an enunciation (statement) about something (question should be treated separately), we shall call the parts THEME (something that one is talking about, TOPIC), and RHEME (what one says about it, COMMENT).
- (2) Following the other line, linking up utterance with the context and/or situation, we recognize that, as a rule, one part contains old, already known or given elements, functioning thus as a 'starting point' of the utterance, while the other conveys a new piece of information (being thus the 'core' of the utterance). But, as in most cases, the two aspects coincide, we shall, in our following discussion, disregard the said distinction.

Daneš (1970, 137f) notes that the two aspects are not independent, since one can extend the idea of the topic of a sentence to the discourse. He introduces three ways sentential topics can be concatenated in a discourse: (i) simple linear progression as in (11), a progression with a continuous theme, and (iii) the exposition of a split theme.

(11) simple linear progression of a theme

T₁ R₁

T₂ (= R₁) R₂

T₃ (= R₂) R₃

...

In the simple linear progression (11), the rheme of the first sentence becomes the theme of the following sentence and so on. This progression is suspiciously similar to Paul's incremental development of the theme in the sentence in example (8) above.

3.2.2 Halliday and the American structuralists

While the Praguian approach builds information structure into the grammatical system in the syntax-semantics interface, Halliday postulates an independent level for information structure. He is in fact the first who uses the term *information structure* and establishes an independent concept of it. His main preoccupation was to account for the structure of intonation in English. Since phrasing does not always correspond to syntactic constituent structure, Halliday (1967b, 200) postulates a different structural level as the correlate to phrasing (his "tonality"):

Any text in spoken English is organized into what may be called 'information units'. (...) this is not determined (...) by constituent structure. Rather could it be said that the distribution of information specifies a distinct structure on a different plan. (...) Information structure is realized phonologically by 'tonality', the distribution of the text into tone groups.

The utterance is divided into different tone groups, which are roughly equivalent to intermediate phrases. These phrases exhibit an internal structure. Analogously, Halliday assumes two structural aspects of information structure: the informational partition of the utterance, and the internal organization of each informational unit. He calls the former aspect the *thematic structure* (theme-rheme) and the latter aspect is treated under the title *givenness*. The thematic structure organizes the linear ordering of the informational units, which corresponds to the Praguian view of theme-rheme (or topic-comment, or topic-focus) and is organized according to the principle of aboutness. The theme refers to that informational unit that comprises the object the

utterance is about, while the rheme refers to what is said about it. Halliday assumes that the theme always precedes the rheme. Thus theme-rheme are closely connected with word order, *theme* being used as a name for the first noun group in the sentence, and theme for the following:¹⁵ "The theme is what is being talked about, the point of departure for the clause as a message; and the speaker has within certain limits the option of selecting any element in the clause as thematic." (Halliday 1967b, 212). This is the aspect that is determined by the "ontological structure" of the message as described by Ammann (see above).

The second aspect refers to the internal structure of an informational unit, where elements are marked with respect to their discourse anchoring: "At the same time the information unit is the point of origin for further options regarding the status of its components: for the selection of point of information focus which indicates what new information is being contributed" Halliday (1967b, 202). Halliday calls the center of informativeness of an information unit *information focus*. The information focus contains new material that is not already available in the discourse. The remainder of the intonational unit consists of given material, i.e. material that is available in the discourse or in the shared knowledge of the discourse participants. Halliday (1967b, 202) illustrates the interaction of the two systems of organization with the following example (using bold type to indicate information focus; // to indicate phrasing). Sentence (12a) contrasts with (12b) only in the placement of the information focus in the second phrase. The phrasing, and thus the thematic structure, is the same. On the other hand, (12a) contrasts with (12c) in phrasing, but not in the placement of the information focus. However, since the information focus is defined with respect to the information unit, the effect of the information focus is different.

(12a) //**Mary**//always goes to **town** on Sundays//

(12b) //**Mary**//always goes to town on **Sundays**//

(12c) //**Mary** always goes to //**town** on Sundays//

Phrasing and its correlate thematic structure is independent of information focus: "But the interpretation of information focus depends on where it is located relative to the information unit, so that it is the distribution that partially determines the focus and not the other way round" (Halliday 1967b, 202).

Halliday's information structure is the most explicit system with very close connections to the intonational features: Intonational phrasing is correlated with informational units which are organized by the thematic structure. Pitch accents are the nuclei of the tone

¹⁵ Here as in the case discussed for Paul, it is not clear how to define information units in terms of theme and rheme if there are more than two. Furthermore, it is not clear whether a definition of theme in terms of information structure *and* in terms of linear precedence makes sense. It seems rather that linear precedence is sufficient.

groups, and they mark the informational foci of the informational units. Informational foci indicate the givenness of the expression with respect to the discourse. Halliday's system consists of different levels that are all related by one-to-one relations, as illustrated in (13):

- (13) Halliday's system of intonation and information structure
- | | | |
|-------------------|---|----------------------------------|
| * | * | <i>pitch accent</i> |
| // Mary // | always goes to town on Sundays// | <i>phrasing</i> |
| [Mary] | [always goes to town on Sundays] | <i>theme-rheme</i> ("aboutness") |
| [Mary] | [..... town] | <i>information focus</i> |
| [Mary] | [..... town] | <i>new</i> ("discourse |
| [.....] | [always goes to on Sundays] | <i>given</i> anchoring") |

Halliday does not connect the sentence perspective with the discourse perspective, even though he makes some vague comments on it:

The difference can perhaps be best summarized by the observation that, while 'given' means 'what you were talking about' (or 'what I was talking about before'), 'theme' means 'what I am talking about' (or 'what I am talking about now'); and, as any student of rhetoric knows, the two do not necessarily coincide. (Halliday 1967b, 212)

The main progress initiated by the work of Halliday is the assumption of an independent level of information structure. This structure is closely related to the discourse and assigns the features *given* or *new* to the expressions in a sentence. However, what was still not solved is the definition of given vs. new. Halliday (1967b, 211) himself defines "given" information as being treated by the speaker as "recoverable either anaphorically or situationally". New information, on the other hand, is characterized by at least three formulations: (i) "new" information is said to be focal "not in the sense that it cannot have been previously mentioned, although it is often the case that it has not been, but in the sense that the speaker presents it as not being recoverable from the preceding discourse" or (ii) new information is "contrary to some predicted or stated alternative", or (iii) new is what is "replacing the WH-element in a presupposed question", as illustrated in the examples (14)-(16), respectively:

- (14) A. Why don't you have some French TOAST?
B. I've forgotten how to MAKE French toast.
- (15) (John's mother voted for BILL.)
No, she voted for JOHN.
- (16) Who did John's mother VOTE for?
She voted for JOHN.

These three characterizations of *new* suggest three different kinds of focus, as in (17):

- (17) Three kinds of focus
- | | |
|----------------------|----------------------------|
| (i) informative | in assertion/addition |
| (ii) contrastive | in assertion/contradiction |
| (iii) focus-question | in question/answer pairs |

Since it is not clear whether there is one coherent definition of *new* or of *focus*, it seems more plausible to find a definition of *given* (cf. Schwarzschild).¹⁶ Halliday himself relates givenness to "anaphorically recoverable".

There have been other directions in which the concept of givenness was characterized. For example, Chafe (1976) and others reinterpreted the givenness of Halliday as a cognitive or psychological category which is applied to the objects in the mental states of the speakers. Another direction is represented by Chomsky (1971) and Jackendoff (1972), who replaced the concept of given-new by presupposition-focus. The notion of presupposition was already a basic concept in semantics even though not fully understood. In the next two subsection, both positions are briefly reviewed.

3.2.3 Chafe on givenness

In his seminal paper *Givenness, Contrastiveness, Definiteness, Subjects, Topics, and Point of View*, Chafe (1976) discusses aspects – or "statuses" as he calls them – of nouns. Chafe is interested in the way discourse is structured. He assumes that discourse is organized according to the beliefs of the speaker about the beliefs of the hearer, rather than according to the semantic content of linguistic expressions. Chafe (1976, 28) illustrates this with the famous metaphor of "information packaging":

I have been using the term *packaging* to refer to the kind of phenomena at issue here, with the idea that they have to do primarily with how the message is sent and only secondarily with the message itself, just as the packaging of toothpaste can affect sales in partial independence of the quality of the toothpaste inside.

Our starting point, then, is that the packaging phenomena relevant to nouns include the following: (a) the noun may be either *given* or *new*; (b) it may be a *focus of contrast*; (c) it may be *definite* or *indefinite*; (d) it may be the *subject* of its sentence; (e) it may be the *topic* of its sentence; and (f) it may represent the individual whose *point of view* the speaker is taking, or with whom the speaker empathizes.

¹⁶ Thus, Schwarzschild (1997, 2) suggests a uniform approach in the vein of Halliday with a new definition, in which only the notion of *given* is defined, while the notion of *new* is understood as being the complement: "I submit therefore that the grammar makes reference to givenness and includes the statement in (4a) but no mention is made of novelty, hence there is nothing like (4b):

- (4a) Lack of focus indicates givenness
 (4b) Focus indicates novelty

Chafe extends Halliday's givenness into psychological models of the consciousness of speaker and hearer:

Givenness. What is it? The key to this distinction is the notion of consciousness (...). Given (or old) information is that knowledge which the speaker assumes to be in the consciousness of the addressee at the time of the utterance. So-called new information is what the speaker assumes he is introducing into the addressee's consciousness by what he says. (Chafe 1976, 30)

This definition of information structure is very similar to the definition of *psychological structuring* of von der Gabelentz (see above section 2.3.1 (i)). Chafe (1976, 30) himself notes that although this use of *given* and *new* is often misleading and a different use such as "activated" would be more appropriate, he will continue to use the old pair: Terms like "already activated" and "newly activated" would convey this distinction more accurately, but are awkward; we will probably have to live with the terms "given" (or "old") and "new."

The important move Chafe takes is that information structure is to be taken into the realm of psychology or psychological sentence and discourse planning. That is, the additional organization of the sentence is explained with respect to the conditions of the participants' minds. This throws us back to the positions of the early models of information structure, with all the relevant criticisms.

Chafe's view of givenness, as a kind of activation in the consciousness of the speaker and hearer, opens the discussion for a scale of givenness. Since the activation can be higher or lower and it can die away, a continuum of activation or givenness seems more appropriate. And in fact, research in this direction has proposed several such givenness hierarchies, like the *Scale of Familiarity* (Prince 1981), the *Givenness Hierarchy* (Gundel & Hedberg & Zacharski 1993) or the *Accessibility Marking Scale* (Ariel 1990).

Prince (1981; 1986, 208) picks up Chafe's packaging idea and states that speakers tailor sentences in various ways to (their assumptions about) their interlocutors or, in more detail:

Information in a discourse does not correspond simply to an unstructured set of proposition; rather, speakers seem to form their utterances so as to structure the information they are attempting to convey, usually or perhaps always in accordance with their beliefs about the hearer: what s/he is thought to know, what s/he is expected to be thinking about.

The idea of information packaging was further developed by Vallduví (1990), who assumes an information structure that consists of three parts merging the most prominent aspects of information structure into one: focus-background and topic-comment. The question (18) introduces *John* as a topic and focuses on the object that

John drinks. The predicate *drink* is both part of the comment as well as part of background in (19). Vallduví (1990, 55) proposes the structure (20) corresponding to his information structure in (21). He proposes a main partition into *focus* and *ground* (corresponding to the notion of focus-background), and a second partition of the ground (background) into *link* and *tail* (topic and the rest of the background), yielding his three informational units: *focus*, *link* and *tail*.

(18) What does John drink?

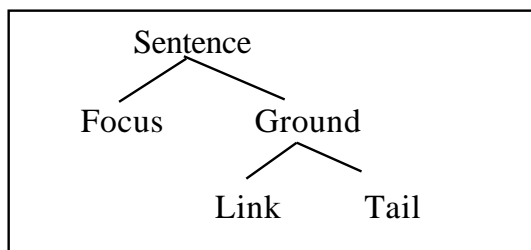
(19) Topic-comment and focus-background structure

topic	comment	
<i>John</i>	<i>drinks</i>	<i>beer</i>
background		focus

(20) Information packaging (Vallduví)

link	tail	focus
<i>John</i>	<i>drinks</i>	<i>beer</i>

(21) Information structure as focus-link-tail



Like Chafe and Prince, Vallduví describes the situation very informally using, for example, Heim's metaphor of file cards, but he does not attempt to give a semantic analysis of the phenomena presented.¹⁷ Vallduví (1990, 2) claims that information packaging does not effect truth conditions: "While their propositional contents are the same, they do not provide the same INFORMATION (...)." However, he does not give a clear account of what he means by information.

¹⁷ Asher (1997, 29) comments on this: "Vallduví's ideas are very suggestive and I think propitious for a general analysis of these notions. But many questions arise when one considers his analysis. What is this file cabinet information structure? Is it to be a model of discourse content (and the truth conditions of a discourse) or is it distinct? Vallduví suggests that it is distinct. But then, what is its role?"

In discussing contrastiveness, Chafe makes some interesting remarks on the semantics of contrastive focus, which he distinguishes from information focus expressed by the contrast of given-new. The contrastive focus on *Ronald* in sentence (22) conveys "the speaker's knowledge that Ronald, as opposed to other possible candidates the addressee might have had in mind, is the right selection for this role" (Chafe 1976, 33). Chafe lists three factors that are involved in the interpretation of this sentence: (i) the shared assumption or background knowledge that someone made the hamburgers; (ii) a set of possible candidates, and (iii) the assertion of which candidate is the correct one.

- (22) RÓNALD made the hamburgers.
- (i) background: someone made the hamburgers
 - (ii) set of possible candidates: {Bill, John, Max, Ronald, Tom,...}
 - (iii) assertion: Ronald is the one who made the hamburgers

Chafe's conception of contrastive focus is similar to Chomsky's description of information structure in terms of presupposition and focus.

3.2.4 Chomsky on focus and presupposition

Chomsky (1971, 199ff) discusses information structure in the context of his distinction between deep structure and surface structure. It is the deep structure that determines the meaning of a sentence. However, if it can be shown that intonational contrasts, which only effect the surface, exhibit systematic meaning contrasts, then the model is threatened. Even though Chomsky does not give a final answer, he discusses several examples and some approaches to describe them. What should be of interest here is his treatment of the contrast given-new, or in his terms: presupposition-focus. Focus is defined "as the phrase containing the intonation center" (Chomsky 1971, 200).

In a first approach Chomsky explains the focus-presupposition dichotomy in the following way. (24) is a reasonable answer to (23a)-(23d), all of which have the presupposition that John writes poetry somewhere. The presupposition is informally described as that part of the sentence that is conveyed independently of the speech act or the negation made in the sentence. The presupposition corresponds to the sentence minus the focus element. Chomsky proposes the deep structure (25) for (24), in which the presupposition is the embedded sentence and the focus is part of the matrix predicate *is in the garden*.

- (23a) Does John write poetry in his STUDY?
- (23b) Is it in his STUDY that John writes poetry?
- (23c) John doesn't write poetry in his STUDY.
- (23d) It isn't in his STUDY that John writes poetry

- (24) No, John writes poetry in the GARDEN.
- (25) [the place where John writes poetry] [is in the garden]
presupposition: John writes poetry at a place
focus: garden

Chomsky (1971, 205) informally describes the construction of such a deep structure: "The focus is the phrase containing the intonation center, the presupposition, and the expression derived by replacing the focus by a variable." Then in a quasi formalization, he proposes to associate each sentence with a class of pairs (F, P) where F is a focus and P a presupposition indicating the range of possible interpretations. Since the function of focus is to "determines the relation of the utterance to responses, to utterances to which it is a possible response, and to other sentences in the discourse", the range of possible interpretation can do so. For example, (24) is a proper answer to (23a) since they share the same presupposition that John write poetry at some place.

Even though Chomsky is not very explicit in his description of focus – he is more interested in the relation between surface structure and deep structure – he assumes like Halliday that focus is intonationally marked. In contrast to Halliday Chomsky (1971, 205) makes the claim that the interpretation of focus is to be integrated into semantics proper:

The notions 'focus', 'presupposition', and 'shared presupposition' (...) must be determinable from the semantic interpretation of sentences, if we are to be able to explain how discourse is constructed and, in general, how language is used.

Chomsky's very general view of focus in generative grammar was developed into a semantic theory by Jackendoff (1972), Höhle (1982) and others. Jackendoff's account will be the basis of the semantic theories of focus presented in chapter 4.