Mixed categories and participles: syntax and morphology

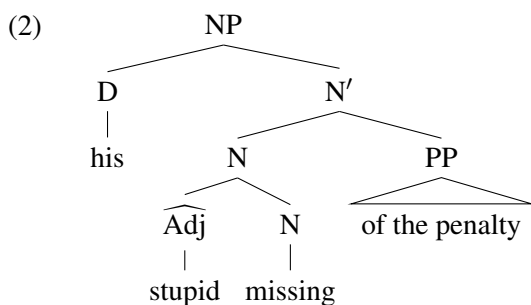John J. Lowe
University of Oxford

HeadLex16
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1 Mixed categories

Mixed categories in LFG: Bresnan (1997, 2001: 289–296), Spencer (2004), Bresnan and Mugane (2006), Seiss (2008), Nikitina (2008), Alsharif (2014), Spencer (2015), Börjars et al. (2015), and Haug and Nikitina (2015) and Nikitina and Haug (2016).
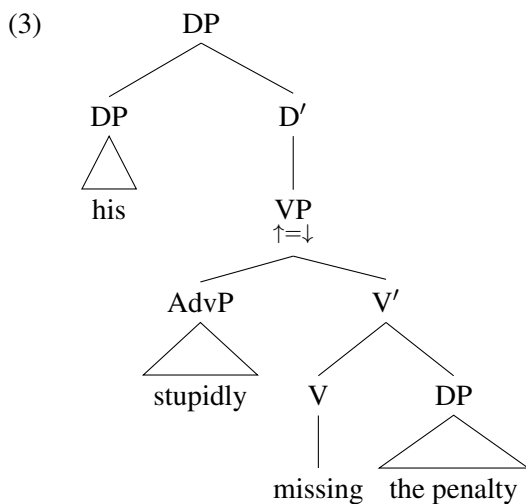
English gerund, which can display either entirely nominal, entirely verbal, or 'mixed' phrasal structure:

(1) a. His stupid missing of the penalty lost us the game.
     b. Him stupidly missing the penalty lost us the game.
     c. His stupidly missing the penalty lost us the game.
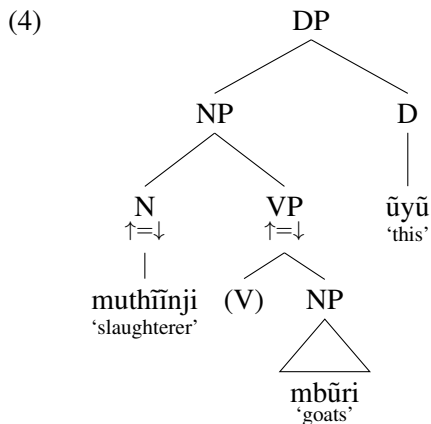
The entirely nominal structure (1a) is uninteresting:

(2)

The unambiguous mixed construction (1c), analysis of Bresnan (2001: 289–296):[1]

(3)

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[1] Unchanged in Bresnan et al. (2016: 311–319).

This exemplifies a *head-sharing construction*. 'Mixed' construction involves VP as complement of DP. A second possibility: besides having a functional category as its extended head ('lexical-functional' head sharing!), a lexical category may have another lexical category as its extended head ('lexical-lexical' head-sharing).
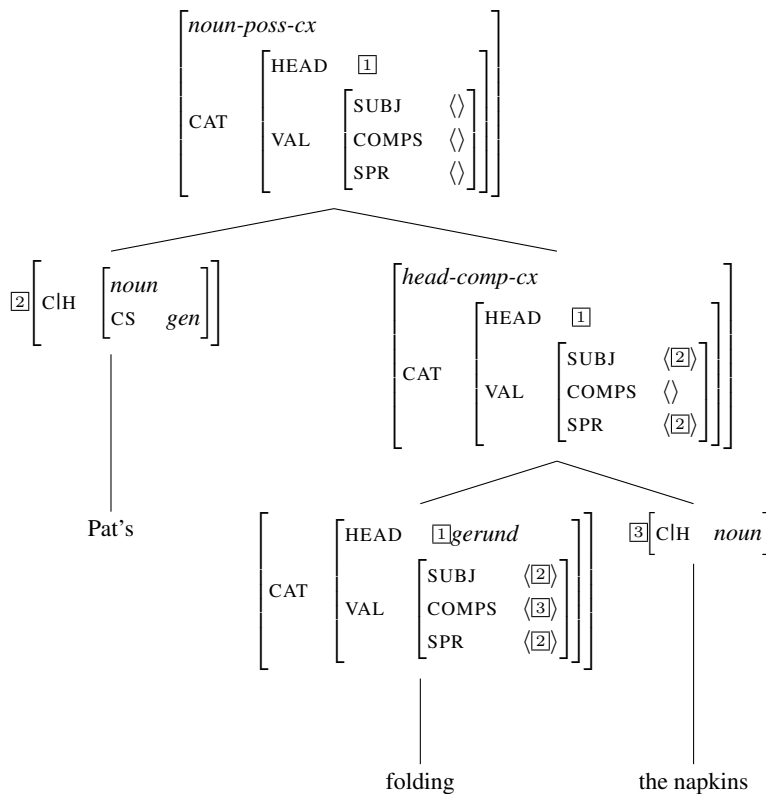
Gĩkũyũ nominalizations: VP with NP as its extended head, following Mugane (1996), Bresnan (1997) and Bresnan and Mugane (2006).

(4)

```
                        DP
                       /  \
                     NP     D
                    /  \     |
                   N    VP   ũyũ
                  ↑=↓   ↑=↓  'this'
                   |    /  \
              muthĩĩnji (V)  NP
             'slaughterer'    /\
                            mbũri
                            'goats'
```
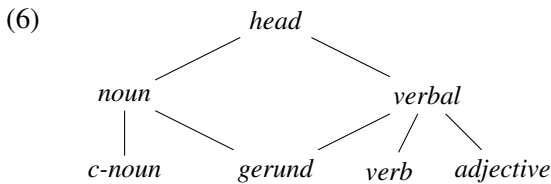
Other possibilities: Nikitina (2008) permits lexical-lexical head-sharing with head in lower projection, also IP with DP extended head; Nikitina and Haug (2016) permit S with NP extended head.

An alternative approach is to assume a separate, intermediate category. E.g. HPSG analysis of Malouf (1996, 2000a): in multiple inheritance hierarchy for HEAD values, *gerund* is a subtype of both *noun* and *verbal*.

(5)   English gerund in HPSG (Malouf 2000b: 22)

$$
\begin{bmatrix}
\textit{noun-poss-cx} \\
\text{CAT} \begin{bmatrix}
\text{HEAD} & \boxed{1} \\
\text{VAL} \begin{bmatrix}
\text{SUBJ} & \langle\rangle \\
\text{COMPS} & \langle\rangle \\
\text{SPR} & \langle\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

$$
\boxed{2}\begin{bmatrix}
\text{C|H} \begin{bmatrix}
\textit{noun} \\
\text{CS} \quad \textit{gen}
\end{bmatrix}
\end{bmatrix}
\qquad
\begin{bmatrix}
\textit{head-comp-cx} \\
\text{CAT} \begin{bmatrix}
\text{HEAD} & \boxed{1} \\
\text{VAL} \begin{bmatrix}
\text{SUBJ} & \langle\boxed{2}\rangle \\
\text{COMPS} & \langle\rangle \\
\text{SPR} & \langle\boxed{2}\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Pat's

$$
\begin{bmatrix}
\text{CAT} \begin{bmatrix}
\text{HEAD} & \boxed{1}\textit{gerund} \\
\text{VAL} \begin{bmatrix}
\text{SUBJ} & \langle\boxed{2}\rangle \\
\text{COMPS} & \langle\boxed{3}\rangle \\
\text{SPR} & \langle\boxed{2}\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\qquad
\boxed{3}\begin{bmatrix}\text{C|H} & \textit{noun}\end{bmatrix}
$$

folding   the napkins

(6)

```
                    head
                   /     \
              noun        verbal
              /  \        /  | \
          c-noun  gerund verb  adjective
```

But LFG lacks a way of truly categorizing a word as intermediate. Complex categories permit larger categories to be broken down (e.g. $V_{[tr]}$ and $V_{[itr]}$), but do not permit classification across categories. Feature breakdowns are used for cross-classification, not mixed status or underspecification.
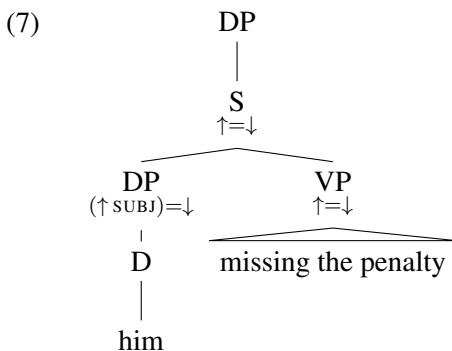
2 'Mismatched' categories

I accept the head sharing analysis for truly mixed structures like that in (1c), but some authors extend this type of analysis to structures which are not mixed in the same sense.

Internal syntax: e.g. Vs head VPs, and can take OBJ/COMP/OBL complements and adverbial adjuncts, while Ns head NPs and cannot take OBJ complements, are more restricted in taking adverbial modifiers (cannot be prenominal, at least), but do take possessive phrases and adjectival modifiers.

External syntax: Vs have certain functions in clauses, e.g. heading finite and infinitival clauses, in English; Ns have other functions, e.g. filling grammatical functions.

Morphosyntax, esp. agreement: verbs show 'verbal' agreement properties like person and number, while nouns and adjectives show 'nominal' agreement features like case and gender.

Bresnan (2001): purely verbal gerund construction in English (1b):

(7)

```
                    DP
                     |
                     S
                    ↑=↓
                  /     \
             DP          VP
        (↑SUBJ)=↓        ↑=↓
             |          /      \
             D      missing the penalty
             |
            him
```

Same kind of head-sharing analysis as the mixed gerund construction, but the only function of outer DP structure is to constrain the external syntax (the distribution of the phrase). Nothing in the internal syntax of the phrase requires a DP node: there can never be a determiner, or possessor phrase.

External syntax (and morphology) taken as sufficient for a mixed category analysis by Spencer (2015), Börjars et al. (2015), Haug and Nikitina (2015).

3 Participles

Sanskrit, attributive/adnominal use:

(8) sárasvatī   <u>sādháyantī</u>   dhíyam   naḥ
     S.NOM.SG   perfect.PTC.PRS.ACT.NOM.SG.F   thought.ACC.SG   us.GEN/DAT
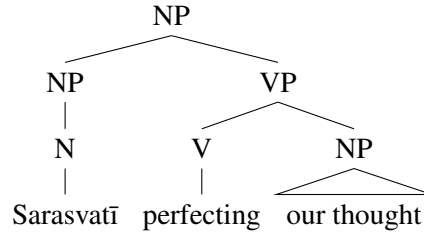   'Sarasvatī <u>who perfects</u> our thought' (RV 2.3.8a)

Lithuanian, attributive use:

(9) ateisiančios   žiemos   ilgumo
     come.PTC.FUT.ACT.GEN.SG.F   winter.GEN.SG   length
     'the length of the coming winter' (LG:355, from Spencer 2015: ex. 3)

Attributive participles can be analysed as heading an ADJ (Lowe 2015), or as heading an XADJ (Haug and Nikitina 2012, 2015, Spencer 2015).

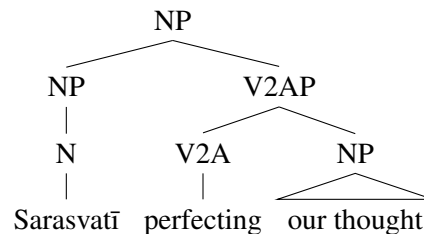At c-structure, Lowe (2015) assumes participle phrases are VPs headed by participle Vs.
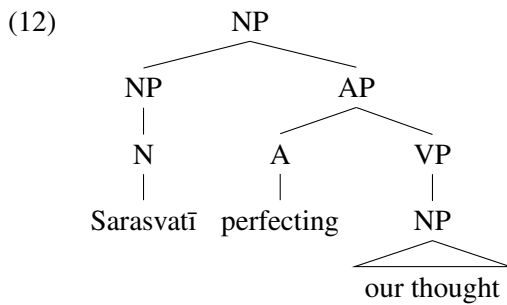
(10) Ex. (8), following Lowe (2015):

```
                    NP
              ┌──────┴──────┐
            NP             VP
             |        ┌─────┴─────┐
             N        V          NP
             |        |        ╱─────╲
         Sarasvatī  perfecting  our thought
```

But Spencer (2015) argues they are a mixed category ("verb-to-adjective transpositions"):

- Spencer (2015) adopts model of Spencer (2013), adapted to LFG: semantic argument structure representation in morphology determines category of word. Morphological process deriving participle from verb creates a composite representation, which maps to an intermediate category at c-structure.

- claims that Sanskrit/Lithuanian type participles are adjectival projections, primarily for two reasons: adjectival morphosyntax (essentially agreement), and adjectival distribution.

(11) Ex. (8), following Spencer (2015):

```
                    NP
              ┌──────┴──────┐
            NP            V2AP
             |        ┌─────┴─────┐
             N       V2A         NP
             |        |        ╱─────╲
         Sarasvatī  perfecting  our thought
```

V2A is an intermediate category, like Lapointe's (1993) ⟨N|V⟩ or Malouf's (2000a) *gerund*; but Spencer (2015) notes that an extended head analysis would work for this type of participle (cf. also Spencer 2013: 254–256).

(12)

```
                    NP
          ┌─────────┴──────────┐
         NP                    AP
          │              ┌──────┴──────┐
          N              A             VP
          │              │             │
      Sarasvatī      perfecting        NP
                                    ╱─────╲
                                  our thought
```

Against the intermediate category, note that its features must be stipulated: V2A has internal syntax of V and distribution of Adj by stipulation, not by any principle of category formation.

But why does Spencer (2015) assume a mixed category? Internal syntax is *exclusively* verbal. For Spencer (2015), external syntax and morphology are sufficient to justify a mixed category. Same for German participles in Bresnan (1997).

4   External syntax

External syntax (distribution) is key to several 'mixed category' proposals: Bresnan (2001) on the fully verbal English gerund, Spencer (2015) on attributive participles, Haug and Nikitina (2015) on Latin 'dominant' participle construction, Börjars et al. (2015) on Arabic masdars.

External syntax tells us very little:

- Different category types may have (roughly/exactly) the same distribution;

- Many positions can be filled by more than one (or almost any) phrase type.

English: Seiss (2008) discusses a number of tests which have been proposed to show that English gerunds, including the fully verbal gerund (1b), have external syntax of nouns: functioning as subject or object, complementing prepositions, coordination with NPs, *it*-replacement, tough movement, topicalization, clefting, and pseudo-clefting. Seiss shows, partly building on Kim (2003), that all these tests also apply to CPs or IPs, especially *that*-clauses (CPs) and *to*-infinitive clauses (IPs).

(13)   a. Joining the club is objected to. (subject)

      b. We object to joining the club. (object)

      c. We thought about joining the club. (preposition complement)

      d. We object to joining ourselves and your decision to join. (coordination with NP)

      e. We object to it. (*it*-replacement)

      f. Joining the club is hard to object to. (tough movement)

      g. Joining this club, we don't want to object to. (topicalization)

      h. It was joining the club that we objected to. (clefting)

      i. What we want to object to is joining this club. (pseudo-clefting)

(14)   a. To see is to believe. / That he arrived very early surprised everyone. (Kim 2003: 128)

b. I like to play tennis. / No one remembered that he arrived very early. (Kim 2003: 128)

c. Let me think about what the consequences will be. / It depends on whether you have the intention to do it or not. (Kim 2003: 128–129)

d. That I would go to Spain and my decision to do so quickly upset my family.

e. I decided that I should go to Spain although it upset my family.

f. To go to Spain was hard for me to decide.

g. That I should go to Spain, I decided.

h. It was to go to Spain that I decided.

i. What I decided was that I should go to Spain.

Complication: Bresnan et al. (2016: 15–19) argue that we are dealing with two different positions. E.g., auxiliary inversion is impossible with 'subject' *that*-CPs, while it is unproblematic with subject DPs:

(15)   a. *That/that he fell over* was quite unexpected.

b. Is *that/*that he fell over* unexpected?

c. How unexpected was *that/*that he fell over*.

Bresnan et al. (2016) argue that 'subject' CPs do not appear in the structural subject position in English, SpecIP, but in a higher, adjoined, topic position; they propose that SpecIP can only be filled by noun phrases. Similarly, complement clauses are not OBJ because they cannot generally enter into the passive alternation (Bresnan et al. 2016: 18):

(16)   a. I don't care that languages are learnable.

b. *That languages are learnable isn't cared.

But Alsina et al. (2005) show that certain complement clauses in Catalan can become passive subjects, and in fact the same is also true with some verbs in English, including some that take *that*-CP complements:

(17)   a. We did not debate whether this was a good thing. / Whether this was a good thing was not debated.

b. They did not consider why he had come. / Why he had come was not considered.

c. They soon forgot that he had previously criticized them. / That he had previously criticized them was soon forgotten.

Clauses introduced by wh-words can relatively freely serve as passive subjects. In addition, subject wh-clauses can even undergo auxiliary inversion, suggesting that they can, in fact, appear in SpecIP, despite being clausal:

(18)   a. Whether he knows is not relevant.

b. Is whether he knows relevant?

c. How relevant is whether he knows?

The data for embedded clauses serving as subjects and objects is therefore relatively complicated, but it does not seem possible to restrict the canonical subject and object positions (and SUBJ and OBJ roles at f-structure) to noun phrases. Consequence is that distribution cannot necessarily be used as a sufficient criterion, on its own, for a particular syntactic categorization.

Thus for the fully verbal English gerund, while the evidence of internal syntax necessitates a VP projection, the evidence of distribution does not necessitate a DP projection above this.

(19)   Seiss (2008):

$$
\begin{array}{c}
\text{VP} \\
\diagup \quad \diagdown \\
\underset{(\uparrow\text{SUBJ})=\downarrow}{\text{NP}} \qquad \underset{\uparrow=\downarrow}{\text{V}'} \\
\mid \qquad\qquad \diagup \quad \diagdown \\
\text{him} \qquad \underset{\uparrow=\downarrow}{\text{V}} \quad \underset{(\uparrow\text{OBJ})=\downarrow}{\text{DP}} \\
\mid \qquad\qquad \\
\text{missing} \quad \text{the penalty}
\end{array}
$$

Same is true of participle phrases in Sanskrit (and Lithuanian, etc.). Functioning as an adjunct does not mean we have an AdjP, since relative clauses can function as adjuncts, and these are definitely not AdjPs.

Even if external syntax were crucial, Sanskrit participles do not have the same distribution as adjectives: e.g., adjectives can function as matrix clause predicates, while participles cannot.

Rather, it is the internal syntax of a phrase that is key to determining its category. When we consider the internal syntax of NPs and CPs, the difference is obvious.

Clearly, if the fully verbal English gerund heads a VP (or e.g. S), and the Sanskrit participle heads a VP, we need to ensure that these are restricted in their distribution, so e.g. they cannot function as the head of a main clause. But constraining this is trivial, either via complex categories, or via f-structure annotations referring to VFORM.

(20) $\text{VP}_{[ptc]} \rightarrow \ldots \quad \underset{((X)\text{ADJ} \in \uparrow)}{\text{V}'_{[ptc]}} \quad \ldots$

(21) $\text{NP} \rightarrow \ldots \quad \underset{\substack{\downarrow \in (\uparrow (X)\text{ADJ}) \\ (\downarrow \text{VFORM}) = \text{PARTICIPLE}}}{\text{VP,}} \quad \underset{\uparrow=\downarrow}{\text{N}} \quad \ldots$

5   Morphology and agreement

Spencer (2015): participles are categorially adjectives (at least partially), because they show adjectival agreement (and adjectival distribution).

Diachronically, this argument is weak: in many languages participles or agent nominalizations have been reanalysed as finite verb categories, without changing their morphology. E.g. Slavic past tense verbs in *-l-*, originally from a verbal adjective, agree in gender and number with their subject, showing same morphological forms as ordinary nouns/adjectives, very different from morphology of other finite verbs, which agree in person and number.

Categoriality may change but this does not necessitate a change in morphology. If an adjective category were reanalysed as a non-finite verb category, i.e. a participle, it could be a V in category terms, but would have no reason to lose its adjectival agreement.

But Spencer (2015) reasonably argues that participial adjectival agreement should not be an accident, synchronically.

Dalrymple (2015): model for morphology within LFG. Not a theory of morphology, but a way of representing the contribution of morphology to the syntactic properties of words.

Lexical entries are built out of lexemic entries LE, the realization relation R, and the functional description function D.

LE is a three-place relation defining: the form(s) of the root; f-descriptions common to all forms of the lexeme; the Lexemic Index (LI), a unique identifier of the lexeme.

(22) LE <{ROOT:dog}, {($\uparrow$ PRED)='dog'}, DOG1>

R is a set of four-place relations, *m-entries*, which associate a LI, an s-form, and a p-form with a set of m-features.

(23) M-entry for word form *dogs*:
      R <DOG1, dogs, /dɔgz/, {M-CAT:NOUN, M-NUM:PL}>

D maps a set of m-features to the relevant c-structure category and f-descriptions, given a particular LI:

(24) Description function D for *dogs*:
      D <DOG1, {M-CAT:NOUN, M-NUM:PL}, N, {($\uparrow$ NUM) = PL}>

Components of D can be specified separately, in particular Dalrymple (2015) defines a description function D_{cat} which specifies the c-structure category alone, based on the LI and m-features.

We can assume that the lexemic entry for a verbal root will look something like:

(25) LE <{ROOT: gam; STEM1: gaccha}, {($\uparrow$ PRED)='go'}, GO1>

There will be a morphological realization relation R that specifies the properties of the nom. pl. masc. present participle *gácchantaḥ* 'going':

(26) R <GO1, gacchantaḥ, /gátʃantah/, {M-TENSE:PRES, M-VOICE:ACT, M-CAT:ADJ, M-CASE:NOM, M-NUM:PL, M-GEND:MASC}>

The set of m-features specified here can be understood as the union of two distinct sets of m-features: the set associated with the morphology of the present verbal stem (*gáccha-*), and the set associated with the adjectival suffix. Abstracting over the adjectival m-features using a template, we rewrite (26) in the following way:

(27) R <GO1, gacchantaḥ, /gátʃantah/, {M-TENSE:PRES, M-VOICE:ACT, @M-ADJ(NOM,PL,MASC)}>

where the template has the following definition:

(28) M-ADJ(_CASE,_NUM,_GEND) ≡ M-CAT:ADJ, M-CASE:_CASE, M-NUM:_NUM, M-GEND:_GEND

This permits us to generalize over the morphological contribution of specific morphological categories and classes. So the instantiation of (28) with the arguments NOM, PL and MASC produces a set of m-features which is associated with every nom.pl.masc. adjective in the language. Thus morphological 'adjective-hood' has a unified and coherent morphological contribution in the lexicon.

In order to produce a lexical entry, we also require a description function D, which maps the set of m-features to the appropriate c-structure category and f-description. For the most part, trivial: M-TENSE:PRES maps to (↑ TENSE = PRES), etc. What matters is the c-structure category. Dalrymple (2015) proposes the following structure for D_{cat}:

(29) D_{cat} <LI, m-features, N> iff M-CAT:N ∈ m-features.
      D_{cat} <LI, m-features, V> iff M-CAT:V ∈ m-features.
      D_{cat} <LI, m-features, Adj> iff M-CAT:ADJ ∈ m-features. etc.

These examples represent the expected mappings, likely to be default cross-linguistically. However, the ability to specify these mapping by the lexemic index LI means that in principle the mappings between M:CAT features and grammatical category need not be uniform, even within a single language. So we can assume that the following applies for all lexical adjectives in Sanskrit:

(30) D_{cat} <LI_{adj}, m-features, Adj> iff M-CAT:ADJ ∈ m-features.

using LI_{adj} to generalize over the set of lexemic indices associated with lexemic entries which are fundamentally adjectival, i.e. {HAPPY1, SAD1, TALL1, SHORT1...}.

However, we can assume that in the case of morphological adjectives based on verbal lexemes, we have a different specification:

(31) D_{cat} <LI_{vb}, m-features, $V_{[ptc]}$> iff M-CAT:ADJ ∈ m-features.

where LI_{vb} refers to any LI associated with a verbal lexeme, i.e. {GO1, FIND1, LOVE1...}.

Thus, although the morphological adjective-hood of a participle supplies the same m-features as for any lexemic adjective, the one specifying grammatical category is treated differently due to the verbal nature of the base lexeme, resulting in a mapping from M-CAT:ADJ to the grammatical category $V_{[ptc]}$ in the case of participles.

6 Conclusion

- Two distinct phenomena have become conflated under the 'mixed category' heading; only one type is truly 'mixed';

- of three properties invoked in the analysis of a phrase as 'mixed' (internal syntax, external syntax, morphology), only one (internal syntax) is crucial for mixed category status;

- mismatch between internal and external syntax does not necessitate a mixed category analysis;

- morphological mismatch can be accounted for, e.g. using the morphology model of Dalrymple (2015).

References

Alsharif, Ahmad. 2014. *The Syntax of Negation in Arabic*. Ph. D.thesis, University of Essex.

Alsina, Alex, Mohanan, K. P. and Mohanan, Tara. 2005. How to get rid of the COMP. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG05 Conference*, Stanford, CA: CSLI Publications.

Börjars, Kersti, Madkhali, Safiah and Payne, John. 2015. Masdars and mixed category constructions. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG15 Conference*, pages 26–42, Stanford, CA: CSLI Publications.

Bresnan, Joan. 1997. Mixed Categories as Head Sharing Constructions. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG97 Conference*, Stanford, CA: CSLI Publications.

Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Oxford: Blackwell.

Bresnan, Joan, Asudeh, Ash, Toivonen, Ida and Wechsler, Stephen. 2016. *Lexical-Functional Syntax*. Oxford: Wiley-Blackwell, second edition. First edition by Joan Bresnan, 2001, Blackwell.

Bresnan, Joan and Mugane, John. 2006. Agentive Nominalizations in Gĩkũyũ and the Theory of Mixed Categories. In Miriam Butt, Mary Dalrymple and Tracy Holloway King (eds.), *Intelligent Linguistic Architectures: Variations on themes by Ronald M. Kaplan*, pages 201–234, Stanford, CA: CSLI Publications.

Dalrymple, Mary. 2015. Morphology in the LFG Architecture. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG15 Conference*, pages 43–62, Stanford, CA: CSLI Publications.

Haug, Dag T. T. and Nikitina, Tanya. 2012. The Many Cases of Non-Finite Subjects: The Challenge of "Dominant" Participles. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG12 Conference*, pages 292–311, Stanford, CA: CSLI Publications.

Haug, Dag T. T. and Nikitina, Tanya. 2015. Feature sharing in agreement. *Natural Language & Linguistic Theory* Online First.

Kim, Jong-Bok. 2003. A constraint-based approach to English gerunds. *Language and Information* 7(2), 117–137.

Lapointe, Steven G. 1993. Dual lexical categories and the syntax of mixed category phrases. In A. Kathol and M. Bernstein (eds.), *Proceedings of the Eastern States Conference on Linguistics*, pages 199–210, Ithaca, NY: Cornell University.

Lowe, John J. 2015. *Participles in Rigvedic Sanskrit: The Syntax and Semantics of Adjectival Verb Forms*. Oxford: Oxford University Press.

Malouf, Robert. 1996. A constructional approach to English verbal gerunds. In *Proceedings of the Twenty-Second Annual Meeting of the Berkeley Linguistics Society: General Session and Parasession on the Role of Learnability in Grammatical Theory*, pages 255–266, Berkeley: Berkeley Linguistics Society.

Malouf, Robert. 2000a. *Mixed Categories in the Hierarchical Lexicon*. Stanford, CA: CSLI Publications.

Malouf, Robert. 2000b. Verbal gerunds as mixed categories in HPSG. In R. Borsley (ed.), *The Nature and Function of Syntactic Categories*, pages 133–166, New York: Academic Press.

Mugane, John M. 1996. *Bantu Nominalization Structures*. Ph. D.thesis, University of Arizona, Tucson.

Nikitina, Tatiana V. 2008. *The Mixing of Syntactic Properties and Language Change*. Ph. D.thesis, Stanford University.

Nikitina, Tatiana V. and Haug, Dag T. T. 2016. Syntactic nominalization in Latin: a case of non-canonical subject agreement. *Transactions of the Philological Society* 114(1), 25–50.

Seiss, Melanie. 2008. The English *-ing* Form. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG08 Conference*, pages 454–472, Stanford, CA: CSLI Publications.

Spencer, Andrew. 2004. Towards a typology of mixed categories. In C. Orhan Orgun and Peter Sells (eds.), *Morphology and the web of grammar: Essays in memory of Steven G. Lapointe*, Stanford, CA: CSLI Publications.

Spencer, Andrew. 2013. *Lexical Relatedness: A Paradigm-Based Approach*. Oxford: Oxford University Press.

Spencer, Andrew. 2015. Participial relatives in LFG. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG15 Conference*, pages 378–398, Stanford, CA: CSLI Publications.