Predicate Integration: Phrase Structure or Argument Structure?

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1 Introduction

1.1 The Phenomenon

It is a well-known fact that verbs —or more generally predicates— that follow their argument often stay unaccented. This phenomenon, which we will refer to as Predicate Integration (echoing the terminology in Fuchs, 1976, 1984; Jacobs, 1992, among others), is illustrated for English in (1) and for German in (2), where capitals indicated the word bearing the final pitch accent (PA) of the sentence:

(1) a. Our DOG disappeared.
b. The PIPES are rusty.
c. The volCANoes are erupting.
d. A poLICEman called.
e. Your COAT is on fire.
f. I've got a PLANE to catch.
g. How much MONEY do you have left?
h. We should have the CARpets cleaned.

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(2) a. Sie haben ihr das FAHRrad geklaut.
they have her-DAT the bicycle stolen
'They stole her bicycle.'

b. Ich möchte auf einer INsel leben.
I like on an island live
'I'd like to live on an island.'

c. Wir sahen, wie sich EIS bildete.
we saw how self ice formed
'We saw how ice formed.'

When I say that the predicates in these sentence 'stay unaccented', I mean that placing a pitch accent on them leads to the impression of a marked, contrastive, or non-neutral intonation. Theoretically speaking, the standard notion is that a pitch accent on the predicates in these sentences indicates either narrow focus on the predicate (but not the argument), or contextual givenness of the argument (but not the predicate). The sentences as given above, on the other hand, do not indicate such a contrast in focus/givenness between predicate and argument, and indeed are infelicitous in a context that trigger narrow focus on the verb or make the argument given. In this sense we may say that the sentences above are represented in their NEUTRAL INTONATION.

Integration of predicates that follow their arguments is a very notable phenomenon: Perceptually, because it results in an unaccented content word at the end of the sentence, which is easy to detect even for naive speakers. Theoretically because it constitutes a glaring exception to the simplest form of a NUCLEAR STRESS RULE (e.g. Chomsky and Halle, 1968), which would have the final pitch accent in a sentence fall on the final content word (a rule which seems otherwise appropriate).

1.2 Outline of the Paper

The intuition I want to develop more formally in this paper is that integration is one of several phenomena in which grammar seeks to align prosody and morphosyntax, in particular, where a contrast in the prosody reflects a parallel contrast in the morphosyntax. The contrasts in the prosody is one of accenting: one element is accented, the other is not. The corresponding morphosyntactic contrast is that between arguments and predicates.

In describing integration in this way, I am deliberately emphasizing the

parallelism with another case of alignment between prosody and morphosyntax: focusing, where the same prosodic contrast (between accented and unaccented) reflects the morphosyntactic contrast between focus and background —or F-marked and not F-marked.[1]

In fact, I want to explore the idea that the two cases of alignment between prosody and morphosyntax are not just similar, but emerge through the very same set of constraints on the mapping between prosody and morphosyntax, or more precisely: the mapping of morphosyntactic contrasts onto prosodic contrasts.

In this paper I present a new formal spell-out of this idea, one which circumvents a number of problems I see with existing accounts, including my own earlier work.

2 The Proposal

It will be useful to fix some terminology. On the morphosyntactic side, I will speak of (Structural) Strength: axioms of structural strength are things like 'focus is stronger than background', 'arguments are stronger than their predicates' etc. I call these axioms because I don't want to speculate here on why, for example, focus is stronger than background, and not the other way around. In fact, one shouldn't read much into the term 'strong'; all we need is a way of imposing a (partial) ordering on categories of morphosyntactic expressions in order to correctly predict their prosodic realization.

On the prosodic side, I will speak of (Prosodic) Prominence: For now, all we need is the claim that elements that bear the Nuclear Pitch Accent are more prominent than elements that don't. In the end, I believe that prominence is more aptly defined in terms of degrees of metrical stress, but that's not required for now.

Mediating between structural strength and prosodic prominence are interface constraints that seek a parallelism between the two. In its simplest form, such a constraint states that the strongest element will be the most prominent, or that if A is stronger than B, it must be more prominent than B etc. Of course, the simplest form won't quite do; the general outline of this line of approach, however, can be schematized as in figure 1.

[1] I call focus part of the morphosyntax here, since it is assumed to be represented by F-markers in the syntactic structure. Nothing hinges on this, however: the crucial point is that prosody is aligned with something outside of prosody.

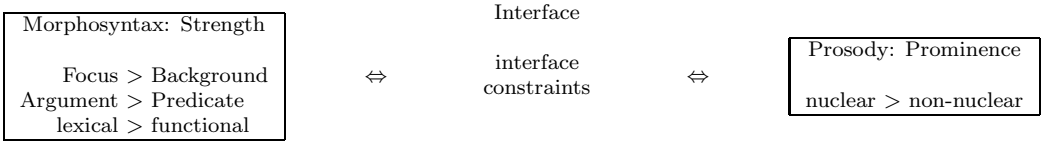


FIGURE 1: General format of the present approach.

I will now elaborate on each element in figure 1 —strength, prominence, and interface constraints— in turn.

2.1 Prosody and Prominence

We assume that prosodic structure is made up of prosodic phrases ϕ, each of which has exactly one maximally prominent daughter, its HEAD. For the kind of phrases we are dealing with here, the head is easy to identify: It is the daughter that bears the last (rightmost) pitch accent in ϕ. Other than that NUCLEAR PITCH ACCENT, a ϕ can —as far as basic prosodic wellformedness is concerned— contain any number (including zero) of PRENUCLEAR PITCH ACCENTS, about which I will say a little more in section 3 below. A prosodic phrase can thus be schematized as in figure 2; here and henceforth, the head of a ϕ is marked by an asterisk on top.

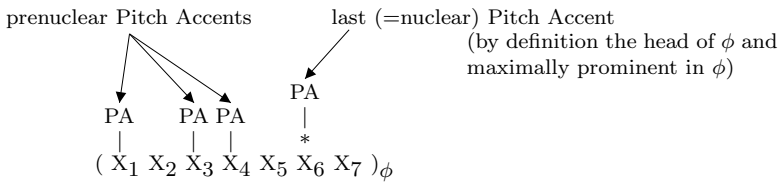


FIGURE 2: ϕ-phrases and accents; x_1 through x_7 stand for immediate constituents (daughters) of ϕ, e.g. clitic groups, prosodic words or other ϕs

We will say that all the non-head daughters in a given ϕ are (PROSODICALLY) SUBORDINATED to the head, i.e. 'less prominent'=subordinated.

Thus in figure 2, all of X_1–X_5, as well as X_7 —accented or not— are subordinated to the head, X_6.

In many of the prosodic representations to be discussed, the topmost ϕ corresponds to the intermediate phrase of intonational phonology, and its constituent parts to something like minor phrases. However, nothing in the present proposal hinges on the identity of these, or even the question of whether different levels of ϕs are distinguished by name in the grammar.

2.2 Focus, Integration and Strength

As already shown in figure 1, I will be concerned with three different dimensions of structural strength:

(3) (Structural) Strength

a. Focus Prominence (fp): F-marked elements are stronger than non-F-marked elements.[2]

b. Argument over Predicate (AoP): Arguments are stronger than their predicates.

c. Function Words < Lexical Words (FuncLex)
Function (closed class) words are weaker than lexical (content) words.

An obvious questions that needs answering is: what to do in case (3a–c) favor opposite elements? For example, what to do between a focused predicate and an unfocused argument? The former is stronger according to FP, the latter according to AoP. In order to resolve conflicts like this one, we merge the strength scales expressed by (3a–c) into one, and we do so asymmetrically, so that in case of conflicts, one takes precedence over the other. In our particular case, it is easy to see that FP must take prominence over AoP:

(4) a. (What's the condition of the pipes? —) The pipes are RUSty.
b. (We have pipes, alright, but) the pipes are RUSty.

[2]The entire discussion here is framed in terms of focusing, where the absence of F(ocus) marking is interpreted as anaphoric Givenness, as proposed in Selkirk (1984, 1995) and semantically elaborated in Schwarzschild (1999); alternatively, one could use G(ivenness)-marking instead (Wagner, 2006), or in addition (Féry and Samek-Lodovici, 2006), with the obvious changes in the corresponding strength scale (see Büring, 2008, for more discussion).

In (4a), the question triggers narrow focus on the predicate. Integration does not happen, i.e. the predicate must be more prominent than the argument, contrary to AoP. Likewise in (4b), *pipes* is Given (but *are rusty* is not), and, again, integration is impossible. In either case, *the PIPES are rusty* would be infelicitous. We thus see that FOCUS PROMINENCE is more important in determining structural strength than ARGUMENT OVER PREDICATE. It is less easy to see, but arguably correct, that AoP in turn takes precedence over FuncLex.

Before presenting the merged strength scale, I should point out that while FuncLex and FP are defined on all constituents (any constituent is either focus or background, and functional or lexical) this is not true for AoP. In particular, modifiers are not mentioned and are thus neither stronger nor weaker than arguments or predicates (similarly for arguments and predicates other than the one that selects them). That is to say, the order expressed by AoP is PARTIAL. We thus need a way to merge partial orders.

The details of such a merger are defined in the appendix (p. 21), but the resulting partial strength order is shown on the left in figure 3. Here lines correspond to greater strength from top to bottom. For example, a non-focused lexical predicate —'lex.Pred'— is stronger than any non-focused functional elements (argument, predicate, and modifier) and weaker than a non-focused lexical argument or anything focused; it is neither stronger nor weaker than a non-focused lexical modifier. The fact that there is more than a single column of elements reflects the fact that the order is partial.

The basic integration facts can be read from the strength order as follows: find predicate and argument in the ordering (i.e. are they focused or not, lexical or functional); if the argument is stronger, integration will take place, otherwise it won't.

2.3 Interface Constraints

We now turn to the interface constraint that connects strength to prominence. I will use the constraint in (5) to accomplish the mapping between strength and prominence:

(5) PROMINENCE TO STRENGTH (PROM–STRENGTH)
If A is prosodically less prominent than B, A is structurally less strong than B.

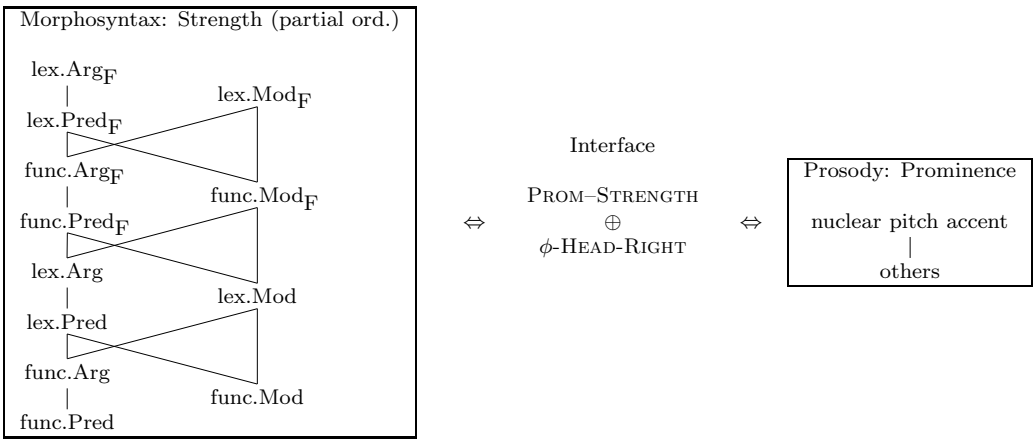


FIGURE 3: More specific schema of the present approach including fully articulated partial strength order.

According to (5), any non-head-daughter of a ϕ should be structurally weaker than the head daughter. In many cases, this will be impossible. For example, consider the case of two arguments α, β, both focused and lexical. According to the strength order, neither is stronger than the other, and nothing could be stronger than them. Yet, in a ϕ, at most one of them can be the head, the other will have to be WRONGFULLY SUBORDINATED, in violation of (5). There are now at least two choices, schematized in (6):[3]

(6) a. $(\alpha \overset{*}{\beta})_\phi$ β is the head of ϕ

[3]I sloppily call one syntactic constituent less or more prominent than another. Technically, prominence only relates *prosodic* constituents, whereas strength relates syntactic ones. We therefore define:

(i) (PROSODIC) PROMINENCE AMONG SYNTACTIC CONSTITUENTS
Syntactic constituent A is prosodically more prominent than syntactic constituent B if A is contained in some $\phi_{\ A}$ which is prosodically more prominent than some $\phi_{\ B}$ containing B.

Since in all the examples discussed in this paper, syntactic and prosodic constituents can be assumed to match closely, I will continue to use sloppy talk in the main text.

b. $(\overset{*}{\alpha}\ \beta)_{\phi}$ α is the head of ϕ

In (6a), α violates Prom–Strength, in (6b), β does. The empirically correct choice in this case is (6a): all other things (in particular: focus) being equal, the NPA falls on the rightmost element. This suggests that we have to distinguish two cases of Wrongful Subordination: prenuclear and postnuclear. The first happens frequently; it seems to be the default strategy to resolve the inevitable conflict that many elements can be maximally strong, but only one can be maximally prominent. *Post*nuclear Wrongful Subordination, on the other hand, is arguably impossible in English and German. Put differently, an element occurs in postnuclear position only when it is lower on the strength order than the element bearing the NPA.

We model this fact by conjoining (5) with a constraint that generally punishes postnuclear material, ϕ-Head-Right:

(7) ϕ-Head-Right
No prosodic phrase A appears between the right edge and the head daughter of the ϕ dominating it.[4]

(8) Prom–Strength$\oplus\phi$-Head-Right
If A is prosodically less prominent than B and to the right of B, then A is structurally less strong than B.
Violated by any element A that follows the NPA and is not weaker than the element bearing the NPA.

Prom–Strength$\oplus\phi$-Head-Right is undominated and will rule out any postnuclear Wrongful Subordination. Prenuclear Wrongful Subordinations will be caught by Prom–Strength alone, which is ranked below Prom–Strength$\oplus\phi$-Head-Right.

How does this setup trigger integration? Consider two ways of prosodifying an argument α followed by its predicate π:

(9) a. $(\alpha\ \overset{*}{\pi})_{\phi}$ b. $(\overset{*}{\alpha}\ \pi)_{\phi}$

The correct structure is (9b), in which the predicate is subordinated postnuclearly. This does not violate Prom–Strength (nor *a fortiori* Prom–

[4] A more common way of stating ϕ-Head-Right is: Align the right edge of a ϕ with the right edge of its head daughter. The present formulation is chosen to make it easier to interpret the conjunction of ϕ-Head-Right with Prom–Strength below.

STRENGTH⊕ϕ-HEAD-RIGHT), since the predicate is structurally weaker than the argument. In other words, (9b) involves LEGITIMATE SUBORDINATION. In (9a), on the other hand, the argument is subordinated to the predicate, in violation of PROM–STRENGTH (since the argument is stronger than the predicate). So although (9b) involved postnuclear subordination while (9a) involves prenuclear subordination, the former is preferred because subordination there is not wrongful.

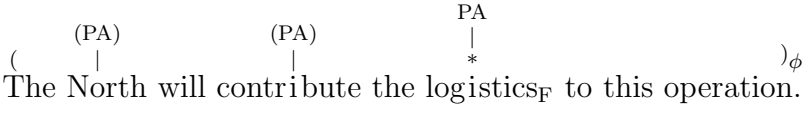
Note, on the other hand, that if π were narrowly focused (and hence α unfocused), or α were functional (and π lexical), strength relations would be reversed. In that case, (9a) is correctly predicted to be the only permitted structure. This concludes the presentation of the present system.

3 Prenuclear Accents

The system introduced so far only determines nuclear accent placement. It is silent on the question of prenuclear accents; it permits them, but doesn't require them.

Empirically, however, it is doubtful that prenuclear accents are completely optional.[5] I suspect that there are indeed two kinds of factors that result in prenuclear accenting. The first has to do with very general principles determining prosodic structure, which have the effect of ruling out long stretches of unaccented material. These could be purely prosody-internal ('eurythmic') constraints (such as 'Avoid Lapses'), or additional principles governing the syntax-to-prosody mapping, such as a principle that favors accenting open class expression, or one like STRESSXP in Truckenbrodt (1995, 1999), that wants every lexical XP to contain an accent. It is straightforward to add such constraints to the present system, and either kind will generally yield adequate prenuclear accenting (as long as it is ranked lower than PROM–STRENGTH/ PROM–STRENGTH⊕ϕ-HEAD-RIGHT, of course). As an example consider (10):

(10) (What will the North contribute in this operation? —)



[5] A fact I was reminded of by Caroline Féry and Hubert Truckenbrodt.

Since *the logistics* is a narrow focus in this sentence, PROM–STRENGTH will force the NPA onto it. Natural pronunciations of this sentence will furthermore have a PA on *North* and, likely, *contribute*. In earlier work I have referred to these as ORNAMENTAL PITCH ACCENTS, the connotation being that these are there for purposes of 'good form', rather than triggered by focus or such. A simple constraint 'Accent Content Words', ranked below PROM–STRENGTH, would yield this effect.[6,7]

The second kind of prenuclear accent pattern results where a sentence consists of more than one ϕ, each with its own NPA. Candidates for such a struture are given in (11):

(11) a. To have your CARpets cleaned is exPENsive.
b. Faule ToMAten zu werfen ist UNschön.
rotten tomatoes to throw is un-nice
'It is not nice to throw rotten tomatoes.'

In both cases there is a detectable prenuclear PA (on *carpets* and *Tomaten*, respectively). I submit that the structure of, for example, (11b), is as in (12a), not (12b):[8]

(12) a. faule Tomaten zu werfen ist unschön
b. faule Tomaten zu werfen ist unschön

In (12a), there are two levels of prosodic phrasing, resulting in two levels of NPAs: the PA on *Tomaten* is the last (and hence most prominent) in the ϕ *faule Tomaten werfen*, the PA on *unschön* is the last (and hence most

[6]Technically, the prenuclear PAs are nuclear as well, within the smaller prosodic units *the North* and *will contribute*. The difference between these kinds of prenuclear accents and the ones to be discussed below is that there is no post-nuclear subordination involved.

[7]The existence of ornamental pitch accents, though as best as I can tell undisputed empirically, is incompatible with theories that employ general constraints to the effect that non-focused (Given) material must be unaccented (such as DEACCENT GIVEN in Féry and Samek-Lodovici, 2006; Truckenbrodt, 2006, in press, or Selkirk's 1984; 1995 BASIC FOCUS RULE).

[8]I know of no systematic study that has shown whether deaccenting of *cleaned* and *werfen* in (11) is in fact obligatory. The following discussion —in keeping with my own judgements— tentatively assumes that it is, though a more systematic data base would be desirable.

prominent) in the entire sentence. I've labeled both levels of prosodic phrasing as ϕ here, but nothing hinges on this. They could be different entities (e.g. minor and major phrases) in a prosodic hierarchy, or recursive instances of the same.

If there are rules which indpendently predict the sub-phrasing in an example like (11b)/(12a), PROM–STRENGTH/PROM–STRENGTH$\oplus\phi$-HEAD-RIGHT will predict the NPA placement in each ϕ independenly, as instances of integration. Perhaps we can go further and attribute the formation of the two subordinate ϕs itself to PROM–STRENGTH/PROM–STRENGTH$\oplus\phi$-HEAD-RIGHT as well. To see how, compare (12a) to (12b): Concentrating on the lexical elements, in (12b), *faule, Tomaten* and *werfen* are all subordinated to *unschön*.[9] Since neither of them is structurally weaker than *unschön*, these are Wrongful Subordinations, yielding three violations of PROM–STRENGTH. In (12a), on the other hand, *werfen* is *legitimately* subordinated to *Tomaten* (since the former is the predicate of the latter, i.e. integration). *Faule* is still wrongfully subordinated, albeit to a different element, *Tomaten*; *Tomaten* itself is not subordinated at all, since it is the head of its ϕ. This reduces the number of wrongful subordinations to one (recall that subordinations is a relation between prosodic sisters only; hence in (12a), neither *Tomaten* nor *faule* or *werfen* are subordinated to *unschön* (nor *vice versa*)). Presumably, the ϕ *faule Tomaten werfen* as a whole should count as wrongfully subordinated, too, bringing the tally to two, which is still an improvement over the flat structure's three PROM–STRENGTH violations. The arithmetics work out quite in general: Where there is a prenuclear strength difference (such a between an argument and its predicate), formation of a subordinate ϕ will result in one fewer violation of PROM–STRENGTH.

Ostensibly, the same effect can be seen in prenuclear focus–background structures such as in (13) from Rooth (1992):

(13) An AMERican farmer was talking to a CaNAdian farmer.

Rooth (1992) proposes that *American* and *Canadian* are foci in their respective domains, *American farmer* and *Canadian farmer*. Hence by our strength ordering, each A is stronger than its N, or put differently: each N could legitimately be subordinated to its A. This can be achieved by making

[9]The functional elements, *ist* and *zu*, are subordinated, too, but legtitimately so since in either case they are subordinated to a lexical element, satisfying PROM–STRENGTH.

American the NPA in the ϕ *American farmer*, and *Candadian* the NPA in the whole sentence (plus arguably some smaller sub-unit, either *was talking to a Candian farmer* or just *a Canadian farmer*). Again, we find a nested prosodic structure with accents of different strength. The rationale, as before, would seem to be that it is preferable to, for example, legitinately subordinate *farmer* to *American* in an embedded ϕ, than to wrongfully subordinate both directly to *Canadian* in the ϕ that corresponds to the sentence.

Although this section has provided mere sketches, it has hopefully become clear that the present setup is compatible with prenuclear accents, both for purely structural reasons (e.g. 'every XP contains an accent') or as a reflex of local integration, or focus-background structures.

I will now highlight several aspects of the present proposal which set it apart from existing ones.

4 Directional Asymmetries

As pointed out, the present system deals in relative strength, and, based on that, determines the NPA position in a given domain. Thus, there is no strict correlation between the factors that influence strength (i.e. focus, predicate–argument relations etc.) and accenting. Weaker elements may well be accented, as long as they precede the NPA. Put differently, there is an inherent asymmetry: a weaker element may be accented if it happens to be pre-nuclear (i.e. is followed by a stronger element), but it can't be if it is post-nuclear.

I have pointed out one effect of this above: Prenuclear elements can be accented at will (or at the command of general constraints like 'Accent Content Words'), even if they are in the background ('ornamental accents'). The very same asymmetry occurs with integration, as is well-documented in the literature: in predicate final integration structures, accents on predicates are completely impossible; (14b) can only be understood as narrowly focusing the predicate (or interpreting the subject as given); the umarked structure is the mono-accented (14a):

(14) a. The PIPES are rusty. $\overset{\text{PA}}{\underset{*}{|}}$ (the pipes are rusty)$_\phi$

b. The PIPES are RUSTY. *(the pipes are rusty)$_\phi$

In structures in which the predicate precedes the argument, on the other hand, an accent on the predicate is perfectly possible (in addition to the nuclear accent on the argument); indeed, as shown in Gussenhoven (1983b), Nooteboom and Kruyt (1987) and Birch and Clifton (1995), the presence or absence of an accent on the predicate doesn't make a difference in whether hearers perceive the predicate as part of the focus or not:

(15) a. They are stealing our DOG. (they are stealing our dog)$_\phi$

b. They are STEAling our DOG. (they are stealing our dog)$_\phi$

Our present account predicts this pattern (as in the focus/background cases) because it only considers *relative* prominence of elements: since prenuclear accents are by definition less prominent than the nuclear one, principles which seek to express structural asymmetries such as AoP or FP can be met under regular accenting. This idea can be found at least as far back as Uhmann (1991), and has, in various implementations, been incorporated in many later approaches.[10]

5 Predicates v. Heads

I've used the terms predicate and argument without further clarification so far. To a first approximation, a predicate is the assigner of a thematic role (Θ-role), and an argument is a phrase that receives that role. I intend the notion of predicate–argument relation here to extend to cases of predicative uses of APs and PPs as in (16):

(16) a. Your COAT is on fire.
b. The PIPES are rusty.

[10]Though not in Selkirk (1995) and Truckenbrodt (2006); the former predicts accents on the predicate to be possible in either order, the latter prohibits them in both.

For all intents and purposes, the AP *rusty* and the PP *on fire*, or perhaps the VPs *are rusty/is on fire* behave like simple intransitive verbs here, and without further discussion of their finer syntactic and thematic structure I wish to conveniently subsume them under the predicate–argument label.

Likewise, resulative secondary predicates as in (17) show the same integration pattern, as do predicates in the *have* construction (18). All of these, too, should count as predicates to the arguments they integrate into:

(17) They painted the WINdows shut.

(18) a. We're having our CARpets cleaned.
b. Have you ever had your HEART ripped out?

A final case occurs with certain directional PPs as in (19) (Jacobs, 1988; Selkirk and Kratzer, 2007; Uhmann, 1991, a.o.):

(19) Wir müssen noch das HEU ins Trockene bringen.
we must still the hay into the dry bring
'We still need to get the hay to a dry place'

Here the PP *ins Trockene* behaves like a predicate that integrates with the argument *das Heu* as does the verb *bringen* (or perhaps *bringen* integrates with *das Heu ins Trockene*).[11]

It should be clear that the cases discussed in this section are nothing but a laundry list of examples that a proper theory of thematic role assignment (and hence predicate–argument relations) should capture. As such, it is not meant as an empirical argument in favor of the present proposal. I do submit, though, that at least some of these cases involve integration between

[11] I don't think that it is true in general that PP arguments behave like predicates in that way *pace* Selkirk and Kratzer (2007). Thus (ia) (their (22b)) is clearly not an acceptable all-new sentence to me: an accent on the PP argument, as in (ib), is clearly required (similarly for their (22a)):

(i) a. ... dass ein JUNge eine GEIge an einen Freund kaufte
that a boy a violin to a.ACC friend sent
'... that a boy sent a violin to a friend.'
b. ... dass ein JUNge eine GEIge an einen FREUND schickte

I believe the correct generalization to be that only truly directional PPs allow for integration. Thus only those count as predicates in the sense the term is used here.

a phrasal predicate and its argument.

6 Non-Local Integration

In appealing to the notions 'predicate' and 'argument' (or Θ-assigner/assignee), we follow Gussenhoven (1983a) in making reference to thematic structure. As Truckenbrodt (2006) points out, a more elegant theory would be one that reduces this appeal to thematic relations to syntactic structure in the narrow sense, i.e. tree-geometrical properties: since prosodic structure is arguably sensitive to syntactic structure anyway, and thematic relations are reflected in syntactic structure by way of local relations such as head–complement, a theory that constructs prosodic structure exclusively with regard to phrase structure is more simple and parsimoneous. Truckenbrodt (1995, 2006) presents just such a theory, which entails the following theorem:

(20) Truckenbrodt's Theorem:
Prosodic integration of Y into XP happens if and only if XP is within the maximal syntactic projection of Y.

In Truckenbrodt (1995, 2006), (20) follows from very general principles relating syntactic phrase structure to prosodic structure. Since by standard *syntactic* assumption, the only elements that appear within the maximal projection of a head are arguments to that head, (20) elegantly captures integration without reference to argument structure, or indeed any special provisos at all.

The reason the present system chooses the more cumbersome route of appealing to thematic relations directly is two-fold. First, as pointed out in section 5 above, it is unclear to me whether indeed all predicates are heads, and accordingly, whether their arguments are syntactic sisters to a head. Second, the predicate–argument relation is preserved Non-Locally, as I will discuss in the remainder of this section and the next. For exmple, an argument remains an argument even after promotion (raising, passivization), scrambling, or *wh*-movement. Put in transformationalist terms, A is an argument to P whenever A is the pronounced part of a chain which is Θ-marked by P, regardless of whether A is in any local tree-geometrical relation to P or not (the same reasoning applies *mutatis mutandis* if you assume that non-local relations can be base-generated). But after movement, A is no longer

a sister to P, as Truckenbrodt's Theorem (20) would require for integration to happen.

Let is look at non-local integration in more detail. We can distinguish two kinds of non-locality, for both of which integration can be observed. Cases in which an argument is external to the projection of the predicate, but string-vacuously so. And cases in which predicate and argument are separated by further material.

The former case can be observed in intransitive sentences and passives:

(21) a. A train arrived
b. Ein KIND weint.
a child cries
'A child is crying.'
c. DINner was served.[12]

In all of these, the argument is outside of the VP (and, depending on your theory of verb-second in German, outside of several further projections as well). Nevertheless, the subject here is an argument to the predicate and as such subject to AoP; therefore, integration happens.

Cases in which overt material intervenes between the predicate and the argument include (22) (modelled on one in Ladd, 1980) for English, and (23) for German:[13]

(22) (We need to know various things about you: Where are you from? What were your previous jobs? Which school did you go to?) How many LANguages do you speak?

(23) a. Ein SCHWARZmarkt ist entstanden.
a black market emerged

[12]If the predicate here is *served* rather than *is served*, (21) is not actually a case of strong-vacuous movement and properly belongs to the second class of examples.

[13]A similar configuration was pointed out in (i) from Jacobs (1988), in which a (Given) dative DP, *mir* intervenes between a subject and an integrating verb:

(i) a. Wo hast du denn das tolle Armband her?
where have you then the great bracelet from
'Where did you get that great bracelet?'
b. Das hat GERDA mir geliehen.
the-ACC has G. me-DAT loaned.
'Gerda lend it to me.'

b. EIS hat sich gebildet.
ice has self formed
'Ice formed.'

Like in the example in (21) above, the accented argument in these examples is clearly not contained in the projection of the integrating verb; even clearer so, since —unlike in these earlier cases— other material linearly intervenes between argument and predicate.

In (22) and (23), the intervening elements are functional in nature, so it is legitimate to subordinated them to the lexically headed constitutent *how many languages*. Put differently, each of *do, you* and *speak* has its own reason to prosodicaly subordinate under the object DP *how many languages*, the former two because they are functional (and the object is not), the latter because it is a predicate (and the object is its argument).

Given our claim that focus–background structure is another factor determining structural strength, and hence legitimizing post-nuclear subordination, we predict that deaccented lexical elements may intervene in the same way. Correctly, as can be seen for example in (24) from Gussenhoven (1983a):

(24) (Speaking about mysteries...) Our DOG mysteriously disappeared.

Here, *mysteriously* is Given, but *dog* and, crucially, *disappeared* are not. Deaccenting *disappeared* must thus be due to integration —across the intervening adverbial.

In German, where a predicate is routinely preceded by more than one argument, the same phenomenon can arguably be seen without movement. In (25), *(mit) Zeitung*, 'with newspaper' (which here is presumably an argument to *auslegen*, 'cover') is contextually given,[14] and integration of the accusative object and the verb proceeds across it:

(25) (Newspapers are useful for many purposes. John reads them, Sally uses them to light her fireplace and...)

[14]Without the context, integration is impossible here. That is to say, (i) is not a good out of the blue utterance:

(i) Peter hat sein/ein ZIMMER mit Zeitung ausgelegt.

(i) either indicates narrow focus on *sein Zimmer*, or on a larger predicate like *sein Zimmer ausgelegt*, where *Zeitung* must be given.

Peter hat seinen FUSSboden mit Zeitung ausgelegt.
P. has his floor with newspaper covered
'Peter covered his floor with newspaper.' [15]

The discussion in this section has provided many examples in which integration is non-local: It proceeds between independent projections, and across intervening functional and backgrounded material. The present account captures these since it makes no reference to local tree-geometrical relations, but only to argumenthood (Θ-assignment), which can be non-local (either in the base, in case a predicate has more than one argument, or mediated via movement chains).

We alluded above to more parsimoneous theories that seek to account for integration without direct reference to the predicate argument relation, either in favor of tree geometrical locality (Truckenbrodt, 2006) or locality as expressed by Chomskian phase theory (Selkirk and Kratzer, 2007). The data presented in this section present a *prima facie* challenge to such theories. For example, integration in all of these examples violates Truckenbrodt's theorem in (20) above: The argument is clearly not within the maximal projection of the integrating predicate.

One way to meet the challenge would be to incorporate into such theories a way by which local domains are enlarged through movement.[16] Crucially, however, any such account would have to be sensitive to the structural strength of the intervening material. The generalization as predicted — correctly I believe— by the present approach is that any number of elements can occur between an argument and its integrating predicate, as long as all

[15]It bears mentioning, too, that a PP with an mass complement like *mit Zeitung*, 'with newspaper' strongly resists scrambling in German. It thus doesn't seem feasible to assume that it occupies a position outside of VP, as would be required on the analysis put forth in Selkirk and Kratzer (2007).

[16]See e.g. Truckenbrodt and Darcy (in press), or Selkirk and Kratzer (2007). Selkirk and Kratzer (2007) propose that the local domain ceases to 'count' in case it is emptied by movement, in which case the larger domain (the one containing the movement target positons) counts as local. But their proposal is explicitly restricted to cases in which the entire VP from which argument and predicate originate is emptied. It is unclear, for example, how this approach could accommodate cases of subject integration like (21) above, where it is usually assumed that the subject raises out of VP, but the verb stays low. It furthermore follows from their assumptions that at least no other arguments could ever linearly intervene between an argument and an integrating predicate, as it does in examples like (22) above.

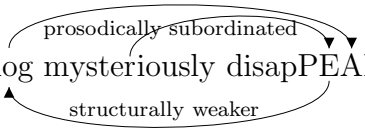
of them are structurally weaker than the argument. On the other hand, integration is blocked the moment any intervener is not itself weaker than the argument. This is the final set of cases we will discuss in the next section.

7 Interveners

So far, we have exclusively discussed cases in which predicates and arguments do integrate, even across stretches of intervening material. While problematic for certain accounts, the data so far could be captured by a much simpler, single constraint, namely one that simply bars predicates that are more prominent than their arguments in general (as is done e.g. in Büring and Gutiérrez-Bravo, 2001). But in certain configurations, predicates are systematically more prominent than their argument, namely where a modifier which is not in the background intervenes between the two, as in (26), again from Gussenhoven (1983a):

(26) (What happened? —) Our DOG mysTERiously disapPEARED.

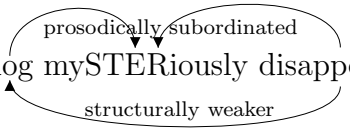
Crucially, in (26), the predicate bears the main accent: integration is not possible (I've included pre-nuclear accents on argument and modifier, in keeping with our earlier generalization that pre-nuclear accents are always possible). (27) abstractly represents strength and prominence relations in (26); arrows above the example indicate prosodic subordination, arrows below it structural weakness (recall that none of the elements is in the background, and modifiers and arguments are equally strong):

(27) 

(correct all-new)

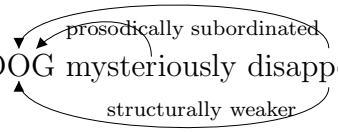
One can see that neither of the arrows on top has a correponding arrow on the bottom. What this means is that both the modifier and the argument are Wrongfully Subordinated to the predicate. Crucially, however, both arrows on the top go from left to right, in other words, this is *pre*nuclear Wrongful Subordination (see section 2.3 above for this terminology). This is crucial, because all alternative accentings involve Wrongful *Post*nuclear Subordination. If the modifier bears the NPA, the predicate would be Wrongfully

Subordinated postnuclearly:[17]

(28) 

(impossible as all-new)

If the argument bears the NPA, the predicate would be Legitimately Subordinated (there are parallel arrows above and below), but the modifier would be Wrongfully Subordinated, and postnuclearly so:

(29) 

(impossible as all-new)

So crucially, (28) and (29) involve postnuclear Wrongful Subordination, whereas the attested structure (27) —although having one more Wrongful Subordination in total than (29)— has only prenuclear Wrongful Subordinations.

This is why it was crucial to set up our constraints in such a way that even a single postnuclear Wrongful Subordination is worse than any number of prenuclear ones. The reader is invited to verify that no ranking of simple constraints like 'Arguments are more prominent than their predicates', 'Focus is more prominent than non-focus' and ϕ-HEAD-RIGHT would actually yield this result.

Of the proposals in the literature I am aware of, only Gussenhoven (1983a) and Zubizarreta (1998) correctly derive the pattern discussed in this section. They do so, however, by essentially using a separate stage or level of representation at which only focused material is considered. The present proposal is the only one I am aware of that derives it in a purely monostratal system; it furthermore connects it up to prosodic structure in general, and —unlike the two proposals just mentioned— to pre-nuclear accenting, including accenting of non-focused items (ornamental accents).

[17]Note that the verb in (28) does not count as prosodically subordinated to the subject *our dog*, even if the latter is accented (and the verb is not). Subordination only holds between non-heads and the head; whether a non-head is accented or not is irrelevant for its strength.

8 Summary

The main empirical purpose of this paper was to document the wide array of cases in which predicate integration takes place in a non-local configuration, i.e. between independent phrases and even across intervening phrases. These cases, I submit, require substantial modifications to purely phrase-structure based approaches to predicate integration such as Truckenbrodt (2006) (also adopted in Féry and Samek-Lodovici, 2006), and —for at least a subset of the cases— Selkirk and Kratzer (2007).

The generalization argued for is that predicate integration can take place whenever predicate and argument are separated at most by elements that are structurally weaker than the argument. The two classes of weaker elements discussed here were function words and contextually given elements.

I proposed to implement this by defining a structural (partial) ordering of strength that merges the different dimensions, in particular ±focus, predicate/argument, and functional/lexical. Structural strength is then mapped onto prosodic prominence by a single constraint, PROM–STRENGTH in (5), conjoined with a structural prosodic constraint, ϕ-HEAD-RIGHT. The way this captures our generalization is that elements will occur post-nuclearly (including integrated predicates) if and only if they each are structurally weaker than the element bearing the nuclear accent (the head).

The present proposal, then, fits in with current theorizing about the syntax-to-prosody mapping and its interplay with focus-marking. It integrates into such a prosody-based account an argument-structure based treatment of predicate integration, thereby adding to the empirical coverage of such theories. It finally offers a specific way to construct and combine scales of structural strength into a single partial ordering, which is then linked up to the notion of prosodic prominence and ultimately accenting.

Appendix: Formal Definitions

We model scales of strength as partially ordered sets, i.e. pairs S = ⟨D,O⟩ where D is the domain of the scale, and O is an irreflexive partial order on the elements of D. For any given poset S, we alternatively write D_S for the domain and $<_S$ for the order.[18]

[18]Where for any poset $S = \langle D, O\rangle$, any $x, y \in D, x <_S y$ iff $\langle x, y\rangle \in O$.

(30) a. pred(icates) are weaker than arg(uments)
formally: ⟨{pred,arg,mod},{⟨pred,arg⟩}⟩
b. -focus is weaker than +focus
formally: ⟨{-F,+F},{⟨-F,+F⟩}⟩
c. func(tion word) ≺ lexical/content word
formally: ⟨{func, lex⟩,{⟨func,lex⟩}⟩

Note that the scale in (30a) is itself a partial order: modifiers are not ordered with respect to arguments and predicates (see figure 4 for visualization).

We define the ASYMMETRICAL MERGER of two posets (scales) as in (31):

(31) Let S and S' be two posets, with $<_S$ and $<_{S'}$ their respective orders, and D_S and $D_{S'}$ the elements ordered by them. Then we define the GENERALIZED LEXICOGRAPHICAL ORDER (GLO) based on S and S' with S' as the primary order, written $S \prec S'$ as follows:
a. $D_{S \prec S'} = D_S \times D_{S'}$
b. For any $\langle x, y\rangle, \langle x*, y*\rangle \in D_{S \prec S'}, \langle x, y\rangle <_{S \prec S'} \langle x*, y*\rangle$ iff $y <_S y*$ or $(y = y* \wedge x <_{S'} x*)$

Note that $S \prec S' \neq S' \prec S$, since the second component order 'takes precedence' over the second. For example, in merging the scales **functional≺lexcial** (FuncLex) with the scale **predicate≺argument** (AoP), the relative ordering between a functional argument (say a pronoun) and a lexical predicate (say a verb) depends on which of the two scales serves as the primary order; the different results are given in (32):

(32) a. functional argument $<_{AoP \prec FuncLex}$ lexical predicate
b. lexical predicate $<_{FuncLex \prec AoP}$ functional argument

Which of the two is the correct choice in this particular case is, incidentally, not easy to determine, but I opt for (32a).

To illustrate with just this one case formally, we start out with the two scales in (33):

(33) a. func(tion word) ≺lex(ical word)
formally: ⟨{func, lex⟩,{⟨func,lex⟩}⟩
b. pred(icate) ≺ arg(ument)
formally: ⟨{pred,arg},{⟨pred,arg⟩}⟩

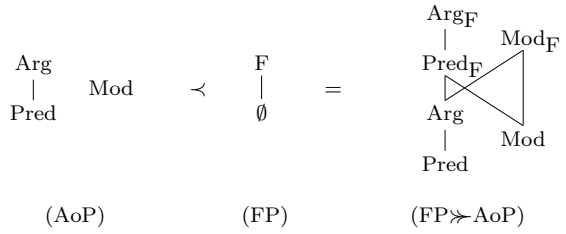


FIGURE 4: Argument-over-predicate preorder (AoP), Focus prominence (FP), and their asymmetrical merger (AoP≺FP)

The domain of the asymmetrically merged scale **(pred≺arg)≺(func≺lex)** is (34):

(34) {⟨pred,func⟩,⟨pred,lex⟩,⟨arg,func⟩,⟨arg,lex⟩}

Its ordering is (35):

(35) {⟨⟨pred,func⟩, ⟨arg,func⟩⟩, ⟨⟨pred,lex⟩, ⟨arg,lex⟩⟩, ⟨⟨pred,func⟩, ⟨arg,lex⟩⟩, ⟨⟨pred,func⟩, ⟨pred,lex⟩⟩, ⟨⟨arg,func⟩, ⟨arg,lex⟩⟩, ⟨⟨arg,func⟩, ⟨pred,lex⟩⟩}

This corresponds to the scale in (36):

(36) ⟨pred,func⟩ ≺ ⟨arg,func⟩ ≺ ⟨pred,lex⟩ ≺ ⟨arg,lex⟩

Asymmetrical merger via GLO is associative, meaning that for any posets/scales S1, S2, S3, (S1≺S2)≺S3 is the same as S1≺ (S2≺S3). It is therefore straightforward to define the asymmetrical merger of arbitrary sequences of posets via iterated binary asymmetrical merger.

For the case at hand, since one of the scales involved is itself a partial order, namely (30a), it is easiest to think of these as well as their mergers as graphs, as in figures 4 and 5. (Generally, the mergers of two scales S and S', i.e. $S \prec S'$ and $S' \prec S$, will be total orders iff both S and S' are.)

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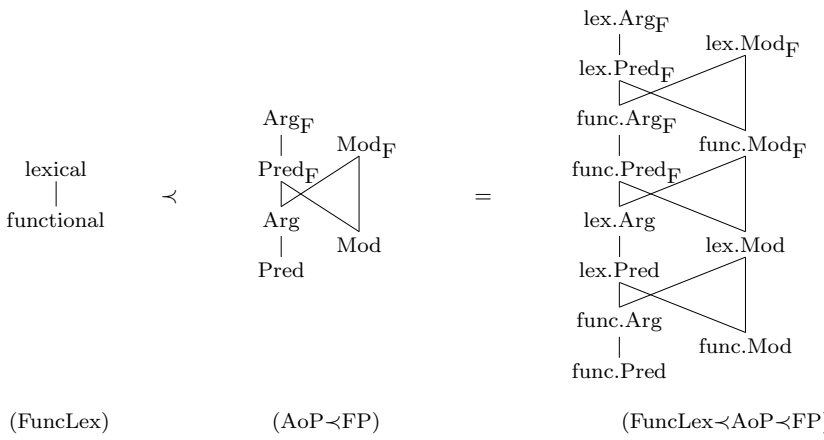

FIGURE 5: AoP≺FP from figure 4, lexical over functional (FuncLex), and their asymmetrical merger FuncLex≺AoP≺FP (brackets omitted, since asymmetrical merger is associative).

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