

Perceptibility of Nuclear Focus in English

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ABSTRACT

Considering the large body of studies on English intonational focus, it was thought appropriate to investigate whether nuclear focus is identifiable to the extent that the literature would lead us to expect. Perception tests were designed in which British listeners had to identify two focus patterns realized by an English R.P. (Received Pronunciation) speaker. A naturalness test was included in which listeners were asked to rate the likelihood of the structures.

Results prove that nuclear focus is indeed a familiar structure in British English with a very high degree of correct identifications. Focus on the first constituent of an intonation group (subject) is significantly better identified than focus on a medial constituent (verb focus). Naturalness results indicate that intonational focus is considered to be a very likely pattern in English. Although subject focus was rated as slightly more natural, the difference with ratings for verb focus is not significant. The reasons for which group initial focus is more readily identified than focus on medial items may be related to the semantic content of sentences or to differences in the phonetic realization of the two types of structure.

Introduction

This paper will concentrate on a particular aspect of intonational functions: the use of nuclear focus, that is, the use of nucleus placement to signal the information structure of an utterance. *Nucleus (sentence stress, tonic)* is the name generally given to the last accent in an intonation group. Some definitions of *nucleus* add that it is also the most important or prominent accent (Halliday 1970, Ladd 1980, Wells 1986) and that it marks the centre of information in the group. The term *focus* in intonational studies has usually been associated with new or contrastive information. Focal material is that which is being presented as new, important, contrastive; non-focal material is old, given information (Taglicht 1982). Other authors offer less specific definitions abandoning the associations with information type: Maidment (1990), for example, defines focus as “a general attention-directing device” (1990, 26). Alternative terms are *highlighting* (Bolinger 1972, 1986, 1989) and *foregrounding* (House 1983, Knowles 1984, Faber 1987).

In some languages nuclear accent location is considered to be a signaller of focus. Danés (1972) argues that nuclear focus is language specific, and that languages differ in this respect depending on whether they have fixed or free word order. In languages with fixed word order, such as English, if the new information

moves from its usual position at the end of the sentence, the nucleus moves too and falls on the new information. Languages with free word order keep the centre of intonation at the end of the group and move words to accommodate the information structure. Nevertheless, both types of languages share other focusing devices such as clefting, elision and use of pro-forms.

Intonational signalling of focus in English has traditionally been associated with nucleus placement, or *tonicity*, in Halliday's (1966) terms. Most authors believe that nuclear accents signal focus (Schubiger 1958, Crystal 1969, Clark and Haviland 1977, Taglicht 1982, Bing 1985). Indeed, many definitions of nucleus include the notion that it is the marker of the most important information in the group (Halliday 1970, Quirk et al. 1972, Chafe 1974, Cutler 1984, Cruttenden 1986). There are, however, differing views as to whether the nucleus is the *only* accent that marks information structure, or whether this is a function common to all accents (Bolinger 1972, Ladd 1980, Gussenhoven 1983, Maidment 1990). In this paper we will concentrate on focus signalling by nuclear accents.

In this study we wanted to investigate whether nuclear placement plays as important a part in signalling informational structure in English as most studies have led us to believe (Halliday 1966, 1970, Bolinger 1972, Taglicht 1982 and Gussenhoven 1983 amongst others). Given that there are other more "economical" devices such as elision and the use of pro-forms to indicate which information in the message is old or new, it could well be the case that nuclear focusing does not occur all that frequently in English. If nuclear focus is a frequent device, we would expect it to be readily identified by naive listeners and, moreover, its occurrence to be considered natural.

In order to investigate the degree to which listeners identified intonational focus and how acceptable they considered it to be, two perception tests were designed in which native English speakers were presented utterances with intonational focusing. Test 1 (section 2 below) was an information structure test in which listeners had to identify focus. Test 2 (section 3 below) was a naturalness test in which listeners were asked to rate focused utterances on a scale of acceptability. In section 4 below we shall discuss the results obtained and the conclusions that can be drawn from them.

Focus identification tests

Focus identification tests were designed to assess the extent to which native listeners were able to identify nuclear accents as signallers of focus. Two different types of test were constructed. One of them was a multiple choice test in which listeners had to choose one of four alternative contexts provided for each stimulus

sentence; the other was an open test in which listeners were asked to provide a context for each stimulus sentence. Results for the two information structure tests will be presented in the same section (Results) for ease of comparison.

Materials

The input for both tests consisted of 12 declarative sentences produced by a naive English speaker as answers to Wh-Questions (see trigger questions in appendix below). It was decided to limit the scope of the investigation to positions where nuclear focus in English is unambiguous. Therefore focus on the last elements of sentences (which often coincides with unmarked nucleus placement) was avoided, and the corpus concentrated on non-sentence final structures: focus on subjects (sentence initial) and focus on main verbs (sentence medial). There were six sentences for each focus type (see appendix). Target sentences were framed by 18 distractor sentences whose purpose was to prevent listeners becoming wise as to the aim of the test. The whole test consisted of thirty sentences and three introductory trial sentences. There were no target focus domains with more than one accentable syllable, so that focus scope¹ would not be an issue.

Listeners

Ten people took part in each perception test. They were all British speakers of a standard variety of southern English. None of them had any background in linguistics. All the listeners were above twenty years old and had at least a secondary school education.

Multiple choice Test

The multiple choice test was designed in the form of four potential context questions for each utterance, of which only one was correct. Each alternative context referred to a different constituent of the sentence as new information. The following is an example of the type of questions presented for a sentence realized with intonational focus on verb (sentence numbers refer to the list of target

¹ According to Halliday (1967, 1970), the scope of a focal accent is ambiguous as far as the elements situated to its left are concerned. For instance, a phrase such as “the Irish BOY went to the park” in which the nuclear accent falls on “boy” could be ambiguous as far as focus scope is concerned since there is another lexical item, namely “Irish”, in the constituent containing the focal accent. Thus the rendition with focal accent on “boy” could correspond to both (a) “Which Irish person went to the park?” and to (b) “Who went to the park?”. However, this ambiguity may be resolved by placing a pre-nuclear accent on “Irish” when the context is (b).

sentences provided in the appendix):

Stimulus: Sentence 9. *My brother loves animals*

Questions:

- a- How does your brother feel about animals? c- Why did you go to the zoo?
b- What does your brother love? d- Who loves animals?

Subjects were told that the tape was the edited version of a conversation in which one person asked questions and another one answered them, but that in the version they would hear, the questions had been deleted. Their task was to find the missing question in each case from amongst the four possibilities. If they found none of them satisfactory, they could leave a blank. Listeners were asked to choose only one of the four alternatives given.

Open Test

In the open test, listeners were presented with a written transcript of all sentences, and gaps were provided underneath each sentence for the listeners to write their answer. The stimuli were presented in exactly the same manner as for the multiple choice test.

Questions chosen or provided for each of the tests by listeners were considered to be correct if they agreed with the information structure signalled by the speaker. In the case of the open test, questions provided by listeners were considered to be correct if they referred exclusively to the focused material, independently of whether wh-questions or contrastive questions were used. The statistical analysis was done on a PC with the SPSS statistical package. The number of correct and incorrect listeners' perceptions, as reflected in the type of question chosen was counted and percentages were obtained for the different conditions. A Normal Distribution test was applied for the comparison of percentages. The significance level considered was 5 per cent ($p < 0.05$). The critical value of Z for this level is 1.96.

Results

The number of target sentences was 12 (see appendix) which, considering there were 20 listeners, amounted to a total number of 240 responses analyzed. The total number of correct perceptions for the whole test was as follows:

Number of correct responses: 207 = 86.2% correct

This result suggests that intonational focus is readily recognized by listeners. It would have been unreasonable to expect a 100% correct perception rate because

of the difficulties inherent to the test situation². However, some of the failures are due to other factors. There are, as we can see below, interesting variations for the two variables under study, which, we shall argue, are partly responsible for the total number of correct recognitions being lower.

The following table summarizes the results obtained by listeners who took the multiple choice and the open test. A comparison of results obtained in each type of test is also included.

Condition	Multiple Choice Test	Open Test
Number of responses	120	120
No of correct responses	109	98
% of correct responses	98.83%	81.67%
Z	2.06	
probability	<0.05	

Table 1. Multiple choice versus open test perceptions.

The difference in listeners' performance in the two types of test is significant according to the normal deviation score: $Z = 2.06$. It is apparent that, as was predicted (see above) the open test constituted a more difficult task as well as offering a smaller probability of coincidentally correct results. In table 2, results for items with focus on subject versus items with focus on verb are presented, and a comparison of the results obtained for the two focus domains is offered.

Condition	Subject Focus	Verb Focus
Number of responses	120	120
No of correct responses	114	93
% of correct responses	95%	77.50%
Z	3.94	
probability	<0.05	

Table 2. Subject versus verb focus perceptions.

²In a test such as the one described here, listeners faced several difficulties which would normally be absent in an every day situation; they were conscious of the fact that they were being tested and that their performance was to be evaluated; they were listening to speech on tape, which thus lacked visual or situational clues; utterances did not constitute a cohesive semantic whole, that is, they could not be seen as parts of a single topic conversation, so there were no contextual clues outside the target sentences themselves, etc.

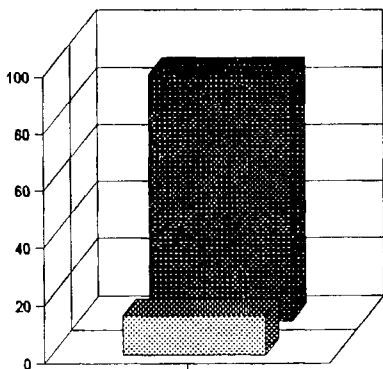


Fig. 1. Bar chart of English subject focus perceptions by 20 listeners.

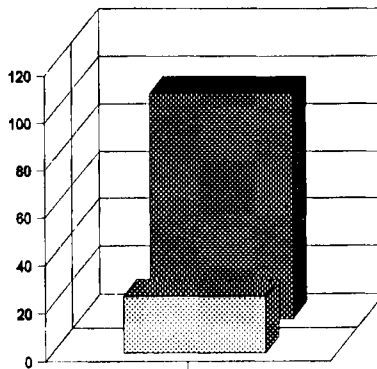


Fig. 2. Bar chart of English verb focus perceptions by 20 listeners.

The number of correct judgements for intonational focus on subject is significantly higher ($Z= 3.94$) than that for focus on verb: 95% correct versus 77.50% correct, respectively. It must be pointed out that most incorrect identifications were restricted to two of the target sentences, numbers 11 and 12:

- 11. The war *divided* the region
- 12. David *removed* his belongings

For both these sentences, almost half of the listeners that took the open test perceived a focus-on-predicate pattern. It might have been thought that this result was indicative that there actually was an undesired intonation pattern present (focus on predicate); however, that was not the case. Our perception together with that of external listeners brought in for confirmation of particular cases, agreed that the intonational focus being signalled in both cases referred to the verb alone. There may be other reasons for which the intonational focusing in these two sentences was more difficult to identify. Amongst the possible explanations, we may propose that the semantic content of these sentences may have favoured a more common interpretation such as the division theme/rheme corresponding to subject/predicate is³. It could also be the case that the intonational configuration

³ Sentence 11 contains the only case of inanimate subject in our corpus (see appendix). In sentence 12, listeners may have felt that "removed" and "belongings" formed a close knit unit since both words are often found together as a phrase.

of these sentences might have exhibited a different pattern to that present in the other verb focus sentences. This possibility will be further discussed in Discussion and Conclusions below.

Naturalness Test

As was pointed out in section 1 above, the fact that other focusing devices such as elision are available in English made us question whether intonational focusing would be perceived as a very natural device, since it entails repetition of known, old information. Therefore we designed a test in order to investigate if naive English listeners felt that sentences with intonational focus are natural in their language.

Materials

A new written transcript of the same sentences was provided, this time accompanied by its context question (see appendix). This was done in order to ensure that listeners were fully aware that the sentences they were assessing for naturalness had a missing context. It was felt that the naturalness of the sentences could only be fairly judged if seen in context. An “out of the blue” focused sentence would rarely sound natural unless the judges went through the process of assuming certain information such as common backgrounds, knowledge of the world and previous discourse context. Accordingly, the naturalness test had to be done after the informational structure test because otherwise listeners would have had access to the “solutions” to the information tests prior to doing them. All twenty listeners who had participated in the two information structure tests took part in the naturalness test. A scale of 0 to 4 was to be used by listeners according to which they would give a score of zero if the answer was *impossible in English*, 1 if it was *hardly possible*, 2 if it was *possible*, 3 for *quite possible* and 4 if they thought it was *totally possible*.

Statistical analysis was carried out with a Macintosh statistical package, Statview SE + Graphics. Mean scores and standard deviations were obtained for each sentence subtype. Comparison between mean scores was done applying paired two-tailed *t*-tests to pairs of variables.

Results

There was a total of 240 responses to sentences in the test (20 listeners rating 12 sentences). The following is the mean of the naturalness ratings given to all target sentences in the test.

Mean= 3.61 Standard Deviation= 0.71

Listeners' mean score places this informational signalling between the categories of *quite possible* (3 points) and *totally possible* (4 points).

Table 3 presents the ratings given to sentences with focus on subject versus those with focus on verb.

Condition	Subject Focus	Verb Focus
Number of responses	120	120
Mean response	3.63	3.58
Standard Deviation	0.72	0.69
<i>t</i>	0.80	
probability	<0.43	

Table 3. Naturalness ratings for subject focus versus verb focus.

As we can see from the value of $t=0.80$, there is no significant difference between the ratings obtained for sentences with focus on subject and those with focus on verb. Nevertheless, sentences with focus on subject were considered to be slightly more natural than those with focus on verb, 3.63 versus 3.58 mean scores respectively.

Discussion and Conclusions

As was expected, a multiple choice test provides a higher number of correct interpretations (98.83%). Nevertheless, as the high number of correct identifications shows (81.67%), we can see that, in spite of constituting a more difficult task, open tests do not present the listeners with serious problems for the identification of intonational focus.

Our results prove that listeners find focus on subject totally conspicuous and identify its presence almost consistently (mean identification rate of 95%), whereas focus on verb is more elusive, although it is still highly identifiable (mean identification rate of 77.50%). Comparison of focus identification tests with the naturalness test show that the difference observed between the perception of focus on subject and that of focus on verb, namely, the statistically significant worse identification of focus on verb, did not wholly arise because of its being a less common, *natural* pattern. Listeners thought it was almost equally possible to produce focus on verb as on subject structures: considering the maximum naturalness score possible was 4, focus on verb obtained a mean naturalness rating of 3.58 and focus on subject presented a mean score of 3.63. Therefore, there must be other reasons why focus on verb was more difficult for speakers to

identify. We will propose a couple of explanations: firstly, the leftward scope ambiguity of focal accents (see footnote 2 above and Halliday 1967, 1970) and, secondly, possible differences in accent realization between sentence initial and sentence medial nuclear accents which might make the latter less prominent (see below).

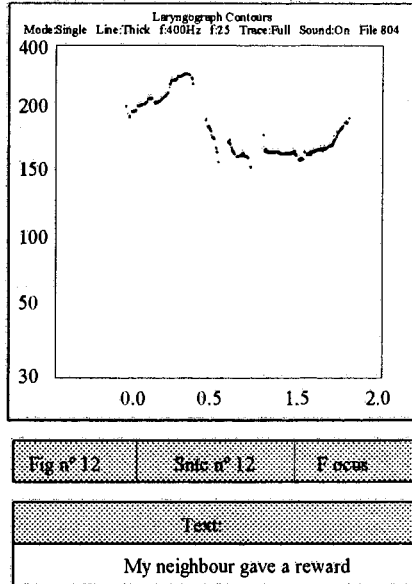


Figure 3. Fundamental Frequency (pitch) trace of a sentence with subject focus (n° 4): "My NEIGHBOUR gave a reward"

The two sentences which had produced the lowest identification scores above, numbers 11 and 12, obtained significantly different naturalness ratings. Sentence number 12 obtained a significantly lower rating (Mean= 3.40 $t = -2.81$, $p = 0.006$) when compared to the other verb sentences. This fact would seem to indicate that there might be something in the lexical content of the sentence or in its realization which did not fall within listener's expectation for verb focus. On the other hand, sentence number 11 obtained a significantly higher naturalness score than the score obtained by the whole of verb focus (Mean= 3.75 $t = 2.68$, $p = 0.008$). Again, the reasons for which this sentence was considered more natural than the mean could be related to its lexical content, phonetic realization and listeners' schematal knowledge of the world. If lexical content made it less likely for the listeners to identify focus on its verb, it must be thought that when

speakers rated it as more natural they were again ignoring information structure and concentrating on lexical content which should make us cautious when discussing the relevance of listeners naturalness ratings.

The analysis of pitch traces may offer an alternative explanation for these sentence scores. Five out of six verb accents were realized with falls that started much lower than the subject ones (sentences 8 to 12). Figures 3 and 4 show examples of typical realizations for each type of sentence. This difference seems to be greater than that which declination would lead us to expect. It is my view that the speaker realized focus on subject more emphatically which, as was suggested above, could be one of the reasons for which it was more difficult to identify but still accepted as natural.

Another interesting point is that half the sentences in our corpus were

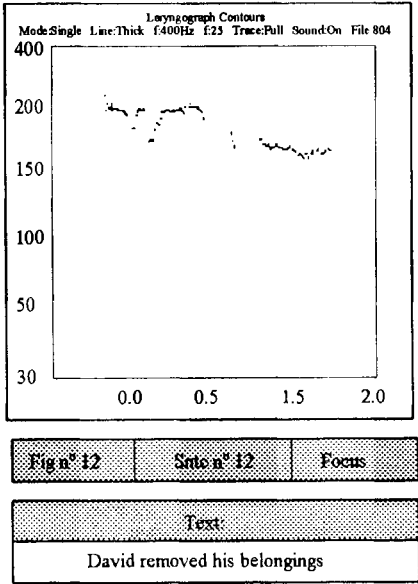


Figure 4. Fundamental Frequency (pitch) trace of a sentence with verb focus (n° 12): “David REMOVED his belongings”

realized with a final rise (see figure 3) which, in some cases might be seen as an accent. However, these rises appear mostly on subject focus sentences (5 out of 6 sentences) whereas only one verb sentence displayed this pattern (sentence n° 9, see appendix). Neither of the two verb sentences which were often considered to have a focus on predicate structure exhibited a final rise (see figure 4).

Accordingly, the final rise did not constitute a confusing element as far as the scope of focus is concerned.

Further investigations need to be done in order to offer definite explanations of the poorer identification rates found for verb focus in the present study. However, we can already suggest some possibilities. Focused verbs did not present worse identification rates because of their post-focal structure, since most verb focus sentences did not have final rises that might have been considered to constitute accentual prominences. On the other hand, the fact that subject focal accents were much more prominent intonationally may have been responsible for their being more easily perceived. It could also be that listeners are less tolerant of the lexical contents which can be associated to verb focus.

The high number of correct identifications for nuclear focus structures as a whole, together with their being considered very natural, indicates that intonational focus is indeed a normal mechanism in British English, as the literature has led us to believe. More tests in the line of those presented here would be needed to investigate possible preferences for focus on different sentence constituents and positions. Further research should also involve the perception and realization of focus in ambiguous positions, such as focus on the last lexical item of sentences and the leftward catch of focus scope. It would also be of interest to conduct research destined to find out the incidence of nuclear focus as opposed to other mechanisms such as clefting or the use of pro-forms and elisions.

Appendix: Trigger questions and target sentences.

NB: Words bearing focal accents are indicated in small capitals.

Trigger Questions

1. Who paid the waiter?
2. Who came for a meal?
3. Who ordered those dishes?
4. Who gave a reward?
5. Who studies languages?
6. Who plays the violin?

Subject Focus Sentences

ISABEL paid the waiter
 ANDY came for a meal
 I ordered those dishes
 My NEIGHBOUR gave a reward
 MIRANDA studies languages
 The BOY plays the violin

Trigger Questions

7. What does Gary do in their restaurant?
8. What did his friend do about the money?
9. How does your brother feel about animals?
10. What does Diane think of his music?
11. What did the war do to the region?
12. What did David do with his belongings?

Verb Focus Sentences

Gary MANAGES their restaurant
 His friend BORROWED the money
 My brother LOVES animals
 Diane ADMIRES his music
 The war DIVIDED the region
 David REMOVED his belongings

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