

GENERATION OF ACCENT IN NOMINALLY PREMODIFIED NOUN PHRASES

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abstract¹

The primary purpose of this paper is to present a set of conditions that constrain accent placement in focused nominally premodified NPs. Selkirk (1984) argues that if the premodifier is an argument of the head, then the head can be deaccented. I agree with Selkirk's proposal and argue that what is essential is not whether the premodifier is a grammatical argument of the head noun, but rather, whether it is a θ -complement in lexical conceptual structure. This proposal is evaluated by testing it against a corpus of naturally occurring data.

0. introduction

It is generally agreed that an utterance can be divided into two parts which are related to the discourse function of the information represented by that utterance. The TOPIC is what the sentence is about and the FOCUS represents a new predication about the topic. This information structure constrains accent placement. For example, 'primary' accent must be within the constituent that represents the focused information. The ability of an accent on a single word to mark a larger phrase as focus is widely recognized. For example in (1) the accent on *conservative* can mark the phrase *redneck conservative* as the focused constituent (since (1) can be used to answer the question *What was your town like?*). (Accent is indicated by small caps and focus by underlining.)

- (1) My hometown was redneck CONSERVATIVE.
(Lia Matera 1988 Smart Money)

In (1) focus is represented by a single constituent, but this need not be the case as (2) illustrates.

- (2) A: Where's Kari?
B: SILAS dropped her off at SUBDIKS.

In (2B), Kari, the referent of *her*, is the topic and the focus is thus discontinuous.

Though there seems to be agreement about the importance of a theory that accounts for the accent-focus relation, there is little agreement about the exact nature of this relationship. For instance, different theories give different answers to the question of whether this relationship is syntactic, semantic, morphological, or pragmatic. There is also disagreement over how large a phrase can be brought into focus by a single accent.

Even for simple constructions the relationship between accent and focus is unclear. In examples (3)-(7), a MODIFIER + NOUN constituent is focused. Note that in the (a) member of each pair, it is the modifier that receives the accent and in the (b) member of the pair, it is the head noun.

- (3) a. Those are CRAWLING things.
b. Those are crawling INSECTS.
(Bolinger 1986.120)
- (4) a. He has HUNTINGTON'S disease.
b. He has Huntington's CHOREA.
(Bolinger 1986.118)
- (5) a. I do university RESEARCH.
b. I do CETACEAN research.
- (6) a. (How do you know Franz? What was he to you?)
He was my HISTORY teacher.

¹I would especially like to thank Jeanette Gundel and Nancy Hedberg for discussions and comments.

- b. (How do you know Franz? What was he to you?)
He was my first-grade TEACHER.
- (7) a. I work for the ROCKEFELLER Foundation.
b. I work for the Carnegie ENDOWMENT.
(Bolinger 1986:118)

This paper examines the association of accent and focus in nominally premodified NPs.²

1.0 previous work.

Pierrehumbert and Hirschberg (1990) state that some cases of the relationship between accent and focus seem clear. For example, when accent is on *dress* in *the girl with the red DRESS* the focus can be information represented by the noun *dress*, the NP *the red dress*, the PP *with the red dress*, or the entire NP *the girl with the red dress*. Whereas, accenting *RED* in the same phrase can serve only to focus information represented by the adjective *red*. However, regarding the relationship between accent and focus in general, they state that 'The question of how an accent becomes associated with certain material is not yet well understood.' (p309 n.4)

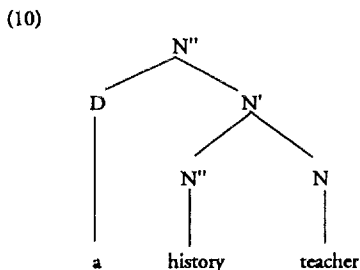
Some researchers view this relationship between focus and accent as essentially syntactic. In the computational literature, Lyons and Hirst (1990) present the following rule constraining the accent focus relation:

- (8) a. What is accented is necessarily in focus.
b. 'focus is optionally and nondeterministically percolated up the syntax tree, to any node from its rightmost daughter (rightmost because stress manifests itself only at the end of the focused constituent).' (1990:57)

Many theoretical linguists have proposed similar syntactic constraints relating phrasal accent placement and focus (see, for example, Chomsky and Halle 1968, Chomsky 1971, Jackendoff 1972, and Culicover and Rochemont 1983). However, as noted by these researchers, a rule like the one in (8b) makes incorrect predications for most nominally premodified NPs. For example, consider

the NP *the history teacher* in (9B) which has the structure presented in (10):

- (9) A: What do you do?
B: I'm a HISTORY teacher.



Clearly the NP *a history teacher* is the focused constituent.³ But by rule (8) the accent on *history* cannot serve to focus the entire NP since *history* is not the rightmost daughter of this phrase.⁴ Thus, a phrasal rule such as (8b) cannot be operative in these cases. Instead, *history teacher* is viewed as a compound (as a structure of category N⁰) and accent is determined by a separate compound accent rule, which places stress on the leftmost element (see Chomsky and Halle 1968, and Selkirk 1984).

Steedman (1991) claims that accent serves to divide an utterance into an optional constituent that represents the topic (what he, following Jackendoff 1972, calls the 'open-proposition') and a constituent that represents the focus. He argues that within each of these constituents, accent is put on the part that represents what is 'emphasized or contrasted' with something in the discourse context—the 'interesting part'. This idea has also been proposed by a number of other researchers (see, for example, Schmerling 1976, Gundel 1978, Selkirk 1984, Bolinger 1986, 1989, and Rochemont 1986). Although there is wide disagreement about the formal definitions of 'topic-focus' and 'the interesting part' there is no doubt that these are essential pragmatic determinants that constrain accent placement, and it is equally

³By focused constituent I mean the phrase that represents focused information.

⁴Rule (7) also fails in a range of other cases including most intransitive sentences (*What happened?—BUSH resigned*). See Schmerling 1976, Gundel 1978, Bolinger 1986, and Lambrecht 1992 for further discussion.

²I use the more neutral term *nominally premodified NPs* instead of *compounds*.

clear that they play a major role determining accent in nominally premodified NPs. Consider (11), a dialogue between two linguistics professors about the dissertation of a student in the department:

- (11) A: What's the dissertation about?
 B: Something to do with language ACQUISITION.
 (=Ladd 1980.90 ex.48)

Ladd (1980) notes that when linguistics professors are talking about a dissertation of a student in the department, they assume that the dissertation is about some aspect of language and *language* can be deaccented. Ladd continues 'But the linguist's proud parents, who are not linguists, would tell their friends, who are also not linguists, that their son's dissertation was about *LANGUAGE acquisition*.' (Ladd 1980.90)

It could be argued that the accent patterns in (3)-(5) are also determined by 'interestingness'. However, the role of 'interestingness' is less clear in phrases like those in (6) and (7). As Bolinger (1989.200) notes, accent placement in some preminimally modified NPs is more invariable than in others. For example, while in (12) the old information constrains the the location of accent, this is not the case in (13) and (14)

- (12) a. My research is on language-
 { Particularly on language ACQUISITION. }
 { #Particularly on LANGUAGE acquisition. }
 b. My research is on acquisition-
 { #Particularly on language ACQUISITION. }
 { Particularly on LANGUAGE acquisition. }

- (13) June hold a singular place in the study of insects.
 { JUNE bugs can be seen. }
 { ??June BUGS can be seen. }

- (14) As we were travelling along the road we came to a { ROADblock. }
 { #roadBLOCK. }
 (= Bolinger 1989.216)

The fixed stress on the initial syllables serves to mark the phrase as a unitary concept rather than a compositional one. However, not all NPs representing unitary concepts receive leftward stress (for example, *human Being*).

2. argument structure and accent

What then governs the location of accent in nominally premodified NPs? Why, for example, does *He was my history TEACHER* sound odd as an answer to the question *How do you know Franz?* *What was he to you?* Selkirk (1984) suggests a particularly compelling answer. She presents the two constraints in (15) and (16).

- (15) *Basic Focus Rule*
 A constituent to which a pitch accent is assigned is a focus. (1984.207)
- (16) *Phrasal Focus Rule*
 A constituent may be in focus if (i) or (ii) (or both) is true:
 i. The constituent that is its *head* is a focus.
 ii. A constituent contained within it that is an *argument* of the head is a focus
 (1984.207)

The Basic Focus Rule in (15) is mandatory. This rule states that every word that contains an accent is necessarily focused. The phrasal focus rule given in (16) is optional. The rule (16i) states that if a head is a focused constituent, then any projection of that head can optionally be focused. If I say

- (17) Victoria visits BONEYards

the N, *boneyards*, is necessarily a focused constituent by rule (15). Rule (16i) permits focus to percolate to the projections N' and N'' as shown in (18):

- (18) *Victoria visits* {N':+focus [N':+focus [N:+focus [BONEYards]]]}

Rule (16ii) states that if an argument of a head is focused, and if that focused constituent is contained within the maximal projection of that head, then the projection of that head can be focused. For example, if I say

- (19) Ann danced the taranTELla

the N, *sarantella*, is necessarily a focused constituent. Since this N is the head of the N'', *the sarantella*, by rule (16i) *the sarantella* can be a focused constituent. This N'' is an argument of the V, *danced*, and is contained within the maximal

projection of that V. Thus, the VP can be a focused constituent by rule (16ii). This leads to correct results since this utterance can be used to respond to the question *What did Ann do at the party?* (*She* [_V':+focus *danced the tarantELLA.*])

Selkirk's theory of prosody-focus relation predicts the following accent patterns in focused modifier-noun constructions:

(20) *Selkirk's predictions concerning modifier-noun pairs*

ARGUMENT head	adjunct HEAD
ARGUMENT HEAD	ADJUNCT HEAD
*argument HEAD	*ADJUNCT head

Thus, if a noun phrase represents focused information, and if that noun phrase consists of an argument followed by the head noun, then the prediction is that the argument is necessarily accented. This seems like an elegant way to characterize the difference between leftward and rightward accented prenominal modified noun phrases, which has been problematic for other approaches to accent placement. Consider, for example, the difference in accent pattern between (21) which has an accent on its left constituent, and (22) which has the accent on its right constituent.

- (21) HISTORY teacher
 (22) student TEACHER

Selkirk's theory offers a straightforward explanation of this difference. *History* is an argument of *teacher* in (18) and thus by rule (13ii) representation of the entire noun phrase can be focused. However, in (19) *student* is an adjunct and accenting the head, *teacher*, is required to focus the representation of that noun phrase. A similar notion has been suggested by Rochemont (1986) as shown in (23). (See Rochemont 1986 for a discussion comparing his focus rules to those of Selkirk 1984.)

- (23) a. If α is [+focus] and α is X^0 , then X^n is [+focus].
 b. If α is [+focus] and α is an argument of X^0 contained in X^n , then X^0 is [+focus].
 c. If X^0 is [+focus] and α is an adjunct of X^0 then α is [+focus].

There are three possible relations between a prenominal NP and its head. The prenominal can

be a grammatical argument, a complement in lexical conceptual structure, or an adjunct modifier. A distinguishing characteristic of an adjunct modifier is that it is licensed by predication.⁵ As a result, it can be separated from its head by a copula. For example, in the phrase *the red car*, *red* is an adjunct modifier and can be separated from its head as (24) illustrates.

- (24) The car is red.

In (22) *student* is a modifier and can be separated from its head as in

- (25) The teacher is a student.

However, in (21) *history* is not a modifier and it cannot be separated from its head as (24) shows.

- (26) ??The teacher is of history.

There is one question that immediately comes to mind: is Selkirk's notion of 'argument' a syntactic notion (that is, is it a grammatical argument licensed by A-structure), or is it a semantic notion involving θ -participants in lcs?

2. arguments

Grimshaw (1990) argues convincingly that only nouns that have an internal aspectual analysis (nouns that refer to what she calls *complex events*) have argument structure (A-structure). She describes significant differences in the behavior of complex event nouns and other nouns to support this analysis. For example, complex event nominals have obligatory arguments as shown in (27)

- (27) a. The assignment is to be avoided.
 b. *The constant assignment is to be avoided.
 c. The constant assignment of unsolvable problems is to be avoided.
 (Grimshaw 1990.50 ex.8)

Grimshaw considers *assignment* to be ambiguous between a complex event interpretation and a process interpretation. The addition of the modifier *constant* forces the complex event interpretation since *constant* can only be construed as a modifier of *assignment* on the complex event reading. Thus, its A-structure must be satisfied as in (27c) just as

⁵That is, the meaning of modifier is predicated on the external argument of the head noun (Its R argument).

the A-structure of the verb *assign* must be satisfied as in (28).

- (28) a. We constantly assign problems.
 c. *We constantly assign.
 (Grimshaw 1990.50 ex.8)

If Grimshaw's analysis is correct, as I believe it is, then the argument referenced in Selkirk's Phrasal Focus Rule, is best not construed as an argument in A-structure. For while rule (16) would make correct predictions regarding complex event nominals such as those illustrated in (29), it fails on nominals that do not represent complex events as in (30)

- (29) a. TREE felling
 b. COOKIE baking
 (30) a. HISTORY teacher
 b. BIT guzzler

I believe the distinction is a semantic one involving θ -participants in lexical conceptual structure (lcs). Every verb and noun (including deverbal nouns) has a lexical conceptual structure that includes the entities involved in the events or states described (see, for example, Dowty (1989), Fillmore (1968), and Jackendoff (1987, 1990)). Selkirk's intuitions expressed in rules (15) and (16) are essentially correct. Reformulating her rules as constraints between lexical conceptual structure and focused information offers a more precise characterization of her insights. A reformulation of (15) and (16) constraining the accent-focus relation of premodified NPs containing a deverbal element is given in (31) and (32):

- (31) The representation of a constituent is focused if that constituent receives a pitch accent.
 (32) A representation, *R*, may be focused if a representation that is a θ -complement of *R* is focused.

Consider the pairs in (33) and (34).

- (33) a. PACKAGE delivery
 b. overnight DELIVERY
 (34) a. CETACEAN research
 b. university RESEARCH

According to Grimshaw, neither *delivery* nor *research* has an A-structure since neither has an internal aspectual analysis. However, since these are both deverbal nouns, they inherit their θ -structure from

the related verbs. *Package*, then, is a θ -complement of *delivery*, since *package* is the theme of *deliver*, (*He delivers packages*). Thus *delivery* can be deaccented as in (33a). However, in (33b), *overnight* is not a θ -complement of *delivery* (**He delivers overnight*) and thus *delivery* must be accented. Likewise, in (34a) *cetacean* is the theme of *research* (*He researches cetaceans*) and thus *research* can be deaccented. However, in (34b) *university* is not a θ -complement of *research* and *research* must be accented.

The rules presented in (31) and (32) were tested on data collected from multiple genres of natural discourse including public radio news articles, multiple participant discussions, and academic lectures. The results are given in Table 1

modifier's relation to head	accent on left element	accent on right element	totals
θ -argument	115	11	126
non- θ -argument	2	18	20
totals	117	29	146

Table 1. accent patterns of NOUN MODIFIER + DEVERBAL NOUN constructions

As shown in this table, the rule makes correct predictions in approximately 90% of the cases. The rule predicts that if the modifier's relation to head is a θ -complement, then the accent should be on the left element—the complement. This was indeed true for 115 instances. Some examples are given in (35) and (36).

- (35) Why should I buy one of those POTATO twaddlers (that can make potato rosettes simply and easily and comes with a free set of Ginso knives?)
 (36) a. FEMINIST' bashing
 a. LANGUAGE users
 b. PUB crawlers
 c. COMPUTER makers
 d. TEAK trade
 e. CONSISTENCY checkers

The rule also predicts that if the modifier is not a θ -complement of the head then the head needs to be accented. That was the case for 18 of the 20 instances in the data. Examples of this are given in (37) and (38)

- (37) She and her **sister RAPPERS** never stop **TELLING** each other to be **PROUD** of what they **ARE**, to have **RESPECT** for themselves and the culture they **COME** from.
- (38) a. amateur **WRITER**
 b. woman **HIPHOPPERS**
 c. continuation **COVERAGE**
 e. last-minute **FILER**

There were 11 θ -complement instances that were counterexamples to the rule presented in (32). Some examples of this are presented in (39).

- (39) a. government **ENCOURAGEMENT**
 b. systems **ANALYST**
 c. tenant **BLACKLISTING**
 d. human **INTERVENTION**
 e. relationship **DEPENDENCY**

At present I have no explanation as to why these are accented the way they are. Why, for example, is one problem referred to as *DRUG addiction* and another as *relationship DEPENDENCY*?

3. agents and experiencers

The accent characteristics of phrases where the nominal premodifier can be construed as a subject of the head is less clear. There is some controversy as to whether such constructions are possible. For example, Selkirk (1982:34) restricts subjects from occurring in these compounds by use of the rule presented in (40)

- (40) The **SUBJ** argument of a lexical head may not be satisfied in compound structure.

Sproat and Liberman (1987) point out that subjects in compounds are not usually accented. The examples they give are presented in (41)

- (41) a. woman **SWIMMER**
 b. child **DANCING**
 c. student **DEMONSTRATION**
 Sproat and Liberman 1987:143

However, I suggest that *woman* in (41a) is not a complement of *swimmer*. *Woman SWIMMER* is an appositional compound (similar to *helicopter GUNSHIP*). Appositional compounds are lists of propositions, and like all lists, the last element of the list typically receives the main accent. Some evidence to support this view that (41a) is appositional is that the prenominal can be separated from the head by a copula as in (42)

- (42) The swimmer is a woman.

Following Booij and van Hafften (1988) I believe that a semantic effect of *-er* affixation is to bind the agent or experiencer in lcs. Thus, the agent role is not available to the representation of *woman* and that representation must be linked by θ -identification. Other examples of this type include (36) and (37a&b). In cases where the nonhead is the agent of the head the accent pattern varies—sometimes the head receives the accent (as (39a), (41b), and (41c)) and at other times the nonhead receives the accent as in (43).⁶

- (43) a. **DOG** bite
 b. **BEE** sting
 c. **COCK** fighting

4. discussion

Deverbal nouns head 25% of the nominally premodified NPs in the corpus examined.⁷ Since deverbal nouns are distinguished from other nouns in the lexicon, the generation system can correctly determine when to apply the rule in (32). As Dowty (1989), Jackendoff (1987, 1990) and others have noted, lexical conceptual structure is needed for correct semantic interpretation. (For computational approaches see Charniak (1981), Dorr (1989), and Sowa (1991).) Thus, the rule requires only information that has independent motivation for being in the lexicon.

As Selkirk noted, the same factors that govern accent placement in these constructions also constrain accent in verb phrases and sentences. In both cases the semantic interpretation of a head can be focused if its θ -complement is focused.

⁶This variation in accent is also seen in agents realized as possessives.

⁷Deverbal in the sense that they inherit the lcs of a related verb. They do not necessarily have A-structure (other than the external role for nouns).

The same rules ((31) and (32)) are operative. Thus accenting *potatoes* in *John twaddles POTATOES* can serve to focus the representation (x twaddles potatoes) and similarly, accenting *potato* in *POTATO twaddler* focuses the representation (the x such that (x twaddles potatoes)).

A central question in the study of intonation is what factors govern accent placement. I have argued here that argument structure plays no role in this determination at least as to prenominal modified noun phrases and have shown how a theory of focus like the one presented in Selkirk 1984 can be refined to account for semantic constraints for accent placement.

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