RESEARCH

The structure of approximative numerals in German

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This paper argues that approximative numerals in German such as *an die zwanzig* 'up to twenty' are not numerals contained in a PP, as suggested by Corver & Zwarts (2006). Such numerals are compared with regular PPs and shown to never pattern with PPs. Rather, they pattern with numerals modified by an adverb like *ungefähr zwanzig* 'approximately twenty.' The words appearing before the numeral in approximative numerals such as *an die* 'up to' are hence adverbs, contrary to surface appearance. This result is further supported by the observation that in expressions like *an die* 'up to' neither the alleged preposition behaves like a preposition nor does the alleged definite determiner behave like a definite determiner.

1 Introduction

The topic of this paper is the structure of the German numeral expressions illustrated in (1).

(1) a. **Um   die tausend** Kinder   saßen im   Foyer.
         around the thousand children sat   in.the hall
         'Around one thousand children were sitting in the hall.'

     b. **An die siebzig** Flüchtlinge sind erstickt.
         on the seventy refugees   are suffocated
         'Up to seventy refugees suffocated.'

     c. **Gegen siebzig** Flüchtlinge sind erstickt.
         against seventy refugees   are   suffocated
         'Nearly seventy refugees suffocated.'

I will follow Plank (2004) and refer to such numeral expressions as approximative numerals. They are so-called because these numerals do not specify a unique cardinality but only narrow it down to a certain range of cardinalities. What makes approximative numerals theoretically interesting is the element giving rise to the approximative reading, the so-called approximative modifier. In the examples in (1), the approximative modifier is drawn from the set of local prepositions: *um* 'around' in (1a), *an* 'on' in (1b), and *gegen* 'against' in (1c). Depending on the preposition, the definite determiner *die* has to be included in the approximative modifier. Omitting *die* in (1a) and (1b) results in ungrammaticality, whereas adding *die* in (1c) results in ungrammaticality. Hence in (1a) and (1b), the approximative modifier is *an die* and *um die*, respectively, and in (1c) it is *gegen*. Since the approximative reading cannot be subsumed under the local interpretation of

prepositions,[1] the question is how to structurally represent such prepositions within the approximative numeral. Based on Dutch, Corver & Zwarts (2006) argue that approximative numerals are PPs, as shown in (2) for the examples (1b) and (1c).[2]

(2)

```
                          _____
                         /            \
                       PP              NP
                      /  \             △
                    P°    DP        Flüchtlinge
                    |    /  \
                   an  D°    NP
                 gegen  |    △
                       die  siebzig
                        Ø
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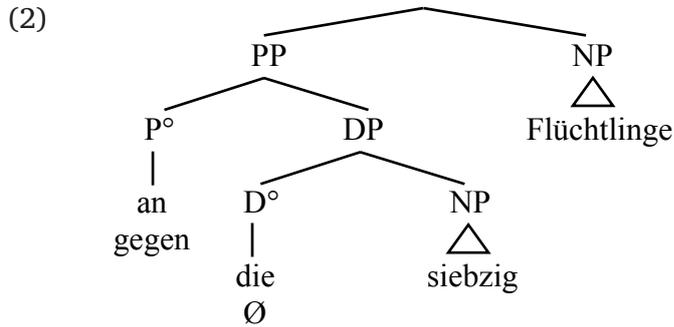
I argue in this paper that approximative numerals are not PPs. Rather, approximative modifiers are adverbs that are homophonous to a sequence of a preposition with or without the determiner *die*. The corresponding structures under this approach for (1b) and (1c) are provided in (3).

(3)

```
                      _____
                     /            \
                   NUM            NP
                  /   \           △
             adverb   NUM     Flüchtlinge
                |      |
             an die  siebzig
             gegen
```
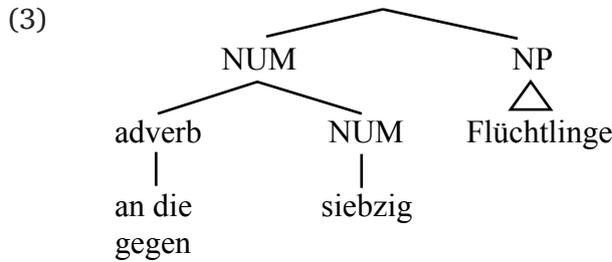
The structure of approximative numerals as in (1) is hence subsumed under a structure that is independently required, namely one for approximative numerals that contain an adverb as their approximative modifier. Two examples for approximative numerals containing adverbs as approximative modifiers are given in (4), and the corresponding structure for (4b) in (5).

(4)   a.   **Ungefähr   tausend**   Kinder   saßen   im   Foyer.
             approximately   thousand   children   sat   in.the   hall
             'Around one thousand children were sitting in the hall.'

       b.   **Fast   siebzig**   Flüchtlinge   sind   erstickt.
             nearly   seventy   refugees   are   suffocated
             'Nearly seventy refugees suffocated.'

(5)

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                      _____
                     /            \
                   NUM            NP
                  /   \           △
             adverb   NUM     Flüchtlinge
                |      |
             fast    siebzig
```
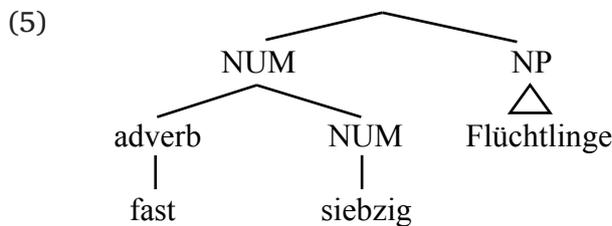
[1] This claim is a bit simplified; I will return to this issue in section 5.2.

[2] Corver & Zwarts (2006: 828) make two additional assumptions about the structure of NPs modified by a numeral. The first concerns the status of numerals. Whereas I analyze them as modifiers, Corver & Zwarts (2006) analyze them as predicates of the NP modified by that numeral. The second concerns the phrasal status of the numeral + NP constituent. For Corver & Zwarts (2006), the resulting constituents are NumPs whereas for me they are NPs. As both issues are orthogonal to the topic of this paper, namely the internal structure of approximative numerals, I chose to leave out the phrasal status of numeral + NP constituents and to label numerals as *NUM* in order to make no commitment about their internal make-up.

The paper is structured as follows. I first argue in section 2 that approximative modifiers are attached to the numeral and not to the full DP nor to the DP-internal NP containing the numeral. In section 3, I provide three arguments that show that approximative numerals differ from bona fide PPs but pattern with approximative numerals containing adverbs as their approximative modifier, thereby providing support for a uniform analysis of approximative modifiers as adverbs. In section 4, I argue that in addition to not behaving like PPs, the alleged preposition and the alleged determiner do not behave as prepositions or determiners either, respectively. In section 5, I spell out in more detail the idea that approximative modifiers such as *an die* 'up to' and *um die* 'around' are adverbs and discuss some problems that result from this analysis. In section 6, I discuss the status of approximative modifiers in Dutch and conclude that Dutch in fact has prepositional numerals. The final section, section 7, summarizes the main result.

2 The position of the approximative modifier

The purpose of this section is to establish that the approximative modifier is attached to the numeral. Two alternatives suggest themselves. First, the approximative modifier could be directly attached to the DP. Depending on the analysis of the lexical status of the approximative modifier, this either results in a PP or an adverbially modified DP. I will argue that neither option is viable. The second alternative treats the approximative modifier as being attached to the DP-internal NP. I will show that this option is not viable either, irrespective of the lexical status one wishes to assign to the approximative modifier. The three options based on the two alternatives are summarized in (6).

(6)   a.   The approximative modifier occupies the head position within a PP that takes the DP containing the numeral and the noun as its complement
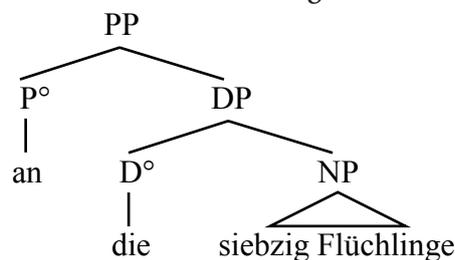
        b.   The approximative modifier occupies a DP adjoined position
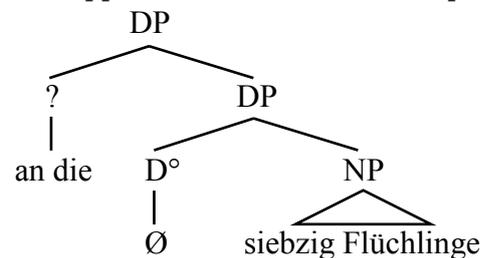
        c.   The approximative modifier occupies an NP adjoined position
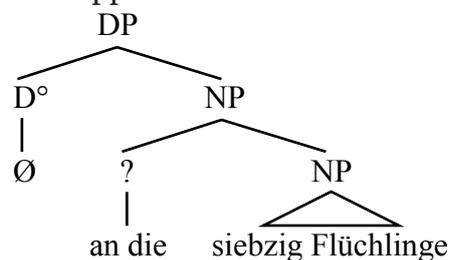
2.1 Phrases containing approximative numerals are not PPs

The first option in (6a) has already been convincingly rejected for Dutch by Corver & Zwarts (2006: 820–821). Based on extraposition, split topicalization, extraction properties of R-pronouns and subcategorization, all which distinguish DPs from PPs, they show that constituents containing approximative numerals always line up in their behavior with DPs, thereby suggesting that they are DPs. Except for split topicalization, which is possible out of PPs in German for some speakers, all these arguments carry over to German. I will only add some more arguments to this conclusion.

The first argument comes from pronominalization. When PPs are pronominalized, the preposition is retained, as can be seen in example (7) for the PP headed by *an* 'on', selected from the verb *sich erinnern* 'to remember.'

(7)   Peter erinnert   sich   √an die siebzig Vasen / √an sie   / *sie.
        Peter remembers   REFL.3 on the seventy vases   on them   them
        'Peter remembers seventy vases/them.'

This contrasts with the pronominalization properties of constituents containing an approximative numeral, as shown in (8) with the transitive verb *zerbrechen* 'to break,' which selects a DP object.

(8)   Peter zerbrach √an die siebzig   Vasen / *an sie   / √sie.
        Peter broke   on the seventy vases   on them   them
        'Peter broke up to seventy vases/them.'

As shown, when the object contains an approximative numeral and is pronominalized, then the objects pronominalize as a regular pronoun, indicating that it is a DP.

The second argument is based on PP-subjects. If constituents containing an approximative numeral were PPs, then they should be unavailable in German in subject position, because German lacks PP-subjects (Plank 2004: 174).

(9)   Under dem Tisch war *(es) sehr dunkel.
        under the table was   it very dark
        'Under the table was very dark.'

However, despite the lack of PP-subjects, German does allow constituents containing approximative numerals in subject position, suggesting that they are DPs.

(10)   An die ein Gramm Quecksilber ist (*es) schon tödlich.
        on the one gram mercury   is   it   already lethal
        'Up to one gram of mercury is already lethal.'

The third argument is based on verb agreement. If constituents containing an approximative numeral were PPs, one expects them to not trigger verb agreement, since verb agreement is a property of subject DPs only in German. But as the data in (11) show, such constituents do trigger verb agreement when they are subjects, indicating that they are DPs.

(11)   An   die zehn Gäste$_{PL}$ √kommen$_{PL}$ / *kommt$_{SG}$.
        on   the ten guests   come   comes
        'Up to ten guests come.'

Passivization provides the fourth argument against the idea that constituents containing approximative numerals are PPs. In German, passivization is a property of object DPs. Example (12a) illustrates the active version of a sentence containing the ditransitive verb *verabreichen* 'to dose.' The fact that the direct object containing an approximative numeral can be passivized, as shown in (12b), indicates again that it is a DP.

(12)   a.   Die Ärzte   verabreichten ihm an die ein Gramm Quecksilber.
           the doctors dose   him on the one gram   mercury
           'The doctors dosed him with up to one gram of mercury.'

         b.   An die ein Gramm Quecksilber wurde ihm von den Ärzten   verabreicht.
           on the one gram   mercury   became him of   the   doctores dosed
           'He was dosed with up to one gram of mercury.'

The sentence in (12b) cannot be analyzed as an impersonal passive with the PP moved to SpecCP because when the alleged PP contains a plural noun, verb agreement correspondingly changes to plural, as shown in (13).

(13)   An die zehn Tabletten wurden ihm von den Ärzten   verabreicht.
           on the ten   pills   became him of   the   doctores dosed
           'He was dosed with up to ten pills.'

This contrasts with clear cases of impersonal passives with a PP containing a plural noun, as shown in (14). There the verb *sich erinnern* 'to remember' selecting a PP is passivized. As can be seen, even when the PP contains a plural noun, singular verb agreement is retained.

(14)   a.   Er hat sich   an die zehn Gäste   erinnert.
           he has REFL.3 on the ten   guests   remembered
           'He remembered the ten guests.'

         b.   An die zehn Gäste$_{PL}$ √wird$_{SG}$ /* werden$_{PL}$ sich   oft   erinnert.
           on the ten   guests   becomes   become REFL.3 often remembered
           'One often remembers the ten guests.'

Moreover, PPs in impersonal passives cannot control a PRO in an infinitival adjunct clause, as shown in (15).

(15)   *Ohne   PRO$_i$ etwas   dafür zu machen, wird   sich   an jeden
         without   something for.it to make   becomes REFL.3 on every
         Gast$_i$ erinnert.
         guest   remembered
         intended: 'Without doing anything for it, every guest gets remembered.'

But constituents containing an approximative modifier can control a PRO in an infinitival adjunct clause, as shown in (16), indicating that they are proper subject DPs.

(16)   Ohne   PRO$_i$ vorher getestet worden zu sein, wurden an die zehn
           without   before tested   become to be   became on the ten
           neue   Verfahren$_i$ angewendet.
           new   procedures   applied
           'Without having been tested before, up to ten new procedures were applied.'

A fifth argument comes from case marking. If the constituents containing an approximative numeral were PPs, they should be invisible to case marking from the verb. But this is not the case. Consider first the examples in (17).

(17)   a.   Peter hilft$_{DAT}$ √Männern /* Männer.
           Peter helps   men.DAT / men.ACC
           'Peter helps men.'

         b.   Peter kämpft um$_{ACC}$ *Männern /√Männer.
           Peter fights   around men.DAT / men.ACC
           'Peter fights for men.'

(17a) shows that the object position of the verb *helfen* 'to help' assigns dative case to its object; (17b) shows that *um* 'around' assigns accusative case to its DP-complement. If constituents containing the approximative modifier *um* 'around' occupy the object position of *helfen* 'to help', then dative marking on the noun should be blocked by Minimality: although both the preposition and the verb are licit governors, the preposition is contained within the c-command domain of the verb and is therefore is more local. However, the example in (18) shows that the reverse is the case: dative marking occurs and case assignment by *um* 'around' is blocked.

(18)   Peter hilft$_{DAT}$ um$_{ACC}$ die zehn √Männern /* Männer.
        Peter helps around the ten   men.DAT / men.ACC
        'Peter helped around ten men.'

In order to account for this, an otherwise unmotivated transparency of PPs for case marking from outside need to be invoked. Under the hypothesis that such constituents are regular DPs, case marking follows neatly.[3]

The sixth argument comes from coordination.[4] On the one hand, a constituent containing an approximative numeral can be conjoined with a DP.

(19)   Zwanzig Frauen und an die zehn Männer waren   im   Kino.
        twenty   women and on the ten men   were   in.the cinema
        'Up to ten men and twenty women were in the cinema.'

On the other hand, two such constituents can be conjoined, as shown in (20).

(20)   An die ein Gramm Quecksilber und um   die ein Milligramm
        on the one gram   mercury   and around the one milligram
        Arsen   sind schon   tödlich.
        arsenic are already lethal
        'Up to one gram of mercury and up to one milligram of arsenic are already lethal.'

The sentence in (20) features plural verb agreement, similar to the coordination of two singular subject DPs. As the data in (21) show, the grammaticality of (20) cannot be analyzed as coordination of two thematically identical constituents that happen to have a different phrasal status. For this type of coordination is usually not available in German.

(21)   a.   Peter diskutiert (über) ein Thema.
             Peter discusses   about a   topic
             'Peter discusses a topic.'

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[3] The determiner surfaces as *die*, which is the nominative and accusative form, and not as *den*, the dative plural form. This follows both from my analysis that *an die* 'up to' is an adverb and hence fixed in its shape, as well as from Corver & Zwarts' (2006) analysis that *an die* 'up to' projects a PP containing only the numeral, because via Minimality the preposition blocks case assignment from outside.

[4] An anonymous reviewer points out that the argument makes use of the idea that coordination is based on categorial identity of the two conjuncts, even though problems with this approach are well-known (Sag et al. 1985). I agree with the reviewer that this approach is problematic. I nevertheless claim that coordination is a problem for the view that the constituents under discussion are PPs. There are three routes to the problem of the categorial non-identity of conjuncts that have been taken in the literature. None of these routes is satisfactory to deal with the fact that an alleged PP can be conjoined with a DP. The first invokes relational identity instead of categorial identity (Dik 1968). This approach doesn't help because it requires PPs to be licit subjects to start with, but as shown in (9), this is not the case, so that the grammaticality of (19) remains a problem. The second approach demands both conjuncts to be independently compatible with the position occupied by the coordinate structure (Sag et al. 1985). This approach doesn't work either because it directly clashes with the contrast in (21). According to the third approach, only the categorial feature of the first conjunct has to be compatible with the position of the position occupied by the coordinate structure (Progovac 1998a; b; Johannessen 1998; Zhang 2009). However, reversing the order of the two conjuncts in (19) doesn't affect the grammaticality of the sentence, contrary what is expected under this approach.

b. *Peter diskutiert die Homoehe   und über   das Burkaverbot.
    Peter discusses the gay marriage and about the burqa ban
    intended: 'Peter discusses gay marriage and burqa ban.'

The seventh and final argument comes from split topicalization. As mentioned at the beginning of this section, split topicalization is possible with PPs in German for some speakers. Crucially, the preposition has to be retained on both constituents derived from splitting (Fanselow & Ćavar 2002).

(22)   Mit   Frauen$_i$ hab ich nur   mit schönen t$_i$ getanzt.
       with   women have I   only with beautiful   danced
       'As for women, I danced only with beautiful ones.'

If constituents with an approximative numeral were PPs, their splitting is also expected to result in a repetition of the preposition. But as the data in (23) show, this is not possible: the preposition must not appear at the dislocated constituent.

(23)   (*An) Frauen$_i$ habe ich nur an die zehn t$_i$ gesehen.
        on   women have I   only on the ten   seen.
       'As for women, I only saw up to ten.'

Under the approach that such constituents are DPs, the non-repetition follows naturally.

2.2 Approximative modifiers are not adjoined to DP

Turning to the approach in (6b), according to which the approximative modifier is an adverb adjoined to the DP, DPs containing numerals can be preceded by a quantificational determiner like *alle* 'all' and various elements that are definite.

(24)   a.   alle zwanzig Gäste
            all twenty   guests
            'all the twenty guests'

       b.   die drei Frauen
            'the three women'

       c.   meine zwei Kinder
            'my two kids'

       d.   Peters zwei Jobs
            'Peter's two jobs'

All of these elements occur in the DP-domain, that is, in D˚ or SpecDP. Now if approximative modifiers were adverbs adjoined to DP, they are predicted to precede the elements from (24). But the data in (25) show that approximative modifiers necessarily follow them.

(25)   a.   alle an die hundert Gäste /* an die alle hundert Gäste
            all on the hundred guests   on the all hundred guests
            'all the up to hundred guests'

       b.   die an die zehn Frauen /* an die die zehn Frauen
            the on the ten   women   on the the ten   women
            'the up to ten women'

       c.   meine an die tausend Bücher /* an die meine tausend Bücher
            my   on the thousand books   on the my   thousand books
            'my up to thousand books'

      d.   Peters an die tausend Bücher /* an die Peters tausend   Bücher
           Peter's on the thousand books   on the Peter's thousand books
           'Peter's up to thousand books'

Moreover, adverbs that do modify DPs like *schon* 'already' or *sogar* 'even' attach to DP and precede elements that are definite.

(26)   a.   Schon / sogar alle zwanzig Gäste   im   Nebenraum machen Arbeit.
           already even all twenty   guests in.the side.room   make   work
           'Already/even all the twenty guests in the side room cause a lot of work.'

      b.   Schon   / sogar die zehn Frauen machen Lärm.
           already   even the ten   women make   noise
           'Already/even the ten women make noise.'

      c.   Schon / sogar meine tausend Bücher haben ihn beeindruckt.
           already   even my   thousand books have   him impressed
           'Already/even my thousand books impressed him.'

      d.   Schon / sogar Peters zwei Bücher haben ihm gefallen.
           already   even Peter's two   books have   him impressed
           'Already/even Peter's two books impressed him.'

2.3 Approximative modifiers are not adjoined to NP

Lastly, the approach in (6c), according to which approximative modifiers are adjoined to NP, makes wrong predictions about the scope of approximative modifiers. As is well-known, adjectival modifiers can take scope over NP-internally conjoined material.

(27)   Ich habe attraktive Frauen und Männer gesehen.
        I   have attractive women and men   seen
        'I saw attractive women and men.'

    = I saw [attractive women] and [men].
    = I saw [attractive [women and men]].

But approximative modifiers – be they adverbs or alleged prepositions – lack the wide scope reading where they take scope over both conjuncts and only allow the reading where they take narrow scope over the first conjunct.[5]

(28)   a.   An die 300 Demonstranten und 10 Randalierer wurden festgenommen.
           on the 300 protesters   and 10 rioters   became arrested
           'Up to 300 protesters and 10 rioters were arrested.'
        = [up to 300 protesters] and [10 rioters] were arrested
   = / = [up to [300 protesters and 10 rioters]] were arrested

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[5] The unavailability of the wide scope reading becomes especially clear under corrective focus. It is possible to give the correction in (i) to (28a) and (28b), but it is impossible to give the correction in (ii).

(i)   No, it were *exactly* 300 protesters.
(ii)   #No, it were *exactly* 10 rioters.

I do not wish to exclude that approximative modifiers such as *ungefähr* 'approximately' never adjoin to NP in any other languages. In Dutch, the sentence corresponding to (28b) does have a wide scope reading (Norbert Corver, personal communication, 2017/2/23), as does its Greek equivalent with περίπου (Vasiliki Koukoulioti, personal communication, 2017/5/27). But at least in German, they do not adjoin to NP.

    b.   Ungefähr   300 Demonstranten und 10 Randalierer wurden festgenommen.
          approximately 300 protesters   and 10 rioters   became arrested
          'Approximately 300 protesters and 10 rioters were arrested.'
      = [approximately 300 protesters] and [10 rioters] were arrested
    =/= [approximately [300 protesters and 10 rioters]] were arrested

The unavailability of the wide scope reading is unexpected if approximative modifiers were adjoined to NP. For if that were possible, they should be able to adjoin to an NP resulting from the coordination of two NPs. Since the approximative modifier c-commands the two conjoined NPs, it should consequently be able to take scope over both NPs, as shown in (29).

(29)
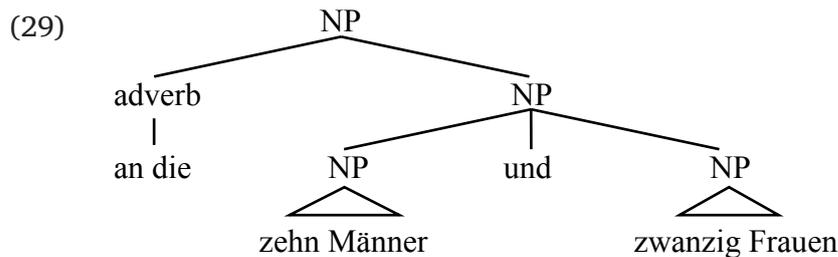
The unavailability of the wide scope reading therefore argues against the idea that the approximative modifier occupies an NP adjoined position as shown in (29). The absence of this reading, however, follows neatly from a structure where the approximative modifier is adjoined to the numeral, as shown in (30).

(30)
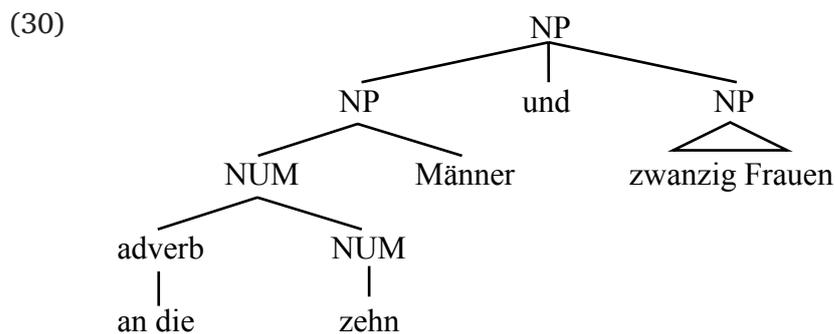
In (30), the approximative modifier only c-commands the numeral, hence only scopes over this numeral, so that the wide scope reading for (28) is excluded, as desired. In this respect, approximative modifiers behave like adverbs that modify adjectives.[6]

(31)   Sehr schöne   Männer und attraktive Frauen haben uns begrüßt.
        very handsome men   and attractive women have   uns greeted
        'Very beautiful men and attractive women welcomed us.'
      = [very beautiful men] and [attractive women] welcomed us
    =/= [very [beautiful men and attractive women] welcomed us

This similarity is expected because under the analysis that the approximative modifier is adjoined to the numeral, both (31) and (28) feature a structure where the adverb is attached too low to take wide scope. The structure of the subject-internal coordination structure of (31) is given in (32) and should be compared with (30).[7]

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[6] To be more precise, what is important is that the wide scope reading is not entailed by the meaning of (31); it is of course nevertheless compatible with it.

[7] Similar to the label *NUM* (cf. fn. 2), I chose the label *ADJ* in order to make as few as possible commitments about the structure of adjectives and the way they combine with nominals.

(32)
```
                              NP
              ┌───────────────┼───────────────┐
             NP              und              NP
        ┌─────┴─────┐                    ┌─────┴─────┐
       ADJ        Männer              attraktive Frauen
   ┌────┴────┐
 adverb     ADJ
   │         │
  sehr     schöne
```
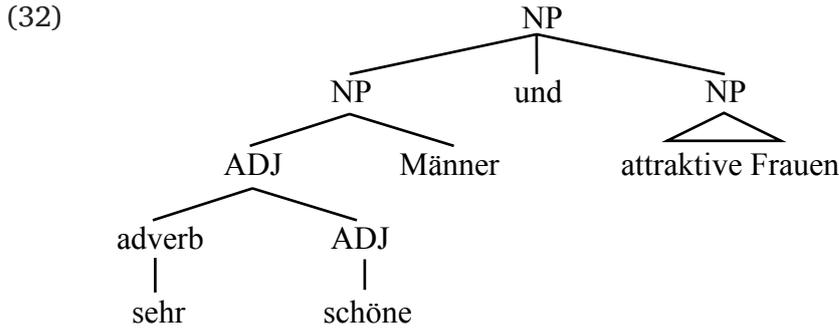
3 Approximative numerals are not PPs

The previous section established that approximative modifiers are attached to the numeral. In this section I will argue that approximative modifiers are not prepositions and hence that the resulting approximative numerals are not PPs either. Rather, approximative modifiers that look like prepositions are adverbs adjoined to the numeral. Therefore, approximative numerals are adverbially modified numerals. In total I will present three arguments against the idea that approximative numerals are PPs. They are all of the same form. I will present properties of bona fide PPs and show that approximative numerals containing approximative modifiers that look like prepositions behave differently vis-à-vis these properties. I will then show that the behavior of approximative modifiers is identical to that of clear cases of approximative modifiers that are adverbs, pointing to a uniform analysis of approximative modifiers.

3.1 PP splitting

The first difference between bona fide PPs and approximative numerals concerns the splitting of PPs by focus particles, expressions such as *zum Beispiel* 'for example,' and parentheticals. By parentheticals, I refer to clause-like expressions indicating the attitude of the speaker or the subject, such as *glaube ich* 'I think' or *so wird behauptet* 'it is claimed.' In bona fide PPs, focus particles, *zum Beispiel*, and parentheticals can split up PPs and appear between the preposition and its complement.[8]

(33)   a.   focus particles splitting up PPs
             Ich habe mal   eine Frage   an nur   die Frauen unter uns.
             I   have once a   question on only the women under us
             'Here is a question for only the women among us.'

        b.   *zum Beispiel* splitting up PPs
             Die Stadt kann den Auftrag an zum Beispiel einen lokalen Anbieter vergeben.
             the city can the order   on for example a   local   company give
             'The city can place the order with a local company.'

        c.   parentheticals splitting up PPs
             Peter denkt an denke ich die Frauen.
             Peter thinks on think I   the women
             'Peter has in mind the women, I think.'

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[8] Originally claimed to be impossible (Bayer 1990), focus particles have been shown to be able to occur between a preposition and its complement in German (Hoeksema & Zwarts 1991; Reis 2005; Bouma et al. 2007).

Whatever the precise position for parentheticals, *zum Beispiel* 'for example', and focus particles inside PPs turns out to be, it can be observed that such expressions can split up PPs as shown in (34).

(34)

    focus particles
    zum Beispiel 'for example'
    parentheticals
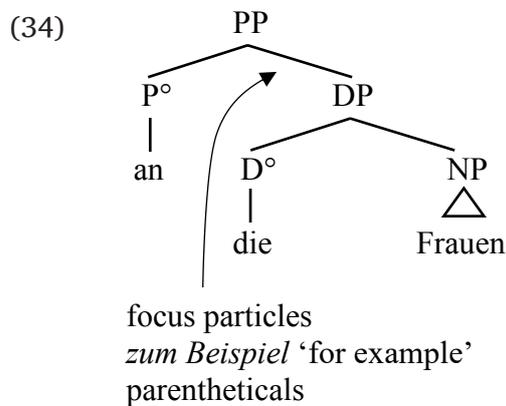
If approximative numerals were PPs, it is predicted that they can equally be broken up, as shown in (35).

(35)

    focus particles
    zum Beispiel 'for example'
    parentheticals
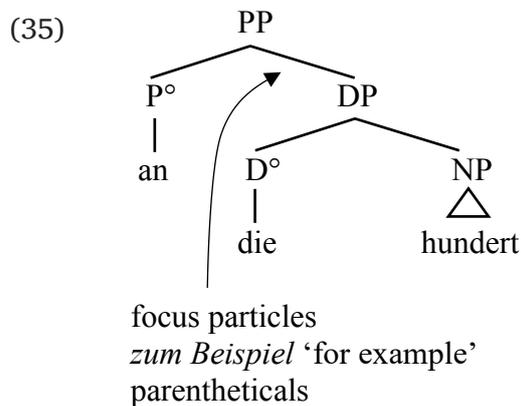
However, the examples in (36) show that this prediction is not borne out: none of these elements can split up approximative numerals, providing the first piece of evidence against the idea that approximative numerals are PPs.[9]

(36)   a.   focus particles not splitting up approximative numerals
              *Er hat an nur   die   zehn Menschen getötet.
              he   has on only the   ten   people   killed
              intended: 'He killed only up to ten people.'

        b.   *zum Beispiel* not splitting up approximative numerals
              *Peter hat an zum Beispiel die hundert Frauen geküsst.
              Peter has on for   example the hundred women kissed
              intended: 'Peter kissed up to hundred women for example.'

        c.   parentheticals not splitting up approximative numerals
              *Peter hat   an   denke ich   die hundert Frauen   geküsst.
              Peter has   on   think I   the hundred women   kissed
              intended: 'Peter kissed up to 100 women, I think.'

_____

[9] An anonymous reviewer suggests that the contrast between (33) and (36) could be due to an obligatory incorporation operation affecting the preposition and the determiner in approximative numerals, which then blocks intervening elements. I return to this suggestion in section 3.5.

The impossibility of (36) is crucially not due to some constraint banning the splitting expressions from appearing inside a complex numeral. In (37), the splitting expressions appear after the approximative modifier and the sentences are perfectly grammatical.

(37)   a.   focus particles splitting up numerals
            Er hat an die nur zehn Menschen getötet.
            he has on the only ten people killed
            'He killed only up to ten people.'

       b.   *zum Beispiel* splitting up numerals
            Peter hat an die zum Beispiel hundert Frauen geküsst.
            Peter has on the for example hundred women kissed
            'Peter kissed up to hundred women for example.'

       c.   parentheticals splitting up numerals
            Peter hat an die denke ich hundert Frauen geküsst.
            Peter has on the think I hundred women kissed
            'Peter kissed up to 100 women, I think.'

The alternative analysis treating approximative numerals as adverbially modified numerals predicts both the contrast between (33) and (36) as well as the contrast between (36) and (37). As for the first contrast, it follows from the fact that approximative qualifiers are adverbs. Since adverbs are monolexical, they simply cannot be split up. This is completely parallel to bona fide adverbial modifiers of numerals, which cannot be split up either.

(38)   a.   focus particles not splitting up adverbs
            *Er hat un– nur – gefähr sechzig Hot dogs gegessen.
            he has ap– only – proximately sixty hot dogs eaten
            intended: 'He ate only approximately sixty hot dogs.'

       b.   *zum Beispiel* not splitting up adverbs
            *Peter hat un – zum Beispiel – gefähr hundert Frauen geküsst.
            Peter has ap – for example – proximately hundred women kissed
            intended: 'Peter kissed up to hundred women for example.'

       c.   parentheticals not splitting up adverbs
            *Peter hat un – denke ich – gefähr fünfzig Hot dogs gegessen.
            Peter has ap – think I – proximately fifty hot dogs eaten
            intended: 'Peter approximately ate 50 hotdogs, I think.'

The second contrast, that between (36) and (37), follows from the structure the alternative analysis assigns to approximative numerals, as shown in (39) for example (37a).

(39)
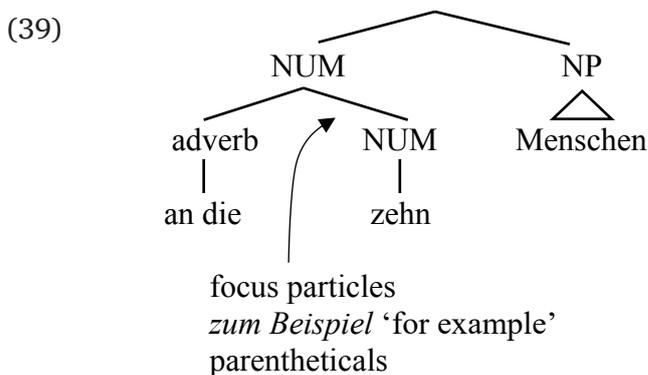
Since the adverb *an die* 'up to' and the numeral *sechzig* 'sixty' form separate constituents, the splitting expressions can appear in-between them. Importantly, this analysis also correctly predicts that focus particles, *zum Beispiel* 'for example', and parentheticals are fine after approximate modifiers that are clearly adverbs.[10]

(40) a. focus particles splitting up numerals
Er hat höchstens nur zehn Menschen getötet.
he has at.most only ten people killed
'He killed only at most ten people.'

b. *zum Beispiel* splitting up numerals
Peter hat ungefähr zum Beispiel hundert Frauen geküsst.
Peter has approximately for example hundred women kissed
'Peter kissed at most 100 women for example.'

c. parentheticals splitting up numerals
Peter hat ungefähr denke ich hundert Frauen geküsst.
Peter has approximately think I hundred women kissed
'Peter kissed approximately 100 women, I think.'

3.2 Case in nominal ellipsis

3.2.1 Emergence of inflectional case marking under nominal ellipsis

The second argument against treating approximative numerals as PPs comes from case marking of numerals. In contrast to adjectives, numerals are not case marked when their NP complement contains an overtly realized noun (the subscript on the verb indicates the case it assigns to its object).

(41) a. Peter traf$_{\text{ACC}}$ * schön / √schöne Frauen.
Peter met beautiful beautiful.ACC women
'Peter met beautiful women.'

b. Peter traf$_{\text{ACC}}$ √fünf /*fünfe Frauen.
Peter met five five.ACC women
'Peter met five women.'

(42) a. Peter begegnete$_{\text{DAT}}$ * schön / √ schönen Frauen.
Peter met beautiful beautiful.DAT women
'Peter met beautiful women.'

b. Peter begegnete$_{\text{DAT}}$ √ fünf /*fünfen Frauen.
Peter met five five.DAT women
'Peter met five women.'

---

[10] An anonymous reviewer observes that PP-structures cannot be generally split up. In Dutch, for example, the focus particle *zelfs* 'even' cannot appear between the preposition and its complement.

(i) <Zelfs> naar <?*zelfs> de kerk gaat Jan iedere week.
even in even the church goes Jan every week
'John goes every week even to the church.'

Ignoring that the German equivalent of this sentence is grammatical, the observation that PPs cannot be split up across the board does not affect the argumentation. For the argument only says that whatever element can appear between a preposition and its complement in bona fide PPs should also be able to appear between the alleged preposition and its complement in the relevant approximate numerals. This does neither entail nor necessitate that anything can appear between a preposition and its complement.

When the complement NP is elided, case marking on the numeral is optionally licensed.[11]

(43)　a.　Ich traf$_{\text{ACC}}$ zehn Frauen, aber Peter nur　fünfe _.
　　　　　 I　 met　　ten　women but　Peter only five.ACC
　　　　　 'I met ten women, but Peter only five.'

　　　b.　Ich begegnete$_{\text{DAT}}$ zehn Frauen, aber Peter nur　fünfen _.
　　　　　 I　 met　　　　　ten　women but　Peter only five.DAT
　　　　　 'I met ten women, but Peter only five.'

What is important for the discussion of the status of the approximative numeral is that case marking of the numeral under nominal ellipsis is unaffected by the presence of an approximative modifier. As (44) illustrates, the approximative modifier *um die* 'around' does not interfere with dative case marking on the numeral.

(44)　a.　Ich begegnete$_{\text{DAT}}$ um$_{\text{ACC}}$　die zehn Frauen, aber er　nur　um
　　　　　 I　 met　　　　　around the ten　women but　he　only　around
　　　　　 die fünfen _.
　　　　　 the five.DAT

　　　b.　*Ich begegnete$_{\text{DAT}}$ um$_{\text{ACC}}$　die zehn Frauen, aber er　nur　um
　　　　　 I　 met　　　　　around the ten　women but　he　only　around
　　　　　 die fünfe _.
　　　　　 the five.ACC
　　　　　 'I met around ten women, but he only around five.'

The reason this observation is important is that it points to the following generalization.

(45)　In nominal ellipsis, case marking on the numeral is determined by the verb.

This generalization is a problem for the analysis of approximative numerals as PPs. Consider the simplified structure in (46) for the numeral from (44a), where strike-through indicates ellipsis.

(46)
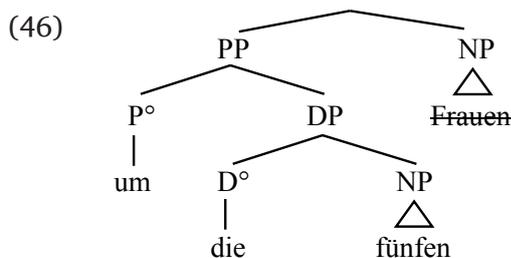
No matter how the PP is eventually combined with the NP, what is apparent is that the PP defines a separate case marking domain. So what the structure in (46) predicts is that if case marking appears on the numeral, then it is determined by the preposition. Since *um* 'around' assigns accusative case, the numeral should show up with accusative case under nominal ellipsis. But this is precisely not what happens, as (44b) shows. Instead, the case on the numeral is determined by the verb. This indicates quite strongly that the numeral is not part of a separate case domain and hence not part of a PP either. Importantly, the generalization in (45) is of course no problem for the analysis of the approximative numeral as an adverb, as shown in (47).

––––––––––––––

[11] Case marking on numerals also re-appears under split topicalization, cf. (i), which is well-known for its morphological regeneration effects (van Riemsdijk 1989).

(i)　Frauen$_i$ hab ich nur　fünfe　　t$_i$ getroffen$_{\text{ACC}}$.
　　 women　 have I　only five.ACC　　met
　　 'As for women, I only met five.'

(47)

```
                          ╱‾‾‾‾‾‾╲
                    NUM            NP
                  ╱‾‾‾‾╲           △
              adverb    NUM      F̶r̶a̶u̶e̶n̶
                 |       |
              um die   fünfen
```
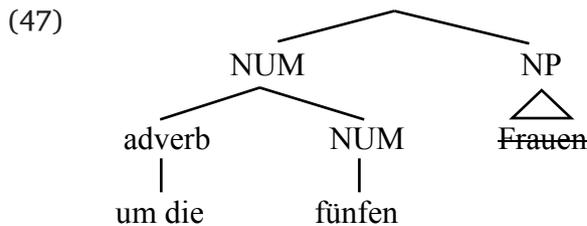
The reason that this structure is compatible with the generalization in (45) is that the presence of an adverb does not define a separate case marking domain since adverbs don't assign case. The adverb will hence be invisible to whatever case marking demands the numeral is subject to. Moreover, as correctly predicted by this analysis, case marking is not affected by the presence of an approximative modifier that is clearly an adverb.

(48) a. Ich traf$_{\text{ACC}}$ fast   zehn Frauen, aber er nur fast   fünfe _.
          I   met   nearly ten   women but he only nearly five.ACC
          'I met nearly ten women, but he only nearly five.'

      b. Ich begegnete$_{\text{DAT}}$ fast   zehn   Frauen, aber er nur fast   fünfen _.
          I   met   nearly ten   women but   he only nearly five.DAT
          'I met nearly ten women, but he only nearly five.'

3.2.2 Case marking vs. empty nouns

An anonymous reviewer points out that the argument just developed crucially hinges on the assumption that the suffixes -e and -en in (43), (44) and (48) are inflectional suffixes and hence directly belong to the numeral. However, there are alternative approaches such as those developed by Corver & van Koppen (2009; 2011) according to which such suffixes are not inflectional suffixes but exponents of empty nouns. If this line of reasoning is adopted for the data in (43), (44) and (48), then the argument loses its force. Since the empty noun is outside the c-command domain of the preposition, it is outside its case assignment domain, too, cf. (49).

(49)

```
                        ╱‾‾‾‾‾‾╲
                 PP              NP
              ╱‾‾‾‾╲             △
           P°       DP          -en
           |      ╱‾‾‾╲
          um    D°     NP
                |      △
               die    fünf
```
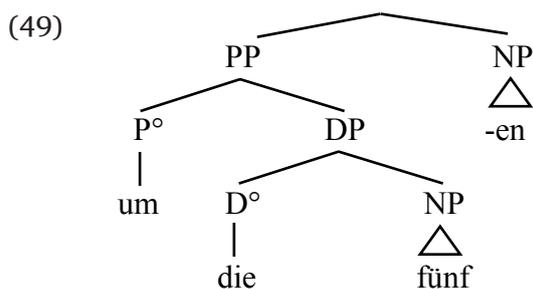
But there are two arguments in favor of the view that the relevant suffixes are inflectional.
   The first argument in favor of an analysis in terms of inflection is that numerals follow the inflectional paradigm of the determiner *ein* 'a' in German. The determiner *ein* 'a' follows one of the following three paradigms: strong, weak, and mixed.

(50) a. einer$_{\text{strong}}$ Einer   hat was   gesagt.
                            a.STRONG has something said
                            'Someone said something.'

      b. eine$_{\text{weak}}$ Der   eine   Mann hat etwas   gesagt.
                          the   a.WEAK man   has   something said
                          'The one man said something.'

    c.   ein$_{mixed}$ Ein   schöner   Mann hat etwas   gesagt.
                        a.MIXED handsome man has something said
                        'A handsome man said something.'

The strong form is shown in (50a), which is used when *ein* 'a' is free standing. (50b) illustrates the weak form, which is used if *ein* 'a' follows a determiner with strong inflection. (50c) finally illustrates the mixed form, which is used if *ein* 'a' is used as determiner in the nominative case; in that case, the following adjective bears strong inflection. In case of nominal ellipsis, each of the three forms is licensed, depending on the position of *ein* 'a' and the amount of elided material.

(51)   a.   Mir   gefiel ein schöner   Mann und ihr   gefiel auch einer _.
               I.DAT liked a   handsome man and she.DAT liked also a.STRONG
               'I liked a handsome man and she also liked one.'

        b.   Mir gefielen alle Männer aber ihr   gefiel dieser eine _.
               I.DAT liked   all men   but she.DAT liked this   a.WEAK
               'I liked all men and she liked this one.'

        c.   Mir   gefiel ein schöner   Mann, aber ihr   gefiel ein   hässlicher _.
               I.DAT liked a   handsome man   and she.DAT liked a.MIXED ugly
   'I liked a handsome man but she liked an ugly one.'

Now compare the behavior of *ein* 'a' with numerals such as *vier* 'four'.

(52)   a.   viere$_{strong}$ Viere   haben was   gesagt.
                        four.STRONG have   something   said
                        'Four people said something.'

        b.   vier$_{weak}$ Die vier   Männer haben etwas   gesagt.
                        the four.WEAK men   have   something said
                        'The four men said something.'

        c.   vier$_{mixed}$ Vier   schöne   Männer haben etwas   gesagt.
                        four.MIXED handsome men   have something said
                        'Four handsome men said something.'

(53)   a.   Mir   gefielen drei Männer, aber ihr   gefielen viere _.
               I.DAT liked   three men   but she.DAT liked   four.STRONG
               'I liked three men but she liked four.'

        b.   Mir   gefielen die drei Männer, aber ihr   gefielen die vier _.
               I.DAT liked   the three men   but she.DAT liked   the four.WEAK
               'I liked the three men but she liked the four.'

        c.   Mir   gefielen drei alte Männer, aber ihr   gefielen vier   junge _.
               I.DAT liked   three old men   but she.DAT liked   four.MIXED young
   'I liked three old men but she liked four young ones.'

As the comparison between (50)/(51) and (52)/(53) makes clear, the strong, weak, and mixed forms of *vier* 'four' are used in the same contexts as the strong, weak, and mixed forms of *ein* 'a'. The strong form is used when the numeral is freestanding (52a and 53a). The weak form is used after determiners with strong inflection (52b and 53b). And finally, the mixed form is used when the numeral is used as a determiner (52c and 53c). The only difference between numerals such as *vier* 'four' and *ein* 'a' is that the mixed and the weak form of numerals are syncretic. Importantly, that numerals follow an inflectional pattern

is completely unexpected under the view that the endings are exponents of empty nouns, but it trivially follows from an analysis where they are inflectional suffixes.

The argument just developed only works if one accepts that the suffix appearing on free-standing *ein* 'a' in (50a) and (51a) is inflectional, that is, that *einer* 'one' has the structure in (54).

(54)

```
            D°              NP
            |              /  \
          einer      s̶c̶h̶ö̶n̶e̶r̶ ̶M̶a̶n̶n̶
```
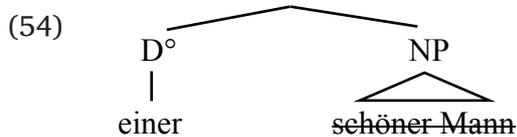
If one denies this and again follows Corver & van Koppen (2009; 2011), then possibly the suffix *-er* on *einer* 'one' is an exponent of an empty noun, too, so that (50a) and (51a) have the following structure.

(55)

```
            D°              NP
            |              / \
           ein-           -er
```
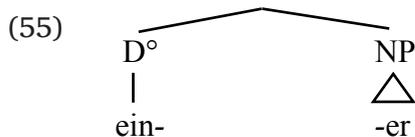
Then the parallelism between *ein* 'a' and numerals such as *vier* 'four' shows nothing about inflection. Here the second argument comes in. If the examples in (50a) and (51a) really have the structure in (55), then one predicts that the suffix *-er* should attach to any possible host. For example, *-er* is also expected to appear on phrases in SpecDP, such as possessors. So the following structure is predicted to also be available.[12]

(56)

```
                    DP
                  /    \
              XP          D`
              /\         /  \
          Guidos       D°       NP
                       |       /  \
                       Ø        -er
```
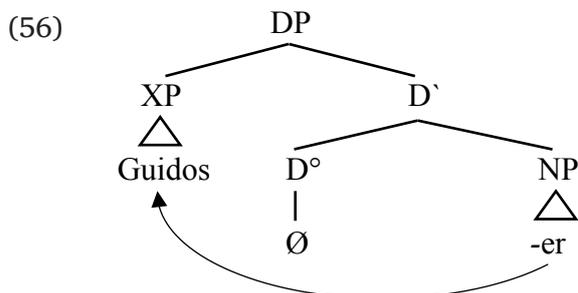
But this is not the case. Crucially, the suffix *-er* never attaches to prenominal possessors (cf. Roehrs 2006: 285).

(57)   Mir   gefällt Stefans   Rechner, aber ihr   gefällt Guidos/**Guidoser _ mehr.
       I.DAT like   Stefan's   computer but she.DAT liked   Guido's   more
       'I like Stefan's computer but she likes Guido's computer more.'

The behavior of prenominal possessors is a problem for the view that *-er* is not inflectional because nothing excludes phrases as hosts. In fact, not only is not excluded, Corver & van Koppen make use of structures where the host is phrasal (Corver & van Koppen 2011: 383). But if *-er* is inflectional, the ungrammaticality of (57) is a trivial consequence of the fact that inflection is a property of noun-related heads only in German (nouns, determiners, adjectives, numerals) but never of phrases.[13]

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[12] Conceiving of this movement as a form of local dislocation (Embick & Nover 2001), *-er* attaches to XP at the level of PF. The intervening D° head does not block this movement because local dislocation affects string-adjacent elements.

[13] An anonymous reviewer suggests that the ungrammaticality of (57) is compatible with Corver & van Koppen's (2011) approach if one assumes some Spell out constraint that either bans two inflectional elements or a linear sequence of two weak elements. As for the first constraint, it is at odds with the fact that the presence of two inflectional endings in German usually doesn't cause any trouble. For example, the

In sum, the analysis of the suffixes in (50a) and (51a) as exponents of empty nouns instead of inflectional suffixes is hard to motivate for German.

3.3 Stacking

The third problem for the idea that approximative numerals are PPs comes from the observation that approximative numerals allow stacking of approximative modifiers. That is, two or more approximative modifiers can be attached to the numeral. This is illustrated in (58).

(58) a. Ich füttere ihn jeden Tag um   die an die hundert Gramm Rindfleisch.
          I   feed   him every day around the on the hundred   gram   beef
          'I feed him every day with approximately up to 100g beef.'

      b. Mein Baby hatte jeden Tag immer an die um   die vierzig Grad   Fieber.
          my   baby had   every day always on the around the fourty   degrees fever
          'My baby had up to approximately 40°C fever every day.'

Since under Corver & Zwarts' (2006) approach approximative modifiers are heads of PPs, stacking of approximative numerals has to involve multiple PPs. There are three strategies to implement this idea technically, and all three turn out to be unsatisfactory.

The first strategy is to assume that stacked approximative modifiers involve a recursive PP structure.

(59)

In (59), the lower PP is a complement to the determiner of the complement DP of the higher PP. The problem with this structure is that it is otherwise unattested in the grammar of German. There are no other instances of a structure in German where a determiner selects for a PP, casting doubt on the appropriateness of this structure. An anonymous reviewer points out that if viewed from an antisymmetry perspective (Kayne 1994), PP-modifiers necessarily instantiate such a structure. Consider (60), adopted from Kayne (2005: 52).

---

noun *Männern* 'men.DAT' contains both the plural morpheme *-er* and the case morpheme *-n*. The second constraint is at odds with the fact that a sequence of two weak elements, for example two weak object pronouns, is otherwise licit in German.

(i)   Ich   hab's'm   gesagt.
        I   have'it'him told
        'I told it to him.'

One argument in favor of an analysis of *'s* 'it' and *'m* 'him' as weak object pronouns comes from the observation that both are banned from the preverbal position in a verb second clause, similar to Dutch (Zwart 1997).

(ii)   a. *'s hab ich ihm gesagt.   b. *'m hab ich es gesagt.
            it have I   him told   him have I   it told
            'I told it to him.'   'I told it to him'

(60)

```
                    DP
            ┌───────┴────────┐
           D°                PP
            |          ┌──────┴──────┐
          the        NPᵢ            P`
                      △        ┌─────┴──────┐
                     man      P°           KP
                               |      ┌─────┴──────┐
                             from    NPₖ          K`
                                      △      ┌─────┴─────┐
                                   Brazil   K°          XP
                                             |      ┌────┴────┐
                                             Ø     tᵢ        tₖ
```

I agree on this, but (59) and (60) still differ in one crucial aspect: in (60), the SpecPP is obligatorily filled by the NP, whereas in (59), the SpecPP-position has to remain obligatorily empty. As shown in (61) and (62), raising *vierzig* 'fourty' to the specifier of the embedded PP, which is fully parallel to the raising of *man* in (60), results in ungrammaticality.

(61)

```
                 PP
          ┌──────┴──────┐
         P°             DP
          |      ┌───────┴───────┐
         an     D°               PP
                 |         ┌──────┴──────┐
                die      NPᵢ            PP
                          △        ┌─────┴──────┐
                       vierzig    P°           DP
                                   |       ┌────┴────┐
                                  um      D°         tᵢ
                                           |
                                          die
```
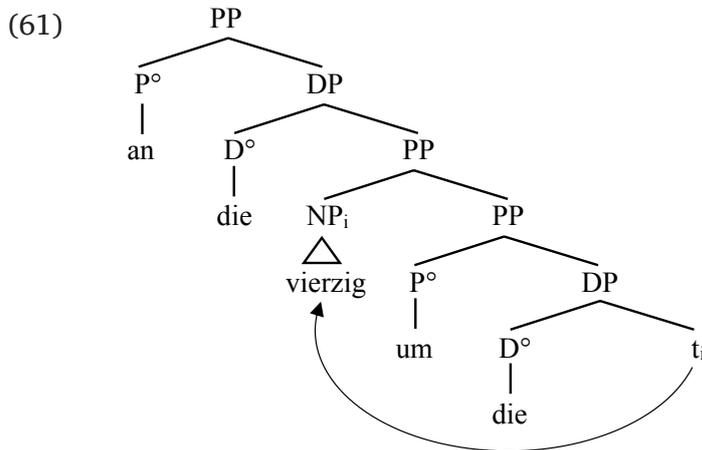
(62)   *an die vierzig um   die
        on the fourty   around   the
        intended: 'up to around forty'

The second strategy is again to assume a recursive structure, but one where the inner PP is the complement to an empty N°.

(63)

```
                 PP
          ┌──────┴──────┐
         P°             DP
          |      ┌───────┴───────┐
         an     D°               NP
                 |         ┌──────┴──────┐
                die       N°            PP
                           |       ┌─────┴──────┐
                           Ø      P°           DP
                                   |       ┌────┴────┐
                                  um      D°         NP
                                           |          △
                                          die       vierzig
```
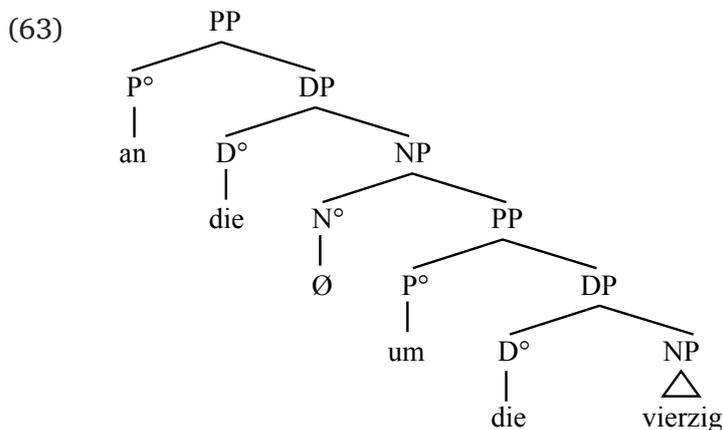
Although PPs selected by N°s are attested in German, the precise configuration in (63) is not attested. There is no N° that is both empty and requires a PP-complement. But this is required to make (63) work. Otherwise approximative modifiers themselves are expected to function as numerals, contrary to fact, cf. (64).

(64)   a.   *Peter hat an die Ø Männer gesehen.
             Peter has on the   men   seen
             *'Peter saw up to men.'

       b.   *Ich habe um   die fünf Männer gesehen, und Peter an die Ø Frauen.
             I   have around the five men   seen,   and Peter on the women
             intended: 'I saw around five men, and Peter up to five women.'

Example (64b) is particularly telling because it shows that the relevant N° must not be empty, even when discourse given and hence available for ellipsis. An anonymous reviewer points out that partitive structures (Jackendoff 1977) instantiate structures where an empty N° requires a PP-complement.

(65)
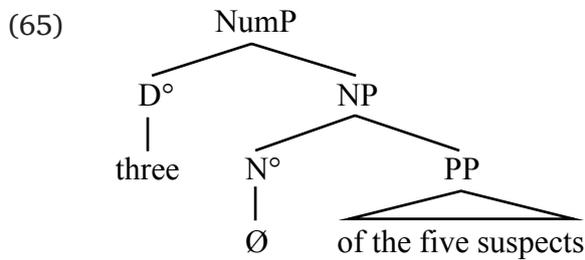
I disagree that partitives provide independent support for the structure in (63). On the one hand, the empty noun position in partitives can, but need not, be empty, contrary to the empty noun position in (63). Witness the contrast between (66a) and (66b).

(66)   a.   drei Verdächtige von den fünf Verdächtigen
             three suspects   of   the five suspects
             'three suspects out of the five suspects'

       b.   *Wir haben an die vierzig um   die vierzig Männer gesehen.
             we   have on the fourty around the fourty men   seen
             intended: 'We saw up to approximately fourty men.'

On the other hand, there are serious problems with the idea that the empty N°-position in partitives is syntactically empty. Rather, the empty noun arguably results from the ellipsis of a lexical noun. Evidence for this comes from selectional restrictions. The quantifier element in partitives in German need not be a numeral, it can also be a container noun, similar to pseudo-partitives (*a glass of water*). Some container nouns are possible as a quantifying element only with a restricted set of nouns.

(67)   ein Teller Suppe/* Brühe
       a   plate soup   broth
       'a portion of soup/broth'

The contrast observed in (67) carries over to partitives.

(68)   Ich hätte gern   einen Teller von der Suppe/* Brühe.
       I   had gladly a   plate of   the soup   broth
       'I'd like a portion of soup/broth.'

The contrast in (68) follows trivially under the ellipsis approach. The corresponding structures for (68) are provided in (69).

(69) a. Ich hätte gern   einen Teller ~~Suppe~~ von der Suppe.
          I   had gladly a   plate soup of   the soup
          'I'd like a portion of soup/broth.'

      b. *Ich hätte gern   einen Teller ~~Brühe~~ von der Brühe.
          I   had gladly a   plate broth of   the broth
          intended: 'I'd like a portion of broth.'

Since an elided copy of *Suppe* 'soup' and *Brühe* 'broth' is contained within the partitive expression, this noun has to satisfy the selectional restriction of the container noun *Teller* 'plate'. But whereas the noun *Suppe* 'soup' is compatible with *Teller* 'plate', *Brühe* 'broth' is not (cf. 67).

The third strategy treats the higher PP as adjoined to the lower PP, which defines the real approximative numeral.

(70)

```
                        PP
              ┌──────────┴──────────┐
             PP                     PP
        ┌─────┴─────┐          ┌─────┴─────┐
       P°           DP        P°           DP
        │        ┌───┴───┐     │        ┌───┴───┐
       an        D°      NP   um        D°      NP
                 │       △              │       △
                die      Ø             die    vierzig
```
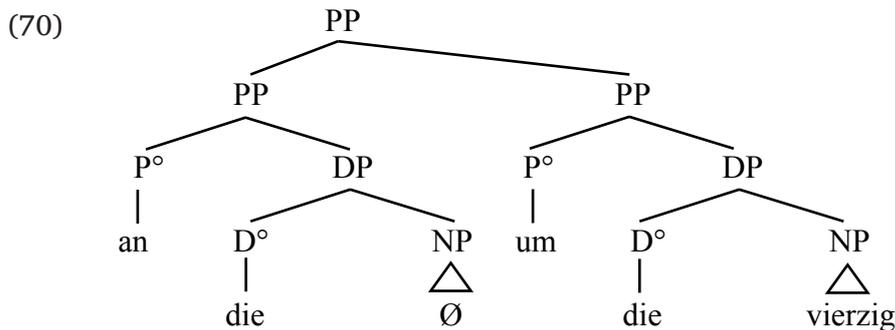
Even though this type of adjunction structure does not pose a general problem, the specific structure is again unattested. For there is no empty N° in German that only occurs in PPs that are adjoined to another PP. As shown in (71), if the empty N° appears in the lower PP, ungrammaticality results.

(71) *Peter hat an die fünf um   die Ø Männer gesehen.
       Peter has on the five around the   men   seen
       intended: 'Peter has seen up to approximately five men.'

An anonymous reviewer points out that empty nouns inside a PP that is adjoined to another PP are attested in path structures (Jackendoff 1990; Williams 1994).

(72) [$_{PP}$ [$_{PP}$ Von meinem Ø] [$_{PP}$ bis zu deinem Haus]] sind es nur drei Minuten.
          from my   until to your   house are it only three minutes
          'From my to your house takes only three minutes.'

But the two structures cannot be compared, for three reasons. First, the empty noun in path structures is not required, contrary to approximative numerals; witness the contrast in (73).

(73) a. [$_{PP}$ [$_{PP}$ Von   meinem Haus] [$_{PP}$ bis zu deinem Haus]] sind es nur
              from   my   house   until to your   house are it only
              drei   Minuten.
              three minutes
              'From my house to your house takes only three minutes.'

      b. *Wir haben an die vierzig um   die vierzig Männer gesehen.
          we have on the fourty around the fourty men   seen
          intended: 'We saw up to approximately fourty men.'

Second, in path structures either of the two noun positions can be empty, contrary to approximative numerals. Compare (74) with (71).

(74)   [$_{PP}$ [$_{PP}$ Von meinem Haus] [$_{PP}$ bis   zu deinem Ø]] dauert es nur   drei Minuten.
              from until   house   until to your   takes it only three minutes
              'From my house to yours takes only three minutes.'

Third, in path structures both positions can remain empty, again contrary to approxima-tive numerals, as the contrast in (75) shows.

(75)   a.   [$_{PP}$ [$_{PP}$ Von meinem Ø] [$_{PP}$ bis   zu deinem Ø]] dauert es nur   drei   Minuten.
                        from mine   until to yours   takes it only three minutes
                 (talking about houses) 'From mine to yours takes only three minutes.'

           b.   *Peter hat an die Ø um   die Ø Männer   gesehen.
                 Peter has on the   around the   men   seen
                 intended: (talking about the quantity '40') 'Peter saw up to approximately
                 40 men.'

Strikingly, the analysis of approximative modifiers as adverbs adjoined to numerals runs into no problems. The examples in (58) with stacking simply involve two adjoined adverbs.

(76)   a.
```
              NUM
            /     \
       adverb      NUM
         |        /    \
      um die   adverb    NUM
                 |         |
              an die    hundert
```

       b.
```
              NUM
            /     \
       adverb      NUM
         |        /    \
       an die  adverb    NUM
                 |         |
               um die    vierzig
```
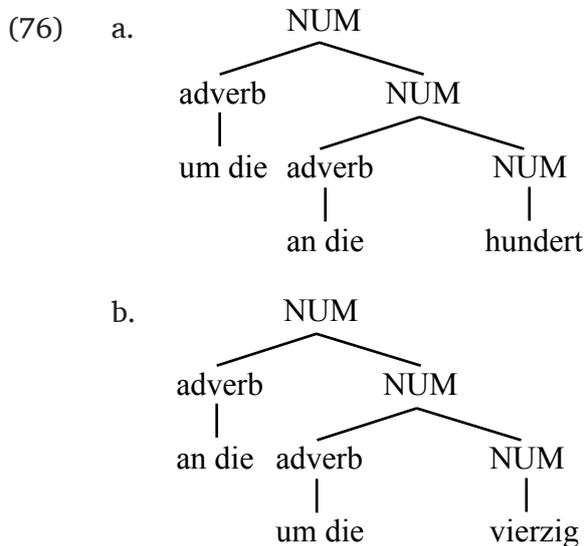
There are three benefits of this multiple adjunction analysis. First, multiple modifiers are independently attested, for example in the domain of adjectival modifiers (*the beautiful young woman*). Second, this analysis correctly captures that the different orders of the two modifiers *an die* 'up to' and *um die* 'around' correspond to two different readings, due to their different c-command relations. The two examples from (58) are repeated in (77) for convenience.

(77)   a.   Ich füttere ihn jeden Tag um   die an die hundert Gramm Rindfleisch.
                 I   feed   him every day around the on the hundred gram   beef
                 'I feed him every day with approximately up to 100g beef.'

           b.   Mein Baby hatte jeden Tag immer an die um   die vierzig Grad   Fieber.
                 my   baby had   every day always on the around the fourty degrees fever
                 'My baby had up to approximately 40°C fever every day.'

The reading of (77a) is that the amount of beef is around an upper limit of 100 gram. The reading of (77b) is that the amount of fever goes up to an amont of approximately 40°C. Now these two readings differ. The first reading says that the amount of beef is always around 100 gram but never much lower or much higher than that. For example, 80 gram is not within the range of possible amounts. Under the second reading, the maximum

amount of fever is also around 40°C or a bit higher (say, 40.2°C). What is possible under the second reading however is that the amount of fever is much lower than 40°C, say 38°C. All that is required is that the relevant amount still satisfies the definition of fever (that is, 30°C are excluded). In a nutshell, the first reading defines both an upper and a lower limit, the second reading only a higher limit.

The third (although not exclusive)[14] benefit of this analysis is that approximative modifiers that clearly are adverbs can be stacked with aproximative modifiers that look like prepositions.

(78) a. Ich füttere ihn jeden Tag ungefähr   an die hundert Gramm Rindfleisch.
          I   feed   him every day approximately on the hundred gram   beef
          'I feed him every day with approximately up to 100g beef.'

      b. Mein   Baby   hatte jeden Tag immer an die ungefähr   vierzig
          my   baby   had   every day always on the approximately   fourty
          Grad   Fieber.
          degrees fever
          'My baby had up to approximately 40°C fever every day.'

Before turning to the next section, let me add that the problems posed by stacking are not specific to the idea that approximative numerals are PPs. They carry over to any approach that treats the relation between the approximative modifier and the numeral it belongs to as one of complementation. Consider for concreteness the idea that approximative numerals in German are structurally parallel to approximative numerals in French (thanks to an anonymous reviewer for raising this possibility), illustrated in (79).

(79)   quinzaine 'around fifteen'   = quinze 'fifteen'   + -aine 'around'
        vingtaine 'around twenty'   = vingt 'twenty'   + -aine 'around'
        centaine 'around one hundred' = cent   'hundred' + -aine 'around'

According to Kayne (2005: 15–18; 2010: Chapter 3), the suffix -aine occupies the head position of a functional projection and attracts the numeral to its specifier. Transposing this idea to approximative numerals in German, one could suggest that approximative modifiers occupy the same head position as -aine, but given their non-affixal status do not trigger movement of their complement nominal to their specifier position. Alternatively, one could suggest that the relevant head position is empty and approximative modifiers are base-generated in the specifier position, thereby blocking movement of the numeral to that position. The two analyses are shown in (80).

(80) a.
```
            XP
           /  \
               X`
              /  \
           X°     NumP
           |       △
         um die   vierzig
```

---

[14] An anonymous reviewer observes that if adverbs are analyzed as adjuncts, then the data in (78) also follow from Corver & Zwarts' (2006) analysis: the adverb *ungefähr* 'approximately' is adjoined to the numeral in (78a) but to NP in (78b). I agree but Corver & Zwarts' (2006) analysis wrongly predicts that the adverb *ungefähr* 'approximately' can also adjoin to the DP selected by the preposition *an* 'on'.

(i)   *Ich kenne an ungefähr   die hundert Frauen.
       I   know on approximately the hundred women
       'I know approximately around a hundred women

For reasons laid out in section 3.1, my analysis predicts the ungrammaticality of (i).

b.
```
                    XP
            ┌───────┴───────┐
           ZP              X`
           △          ┌────┴────┐
        um die        X°       NumP
                      │         △
                      Ø       vierzig
```
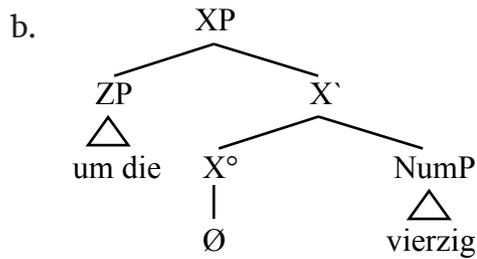
However, the two structures are as inadequate as the previous proposals when it comes to stacking. The first structure, (80a), allows the following structure to be assigned to stacked approximative modifiers.

(81)
```
                        X₁P
              ┌──────────┴──────────────┐
            X₂P                         X₁`
         ┌───┴────┐               ┌──────┴──────┐
                 X₂`            X₁°          NumP₁
              ┌───┴────┐          │             △
             X₂°    NumP₂      um die        vierzig
              │        △
           an die      Ø
```
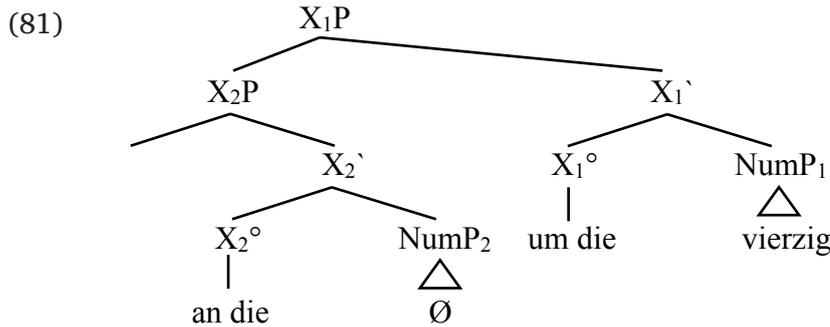
The problems with this structure are basically identical to the ones the structure (70) poses. Only ad hoc conditions can guarantee that, first, both NumP's must not be filled simultaneously (cf. 73b), that, second, both positions cannot be empty simultaneously (cf. 75b), and that, third, only NumP₂ but not NumP₁ can remain empty (cf. 71). No such ad hoc conditions are required under the analysis that approximative numerals are adverbs.

The two structures in (80) also allow the following structure to be assigned to stacked approximative modifiers.

(82)
```
              X₂P
         ┌─────┴─────┐
        ZP          X₂`
        △       ┌────┴─────┐
     an die    X₂°        X₁P
               │      ┌────┴─────┐
               Ø     WP         X₁`
                     △      ┌────┴────┐
                  um die   X₁°      NumP
                           │         △
                           Ø       vierzig
```
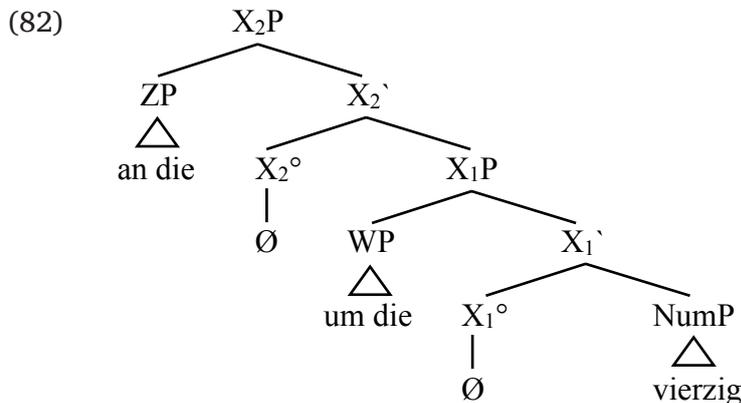
Although this structure doesn't face the problems the structure in (81) faces, it faces complications when it comes to issues of selection. In order to capture the very fact that stacking is possible, one has to assume that approximative heads select either NumP's or other phrases containing an approximative head. No such double selection is required under the view that approximative modifiers are adverbs and hence adjoin. To solve this problem, two solutions suggest themselves. First, one could assume that the relevant functional heads for approximative modifiers are always present but can remain inactive (by not filling the specifier position, for example). This view, however, faces the problem that the order of approximative modifiers is simply not fixed (cf. 58), whereas the order of functional projections is fixed. Crucially, the relevant ingredient to derive different

orders, namely movement, is unavailable in this case because the specifier positions are already filled. If one allows multiple specifiers, this problem disappears but then a new problem pops up: the relevant movement step must never move NumP alone, for otherwise the numeral is expected to occur between approximative modifiers, contrary to fact (cf. 62b). Second, an anonymous reviewer suggests that the selectional relation between the functional head and the numeral is one of s-selection, that is, all that $X_2°$ in (82) selects is some phrase containing a numeral. Then the intervening X_1P is invisible, "as in the case where a verb s-selects a particular property of its object noun (say, animacy)." The problem I see with this approach is that it massively overgenerates. It basically predicts that any functional projection can intervene between $X_2°$ and the numeral in (82). But this is not the case: neither can a DP intervene (*an die die/diese zwanzig 'up to the/these twenty') nor a PP (*an die mit zwanzig 'up to with twenty'). So eventually this structure too requires ad hoc assumption to capture the stacking behavior of approximative numerals. The alternative analysis, however, which treats them as adverbs does not only not require ad hoc constraints to capture stacking, it in fact predicts stacking.

4 Approximative modifiers do neither contain a determiner nor a preposition

I have so far argued that approximative numerals containing approximative modifiers that look like prepositions never behave like PPs but always pattern with numerals modified by an adverb. In this section, I will investigate the internal make-up of approximative modifiers that look like prepositions and argue that despite appearance, they do neither contain a determiner nor a preposition.

4.1 The inertness of the determiner

Corver & Zwarts (2006: 823, fn. 11) mention the following contrast, noted by Gertjan Postma.[15]

(83)   a.   *de   /√het   miljoen
               the.COM   the.NEUT   million.NEUT
               'the million'

        b.   rond   √de   /*het   miljoen   mensen
              around the.COM   the.NEUT million.NEUT people
              'around one million people'

The problem this contrast poses is that the numeral *miljoen* 'million' is lexically specified for neuter gender (cf. 83a) but that this gender specification is overwritten to common gender when appearing as an approximative numeral (cf. 83b). Corver & Zwarts (2006: 823, fn. 11) acknowledge the problem and suggest that "it could be that *de* is chosen under the influence of the plural noun *mensen*". According to this idea, the definite article in the approximative numeral in (83b) agrees with the plural noun *mensen* 'people.' Since the plural form of the definite article is also *de* 'the', the occurrence of *de* 'the' is captured. This idea is sketched in (84).

---

[15] An anonymous reviewer doubts that *rond het miljoen* 'around one million' is ungrammatical, noting that it is attested and concludes from this that the determiner is not inert. As for the grammaticality of this expression, I cannot judge because I'm not a native speaker of Dutch. Regarding the reviewer's conclusion that this invalidates my argument for the inertness of the determiner, I strongly disagree. As Corver & Zwarts (2006: 823) observe, the definite article in *rond de* 'around' is facultative, that is, *rond* 'around' alone is also fine as an approximative modifier. But then, *rond het miljoen* 'around one million' simply features the bare version *rond* 'around' directly attached to the numeral *het miljoen* 'one million'. Support for this analysis comes from the observation, made by another anonymous reviewer, that *rond de* 'around' can also attach to the numeral *een miljoen* 'one million', giving rise to *rond de een miljoen* 'around one million.'

(84)

rond   √de   / * het   miljoen   mensen
around   the.PL   the.SG   million.NEUT   people.PL
'around one million people'

What I want to argue is that this solution is not viable and the contrast in (83) is part of a much bigger problem, namely that the determiner in approximative numerals is inert and hence syntactically invisible. There are two arguments that the alleged determiner is not a determiner.

The first argument is that the solution offered by Corver & Zwarts (2006) for the contrast in (83) cannot be correct. For there are cases where there is no possible source that could possibly determine the shape of the determiner. Consider the following contrasts from German.[16]

(85)   a.   Ich nehme täglich an die ein Gramm Magnesium   zu mir.
            I   take   daily   on the one gram   magnesium   to me
            'I ingest up to 1g magnesium each day.'

       b.   *der   /*die   /√das   Gramm
            the.MASC   the.FEM   the.NEUT   gram

       b`. *der   /*die   / √das   Magnesium
            the.MASC   the.FEM   the.NEUT   magnesium

       c.   die   *Magnesium   /*Magnesiums   /* Magnesia   /* Magnesien
            the.PL   magnesium   magnesiums   magnesia   magnesia

(86)   a.   Plank (2004: ex. 32b)
            Manche von ihnen können um   die ein Pfund heben.
            some   of   them   can   around the one pound lift
            'Some of them are able to lift around a pound.'

       b.   *der   /*die   /√das   Pfund
            the.MASC   the.FEM   the.NEUT   pound

       c.   die   *Pfund   /√Pfunde
            the.PL   pound.SG   pound.PL

The a-examples illustrate two grammatical cases of an approximative numeral containing the approximative modifiers *an die* 'up to.' The b-examples show that the alleged determiner *die* 'the' cannot be the singular feminine form of the definite article because neither *Gramm* 'gram' nor *Magnesium* 'magnesium' in (85), nor *Pfund* 'pound' in (86) is feminine. And the c-examples also show that *die* 'the' cannot be the plural form of the definite article either because none of the three nouns is plural. Moreover, as (85c) shows, *Magnesium* 'magnesium' in German is a singulare tantum and hence doesn't even possess a plural form. So bascially there is simply no noun in (85) and (86) that could specify the morphological shape of the alleged determiner *die* 'the' within the approximative numeral *an die* 'up to'. This casts doubt on the overall idea of Corver & Zwarts' (2006) proposal that one is dealing with a regular determiner in approximative qualifiers such as *rond de* 'around' or *an die* 'up to.'

---

[16] I ignore in my discussion the problem that the definite article does not c-command the noun to which the numeral belongs at any point in the derivation (cf. the structures in 2 and 3). Given standard assumptions that the agreement controller has to be c-commanded by the element with unvalued features, the agreement features of the noun are outside the search domain of the definite article, so that the noun could never provide the number features for the definite article.

An anonymous reviewer suggests that *die* 'the' alternatively forms a complex numeral with *ein* 'one' as shown in (87).

(87)   an   [die ein] Gramm/ Pfund

The shape of the determiner then follows trivially from the inherent gender feature of the numeral *ein* 'one': numerals in German all bear feminine gender, so *die* 'the' would agree with *ein* 'one'.

(88)   an   [die$_{fem}$ ein$_{fem}$]   Gramm/Pfund

The problem with this idea is that *an die* 'up to' also occurs in contexts where a numerical expression is present that does not contain a numeral and hence no source for the gender feature on *die* 'the'. What I have in mind are elements such as *zig* 'umpteen' or *etlich* 'many.' These elements are simplex approximative numerals, that is, elements that inherently specify an approximate value but disallow an accompanying numeral.

(89)   Peter hat zig/etliche (*zwanzig) Frauen   gehabt.
        Peter has umpteen   twenty   women   had
        'Peter had umpteen (*hundred) women.'

To the extent that approximative modifiers like *an die* 'up to' can combine with such expressions, we see that it is still *die* 'the' that shows up.

(90)   ?Peter hat an die etliche   Frauen gehabt.
        Peter has on the umpteen women   had
        'Peter had up to umpteen women.'

In this example, there is no numeral that could determine the shape of *die* 'the', yet the example is possible, although a bit odd. The oddity of (90) cannot be explained by the absence of an accompanying numeral for the determiner. Examples with bona fide adverbs, which do not contain a determiner, are equally odd when modifying simplex approximative numerals.

(91)   ?Peter hat fast   etliche   Frauen gehabt.
        Peter has nearly umpteen women had
        'Peter had nearly umpteen women.'

The second argument against Corver & Zwarts' (2006) analysis of *die* 'the' in *an die* 'up to' as a regular determiner comes from the observation that there are numeral expressions that under Corver & Zwarts' (2006) view contain two adjacent articles, as shown in (92).

(92)   Peter hat an die eine Million Frauen geküsst.
        Peter has on the one million women kissed
        'Peter kissed up to one million women.'

In (92), there are two determiners, *die* 'the' and *eine* 'a.' That *eine* is really a determiner and not the homophonouns numeral *eine* 'a' is suggested by the fact that *eine* 'a' in (92) can be reduced to *'ne*, which option is only available for determiners but never for numerals.[17]

---

[17] Numerals upwards from and including *Million* 'million' seem to feature an obligatory determiner, whereas those below *Million* 'million' seem to feature an optional one.

(i)   a.   *(eine) Million/Milliarde/Billion
            'one million/billion/trillion'
       b.   (ein)hundert/tausend
            'one hundred/thousand'

But the forms in (ib) are no longer determiners. First, no reduction to *'n* as in (93) is possible with the numerals from (ib).

(93)　　a.　Peter hat 'ne　Million Frauen geküsst.
　　　　　　Peter has one　million　women kissed
　　　　　　'Peter kissed one million women.'

　　　　b.　Peter hat 'ne Frau　　geküsst.
　　　　　　Peter has one woman kissed
　　　　　　'Peter kissed √a/*one woman.'

Crucially, this reduction is also possible when the numeral *eine Million* 'one million' is preceded by an approximative modifier.

(94)　　Peter hat ungefähr　　　　/ um　　die /bis　zu 'ne Million Frauen geküsst.
　　　　Peter has approximately　around the　until to　one million women kissed
　　　　'Peter kissed approximately/up to one million women.'

According to Corver & Zwarts' (2006) proposal, the structure for (92) then has to be the one in (95).[18]

(95)

```
                 PP
               /    \
            P°        DP
            |        /   \
            an     D°      ??
                   |      /   \
                  die   D°      NP
                        |       △
                       eine   Million
```
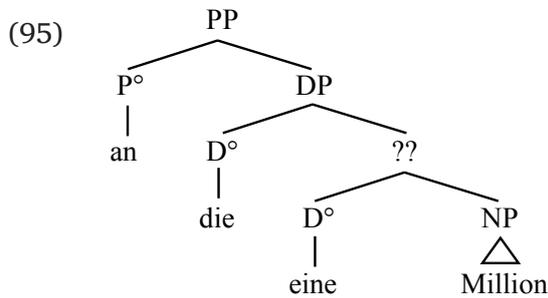
The problem with this structure is that it is otherwise not attested: there are no other structures containing two articles that also differ in their definiteness value. The approach that treats approximative modifiers as adverbs runs into no difficulties when faced with the data from this section. The structures for the approximative numerals from (83b), (85a), (86a), and (92) are provided in (96).[19]

(96)　　a.

```
              /    \
          NUM        NP
         /    \      △
    adverb    NUM  mensen
       |       |
    rond de  miljoen
```
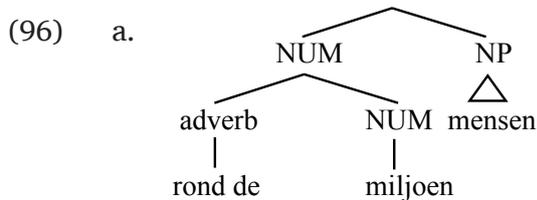
　　(ii)　　*'n hundert/'n tausend Frauen
　　　　　　'a hundred/a thousand women'

Second, *een(e)*, the form of *ein(e)* 'a' in the Berlin-Brandenburg dialect, is available for the numerals from (ia) but not for the ones from (ib).

　　(iii)　　√eene Million/*eenhundert/*eentausend
　　　　　　'one million/one hundred/one thousand'

[18] An anonymous reviewer calls it "misleading" to claim that under Corver & Zwarts' (2006) proposal the structure for (92) has to be (95) "because *eine Million* in their proposal would be a numeral." But such a solution is not available for Corver & Zwarts (2006) because the overall conclusion they draw in their paper is that "that there is no separate syntactic category of numerals" and that "words like *four* and *twenty* behave in all sorts of respects as nouns" (Corver & Zwarts 2006: 833).

[19] An anonymous reviewer points out that (96d) presents a problem for my analysis because if the determiner projects, then (96d) is incompatible with the result from section 2.2, namely that approximative modifiers are not attached to DPs. This problem is only a minor one. On the one hand, the internal structure of numerals is irrelevant to the topic of this paper (cf. fn. 2). On the other hand, assume for the sake of the argument that *eine Million* 'one million' is indeed a DP. This will not affect the result from section 2.2 because the DP *eine Million* 'one million' and the DPs investigated in section 2.2 differ from each other in that only the latter are arguments of predicates. So the hypothesis rejected in section 2.2 must then be re-phrased as "the approximative modifier is an adjunct to an argument."

b.
```
              NUM              NP
         /           \         △
      adverb       NUM      Gramm
        |            |
     an die         ein
```

c.
```
              NUM              NP
         /           \         △
      adverb       NUM      Pfund
        |            |
     um die         ein
```

d.
```
              NUM              NP
         /           \         △
      adverb       NUM      Frauen
        |            |
     an die     eine Million
```
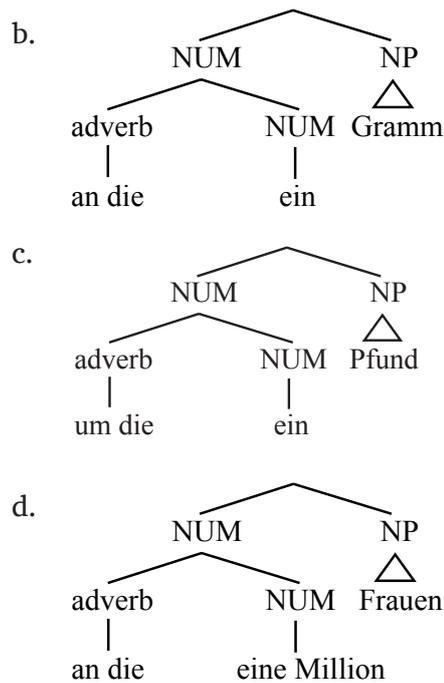
Under this approach, the alleged determiner is not a determiner but part of an adverb, so the alleged determiner is correctly predicted not to behave as a determiner.

4.2 The inertness of the preposition I

The first piece of evidence that approximative modifiers that look like prepositions do not contain regular prepositions comes from the phonological behavior of the two elements *gegen* and *bis zu* in the dialect of the Berlin-Brandenburg area. In Standard German, the two elements are used as prepositions, as shown in (97).

(97) a. Peter kämpft gegen Drachen.
          'Peter fights against dragons.'

      b. Peter läuft bis   zu Marias Haus.
          Peter runs until to Maria's house
          'Peter runs until Maria's house.'

In the Berlin-Brandenburg dialect, the two elements are used as prepositions, too, but undergo phonological changes: the initial [g] of *gegen* is lenited to [j], and the affricate [ts] represented by {z} of *zu* is changed to [s].

(98) a. Peter kämpft [j]egen Drachen.
          'Peter fights against dragons.'

      b. Peter läuft bis   [s]u Marias Haus.
          Peter runs until to Maria's house
          'Peter runs until Maria's house.'

Both *gegen* and *bis zu* are also used as approximative modifiers in the standard language.

(99) a. Peter hat gegen sechzig Hotdogs gegessen.
          Peter has against sixty   hot dogs eaten
          'Peter ate up to sixty hot dogs.'

      b. Peter hat bis   zu sechzig Hotdogs gegessen.
          Peter has until to sixty   hot dogs eaten
          'Peter ate up to sixty hot dogs.'

The same basically also holds for the Berlin-Brandenburg dialect, with one important difference. When used as approximative modifiers, *gegen* and *bis zu* no longer undergo the phonological changes illustrated in (98).

(100) a. Peter hat √[g]/*[j]egen sechzig Hot dogs gegessen.
           Peter has   against   sixty   hot dogs eaten
           'Peter ate up to sixty hot dogs.'

       b. Peter hat bis   √[ts]/*[s]u sechzig Hot dogs gegessen.
           Peter has until   to   sixty   hot dogs eaten
           'Peter ate up to sixty hot dogs.'

This state of affairs is again unexpected for the approach according to which approximative modifiers are prepositions. For whatever phonological process affects the preposition should likewise affect the approximative modifier because the modifier simply is this preposition. So this view provides no basis for an analysis of the contrast between (98) and (100).

   The alternative view that approximative modifiers are adverbs does offer an analysis. As for *gegen*, even though the lenition of [g] to [j] affects many [g]-initial words in the Berlin-Brandenburg dialect, it nevertheless does not affect all words. Witness the contrasts in (101), with the standard version in (101a), and their dialectal variants in (101b).

(101) a. ganz   b. √[j]anz   'totally'
           gaffen   *[j]affen   'to stare'
           gib   √[j]ib   'give!'
           Gicht   *[j]icht   'arthritis'
           Gold   √[j]old   'gold'
           Gorilla   *[j]orilla 'gorilla'

These contrasts show that not every syllable-initial [g] is lenited to [j]; rather, it is a lexical property. Since the alternative analysis analyzes the preposition *gegen* as a word different from the approximative modifier *gegen*, the contrast between (98a) and (100a) is easily captured: the preposition undergoes lenition from [g] to [j], the approximative modifier does not.

   Regarding *bis zu*, the change from [ts] to [s] only affects word-initial [ts].

(102) a. Razzia   b. *Ra[s]ia   'razzia'
           schätzen   *schä[s]en   'to estimate'
           Zahl   √[s]ahl   'number'
           bezahlen   *be[s]ahlen   'to pay'
           ziehen   √[s]iehen   'to pull'
           Erziehung   *Er[s]iehung   'education'

The first two examples show that morpheme internal [ts] is never affected by the change. The last four examples are important because they show that the change affects only word initial [ts] but not morpheme-initial [ts]. This is a problem for the approach treating approximative qualifiers as prepositions because *bis zu* consists of two words. Whereas the preposition *zu* 'to' marks the direction, the preposition *bis* 'until' indicates completion, cf. (103).

(103) a. Peter geht zu der Tür.
           'Peter goes to the door.' (but maybe Peter never reaches the door)

       b. Peter geht bis   zu der Tür.
           Peter goes until to the door.
           'Peter goes until the door.' (Peter necessarily reached the door)

bis 'until' also combines with directional adverbs.[20]

(104) Peter geht bis dorthin.
       'Peter goes until there.'

Thus *bis* 'until' takes directional XPs as its complement, irrespective of their category, as shown in (105).

(105)

```
            PP
          /    \
        P°     XP[dir]
        |
       bis
```
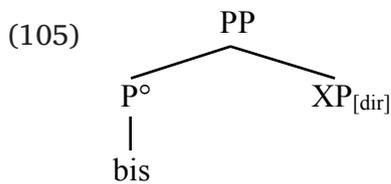
The corresponding structures for (103b) and (104) are provided in (106).

(106) a.

```
            PP
          /    \
        P°     PP
        |     /   \
       bis  P°    DP
            |      △
            zu   der Tür
```

b.

```
            PP
          /    \
        P°     AdvP
        |       △
       bis    dorthin
```
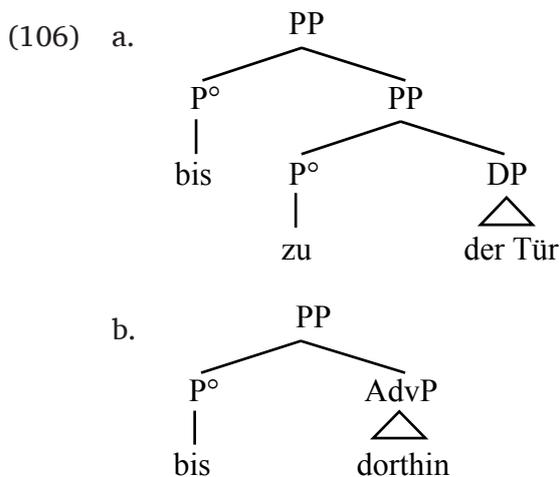
Now if *bis zu* as used in (103b) were the same *bis zu* that is used as an approximative modifier in (99b), then the preposition *zu* 'to' is a separate word. If so, the *zu* in the approximative modifier is expected to undergo the change from [ts] to [s], contrary to fact. However, under the alternative analysis, *bis zu* when used as an adverbial modifier is an adverb and has the following structure.

(107)

```
            NUM
          /    \
       adverb   NUM
          |
        bis zu
```
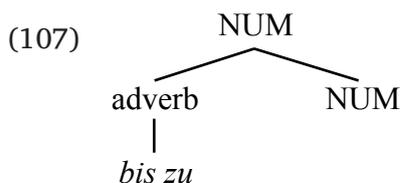
According to this structure, *zu* is not word initial. Since, as shown in (102), the change from [ts] to [s] only affects word initial [ts], the non-change from [ts] to [s] is captured.

Two anonymous reviewers suggest an alternative for the different behavior of *gegen* and *bis zu* in the Berlin-Brandenburg dialect. As is well-known, German possesses fused versions of preposition and determiner, both of the contraction-type, where the preposition is fused with an article (van Riemsdijk 1998), and of the R-pronoun type (van Riemsdijk 1978), where the preposition is fused with a pronoun.

(108) a. für   + das → fürs
           for   the   for.the
           'for the'

---

[20] I ignore that *bis* can unexpectedly also combine with locational adverbs, like *bis hier* 'until here' and *bis dort* 'until there.' Possibly these expression contain the elided directional marker *hin*.

in   + das → ins
in   the   in.the
'for the'
mit   + dem → mitm (substandard)
with   the   with.the
'with the'

b.   mit   + es → damit
with   it   with.it
'with it'
für   + es → dafür
for   it   for.it
'for it'

The relevant incorporation operation between P° and D° can affect the shape of the preposition. In Afrikaans, for example, the prepositions *met* 'with', *tot* 'to', and *vir* 'for' have distinct forms when they are fused with *dat* 'it' in the formation of R-pronouns (Donaldson 1993: 345–6).

(109)   met   +   dat → daarmee/*daarmet
with   it   with.it
'with it'
tot   +   dat → daartoe/*daartot
to   it   to.it
'to it'
vir   +   dat → daarvoor/*daarvir
for   it   for.it
'for it'

Combining these two observations, the alternative analysis that suggests itself is that preposition and determiner obligatorily fuse in approximative numerals. A first result of this is that nothing can intervene between the preposition and the determiner, thereby neatly capturing the data from section 3.1. The second result is that the preposition is blocked from undergoing whatever phonological change it normally can undergo. So the absence of the lenition of [g] to [j] in *gegen* is the consequence of fusing *gegen* with an empty D°. Similarly, *zu* cannot be changed to *su* because it fuses with *bis*. Although attractive, this analysis cannot be correct. It crucially relies on the assumption that the preposition and the determiner can fuse in approximative modifiers. But this is in fact impossible. In contrast to Standard German, where *die* 'the' never fuses with prepositions (van Riemsdijk 1998: 653), it does so in the Berlin-Brandenburg dialect.

(110)   a.   Ich denk' jeden Tag an'e   Maria.   [an'e = an die]
I   think every day on.the Maria
'I think of Maria every day.'

b.   Ich denk' jeden Tag an'e   Eltern.   [an'e = an die]
I   think every day on.the parents
'I think of the parents every day.'

c.   Ich lauf' um'e   Ecke.   [um'e = um die]
I   walk around.the corner
'I walk around the corner.'

Importantly, *die* 'the' never fuses with *um* 'around or *an* 'on' in approximative modifiers.

(111) a. *Peter küsst an'e   hundert Frauen.
            Peter kisses on.the hundred women
            intended: 'Peter kisses up to hundred women.'

       b. *Peter küsst um'e   hundert Frauen.
            Peter kisses around.the hundred women
            intended: 'Peter kisses approximately hundred women.'

Since fusion is not independently motivated for approximative modifiers to begin with, fusion cannot be responsible for the contrasts observed in (98) and (100).

4.3 The inertness of the preposition II

The second piece of evidence against the idea that approximative modifiers that look like prepositions contain a preposition comes from the behavior of *um*. As a local preposition, it is usually extended to a circumposition.

(112) Peter läuft um   das Haus herum.
        Peter walks around the house around
        'Peter walks around the house.'

At first appearance, this looks like a form of doubling (van Riemsdijk 1990; 1998; Brandner 2008) illustrated in (113) and hence not like a circumposition.

(113) Peter läuft auf den Berg   herauf.
        Peter walks up the mountain up
        'Peter walks up the mountain.'

But there are two arguments that *um … herum* is a circumposition and cannot be subsumed under doubling. First, *herum* in (112) does not indicate movement, in contrast to the doubled prepositions. This can be seen in (114), where *um … herum* occurs in a stative context.

(114) Maria hat die Kette   um   den Hals herum.
        Maria has the necklace around the neck around
        'Maria wears the necklace around the neck.'

Second, in contrast to doubled prepositions, the right member *herum* of *um … herum* cannot be separated from the rest of the PP.

(115) a. dass Peter auf den Berg   hat herauf laufen wollen
            that Peter up the mountain has up   walk   want
            'that Peter wanted to walk up the hill'

       b. *dass Maria die Kette   um   den Hals hat herum haben wollen
            that Peter the necklace around the neck   has around have   want
            intended: 'that Maria wanted to wear the necklace around the neck'

Now if the element *um* when used in the approximative modifier *um die* 'around' is simply the local preposition *um* 'around', then it should be possible to replace *um* in the approximative modifier by *um … herum*. But this is not possible: *herum* can neither appear after the numeral nor after the DP.

(116) Peter hat um   die sechzig < *herum > Hotdogs < *herum > gegessen.
        Peter has around the sixty   around hot dogs   around   eaten
        'Peter ate approximately sixty hot dogs.

The view according to which approximative modifiers that look like prepositions gives us no clue as to why there is a contrast between (112) and (116). The alternative analysis treating such modifiers as adverbs does capture the contrast because *um* in *um die*

'up to' is not a preposition and hence not expected to undergo whatever change the real preposition *um* 'around' undergoes.

5 Approximative modifiers as adverbs

The data presented in sections 3 and 4 have shown that approximative modifiers that look like prepositions such as *an die* 'up to', *um die* 'around', *bis zu* 'up to', and *gegen* 'around' do not behave in any respect like PPs. Rather, they show the behavior of approximative modifiers that are adverbs like *ungefähr* 'approximately' and *fast* 'nearly.' The conclusion to draw from this pattern is that approximative modifiers are always adverbs, even if on the surface they look like PPs. The structure for the approximative modifiers illustrated in (117) is given in (118).

(117)   Peter hat   um   die / an die / gegen   / ungefähr / fast   60
        Peter has   around   the   on the   against   around   nearly 60
        Hot   dogs gegessen.
        hot   dogs eaten
        'Peter ate approximately/up to/up to/approximately/nearly sixty hot dogs.

(118)

```
                       NUM                    NP
               adverb        NUM         Hotdogs
                 |            |
               um die      sechzig
               an die
               gegen
               ungefähr
                fast
```
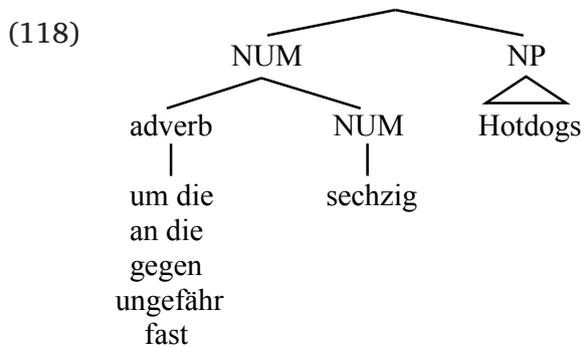
So what I ultimately claim is the following.

(119)   In German, approximative modifiers that look like prepositions (*um die, an die, bis zu* etc.) constitute single lexemes that lack internal structure.

Ignoring the clash with orthographic convention,[21] this analysis apparently faces three problems. First, it seems to postulate a completely novel class of adverbs, namely one where an adverb has the surface form of a preposition followed by a determiner. Second, the analysis doesn't capture that the approximative reading of approximative modifiers that look like prepositions is related to the local interpretation of the preposition they contain. And third, it doesn't capture that adverbs proper that function as approximative modifiers like *ungefähr* 'approximately' have a much freer distribution than approximative modifiers that look like prepositions. I will discuss each problem in turn and argue that these problems are only apparent.

5.1 [P + D] adverbs

The first problem the analysis of approximative modifiers as adverbs faces is that it requires the postulation of a class of adverbs otherwise unattested, namely a class of adverbs that have the surface form 'preposition + determiner', which class one anonymous reviewer calls "unusual." But this problem is not real because similar adverbs outside the domain of approximative modifiers are well-attested in German, cf. (120).

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[21] Orthography is never a good indicator for wordhood. Already within the narrow domain of approximative modifiers that look like prepositions, inconsistencies are observed. Whereas *bis zu* 'up to' is written as two words, the closely related item *nahezu* 'nearly' is written as a single word.

(120) trotzdem   'nevertheless' ← trotz 'despite' + dem$_{DAT}$ 'that'
       unterdessen 'meanwhile'   ← unter 'under'   + dessen$_{GEN}$ 'that'
       überdies   'furthermore' ← über 'over'   + dies$_{ACC}$ 'that'

That these three elements are adverbs and not PPs composed of the preposition plus a determiner is suggested by their morphological and semantic properties.[22] As for the morphological properties, the preposition *trotz* 'despite' selects genitive case in present-day German and not dative case. Similarly, the preposition *unter* 'under' is only compatible dative or accusative case (depending on its use as a local or directional preposition) but never with genitive case. Lastly, the form of the demonstrative in *überdies* 'furthermore' is the archaic short neuter form *dies* 'this', which in modern German has been replaced by the long form *dieses* 'this.' Regarding their semantics, *unter* and *über* do not have the relevant meaning when used as prepositions. That is, *unter* when used as a preposition never means 'during' nor does *über* when used as a preposition mean 'in addition to.' Therefore, analyzing the elements in (120) as PPs requires idiosyncratic case assignment properties for these PPs only as well as a non-compositional interpretation for *unterdessen* 'meanwhile' and *überdies* 'furthermore'. If one analyzes these elements as adverbs, these problems disappear. As no case assignment is invoked, no idiosyncratic case assignment rules are required. And a non-compositional interpretation for lexemes is standard. So adverbs having the surface form of a preposition followed by a determiner do exist in German outside the approximation domain.

Related to this problem, but partly distinct from it, is Corver & Zwarts' (2006: 823) observation "that adverbs that fulfill the same role as (approximative) prepositions are never accompanied by an article", illustrated in (121).

(121) Er   waren ongeveer/ hoogstens (*de) twintig deelnemers.
       EXPL were   around   at most   the twenty participants
       'There were approximately/at most twenty participants.'

Based on this distribution, Corver & Zwarts (2006: 823) conclude that "the article can be taken as indicating that the numeral functions as the argument of the preposition". Although I disagree with this conclusion for the reasons laid out in sections 3 and 4,[23] the problem nevertheless remains. That is, why is it the case that one never finds adverbs that have the surface form 'adverb + determiner' (be it inside or outside the domain of approximation)? The answer to this question in my view is ultimately a diachronic one.

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[22] There are other elements for which this is not so clear, like *außerdem* 'furthermore', *zudem* 'furthermore', *währenddessen* 'meanwhile', and *stattdessen* 'instead.'

[23] In general, I find the argumentation based on co-occurrence restrictions dubious. In German the adverb *etwa* 'around' functioning as an approximative modifier can optionally be preceded by the element *in*, which looks like the preposition *in* 'in.'

(i)   (In) etwa   zwanzig Leute   kamen.
       in   approximately   twenty   people came
      'Approximately twenty people came.'

According to Corver & Zwarts' (2006) argumentation, this indicates that *etwa* 'around' has to be an article. First, the example in (i) cannot feature stacking of two approximative modifiers because the element *in* itself is bad as an approximative modifier in German.

(ii) *In zwanzig Leute   kamen.
       in twenty   people came
      'Around twenty people came.'

Second, *in* 'in' cannot be an adverb modifying *etwa* 'around' because the adverb corresponding to *in* is *drin(nen)*. Third, the preposition *in* 'in' in German is only compatible with DP-complements, in contrast to other preposition (for example *bis*, cf. 104). Hence *etwa* 'around' can only be an article. But this clashes with the overall syntactic behavior of *etwa* 'around.' So co-occurrence data show little about the categorial status of approximative modifiers.

As Plank (2004) shows, approximative modifiers that look like prepositions in German did in fact start out as PPs that only recently were reanalyzed as DPs. The relevant change for German is illustrated in (122).

(122) a.
```
            PP
          /    \
        P°      DP
        |      /   \
        an   D°     NP
             |     /   \
            die  NUM    NP
                  |     /\
               dreißig  Flaschen
```
b.
```
            DP
          /    \
        D°      NP
        |      /   \
            NUM     NP
           /    \    /\
       adverb   NUM  Flaschen
         |       |
       an die  dreißig
```
→ (between the two trees)
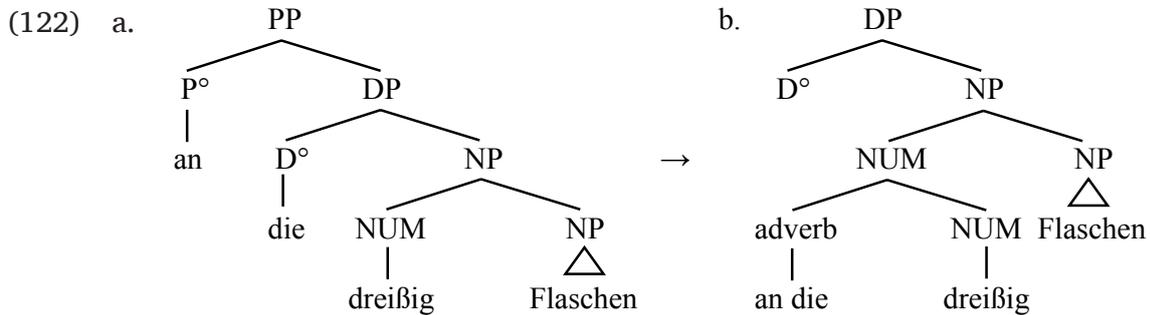
The reason that approximative adverbs (or adverbs generally) never co-occur with an article is that adverbs never take complements. Therefore, they could never possibly instantiate a structure similar to the one in (122a) and hence never undergo the structural change to (122b). But this change is required to arrive at a structure with an adverb of the surface form 'adverb + determiner'. Instead, approximative adverbs would directly attach to the numeral.[24]

5.2 Local meaning

The second problem for the view that approximative modifiers that look like prepositions are adverbs is that it doesn't capture the semantic relationship between the meaning of the modifier and that of the local preposition. For concreteness, consider the approximative modifier *über* 'above.' The local interpretation of the homophonous preposition *über* is that it defines a region where the complement über takes is at the lower border of that region. When the resulting PP is used as a predicate, the subject is then located inside that region. Being above the clouds means that one is a region where the clouds define lower border. Now as Corver & Zwarts (2006: 824–825) observe, when *über* is used as an approximative modifier, its meaning is basically identical: *über* selects a region on the one-dimensional space of natural numbers such that the number *über* combines with is at the lower border.

In fact, the analysis that treats approximative modifiers such as *über* as adverbs cannot establish a connection between the meaning of the approximative modifier and that of the homophonous preposition, at least not a synchronic one. But there is of course a diachronic connection. If the change sketched at the end of the previous section 5.1 is on the right track, then the approximative modifier *über* diachronically results from a re-analysis of a PP with *über* as its head. The approximative meaning of the preposition was then transferred to the adverb resulting from the re-analysis sketched in (122). So the reason that the meaning of *über* when used as an approximative modifier resembles the meaning of *über* when used as a preposition is not that they are synchronically related to each other but that the approximative adverb *über* is diachronically related to a PP-structure where *über* is the head of the PP. There are two arguments in favor of a diachronic instead of a synchronic connection.

First, if it is their local meaning that allows prepositions to be used as approximative modifiers, then one fails to account for the curious fact that only a small subset of

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[24] Possibly, this diachronic scenario also explains why one only finds the article *die* 'the' in approximative modifiers that look like prepositions in German. Suggesting a much more elaborate structure, the determiner would take an empty noun AMOUNT as it complement, to which a small clause of the form 'numeral + noun' is attached, in the spirit of Corver (2001) and Corver & Zwarts (2006). Since the German word *Menge* for AMOUNT is feminine, the feminine version of the definite article is chosen, which is *die* 'the.' Lastly, as to why only the definite determiner occurs in the relevant approximative modifiers, cf. Plank (2004: 180).

the many local prepositions can be used as approximative modifiers. In German, only seven local prepositions are used as approximative modifiers: *an* 'on', *bis zu* 'up to', *gegen* 'against', *über* 'above', *um* 'around', *unter* 'below', and *nahezu* 'nearly.' Needless to say that out of those that cannot be used, many are excluded because they are incompatible with the one-dimensional space of natural numbers (for example *abseits* 'apart from', *außerhalb* 'outside of', or *durch* 'through'). But there are many others that possess the right semantics, yet cannot be used as approximative modifiers. A partial list is given in (123).

(123)   *auf* 'up', *bei* 'at', *diesseits* 'on this side of', *hinter* 'behind', *in* 'in', *jenseits* 'on the far side of', *nach* 'towards', *neben* 'next to', *oberhalb* 'above', *unterhalb* 'beneath', *unweit* 'near', *vor* 'in front of'

Corver & Zwarts (2006: 819) acknowledge this mismatch but their analysis provides no clue as to why there is such a mismatch to begin with. The analysis of such approximative modifiers as adverbs doesn't face this problem because it simply doesn't expect a full match between the set of local prepositions and the set of approximative modifiers that look only like prepositions. In addition, the alternative analysis need not be enriched with a filter that blocks prepositions in general to function as approximative modifiers.

Second, subsuming the meaning of approximative modifiers under the meaning of the prepositions they contain is not general enough a solution. For there are still bona fide adverbs that can be used as approximative modifiers. And although these adverbs do not have a local interpretation, they are nevertheless mapped onto the one-dimensional space of natural numbers, too. So whatever mechanism gives the meaning for adverbs as approximative modifiers will also provide the basis for assigning a meaning to approximative modifiers that only look like prepositions. Thus, the alternative analysis presented in this paper relies on a uniform semantic mechanism, namely one for adverbs. The view that takes some approximative modifiers to be adverbs and others to be prepositions requires two mechanisms, one for adverbs and another one for prepositions enriched with a filter blocking any preposition.

5.3 A contrast between ungefähr vs. an die

The third problem was first brought to my attention by Yaron McNabb (personal communication, 2015/9/3) and also raised by two anonymous reviewers. As they point out, bona fide adverbs like *ungefähr* 'approximately' differ from approximative modifiers that look like prepositions in that only *ungefähr* 'approximately' can right-adjoin to a DP containing a numeral and extrapose. Witness the contrast between (124) and (125).

(124)   a.   Zwanzig Leute ungefähr   wurden verhaftet.
             twenty   people approximately became arrested

        b.   Zwanzig Leute wurden   verhaftet ungefähr.
             twenty   people became   arrested approximately
             'Approximately twenty men were arrested.'

(125)   a.   *Zwanzig Leute an   die   wurden verhaftet.
             twenty   people on   the   became arrested

        b.   *Zwanzig Leute wurden verhaftet an   die.
             twenty   people became arrested on   the
   intended: 'Up to twenty men were arrested.'

As the a-examples show, *ungefähr* 'approximately' can right-adjoin to a DP, whereas *an die* 'up to' cannot. German is verb-second in main clauses, so *zwanzig Leute* 'twenty people' and *ungefähr* 'approximately' have to form a constituent in (124a). The b-examples show

that *ungefähr* 'approximately' can extrapose, in contrast to *an die* 'up to.' There are two dimensions of this problem. First, can the analysis according to which some approximative modifiers are adverbs and some are prepositions capture the contrast between (124) and (125)? Second, can the analysis defended here according to which approximative modifiers are all adverbs capture that contrast?

### 5.3.1 The contrast under Corver & Zwarts' (2006) analysis

As for the first issue, it depends on the treatment of right-adjunction and extrapostion. If one conceives of these two as rightward movement, then one can easily capture the contrast. For under the PP analysis of the approximative modifiers in (125), *an die* 'up to' doesn't form a constituent, and is thus unmovable.

(126)
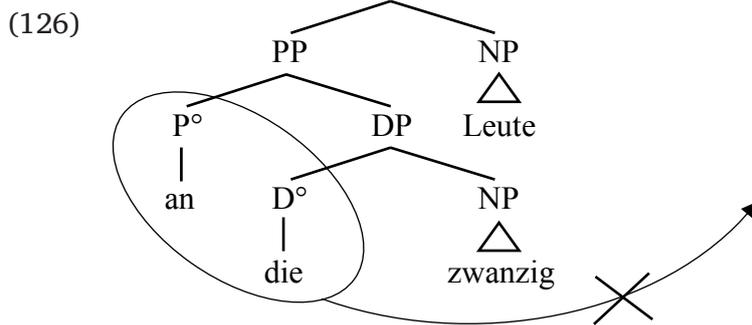
However, if one follows Corver & Zwarts' (2006: 831) analysis of right-adjunction and extraposition as leftward movement plus rightward stranding, then the contrast does not follow. Consider their analysis for (124a), shown in (127).

(127)
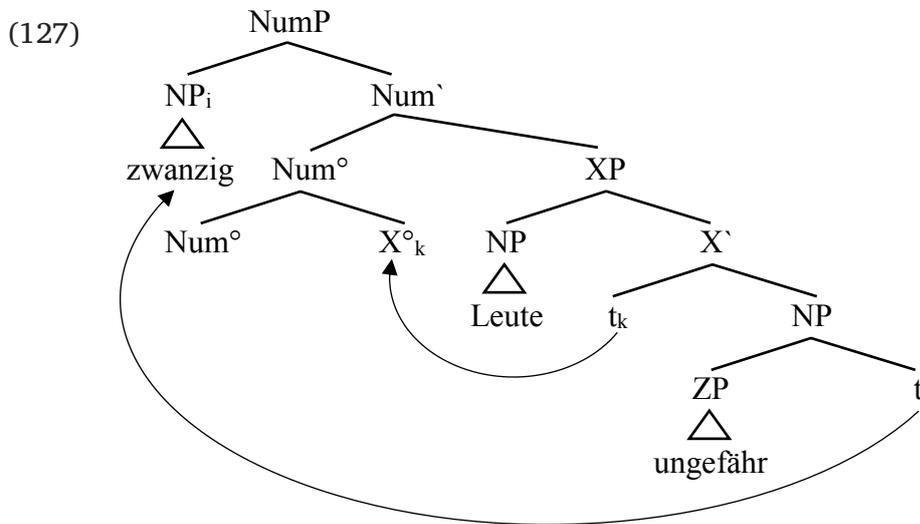
This structure incorporates two ideas of Corver & Zwarts' (2006) already alluded to in fn. 2. First, the numeral *ungefähr zwanzig* 'approximately twenty' and the NP *Leute* 'people' the numeral modifies are assumed to form a small clause (XP in 127) such that the modified NP is the subject and the numeral is the predicate of that small clause. On top of that XP, a NumP is projected to whose head Num° the empty head X° of XP adjoins. Second, normally the whole numeral is moved to the specifier of NumP. In (127), however, subextraction out of the numeral takes place, moving only *zwanzig* 'twenty' instead of *ungefähr zwanzig* 'approximately twenty.' If this analysis is applied to approximative modifiers that look like PPs, then one arrives at (128) as a licit structure for (125a).

(128)
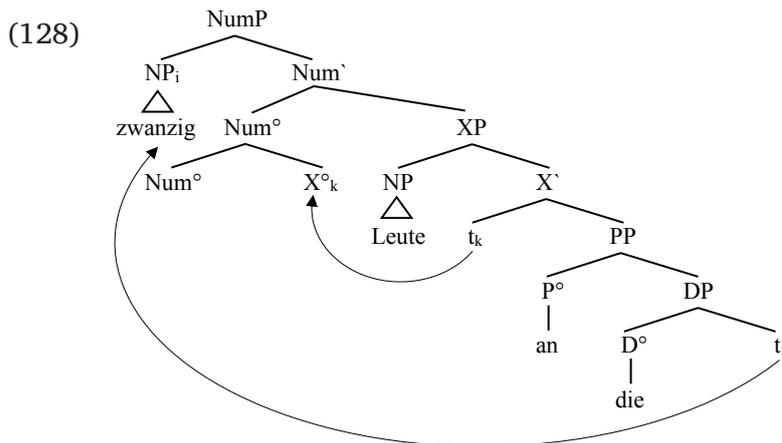
Based on this structure, one also derives extraposition of *an die* 'up to.' No matter how one wishes to analyze extraposition under a leftward movement plus rightward stranding approach, *an die* 'up to' does form a constituent all of the sudden. Note that the type of movement in (128) violates an independent constraint on movement, namely that extraction out of PPs in German is generally blocked (ignoring R-pronouns). However, the same applies to the structure in (127): adverbs cannot be stranded in German (or Dutch) either.

(129)   *Schön$_i$ ist Jan sehr t$_i$.
          handsome ist Jan very.
          intended: 'Jan is very handsome.'

An anonymous reviewer points out that *sehr* 'very' and *ungefähr* 'approximately' might have a different syntax. Their Dutch counterparts *heel* 'whole' and *ongeveer* 'approximately' differ in their positioning: *heel* 'whole' occupies a head or a specifier position whereas *ongeveer* 'approximately' is an adjunct (Corver 1997). The relevance of this difference is that adjuncts can be stranded, for example quantifiers under quantifier-float.

(130)   Die Frauen$_k$ sind gestern   alle t$_k$ gekommen.
        the women   are   yesterday all   come.
        'Yesterday all the women came.'

However, it is not clear whether (124a) is parallel to (130). On the one hand, it is far from obvious that (130) involves simple subextraction because the corresponding base structure is marginally grammatical at best.

(131) $^{???}$Gestern   sind alle die Frauen gekommen.
        yesterday are   all   the women come
        'Yesterday all the women came.'

On the other hand, the fully grammatical version of (131) with the non-agreeing form *all* 'all' instead of *alle* 'all' does not allow subextraction.

(132) a.   Gestern   sind all die Frauen gekommen.
             yesterday are   all   the women   come

       b. *Die Frauen$_i$ sind gestern   all t$_i$ gekommen.
            the women   are   yesterday all   come.
            'Yesterday all the women came.'

More importantly, if one considers structures other than Q-float, then one observes that being an adjoined non-agreeing adverbs is not sufficient for stranding. One example is the

adjunct *genau* 'exactly'. The example in (133a) shows that *genau* 'exactly' attaches to DPs and the example in (133b) shows that it cannot be stranded.

(133) a. Genau   diese   Frauen   sind   gestern   gekommen.
           exactly these   women   are   yesterday come

       b. *Diese Frauen$_i$ sind gestern   genau t$_i$ gekommen.
           these   women are   yesterday exactly   come.
           'Yesterday exactly these women came.'

In sum, the contrast between (124) and (125) doesn't necessarily favor the view that approximative modifiers come in two flavors.

5.3.2 The contrast under the adverb analysis

This brings us to the second and more important issue of how the analysis defended here according which all approximative modifiers are adverbs can handle the contrast between (124) and (125). The analysis I would like to suggest is that this contrast shows nothing about a distinction between adverbs as approximative modifiers on the one hand and alleged prepositions as approximative modifiers on the other hand. Rather, the contrast derives from an independent factor, namely the number of possible hosts for an adverb. More specifically, I claim that the following descriptive generalization holds.[25]

(134)   An adverb x can right-adjoin to a DP and extrapose if and only if x has more than one licit host phrase.[26]

The contrast between the synonymous *ungefähr* and *um die* (both 'around') shown in (135) and (136), respectively, illustrates this generalization.

(135) a. ungefähr   das dümmste   Argument   [host = DP]
           approximately   the most stupid argument
           'the approximately most stupid argument'

       b. Peter hat ungefähr   getanzt.   [host = VP]
           Peter has approximately   danced
           'Peter did something that approximately resembles dancing.'

(136) a. *um   die das dümmste   Argument   [host = DP]
           around the the most stupid argument
           intended: 'the approximately most stupid argument'

       b. *Peter hat   um   die getanzt.   [host = VP]
           Peter around around the danced
           intended: 'Peter did something that approximately resembles dancing.'

(135) shows that *ungefähr* 'approximately' can attach to hosts other than numerals, whereas *um die* 'around' cannot, as (136) reveals. According to the analysis in (134), the contrast between (124) and (125) is not one about adverbs vs. prepositions. It therefore predicts that one should find approximative modifiers that are bona fide adverbs that cannot right-adjoin to DP and extrapose, and that one should find approximative modifiers that look prepositions that can right-adjoin to DP and extrapose. In fact, both predictions are confirmed. As for the first prediction, the adverbs *rund* and *so* (both 'around') cannot right-adjoin to DPs nor extrapose, as shown in (137).

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[25] I leave it to future research whether and how this generalization can be derived from independent principles of grammar.

[26] The restriction to a unique type of host is not unknown. In English, *very* when used as a degree adverb can only attach to adjectives and adverbs derived from them (Huddleston & Pullum 2002: 532–533).

(137) a. *Zwanzig Leute rund   / so wurden verhaftet.
            twenty   people round   so became arrested

       b. *Zwanzig Leute   wurden verhaftet rund   / so.
            twenty   people became arrested   round   so
            intended: 'Approximately twenty men were arrested.'

Importantly, these two adverbs cannot combine with hosts other numerals either.[27]

(138) a. *rund / so das dümmste   Argument   [host = DP]
            round   so the most stupid argument
            intended: 'the approximately most stupid argument'

       b. *Peter hat rund / so getanzt.   [host = VP]
            Peter has round   so danced
            intended: 'Peter did something that approximately resembles dancing.'

As for the second prediction, there is one approximative modifier that looks like a preposition that can right-adjoin to DP and extrapose, namely *nahezu* 'nearly', as shown in (139) and (140).

(139) a. ?Zwanzig Leute   nahezu wurden   verhaftet.
            twenty   people nearly   became   arrested

       b. ?Zwanzig Leute   wurden   verhaftet nahezu.
            twenty   people became   arrested nearly
            'Nearly twenty men were arrested.'

(140) a. nahezu das dümmste   Argument [host = DP]
            nearly the most stupid argument
            'the nearly most stupid argument'

       b. Peter hat nahezu getanzt.   [host = VP]
            Peter has nearly danced
            'Peter did something that comes close to dancing.'

Incidentally, closely related elements can differ with respect to their potential to right-adjoin to DP and to extrapose, like *etwa* and *in etwa* (both 'around').

(141) a. Zwanzig Leute   in etwa   / * etwa   wurden verhaftet.
            twenty   people in around   around   became arrested

       b. Zwanzig Leute   wurden verhaftet in etwa   /* etwa.
            twenty   people became   arrested   in around   around
            'Approximately twenty men were arrested.'

(142) a. in etwa   / * etwa   das dümmste   Argument   [host = DP]
            in around   around the most stupid argument
            'the approximately most stupid argument'

       b. Peter hat in etwa   / * etwa   getanzt.   [host = VP]
            Peter has in around   around   danced
            'Peter did something that approximately resembles dancing.'

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[27] Importantly, *so* in (137b) and (138b) illustrates the adverb *so* meaning 'approximately' and not the adverb *so* meaning 'in that manner'.

So it is the possibility to attach to more than one host that correlates with the availability to right-adjoin to DPs and to extrapose. Whatever the ultimate reason for this correlation might turn out to be, it undermines the analysis that it is the status of the approximative modifier as an adverb or as an alleged preposition that correlates with the greater distributional flexibility. For there are bona fide adverbs that cannot right-adjoin to DP or extrapose and there are approximative modifiers that like prepositions that can right-adjoin to DP and extrapose. Hence the flexibility cannot be taken as argument for a separate treatment of approximative modifiers containing adverbs and those that look like prepositions.

6 A note on Dutch

6.1 The status of approximative numerals in Dutch as PPs

The discussion has so far centered on German exclusively. Since Corver & Zwarts' (2006) paper is mainly concerned with Dutch, the question is of course whether the analysis of approximative modifiers as adverbs can be adapted for Dutch. To the extent that I can overlook the relevant evidence, the answer is negative. Although the original arguments Corver & Zwarts (2006) gave are inconclusive in my view, there are new ones that provide conclusive evidence that Dutch does in fact have prepositional numerals. Let me start with the three arguments Corver & Zwarts (2006: 822–823) provided and then move on to the new ones.

6.1.1 Corver & Zwarts' (2006) old arguments

The first argument Corver & Zwarts (2006) discuss is that similar to real prepositions, approximative modifiers that look like prepositions select a definite article. This contrasts with bona fide adverbs functioning as approximative qualifiers, which never take the definite article.

(143) a. Er   waren rond   (de) twintig deelnemers.
            EXPL were   around   the twenty participants
            'There were around twenty participants.'

       b. Er   waren tegen   *(de) twintig deelnemers.
            EXPL were   against   the twenty participants
            'There were close to twenty participants'

(144) Er   waren ongeveer/ hoogstens (*de) twintig deelnemers.
        EXPL were   around   at most   the   twenty participants
        'There were approximately/at most twenty participants.'

This argument is inconclusive because of the seven true prepositions that allegedly function as approximative modifiers in German, only two select the definite article; all other forbid it.

(145) a. An / um   *(die) zwanzig Leute   kamen.
            on   around   the   twenty people came
            'Up to/around twenty people came.'

       b. Bis   zu / nahezu/ über / gegen   / unter (*die) zwanzig Leute   kamen.
            until to   nearly   over   against   under   the twenty people came
            'Up to/nearly/more than/up to/less than twenty people came.'

In addition, the argumentation is problematic on its own (cf. fn. 23) and the exclusion of (144) probably has the diachronic explanation suggested at the end of section 5.1.
The second argument they provide is that approximative modifiers can be complex.

(146) Er   waren in de buurt   van de twintig deelnemers.
        EXPL were   in the neighborhood of   the twenty participants
        'There were close to twenty participants.'

They then state that "expressions like *in de buurt van* do not make sense as adverbs, of course". This argument tacitly assumes that it is fine for prepositions to be complex but not for adverbs. But I see no principled reason why preposition are allowed to be complex but not adverbs.[28,29]

   Their third argument is that approximative numerals that look like PPs allow modifiers that only attach to PPs.

(147)   Ergens   /iets   /ruim in de twintig deelnemers hebben
        somewhere something   above in the twenty participants have
        zich   aangemeld.
        REFL.3   registered
        'Approximately/around/way over twenty participants registered.'

This argument is inconclusive because the relevant modifiers in (147) are not genuine PP-modifiers.[30] On the one hand, *ruim* 'way over' is compatible with numerals quite general, cf. (148).

(148)   voor ruim   dertig   klanten
        for   above thirty   clients
        'for more than thirty clients'

On the other hand, *ergens* 'somewhere' and *iets* 'around' can also combine with adverbs.

(149)   a.   Vandaag voel ik me al   iets   beter.[31]
             today   feel I me already something better
             'I feel already a little bit better today.'

        b.   Zijn beenderen liggen ergens   hier begraven.
             his remains   lie   somewhere here buried
             'His remains are buried somewhere here.'

6.1.2 New arguments

There are nevertheless three new arguments kindly provided by Norbert Corver (personal communication, 2017/2/23), two of which in my view convincingly show that in Dutch, approximative modifiers that look like prepositions in fact project a PP. The first argument he gives is that approximative modifiers that look like prepositions disallow stacking, in contrast to German (cf. 58) as expected under the view that they project a PP (cf. section 3.3).

(150)   *tegen de over de dertig deelnemers
         against the above the thirty participants
         intended: 'up to more than 30 participants'

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[28] An anonymous reviewers questions an analysis of *in de buurt van* 'close to' as an adverb because it would be "strange to have an adverb that ends with a preposition that is usually never intransitive." But at least in German, there are plenty of adverbs that end in a preposition that is never intransitive.

(i)   anbei   'enclosed'   ←   an   'on'   +   bei   'at'
      durchaus   'by all means'   ←   durch   'through' +   aus   'out of'
      hingegen   'by contrast'   ←   hin   'towards' +   gegen 'against'
      immerzu   'always'   ←   immer   'always'   +   zu   'to'
      nebenan   'next door'   ←   neben   'next to' +   an   'at'
      zuvor   'earlier'   ←   zu   'to'   +   vor   'before'

[29] I deliberately remain silent about the precise structure of *in de buurt van* 'close to' as this is not at stake. What is at stake is whether one allows a complex structure for elements that are standardly taken to have a monolexical structure only. If one does so for prepositions, then one can also allow it for adverbs, irrespective of how the resulting structures eventually look like.

[30] I do not wish to claim that *ruim* 'way over', *ergens* 'somewhere', and *iets* 'around' are unconstrained regarding their hosts. All I say is that PPs do not define the relevant restriction on their hosts.

[31] An anonymous reviewer points out that *beter* 'better' is maybe an adverbially used adjective, which analysis is suggested by the presence of the comparative morpheme *-er*. If true, this doesn't affect my argument that *iets* 'a little bit' is not a modifier restricted to PPs. However, I am unconvinced that comparative formation is a sufficient criterion for adjectivehood because there are also genuine adverbs that form a comparative. For example, the German adverb *oft* 'often' has a comparative form *öfter* 'more often'. Analyzing *oft* 'often' as an adverbially used adjective is precluded by the fact that it can never be used as an adjective in German.

The second argument comes from Right Node Raising. Right Node Raising can apply to approximative modifiers that look like prepositions but not to adverbs, again as expected under an analysis where they project a PP.

(151) a.   Jan heeft **tegen** ⌴,en   Marie heeft **over** de   dertig vrienden.
             Jan has   against and Marie has   over the   thirty friends
             'Jan has close to thirty friends, and Marie has more than thirty friends.'

       b.   *Jan heeft **min**- ⌴, en   Marie heeft **hoog**-stens dertig vrienden.
             Jan has   at least and Marie has   highest   thirty friends
             intended: 'Jan has at least thirty friends, and Marie has at most thirty friends.'

Dutch contrasts sharply with German, where Right Node Raising cannot apply to approximative numerals that look like prepositions.

(152) *Peter   trinkt   **um**   ⌴,aber Maria sicher   nur   **an** die zehn Bier.
         drinks   around around   but Maria certainly only   on the ten   beer
         intended: 'Peter drinks around ten beers, but Maria certainly only up to ten beers.'

There is a third argument that possibly indicates that they are PPs: parentheticals can appear between the preposition and the definite article.

(153) ??Er   waren rond   – pak 'm beet – de   twintig deelnemers.
         EXPL   were   around   grab him PRT   the twenty   participants
         'There were about, I guess, twenty participants.'

It is not fully clear, however, whether (153) really involves splitting. *rond de* 'around' has a variant without *de* 'the' (Corver & Zwarts 2006: 823). Coupled with the observation from the previous subsection about the difference between *etwa* 'around' and *in etwa* 'around', it might be the case that *rond* 'around' is different from *rond de* 'around', namely that *rond* 'around' is an adverb attaching to the DP containing the numeral. Then, *de* 'the' belongs to *twintig deelnemers* 'twenty participants' so that it is not *rond de* 'around' that is broken up. So data from approximative modifers that look like prepositions other than *rond de* 'around' is required before one can draw any firm conclusion from (153).

6.2 Why Dutch (still) possesses prepositional numerals

The two arguments illustrated in (150) and (151) show that Dutch in contrast to German possesses prepositional numerals. What could be responsible for this difference between Dutch and German? The relevant clue to answer this question comes from an observation made by Plank (2004). Consider again the change approximative numerals underwent in German in (154).

(154)   a.   [tree diagram]
        PP
        ├─ P° — an
        └─ DP
           ├─ D° — die
           └─ NP
              ├─ NUM — dreißig
              └─ NP △ — Flaschen

        →

        b.   [tree diagram]
        DP
        ├─ D°
        └─ NP
           ├─ NUM
           │ ├─ adverb — an die
           │ └─ NUM — dreißig
           └─ NP △ — Flaschen
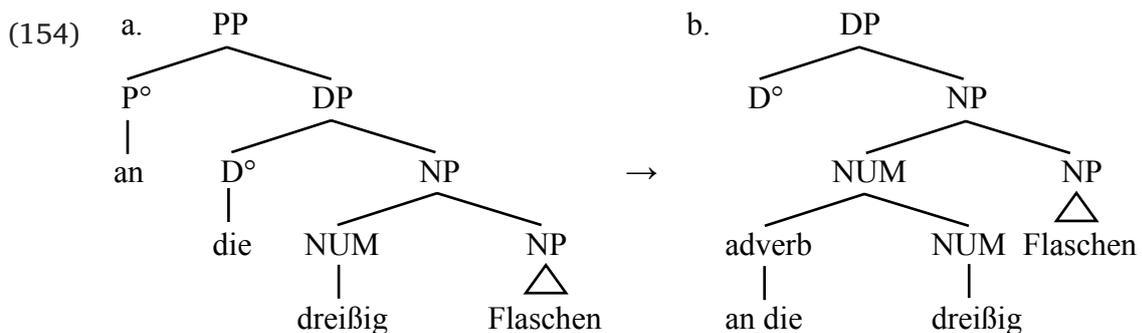
Regarding this change, Plank (2004: 183) notes the following:

(155) "It is only in the twentieth century […] that [approximative modifiers that look like prepositions] with definite articles have begun to appear in syntactic contexts where they are externally assigned case […]"

As external case assignment implies the change from PP to DP shown in (154), the structural reanalysis from (154a) to (154b) is a relatively recent one. On the assumption that (i) approximative modifiers that look like PPs have been existing for the same time in Dutch as in German and that (ii) the change from PP to DP that German underwent was only possible after some 400 years, Dutch could not have possibly been undergone that change. The reason that German underwent the change from (154a) to (154b) was to resolve the conflict between case assignment by the preposition and external case assignment by the predicate. Whereas in earlier stages, case assignment by the preposition outranked external assignment, in the 19th century external case assignment started to outrank case assignment by the preposition. However, Dutch lost its case system already at the end of the 18th century (Donaldson 1983). Since due to the loss of case marking there was no conflict between the case marking requirements of the preposition and that of the position the PP appeared in, the change that resolved this conflict was never required. In other words, due to the existence of only a single case form for nouns, the DP inside the PP was trivially compatible with the requirements of external case marking. So no conflict arose and no re-analysis was needed.

  If this analysis is on the right track, it implies that prepositional numerals in Dutch are real PPs, that is, it's not the numeral that is merged with the preposition but the whole DP containing the numeral. But if this is true, then how can this be made compatible with the evidence provided by Corver & Zwarts (2006: 820–821) that these PPs behave like DPs? The most promising route to take in my view can be found in the work by Hornstein & Uriagereka (2002). They suggest that the by now common mechanism of reprojection (Donati 2006; Cecchetto & Donati 2015; Blümel 2017), whereby the label of a constituent changes in the course of the derivation, applies at the interface to LF. Their analysis is based on the behavior of subject quantifiers. Syntactically, subject quantifiers are subject arguments and hence specifiers. Semantically, however, they are predicates and therefore heads. What they suggest is that the label of the clause changes when sent to LF. Before LF, the clause is a TP where the subject quantifier is a specifier. At LF, the clause is a QP and the subject quantifier is the head of the structure. So a sentence as *Most men like beer* has the two structures in (156).

(156)
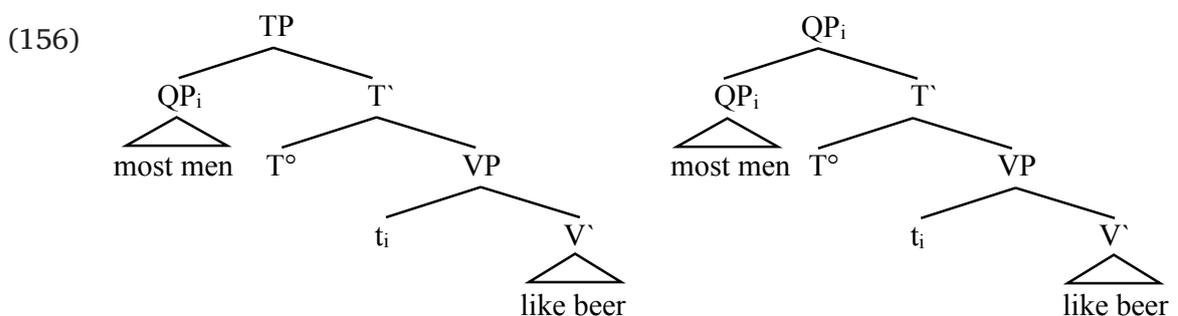
This captures that quantifiers behave as arguments syntactically but as predicates semantically. Transposing this idea to prepositional numerals in Dutch, one could suggest that the label of the nominal containing a prepositional numeral changes. Before LF, the DP provides the label, whereas at LF, the preposition provides the label, as shown in (157).

(157)

```
        DP                                         PP
      /    \                                     /    \
    P°      DP                                 P°      DP
    |      /  \                                |      /  \
    in   D°    NP                              in   D°    NP
         |    /  \                                  |    /  \
         de twintig deelnemers                      de twintig deelnemers
```
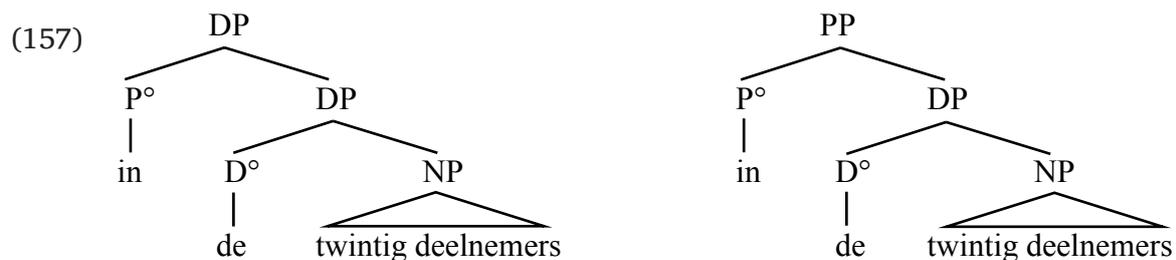
The pre-LF structure derives that they occur in DP-positions only, the post-LF structure captures that they behave like PPs interpretation-wise.

Conclusion

To conclude, I argued in this paper that expressions such as *an die* 'up to' used as approximative modifiers in numeral expression in German like *an die zehn Bier* 'up to ten beer' are directly attached to the numeral, and that such expressions are not PPs in German. Although they look like prepositions, they don't behave like prepositions but pattern with adverbs modifying numerals.

Abbreviations

3 = third person, ACC = accusative, COM = common gender, DAT = dative, FEM = feminine gender, MASC = masculine gender, MIXED = mixed declension class, NEUT = neuter gender, PL = plural, REFL = reflexive pronoun, SG = singular, STRONG = strong declension class, WEAK = weak declension class

Acknowledgements

Competing Interests

The author has no competing interests to declare.

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