Danish non-specific free relatives

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Within the Head-driven Phrase Structure Grammar (HPSG) community, one part of the Base Hypothesis concerning free relatives proposed by Bresnan & Grimshaw (1978) has gained wide support, namely that free relatives are headed by the *wh*-phrase. The second part of the hypothesis is that the *wh*-phrase is base-generated, and this has not gained support. In this paper, we will consider a subset of free relative constructions, i.e. non-specific free relatives, and provide support for this second part, restated in HPSG terms as a claim that there is no filler–gap relation between a free relative pronoun filler and a gap in the sister clause of the free relative pronoun.

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1. INTRODUCTION

Bresnan & Grimshaw (1978) presented an analysis of the syntax of English free relatives. Their main claim was that free relatives are headed by the *wh*-phrase and that the *wh*-phrase is base-generated, i.e. it has not been moved from a canonical position to its clause-initial position. Within the Head-driven Phrase Structure Grammar (HPSG) framework, the first part of the claim has gained support, see e.g. Kim (2001), Wright & Kathol (2003), Kubota (2003), Taghvaipour (2005) and Borsley (2008). However, unlike the analysis of Bresnan & Grimshaw (1978), these analyses assume that the free relative pronoun is the filler of a gap in the sister clause of the free relative pronoun. Bjerre (2012) presents data which suggests that such a filler–gap relation does not hold for Danish specific free relatives. In this paper, we consider Danish non-specific free relatives. We examine their ability to appear with a bound relative clause, and show that this syntactic property provides support for the claim in Bjerre (2012) that there is no such relation. In Section 2, we provide data showing Danish non-specific free relatives. In Section 3, we introduce the Base Hypothesis proposed by Bresnan & Grimshaw (1978) and discuss one of their arguments. In Section 4, we briefly introduce previous HPSG analyses of free relatives. In Section 5, we present our analysis of Danish non-specific free relatives, and in Section 6, we propose an HPSG formalization of our analysis. Finally, in Section 7, we discuss an empirical implication of our formalization before we conclude the paper in Section 8.

2. DANISH NON-SPECIFIC RELATIVES

Free relative constructions are different from ordinary relative clauses. A free relative construction contains a relative phrase which is 'fused' with the antecedent. If the free relative pronoun has a determiner function, the antecedent is explicitly present. This is illustrated in (1) where the antecedent and relative pronoun in parentheses on the left indicate the 'unfused' representation of the free relative pronoun in parentheses on the right.[1]

(1) a. (enhver mand hvem) bor her → (hvem som helst) der bor her.
   any man who lives here whoever there lives here

 b. (enhver ting hvilken) ligger her → (hvad som helst) der ligger her.
   any thing which lies here whatever there lies here

 c. (ethvert sted hvor) jeg bor → (hvor som helst) jeg bor.
   any place where I live wherever I live

 d. (enhver mand hvem) jeg kender → (hvem som helst) jeg kender.
   any man whom I know whoever I know

 e. (enhver bog hvilken) jeg læser → (hvilken som helst bog) jeg læser.
   any book which I read whatever book I read

It should be noted that if the 'fused' relative pronoun functions as a subject, as in (1a) and (1b), an expletive obligatorily appears in subject position, see e.g. Bjerre (2013) for a discussion of the occurrence of the expletive subject in Danish interrogative and relative clauses.

Because of this dual function of the free relative pronoun, free relatives in many languages obey the so-called 'matching' effect, see Bresnan & Grimshaw (1978). This is also the case with Danish free relatives. A consequence of the 'matching' effect is that free relatives, in contrast to ordinary relative clauses, do not allow PP pied piping. This is illustrated for Danish in (2) and (3), where we can see that the argument from Bresnan & Grimshaw (1978) also holds for the equivalent examples in Danish.

(2) a. Jeg vil genlæse artiklen hvilken John arbejder på.
   I will reread paper.DEF which John works on
   'I will reread the paper which John is working on.'

 b. Jeg vil genlæse artiklen på hvilken John arbejder.
   I will reread paper.DEF on which John works
   'I will reread the paper on which John is working.'

(3) a. Jeg vil genlæse hvilken som helst artikel John arbejder på.
   I will reread whatever paper John works on
   'I will reread whatever paper John is working on.'

 b. *Jeg vil genlæse på hvilken som helst artikel John arbejder.
   I will reread on whatever paper John works

In (3b) the verb *genlæse* 'reread' in the main clause requires an NP object. However, the free relative phrase is a PP and consequently there is a mismatch of category.

Semantically, the non-specific free relatives are commonly taken to involve universal quantification, e.g. Bresnan & Grimshaw (1978), Larson (1987), Tredinnick (1994) and Iatridou & Varlokosta (1996), whereas specific free relatives are definite. We will not go into any detail regarding their semantics, but at least it can be noted that the non-specific free relatives usually admit a paraphrase involving a universal quantifier, as also shown in (1) above.[2]

In this section, we will show a collection of Danish data containing non-specific free relatives. The Danish counterparts of the English free relative pronouns suffixed by *-ever* are multi-word free relative pronouns ending in *som helst*. The set of non-specific free relative pronouns includes *hvem som helst* 'whoever', *hvad som helst* 'whatever', *hvor som helst* 'wherever', *når som helst* 'whenever', and *hvilken som helst* 'whatever/whichever'. In (4) we show non-specific free relatives in subject position. (The URLs for the sources of the examples in this sections are given in endnotes.)

(4) a. Hvem som helst der   citerer Dickens, har min tilslutning.[3]
      whoever   there cites Dickens has my support
      'Anybody who cites Dickens has my support.'
   b. Hvem som helst, der   nogensinde har spillet Matador, har fundet
      whoever   there ever   has played Monopoly has found
      glæde ved at lege med penge.[4]
      pleasure by to play with money
      'Anybody who has ever played Monopoly has found pleasure in playing with money.'
   c. Hvem som helst der   er klog nok   til at sige ja tak   til
      whoever   there is clever enough to to say yes thanks to
      din arbejdskraft, bliver meget tilfredse.[5]
      your labour   becomes very   satisfied
      'Anybody who is clever enough to accept your labour will be very satisfied.'

In (5) the examples contain non-specific free relatives in object position.

(5) a. Jeg drikker hvad som helst der   smager af kaffe.[6]
      I   drink   whatever   there tastes of coffee
      'I'll drink whatever tastes like coffee.'
   b. Det betyder ikke, at du skal give hende hvad som helst, hun vil
      it   means not   that you must give her   whatever   she will
      have.[7]
      have
      'It does not mean that you must give her whatever she wants.'
   c. Stræbsomme elever   læser hvad som helst, de   bliver præsenteret for.[8]
      diligent   students read whatever   they become presented for
      'Diligent student read whatever they are presented with.'

And finally, in (6) the examples contain non-specific free relatives as adverbials.

(6) a. Logbogen   kan læses   hvor som helst der   er internetadgang.[9]
        log book.DEF can read.PASS wherever   there is internet access
        'The log book can be read wherever there is an internet connection.'

    b. Man kan ansøge om   tidsubegrænset opholdstilladelse når som helst
        one can apply about permanent   residency   whenever
        man mener   at   man kan opfylde alle betingelserne.[10]
        one believes that one can meet   all requirements.DEF
        'You can apply for permanent residency whenever you think
        you meet all the requirements.'

    c. Han skyr   ingen midler for at tilrane sig magten   hvor som helst
        he spares no   means for to steal self power.DEF wherever
        han befinder sig.[11]
        he finds   self
        'He spares no means to take over the power wherever he is.'

Danish non-specific free relative pronouns may occur with bound relative clause
sisters.[12]

In (7) the free relative phrases are followed by bound relative clauses with
possessive relative phrases, phrases which contain the relative pronoun *hvis*.

(7) a. Hun   kunne være hvem som helst, hvis   usikkerhed han måske kan
        she   could be   whoever   whose insecurity he maybe can
        spore.[13]
        trace
        'She could be anybody whose insecurity he might be able to sense.'

    b. Det kan være hvem som helst hvis   attitude, værdisæt og   karisma
        it can be whoever   whose attitude values   and charisma
        gør et uudsletteligt indtryk.[14]
        make an unerasable   impression
        'It can be anybody whose attitude values and charisma make a lasting
        impression.'

In (8) the free relative phrases are followed by a bound relative clause with a
prepositional relative phrase.

(8) Den må æres   og respekteres   af dem, der   har
     it must honour.PRES.PASS and respect.PRES.PASS by those there have
     den og af hvem som helst, på hvem der   er lagt   et ansvar   i
     it and by whoever   on whom there is placed a responsibility in
     kirken.[15]
     church.DEF
     'It must be honoured and respected by those who have it and by anybody on whom
     a responsibility is placed in the church.'

And finally, in (9) we find examples of *hvor som helst* 'wherever', followed by
bound relative clauses with the relative pronoun *hvor* 'where', which is equivalent to
på hvilket 'on which'.

(9) a. Flokke samles   hvor som helst, hvor fugle bliver   fodret om
         flocks gather.PRES.PASS wherever   where birds become fed   in
         vinteren.[16]
         winter.DEF
         'Flocks gather wherever birds are fed in the winter.'

     b. Som forfatter kan jeg arbejde hvor som helst, hvor   jeg har   en laptop
         as   writer   can I   work   wherever   where I   have a   laptop
         og   internet.[17]
         and internet
         'As a writer I can work wherever there is a laptop or internet.'

The occurrence of a following bound relative clause is restricted to cases involving pied piping. This also means that the free relative construction is not an ordinary relative construction, with an ordinary relative clause. If it were, we would not expect this restriction, and examples like those in (10) would be expected to be well-formed. Such examples are not well-formed.[18]

(10) a. *Hun kunne være hvem som helst, hvem han kendte.
          she could be   whoever   whom he knew

     b. *Den må æres   og respekteres   af dem,
          it   must honour.PRES.PASS and respect.PRES.PASS by those
          der   har den og af hvem som helst, hvem kirken   lukker ind.
          there have it and by whoever   whom church.DEF lets   in

     c. *Flokke samles   hvor som helst, hvilket fugle foretrækker om
          flocks gather.PRES.PASS wherever   which   birds prefer   in
          vinteren.
          winter.DEF

3. BACKGROUND

Danish free relative constructions have been discussed in the Danish literature under various headings. Mikkelsen (1911:509) discusses *uegentlige* (improper) relative clauses which are defined as relative clauses with no explicit correlate in the main clause. Diderichsen (1957:210) talks about a type of relative clause where the correlate is only expressed in the relative clause. Hansen (1967:200) talks about indefinite relative clauses where the free relative pronoun does not refer back to a constituent in the preceding clause. Hansen & Heltoft (2011:1537) talk about *almene* (general) relative clauses which lack an explicit correlate in the main clause, i.e. they lack a nominal head. What all these accounts have in common is that they assume that the entire free relative construction is a relative clause.

The above Danish analyses are in line with the traditional analysis of free relatives within the generative paradigm, where free relatives are also assumed to be clauses,

projected to NPs, where the *wh*-phrase is extracted to clause-initial position, see e.g. Chomsky (1973). Example (11) shows this analysis (from Bresnan & Grimshaw 1978:331).
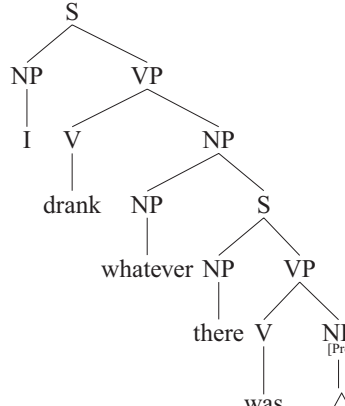
(11) a. I'll buy [NP [S   you are selling what]]

  b. I'll buy **what you are selling**.

Example (12) shows the alternative structure, assumed by Bresnan & Grimshaw (1978).[19] Importantly, in a free relative, the *wh*-phrase is a base-generated head rather than extracted from the sister clause, see Bresnan & Grimshaw (1978:331).

(12) I'll buy [NP what [S you are selling [pro]]]
                               ↓
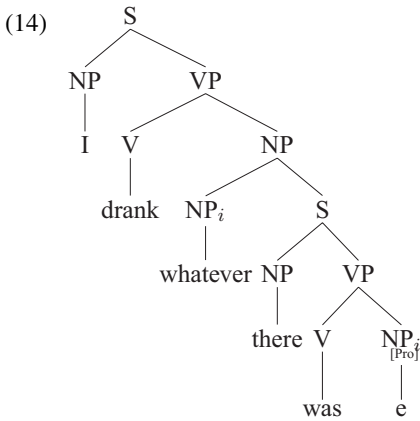 ϕ

The process by which a free relative is derived is called Controlled Pro Deletion, (Bresnan & Grimshaw 1978:368–378). Controlled Pro Deletion deletes the terminal string of a pro-category and co-indexes the pro-category with the antecedent free relative phrase.

   The process is illustrated in (13) and (14), where the terminal string △ of an NP pro-category is deleted and co-indexation between the pro-category and the antecedent free relative phrase is established (Bresnan & Grimshaw 1978:369).

(13)

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                    S
              ┌─────┴─────┐
            NP           VP
            │        ┌────┴────┐
            I      V          NP
                   │       ┌───┴───┐
                 drank    NP       S
                          │     ┌──┴──┐
                       whatever NP    VP
                                │   ┌──┴──┐
                              there V    NP
                                    │   [Pro]
                                   was   △
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(14)

According to Bresnan & Grimshaw (1978), the analysis of free relatives as base-generated *wh*-phrase–headed constructions is confirmed by a number of grammatical phenomena. Bresnan & Grimshaw (1978) show that assuming the *wh*-phrase to be the head of a free relative explains the behaviour of English free relatives with respect to e.g. the matching effect, number agreement, the internal NP over S constraint, the independent generation of non-specific free relatives and PP pied piping, see also Bjerre (2012).

The independent generation of non-specific free relatives is the only argument concerning the part of the hypothesis that the free relative phrase is base-generated, see Bresnan & Grimshaw (1978:339–342). The argument is that a non-specific free relative pronoun may occur without a following sister clause, as in (15), see Bresnan & Grimshaw (1978: 339–340).

(15) a. She wrote whenever possible.
    b. She'll go wherever possible (to promote her cause).
    c. She vowed to do whatever possible to vindicate herself.

In (15) the free relative occurs with an adjetive. Bresnan & Grimshaw argue that such constructions are not derived transformationally from full clauses. This would require an explicit listing of the adjectives which undergo the transformation, as illustrated in (16), (Bresnan & Grimshaw 1978:340).

(16) a. She wrote **whenever it was possible**. →
    b. She wrote **whenever possible**.

(17) a. She didn't write **whenever it was impossible** . →
    b. *She didn't write **whenever impossible**.

When a non-specific *wh*-phrase occurs without a sister clause, there is no sister clause from which it can have been extracted and consequently the *wh*-phrase is a base-generated head.

In Danish, non-specific free relative pronouns also commonly occur without a dependent clause, as in (18).

(18) a. Hvem som helst kan kalde sig psykoterapeut.[20]
      whoever   can call   self psychotherapist
      'Anybody can call himself a psychotherapist.'
    b. Hvad som helst kan ske   i   krig.[21]
      whatever   can happen in war
      'Anything can happen in war.'

And in Danish this is also restricted to non-specific free relative constructions, as shown in (19).

(19) a. Jeg spiser hvad som helst (der   serveres).
      I   eat   whatever   there serve.PASS
      'I'll eat whatever is served.'
    b. Jeg spiser hvad *(der   serveres).
      I   eat   what   there serve.PASS
      'I'll eat what is served.'

The dependent clause after the specific free relative is obligatory. The optionality/obligatoriness of the dependent clause is determined by the antecedent 'fused' into the relative pronoun. This is illustrated in (20).

(20) a. Jeg spiser alt mad (der   serveres).
      I   eat   all food   there serve.PASS
      'I eat all food that is served.'
    b. Jeg spiser det mad *(der   serveres).
      I   eat   the food   there serve.PASS
   'I eat the food that is served.'

The relative clause after the definite antecedent with the definite article is obligatory, whereas the relative clause after the universally quantified noun is optional.

4. HPSG *WH*-HEAD ANALYSES OF FREE RELATIVES

As explained in Bjerre (2012), a number of HPSG accounts of free relatives have adopted the *wh*-head analysis, see e.g. Kim (2001), Wright & Kathol (2003), Kubota (2003), Taghvaipour (2005) and Borsley (2008).[22] However, these analyses do not adopt the idea that the *wh*-phrase is base-generated and not extracted from its sister clause, as in Bresnan & Grimshaw (1978); rather, in HPSG terms, they assume that there is a filler–gap relation between the *wh*-phrase and a gap in the sister clause of the

wh-phrase. The structure in (21), slightly modified from Kim (2001:44), illustrates the structure of free relatives that is assumed by these analyses.

(21)

NP[SLASH {}]
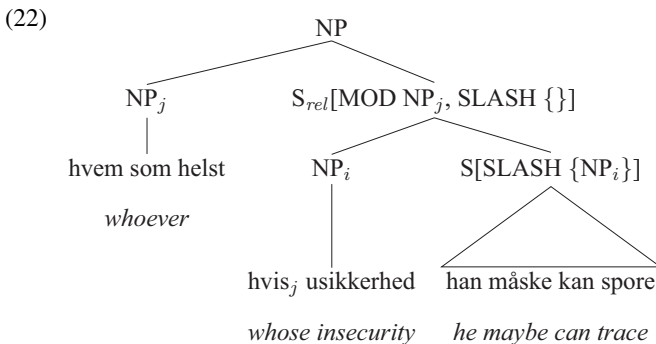
NP$_i$　　　　　S[SLASH {NP$_i$}]

what　　　　　they ate
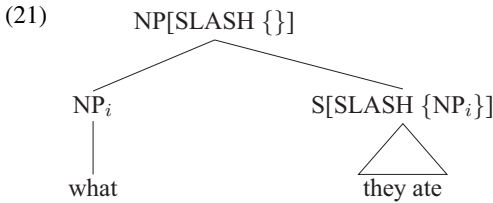
As this example shows, the constituent is an NP. At the same time, though, the constituent is a head–filler structure which contains a filler free relative pronoun and a sister clause with a missing constituent.[23] The NP does not miss a constituent, as the filler free relative pronoun cancels the missing constituent. The structure implies that the free relative pronoun has been extracted from its sister clause in the sense that its canonical position is in the sister clause. There is no implication that actual movement is involved.
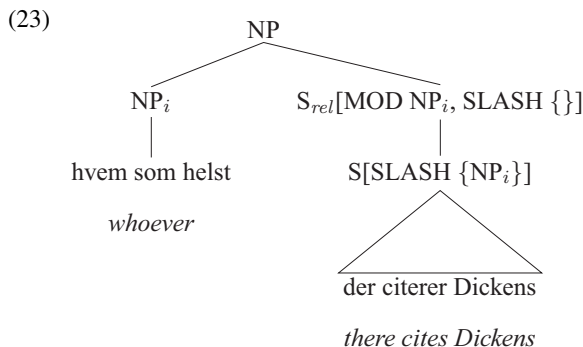
5. OUR ANALYSIS

The data in Section 2 suggests that the structure of Danish free relatives does not involve a clause from which the free relative pronoun has been extracted. We propose that the gap in the sister clause in a free relative is cancelled off before forming a constituent with the free relative pronoun phrase. The *wh*-phrase is the head of an NP and the sister clause is a bound relative clause, albeit with the restriction mentioned in Section 2 that the bound relative clause involves pied piping.

　　Importantly, we need to look at the structure of the free relative constructions with bound relative clauses. The structure proposed for (7a) above is shown in (22).

(22)

NP

NP$_j$　　　　　S$_{rel}$[MOD NP$_j$, SLASH {}]

hvem som helst　　NP$_i$　　　　S[SLASH {NP$_i$}]

whoever

hvis$_j$ usikkerhed　　han måske kan spore

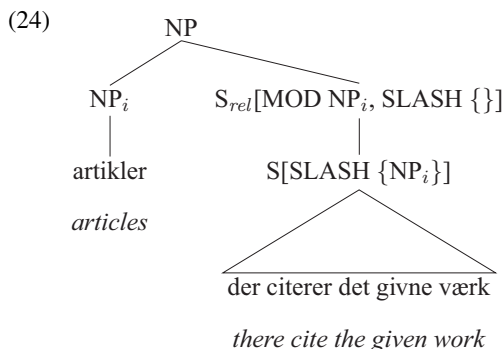*whose insecurity　　he maybe can trace*

The gap in the relative clause is filled by the phrase containing the relative pronoun *hvis* 'whose'. There is no gap for the non-specific free relative pronoun phrase to fill in the modifying sister clause.

The diagram in (23) shows the structure for the free relative *hvem som helst der citerer Dickens* 'whoever there cites Dickens'.

(23)

$$NP$$
$$NP_i \qquad S_{rel}[\text{MOD } NP_i, \text{SLASH } \{\}]$$
$$\text{hvem som helst} \qquad S[\text{SLASH } \{NP_i\}]$$
whoever
der citerer Dickens
there cites Dickens

In this example, the gap is cancelled off by a construction, as the relative clause does not contain a relative pronoun filler.

The structure we propose is similar to the structure of an ordinary relative construction like (24), which shows the structure of the relative construction *artikler der citerer det givne værk* (literally: 'articles there cite the given work'), and, as can be seen, it is similar to the structure in (23).

(24)

$$NP$$
$$NP_i \qquad S_{rel}[\text{MOD } NP_i, \text{SLASH } \{\}]$$
$$\text{artikler} \qquad S[\text{SLASH } \{NP_i\}]$$
articles
der citerer det givne værk
there cite the given work

Supporting evidence for our proposed analysis of free relatives comes from extraposition data. Ordinary relative constructions allow extraposition of the relative clause out of the NP. This is illustrated in (25) where the relative clauses are separated from their head noun by a verbal particle.

(25) a. Der blev slået en stilling op, der bare var helt perfekt.[24]
 there was hit a position up there just was absolutely perfect
 'A position was advertised that was absolutely perfect.'
   b. Hun samlede en bog op der havde gemt sig under en stol.[25]
 she picked a book up there had hidden self under a chair
 'She picked up a book which was hidden under a chair.'

c. Den kvindelige bilist overså   sin vigepligt,   og kørte
the woman   driver overlooked her duty to give way and drove
manden ned, der endte med lidt knubs   og 2 brækkede
man.DEF down there ended with some scratches and 2 broken
tommelfingre.[26]
thumbs
'The woman driver missed her duty to give way and ran down the man who
ended up with a few scratches and two broken thumbs.'

In non-specific free relatives, the free relative pronoun can also be separated from its
sister clause by a verbal particle, as shown in (26).

(26) a. De har lov   til at nægte dig at tage hvad som helst med,
        they have permission to to deny   you to take whatever   with
        der kan betragtes   som farligt.[27]
        there can consider.PASS as   dangerous
        'They are allowed to deny you to bring anything that can be considered
        dangerous.'

     b. De mener åbenbart   at de kan lukke hvad som helst ned der
        they mean apparently that they can close whatever   down there
        truer   dem.[28]
        threatens them
        'Apparently they think that they can close down anything that threatens
        them.'

     c. Han stikker hvem som helst ned, der tilfældigvis er på det forkerte
        he   stabs   whoever   down there accidentally is on the wrong
        sted på det forkerte tidspunkt.[29]
        place on the wrong   time
        'He stabs anybody who accidently is in the wrong place at the wrong time.'

The extraposition in (26) is accounted for on the assumption that the free relative
pronoun's sister clause is a relative clause in itself without a missing constituent
modifying the free relative phrase head. On this assumption, we are dealing with
relative clause extraposition. If, on the other hand, the free relative construction itself
is a clause, the extraposition behaviour is not readily accounted for. Then the free
relative construction would have a structure similar to e.g. an interrogative clause.
As (27) shows, interrogative clauses do not allow extraposition of the sister clause of
the interrogative pronoun.

(27) a. Bliver vi spurgt hvem vi er igen og igen, vil vi på et tidspunkt
        become we asked who we are again and again will we on a time
        løbe tør for svar.[30]
        run dry for answers
        'If we are asked who we are again and again we will run out of answers
   at some point.'

b. *Bliver vi spurgt hvem igen og igen vi er, vil vi på et tidspunkt
   become we asked who   again and again we are will we on a time
   løbe tør for svar.
   run   dry for answers

6. FORMALIZATION

In this section we will show the formalization of our analysis. We will use the free relative construction in example in (28) to illustrate the formalization.

(28) Jeg spiser hvad som helst der   smager godt.
      I   eat   whatever   there tastes good
      'I eat anything that tastes good.'

The sentence has the structure shown in (29).

(29)
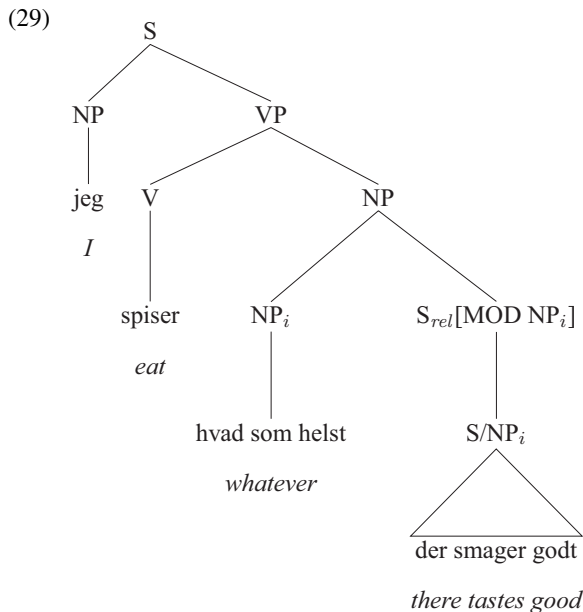
The formalization is based on Ginzburg & Sag (2000) and Sag (1997) using a *gap-ss* type to represent gaps, the Argument Realization Principle to remove *gap-ss* arguments from the valence lists, the SLASH-Amalgamation Constraint to determine the SLASH value of a word, the Generalized Head Feature Principle to propagate the SLASH value, and a head–filler phrase or constructional gap-binding to finally bind off the gap. Our formalization also uses the *expl(etive)-ss* type and the revised Argument Realization Principle for Danish proposed in Bjerre (2011a, b, 2013).

In our analysis, expletives in relative clauses appear on the ARG -ST list and are put in the SLASH set like ordinary gaps to be bound off at some point in the structure. (30) shows the hierarchy of *synsem* types assumed in this analysis, see Bjerre (2011b:281).

(30)
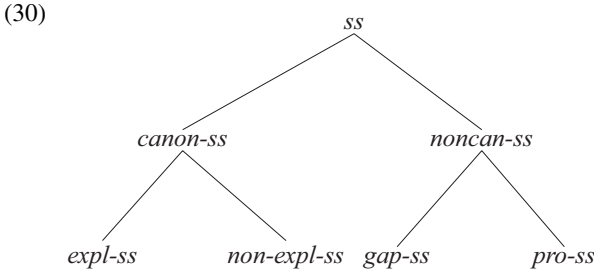
The *canon-ss* type is subtyped into an *expl(etive)-ss* and a *non-expl(etive)-ss*, the former representing the expletive occurring in subject position. In (31) and (32), the constraints on the *gap-ss* (see Sag 1997:446; Ginzburg & Sag 2000:170), and the *expl-ss* (Bjerre 2011b:282) are shown.

(31)

$$gap\text{-}ss \Longrightarrow \begin{bmatrix} \text{LOC } \boxed{1} \\ \text{SLASH} \left\{ \boxed{1} \right\} \end{bmatrix}$$

(32)

$$expl\text{-}ss \Longrightarrow \begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT | HEAD } expl \\ \text{CONT } \boxed{1} \end{bmatrix} \\ \text{SLASH} \left\{ \begin{bmatrix} \text{CONT } \boxed{1} \end{bmatrix} \right\} \end{bmatrix}$$

The *gap-ss* has neither syntactic nor semantic content of its own. The entire LOCAL value is put in its SLASH set. The *expl-ss*, on the other hand, has syntactic content of its own, i.e. the value of HEAD is the category *expl(etive)*, and only its CONTENT value is structure-shared with an otherwise underspecified element in its SLASH set.[31] The constraint for the verb *smager* 'tastes', as it occurs in (29) above, is given in (33).

(33)

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{smager} \right\rangle \\[2ex]
\text{ARG-ST} \left\langle
\begin{bmatrix}
\textit{expl-ss} \\[1ex]
\text{LOC} \mid \text{CONT} \; \boxed{1} \\[2ex]
\text{SLASH} \left\{ \begin{bmatrix} \text{CONT} \; \boxed{1} \end{bmatrix} \right\}
\end{bmatrix}, \; \text{AdvP} \begin{bmatrix} \text{SLASH}\{\} \end{bmatrix} \right\rangle
\end{bmatrix}
$$

The verb takes two arguments, an expletive and an AdvP.

In (34), the SLASH-Amalgamation Constraint from Ginzburg & Sag (2000:169) is shown. The constraint determines the SLASH value of a head word by amalgamating all the SLASH values of its arguments.

(34)

$$
\textit{word} \Longrightarrow
\begin{bmatrix}
\text{SYNSEM} \mid \text{SLASH} \; \boxed{\Sigma_1} \cup \dots \cup \boxed{\Sigma_n} \\[2ex]
\text{ARG-ST} \left\langle \begin{bmatrix} \text{SLASH} \; \boxed{\Sigma_1} \end{bmatrix}, \dots, \begin{bmatrix} \text{SLASH} \; \boxed{\Sigma_n} \end{bmatrix} \right\rangle
\end{bmatrix}
$$

Applying the SLASH-Amalgamation Constraint to the entry in (33) above results in the entry in (35), where the SLASH set for *smager* 'tastes' is defined.

(35)

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{smager} \right\rangle \\[2ex]
\text{SYNSEM} \mid \text{SLASH} \; \boxed{2} \cup \boxed{3} \\[2ex]
\text{ARG-ST} \left\langle
\begin{bmatrix}
\textit{expl-ss} \\[1ex]
\text{LOC} \mid \text{CONT} \; \boxed{1} \\[2ex]
\text{SLASH} \; \boxed{2} \left\{ \begin{bmatrix} \text{CONT} \; \boxed{1} \end{bmatrix} \right\}
\end{bmatrix}, \; \text{AdvP} \begin{bmatrix} \text{SLASH} \; \boxed{3}\{\} \end{bmatrix} \right\rangle
\end{bmatrix}
$$

The Argument Realization Principle for Danish in (36) (see Bjerre 2011b:282) is used to map the lexical arguments on the ARG-ST list on to the valence lists representing syntactic functions.

(36)

$$
word \implies \begin{bmatrix} \text{SS} \mid \text{LOC} \mid \text{CAT} \begin{bmatrix} \text{SUBJ} \; \boxed{A} \ominus \textit{list(gap-ss)} \\ \text{SPR} \; \boxed{B} \\ \text{COMPS} \; \boxed{C} \ominus \textit{list(gap-ss)} \end{bmatrix} \\ \text{ARG-ST} \; \boxed{A} \oplus \boxed{B} \oplus \boxed{C} \end{bmatrix}
$$

The valence lists, i.e. the SUBJ and COMPS lists, are used to represent syntactic functions whereas the ARG-ST list represents argument structure at the lexical level ignoring syntactic functions. The $\ominus$ symbol is used for contained list difference. The expression L1 $\ominus$ L2 is the list resulting from removing the elements in L2 from L1, see Ginzburg & Sag (2000:170).

The elements on the ARG-ST list are initially underspecified with respect to whether they are *canon-ss* or *gap-ss* types. If an argument is resolved to a *gap-ss*, the principle excludes it from both the SUBJ(JECT) list and the COMP(LEMENT)S list, i.e. we analyze subject gaps as being extracted. On the other hand, if an argument is resolved to an *expl-ss*, it appears on the SUBJ list, even though it also gives rise to an element in the SLASH set.

Applying the Argument Realization Principle for Danish to our entry in (35) gives rise to the entry in (37).

(37)

$$
\begin{bmatrix} \text{FORM} \; \left\langle \textit{smager} \right\rangle \\ \text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \begin{bmatrix} \text{SUBJ} \; \left\langle \boxed{4} \right\rangle \\ \text{COMPS} \; \left\langle \boxed{5} \right\rangle \end{bmatrix} \\ \text{SLASH} \; \boxed{2} \cup \boxed{3} \end{bmatrix} \\ \text{ARG-ST} \; \left\langle \boxed{4} \begin{bmatrix} \textit{expl-ss} \\ \text{LOC} \mid \text{CONT} \; \boxed{1} \\ \text{SLASH} \; \boxed{2} \left\{ \begin{bmatrix} \text{CONT} \; \boxed{1} \end{bmatrix} \right\} \end{bmatrix}, \; \boxed{5} \text{AdvP} \begin{bmatrix} \text{SLASH} \; \boxed{3} \{ \} \end{bmatrix} \right\rangle \end{bmatrix}
$$

The expletive on the ARG-ST list is structure-shared with an element on the SUBJ list and the AdvP appearing on the ARG-ST list is structure-shared with an element on the COMPS list. In this example none of the elements on the ARG-ST list is removed from the valence lists.

In (38) the verb *smager* 'tastes' combines with the AdvP complement *godt* 'well'.

(38)

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{smager, godt} \right\rangle \\
\text{SYNSEM} \begin{bmatrix}
\text{LOC | CAT} \begin{bmatrix} \text{SUBJ} \left\langle \boxed{4} \right\rangle \\ \text{COMPS} \left\langle \right\rangle \end{bmatrix} \\
\text{SLASH } \boxed{6}
\end{bmatrix}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{smager} \right\rangle \\
\text{SYNSEM} \begin{bmatrix}
\text{LOC | CAT} \begin{bmatrix} \text{SUBJ} \left\langle \boxed{4} \right\rangle \\ \text{COMPS} \left\langle \boxed{5} \right\rangle \end{bmatrix} \\
\text{SLASH } \boxed{6}(\boxed{2} \cup \boxed{3})
\end{bmatrix} \\
\text{ARG-ST} \left\langle \boxed{4} \begin{bmatrix} \textit{expl-ss} \\ \text{LOC | CONT } \boxed{1} \\ \text{SLASH } \boxed{2}\left\{ \begin{bmatrix} \text{CONT } \boxed{1} \end{bmatrix} \right\} \end{bmatrix}, \boxed{5}\text{AdvP}\begin{bmatrix} \text{SLASH } \boxed{3}\{\} \end{bmatrix} \right\rangle
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{godt} \right\rangle \\
\text{SYNSEM } \boxed{5}
\end{bmatrix}
$$
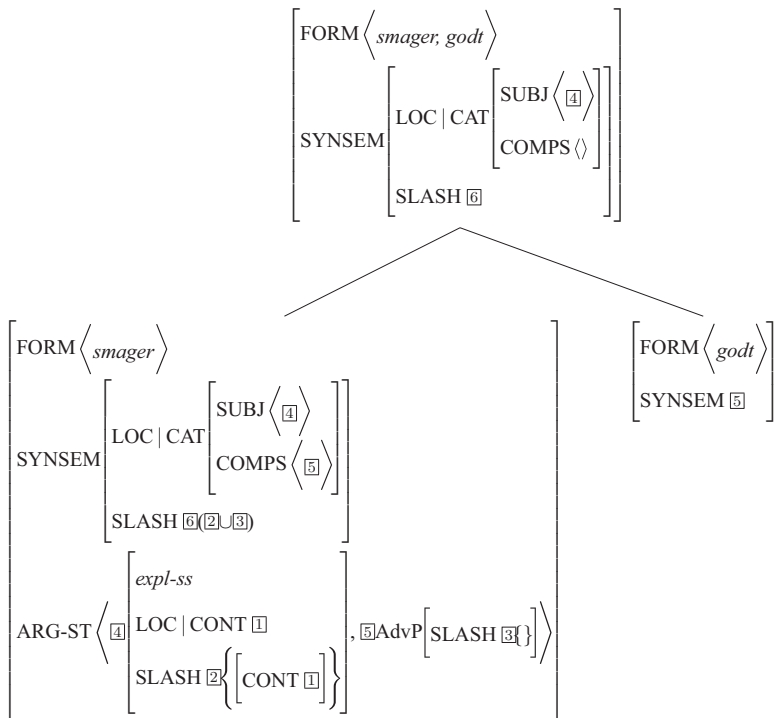
The element on the COMPS list is cancelled off and the mother's COMPS list is empty. The other features, including the SLASH value, are propagated by the Generalized Head Feature Principle from Ginzburg & Sag (2000:33). The constraint is a default constraint and all the features and their values in SYNSEM are propagated by default. The default rule can be overridden by other constraints, e.g. a constraint binding off an element from the SLASH set, or, as in this example, a constraint cancelling off the element on the mother's COMPS list. The Generalized Head Feature Principle is shown in (39).

(39)

hd-ph:

$$\left[\text{SYNSEM} / \boxed{1}\right] \longrightarrow \dots \textbf{H}\left[\text{SYNSEM} / \boxed{1}\right]$$

The VP is then combined with the expletive subject *der* 'there' to form a clause, as shown in (40).

(40)

$$
\left[
\begin{array}{l}
\text{FORM}\left\langle \textit{der, smager, godt} \right\rangle \\[4pt]
\text{SYNSEM}\left[
\begin{array}{l}
\text{LOC | CAT | SUBJ}\,\langle\rangle \\[4pt]
\text{SLASH}\;\boxed{6}
\end{array}
\right]
\end{array}
\right]
$$

$$
\left[
\begin{array}{l}
\text{FORM}\left\langle \textit{der} \right\rangle \\[4pt]
\text{SYNSEM}\;\boxed{4}
\end{array}
\right]
\qquad
\left[
\begin{array}{l}
\text{FORM}\left\langle \textit{smager, godt} \right\rangle \\[6pt]
\text{SYNSEM}\left[
\begin{array}{l}
\text{LOC | CAT}\left[
\begin{array}{l}
\text{SUBJ}\left\langle \boxed{4} \right\rangle \\[4pt]
\text{COMPS}\,\langle\rangle
\end{array}
\right] \\[10pt]
\text{SLASH}\;\boxed{6}
\end{array}
\right]
\end{array}
\right]
$$
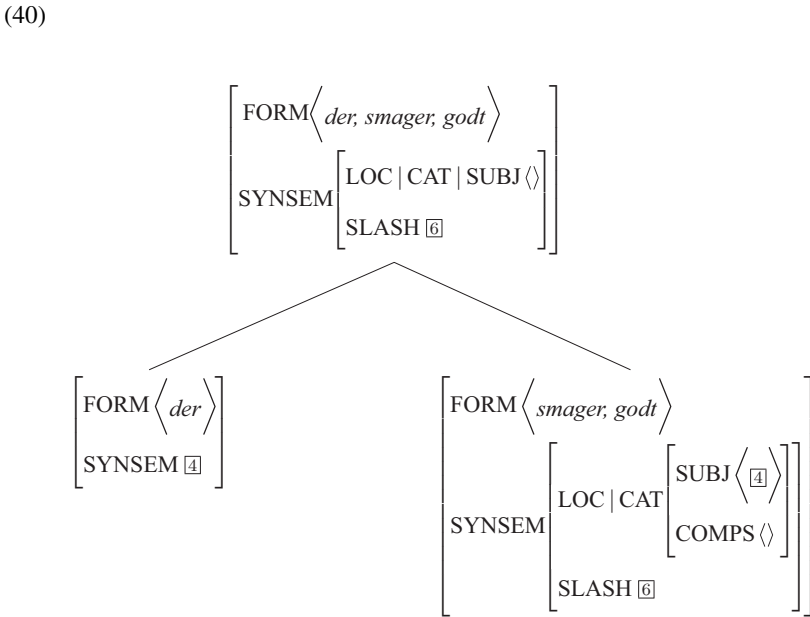
The element on the SUBJ list is cancelled off and the mother's SUBJ list is empty. The Generalized Head Feature Principle ensures that the SLASH value from the entry for *smager* 'tastes' is present at clause level
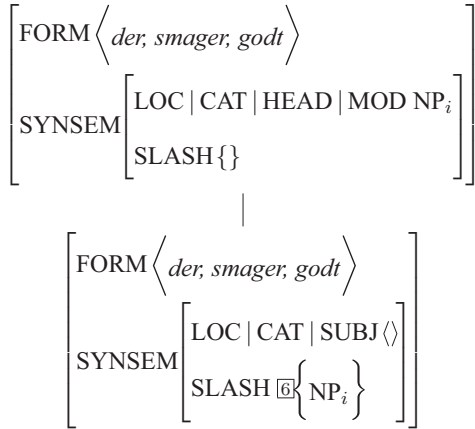
As explained in Section 5 above, we do not assume a filler–gap relation between the free relative phrase and a gap in its sister clause. The SLASH element due to the gap filled by an expletive is not bound off by the free relative phrase in a head–filler-phrase. Instead we assume that the SLASH element is bound off constructionally by the constraint in (41), see Sag (1997:36).

(41)

non-wh-rel-cl:

$$
\left[
\begin{array}{l}
\text{HEAD | MOD NP}_i \\[4pt]
\text{SLASH}\{\}
\end{array}
\right] \longrightarrow \textbf{H}\left[\text{SLASH}\left\{\text{NP}_i\right\}\right]
$$

Constructional gap-binding is used when there is no relative pronoun to bind off the gap. If, on the other hand, we had an example like (22), the gap would be bound off in a subtype of a *wh-rel(ative)-cl(ause)* constraining the filler to be a pied piped phrase. Applying the constraint in (41) to our clause in (40) we get a relative clause as shown in (42).
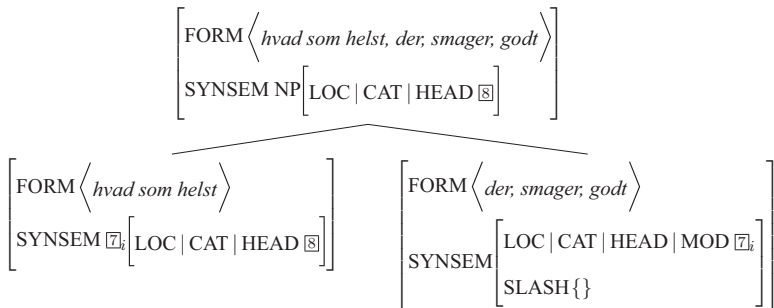
(42)

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{der, smager, godt} \right\rangle \\
\text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{MOD NP}_i \\ \text{SLASH}\{\} \end{bmatrix}
\end{bmatrix}
$$

$$
\mid
$$

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{der, smager, godt} \right\rangle \\
\text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \mid \text{SUBJ} \langle \rangle \\ \text{SLASH} \;\boxed{6}\left\{ \text{NP}_i \right\} \end{bmatrix}
\end{bmatrix}
$$

As can be seen, the top node now has the MOD feature characterizing a modifying relative clause. Further, the SLASH set is empty, as the element in it has been bound off.

Finally, the relative clause combines with the free relative phrase to form an NP. The resulting construction is shown in (43).

(43)

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{hvad som helst, der, smager, godt} \right\rangle \\
\text{SYNSEM NP} \begin{bmatrix} \text{LOC} \mid \text{CAT} \mid \text{HEAD}\;\boxed{8} \end{bmatrix}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{hvad som helst} \right\rangle \\
\text{SYNSEM} \;\boxed{7}_i \begin{bmatrix} \text{LOC} \mid \text{CAT} \mid \text{HEAD}\;\boxed{8} \end{bmatrix}
\end{bmatrix}
\qquad
\begin{bmatrix}
\text{FORM} \left\langle \textit{der, smager, godt} \right\rangle \\
\text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{MOD}\;\boxed{7}_i \\ \text{SLASH}\{\} \end{bmatrix}
\end{bmatrix}
$$

The index on the slashed element and the modified element are structure-shared, and this index is again structure-shared with the index on the *wh*-phrase. In this way the relation between the gap and the free relative pronoun is established. That the

wh-phrase is the head of the construction can be seen by the structure sharing between the HEAD values of the *wh*-phrase and the top node.

7. IMPLICATION OF OUR FORMAL ANALYSIS

In this section we will explore one consequence of our formal analysis. Our formal analysis does not allow for free relative constructions involving PP pied piping. In Section 2 we argued that such free relative constructions are not allowed. There are, however, examples of free relatives which apparently involve such pied piping. Müller (1999) provides the German equivalent of the Danish example in (44) which apparently involves PP pied piping.

(44) I   kan begynde med hvem I   vil   (begynde).
     you can begin   with whom you will begin
     'You can begin with whom you like.'

Such examples are restricted, though, and it should be noted that categorial matching of the PPs is not enough to achieve well-formedness. Note that the example in (45) is not well-formed.

(45) *I   kan begynde   med hvem I   vil   lege.
     you can begin   with whom you will play

In such examples the verbs in the main clause and the relative clause must be identical. Examples without the apparent pied piping are of course possible, as shown in (46).
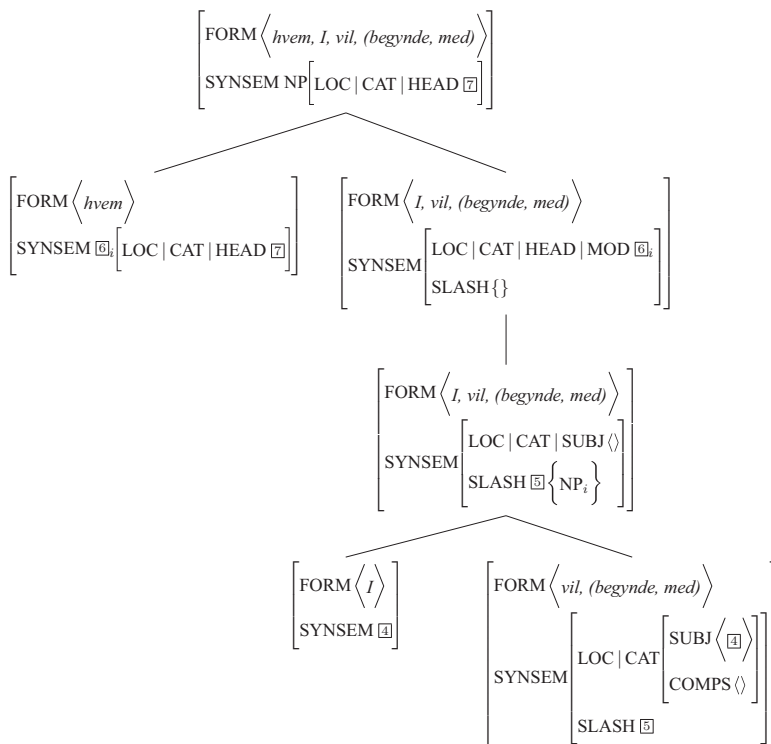
(46) I   kan begynde med hvem der   kom   først.
     you can begin   with whom there came first
     'You can begin with the person who came first.'

In analyses allowing pied piping of the free relative pronoun phrase, the example in (44) becomes structurally ambiguous, as shown in (47), where (47b) is the pied piping analysis.

(47) a. I   kan begynde med [NP hvem [S I   vil   (begynde med)]]
        you can begin   with   whom   you will begin   with
     b. I   kan begynde [PP med hvem [S I   vil   (begynde)]]
        you can begin   with whom   you will begin

In our analysis, (47b), involving PP pied piping, is not possible. The gap in the sister clause is bound off by the constraint in (41) which can only bind off NP gaps. As the structural ambiguity does not reflect a semantic ambiguity, we believe that this limitation of our formalization is desirable. The analysis provided for the free relative construction in (47a) is shown in (48).

(48)

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{hvem, I, vil, (begynde, med)} \right\rangle \\
\text{SYNSEM NP}\begin{bmatrix} \text{LOC} \mid \text{CAT} \mid \text{HEAD} \; \boxed{7} \end{bmatrix}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{hvem} \right\rangle \\
\text{SYNSEM} \; \boxed{6}_i \begin{bmatrix} \text{LOC} \mid \text{CAT} \mid \text{HEAD} \; \boxed{7} \end{bmatrix}
\end{bmatrix}
\qquad
\begin{bmatrix}
\text{FORM} \left\langle \textit{I, vil, (begynde, med)} \right\rangle \\
\text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \mid \text{HEAD} \mid \text{MOD} \; \boxed{6}_i \\ \text{SLASH}\{\} \end{bmatrix}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{I, vil, (begynde, med)} \right\rangle \\
\text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \mid \text{SUBJ} \left\langle \right\rangle \\ \text{SLASH} \; \boxed{5}\left\{ \text{NP}_i \right\} \end{bmatrix}
\end{bmatrix}
$$

$$
\begin{bmatrix}
\text{FORM} \left\langle \textit{I} \right\rangle \\
\text{SYNSEM} \; \boxed{4}
\end{bmatrix}
\qquad
\begin{bmatrix}
\text{FORM} \left\langle \textit{vil, (begynde, med)} \right\rangle \\
\text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT}\begin{bmatrix} \text{SUBJ} \left\langle \boxed{4} \right\rangle \\ \text{COMPS} \left\langle \right\rangle \end{bmatrix} \\ \text{SLASH} \; \boxed{5} \end{bmatrix}
\end{bmatrix}
$$

8. CONCLUSION

This paper has presented the Base Hypothesis concerning free relatives proposed by Bresnan & Grimshaw (1978). It has been shown that the hypothesis consists of two claims. On the one hand it claims that free relatives are headed by the *wh*-phrase, and, on the other, it claims that the *wh*-phrase is base-generated. In spite of the lack of support for the second claim within the HPSG community, we have shown that a certain syntactic property of non-specifc free relatives does indeed lend support to the second claim as well, restated in HPSG terms as a claim that there is no filler–gap relation between the free relative pronoun and a gap in its sister clause. The syntactic property was shown to be the ability to appear with a bound relative clause involving pied piping.

ACKNOWLEDGEMENTS

NOTES

1. The relative pronoun *hvem* in (1a) and (1d) is restricted to old Danish language and formal style in present-day Danish.
2. It may be noted that free relatives do not appear in e.g. 'there'-insertions, as shown in (i).

   (i) *Der var hvilken som helst artikel John arbejder på på skrivebordet.
      there was whatever   paper John works on on desk.DEF

3. http://www.180grader.dk/Politik/rigsretten-er-politisk-teleskopisk-filantropi
4. http://www.180grader.dk/Udland/billedet-som-kan-koste-romney-dyrt
5. https://twitter.dom/MissDammer/status/285086912899846144
6. http://www.sunddebat.som/showthread.php/3147-Hvilken-kaffe/page3
7. http://www.skolemaelk.dk/foraeldre/brevkasse-klumme/brevkasse/2010/september/min-pige-paa-5-aar-vil-ikke-falde-i-soevn-om-aftenen/
8. http://www.fysik7.dk/index.php/forord
9. http://www.peter-holmboe.dk/category/undervisning/page/3/
10. http://www.kina.cc/cm/script/forum/view.asp?article_id=6193538
11. http://comicwiki.dk/wiki/Kloro
12. A bound relative clause is a clause modifying an explicit nominal.
13. http://www.mandala.dk/view-post-comments.php4?blogID=1934&postID=5195
14. http://books.google.dk/books?id=OsEuGPmO2loC&pg=PT4&lpg=PT4&dq=attitude+v%C3%A6rdis%C3%A6t+karisma&source=bl&ots=xjEzD_Ulrx&sig=kijJhvgc8cROqZudIukGdABxBwI&hl=da&sa=X&KOfhywOf34K4BQ&redir_esc=y#v=onepage&q=attitude%20v%C3%A6rdis%C3%A6t %20karisma&f=false
15. www.mormon.dk/data/kpl/joseph_f_smith.pdf
16. http://www.luontoportti.com/suomi/da/linnut/grasisken
17. http://politiken.dk/forbrugogliv/livsstil/mitforbrug/ECE1786086/succesforfatter-lever-i-sus-og-dus-jeg-er-meget–bange-for-faste-udgifter/
18. Of course (10c) is well-formed on a non-restrictive reading where *hvilket* 'which', modifies a proposition.
19. See Gross & van Riemsdijk (1981) for an argument against the analysis in Bresnan & Grimshaw (1978).
20. http://www.tuba.dk/brevkasseindlaeg/et-valg
21. http://www.cswap.com/1961/The_Guns_of_Navarone/cap/da/2_Parts/a/00_16
22. A noteworthy exception is Müller (1999), who argues that the free relative construction must be a clause in its own right in order to explain German extraposition data.
23. Constituents can inherit constraints from multiple super types in HPSG.
24. http://www.firmabeskrivelse.dk/kontor/begynd-jagten-paa-det-nye-job-online/
25. http://www.birgit.0catch.com/godnathistorie_fra_det_virkelige.htm
26. www.scootzone.dk/nyheder/knallertkoerer-koert-ned-af-ukendt-kvinde.html

27. http://www.mobildebat.dk/archive/index.php?t-75741.html
28. http://newz.dk/ultimatum-til-kazaa
29. http://dk.politik.narkive.com/TqSb2W6A/jonke.3
30. http://www.lenekrarup.dk/mig.htm
31. The SLASH element needs to be further restricted to an NP to ensure that the gap is only bound of by NP fillers in varieties of Danish which allow an expletive subject in non-local dependencies.

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