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1. Introduction

Two constructions are possible with transitive particle verb constructions (PV's) in English: the DP-complement follows the complex verb in (1)a), which I call the *continuous structure*, but precedes the particle in (1)b), the *discontinuous structure*.

(1) a) He *turned down* the radio.
b) He *turned* the radio *down*.

It has been argued elsewhere (Erades 1961, Bolinger 1971, Chen 1986, Olsen 1998, Dehé 2000, among others) that the choice of the word order is highly influenced by the information structure (IS) of the context. The main assumptions are the following:

a) The neutral order is the continuous one.[2]
b) Nominal objects that introduce new information, i.e. are focused, occur in the final position.[3]
c) Nominal objects that carry somehow familiar information, i.e. are background constituents, occur between the verb and the particle.

If the continuous order is the underlying one, it follows that the discontinuous alternate has to be derived by a syntactic movement process. In Dehé (2000) I assume that this operation is triggered by the mismatch between a DP that does not bear the [+F]

[1] I would like to thank Kai Alter, Holden Härtl, Andrew McIntyre, Grit Mehlhorn, Melody Nuckowsky, Susan Olsen, and Shari Speer for valuable comments and discussion. Many thanks to Annett Schirmer for her help.

[2] In Dehé (2001) I report an experiment in speech production which gives evidence for the assumption that for PV's in English the continuous word order is the neutral one. In a context free experimental situation it was formed significantly more frequently than the discontinuous alternative.

[3] This assumption is in line with the *focus last* generalization that can be found in the literature. It states, as Krifka (1998:95) puts it, that "focus is realized as late as possible in the clause". I am not considering certain syntactic devices here that are used to highlight focused material in a sentence, such as it-clefts, wh-clefts, passivization, and topicalization (cf. Gussenhoven 1984, Prince 1986, Dehé in prep).

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feature and its base position within the focus domain. Consider the question-answer pairs in (2) through (4).[4]

(2) (What did Peter do?)
He $[_{[+F]}$ turned down the radio].

(3) (What did Peter turn down?)
He turned down $[_{[+F]}$ the radio].

(4) (What did Peter do with the radio?)
He_m [$turned_{i\ [+F]}$] [the $radio_k$ $[_{[+F]}$ t_i down t_k]]

In (2) and (3) the DP *the radio* is part of the focus domain, indicated here by the brackets and the [+F] focus feature. Therefore, the continuous order is chosen, i.e. the object occurs in the final position. In (4), *the radio* is part of the background information of the answer sentence. It has to leave the focus domain by movement to the position between the verb and the particle. The complex verb constitutes the focus domain. After the syntactic movement operations have taken place, the particle remains within the focus domain as the focus exponent.[5]

In this paper I argue that with regard to PV constructions in English evidence for the distribution of the focus feature and the division of the sentence in focus and background domains comes from intonation patterns, i.e. from the placement of the accent in the two alternate orders.

The remainder of the paper is organized as follows: Section 2 provides a brief survey of the relation between focus and accent placement both in general and with regard to PV constructions. I make predictions about accent placement in the two possible word orders. In section 3 I report two experimental studies on intonation that confirm these predictions – one pilot study and one more detailed follow-up experiment. Section 4 finishes the paper with a conclusion and outlook.

2. Focus, Accent Placement, and Particle Verb Constructions

2.1. General Assumptions

The term *intonation* refers to the occurrence of recurring pitch patterns, to the prominence (and non-prominence) of syllables, to how and to what extent the syllables

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[4] Roughly speaking, in wh-questions, the position of the focus in an answer correlates with the questioned position.

[5] The verb *turned* is pre-posed for independent syntactic reasons, but is of course part of the focused constituent. To indicate this I add a focus feature to the verbal trace and its index in (4). Note that this operation seems to be quite common. In German, for example, as a V2 language, the verb must pre-pose, but leaves the particle stranded. However, the whole verbal complex can be focused. Consider the example in (x), taken (and slightly altered) from Krifka (1998:98). The pre-posed verb *fing* is part of the complex verb and of the focused constituent, but leaves the focus domain for independent syntactic reasons.

(x) Q: Was tat Maria sofort? (What did Maria do immediately?)
A: $[_{CP}$ $Maria_2$ $[_{C'}$ $fing_1$ $[_{IP}$ t_2 [sofort $[_{[+F]}$an [t_1]]]]]]
Maria lit: catch immediately Particle ("Maria started immediately.")

are made prominent, and to prosodic phrasing. Intonation conveys sentence-level pragmatic meanings in a linguistically structured way. *Pitch* concerns the varying height of the pitch of the voice, i.e. it refers to what the listener hears as high or low tonal properties. Pitch is the prosodic feature most centrally involved in intonation. It is primarily dependent on the rate of vibration of the vocal cords which is reflected in the acoustic measurement of *fundamental frequency* (F0). In languages such as English, F0 is the strongest correlate of how the listener perceives the speaker's intonation, i.e. of accent placement and phrasing.

Other prosodic features besides pitch or pitch accent are *loudness*, i.e. the relative loudness of a number of successive units (syllables) or changes of loudness within one unit, and *length*, i.e. the duration of the same syllable in one environment relative to the duration of the same syllable in another environment or the relative duration of a number of successive syllables. Bolinger (1958:138) among others observes that accented syllables are normally longer than unaccented ones in comparable positions within the utterance.

Above word level but below utterance level, two levels of phrases are essentially involved in the prosodic phrasing in English: *phonological (p-) phrases* and *intonational (I-) phrases*. Although these constituents have often been argued not to be identical to syntactic constituents, they show systematic relations to constituent structure in the syntax (cf. Selkirk 1984, Nespor & Vogel 1986, Truckenbrodt 1995 among others).

It is a general assumption that there is a relation between focus and accent placement (cf. Jackendoff 1972, Gussenhoven 1984, Selkirk 1984, 1995, Pierrehumbert & Hirschberg 1990, Ladd 1996, Cruttenden 1997, to name but a few). In English as in other languages, accent placement is a principal device used in indicating focus structure, even more pervasive than the use of lexical and grammatical means such as passive, cleft, and pseudo-cleft constructions. In Gussenhoven's (1984) model for instance, constituents that are marked [+focus] constitute focus domains. A single accent is assigned to every such focus domain.

Moreover, it is generally assumed that in West Germanic languages, particularly in English, given information is "de-accented", i.e. a word that might be expected to be accented, fails to be accented in a context where the information that it is conveying has already been mentioned before (e.g. Halliday 1967, Cruttenden 1993, Ladd 1996).

According to Pierrehumbert & Hirschberg (1990) among others there is also a relation between information status and accent type. With regard to intonational meaning, they interpret different types of pitch accents. The H* accent, i.e. a local peak on the intonation contour, corresponds to items that convey new, "added" information. The items made salient by this type of accent, they argue (p. 289), "are to be treated as "new" in the discourse."[6]

There are some preliminary assumptions about the relation between intonation and word order in PV constructions in the literature.

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[6] In terms of the corresponding framework, *pitch accents* mark the lexical item with which they are associated as prominent. Pitch accents can be high (H) or low (L) tones or bi-tonal combinations. The asterisk (*) indicates that the tone is aligned with a stressed syllable. The H* accent marks items that are new in the discourse, whereas the L* accent marks items that are intended to be salient but not proposed as an addition. Moreover, bi-tonal accents are related to certain intonational meanings (cf. Pierrehumbert & Hirschberg 1990).

Van Dongen (1919), Taha (1960), and, more recently, Svenonius (1996) all note that the discontinuous order is chosen if the main accent is on the particle, whereas the continuous alternate is used in cases where the object receives the accent. However, van Dongen's and Svenonius' assumptions imply that the word order follows from intonation, not vice versa, a point that has been argued against e.g. by Gussenhoven (1984). Taha's study is a pure investigation of the accent pattern of PV constructions, which does not take the relation between focus and accent placement into account.

Bolinger (1971:49f) argues that the discontinuous word order and accent placement on the particle in this construction can be used as a device to make the content of the verbal constituent salient.

2.2. Predictions

Following the assumptions outlined in sections 1 and 2.1 above, my predictions with regard to the PV construction in English are:

a) In the continuous order, where the object-DP is part of the focus domain, an H* type of accent is assigned to the focus domain and is realized on the noun. Thus, I expect the H* accent on the noun in the cases in (2) and (3), repeated as (5) and (6) below. The particle is supposed to be unaccented.

b) In the discontinuous order illustrated in (4) and repeated in (7) I expect a H* type of pitch accent on the particle as the sole constituent remaining in the focus domain after the syntactic movement operations. The noun as a background constituent should be "de-accented" in this construction.

In (5) through (7) the placement of the accent is indicated by capital letters and by the expected type of accent H*.

(5) (What did Peter do?)
He $_{+F}$ [turned down the RAdio].
H*

(6) (What did Peter turn down?)
He turned down $_{+F}$ [the RAdio].
H*

(7) (What did Peter do with the radio?)
He$_m$ [turned$_{i\ [+F]}$] [the radio$_k$ [$_{[+F]}$ t$_i$ DOWN t$_k$]]
H*

3. Experimental Studies on Intonation Patterns of PV Constructions in English

To test my predictions, I carried out two experimental studies on accent placement within PV constructions in English. I recorded pre-prepared utterances which were read from a list of sentences by the participants.

3.1. Experiment1: A Pilot Study

3.1.1. Method

Participants and Apparatus
Ten non-professional native speakers of English were recorded. The study was carried out in Colchester/Essex and in Ashtead/Surrey in England.[7] For the recordings, I used a Sennheiser microphone e845 and a Sony MiniDisc Recorder MZ-R50. The software used for the analysis of the speech signals was *SEKD Samplitude Studio (Version V5.10), Cool Edit™ 96* and *WinPitch™ (Version V.1.88)*.

Materials
The target sentences containing the particle verbs were embedded in short contexts. 30 experimental items with transitive particle verbs were chosen. The experimental materials consisted of three sets: 5 pairs containing compositional PV, 5 pairs containing idiomatic PV, and 5 pairs containing aspectual PV.[8] Each pair consisted of one item containing the continuous construction, and one item containing the discontinuous construction of the same verb. The order was chosen in accordance to the given context. Consider the example in (8) (compositional PV):

(8) CONDITION1: Continuous order
It's late and I want to go to bed. I would like you to $_{+F}$[turn down the radio]. The music is too loud, I won't be able to sleep.

CONDITION2: Discontinuous order
"Do you know where that noise is coming from?" - "Yes, I do. It's the radio of our next door neighbor, a student. She likes her music loud." - "Fine, but I can't stand it. I'll go and ask her to turn$_i$ the radio$_k$ $_{+F}$[t_i down t_k]."

In CONDITION2, *the radio* is familiar information. Therefore it appears between the verb and the particle. Accent placement is expected on the particle. In CONDITION1, *the radio* conveys new information, i.e. it is within the focus domain and appears in the continuous construction. The accent is expected on the noun.

The materials also included 30 filler items.

Design and Procedure
The order of the items on the list was pseudo-randomized (cf. Dehé in prep. for details).

The list of all items was presented to the participants. The experimental list was preceded by three practice items. The participants were asked to familiarize themselves with the sentences. They were instructed to read the sentences in a natural way, but did not know what the aim of the study was. They were seated in front of the microphone. The participants first read the practice items, then after a short break when they had the

[7] Many thanks to Katie White and her family and to Sam and Val Gage, and Val's friends.

[8] The meaning of compositional PV's is made up of the meaning of the verb plus the meaning of the particle (*bring in* the pudding (into the room)). The meaning of idiomatic PV's is not fully predictable from the meaning of the constituents (*pick up* her brother (from the station)). In aspectual PV's, the particle adds a telic interpretation to the verb (*eat up* one's lunch vs. *eat* one's lunch).

opportunity to ask questions, they read the sentences from the experimental list. All utterances were recorded.

Data Treatment

The speech signal was digitized with a frequency of 44.1 kHz and a 16 bit sampling rate. The target items containing the particle verb and the nominal object were cut out of their contexts. Only these fragments of the complete utterances were analyzed.

Erroneous utterances were excluded from further analysis. Utterances were classified as errors (i) if an important element was missing in the utterance, e.g. the particle; (ii) if the produced word order did not correspond to the word order given on the list, i.e. if the participant had changed the given word order; (iii) if the utterance contained any errors like long breaks, stuttering, and the like; (iv) if there were problems/errors of some technical kind. This treatment led to the exclusion of only 4 of all 300 experimental items.

As outlined above, the strongest correlate to how the listener perceives the speaker's intonation, i.e. accent placement, is the fundamental frequency (pitch, F0). Therefore, the corresponding intonation contour was used to analyze the experimental items in order to identify location and type of pitch accents.

No other prosodic features were considered. As the elements that we are interested in (particle, noun within object DP) occur at the end of the sentences, i.e. are the final elements within their prosodic domains, we would not be able to tell whether differences in lengthening are due to focus or to phrase-final lengthening (cf. Cruttenden (^{2}1997:33).

3.1.2. Results and Discussion

A descriptive analysis of the experimental items shows that for F0, there is a rise on the particle in the discontinuous, and on the noun in the continuous order (cf. Dehé 2000). These patterns indicate that there are accents of the type H* on the corresponding elements. These results were supported by the statistic analysis.

Of the 300 experimental items that were recorded (30 exp. items from each of the ten speakers) only 160 were included in the statistic analysis.[9] As focus is related to a rise of the F0 contour to a local peak, the measure points were onset and peak on the particle and the noun. What is of central interest here is the range value, i.e. the difference between the mean value peak and the mean value onset for each particle and noun.

First of all, it is important to exclude that the verb type (compositional vs. idiomatic vs. aspectual) plays a role in accent placement. For both particle and noun, the results were therefore analyzed in a two-way analysis of variance with the factors of VERB TYPE (three levels) and CONDITION (two levels: continuous vs. discontinuous order). The mean values are given in Table 1 below.

[9] Due to the nature of this experiment as a pilot study I could not include all items in the statistics. 140 experimental items were excluded for the following reasons: (i) the nominal complements were not the same within the pairs (e.g. load up mother's car vs. load the van up); (ii) some sentences were interpreted as contrastive focus, which is not the type of focus under investigation here. The 160 remaining experimental items consisted of 3 pairs of compositional PV, 3 pairs of idiomatic PV, and 2 pairs of aspectual PV, 10 speakers each.

Table 1 Mean values in Hertz (Hz) as a function of VERB TYPE and CONDITION for particle and noun; CONDITION1 = continuous, CONDITION2 = discontinuous

Particle	Compositional PV			Idiomatic PV			Aspectual PV		
	Onset	Peak	Range	Onset	Peak	Range	Onset	Peak	Range
COND1	214	216	2	188	189	1	203	204	1
COND2	157	184	27	161	174	13	181	195	14
Noun	Compositional PV			Idiomatic PV			Aspectual PV		
	Onset	Peak	Range	Onset	Peak	Range	Onset	Peak	Range
COND1	184	206	22	186	219	33	198	216	18
COND2	187	189	2	185	197	12	199	211	12

For particle, a main effect was obtained for CONDITION ($F[1,9]=97.168$, $p<0.0001$), but not for VERB TYPE ($F[2,18]=1.695$, $p>0.1$). In addition, no significant interaction effect between the two factors was obtained ($F[2,18]=1.296$, $p>0.1$).

The same is true for noun: there was a main effect for CONDITION ($F[1,9]=14.893$, $p<0.005$), but not for VERB TYPE ($F[2,18]=0.322$, $p>0.5$), and there was no significant interaction effect between the two factors ($F[2,18]=1.402$, $p>0.1$).

I take these results as evidence for the fact that the type of the verb group does not play a role in the placement of the accent within PV constructions. Therefore, I did not distinguish between verb types in the further analysis of the data in this pilot study, nor in the analysis of the follow-up experiment.

For the further analysis of Experiment1, the mean values are given in Table 2.

Table 2 Mean values in Hz for all verb types

	Particle	Onset	Peak	Range	Noun	Onset	Peak	Range
COND1		201	203	2		188	213	25
COND2		165	184	19		189	198	9

The main effect for the factor CONDITION for both particle and noun is confirmed and supported by individual t-test results which show the following pattern. For particle, the rise of F0 in CONDITION2 (discontinuous order) is significantly stronger than that in CONDITION1 (continuous order) ($t(9)=-6.9$, $p<0.0001$). The F0 for noun rises significantly stronger in the continuous than in the discontinuous condition ($t(9)=3.962$, $p<0.01$).

I conclude from these results that accent placement is on the noun in the continuous construction, whereas it is on the particle in the discontinuous order.

3.1.3. Further remarks

Let me add some remarks concerning the position of the accented elements. As the accent is placed at the end of the sentence in both conditions it could be argued that this cannot be attributed to the focus structure, but is due to the final (rightmost) position of the relevant element. Especially within the concept of *normal stress*, which has found a definite expression in the *Nuclear Stress Rule* (NSR) (Chomsky & Halle 1968), this would not be an unexpected objection. Within this concept, the sentence accent is in general placed on the most deeply embedded element of the sentence. The context of the

utterance is by definition irrelevant. However, such a view does not comprise the option of placing the accent on certain elements in order to highlight them to signal contrast, newness, or other information of that kind.

I follow Bolinger (1958) and Gussenhoven (1984) in their rejection of the concept of normal stress. As was made explicit above, it is a general assumption that the placement of the accent and meaning are not independent concepts, and that intonation is certainly not independent of the context of an utterance, but that there is a relation between focus and accent placement, a relation that can not be explained by the concept of normal stress. Moreover, as noted above, normal stress is related to sentences that display broad focus. The materials used in experiment 1 are not of this type but show a more distinct focus-background division.

Additional evidence for assuming the relation between IS and accent placement comes from the fact that the same sentence can be uttered with different intonation patterns depending on the speaker's intention. A well-known example has been given by Selkirk (1984), repeated in Selkirk (1995:551f), given here in (9) below.

(9) *Legumes are a good source of vitamins.*

a) Legumes are a good source of vitamins.
H* L H%

b) Legumes are a good source of vitamins.
H* L H%

According to Selkirk (1995:552), the utterance in (9)a) with a high peak on the stressed syllable of *legume* would be appropriate only in a discourse context where the focus is on *legumes*, but the noun *vitamins* is given, e.g. in contradicting the assertion *Nothing in this cupboard is a good source of vitamins*". In contrast to that, the F0 contour in (9)b) indicates the focusing of the predicate noun *vitamins*, e.g. in contradicting the assertion *Legumes aren't good for anything*".

Differences in accent patterns, I argue, depend on the IS of the sentence. However, in order to thoroughly dispel any doubts with respect to the results of experiment1 and to avoid the problems resulting from the sentence final position of the critical elements, I carried out another experimental study on the intonation of particle verb constructions in English, which again supports the claim made above concerning the relation between focus and accent placement. It was necessary to compare the items used in the first experimental study with sentences where the critical elements were not placed at the end of the sentences in which they are embedded, but were followed by some other constituent.

3.2. Experiment2

The main idea that led to this study was to place the critical elements not at the end of prosodic units within their items, but to have them followed by additional constituents, for reasons that have been outlined in the previous section. Such a treatment not only enables me to check whether the accent patterns found in the first study are truly due to focus structure as opposed to the mere position of the critical items within their contexts. It also means that we can take into account another prosodic parameter other than the pitch accent, too, namely syllable length, i.e. the duration of the particle and noun in one

condition (=word order) relative to the duration of the same syllable in the alternate order.

The hypothesis is that the rightmost position of the element in question (noun or particle), as opposed to sentences where the critical element is followed by an additional constituent, may play a role not with respect to accent type and accent position, but only with respect to the degree of the effect that is found. This prediction is born out.

3.2.1. Method

Participants and apparatus

The experiment was carried out at the University of Oxford.[10] Ten native speakers of English without any training in speaking were recorded. For the recordings, I used a Sony DAT Walkman TCD-D8 and a Sennheiser microphone e845. The software used was the same as in the pilot study.

Materials

As in the pilot study, the sentences containing the particle verbs were embedded in short contexts. 80 experimental items with transitive particle verbs plus 82 filler items were chosen. 10 PV's were chosen as experimental PV's.[11] As in the first study, the particle verbs were presented in the continuous and in the discontinuous order, the word order was chosen according to the IS of the context. In addition, this time the particle verbs appeared in four different syntactic surroundings for each order: A) the critical element - N in CONDITION1, the particle in CONDITION2 - was placed at the right edge of the sentence, as in the pilot study above (PV plus ∅); B) a complement-PP or complement-like PP was added; C) an adjunct-PP was added; D) an adverb was added. The same additional phrases that were used in the continuous condition were also used in the discontinuous condition, so that the conditions were comparable. Also for the sake of comparability, the same verbs as in the pilot study were chosen where possible. An example is given in (10) below.

(10) CONDITION1: continuous order
Type A): PV plus ∅
It's late and I want to go to bed. Peter, I would like you to turn down the radio. The music is too loud, I won't be able to sleep.
Type B): PV plus complement
... I would like you to turn down the radio to a lower level. ...

[10] I am particularly grateful to Esther Grabe, who invited me to conduct the experiment at the Phonetics Laboratory, University of Oxford. Many thanks to her and her colleagues who helped me find participants and made my time there very pleasant.

[11] I chose 5 compositional and 5 non-compositional PV's. However, as the pilot study has shown that the verb type does not play a role with regard to intonation, the verb type was not a factor in the statistic analysis.

Type C): PV plus adjunct
... I would like you to turn down the radio in a few minutes. ...
Type D): PV plus adverb
... I would like you to turn down the radio a bit. ...

CONDITION2: discontinuous order
Type A): PV plus Ø
"Peter, do you know where that noise is coming from?" - "Yes, Ann, I do. It's the radio of our next door neighbor, a student. She likes her music loud." - "Fine, but I can't stand it. I'll go and ask her to turn the radio down."
Type B): PV plus complement
... I'll ask her to turn the radio down to a lower level.
Type C): PV plus adjunct
I'll ask her to turn the radio down in a few minutes.
Type D): PV plus adverb
I'll ask her to turn the radio down a bit.

Design, Procedure, and Data Treatment
All 162 items, 80 experimental items, 82 filler items, were presented in one list. The order of the items in the list was pseudo-randomized (cf. Dehé in prep. for details). The procedure was the same as in the pilot study.

The data were treated similarly to those of the pilot study. The target items containing the particle verb, the nominal object, and – depending on the item – the added phrases (complements, adjuncts, adverbs) were cut out from their contexts. 28 of all 800 utterances were erroneous and had to be excluded from the analysis.

3.2.2. Results and Discussion

As in the pilot study reported above, onset and peak of particle and noun were measured for F0 for all 772 target items (800 experimental items minus 28 erroneous utterances). In addition, syllable length was measured for particle and noun.

The first prosodic parameter that I want to consider here is fundamental frequency. The mean values for F0 are given in Table 3 and Table 4 for CONDITIONS 1 and 2, respectively.

Table 3 Mean values (Hz) for F0, CONDITION1: particle and noun

CONDITION1	Particle			Noun		
Sentence type	Onset	Peak	Range	Onset	Peak	Range
Type A (PV plus Ø)	200	201	1	190	220	30
Type B (plus compl.)	217	218	1	195	216	21
Type C (plus adjunct)	216	218	2	193	215	22
Type D (plus adverb)	217	218	1	201	226	25

Table 4 Mean values (Hz) for F0, CONDITION2: particle and noun

CONDITION2	Particle			Noun		
Sentence type	Onset	Peak	Range	Onset	Peak	Range
A	167	183	16	195	201	6
B	183	193	10	206	211	5
C	186	200	14	209	214	5
D	179	193	14	204	209	5

For both particle range and noun range, the results were analyzed in a two-way analysis of variance with the factors of CONDITION (two levels) and SENTENCE TYPE (four levels).

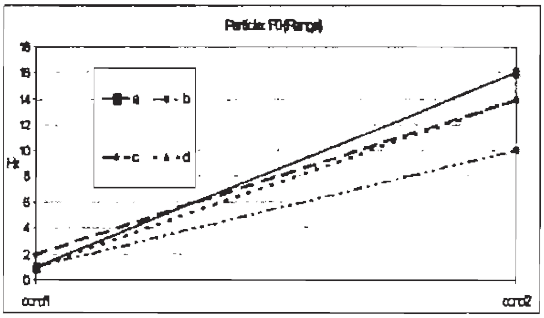
For particle, main effects were obtained for both CONDITION ($F[1,9]=35.34$, $p<0.0001$) and SENTENCE TYPE ($F[3,27]=4.37$, $p<0.02$). There was no significant interaction effect between the two factors ($F[3,27]=2.08$, $p>0.1$).

For noun also, main effects were obtained for both CONDITION ($F[1,9]=55.74$, $p<0.0001$) and SENTENCE TYPE ($F[3,27]=5.46$, $p=0.005$). In addition, the interaction effect between the two factors was significant ($F[3,27]=6.07$, $p<0.005$).

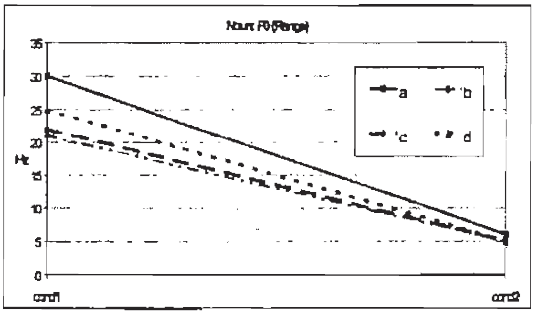
The results indicate that both CONDITION, i.e. the word order in PV constructions, and SENTENCE TYPE do play a significant role in accent placement with regard to particle and noun. This is supported by Figure 1 a) and b) below. For particles, the lines for all sentence types are monotonously rising, for noun they are falling. For particle, there is a rise of F0 for all sentence types in CONDITION2, but not for CONDITION1, whereas for noun we find a rise in CONDITION1, but not CONDITION2.

Figure 1 F0 (Range): CONDITION1 vs. CONDITION2

a) Particle



b) Noun



For particle, bonferoni-adjusted t-tests as individual comparisons revealed that the main effect found for SENTENCE TYPE results from the fact that within CONDITION2, the rise on the particle in sentence type A is significantly stronger than in sentence B. This, I argue, must be put down to the position of the particle at the end of the utterance in type A, but before a p-phrase boundary in type B.

For noun, the results are supported by separate analyses of variance for "F0 range" for the two word order conditions. For CONDITION2 the effect was not significant ($F[3,27]=0.09$, $p=0.965$), but it was for CONDITION1 ($F[3,27]=6.70$, $p<0.005$). In order to explore this pattern further I performed t-tests as individual comparisons between sentence types within CONDITION1, which resulted in the following pattern:

The individual comparisons are highly significant for sentence type A vs. B and for type A vs. C. This means that the rise on the noun in the continuous condition is even

more distinct if the noun occurs at the end of the utterance, as compared to the cases where it is followed by either a complement or an adjunct. Again, I argue that this result is due to the noun's position at the end of the utterance, as opposed to its position at the end of a p-phrase in the case of sentence type B, or - as in the case of sentence type C - at the end of an intonational phrase.

Similar results were obtained for the second prosodic parameter, syllable duration. The mean values for particle and noun for the two conditions are given in Table 5 below.

Table 5 Duration: Mean values in msec for particle and noun

	Particle		Noun	
Sentence Type	Cond1 (cont.)	Cond2 (disc.)	Cond1 (cont.)	Cond2 (disc.)
A	138	299	301	194
B	134	185	212	183
C	132	200	228	182
D	132	183	229	188

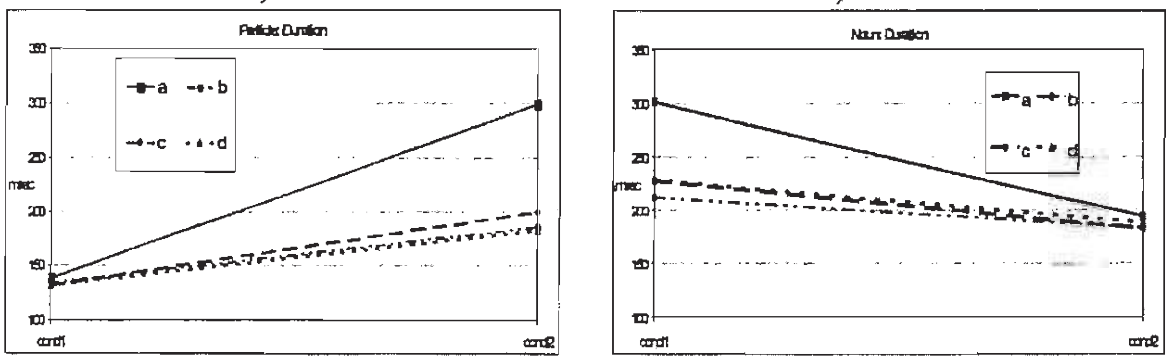
As for F0 range, for both particle and noun the results were analyzed in a two-way analysis of variance with the factors of CONDITION and SENTENCE TYPE.

For both particle duration and object duration the analyses revealed main effects of both factors ((i) particle: CONDITION: $F[1,9]=366.21$, $p<0.0001$; SENTENCE TYPE: $F[3,27]=78.88$, $p<0.001$; (ii) noun: CONDITION: $F[1,9]=288.38$, $p<0.0001$; SENTENCE TYPE: $F[3,27]=89.65$, $p<0.001$). In addition, for both particle and noun the interaction between the two factors was significant ((i) particle: $F[3,27]=65.52$, $p<0.0001$; (ii) noun: $F[3,27]=66.87$, $p<0.0001$).

As with range, these results indicate that both CONDITION and SENTENCE TYPE do play a significant role in syllable length with regard to particle and noun, which is illustrated in Figure 2 a) and b). They show a pattern parallel to that in Figure 1 above in that the lines for all sentence types are monotonously rising for particle, whereas for noun they are falling. For particle, there is a longer syllable duration for all sentence types in CONDITION2 as compared to CONDITION1, whereas for noun we find a longer syllable duration in CONDITION1.

Figure 2 Duration: CONDITION1 vs. CONDITION2

a) Particle b) Noun



As for range, this pattern was further explored in separate analyses of variance. For particle duration, the effect was not significant for CONDITION1 ($F[3,27]=0.98$, $p=0.417$), but it was for CONDITION2 ($F[3,27]=86.70$, $p<0.0001$), i.e. in the discontinuous condition with the particle following the object. Individual comparisons between sentence types within CONDITION2 showed that the results are highly significant in all cases where sentence type A is involved, i.e. when the particle is in the rightmost position without anything following it its duration is significantly longer than in all the other sentence types. This comes as no surprise, but must be put down to sentence final syllable lengthening, as has been predicted. Remember that in the pilot study syllable length was not measured for exactly this reason, namely that the found effect can be argued to be due to the rightmost position of the critical element. Moreover, particle duration was significantly longer in type C than in type B. This, I argue, is due to different kinds of prosodic boundaries between the particle, which terminates its p-phrase, and the following intonation unit. The complement in type B is grouped into one I-phrase with the p-phrase including the particle, whereas between the particle and a following adjunct there is a I-phrase boundary.

For noun duration, the analyses of variance were significant for both CONDITION1 ($F[3,27]=100.59$, $p<0.0001$) and CONDITION2 ($F[3,27]=7.34$, $p<0.005$). Again, t-tests between the sentence types within the conditions were performed for further examination. The tests showed the following pattern of significant differences.

Within CONDITION1, the noun in sentence type A had significantly longer values of syllable duration than for all other sentence types. Remember again that this was predicted and is argued to be due to sentence final lengthening. Moreover, the noun in type B shows shorter duration not only than in type A, but also than in types C and D. This, I assume, must again be put down to the underlying syntactic structure and the corresponding relations to prosodic phrasing.

For CONDITION2, we get the following significant results. The noun in sentence type A has longer values of syllable duration than in types B and C. At first sight, this result is unexpected, as within the discontinuous construction we only predicted accent placement on the particle but made no predictions for the noun. The effect might be due to performance rules (cf. Gee & Grosjean 1983 and related work) and does certainly not challenge the results.[12]

3.3. General Discussion

Experiment2 replicated, confirmed, and extended the results of the pilot study on intonation, and confirms the above made predictions with regard to accent placement in PV constructions. In Experiment1, I concluded that the accent was placed on the particle in CONDITION2, and on the noun in CONDITION1, as was suggested by the corresponding results. I rejected the objection that the effect might be solely due to the rightmost position of the critical element on theoretical grounds, but wanted to further explore and confirm this by another experiment, adding different types of constituents to the right edge of the target sentences.

Firstly, experiment 2 confirmed that the factor CONDITION (word order) plays a role for both prosodic parameters F0 and syllable length for both particle and noun. I

[12] For a more detailed discussion of the results I have to refer the reader to Dehé (in prep).

conclude therefore that we find accent placement on the particle in the discontinuous order and on the noun in the continuous alternate, regardless of whether the critical element is followed by another constituent, or not.

Secondly, the factor SENTENCE TYPE, i.e. the position of the critical element with regard to the following/added constituents, does play a role in that the first effect is more distinct if the critical element is not followed by any further constituent. That means that if the critical element, particle or noun for the two conditions respectively, is in the rightmost position, the effect with regard to F0 and syllable length is enforced, which is due to the phenomenon of sentence final lengthening.
These results are completely in line with the above stated assumptions and predictions.

4. Conclusion and Outlook

I take the results of the two experiments as evidence for the assumption that the choice of the word order in PV constructions in English depends on the focus-background structure of the utterance. A nominal complement occurs in the position between verb and particle, i.e. in the discontinuous order, if it is a background constituent. In this case, the noun is de-accented. The particle is within the focus domain and is assigned the focal accent. In the continuous order, the nominal object DP is part of the focus domain. The focal accent falls on the noun.

In my future research I want to show in more detail that with regard to the syntactic structure, it is this division of the sentence in focus and background and the specification of the elements for [+focus] and [-focus] features that triggers the movement operation by which the discontinuous order is derived from the underlying continuous alternate.

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