

PAUSE AND THE PHONOLOGICAL PHRASE IN ENGLISH

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0. Introduction

In the past many linguists have made reference to phonological units larger than the segment or the word. Chomsky and Halle identify the phonological phrase as the maximal domain of phonological processes (1968:60). Other linguists have proposed units which parallel the notion of the phonological phrase, among them: (1) the phonemic clause (Trager and Smith, 1951), (2) the tone group (Halliday, 1963), (3) the breath group (Lieberman, 1967), and the intonational unit (Schmerling, 1976). In all cases this unit has served some function, if only in the description of how strings of phonation are to be divided. The Chomsky and Halle phonological phrase and Schmerling's intonational unit are integral in the authors' formulations of stress assignment rules. Despite this, adequate definitions of these units have been lacking, in some cases explicitly left to later research or other researchers.

One possibility for delimiting the phonological phrase is the pause; that is, the interruption of phonation. This notion is not new. Trager and Smith (1951) and Lieberman (1967) make use of this concept. However, these works are largely descriptive. One can easily notice, and it is especially salient in the reading aloud of texts, that the insertion of pauses during speech can be very important to 'grammatical' production. Granting the assumption that pause demarcates phonological phrases, the mechanism for determining where pauses may grammatically occur will provide a description of the phonological phrase.

This paper will examine relevant data in an attempt to discover what the important parameters of pause assignment are. Of primary interest is the fact that the surface syntactic component of a grammar will prove insufficient to this end. While a unified description of the pause phenomena cannot be provided here, the arguments against a solely syntactic approach point to some important facts which will need to be considered in any account of pause. This suggests an area where the different components of the grammar converge.

1.0 The pause

The pause has not been neglected in the literature. However, the major thrust of investigation has not been concerned with the theoretical aspects of where a person may pause in speech.

1.1 One body of researchers has been most interested in hesitation pauses in which phonation is interrupted by meaningless phonation, e.g. *er*, or silence. Hesitation pauses contrast with those to be examined in this paper in that their occurrence is not predictable and appears to have no grammatical function. Hesitation pauses indeed seem to render speech more discontinuous and include such phenomena as false starts.

Hesitation pauses have been linked to such psychological issues as cognitive functioning (Goldman-Eisler, 1958b), cognitive rhythm (Henderson, Goldman-Eisler, and Skarbek, 1965; Goldman-Eisler, 1967),

and the emotional state of the speaker (Goldman-Eisler, 1958a). The more regular pauses, which appear to have some grammatical function, have often been dismissed as occurring at major syntactic junctures (Goldman-Eisler, 1958a; Boomer and Dittmann, 1962).

1.2 Others have considered 'regular' pauses, the location of which may be predictable, more carefully. Trager and Smith base their phonemic clause on terminal juncture, generally the site of a pause (1951:49). Lieberman (1967) maintains that the breath group is the overt manifestation of the Trager-Smith phonemic phrase, an abstraction of the phonemic clause which excludes pitch and terminal juncture. Jones (1932) comments that the breath group typically encompasses an entire sentence, an observation echoed by Lieberman (1967) in his discussion of the characteristic scope of the unmarked breath group.

More interesting is the fact that pauses can occur internal to sentence boundaries. Jones characterizes phrases as 'the longest portions that can conveniently be said with single breaths' (1932:254). Data provided below indicate that this may not exactly be the case. Pike (1945) distinguished between pauses made sentence-internally and those made sentence-finally. Lieberman (1967) makes the same distinction by means of the marked breath group, which usually occurs sentence-internally, and the unmarked breath group, which terminates declarative, unemphatic sentences. The reason for the distinction seems to have no theoretical implications but is made solely on phonetic grounds.

Many investigators have commented on the correlation of pause sites with meaning. Pike (1945) claims that sentence-internal pauses add to the 'internal unity' of smaller units. Jones states that breath pauses are made when they are 'necessary or allowable from the point of view of meaning' (1932:254). Lieberman claims 'the breath group may delimit any constituent in the derived phrase marker' (1967:104), an assertion to be examined in the course of the present discussion.

1.3 What these characterizations lack is any concrete motivation for where the pauses may or may not occur. Indeed, although some regularities of pause location have been noted, at best the literature provides a cataloguing of possible locations (Cowan and Bloch, 1948; Henderson, Goldman-Eisler, and Skarbek, 1965). Nowhere is there speculation as to why certain locations are picked instead of others. The syntactic locations reported agree in large part with some I have observed through informal experimentation and introspection. Some of the more highly favored positions appear below. (Pause is indicated by '/')

(1) NP-VP

My little brother and I / went fishing yesterday. /

(2) Between conjoined categories

a. S-S

I went to the store / but I didn't buy any fruit. /

b. NP-NP

Santa Claus brought me socks, / underwear, / a sweater, /
and a subscription to Apartment Life. /

c. VP-VP

I ate a garbonzo bean quiche / and felt healthy for days. /

(3) Adverbial-NP

Naturally / I went home./

It was claimed above that pause placement can influence the 'grammaticality' or 'ungrammaticality' of an utterance. Two points warrant clarification: (1) most of the pauses to be discussed may be considered optional; (2) the number of pauses produced in an utterance is influenced by tempo. The faster the rate of speech, the fewer the pauses. For example, in very rapid speech, non-conjoined sentences may be produced in a single breath group.

(4) I don't know. What do you think?/

Therefore, of primary interest is the potential for 'grammatical' pause. Conversely, a sentence can be produced so slowly that a pause may occur after every word. Lieberman (1967) cites the following:

(5) The / cat / fell / off / the / roof./

Lieberman further states that the syllable may be the smallest unit that can be produced in one breath group (1967:113). Given the working hypothesis, this means that a single syllable might be taken as the maximal domain of phonological processes. Such data is rejected for this study because such a conclusion reduces the importance of the phonological phrase to zero in the description of a competence grammar.

Of more interest is a point between these extremes where one considers potential pauses which yield 'grammatical' utterances in the sense of sounding natural to native speakers of English. While (4) and (5) are not strictly speaking 'ungrammatical', they do strike native speakers as non-fluent and somewhat aberrant, at times quite unintelligible. Conversely, (1)-(3) are 'grammatical' based on this naturalness criterion. An 'ungrammatical' utterance would be (6).

(6) *She / never has friends over to dinner on Wednesdays./

The pause in (6) occurs at the NP-VP juncture, a permissible location as exemplified by (1). On the other hand, (7) is considered 'grammatical'.

(7) She never has friends / over to dinner on Wednesdays./

The reason for the 'ungrammaticality' (henceforth without quotation marks) will be discussed below. The example is given here to illustrate the concept of grammaticality to be used in what follows.

1.4 The task before us, then, is the motivation or description of those factors which determine the potential pause sites in sentences. Given a working assumption that the phonological phrase is determined by pauses, that unit of phonation between pauses, the phonological phrase will have the substance of being more than the performance whim of the speaker. Therefore, neither can the pause be considered a performance whim of the speaker.

2.0 Surface syntactic structure

According to Chomsky and Halle, the surface syntactic structure of a sentence feeds into the phonological component via readjustment

rules (1969:13). Therefore, phonological phrases should be determined by the surface syntax (60). This has been the assumption of many linguists and figures importantly in the formulation of the Nuclear Stress Rule. If the surface syntax is insufficient, at least the syntactic component will be able to insure that the NSR will work, either by including it in the cycle (Bresnan, 1971, 1972), or by means of derivational constraints (Lakoff, 1972). Given our working definition of the phonological phrase, the syntactic component should provide the information necessary for assigning pauses in utterances.

2.1 The first hypothesis which should be explored is that which follows from the Chomsky-Halle formulation, i.e. pause locations are determined by the surface syntactic structure. Exactly what form the rule of pause assignment may take needs to be clarified.

Examples (1)-(3) show that no one syntactic position will always attract a pause. For instance, the NP-VP site in (1) occurs in none of the other sentences. If this site were to occur as a pause location in (2c), the result would be strikingly unnatural.

(2c') *I / ate a garbonzo bean quiche and felt healthy for days. /

Likewise, although conjoined structures are often sites of pauses (as in (2)), inserting a pause between the conjoined NPs in (1) yields ungrammatical results.

(1') *My little brother / and I went fishing yesterday. /

It may be necessary, therefore, to state the rule which inserts pauses in terms of the probability of a certain site being chosen. An alternative might be the choice of a specific location depending on the construction in which it appears.

Bierwisch (1966), in developing a system for the assignment of intonation in German, assigns numerical boundaries depending on the depth of the syntactic break in the phrase marker. The higher the branching node, the lower the number assigned to the boundary; the lower the boundary number, the stronger the boundary ($S^{\#} = 0^{\#}$). Perhaps a system based on boundary strength will apply here. However, whatever the rule, the statement will be made in terms of surface syntactic structure.

2.2 Consider the following sentences:

- (8) The beliefs that lead to the witchhunts / existed long before the thirteenth century. / (Szasz, 1970:2)
- (9) Everything I know about this motorcycle / comes to me through my senses. / (Pirsig, 1974:122)
- (10) We have in our minds / an a priori motorcycle / which has continuity in space and time. / (Pirsig, p. 124)
- (11) Heresy was considered high treason / which was to have been committed against the divine majesty. / (Szasz, p. 1)

In (8) and (9) a pause occurs between the NP and VP of the matrix sentence. In (10) and (11) the head noun has been separated from its relative clause. In all four sentences there are relative clauses

with a constituent shape of $\begin{matrix} & NP \\ & / \backslash \\ NP & S \end{matrix}$. However, the sentences behave differently with regard to the insertion of pauses. In (8) and (9) the relative construction is in subject position; in (10) and (11) it is in object position. Perhaps a pause is inserted between the NP and S of a relative clause construction when it is immediately dominated by a VP node.

Such a formulation runs into difficulty when data such as (12) are considered.

(12) I ate beans that my brother cooked./

The best reading for (12) is one without a pause. However, there is a relative clause construction immediately dominated by a VP node. More compelling may be (13).

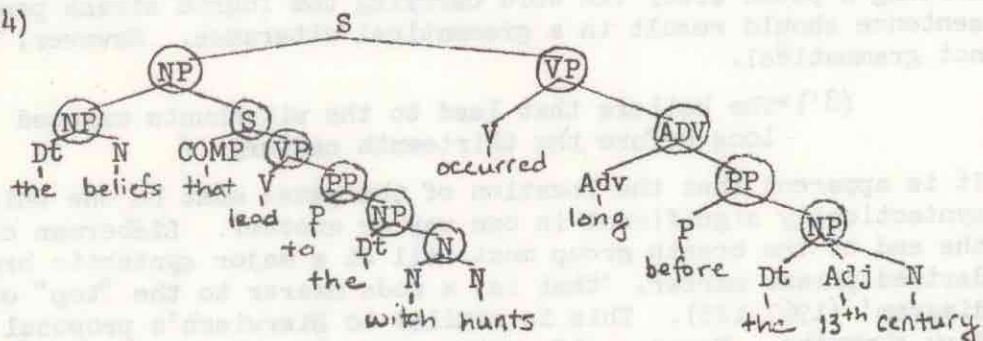
- (13) a. I ate beans that my brother cooked / and my sister threatened to throw away.
b. *I ate beans / that my brother cooked and my sister threatened to throw away.

In (13a) the pause may occur after cooked. Here the NP-S break in object position is skipped. When this position is chosen exclusively, as in (13b), the utterance is judged ungrammatical. Obviously, this position is not of primary importance in the selection of the pause location. It is true, however, that the NP-S site may be selected in (13) provided the pause remains following cooked.

2.3 What (8)-(11) and (13) have in common is the occurrence of a pause near the mid-point of a long sentence. Logically, this point may be considered in terms of the distance from the boundaries of the highest S node. How may this distance be measured? Possibilities include counting the number of syllables, stress peaks, or branching nodes. It also logically follows that since the pause occurs at the mid-point of the utterance, that the two resulting phonological phrases will be equal in terms of the number of units being counted, i.e. syllables, stress peaks, or branching nodes.

The branching node hypothesis deals with phenomena directly reflected in the surface syntactic structure. If pauses can be explained by equivalence of branching nodes in phrases, it will be unnecessary to abandon a surface syntactic explanation. Consider the surface syntactic structure of (8) provided in (14).

(14)



Counting the number of circled nodes in each phrase yields a 7:4 count. This count belies the effectiveness of this procedure. If instead, the number of syntactic breaks is considered, the count becomes 7:6. In this case the phrases are nearly equivalent. Of course, counting these breaks is tantamount to counting the number of words in each phrase. Such a system quickly breaks down if (11) is considered. There are five words in the first phrase and 10 in the second. So it seems that the purely syntactic approach will not work here.

3.0 Phonological considerations

As we have seen the hypothesis that surface syntactic structure will account for the pause phenomena has failed. What we need to do now is consider some phonological facts which prove relevant to the present discussion.

3.1 Stress-timing

3.1.1 It was suggested that counting syllables or stress peaks in phrases might provide a basis upon which to describe pause assignment. Because English has been described as a stress-timed language, one would expect the number of stress peaks per phrase to be more revealing than the number of syllables. The relevance of stress peaks to the rhythm of English prose has been noted by many investigators (Halliday, 1963; Martin, 1972). Halliday points out that the strong syllables (stress peaks) tend to occur at 'regular intervals...whatever the number of weak syllables, including zero, in between' (1963:6). In (8) there is a stress peak count of 3:4 and a syllable count of 9:11. In (11) the counts are 3:3 and 10:16, respectively. While there is near equivalency in the number of stress peaks per phrase, the same claim cannot be made for syllable count. A look at the other data considered thus far reveals that the equivalency allows a difference in stress peak count of ± 1 in the phrases of a sentence. A principle of phrase equivalency may be stated as in (15).

- (15) The number of stress peaks in the phonological phrases of a sentence exhibit a tendency to be equal, allowing a difference of ± 1 .

3.1.2 However, this principle will not be sufficient to predict where a pause will be assigned. The stress peak count of (8) was 3:4. According to (15) a count of 4:3 should also be admissible; therefore, inserting a pause after the word carrying the fourth stress peak of the sentence should result in a grammatical utterance. However, (8') is not grammatical.

- (8') *The beliefs that lead to the witchhunts existed /
long before the thirteenth century. /

It is apparent that the location of the pause must be one which is syntactically significant in one way or another. Lieberman claims that the end of the breath group must fall at a major syntactic break in the derived phrase marker, 'that is, a node nearer to the "top" of the tree diagram' (1967:125). This is similar to Bierwisch's proposal of boundary strengths. However, if syntax were the only determinant, we would

expect a pause after beans in (12) and (13).

3.1.3 The sentences in (16) and (17) exhibit these same principles.

(16) There are stains on the wall / in the dining room
of that Cape Cod./

(17) There are pictures of that Cape Cod / on the wall
in the dining room./

In (16) a pause occurs between two locative prepositional phrases. The same boundary is present in (17), yet no pause occurs. The insertion of a pause following wall in (17) sounds significantly less acceptable to speakers. The important fact is once again the position of these pauses in relation to the sentence boundary and the number of stress peaks in each phrase, i.e. a count of 2:2 in both sentences. The syntax will not give us this information if stress is assigned in the phonological component.

It is interesting to note that even though the NP-VP position has been identified as a favorable site for pauses (which is consistent with Lieberman's observation of pauses at major syntactic breaks and Bierwisch's boundary system), in (16) and (17), as in (6) above, the insertion of a pause here results in an ungrammatical production. The important factor could well be that phrases need to have stress peak equivalence intrasententially and that in all three sentences the NP is unstressed.

3.2 Rhythm

3.2.1 Examination of further data reveals a hierarchy of possible pauses within a sentence. As was previously mentioned, tempo is a major factor in production; the slower the tempo, the greater the number of pauses. The hierarchical principle may be stated as in (18).

- (18) Given a production of some sentence X by speaker A and a production of X by speaker B, if B pauses at more sites than A, the sites of the pauses of A will be a proper subset of the pauses of B.

Sentences exhibiting this principle are given in (19) and (20).

- (19) a. The ideal of social relations was not recipro-
city / but benevolent domination and dutiful
submission. / (Szasz, 1970:5)
b. The ideal of social relations / was not reci-
procity / but benevolent domination / and dutiful
submission. /

- (20) a. He definitely seemed entirely unable to record / the
sweet and mellifluous chords of the Scottish bagpipes. /
b. He definitely seemed / entirely unable to record /
the sweet and mellifluous chords / of the Scottish
bagpipes. /

In (19b) the pause which was chosen in (19a) is once again chosen. The same is true in (20). The principle stated in (18) correctly predicts the ungrammaticality of (19c) and (20c) in which only the two extra

pauses selected in the (b) sentences are chosen.

- (19) c.*The ideal of social relations / was not reciprocity
but benevolent domination / and dutiful submission. /
(20) c.*He definitely seemed / entirely unable to record the
sweet and mellifluous chords / of the Scottish
bagpipes. /

Two points should be made here. One is the reaffirmation of the non-randomness of pause location. In order to pause at all in a grammatical production of (19) or (20), the pause in the (a) sentence must be chosen. Therefore, there must be a methodical means for determining pause sites, as has been claimed throughout. However, it cannot be assumed that pauses necessarily occur at a node 'near the top' of the syntactic tree. In (20b) the pause following chords splits a PP from its dominating NP. Not only does this disrupt the continuity of the NP constituent, this NP acts as the direct object of a deeply embedded sentence which is a very low level in the surface syntactic tree.

3.2.2 These sentences display a type of rhythm which interacts with the phrase equivalence discussed above. In (19a) and (20a) the pause once again falls toward the mid-point of the sentence. The stress-peak count in (19a) is five in the first phrase and four in the second. In the (b) sentences there is an implicational relationship between the additional pauses. That is, the choice of the first additional pause initiates a rhythm which increases the likelihood of the second additional pause site being chosen. Chatman points out that a person is 'biased by what comes first' in matters of rhythm (1965:27). The choice of the first pause initiates a rhythm in terms of phrase length, which is determined by stress-peak count. Remember that since English is a stress-timed language it is just this stress information which is relevant to prose rhythm. The goal of phrase equivalence can be interpreted as an imposition of rhythm on pause production. Pause sites, it seems, cannot merely depend on syntax but are also sensitive to such things as this rhythm.

One might want to assume that these facts can be corroborated by direct measurements in a phonetics laboratory. Sonnenschein remarks: 'What we are concerned with in all manifestations of rhythm is not so much a physical fact as a psychological fact' (1925:35). Following from this would be an assertion that the real time of phonological phrases need not be precisely equivalent in duration. To that point Chatman reports that subjects accept rhythms as regular even with up to a '14.5% displacement of temporal regularity' (1965:21). Allen (1968) and others have shown that the intervals between accents are subject to variation in descriptions of stress-timing and rhythm in English.

The important fact for our purposes is that (19) and (20) are judged most grammatical in the (a) and (b) productions, rather than the (c) productions or some other combination of pauses. This is not directly intuitable from the syntactic tree, indicating the need for more than syntactic information in pause assignment and production.

3.3 Stress

3.3.1 The hierarchy of admissible pauses referred to in 3.2.1 may be related to the relative stress levels in a sentence. The equi-valued phrase that was previously mentioned in conjunction with longer sentences seems to be less important here, although for the data to be discussed in this section, there are no violations of (15). The generalization that emerges is that the first possible pause will occur following the most heavily stressed lexical item in a sentence (following solve in (21a)) or at the end of the sentence; the next pause can occur following a 2 stress item (in a Chomsky and Halle 1968 system) as in (21b); after that, a pause can occur following a 3 stress item as in (21c). If, however, a pause occurs following an item with tertiary stress but not following a word with secondary stress, the result will be ungrammatical.

- (21) a. Which problems is it likely that he'll solve?¹/
 b. Which problems / is it likely that he'll solve?¹/
 c. Which problems / is it likely / that he'll solve?¹/
 d. *Which problems is it likely / that he'll solve?¹/

Further examples of this are given in (22) and (23).

- (22) a. That the²orem was tough³ to prove.¹/
 b. That theorem / was tough to prove.¹/
 c. That theorem / was tough / to prove.¹/
 d. *That theorem was tough / to prove.¹/
 e. That the³orem was tough / to prove.²/
 (23) a. John³ was good² / to leave.¹ / -It was good of John to leave.
 b. John / was good to leave.¹ / -It was good to leave John.

These facts, along with the fact that in conjunction with certain syntactic information (yet to be described) the placement of pauses can be predicted, would be of much greater interest but for the fact that it is the usual course to assign stress predicated on the phrase, i.e. the Nuclear Stress Rule. If such a view were abandoned, the data would be much more revealing, but as it stands, prediction of pauses (therefore phonological phrases) based on the facts of stress is tautological.

3.3.2 What has generally been referred to as contrastive or emphatic stress can have a direct effect on the possibility of inserting a pause in a given sentence.

- (24) John insulted Mary and then she slapped him.
 (25) John insulted Mary and then she insulted him.

These sentences (as well as (26)) were presented by Lakoff (1972). What is interesting for our purposes is the different capacities for pausing in these sentences. In (24) it is possible to insert a pause following Mary, but nowhere else, except after him. Here slapped bears the primary stress in the second conjoined sentence. In (25) a pause is possible after Mary again, but in addition, a pause becomes almost obligatory after she, although the sentence can be produced without a pause there.

Two explanations present themselves. The ability to pause after she in (25) might be due to: (a) the recurrence of the verb insulted, or (b) the occurrence of the contrastive stress on she. These are the two options available since the underlying and surface syntactic structures of the two sentences would be identical except for the verb in the second conjunct. Explanation (a) is clearly untenable when faced with (26).

(26) John called Mary a Republican and then she insulted him. In (26) insulted appears only in the second conjunct and it is still possible to pause following she. Verbal identity could not be triggering the pause.

It is obvious that the occurrence of the contrastive stress is triggering the pausal phenomena that are in evidence here. Once more we need to appeal to a component of the grammar other than the syntax; in this case the prosodic phonology.

A further example of the influence of contrastive stress is:

- (27) *It never occurred to me / that something like that /
would happen. /
(28) It never occurred to me / that something like that /
would happen. /

The structures in (27) and (28) are obviously identical; the difference lies only in the stress contours assigned to each. In (27) it is ungrammatical to pause after that when the sentence is spoken with a 'neutral' stress pattern. However, when that receives contrastive stress, as in (28), it then becomes permissible to pause following the word; however, as in (25) and (26) this pause is optional.

3.3.3 The hierarchy of pause placement discussed in 3.3.1 was dismissed as uninteresting because the current view of stress predicts that the pause which determines the phonological phrase will occur after stressed items because of the statement of the Nuclear Stress Rule. This is because the phonological phrase is determined prior to stress and is integral in the statement of the NSR. Therefore, stress cannot be used as a predictor of pause. In fact, this may be construed as an argument for the syntactic structure predicting pause.

However, the data discussed in connection with contrastive stress lead to an entirely different conclusion. Because contrastive stress cannot be predicted through the working of the NSR, it should not be sensitive to the boundary of the phonological phrase as neutral stress is. However, the fact was established in the preceding section that a contrastively stressed item attracts pause. If it is indeed this stress that attracts the pause, then the assignment of this stress must be logically prior to the assignment of the pause. Thus, once again we see that phonological information must be considered in pause assignment. What is more, as far as the interaction of pause and stress is concerned, 'neutral' stress patterns and contrastive stress patterns behave exactly the same. Pause is attracted to the position following stress. Perhaps, then, one would want to argue for the primacy of stress over pause. This means that if stress is assigned in the

phonological component of the grammar and the syntactic structure feeds into the phonological component, the syntactic structure cannot determine pause.

Formulations of sentential stress based solely on syntactic facts have fallen short of their mark (Chomsky and Halle, 1968; Bresnan, 1971, 1972; Lakoff, 1972). All have failed in one manner or another to account for all the data; none of them can include contrastive stress in their statement. Perhaps one reason for this has been the lack of suitable definitions of the phonological phrase. On the other hand, some linguists have argued against a purely syntactic formulation of stress, suggesting instead that stress is a type of semantic foregrounding (Bolinger, 1958, 1972; Berman and Szamosi, 1972; Schmerling, 1976). If a semantic basis for stress assignment were adopted, stress might then be a primary factor in pause placement.

4.0 Semantics

4.1 A further argument against a theory which posits the prediction of pause phenomena based solely on the syntactic component is evident in data which exhibit the disambiguating function that can be carried by pauses. This function was also noted by Lieberman (1967).

Consider the following ambiguous sentences (inspired by Emonds 1976):

- (29) She once liked sauerkraut and ham sandwiches.
- (30) She once liked watching television and physical exercise.

Sentence (29) is multiply ambiguous but can mean (a) the sauerkraut and ham are both within the confines of the bread or (b) the sauerkraut is in a side dish and eaten with or without an accompanying ham sandwich. In (29) in order to convey the (b) meaning, it is necessary to pause following sauerkraut.

- (31) She once liked sauerkraut / and ham sandwiches. /

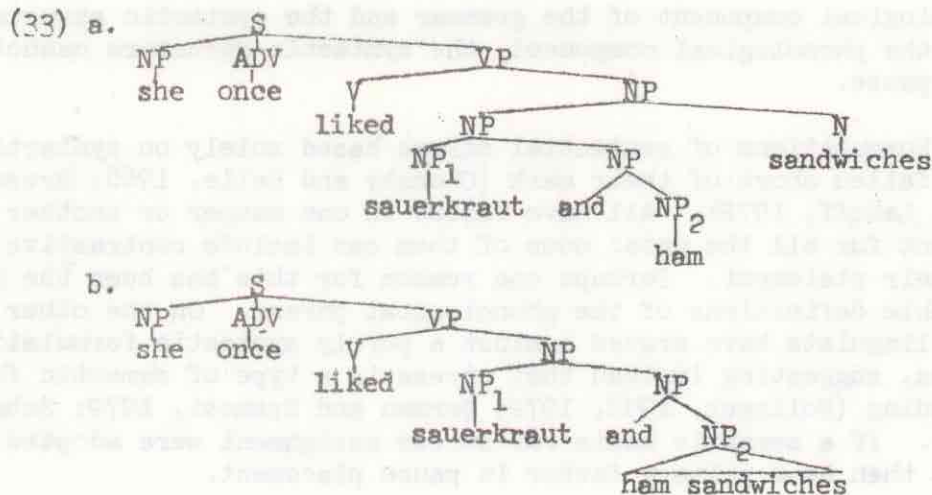
For the (a) reading the pause must obligatorily be omitted.

Sentence (30) can mean that the woman in question liked to watch television and engage herself in physical activity, in which case a pause necessarily follows television.

- (32) She once liked watching television / and physical exercise. /

If there is no pause after television, the woman led a rather sedentary life in which she did not engage in physical activity but merely viewed it.

In (33) are the two syntactic trees associated with the possible readings of (29). The (a) tree corresponds to the pauseless reading, while the (b) tree corresponds to (31).

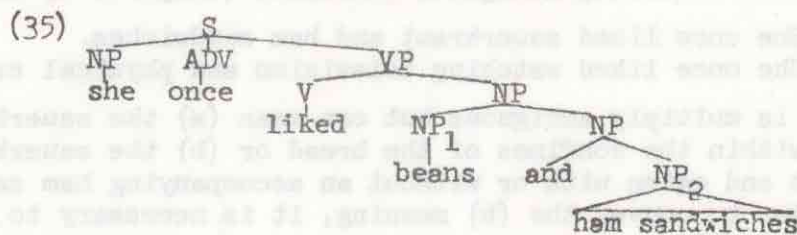


Assuming a syntactic solution to pause assignment, we might hypothesize that a pause occurs after the first of two conjoined NPs which do not function as prenominal modifiers.

However, consider (34).

(34) She once liked beans and ham sandwiches.

The surface syntactic structure is given in (35).



Notice that the trees in (33b) and (35) are identical with the lone exception of the lexical items under the NP₁ nodes. In (34), although a pause may optionally occur for some speakers after beans, it does not obligatorily occur. Remember that for the proper reading of (33b) the pause after sauerkraut is not optional. Therefore, a characterization based solely on the syntactic tree structure will not account for this data. The assignment of pause would be impossible if the lexical items were not present in the trees.

The crucial factor is the avoidance of possible ambiguity. This information is not carried in a single syntactic tree but must be encoded in the semantic realm. Pragmatic considerations are of primary importance here. If the goal of speech is to convey specific meaning, it is pragmatically undesirable to produce ambiguous utterances which work against this goal. Semantic information must be available to the speaker when the pauses are assigned to the sentence. Here, semantic information, together with the syntactic structure, contributes to the assignment of pauses.

In (36), where there is no potential ambiguity, the preferred reading omits pauses.

(36) She once liked ham sandwiches and sauerkraut.

The syntactic structure of (36) is exactly that of (33b) except that ham sandwiches fills the NP₁ slot while sauerkraut is directly dominated by NP₂. Once again pure tree structure makes no unified prediction.

4.2 It should be noted here that there is to some degree variability in the possibility of pausing; this may be likened to varying degrees of grammaticality cited in numerous syntactic discussions in the literature. If one were to pursue a hypothesis which assigns pauses predicated on syntactic structure, one would be forced to attribute this variability to the structure. However, this position appears to be untenable in light of the following data.

(37) She once liked ham sandwiches and sauerkraut.

(38) She once liked ham sandwiches and physical exercise.

I maintain that there is a stronger tendency for speakers to pause after ham sandwiches in (38) than in the same position in (37). In either sentence the pause is optional. Intuition and opinion of other native speakers seem to agree that it is more desirable to omit the pause in (37), while in (38) the pause is more desirable.

Granting the facts as presented, the explanation appears to lie in the semantic domains of the conjuncts. In (37) the conjuncts share the semantic domain of food or eating. In (38) the NPs could be thought of as sharing semantic domain only in the most convoluted of senses. Since apart from the lexical items the syntactic structures of (37) and (38) are identical, once again information from the semantic component of the grammar is an important factor in the assignment of pause.

5.0 Conclusion

Most of the arguments presented have been directed against the notion of the syntactic component of the grammar bearing the total weight of the assignment of pauses in utterances. However, the evidence used to undermine such a theory has pointed to many facts which will be integral in any adequate description of how these locations are assigned.

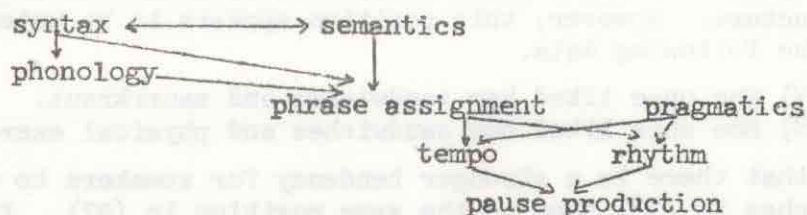
Evidence was presented for a type of rhythmic influence which favors the establishment of phrase units which are nearly equal in the number of stress peaks they contain. However, it was indicated at that time that a theory of the division of sentences based only on this concept would be insufficient. This is because of the regularity noticed by many linguists that pauses usually occur at 'major syntactic breaks', even though these have not been adequately specified.

The data presented in the preceding section are sufficient to rule out the possibility that a combination of syntactic and rhythmic information can account for potential pause locations. Such a hypothesis fails on the grounds that semantic information is necessary to account for the assignment of pauses in the variants of (29) and (30) as well as the varying degrees of possible pauses discussed. In addition, the importance of stress showed that phonological information plays a key

role in pause assignment.

Thus far the importance of syntactic, semantic, and phonological information has been established. What is yet to be determined is in what ways these different types of information interact, that is, what weight is to be given to the information provided by each component of the grammar. Unfortunately, that kind of formulation is beyond the scope of this paper.

However, the situation, as it might now be envisioned, may be schematically represented as:



Pragmatics, while not discussed in this paper, refers to functional factors such as speech situation and is most likely critically linked to tempo and rhythm.

No conclusion has been reached as to whether or not the unit of phonation demarcated by potential pauses can be considered the phonological phrase. In this, this paper is little different from others that have preceded. However, the data on pauses indicate the need for a mechanism in the grammar which can take input from all components in the grammar and provide the desired output.

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abstract

Kanji is one form of written Japanese in which the symbolic/analytic characteristics of language are dissociated from systematic phonetic characteristics; as such, it makes possible a more careful test of which aspect of language is responsible for the frequency of observed misperceptions. In this study, subjects were asked to categorize orthographically presented Kanji as nouns, adjectives, or verbs. The previously reported (Harris, 1977) left visual field advantage for Kanji was found only in the case of nouns, adjectives and verbs were processed more rapidly and correctly in the right visual field.