Ground promotion and complex particle constructions in Norwegian

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ABSTRACT

This paper presents an HPSG analysis of Norwegian particle constructions with Ground promotion, as exemplified in (1), where *av* 'off' functions as a particle and the object *bordet* 'the table' is a Ground argument.[1]

(1)   Jeg rydder AV bordet.
        I   clear   off table.DEF
        'I clear the table.'

    It will be shown that the Ground promotion construction has similarities with both regular particle constructions and constructions with selected prepositions, and an analysis will be presented where Ground promotion is assumed to be a combination of these two constructions, *viz.* a complex particle construction. The analysis is implemented in a bidirectional typed feature structure grammar, and it will demonstrate that unification and type inheritance facilitates the merger of two constructions into one, while simultaneously allowing them to be kept apart.

Keywords:
Ground
promotion,
complex particle
constructions,
Norwegian,
HPSG, Principles
and Parameters,
type hierarchies,
subconstructions

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[1] In order to make the presentation of the data more accessible to non-Norwegian readers, this paper differentiates particles from prepositions by capitalizing particles in all examples, and presenting prepositions in lower case letters.

1   INTRODUCTION

The term 'Ground promotion' signifies the process where a Ground
element, typically the reference point for the movement or location
of another object known as the Figure, is elevated to the role of di-
rect object. This can be observed in the shift from a sentence like 'I
poured the water out,' where 'water' serves as the Figure, to 'I poured
the bucket out,' in which the Ground 'bucket' takes the direct object
position (McIntyre 2007).[2]

Ground promoting constructions have low frequency, and the
suppressed Figure seems to be a conventionalized or a contextually
salient object (Aa 2021, 228). While there are very few Ground pro-
moting constructions in English, they are more frequent in Norwegian.
Aa (2021, 231–233) lists 35 different constructions, and he shows that
some of the Norwegian ones such as *slikke av* 'lick off' and *skjenke i*
'pour', appear more often with Ground objects than with Figure ob-
jects (Aa 2021, 233–235).

Ground promotion constructions in Norwegian (see (2a)) are sim-
ilar to regular Figure retention constructions (see (2b)) in that the verb
and the particle form an intonational unit (Aa 2020, 2021). In many
Norwegian dialects they are pronounced as a single word with tone 2.[3]

(2)   a. Jeg rydder AV bordet.   (Ground)
             I   clear   off table.DEF
             'I clear the table.'

         b. Jeg rydder AV koppene. (Figure)
             I   clear   off cups.DEF
             'I clear the cups.'

The Ground promotion construction is similar to selected prepo-
sition constructions in that the preposition must appear to the left of

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[2] The terms Figure and Ground stem from Talmy (1972), who defines Figure
as "the object which is considered as moving or located with respect to another
object" and Ground as "the object with respect to which a first object is consid-
ered as moving or located" (Talmy 1972, 11).

[3] Most Norwegian dialects distinguish between two pitch acccents on words
with more than one syllable: tone 1 and tone 2.

the object. The examples in (3) demonstrate that if the preposition appears to the right, the object must be interpreted as a Figure.

(3)   a. # Jeg rydder bordet   AV. (Ground)
              I   clear   table.DEF off

      b. Jeg rydder koppene AV. (Figure)
         I   clear   cups.DEF off
        'I clear the cups.'

Ground promotion constructions are special in that in colloquial Norwegian they may have similarities with complex particle constructions. When both the Figure and the Ground are present, the particle may appear together with a selected preposition of the same form, as shown in (4a). This is also possible if the Figure is omitted. The Ground object then follows a particle and a preposition which share the same form, as shown in (4b). The meaning of (4b), with a particle and a preposition, is the same as the meaning of (2a), which only has the particle.[4]

(4)   a. Jeg rydder AV koppene av bordet.   (Figure & Ground)
         I   clear   off cups.DEF off table.DEF
        'I clear the cups off the table.'

      b. Jeg rydder AV av bordet.   (Ground)
         I   clear   off off table.DEF
        'I clear the table.'

The aim of this paper is to investigate Ground promotion constructions and their similarities to complex particle constructions, and to provide an account that captures this similarity. I will base my proposal on ideas from the Principles and Parameters framework (P&P), especially Aa 2020. However, the framework used for the analysis is an HPSG-inspired typed feature structure grammar. It will make extensive use of types and their positions in type hierarchies. A detailed description of the implementation of the analysis will be provided.

The paper is organized into two parts. The first part, consisting of Sections 2–6, presents old and new data as well as previous analyses. Section 2 surveys existing work on particles in Norwegian. In

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[4] See Section 5 for discussion of this kind of complex particle constructions.

Section 3, I describe Norwegian multi-word expressions involving particles and prepositions, and show that a verb may alternate between a range of frames. In Section 4, I examine four of the Norwegian Ground Promotion constructions (*ha på* 'put on', *trekke av* 'pull off', *skjenke i* 'pour', and *trekke fra* 'deduct'), and demonstrate that they can appear also as Figure Retention particle constructions and that both the Figure and the Ground can be expressed simultaneously. In Section 5, I will compare the ground promotion constructions with complex particle constructions, and suggest that ground promotion constructions always have a complex particle variant. Section 6 presents Aa's (2020) analysis of Ground promotion.

The second part, consisting of Sections 7–10, develops an analysis of these data within the framework of a typed feature structure grammar. Section 7 shows how complex particle constructions can be accounted for within this framework by decomposing constructions into subconstructions, and Section 8 extends the account to Ground Promotion constructions. The analysis relies heavily on type hierarchies, and is explicit enough to allow implementation. Sections 9 and 10 examine the implications of the analysis for parsing and generation, as well as its applicability to other grammatical frameworks.

Finally, Section 11 summarizes and discusses the findings of the paper.

2 PREVIOUS WORK ON PARTICLES IN NORWEGIAN

Particles are a widely studied topic in Norwegian syntax, dating back to Aasen (1848) (who refers to them as adverbs). In a discussion about their position with regard to the object, Aasen shows that the particle (or adverb) either appears before the object, as shown in (5a), or after the object, if it is a pronoun (see (5b)).

(5) a. Han slo AV staven   sin.
         he   hit off stick.DEF REFL
         'He broke his stick.'

b. Han slepte dei   INN.
   he   let   them   in
   'He let them in.'

In a thorough investigation of the Norwegian Romsdal dialect, Sandøy (1976) notes that there is a difference between *non-spatial* and *spatial* particle constructions. While the particle in the Romsdal dialect must appear to the left of the object in non-spatial particle constructions like *las opp* 'read aloud', similar to Aasen's (1848) example in (5a) (see (6)), it can appear on either side of the object in spatial particle constructions like *skubbe frå* 'push away', as shown in (7).[5,6]

(6)   a. Han las   OPP brevet.   (Sandøy 1976, 108)
         he   read up   letter.DEF
         'He read the letter aloud.'

      b. * Han las   brevet   OPP.
           he   read letter.DEF up

(7)   a. Han måtte   skubbe båt'n   FRÅ.
         he   must-PRF push   boat.DEF from
         (Sandøy 1976, 103)

         'He had to push away the boat.'

      b. Han måtte   skubbe FRÅ   båt'n.
         he   must-PRF push   from boat.DEF
         'He had to push away the boat.'

Building on findings of Aasen (1848), Sandøy (1976), and Åfarli (1985), among others, Aa (2020, 2021) presents an analysis of particle constructions within X-bar theory (Chomsky 1970), adopting Borer's (2005a; 2005b) neo-constructionist, exoskeletal approach. Aa brings attention to Norwegian Ground promotion constructions, the topic of this paper, which have so far been little studied in the literature. I will return to Aa's analysis of Ground promotion promotion constructions in Section 6.

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[5] The ungrammaticality of (6b) is limited to some dialects of Norwegian.

[6] Sandøy (1976, 103) marks (7b) as preferred to (7a), but they are both acceptable.

3   COMPLEX PARTICLE CONSTRUCTIONS

Multi-word expressions with particles and selected prepositions are very common in Norwegian, and many verbs alternate between several frames. For example, the verb *bytte* 'change' is listed with 10 frames in the Norwegian LFG grammar NorGram (Dyvik 2000; Butt *et al.* 2002), see (8).[7] Among the ten frames, only two (see (8a) and (8b)) do not involve a particle or a selected preposition.

(8)   a. Jeg bytter.
          I   change
          'I change.'

      b. Jeg bytter klær.
          I   change clothes
          'I change clothes.'

      c. Jeg byttet   INN boka.
          I   changed in   book.DEF
          'I exchanged the book.'

      d. Jeg byttet   OM   stolene.
          I   changed about chairs.DEF
          'I changed the chairs.'

      e. Jeg bytter   til kløver.
          I   change to clubs
          'I switch to clubs.'

      f. Jeg byttet   med deg.
          I   changed with you
          'I traded with you.'

      g. Jeg byttet   kort med deg.
          I   changed cards with you
          'I traded cards with you.'

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[7] The searches in the NorGram lexicon referred to in this article used in the 2019-11-21-release, downloaded October 17, 2023. Only the Bokmål part of the lexicon has been searched.

h. Vi byttet   på å kjøre.
we changed on to drive
'We took turns driving.'

i. Jeg byttet   UT dieselbilen.
I   changed out diesel car.DEF
'I replaced the diesel car.'

j. Jeg byttet   UT dieselbilen   med en elbil.
I   changed out diesel car.DEF with an electric car
'I replaced the diesel car with an electric car.'

Three of the frames assigned to *bytte* are regular particle constructions (see (8c), (8d), and (8i)). Four of the frames are selected preposition constructions (see (8e), (8f), (8g), and (8h)). Finally, one of the frames is a combination of a particle construction and a selected preposition construction, constituting a *complex particle construction* (see (8j)). The construction *bytte ut med* 'replace with' has a particle *ut* 'out' and a selected preposition *med* 'with'.[8]

A search in the NorGram lexicon files reveals a set of 3067 particle constructions and 3505 selected preposition constructions. Of these, 221 are complex particle constructions, like *bytte ut med* 'replace with'. Given the large number of complex particle constructions, one would expect some of them to have the same form for the particle and the selected preposition. However, there is no such example among the 221 complex particle constructions.[9]

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[8] We can tell that *ut* 'out' is a particle since it may be pronounced together with *bytter* 'change' as a single word in some dialects, and it will appear after the object if the latter is a light pronoun (see (i)).

(i)   Jeg byttet   den UT med en elbil.
I   changed den out with an electric car
'I replaced it with an electric car.'

[9] In Section 5 I will suggest an explanation why the particle and the preposition always differs in the 221 complex particle constructions.

4   GROUND PROMOTION CONSTRUCTIONS

In the 35 Ground promotion constructions Aa (2021, 231–233) lists for Norwegian, the preposition *på* 'on' appears in nine instances, *til* 'to' in three, *av* 'off' in twelve, *for* 'for' in one, *i* 'in' in seven, *over* 'over' in two, and *fra* 'from' in one. Examples of Ground promotion constructions with four of the prepositions are given in (9).

(9)   a. ha   PÅ brødskiva
           have on slice-of-bread.DEF
           'put spread on the slice of bread'

       b. trekke AV platen
           pull   off hotplate.DEF
           'pull something off the hotplate'

       c. skjenke I   glasset
           pour   in glass.DEF
           'pour the glass'

       d. trekke FRA skatten
           deduct from tax.DEF
           'deduct from taxes'

All the examples in (9) may also be Figure retention particle constructions, illustrated with the examples in (10).

(10)   a. ha   PÅ pålegget
           have on spread.DEF
           'put on the spread'

       b. trekke AV kasserollen
           pull   off saucepan.DEF
           'pull the saucepan off the hotplate'

       c. skjenke I   drikken
           pour   in drink.DEF
           'pour the drink'

       d. trekke FRA utgiftene
           deduct from expenses.DEF
           'deduct the expenses'

The Figure is implicit in Ground promotion constructions, and it can always be added, as shown in (11). When the Figure is added, the construction is no longer a Ground promotion construction with a particle, but rather a verb with a selected preposition. So while the *på* in (10a) is a particle, the *på* in (11a) has to be analyzed as a selected preposition.

(11)   a. ha   pålegget   på brødskiva
                have spread.DEF on slice-of-bread.DEF
                'put spread on the slice of bread'

          b. trekke kasserollen   av platen
                pull   saucepan.DEF off hotplate.DEF
                'pull the saucepan off the hotplate'

          c. skjenke drikken   i glasset
                pour   drink.DEF in glass.DEF
                'pour the drink into the glass'

          d. trekke utgiftene   fra   skatten
                deduct expenses.DEF from tax.DEF
                'deduct the expenses from taxes'

5 SIMILARITY OF GROUND PROMOTION CONSTRUCTIONS AND COMPLEX PARTICLE CONSTRUCTIONS

We saw in Section 3 that complex particle constructions are common in Norwegian. One of the 221 constructions was exemplified in (8j), repeated below as (12).

(12)   Jeg byttet   UT dieselbilen   med en elbil.
        I   changed out diesel car.DEF with an electric car
        'I replaced the diesel car with an electric car.'

As discussed in Section 3, none of the 221 frames have identical particle and selected preposition, even though there are many prepositions that can function as both (33, according to the NorGram lexicon).

This could indicate that if a frame requires a particle and a selected preposition with the same form, they would usually be expressed as one, and only in colloquial Norwegian would both forms be expressed.

The existence of complex particle constructions where a particle and a preposition share the same form is demonstrated by Aa (2021), who has conducted a search in the NoTa dialect corpus and found four examples, given in (13) (Aa 2021, 230)).[10,11]

(13)   a. så   holder de på og tar AV mosen   av plena
              then hold   they on and take off moss.DEF off lawn.DEF
              'then they are removing the moss from the lawn'
              (old woman, Gauldal, CNorw)

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[10] The reason that NorGram does not specify frames with identical particle and selected preposition is probably that they are very infrequent in written texts (NorGram is mainly used to parse written texts), but also that an analysis of the preposition as the head of an adjunct PP is plausible (see Aa 2021, 230).

[11] Aa suggests that the PP (for example *i bøtta* 'in the bucket' in (13c)) may be an adjunct, since the "standard" complex particle constructions have a preference for the particle to appear to the right of the Figure.

In the NorGram lexicon, there are ten complex particle constructions with the template V-SUBJ-PRT-OBJ-POBJ (Dyvik *et al.* 2019). A template is a collection of constraints that are referred to by a pointer in the lexicon. V-SUBJ-PRT-OBJ-POBJ is one of these pointers, referring to a set of constraints that require a verb to select for a subject, a particle, a direct object, a selected preposition, and an oblique object. A search in NorGramBank (Rosén *et al.* 2012; Dyvik *et al.* 2016) reveals that four constructions prefer the particle to be to the right of the Figure (the frequency of each construction is given in parentheses): *lokke med på* 'lure on' (62), *tulle inn i* 'wrap into' (134), *venne av med* 'unlearn' (82), and *tyne ut av* 'squeeze out from' (30). One construction accepts the particle to occur both to the left and to the right: *gjøre om til* 'turn into' (446). Finally, there is one which prefers the particle to appear to the left of the Figure *bytte ut med* 'replace with' (398). (Two of the constructions, *ha å gjøre med* 'have to do with' and *legge til rette for* 'arrange', involve particles consisting of more than one word (*å gjøre* and *til rette*), and are not included in the search. Searches for the last two constructions, *kalle inn til* 'call for' and *skille ut fra* 'single out from', do not yield any results, perhaps because they were added after the treebank was created.) The findings suggest that there is no "standard" preference, but rather that it varies from construction to construction.

b. da   kunne vi banke AV hodet   av riva
    then could we knock off head.DEF off rake.DEF
    'then we could knock the head (the part with metal points)
    off the rake'
    (old man, Røros, CNorw)

c. legge I   mynten   i bøtta
    lay   in coin.DEF in bucket.DEF
    'put the coin in the bucket'
    (young man, Kirkesdalen, CNorw)

d. legge PÅ nytt torvtak på et bur
    lay   on new sod-roof on a cage
    'put a new sod-roof on a cage'
    (old man, Surnadal, CNorw)

The examples Aa reports are colloquial. In written Norwegian, one would normally not use complex particle constructions, but rather Ground promotion constructions with only one preposition, thus for example (13c) would have only one *i*: *legge mynten i bøtta*. However, the meaning is the same.

Complex particle constructions are actually possible with all examples discussed earlier, as shown in (14).[12] The examples in (11) and (14) are semantically equivalent. However, those with one preposition, as in (11), are far more frequent and seem, especially in written form, more acceptable than the examples in (14).[13]

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[12] The claims presented here, including those related to examples (15)–(19), are grounded in the author's native speaker judgement. These intuitions find support among other native linguists who have also reviewed the data. However, substantiating the claims with additional corpus data is challenging, as the complex particle construction is primarily used in colloquial speech, thus the only available source is the Norwegian Dialect Corpus.

[13] These examples have similarities to spoken German where a particle may be repeated after the object, as in (i).

(i)   Er steigt aus dem Bus aus.
       he steps out the   bus out
       'He gets off the bus.'

However, while the complex particle construction is only possible in Ground promotion construction in Norwegian, this is not necessarily so in German, so it

(14)   a.   ha   PÅ pålegget   på brødskiva
            have on spread.DEF on slice-of-bread.DEF
            'put spread on the slice of bread'

       b.   trekke AV kasserollen   av platen
            pull   off saucepan.DEF off hotplate.DEF
            'pull the saucepan off the hotplate'

       c.   skjenke I drikken   i glasset
            pour   in drink.DEF in glass.DEF
            'pour the drink into the glass'

       d.   trekke FRA utgiftene   fra   skatten
            deduct from expenses.DEF from tax.DEF
            'deduct the expenses from taxes'

    If the Figure object is a light pronoun, it will appear before the
particle. This gives us the examples in (15):

(15)   a.   ha   det PÅ på brødskiva
            have it   on on slice-of-bread.DEF
            'put it on the slice of bread'

       b.   trekke den AV av platen
            pull   it   off off hotplate.DEF
            'pull it off the hotplate'

       c.   skjenke den I   i glasset
            pour   it   in in glass.DEF
            'pour it into the glass'

       d.   trekke dem FRA fra   skatten
            deduct them from from tax.DEF
            'deduct them from taxes'

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is not the same phenomenon. A Norwegian version of the German example in (i)
is only grammatical with one particle, as shown in (ii).

(ii)   a.   Han går   AV bussen.
             he   goes off bus.DEF
             'He gets off the bus.'

        b.   * Han går   AV bussen   av.
               he   goes off bus.DEF off

where the same form appears twice (once as a particle and once as a selected preposition) with no intervening material. It should be noted that there are hardly any attested written examples of this construction featuring adjacent particles and prepositions with the same form. [14,15]

It is also possible to have complex particle constructions as shown in (15) without the Figure (see (16)).

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[14] According to Aa (2020, 151), there are no attested examples in the Norwegian Dialect Corpus of such double constructions with the particle appearing to the right of the Figure. A search on the Internet turned up the two examples in (i), where the Figure functions as subject in a passive construction. The examples show that it is possible to have a particle and a selected preposition with the same form appearing side by side in a complex verb particle construction (the particles and prepositions are highlighted in the examples).

(i) a. De påkrevde utgiftene ved å yte   pro bonotjenester kan i   det
        the required expenses by   to provide pro bono services can in the
        minste   trekkes   **FRA fra** skatt på avkastning.
        smallest deduct.PASS from from tax   on return
        'The required expenses of providing pro bono services can at least be
        deducted from taxes on returns.'

     b. Kostnadene avhenger av område og   eksekveringsdetaljer, men
        costs.DEF   depend   on area   and execution details   but
        kan trekkes   **FRA fra** skatt som en ekstraordinær byrde.
        may deduct.PASS from from tax   as   an extraordinary burden.
        'The costs depend on area and execution details, but may be deducted
        from taxes as an extraordinary burden.'

[15] Åfarli (1985, 85) gives the example in (ia), with a particle *på* and a preposition *på*. In a footnote, Åfarli notes that when a particle and a preposition are homophonous, they may be pronounced as one, as in (ib).

(i) a. Vi skrudde hjulet   **PÅ på** akslingen sin.   (Åfarli 1985, 85)
        we screwed wheel.DEF on on shaft.DEF REFL.POSS
        'We screwed the wheel onto its shaft.'

     b. Vi skrudde hjulet   på akslingen sin.   (Åfarli 1985, 96)
        we screwed wheel.DEF on shaft.DEF REFL.POSS
        'We screwed the wheel onto its shaft.'

(16)   a.   ha   PÅ på brødskiva
              have on on slice-of-bread.DEF
              'put (something) on the slice of bread'

         b.   trekke AV av platen
              pull   off off hotplate.DEF
              'pull (something) off the hotplate'

         c.   skjenke I   i   glasset
              pour   in in glass.DEF
              'pour into the glass'

         d.   trekke FRA fra   skatten
              deduct from from tax.DEF
              'deduct from taxes'

Aa (2020, 151) refers to the position of the selected preposition in examples such as (13)–(16) as *in situ* Ground P, implying that the preposition is moved out of this position in cases where it appears alone. *In situ* Ground P examples like (16) are colloquial, and some Norwegian speakers would probably judge them as marginal. However, if they are compared to examples of verbs with selected prepositions where the selected preposition is repeated, the *in situ* Ground P examples are far more acceptable. Example (17) shows that a selected preposition cannot be repeated.

(17)   * Jeg stoler på på henne.
          I   trust   on on her

It is possible to topicalize the object in a Ground promotion construction, as shown in (18a). If one attempts to extract the object of a complex particle construction, as shown in (18b), the result is marginal.[16]

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[16] The example in (18b) would be a combination of two phenomena, an *in situ* Ground promotion construction and extracted object of a preposition. Together with the fact that two adjacent homophonous particles and prepositions are often pronounced as one (see Footnote 15), the appearance of a particle and preposition with the same form in this context is very unlikely, and would by many be considered ungrammatical. In order to get a reading in (18b), one must think of the table as affected by the action.

(18)   a.   Bordet   rydder jeg AV. (Ground)
                      table.DEF clear   I   off

                      'The table I clear.'

        b. ??/* Bordet   rydder jeg AV av. (Ground)
                      table.DEF clear   I   off off

                      'The table I clear.'

The examples in (18) can be compared to the ones in (19), which show that the object of a regular construction with a selected preposition can be extracted as well (see (19a)). However, if the preposition is repeated (as also illustrated with the object in its canonical position in (17)), the sentence becomes completely ungrammatical, see (19b). So even though the extraction variant in (18b) is marginal, it is better than (19b).

(19)   a.   Henne stoler jeg på.
              Her   trust I   on

              'Her, I trust.'

        b. * Henne stoler jeg på på.
              her   trust I   on on

6 ANALYSIS IN PRINCIPLES AND PARAMETERS (P&P)

A P&P analysis of Ground promotion is presented in Aa 2020. Aa assumes the split P hypothesis from Svenonius 2003, which assigns to 'transitive' PPs exemplified in (20) the structure in Figure 1.

(20)   Vi lastet   høy på vognen.
        we loaded hay on wagon.DEF
        'We loaded hay on the wagon.'

Similarly to verbs, prepositions are assumed to have 'internal' and 'external' arguments. The internal argument (complement of P) is the Ground, and the 'external' argument (in the specifier position of *p*) is the Figure.

Figure 1:
Split PP assumed
in Svenonius 2003, 436

*p*P
DP   *p*'
|
høy   *p*   PP
P   DP
| |
på   vognen
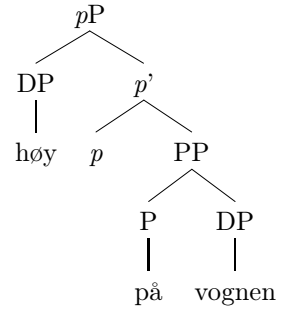
Aa (2020, 150) suggests the analysis of Ground promotion constructions in Figure 2. Here, the Ground object is the argument of the lower P, and the Figure argument is realized as a zero argument in the specifier position of the higher *p*. The two prepositions have identical form, and it is realized as a particle, adjoined to the verb.
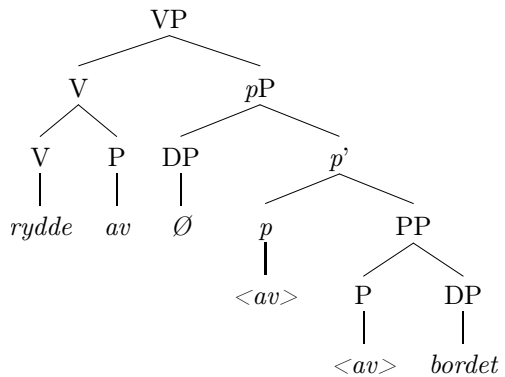
Figure 2:
Ground promotion in P&P
(Aa 2020, 150)

VP
V   *p*P
V   P   DP   *p*'
| | |
rydde   *av*   Ø   *p*   PP
<av>   P   DP
<av>   *bordet*

Aa (2020) suggests that cases of *in situ* Ground promotion can be analyzed as one form appearing in two positions, as illustrated in Figure 3.[17]

Inspired by the P&P analysis I have formulated the definition of Ground promotion in (21).

(21)   A Ground promotion construction is a complex particle construction, a combination of a particle construction and a selected preposition construction, realized by one particle.

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[17] Aa (2020) does not provide the actual analysis of *in situ* Ground promotion, and the tree in Figure 3 is based on Aa's tree in Figure 2.
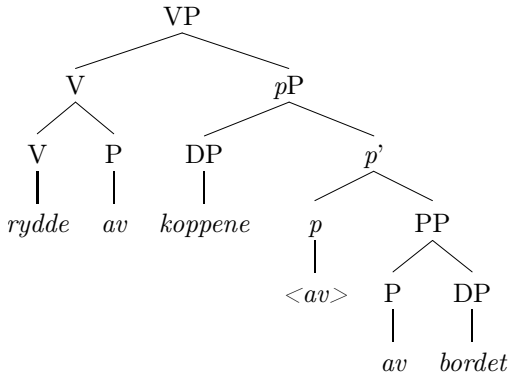
Figure 3:
Possible analysis
of *in situ* Ground promotion

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                    VP
           ┌─────────┴─────────┐
           V                   pP
       ┌───┴───┐        ┌───────┴───────┐
       V       P       DP               p'
       │       │        │        ┌───────┴───────┐
     rydde    av     koppene     p              PP
                                 │        ┌───────┴───────┐
                               <av>       P              DP
                                          │               │
                                          av            bordet
```

The definition of Ground promotion is supported by several facts. First, the verb and the particle may form an intonational unit. This indicates that it is a particle. Second, the particle must appear to the left of the object (see (2a) and (3a)). This shows that it has the behavior of selected prepositions. Third, the Ground promotion construction (see (9)) can alternate with a complex particle construction with two identical forms, one as a particle and the other as a selected preposition (see (16)), without changing its meaning. It is especially the third fact that supports an analysis of the Ground promotion construction as a combination of a particle construction and a selected preposition construction.

ANALYSIS OF COMPLEX PARTICLE CONSTRUCTIONS   7

The analysis of Ground promotion is assumed to be analogous to the analysis of complex particle constructions like (12), and before I present the former, I will first have a look at the latter.

The constituent tree for the sentence in (12), with the complex particle construction, is given in Figure 4. Note that the selected preposition *med* 'with' and the obliqe NP *en elbil* 'an electric car' are treated as separate constituents. PPs with selected prepositions are thus analyzed differently from adjunct PPs.

Figure 4:
Constituent tree of sentence
with a particle, a direct
object and a prepositional
object

```
                           S
                  ┌────────┴────────┐
                 NP                 VP
                 △          ┌───────┴───────┐
                Jeg        VP              NP
                     ┌──────┴──────┐       △
                    VP            SelP   en elbil
               ┌─────┴─────┐       │
              VP          NP      med
          ┌────┴────┐     △
         V        Prt  dieselbilen
         │          │
       bytter      ut
```
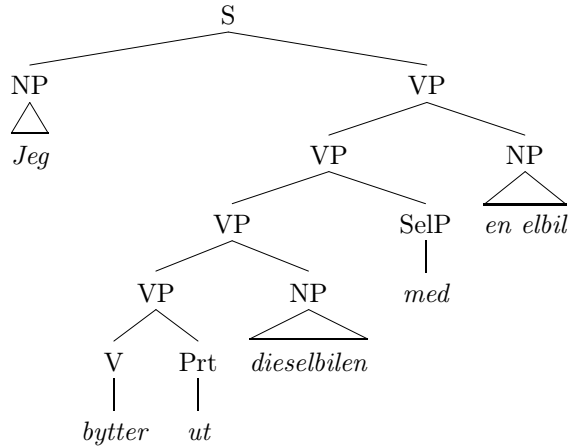
One motivation for the distinction has been that oblique objects are more susceptible to extraction than objects of adjunct PPs. However, in certain environments the selected preposition may be pied-piped along with the oblique object, and we get sentences like (22).

(22) Med hvilken type bil har han byttet   ut dieselbilen?
      with which   type car have he   swithced out diesel car.DEF
      'With which type of car did he replace the diesel car?'

Faarlund *et al.* (1997, 697–714, 773–808) distinguish between three kinds of PPs: (i) prepositional objects, where the preposition has a bleached meaning (see (23)), (ii) bound adverbials, which are required by the verb, but where the preposition has a concrete meaning (see (24)), and (iii) free adverbials, which are not required by the verb (see (25)).

While many prepositional objects are more acceptable if the object of the preposition is extracted rather than the whole PP (see (23)), the prototypical free adverbial only allows for the extraction of the whole phrase (see (25)). Between these extremes, there is a range of PPs where the preposition is more or less bleached.

(23)   a. Jeg stoler på at   du kommer.
           I   trust on that you come
           'I trust that you will come.'

        b. */?? På at   du kommer, stoler jeg.
              on that you come   trust I

    c. At   du kommer, stoler jeg på.
       That you come   trust I   on
       'That you will come, I trust.'

(24)   a. Jeg reiser til byen.
        I   travel to city.DEF
        'I will travel to the city.'

      b. Til byen   reiser jeg.
        to city.DEF travel I
        'To the city, I will travel.'

      c. Byen   reiser jeg til.
        city.DEF travel I   to
        'The city, I will travel to.'

(25)   a. Jeg drar i februar.
        I   leave in February
        'I will leave in February.'

      b. I februar   drar jeg.
        In February leave I
        'In February, I will leave.'

      c. * Februar   drar jeg i.
   February leave I   in

The approach in this paper is that verbs may alternate between a reading where the preposition is selected (and allows topicalization of the prepositional object) and one where it is not selected (and allows topicalization of the whole PP). Thus, what we observe in examples like (24) is interpreted as an alternation between a selected preposition reading (24b) and an adjunct reading (24c). Pied-piping cases like (22) are similarly viewed as an alternation between a selected preposition reading (with the preposition in situ) and an adjunct reading (pied-piping).[18]

The analysis in Figure 5 shows how subconstruction types are added by subconstruction rules. The subconstruction types are unified

---

[18] While this account captures the fact that PPs with bleached prepositions are less likely to be topicalized, it does not capture the range of acceptability very well, and a more fine grained analysis may be needed in the future.

with each other as they are added, so only constructions that are defined in the grammar are allowed. How the unification of subconstruction types constrains the constellations of subconstructions licensed by the grammar will be discussed in more detail towards the end of this section.

Figure 5:
Subconstruction types in a sentence with a particle, a direct object and a prepositional object
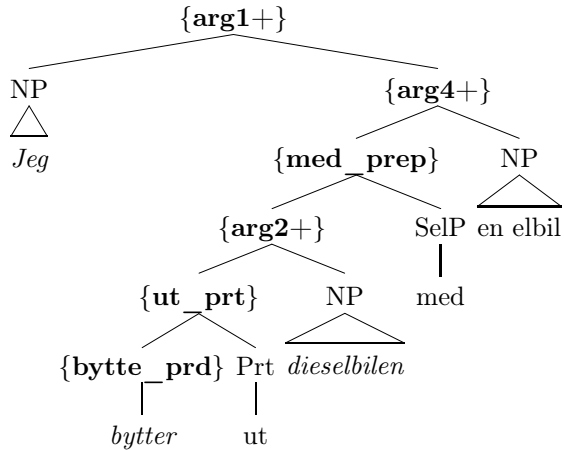
The analysis is implemented in the Norsyg HPSG grammar (Haugereid 2009) using resources from the open-source repository of the Deep Linguistic Processing with HPSG Initiative (DELPH-IN).[19] While the tree structures used in this paper are based on Haugereid 2009, the implementation of the analysis is done in a more recent, incremental version of the grammar that distinguishes between parse trees and constituent structures (Haugereid and Morey 2012). However, since the present analyses do not depend on this distinction, they will be presented using the older, more familiar framework.[20]

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[19] https://github.com/delph-in/docs/wiki

[20] One of the main motivations for the incremental approach to syntax, apart from the undisputed psycholinguistic reality of processing words one by one in the order they are heard or read, is that it gives verbs and complementizers local access to the *extraction path* (Hukari and Levine 1995; Sag 2005). The extraction path is the words appearing between a filler and its gap in a long-distance dependency. In some languages, among others Chamorro and Irish, verbs or complementizers reflect whether they are on the extraction path or not. In an incremental approach, the existence of a filler will be accessible, since the filler is the

The analysis, which utilizes type hierarchies and multiple inheritance, can be effectively implemented within other HPSG grammars (Sheinfux *et al.* 2017). Adapting it to other grammatical frameworks such as LFG (Bresnan 2001) and CCG (Steedman 2000) might not be straightforward since these do not employ types in the same manner.

In Norsyg, the construction type for *bytte ut med* 'replace with' is *_bytte-ut*med_124_rel*, which, as discussed in Section 3, is one of ten possible alternating construction types for the verb *bytte* (see (8)).[21] The name of the construction type encodes that it is the unification of six subconstruction types, marked in bold in Figure 5: *bytte_prd* is the underspecified predicate of the verb, *ut_prt* is the predicate of the particle, *med_prep* is the predicate of the selected preposition, *arg1+* means 'agent/experiencer' argument, *arg2+* means 'patient/theme' argument, and *arg4+* means 'oblique' argument. So the *_bytte-ut*med_124_rel* construction has a verb *bytte*, a particle *ut*, a selected preposition *med*, an agent argument, a patient/theme argument, and an oblique argument (marked by the selected preposition *med*).

In the Norsyg grammar particle constructions and selected prepositions are analyzed by assuming underspecified function words that do not introduce a relation, but rather have a subconstruction type that is unified with the PRED value of the verb. This is exemplified with the particle *ut* in (26) (Haugereid 2014, 2015).[22]

----

first word to be processed, and the SLASH list with information about the filler will be passed up from daughter to mother until a unary extraction rule extracts it (and marks the end of the extraction path). In a regular phrase structure grammar, however, registering of the extraction path is a challenge, especially with regards to extracted adjuncts (see Haugereid 2009, Chapter 6.9). The approach is also motivated by other phenomena such as scrambling (Haugereid 2007), gapping (Haugereid 2017), and head-final structures (Haugereid 2019).

[21] The convention of representing particles following a hyphen and selected prepositions following a star in predicates for multi-word expressions is adapted from NorGram.

[22] If the function word is used compositionally, for example as the head of an adjunct PP, the rule that adds it will unify the PRED value of the function word with the PRED value of a transitive preposition relation, yielding a separate relation with the predicate *_ut_p_rel*. But if the function word is used non-compositionally, which is the case in the examples discussed in this paper, its PRED value is unified with the PRED value of the main verb, and hence it will not be the predicate of a separate relation.

(26)
$$\begin{bmatrix} \textit{ut-part} \\ \text{STEM} \quad \langle \text{"ut"} \rangle \\ \text{KEYREL} \quad \begin{bmatrix} \text{PRED } \textit{ut\_prt} \end{bmatrix} \\ \text{CONT} \quad \begin{bmatrix} \text{RELS} \quad <\,!!\,> \end{bmatrix} \end{bmatrix}$$

Five subconstruction rules are employed in the analysis of the complex particle construction exemplified by (12); *arg1-rule, arg2-rule, arg4-rule, part-rule,* and *prepmark-rule.* Each of these subconstruction rules switches a subconstruction type from negative (in the mother) to positive (in the first daughter). By marking a mother as negative for a subconstruction type, the node (and nodes above it) can no longer be subject to a subconstruction rule with that subconstruction type. For example, a clause can only have one particle and one selected preposition. [23, 24]

The arg4-rule is illustrated in Figure 6. [25] The rule attaches an oblique argument as its second daughter. It marks the realization of the argument by switching the subconstruction type *arg4–* in the mother to *arg4+* in the (first) daughter. The *arg4+* subconstruction type is unified with the KEYREL|PRED value, which ensures that it is unified with the other subconstruction types of the construction. The other valence features in the daughter (CMP1, CMP2, CMP3, and PART) are unified with the corresponding valence features of the mother. The LOCAL constraints (including CAT(egory) and CONT(ent)) of the CMP4

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[23] See Sheinfux *et al.* 2017 for a discussion of the relation between syntax and semantics with this approach to argument structure.

[24] The approach handles argument composition, see Haugereid 2020.

[25] The feature structures used in this paper are primarily based on HPSG. To simplify the representations, the paths to each value are abbreviated (a common practice in HPSG work). The implemented grammar is originally based on the Grammar Matrix (version 0.6) (Zamaraeva *et al.* 2022) but has since undergone significant modifications. Despite these changes, much of the feature geometry has been preserved. Some features, such as SUBJ and COMPS, have been replaced with features like CMP1, CMP2, CMP3, and CMP4, and their values are of the type *synsem*, not empty or non-empty lists, as in regular HPSG. Additionally, the *synsem* type has a LINK attribute, whose value indicates whether an argument is realized or not. For instance, *cmp1*|LINK *arg1+* signifies that an 'agent/experiencer' argument has been realized.

$$
\begin{bmatrix}
arg4\text{-}rule \\
\text{VAL} \begin{bmatrix}
\text{CMP1} & \boxed{1} \\
\text{CMP2} & \boxed{2} \\
\text{CMP3} & \boxed{3} \\
\text{CMP4} & \begin{bmatrix} \text{LINK} & arg4\text{--} \\ \text{LOCAL} & \boxed{4} \end{bmatrix} \\
\text{PART} & \boxed{5}
\end{bmatrix} \\
\text{KEYREL} \quad \boxed{6}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{VAL} \begin{bmatrix}
\text{CMP1} & \boxed{1} \\
\text{CMP2} & \boxed{2} \\
\text{CMP3} & \boxed{3} \\
\text{CMP4} & \begin{bmatrix} \text{LINK} & \boxed{7} arg4\text{+} \\ \text{LOCAL} & \boxed{4} \end{bmatrix} \\
\text{PART} & \boxed{5}
\end{bmatrix} \\
\text{KEYREL} \quad \boxed{6} \begin{bmatrix} \text{PRED} & \boxed{7} \\ \text{ARG4} & \boxed{8} \end{bmatrix}
\end{bmatrix}
\qquad
\begin{bmatrix} \text{LOCAL} & \boxed{4} \begin{bmatrix} \text{CONT}|\text{INDEX} & \boxed{8} \end{bmatrix} \end{bmatrix}
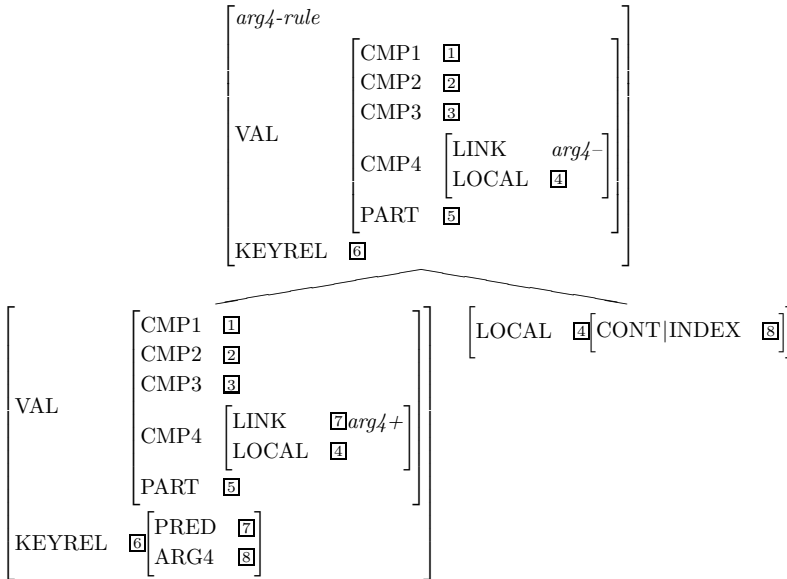$$

Figure 6: Arg4 subconstruction rule

feature are unified with the second daughter (the argument), and the KEYREL|ARG4 role is linked to the index of the second daughter.

The grammar has corresponding valence rules for CMP1 arguments (agents/experiencers), CMP2 arguments (themes/patients), and CMP3 arguments (beneficiaries).

The rule for particles is shown in Figure 7. It takes a particle as its second daughter, and switches the negative PART subconstruction type in the mother to a positive PART subconstruction type in the daughter. The positive subconstruction type *prt+* is unified with the PRED value of the particle and the KEYREL|PRED value of the mother/first daughter. The rule corresponds to a P adjoined to a V in a P&P tree (see the upper P in Figure 3).

The rule for selected prepositions is given in Figure 8. It attaches a preposition as its second daughter and marks that it is realized by switching the *prp–* value in the mother to *prp+* in the daughter. The *prp+* subconstruction type is unified with the PRED value of the selected preposition and the KEYREL|PRED value of the mother/first daughter. The PART value is set to *prt–*, which means that no particle can follow the selected preposition. The rule corresponds to a rule realizing a P *in situ* (see the lower P in Figure 3).

A more detailed version of the constituent tree in Figure 5 can
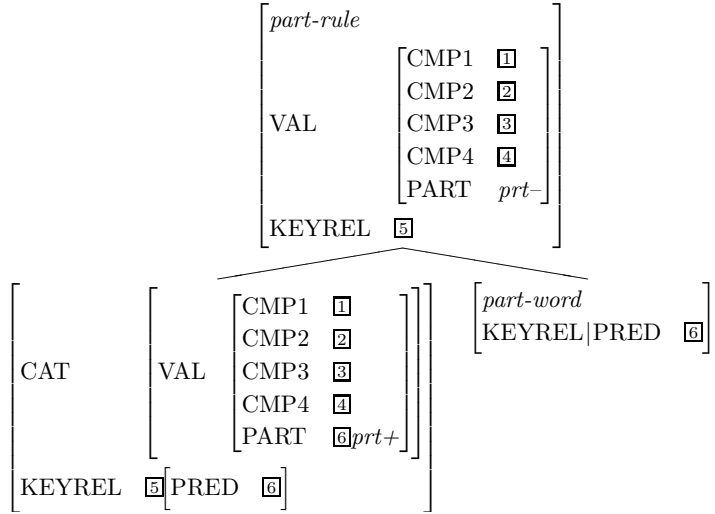
Figure 7:
Rule for
attaching
particles

$$
\begin{bmatrix}
\textit{part-rule} \\
\text{VAL} \begin{bmatrix}
\text{CMP1} & \boxed{1} \\
\text{CMP2} & \boxed{2} \\
\text{CMP3} & \boxed{3} \\
\text{CMP4} & \boxed{4} \\
\text{PART} & \textit{prt–}
\end{bmatrix} \\
\text{KEYREL} \quad \boxed{5}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{CAT} \begin{bmatrix}
\text{VAL} \begin{bmatrix}
\text{CMP1} & \boxed{1} \\
\text{CMP2} & \boxed{2} \\
\text{CMP3} & \boxed{3} \\
\text{CMP4} & \boxed{4} \\
\text{PART} & \boxed{6}\textit{prt+}
\end{bmatrix}
\end{bmatrix} \\
\text{KEYREL} \quad \boxed{5}\begin{bmatrix}\text{PRED} & \boxed{6}\end{bmatrix}
\end{bmatrix}
\qquad
\begin{bmatrix}
\textit{part-word} \\
\text{KEYREL|PRED} \quad \boxed{6}
\end{bmatrix}
$$

Figure 8:
Rule for
attaching
selected
prepositions

$$
\begin{bmatrix}
\textit{prepmark-rule} \\
\text{VAL} \begin{bmatrix}
\text{CMP1} & \boxed{1} \\
\text{CMP2} & \boxed{2} \\
\text{CMP3} & \boxed{3} \\
\text{CMP4} & \begin{bmatrix}\text{LINK} & \boxed{4} \\ \text{PREP} & \textit{prp–}\end{bmatrix} \\
\text{PART} & \boxed{5}\textit{prt–}
\end{bmatrix} \\
\text{KEYREL} \quad \boxed{6}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{VAL} \begin{bmatrix}
\text{CMP1} & \boxed{1} \\
\text{CMP2} & \boxed{2} \\
\text{CMP3} & \boxed{3} \\
\text{CMP4} & \begin{bmatrix}\text{LINK} & \boxed{4} \\ \text{PREP} & \boxed{7}\textit{prp+}\end{bmatrix} \\
\text{PART} & \boxed{5}
\end{bmatrix} \\
\text{KEYREL} \quad \boxed{6}\begin{bmatrix}\text{PRED} & \boxed{7}\end{bmatrix}
\end{bmatrix}
\qquad
\begin{bmatrix}
\textit{prep-word} \\
\text{KEYREL|PRED} \quad \boxed{7}
\end{bmatrix}
$$
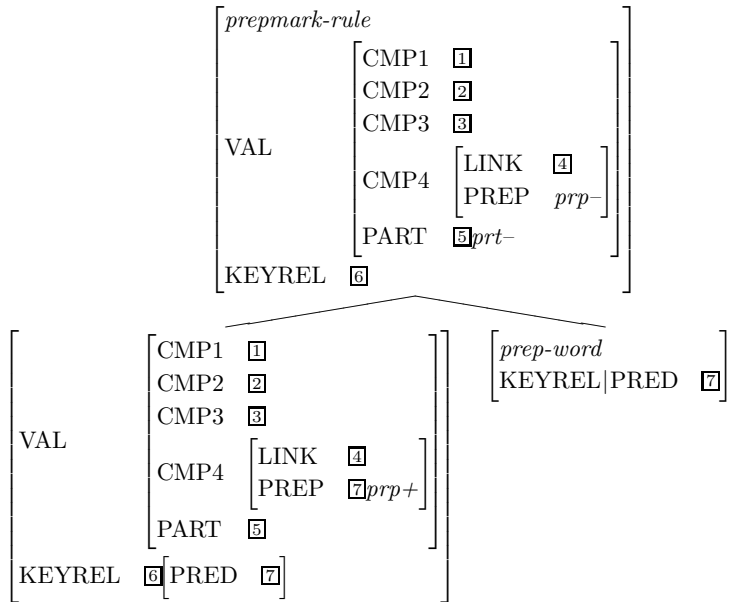
now be given in Figure 9. [26, 27] The constituents are attached to the verb one by one; the particle, the direct object, the selected preposition, the oblique object, and finally, the subject. For each constituent, one or more subconstruction types are added (highlighted in bold in the tree), and they are continuously unified with each other.

All the subconstruction types are organized in a type hierarchy, and only constellations of subconstruction types that have a common subtype, a *construction type*, will be allowed by the grammar. The type hierarchy in Figure 10 is a simplified illustration of the subconstruction types that constitute two of the ten frames that the verb *bytte* 'bytte' can appear with (see (8i) and (8j)). It shows that if the subconstruction types *bytte_prd, arg1+, prt+, ut_prt, arg2+, prp+, med_prp,* and *arg4+* are unified, we get the construction type *_bytte-ut*med_124_rel,* which also becomes the predicate of the clause. If, however, there is no selected preposition or oblique object in the clause, as in (8i), the construction type becomes *_bytte-ut_12_rel.* [28]
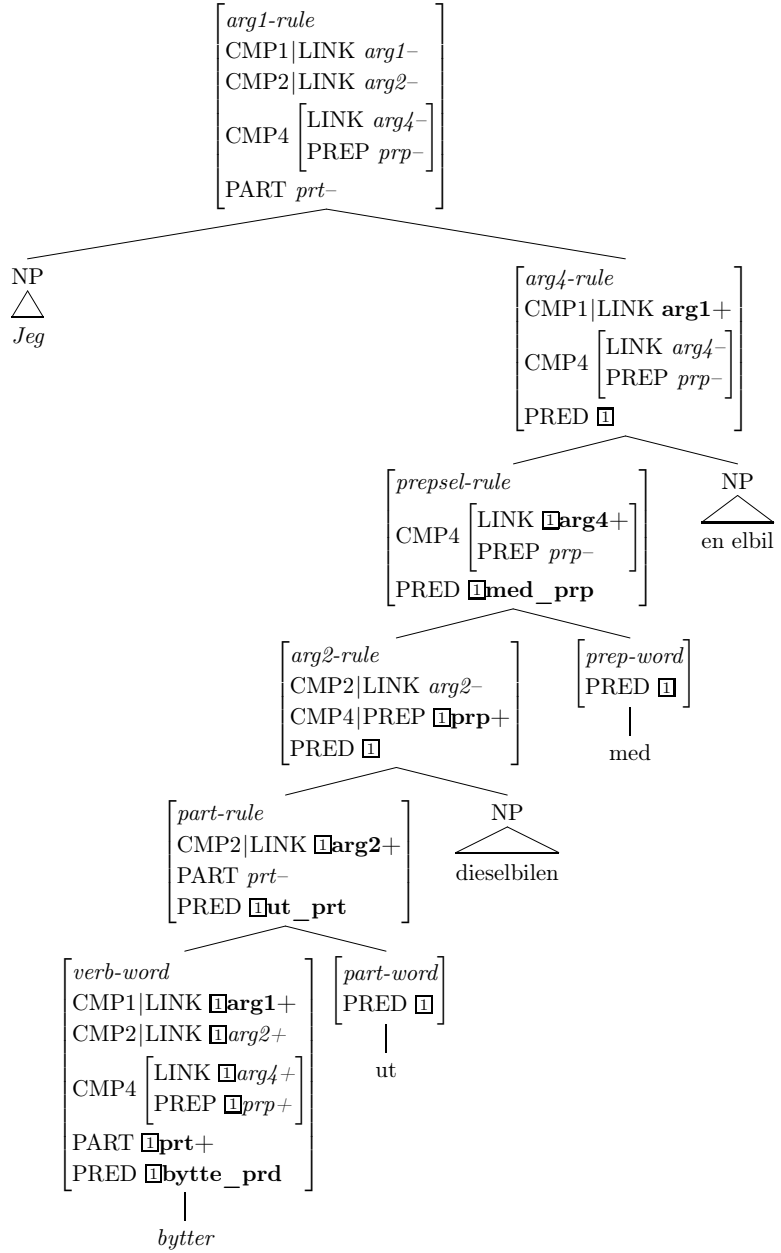
The approach to valence taken in this paper integrates insights from both lexicalist and constructionalist approaches to syntax. In lexicalist approaches, verbs are provided with detailed information about possible syntactic environments. In the present account this is managed through the position of the semantic predicate in a type hierarchy. (See the type *bytte_prd* in Figure 10.) In constructionalist approaches, grammar rules are associated with frames that contribute to the meaning of the clause. The novelty in this paper, and earlier papers on the same topic (see Haugereid 2014, 2015), is the merging of information about lexical requirements and syntactic rules with the

---

[26] Only those valence features that have switched subconstruction type from mother to first daughter (e.g. from *arg1–* to *arg1+*) are displayed in the tree. The valence features that are not displayed are identical in the two nodes.

[27] A common assumption in Norwegian syntax is that the initial constituent, including the subject, is extracted from its canonical position (after the finite verb). While this is implemented in the grammar, extraction is excluded from the analyses presented in this paper in order to keep them as simple as possible.

[28] As mentioned in connection with Figures 5 and 6, *arg4+* indicates that an 'oblique' argument has been realized. So the *_bytte-ut*med_124_rel* construction has an oblique argument (marked by the selected preposition *med*). On the other hand, *arg4–* indicates that no oblique argument has been realized. So *_bytte-ut_12_rel* does not have an oblique argument.

Figure 9:
Analysis of
sentence with
complex particle
construction

$$
\begin{bmatrix}
\textit{arg1-rule} \\
\text{CMP1|LINK } \textit{arg1--} \\
\text{CMP2|LINK } \textit{arg2--} \\
\text{CMP4 } \begin{bmatrix} \text{LINK } \textit{arg4--} \\ \text{PREP } \textit{prp--} \end{bmatrix} \\
\text{PART } \textit{prt--}
\end{bmatrix}
$$

NP

Jeg

$$
\begin{bmatrix}
\textit{arg4-rule} \\
\text{CMP1|LINK } \textbf{arg1+} \\
\text{CMP4 } \begin{bmatrix} \text{LINK } \textit{arg4--} \\ \text{PREP } \textit{prp--} \end{bmatrix} \\
\text{PRED } \boxed{1}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\textit{prepsel-rule} \\
\text{CMP4 } \begin{bmatrix} \text{LINK } \boxed{1}\,\textbf{arg4+} \\ \text{PREP } \textit{prp--} \end{bmatrix} \\
\text{PRED } \boxed{1}\,\textbf{med\_prp}
\end{bmatrix}
$$

NP

en elbil

$$
\begin{bmatrix}
\textit{arg2-rule} \\
\text{CMP2|LINK } \textit{arg2--} \\
\text{CMP4|PREP } \boxed{1}\,\textbf{prp+} \\
\text{PRED } \boxed{1}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\textit{prep-word} \\
\text{PRED } \boxed{1}
\end{bmatrix}
$$

med

$$
\begin{bmatrix}
\textit{part-rule} \\
\text{CMP2|LINK } \boxed{1}\,\textbf{arg2+} \\
\text{PART } \textit{prt--} \\
\text{PRED } \boxed{1}\,\textbf{ut\_prt}
\end{bmatrix}
$$

NP

dieselbilen

$$
\begin{bmatrix}
\textit{verb-word} \\
\text{CMP1|LINK } \boxed{1}\,\textbf{arg1+} \\
\text{CMP2|LINK } \boxed{1}\,\textit{arg2+} \\
\text{CMP4 } \begin{bmatrix} \text{LINK } \boxed{1}\,\textit{arg4+} \\ \text{PREP } \boxed{1}\,\textit{prp+} \end{bmatrix} \\
\text{PART } \boxed{1}\,\textbf{prt+} \\
\text{PRED } \boxed{1}\,\textbf{bytte\_prd}
\end{bmatrix}
$$

bytter

$$
\begin{bmatrix}
\textit{part-word} \\
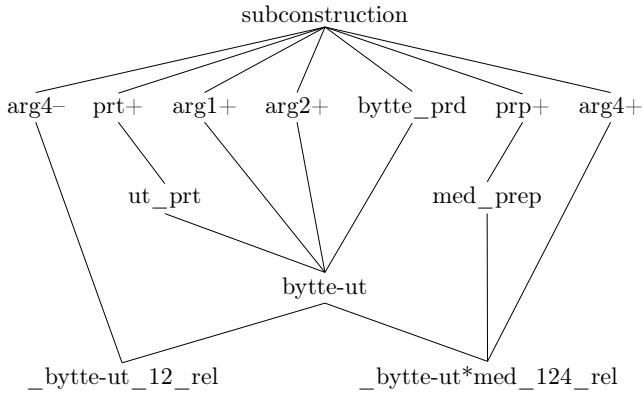\text{PRED } \boxed{1}
\end{bmatrix}
$$

ut

Figure 10:
Simplified hierarchy
of subconstruction types
for the verb *bytte* 'change'

semantic predicates of lexical items and the semantic contributions of syntactic rules within a unified type hierarchy (as exemplified in Figure 10). This integration creates a direct link between syntax and semantics.

The construction types at the bottom of the hierarchy reflect not only the lexical items that make up the construction (such as verbs, particles, and selected prepositions), but also the syntactic rules involved (realizations of verbs, particles, prepositions, and arguments). In this way, the approach directly implements Frege's Principle of Compositionality, as every contribution, whether it is the main verb, a particle, or the realization of a direct object, is encapsulated in the construction type at the bottom of the hierarchy. The inherent compositional nature of the grammar means this process is not only a requirement but also an expectation.

This method contrasts with traditional Head-Driven Phrase Structure Grammar (HPSG), where a semantic predicate usually remains unchanged regardless of valence alternations, which are managed using lexical rules. Moreover, in HPSG syntactic rules generally do not have a semantic contribution.

ANALYSIS OF GROUND PROMOTION   8

The analysis in Figure 9 is also applicable to the NoTa examples (see (13)). Given this analysis, I argue that the sentence in (13c), repeated

below as (27), has a particle *i* and a selected preposition *i*, and that the construction type is *_legge-i*i_124_rel*.

(27)   legge I   mynten   i   bøtta
        lay   in coin.DEF in bucket.DEF
        'put the coin in the bucket'
        (young man, Kirkesdalen, CNorw)

As mentioned in Section 1, the Ground promotion constructions have characteristics of both regular particle constructions (they may form a prosodic unit with the verb) and the selected preposition constructions (the object has a Ground meaning and cannot appear to the left of the preposition). Given these observations, I suggested that the particles in Ground promotion constructions are instances of two constructions at the same time, a particle construction and a selected preposition construction, and that they only appear in cases where the particle and the selected preposition have the same phonological form, as the two cases of *i* 'in' in (27).

In order to account for the variability of Ground promotion constructions demonstrated in Section 5, I assume the hierarchy of rule types in Figure 11. It shows that the type for attaching particles in Ground promotion constructions *part&prep-rule* inherits from the basic types for attaching selected prepositions *prepmark-rule-min* and particles *part-rule-min*, and the subconstruction types added by these rules *prp+* and *prt+* are unified in *part&prep-rule*, hence it is two subconstructions simultaneously. However, the hierarchy also shows that the subconstructions can be realized by separate rules *prepmark-rule* and *part-rule*. The *part&prep-rule* corresponds to the realization of the P in Figure 2.

The type hierarchy illustrated in Figure 11 is inspired by the P&P account of Ground promotion. Previously, the Norsyg grammar only contained separate constructions for selected prepositions (represented by the *prepmark-rule* in Figure 11) and particle constructions (represented by the *part-rule* in Figure 11). This allowed for analyses of complex particle constructions involving both particles and selected prepositions using separate rules (see Figure 9). However, the updated grammar now includes a unified construction for Ground promotion, termed *part&prep-rule*. This unification merges key aspects of the *prepmark-rule* and *part-rule*, in this way representing both construc-
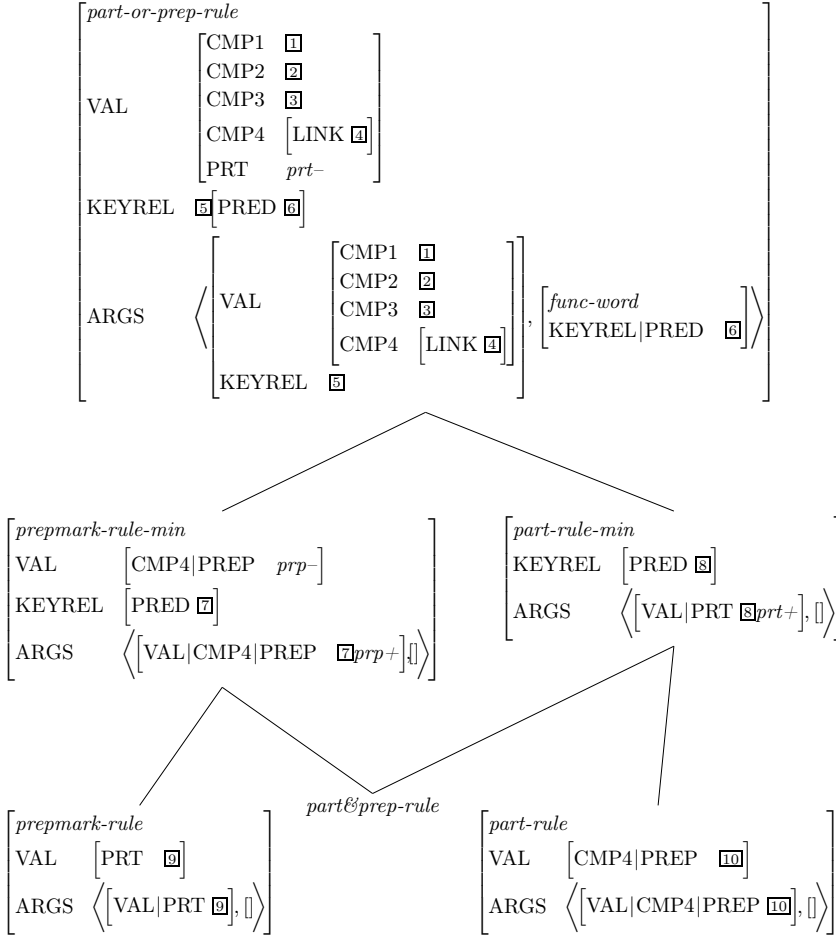
$$
\begin{bmatrix}
\textit{part-or-prep-rule} \\
\text{VAL} \quad \begin{bmatrix} \text{CMP1} & \boxed{1} \\ \text{CMP2} & \boxed{2} \\ \text{CMP3} & \boxed{3} \\ \text{CMP4} & [\text{LINK } \boxed{4}] \\ \text{PRT} & \textit{prt--} \end{bmatrix} \\
\text{KEYREL} \quad \boxed{5}[\text{PRED } \boxed{6}] \\
\text{ARGS} \quad \left\langle \begin{bmatrix} \text{VAL} & \begin{bmatrix} \text{CMP1} & \boxed{1} \\ \text{CMP2} & \boxed{2} \\ \text{CMP3} & \boxed{3} \\ \text{CMP4} & [\text{LINK } \boxed{4}] \end{bmatrix} \\ \text{KEYREL} & \boxed{5} \end{bmatrix}, \begin{bmatrix} \textit{func-word} \\ \text{KEYREL|PRED} \quad \boxed{6} \end{bmatrix} \right\rangle
\end{bmatrix}
$$

Figure 11: Type hierarchy of rules for attaching particles and selected prepositions

$$
\begin{bmatrix}
\textit{prepmark-rule-min} \\
\text{VAL} \quad [\text{CMP4|PREP} \quad \textit{prp--}] \\
\text{KEYREL} \quad [\text{PRED } \boxed{7}] \\
\text{ARGS} \quad \left\langle [\text{VAL|CMP4|PREP} \quad \boxed{7}\textit{prp+}], [] \right\rangle
\end{bmatrix}
$$

$$
\begin{bmatrix}
\textit{part-rule-min} \\
\text{KEYREL} \quad [\text{PRED } \boxed{8}] \\
\text{ARGS} \quad \left\langle [\text{VAL|PRT } \boxed{8}\textit{prt+}], [] \right\rangle
\end{bmatrix}
$$

$$
\begin{bmatrix}
\textit{prepmark-rule} \\
\text{VAL} \quad [\text{PRT} \quad \boxed{9}] \\
\text{ARGS} \quad \left\langle [\text{VAL|PRT } \boxed{9}], [] \right\rangle
\end{bmatrix}
$$

part&prep-rule

$$
\begin{bmatrix}
\textit{part-rule} \\
\text{VAL} \quad [\text{CMP4|PREP} \quad \boxed{10}] \\
\text{ARGS} \quad \left\langle [\text{VAL|CMP4|PREP} \quad \boxed{10}], [] \right\rangle
\end{bmatrix}
$$

tions simultaneously. And it is this unified construction that the definition in (21) refers to (repeated below in (28)).
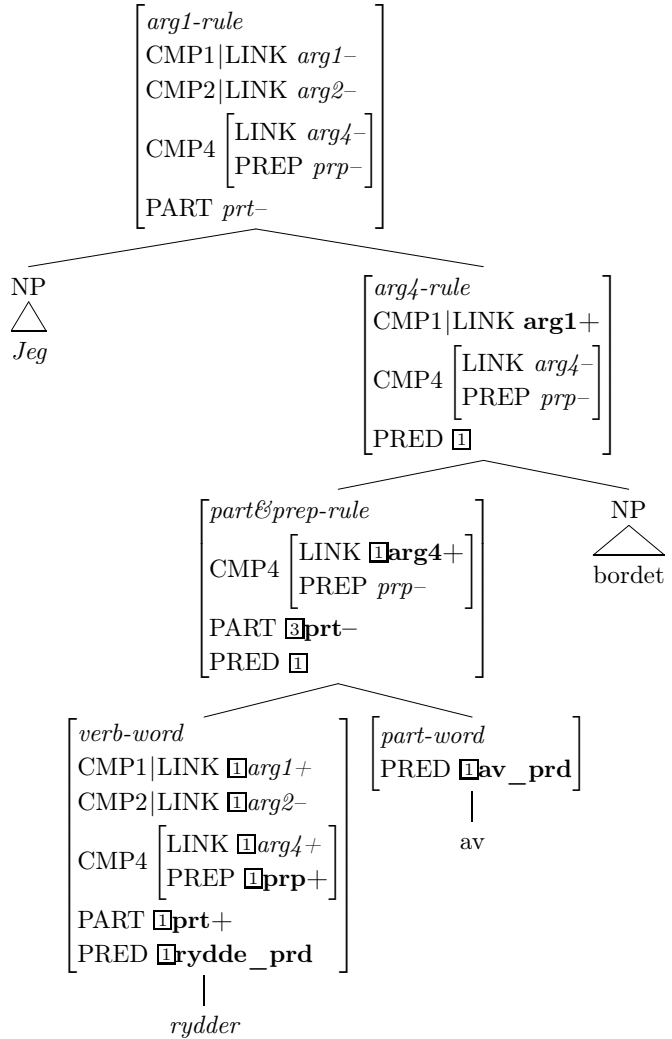
(28)   A Ground promotion construction is a complex particle construction, a combination of a particle construction and a selected preposition construction, realized by one particle.

While Figure 11 presents the structural rules for attaching selected prepositions and particles (*prepmark-rule, part&prep-rule,* and *part-rule*), the semantic contributions of these rules are defined in the types *prepmark-rule-min* and *part-rule-min*. Specifically, in *prepmark-rule-min*, the KEYREL|PRED value is linked to *prp+*, and in *part-rule-*

min, the KEYREL|PRED value is linked to *prt+*. It is the unification of these types in *part&prep-rule* that provides the semantic contribution of a Ground promotion construction.

The analysis of sentence (2a), repeated below as (29), is achieved by means of three subconstruction rules; *arg1-rule* for attaching the subject, *part&prep-rule* for attaching the Ground promoting particle, and *arg4-rule* for attaching the object (see Figure 6). The analysis is shown in Figure 12.

Figure 12:
Analysis of sentence
with Ground promotion
particle construction

$$
\begin{bmatrix}
arg1\text{-}rule \\
\text{CMP1|LINK } arg1- \\
\text{CMP2|LINK } arg2- \\
\text{CMP4 } \begin{bmatrix} \text{LINK } arg4- \\ \text{PREP } prp- \end{bmatrix} \\
\text{PART } prt-
\end{bmatrix}
$$

NP
△
Jeg

$$
\begin{bmatrix}
arg4\text{-}rule \\
\text{CMP1|LINK } \mathbf{arg1+} \\
\text{CMP4 } \begin{bmatrix} \text{LINK } arg4- \\ \text{PREP } prp- \end{bmatrix} \\
\text{PRED } \boxed{1}
\end{bmatrix}
$$

$$
\begin{bmatrix}
part\&prep\text{-}rule \\
\text{CMP4 } \begin{bmatrix} \text{LINK } \boxed{1}\mathbf{arg4+} \\ \text{PREP } prp- \end{bmatrix} \\
\text{PART } \boxed{3}\mathbf{prt-} \\
\text{PRED } \boxed{1}
\end{bmatrix}
$$

NP
△
bordet

$$
\begin{bmatrix}
verb\text{-}word \\
\text{CMP1|LINK } \boxed{1}arg1+ \\
\text{CMP2|LINK } \boxed{1}arg2- \\
\text{CMP4 } \begin{bmatrix} \text{LINK } \boxed{1}arg4+ \\ \text{PREP } \boxed{1}\mathbf{prp+} \end{bmatrix} \\
\text{PART } \boxed{1}\mathbf{prt+} \\
\text{PRED } \boxed{1}\mathbf{rydde\_prd}
\end{bmatrix}
$$

rydder

$$
\begin{bmatrix}
part\text{-}word \\
\text{PRED } \boxed{1}\mathbf{av\_prd}
\end{bmatrix}
$$

av

(29)   Jeg rydder AV bordet.
      I   clear   off table.DEF
      'I clear the table.'

Given that Ground promotion is a combination of two constructions, (29) is assumed to have the construction type *_rydde-av*av_14-_rel*, which is a subtype of both *av_prt* and *av_prep* (see Figure 13).
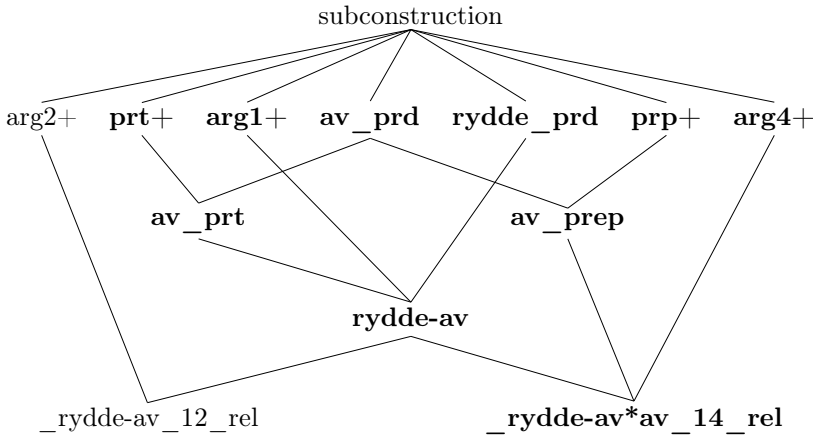
Figure 13: Simplified hierarchy of subconstruction types for the verb *rydde* 'clear'

The type hierarchy in Figure 13 also illustrates how the alternation between a regular Figure retention particle construction *_rydde-av_12_rel* and a Ground promotion particle construction *_rydde-av*av_14_rel* is accounted for. The verb (*rydde* 'clear') is provided with a KEYREL|PRED value *rydde_prd* which is compatible with the subconstruction types shown in the type hierarchy. When all the subconstruction types of a clause are unified, the result is one of the construction types at the bottom of the hierarchy, either *_rydde-av_12_rel* (Figure retention) or *_rydde-av*av_14_rel* (Ground promotion). The grammar only accepts combinations of subconstruction types that are defined in the type hierarchy.

The grammar produces the Minimal Recursion Semantics representation (MRS) (Copestake *et al.* 2005) in Figure 14 for the sentence in (29). Figure 14 shows that, although the sentence has a Ground promoting particle *av* 'off' which is assumed to be a realization of a particle and a selected preposition simultaneously, the particle is not given its own relation(s). Rather, its presence together with the verb *rydde* 'clear' gives rise to the relation '_rydde-av*av_14_rel'.

Figure 14:
MRS of the
sentence in *Jeg
rydder av bordet*
'I clear the table'
(see (1))
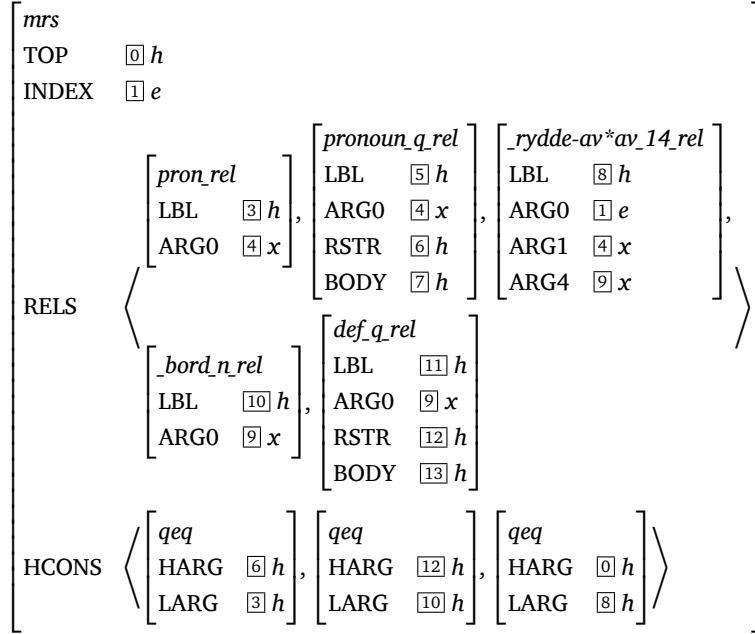
$$
\begin{bmatrix}
mrs \\
\text{TOP} \quad \boxed{0}\, h \\
\text{INDEX} \quad \boxed{1}\, e \\[2ex]
\text{RELS} \quad \left\langle
\begin{bmatrix} pron\_rel \\ \text{LBL} \quad \boxed{3}\, h \\ \text{ARG0} \quad \boxed{4}\, x \end{bmatrix},
\begin{bmatrix} pronoun\_q\_rel \\ \text{LBL} \quad \boxed{5}\, h \\ \text{ARG0} \quad \boxed{4}\, x \\ \text{RSTR} \quad \boxed{6}\, h \\ \text{BODY} \quad \boxed{7}\, h \end{bmatrix},
\begin{bmatrix} \_rydde\text{-}av^*av\_14\_rel \\ \text{LBL} \quad \boxed{8}\, h \\ \text{ARG0} \quad \boxed{1}\, e \\ \text{ARG1} \quad \boxed{4}\, x \\ \text{ARG4} \quad \boxed{9}\, x \end{bmatrix},
\right. \\
\left.
\begin{bmatrix} \_bord\_n\_rel \\ \text{LBL} \quad \boxed{10}\, h \\ \text{ARG0} \quad \boxed{9}\, x \end{bmatrix},
\begin{bmatrix} def\_q\_rel \\ \text{LBL} \quad \boxed{11}\, h \\ \text{ARG0} \quad \boxed{9}\, x \\ \text{RSTR} \quad \boxed{12}\, h \\ \text{BODY} \quad \boxed{13}\, h \end{bmatrix}
\right\rangle \\[2ex]
\text{HCONS} \quad \left\langle
\begin{bmatrix} qeq \\ \text{HARG} \quad \boxed{6}\, h \\ \text{LARG} \quad \boxed{3}\, h \end{bmatrix},
\begin{bmatrix} qeq \\ \text{HARG} \quad \boxed{12}\, h \\ \text{LARG} \quad \boxed{10}\, h \end{bmatrix},
\begin{bmatrix} qeq \\ \text{HARG} \quad \boxed{0}\, h \\ \text{LARG} \quad \boxed{8}\, h \end{bmatrix}
\right\rangle
\end{bmatrix}
$$

The relation '_rydde-av*av_14_rel' has two arguments, an ARG1 subject and an ARG4 object (the Ground). In this construction, the Figure is suppressed. However, in addition to the alternation with the '_rydde-av_12_rel' construction shown in Figure 13, the verb also alternates with a complex particle relation '_rydde-av*av_124_rel' (not displayed in Figure 13). This relation has three arguments ARG1, ARG2 (Figure), and ARG4 (Ground), and accounts for the presence of a Figure argument together with the Ground argument.

9   GENERATION FROM MRS AND IMPLEMENTATION

When the grammar generates from the MRS in Figure 14, it produces the four strings in (30).[29] (30a) and (30b) are generated with the

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[29] The grammar will only generate strings with identical semantics (disregarding information structure). Hence, if the grammar generates strings on the basis

part&prep-rule, and hence have only one *av,* whereas (30c) and (30d) are generated with a combination of the *prepmark-rule* and the *part-rule,* and they are produced as a consequence of the assumption that Ground promotion can be analyzed as a complex particle construction. Hence, they have a particle and a selected preposition. While the string in (30c) is a little odd, and can be considered colloquial, the string in (30d) is marginal, as discussed in connection with (18b) (see Footnote 16). However, all the strings have the same semantics as (30a), even the variants with topicalized objects (see (30b) and (30d)).[30]

(30)　　a.　Jeg rydder AV bordet.
　　　　　　I　　clear　off　table.DEF
　　　　　　'I clear the table.'

　　　　b.　Bordet　　rydder jeg AV.
　　　　　　table.DEF clear　I　　off
　　　　　　'The table, I clear.'

　　　　c.　Jeg rydder AV av bordet.
　　　　　　I　　clear　off　off table.DEF
　　　　　　'I clear the table.'

　　　　d.　??/* Bordet　　rydder jeg AV av.
　　　　　　　　　table.DEF clear　I　　off off
　　　　　　　'The table, I clear.'

---

of the semantic representation of (8j), repeated below as (i), all of these strings will have the same arity (a subject, the particle *ut* 'out', a direct object, and an oblique object marked by *med* 'with'). Figure deletion, as exemplified in (ii), will not apply. However, Figure deletion can be modelled in the grammar by defining two frames where one has an arg2-role and the other does not, for example *_bytte-ut*med_124_rel* (see (i)) and *_bytte-ut*med_14_rel* (see (ii)). Currently, only the former frame exists in Norsyg.

(i)　　　Jeg byttet　　UT dieselbilen　　med en elbil.
　　　　　I　　changed out diesel car.DEF with an electric car
　　　　　'I replaced the diesel car with an electric car.'

(ii)　　　Jeg byttet　　UT med en elbil.
　　　　　I　　changed out with an electric car
　　　　　'I replaced with an electric car.'

[30] The grammar does not represent information about information structure semantically.

The generated sentences in (30) demonstrate how it is possible within the framework of a typed feature structure grammar to account for the merger of two constructions into one, while at the same time allowing them to be separate. They also demonstrate that the Ground promotion construction interacts with the rest of the grammar and that the promoted object can be topicalized. The fact that the grammar generates sentences that are marginal, like (30d), is therefore considered a strength, not a weakness.[31]

All the 35 constructions listed in Aa (2021) are implemented in Norsyg.[32] The implementation of the Ground promotion construction does not have any noticeable impact on the performance of the grammar.[33]

10   APPLICABILITY TO OTHER GRAMMATICAL FRAMEWORKS AND MOTIVATION

The analysis presented in Sections 7–9, which relies on type hierarchies and multiple inheritance, can be incorporated into other HPSG grammars. This presupposes adopting the approach to valence demonstrated for Hebrew by Sheinfux *et al.* (2017). Furthermore, the part of the analysis that involves generalizations over construction types, as illustrated in Figure 11, can be adapted for implementation in LFG

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[31] The generated sentences can be ranked by means of a generation model. In this way, marginal strings will not be a problem for applications.

[32] The Norsyg grammar is open source and can be downloaded from `https://github.com/petterha/norsyg`. The Ground promotion constructions can be found in the file `ground.tdl`. The grammar loads with both ACE (use the `ace/config-mid.tdl` script in order to load a version with the Ground promotion construction) and LKB (use the `lkb/mid-script` script).

[33] A version of the grammar without the Ground promotion construction has been compared with a version *with* the Ground promotion construction on a set of 365 grammatical and ungrammatical test sentences, and the number of tasks and the space required by the parser is basically the same. This is not surprising since the construction is very constrained. It will not apply unless one of the 35 verb + particle combinations appear in a sentence, which is relatively rare.

grammars as a hierarchy of templates (Dalrymple *et al.* 2004; Asudeh *et al.* 2013). Nonetheless, because LFG, unlike HPSG, does not make use of type hierarchies, it is not feasible to underspecify lexical entries with regard to possible argument frames in the same manner as in the current analysis. Instead, one would need to use either multiple lexical entries, each corresponding to an argument frame, or specify the lexical entry with a disjunction of templates for each possible frame, which the parser then expands into separate lexical entries. This latter approach is used in the LFG grammar NorGram.

The fact that lexical entries are underspecified with regard to their syntactic environment does not mean that the grammar is less specific than other grammars regarding the possible structures in a language. The hierarchy of construction types (illustrated in Figures 10 and 13) determines the possible argument frames for each verb. Consequently, the information represented by the predicate of a verb can be thought of as 'packed' argument frame information, including selectional restrictions. In this way, no information is lost; rather, the burden of the lexicon is transferred to the hierarchy of construction types. This results in a more efficient parser, as demonstrated by Haugereid (2011), where a version of the Norsyg grammar with a 'packed' lexicon is compared to a version with an expanded lexicon (with one lexical entry for each argument frame of a verb), while maintaining largely equal coverage of the two grammars.

The use of the position of the semantic predicate in a hierarchy of construction types to constrain the syntactic frames a verb may have implies that we get different predicates for each frame. This is somewhat compatible with the approach in NorGram, as discussed in Section 7, where the semantic predicate reflects which particles and prepositions are selected by the verb. While it may seem counterintuitive to have as many as 10 different predicates associated with one verb form, as in the case of *bytte* 'change', the different predicates reflect the slight differences in meaning that arise from the combination of the verb and the argument frame, as illustrated by the translations in (8). Given the different translations arising from the use of the verb in different argument frames (*change*, *exchange*, *switch*, *trade*, *take turns*, *replace*), I argue that the different semantic predicates are motivated, although sometimes the difference in meaning is very small.

11   SUMMARY AND DISCUSSION

In this paper I have presented data on the Ground promotion construction. Some of these data are known in the literature, while some others are new, especially data showing that Ground promotion constructions alternate with complex particle constructions, where the particle and the selected preposition have the same form (*in situ* Ground promotion).

I have presented the existing analysis of Ground promotion in the P&P literature and shown how ideas from this framework can be transferred to an analysis in an implemented typed feature structure grammar.

Ground promotion is a relatively rare phenomenon, and to my knowledge, this is the first time an analysis of the phenomenon has been implemented that takes into account the assumption that Ground promotion constructions alternate with complex particle constructions. By organizing types of particle construction rules and selected preposition construction rules into a type hierarchy, I have given an account of Ground promotion as a combination of a regular particle construction and a selected preposition construction realized by one particle. I have also shown how this combined construction is equal to a complex particle construction with two identical Ps; a particle and a selected preposition, given that they are generated from the same semantic representation.

Even though the analysis presented in this paper has little impact on the coverage of the grammar, I still think that it deserves some attention as an example of how the definition of types and their organization into type hierarchies can capture generalizations and constrain possible constructions in the grammar. Moreover, the analysis is an example of how intuitions from a more theoretically-based linguistic framework like P&P can inspire implementations of analyses in more computationally-based frameworks like HPSG, which are more suited for testing and verifying analyses.

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