A Span is a Thing
A span-based theory of words

Peter Svenonius
CASTL, University of Tromsø – The Arctic University of Norway

1 Syntactic word formation

(1) The central distinctive hallmark of Distributed Morphology (DM, Halle and Marantz 1993) is “Syntax all the way down” (SAWD), as expressed in the following representative quotes.
   a. “in DM syntactic operations combine terminal nodes to create words prior to Vocabulary insertion, . . . the structure of words—the hierarchical location of affixes and so on—is determined by the syntax” Halle and Marantz (1993, 383)
   b. “Syntactic Hierarchical Structure All the Way Down entails that elements within syntax and within morphology enter into the same types of constituent structures (such as can be diagrammed through binary branching trees).” Harley and Noyer (1999, 3)
   c. “Syntax-all-the-way-down: The primary mode of meaningful composition in the grammar, both above and below the word level, is the syntax. Syntax operates on sub-word units, and thus (some) word-formation is syntactic.” Bobaljik (2017, 2)

(2) I endorse SAWD but argue that recognizing spans gets better results than using head movement (see also Hall (2015), Haugen and Siddiqi (2016), and Harizanov and Gribanova (2019) for related perspectives, and Svenonius (2012), Bye and Svenonius (2012) and Svenonius (2016b) for earlier arguments for this particular implementation).

(3) A span: a sequence of heads related by complementation

(4) Head movement (subject to the Head Movement Constraint, Travis 1984): If one head c-commands another, and no heads intervene, then the lower head can move to the higher head position.
a. Background assumption: specifiers and adjuncts are never just heads; they always project, so that they cannot intervene as heads between two heads related by complementation.

b. Background assumption: Relativized Minimality can be extended to recognize the head-phrase distinction alongside the A-A distinction as relevant to locality of movement.

(5) The background assumptions in (4) allow spans to fall out as an epiphenomenon of head movement; a span is what happens to be the input to head movement.

(6) I argue that both of the background assumptions in (4) are unmotivated. The theory of spans recognizes a particular relation among heads, that of complementation, which renders those background assumptions unnecessary.

2 Examples of Word Formation by Head Movement

(7) Head movement is the dominant theory of word formation because it has been hugely successful, both for derivation and for inflection.

(8) An example of HM in derivation, from Harley (2014): Root moves to category-defining head
A span is a thing

(9) An example of HM in inflection, from Taraldsen (1991): Norwegian N moves to definite D
   a. *hans beskriv-else av seg selv*
      his description of REFL self
      ‘his description of himself’
   b. *beskriv-else-n hans av seg selv*
      description-DEF his of REFL self
      ‘his description of himself’

(10) Taraldsen (1991)

3 Objections to Head Movement

(11) Conceptual objection: Why does D remerge with N, when D just merged with N(P) in the previous stage of the derivation?
(12) Empirical objection: Despite the position of possessors in Norwegian (and adverbs in French), the word order facts do not more broadly support head movement
a. *en grundig beskrivelse
   a thorough description
   ‘a thorough description’
b. *beskrivelse-n grundig-(e)
   description-DEF thorough-WK
   (‘the thorough description’)
c. den grundig-e beskrivelse-n
   the thorough-WK description-DEF
   ‘the thorough description’

(13) Very frequently, head movement based accounts appear to require lowering, which undermines the unification of head movement with phrasal movement

4 Spans

(14) A span is a sequence of heads related by complementation (Williams 1994; Svenonius 2012; Merchant 2015; on complementation, see Svenonius 2016a).
   a. A span is a head (a minimal X0), or
   b. a sequence of heads \( \langle h_1, h_2, \ldots \rangle \)
      such that for each \( n>1 \), \( h_n \) is the head of the complement of \( h_{n-1} \)

(15) In a Brodian representation of a tree (Brody 2000a,b), a span is a sequence of projections joined by a line sloping down to the right; lines sloping down to the left indicate specifiers and adjuncts.

(16) Heads which incorporate must be distinguished from heads which don’t

\[
\begin{align*}
\text{D@} & \quad \text{D@} \\
\downarrow & \quad \downarrow \\
\text{N@} & \quad \text{N@}
\end{align*}
\]
(17) The same trees, but with exponents added (wavy lines are not syntactic dependencies); and, to the right, flattened to allow the exponents to be linearized orthographically without crossing lines:

\[
\begin{align*}
\text{D} @ & \quad \text{D} @ & \quad \text{D} \\
\text{en} & \quad \text{N} @ & \quad \text{N} @ & \quad \text{N} @ \\
\text{hest} & \quad \text{hesten} & \quad \text{hest} \text{-en}
\end{align*}
\]

(18) A span is not a constituent, so it cannot move by itself, stranding specifiers and adjuncts. A span can be a target for lexical insertion in spell-out, both in the sense that an exponent can spell out multiple heads in a span (portmanteaux, Abels and Muriungi 2008) and in the sense that a span can define a cyclic domain for lexical insertion (stems and M-words, Svenonius 2016b).

(19) The material spelled out by a span can linearize at higher or lower positions in the span (marked with “@” in (17)), giving the impression of head movement across adjuncts and specifiers.

5 Postsyntactic word formation

(20) Not all phonological words correspond to spans

(21) For example, the English enclitic copula ’s clearly does not form a span with the last word of the subject in (21a), nor with the matrix verb in (21b) (say’s [sɛz], cf. says [sɛz]).

a. The solution you want’s not available.

b. Who did you say’s coming to the conference?

(22) For another example, the Latin enclitic coordinator que surfaces on the right edge of the first prosodic word in the right conjunct, and clearly can’t be placed there by syntax (Sadock, 1991; Marantz, 1989)

\[
\begin{align*}
\text{bon-i} & \quad \text{puer-i} & \quad \text{bon-ae-que} & \quad \text{puell-ae} \\
\text{good-M.PL.NOM} & \quad \text{boy-M.PL.NOM} & \quad \text{good-F.PL.NOM} & \quad \text{and} & \quad \text{girl-F.PL.NOM} \\
\text{‘good boys and good girls’ (NOM)} & \quad \text{(Latin, Marantz (1989); Sadock (1991))}
\end{align*}
\]

(23) So some postsyntactic operation like Morphological Merger (MM, Marantz 1984, 1989) must be available to add morphemes to syntactic words, a weakening of SAWD
(24) Postsyntactic linearization and prosodic incorporation of que, with no effect on syntax

(25) Does MM undermine SAWD entirely? Could postsyntactic MM be responsible for all word formation? Might there be no such thing as a syntactic word?

(26) No, we can distinguish between
   a. Morphosyntactic Words (MSW) which are created by syntax, and which don’t include postsyntactic material (such as clitics),
   b. and Postsyntactic words (PSW) which include whatever is added postsyntactically (including clitics).

(27) Embick and Noyer (2001): M-word: a node $X^0$ which is not contained in another $X^0$

6 Contextual allomorphy as a diagnostic for MSW

(28) A functional category (like past or plural) may correspond to alternative exponents for any of three reasons.
   a. Syntactically visible features, e.g. plural -i and -ae on the Latin adjectives in (22) due to gender features copied by syntactic agreement
   b. Phonological features, e.g. indefinite a or an in English depending on whether the following word is vowel-initial (a ripe apple, an unripe pear).
   c. Morphological or lexical features, e.g. conjugation class or declension class (e.g., has take-n, has bake-d).

(29) I will here reserve the term Contextual Allomorphy (CA) for the third case, where morphological features or lexical lists having no consistent interpretation in phonology or semantics are implicated.
(30) Contextual Allomorphy (CA) is common; simple illustrations of conjugation and declension classes:

a. Russian first and second conjugation (e.g., third plural present čita-jut ‘they read’ versus govor-jat ‘they speak’)

b. Icelandic noun declensions, e.g., some masculine noun take -ar (e.g., hest-ar ‘horses’) in the nominative plural, others take -ir (e.g., gest-ir ‘guests’) or -(u)r (fæt-ur ‘feet’)

(31) a. íslen-sk-ir hest-ar
   Iceland-ic-M.PL.NOM horse-M.PL.NOM
   ‘Icelandic horses’ (NOM)

b. íslen-sk-ir gest-ir
   Iceland-ic-M.PL.NOM guest-M.PL.NOM
   ‘Icelandic guests’ (NOM)

c. íslen-sk-ir fæt-ur
   Iceland-ic-M.PL.NOM foot-M.PL.NOM
   ‘Icelandic feet’ (NOM)

(32) Since CA is common, it is significant that it is only attested word-internally; cases of form variation across word boundaries are (almost) always analyzable in terms of copying of syntactic features (concord or agreement, (28a)) or phonological conditioning (28b).

(33) Analytically, this suggests that purely morpholexical properties (such as belonging to second conjugation or being a strong verb or being the word ox) with no semantic significance and no consistent phonological characterization are visible to lexical insertion only through a very narrow window, one no larger than the word (specifically, the MSW).

(34) Even more strongly, it seems that CA is not found in cases that strongly motivate postsyntactic MM (cf. e.g., Bobaljik 2012, Bermúdez-Otero 2016)

a. MSW, with stem change in third singular present: does, says, has, is

b. PSW, no stem change: he’s, she’s, it’s, that’s, etc.

(35) Span Adjacency Hypothesis (Merchant 2015): Given heads X and Y with exponents x and y respectively, CA between exponents x and y (x conditions a special form of y, not predictable by regular phonology of the language and not motivated by a syntactically visible feature on x) entails that heads X and Y form a span.
7 Cyclic lexical insertion

(36) CA is restricted to MSW if adjuncts and specifiers are outside a domain in which allomorph selection can take lexical identity and purely morphological class membership into consideration.

(37) The empirical observations are that the word boundary is strongly respected by CA, and the difference between MSW and PSW appears to also be respected;
   a. On the head movement approach, this suggests that there is a cycle of allomorph selection which applies to a complex $X^0$ created by head movement.
   b. On the span-based approach, this suggests that there is a cycle of allomorph selection which applies to a span.

(38) Cyclic models of lexical insertion have been developed by among others Marantz (2001); Marvin (2002); Newell (2008); Embick (2010); Bermúdez-Otero (2012); Arregi and Nevins (2012).

(39) On the model of lexical insertion detailed in Bye and Svenonius (2012), ordered stages of lexical insertion are specified.
   a. Syntactic features interact, including the copying of features by agreement, allowing concord across word boundaries.
   b. Exponents are associated with syntactic spans, including multiple associations in the case of competition (L-Match).
   c. A cycle of phonology applies to the MSW unit, winnowing the set of associated exponents (Insert), and eliminating morphological features with no phonological interpretation (Bermúdez-Otero (2012)).
   d. In the next cycle, features which were copied by syntax are preserved outside the domain of spell-out, so are accessible for L-Match, and the phonological output of the previous cycle stands, so can affect Insert of adjacent material, but there is no way to recover purely morphological information from the previous cycle.

8 Illustration of lexical insertion: íslenškír hes-tar, ‘Icelandic horses’
(40) Merge of N (with masculine gender feature) with Cl (with plural feature and probes for gender and case); followed by valuation of case and gender features

\[
\begin{align*}
\text{Cl} & : \phi_{\text{Num}} : Pl \\
& \phi_{\text{Gen}} : M \\
& \text{Case} : \text{Nom} \\
N & : \phi_{\text{Gen}} : M \\
\end{align*}
\]

(41) L-match: Association of syntactic structure with exponents with matching syntactic features

\[
\begin{align*}
\text{Cl} & : \phi_{\text{Num}} : Pl \\
& \phi_{\text{Gen}} : M \\
& \text{Case} : \text{Nom} \\
N & : \phi_{\text{Gen}} : M \\
\langle \text{M,PL,NOM} \rangle & \xrightarrow{-ar} \langle \text{A} \rangle \\
\langle \text{N,M} \rangle & \xrightarrow{-ir} \langle \text{A} \rangle \\
\text{hest}[\text{A}] &
\end{align*}
\]

(42) Syntactic information unavailable to the phonological component; Insert: Selection of the optimal exponent; Phonology: Declension class information is lost

\[
\begin{align*}
\text{Cl} & : \phi_{\text{Num}} : Pl \\
& \phi_{\text{Gen}} : M \\
& \text{Case} : \text{Nom} \\
\text{Cl} & : \phi_{\text{Num}} : Pl \\
& \phi_{\text{Gen}} : M \\
& \text{Case} : \text{Nom} \\
\text{Cl} & : \phi_{\text{Num}} : Pl \\
& \phi_{\text{Gen}} : M \\
& \text{Case} : \text{Nom} \\
\end{align*}
\]

\[
\begin{align*}
\text{hest}[\text{A}][\text{A}] & \xrightarrow{-ir} \langle \text{0} \rangle \\
\text{hest}[\text{A}] & \xrightarrow{-ir} \langle \text{0} \rangle \\
\text{hest}[\text{A}][\text{A}] & \xrightarrow{-ir} \langle \text{0} \rangle \\
\end{align*}
\]
8.1 Adjective

(43) An adjective

(44) The root allomorph len is always selected before the adjectival ending -sk: grænlenskur ‘Greenlandic’, hollenskur ‘Dutch’, útlenskur ‘foreign’ (“outlandish”). This motivates an analytic Vocabulary Item len-sk (though it is not a word: *‘land-ic’) (cf. Bermúdez-Otero 2016).

(45) In (43), len-sk doesn’t correspond to a constituent, but in the Brodian representation, the adjunct is on a left branch and len-sk spells out a span. To draw the analytic lexeme len-sk in the orthographic order, I reverse the slope of the complementation line. Portmanteau mice for comparison.

(46) Adjective stem, at the end of the stem cycle
8.2 Adj-N

(47) Adjective merged with a functional head Pos and adjoined to ClP; Agreement probes satisfied

\[
\begin{align*}
\text{Pos} & \quad \phi : \quad \text{Cl} \\
\text{Case} & \quad \phi_{\text{Num}} : \quad Pl \\
& \quad \phi_{\text{Gen}} : \quad M \\
& \quad \text{Case} : \quad Nom
\end{align*}
\]

(48) L-Match for Pos: Association of syntactic features of exponents with syntactic structure

\[
\begin{align*}
\text{Pos} & \quad \phi : \quad \text{Cl} \\
\text{Case} & \quad \phi_{\text{Num}} : \quad Pl \\
& \quad \phi_{\text{Gen}} : \quad M \\
& \quad \text{Case} : \quad Nom
\end{align*}
\]

\[
\begin{align*}
\text{íslensk} & \quad [A]-ar \\
\langle M, PL, NOM \rangle & \quad [0]-r \\
\langle M, PL, NOM \rangle & \quad -ir
\end{align*}
\]
(49) Insert for Pos: Selection of the optimal exponent

\[
\begin{array}{c}
\begin{array}{c}
\text{Cl} \\
\phi_{\text{Num}} : P_l \\
\phi_{\text{Gen}} : M \\
\text{Case} : N_{om}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\phi : M, P_l \\
\text{Case} : N_{om}
\end{array} \quad \text{hestar}
\]

\[
a \quad \langle M, P_L, N_{OM} \rangle
\]

\[
\text{íslensk} \quad -ir
\]

(50) ís-len-sk-ir \quad hest-ar

Icelandic-M.PL.NOM horses-M.PL.NOM

‘Icelandic horses’ (NOM)
9 Words not derived by movement

(51) Reversion to the unmarked word-internally

\[
\text{Íslensku} \quad \text{hest-ar-n-ir}
\]

\text{Icelandic-WK.PL horse-M.PL.NOM-DEF-M.PL.NOM}

‘the Icelandic horses (NOM)’

(52) Schematically, reverting to the Brodian convention of letting complementation slope down right, and illustrating with the definite noun with an adjective

\[
\begin{array}{c}
\text{K} \\
\text{D} \\
\text{Cl} \\
\text{n@} \\
\text{Pos} \quad \text{N} \quad \text{hestarnir} \\
\text{a@} \\
\text{íslensku} \\
\text{N} \\
\text{N}
\end{array}
\]

(53) A serious problem for the head movement derivation of a structure like \text{Íslensku hestarnir} in (52) is that the Icelandic noun shows no sign of having moved to D. It is clear that Icelandic has the basic order Dem \text{\smallprech Num} \text{\smallprech Adj} \text{\smallprech N} (Sigurðsson 1992). Following Cinque’s (2005) reanalysis of Greenberg’s Universal 20, based on a large typological survey, there is no derivation of that order in which the noun has moved to a high position.

(54) More generally, Cinque’s survey establishes that basic word order in the noun phrase never involves information-neutral movement of adnominal modifiers: the order of prenominal modifiers is particularly rigid, allowing only Dem \text{\smallprech Num} \text{\smallprech Adj} order in a large and diverse sample. So the adjective cannot have moved left across the definite-marked noun, hence the definite-marked noun must be low.

(55) CA between the root and the first suffix establishes (following the SAH in (35)) that the noun does not come to precede the suffix by phrasal movement
In fact, CA can be observed between the plural marker and the definite suffix, as well: Icelandic *menn ‘men’ is an irregular nominative indefinite plural form, but in the definite form the -ir plural shows up: *menninir, rather than *menninir as would be expected if D were simply added to the plural. So this shows that Cl and D form a span, as well.

10 Conclusion

Head movement suffers from numerous conceptual, theoretical, and empirical problems (Matushansky 2006; Hall 2015; Dékány 2018; Harizanov and Gribanova 2019, inter alios)

Head movement achieves two descriptive tasks: it describes the linearization of heads, for example in French V-to-I, and it describes word formation, for example incorporation (Baker 1988). As recently discussed by Harizanov and Gribanova (2019), however, the two frequently fail to align, as when tensed verbs in English fail to precede VP-adverbs.

However, the DM approach, with SAWD and Late Insertion as an implementation of the Separation Hypothesis, is immensely successful.

In the interest of preserving the good results of DM while eliminating the problems inherent to HM, the current proposal involves recognizing a certain syntactic relation, the one called complementation, as significant for lexical insertion.

Specifically, it involves recognizing a span as being a target for lexical insertion and a domain for linearization.

I have provided an argument that a span-based approach to spell-out gives better results than a head-movement-based approach.

Specifically, there are morphologically complex words of the type that a head movement approach should be able to derive by HM, but which do not linearize in a high position. Effectively, they look like lowering. But to adopt lowering is to abandon a central characteristic of movement, destroying the possibility of unifying HM with phrasal movement.

I have outlined an analysis of one such case in terms of spans, and shown that the problems for a head movement account are avoided. Though I have not had time here to discuss them, there are many more examples, from many languages, of the same general configuration: a low premodfier to a head with a high inflectional suffix.
References


Marantz, Alec. 2001. Words. Ms. MIT.


