A New Diagnostic for Cyclic *Wh*-Movement: Discourse Particles in German Questions

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This article presents novel evidence for cyclic *wh*-movement. Two experiments show that the question-sensitive particle *denn* in German is more readily accepted when occurring in an independent interrogative clause than in a dependent clause embedded in a *wh*-question. Importantly, however, acceptance of *denn* in a dependent clause increases significantly when a *wh*-phrase has been moved out of that clause. We argue that *denn* is locally licensed by an interrogative Force head. In dependent clauses, this licensing can be mediated by long *wh*-movement leaving a transient representation of interrogative force in Spec,CP. Without such a mediating trace in Spec,CP, the licensing of the particle fails. In conclusion, *denn* in a dependent clause indicates cyclic *wh*-movement.

Keywords: discourse particles, cyclic *wh*-movement, licensing of functional elements by Force

1 Introduction

Wh-dependencies can span more than a single clause, as is apparent in long *wh*-movement. While it seems uncontroversial in transformational grammar that movement leaves a trace in the base position, despite arguments in favor of intermediate positions it remains a matter of debate whether intermediate positions play a role at all, and if so, which positions are targeted on the way out of an embedded clause. In this article, we argue that Q(uestion)-sensitive discourse particles (DiPs) provide novel evidence for cyclic movement via Spec,CP, where Spec,CP is seen as the place in which illocutionary force must be syntactically established if it is syntactically established at all. The data rest on acceptability judgments of German *wh*-questions containing the Q-sensitive

DiP *denn* (lit. 'then'). Given that DiPs lack any overt grammatical reflexes such as morphological agreement or relations to argument/event structure, their acceptability can only be based on pragmatic appropriateness and syntactic environment. In this sense, acceptability data for *wh*-questions systematically varying the presence and position of the particle reflect by far subtler judgments than data yielded by overt reflexes of displacement. On the other hand, the fact that Force must be rooted in the C domain provides direct evidence for the activation of an intermediate position in long *wh*-movement. Our data show that in *wh*-questions, the DiP *denn* can only occur in a clausal complement X if a long (i.e., transclausal) *wh*-dependency in the sense of cyclic movement connects X with the interrogative Force head of the root clause. If the particle remains in X without a link to the Force head of the root clause, it cannot be licensed. This is the case if *wh*-movement applies only in the root clause. The contrast is illustrated in (1).

(1) a. Wen   meintest du, dass wir denn zu der Tagung   einladen sollten?
         who.ACC thought you that we DENN to the conference invite   should
         'Who did you think that we should invite to the conference?'
     b. *Wer meinte, dass wir denn einen Gastredner   einladen sollten?
         who thought that we DENN a   guest.speaker invite   should
         'Who thought that we should invite a guest speaker?'

As our data show, this contrast is real. We conclude that the occurrence of a Q-sensitive particle in a dependent (nonroot) clause emerges as an independent diagnostic of long *wh*-movement targeting the C domain on the way out of the dependent clause.

     The article is organized as follows. Section 2 gives an introduction to the role of DiPs in German and their licensing by illocutionary force. The emphasis is on *wh*-questions and Q-sensitive DiPs. Section 3 provides a survey of evidence for the involvement of the CP's left edge in cyclic *wh*-movement. Section 4 presents two experiments, which provide empirical evidence for the contrast in (1). From the finding that *denn* is licit in a dependent clause only when *wh*-movement has taken place out of this clause, we conclude that *denn* can be used as a diagnostic for cyclic *wh*-movement. Section 5 develops a formal syntactic analysis that rests on cyclic agreement between a Q-feature in the Force projection and a corresponding Q-feature of the particle. Section 6 concludes the article.

2 Discourse Particles in *Wh*-Questions

2.1 Properties of Discourse Particles

German is a language with the reputation of having many DiPs (also called ''modal'' particles). However, semantically comparable elements seem to occur in almost every language. DiPs are generally polyfunctional elements. The particle *denn*, for example, which is at the center of the present study, is also a subordinating conjunction, and in its original shape, *dann*, it was a temporal adverb. Historically, it derives from Old High German *thanne* 'then' (see Abraham 1991, Wauchope 1991, Wegener 2002). As far as the historical development of DiPs can be traced back, their status is the result of a grammaticalization process by which a lexical item is subject to

simultaneous reduction of its phonological and semantic features and its syntactic freedom.[1] DiPs cannot be coordinated or modified, they usually cannot bear phonological prominence, they lack proforms, and they are immobile.[2] In a case like *Er ist doch schon alt* 'He is, as you should know, already old', topicalization of *doch* destroys the 'as you should know' reading. In *Doch ist er schon alt*, *doch* equals the adverb 'however': 'Contrary to expectations, he is already old'. In other words, *doch* as a DiP cannot front whereas *doch* as an adverb can do so easily. The syntactic properties of DiPs are generally compatible with the view that particles are heads rather than phrases. We assume here without further discussion that at least some DiPs are heads and that *denn* belongs to this group.[3] DiPs are sensitive to clause type. Some occur in declaratives, others in imperatives or in exclamatives, still others—like *denn*, which we examine here—in interrogatives. DiPs are prototypical root phenomena because the root clause is an utterance, and only utterances have interpretable illocutionary force.[4] As we will show, this general impression requires certain qualifications.

2.2 Discourse Particles in Wh-*Questions*

Let us concentrate more closely on DiPs that arise in constituent questions. Consider the difference between (2) and (3).

(2) Wo   wohnst du?
    where live   you
    'Where do you live?'

(3) Wo   wohnst du   denn?
    where live   you DENN
    'Where do you live? (I am wondering.)'

While (2) is a plain information-seeking question that does not reveal any attitude of the speaker, (3) signals that the speaker is in a particular way ''concerned'' about the proposition that the

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[1] *Denn* must be seen as a weakened version of *dann* with vowel reduction and further reduction to *dn* or *'n*. Semantically, it has been reduced from a temporal adverb to a general deictic element that makes reference to the common ground that the speaker shares or purports to share with the addressee.
[2] An apparent exception are examples in which discourse particles form a constituent with a *wh*-phrase and travel along with it, as in (i).

(i) [Wann denn] hat man Zeit zu schreiben, telefonieren und sich zu treffen . . . ?
     when DENN has one time to write   phone   and REFL to meet
     'When after all does one have time to write, to make phone calls, and to meet . . . ?'

See Bayer and Obenauer 2011:sec. 4, Bayer and Trotzke 2015, and Struckmeier 2014 for discussion.
[3] See Meibauer 1994 for discussion of their X-bar status. Cardinaletti (2011) and Coniglio (2011) argue that discourse particles are not heads but ''weak adverbs,'' a distinction that will not play a role here; see Bayer and Obenauer 2011 and, for different particle constructions, Cable 2010.
[4] Opinions about the syntactic representation of illocutionary force differ to some extent, but there is no doubt about its representation in the root clause. See among many others Thurmair 1989 and more recently Zimmermann 2008, where it is proposed that ForceP provides an epistemic reference point for the interlocutors. Krifka (2014) argues for the possibility of embedded speech acts.

answer would yield. The particle *denn*, related to English *then*, makes reference to some common ground between speaker and hearer beyond the presupposition p, p = there is a place x such that you live in x. No existence of such an additional common ground of shared knowledge is assumed in (2). *Denn* is a quasi anaphoric expression, roughly translatable as 'under some circumstances known to both of us'.[5] This makes *denn* unfit for out-of-the-blue questions.[6]

Although we will concentrate here on the particle *denn*, there are other Q-sensitive particles in German that to some degree function along the lines of *denn*, such as *nur* (lit. 'only') and *bloß* (lit. 'barely').

(4) Wo   hast du nur / bloß meine Schlüssel hingelegt?
    where have you NUR / BLOSS my   keys   put.down
    'Where did you put my keys? (I have already looked everywhere.)'

In a *wh*-question like (4), the DiP signals that the speaker has already tried several times to find an answer. Bayer and Obenauer (2011) refer to such questions as ''can't-find-the-value-of-*x* questions'' (CfvQs). Another particle is *schon* (lit. 'already'). In *wh*-questions, *schon* yields a rhetorical question (RQ).[7]

(5) Wer zahlt schon gerne Steuern?
    who pays SCHON gladly taxes
    'Who likes paying taxes? (Nobody!)'

Another one is *wohl* (lit. 'well'). *Denn* and *wohl* are more general and can easily combine with *nur*, *bloß*, *schon* (see Thurmair 1989). When combined, these particles appear in a fixed order, as is familiar from Cinque's (1999) work on adverbs and the proposed universal adverb hierarchy; for an application to German DiPs, see Coniglio 2011. Thus, cases of particle stacking as in (6) are naturally available in German.

(6) a. Wo   hast du denn wohl {nur / bloß} meine Schlüssel hingelegt?
       where have you DENN WOHL NUR / BLOSS my   keys   put.down
       'Where did you put my keys? (I have already looked everywhere.)'
    b. Wer zahlt denn wohl schon gerne Steuern?
       who pays DENN WOHL SCHON gladly taxes
       'Who likes paying taxes? (Come on, nobody!)'

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[5] An artifact of its presence is that questions of type (3) are often perceived as ''more intimate'' or ''friendlier'' than those of type (2), but this is really no more than a consequence of the speaker's attitude. Questions with *denn* can certainly cater to all kinds of emotions and registers.

[6] For examples and discussion, see Bayer 2012, König 1977, and Wegener 2002. One reviewer objects that a stranger who enters one's private garden may be asked *Was machen Sie denn da?* 'What are you doing here?'. However, this question is not contextless. The speaker assumes that the hearer knows that he or she is on someone's private territory. This common ground suffices to license *denn*. The particle seems to make reference exactly to this circumstance.

[7] *Schon* has other applications as well. For a recent study, see Egg 2012.

2.2.1 Discourse Particles and Illocutionary Force   Since DiPs are linked to illocutionary force, a syntactic account suggests that they need to access the Force projection in the sense of Rizzi's (1997) proposal of a split CP. Force is present at the top of the root clause or of a root-like clause. A root-like clause is formally subordinate but nevertheless counts as quoted speech. Consider the following minimal pair from Bayer 2012:15 (see also Krifka 2014):

(7) a. Christine fragte, warum Klaus denn so blass ist.
      Christine asked why   Klaus DENN so pale is
      'Christine asked why Klaus is so pale.'

   b. *Christine weiß, warum Klaus denn so blass ist.
      Christine knows why   Klaus DENN so pale is

In (7a), the attitude of wondering/being concerned is ascribed to Christine and not to the speaker who utters the sentence. Thus, Christine is responsible for the use of *denn*. In (7b), however, because of the verb *wissen* 'to know', which does not set up a quotational context, only the speaker who utters (7b) would be available. But the speaker utters a declarative—a clause type that does not license the particle *denn*. The conclusion must be that the form of the embedded clause alone cannot be responsible for providing force. Instead, it is the interpretation conditioned by the matrix verb that renders the embedded clause as reported speech or not.[8]

2.2.2 Denn in Dependent Clauses   Despite their association with illocutionary force, Q-sensitive DiPs can also arise in dependent clauses, as in the following examples:

(8) In welcher Weise meinen Sie, dass er denn ihrer Region besser helfen würde?
    in which   way   think   you that he DENN your region better help   would
    'In which way do you think that he would help your region in a better way?'
    http://f3.webmart.de/f.cfm?id=1902785&r=threadview&t=3044307&pg=4   18 July 2013

(9) Wie denkst du, dass es denn weitergehen soll   mit euch?
    how think   you that it DENN go.on   should with you.PL
    'How do you think that it should go on with the two of you?'
    http://mein-kummerkasten.de/142829/fremdgehen.html   18 July 2013

(10) Welches Bild   glaubst du dass er denn von mir haben könnte?
    which   picture believe you that he DENN of   me have   could
    'Which impression do you believe he could have of me?'
    http://www.marsvenus.de/search.php?search_author=Lola&sid=0fe369faf60ccfd8c76eee167
    638b51f   17 November 2011

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[8] Analogous examples can be found with the particles *schon*, *nur*, and so on, in embedded clauses and with the same restrictions. For details about embedded root phenomena, see Heycock 2005. Neither in these cases nor in those to be considered shortly can one find ''double access'' to the speaker or to the issuer of the embedded proposition as discussed for German by Meinunger (2004). Meinunger's focus is on embedded verb-second (V2) clauses. V2 complements play no role in the present study.

All of (8)–(10) are questions. As (11)–(13) show, the possibility of licensing *denn* as a DiP in noninterrogative contexts can be excluded.

(11) Ich meine, dass er (*denn) ihrer Region besser helfen würde.
      I   think that he   DENN your region better help   would
      'I think that he would help your region in a better way.'

(12) Er denkt, dass es (*denn) irgendwie weitergehen wird.
      he thinks that it   DENN somehow   go.on   will
      'He thinks that it will somehow go on.'

(13) Du glaubst, dass er (*denn) ein falsches Bild   von mir haben könnte.
      you believe that he   DENN   a   wrong   picture of me have could
      'You believe that he could have a wrong impression of me.'

The grammatical cases in (8)–(10) involve complement clauses from which a *wh*-phrase has been extracted. The question is how essential extraction from the complement clause is. Could it be the case that it doesn't matter as long as *denn* is in a complement clause while the (immediately) dominating root clause has the right illocutionary force to license the particle? If this is so, the subject-*wh* clauses in (14)–(16) should be fine.

(14) Welche Leute meinten, dass er denn ihrer Region besser helfen würde?
      which people thought that he DENN your region better help   would
      'Which people thought that he would help your region in a better way?'

(15) Wer denkt, dass es denn irgendwie weitergehen wird?
      who thinks that it DENN somehow   go.on   will
      'Who thinks that it will somehow go on?'

(16) Welche Leute glauben, dass er denn ein falsches Bild   von mir haben könnte?
      which people believe that he DENN a   wrong   picture of me have could
      'Which people believe that he could have a wrong impression of me?'

According to our intuitions, these sentences are degraded, but it is not clear how strong the effect really is. Section 4 presents two experiments showing that the contrast between short *wh*-movement and long *wh*-movement is real.

2.2.3 Apparent Counterexamples   Our search for relevant examples of the short *wh*-movement type also yielded sentences like (17) and (18), in which *denn* occurs in a dependent clause from which no *wh*-movement takes place.[9]

(17) Wer sagt, dass Klamottenstil denn teuer   sein muss?
      who says that clothing.style DENN expensive be   must
      'Who says that clothing style must be expensive?'
      http://www.team-ulm.de/Forum/1/145700/749   18 July 2013

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[9] The rest of this section has benefited from critical questions by one of the reviewers.

(18) Wer sagt, dass die denn sitzen?
who says that they DENN sit
'Who says that they [the astronauts] are actually seated?'
http://www.gutefrage.net/frage/frage-zum-space-shuttle 18 July 2013

All the examples we could find involve the subject *wh*-pronoun and the verb *sagen*, and all of them appear in contexts in which the question is interpreted as an RQ. *Who says that p?* amounts to the polar question *Does anyone say that p?* and yields the conversational implicature that hardly anyone or even no one says that p. This puts (17)–(18) on a par with (19). As a matter of fact, polar questions allow embedded *denn* under the condition that the embedding predicate is reduced to a marker of evidentiality.[10]

(19) Glaubst du, dass dieser Mann denn ernsthaft eine Beziehung führen möchte?
believe you that this man DENN seriously a relationship lead wants
'Do you believe that this man seriously wants to be in a relationship?'
http://www.planet-liebe.de/forum/showthread.php?t=276051&page= 10 July 2013

Predicates like *mögen* 'to want' and *sich vorstellen* 'to imagine' appear to refuse this interpretive option, although they show long *wh*-extraction with *denn* in the embedded CP.[11] Examples (17)–(19) show that *denn* may occur in the dependent CP when the question under discussion

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[10] Examples like (19) are invariably in 2nd person. We could not find any in 3rd person. If this reflects a constraint on polar questions, it must be absent in long *wh*-movement. The materials used in the experiments reported in section 4 involve 3rd person matrix predicates.

[11] Attested examples with *wh*-extraction are the following:

(i) Was möchtest du, dass deine Tochter zu Schulbeginn denn alles kann?
what want you that your daughter at school.start DENN all can
'What do you want your daughter to be able to do by the time she starts school?'
http://www.wunschkinder.net/forum/read.php?35,5929291,page=3 20 August 2014

(ii) Wie, Tom, stellst Du Dir vor, dass eine solche Unterstützung denn aussehen sollte?
how Tom imagine you REFL PRT that a such support DENN look should
'Hey Tom, what do you imagine that such support should look like?'
http://www.aktive-erwerbslose.net/forum/kosten-der-unterkunft/zwangsumzuge-in-nurnberg-rucksicht-gibt-es
-nicht/?action=printpagen 22 August 2014

In an informal classroom judgment study, 132 speakers rated questions with long *wh*-extraction from complements under the volitional predicate *mögen*/*möchten* 'to want' (see Meinunger 2006, 2007 for discussion). The particle *denn* was either in the matrix or in the embedded clause.

(iii) An wen$_1$ möchtest du (denn), dass ich deinen Brief (denn) t_1 weiterleite?
to who.ACC want you DENN that I your letter DENN pass.on
'Who do you want me to pass your letter on to?'

Comparison was made with short *wh*-extraction, as in (iv).

(iv) Wer$_1$ möchte (denn) t_1, dass ich deinen Brief (denn) weiterleite?
who wants DENN that I your letter DENN pass.on
'Who wants me to pass your letter on?'

(iv) yielded a sharp difference between *denn* in the matrix clause and *denn* in the embedded clause, whereas the contrast was almost canceled in (iii). This interaction suggests that the difference between long extraction in (8)–(10) and short extraction in (16)–(18) also holds for predicates that cannot be understood as evidential markers.

(also called the ''main point''; see Simons 2007) targets this dependent CP rather than the matrix clause. The matrix predicate is backgrounded to such an extent that it functions rather like an interrogative prefix to the embedded CP. As a result, *denn* is licit in the CP complement, as it is in corresponding simplex polar questions like *Muss Klamottenstil **denn** teuer sein?* 'Must clothing style be expensive?' or *Möchte dieser Mann **denn** ernsthaft eine Beziehung führen?* 'Does this man seriously want to be in a relationship?'[12] Assume for the sake of the argument that for cases like (17) and (18) there is a reanalysis by which the *wh*-clause *who says* is interpreted as *does anybody say* (with the implicature *nobody says*). If so, *denn* is licensed as in (19). In this case, one could argue that there is no actual semantic embedding, and the question is functionally a simplex clause. *Denn* in the embedded CP with *wh*-extraction, as in (8)–(10), appears to be different, though, and can hardly escape a syntactic account. As Marga Reis (pers. comm.) points out, *denn* is licensed in the complement CP even if the embedding predicate is part of the speaker's question. To see this, consider the following dialogue:

(20) A: Mein Freund hat große Pläne für die Zukunft. Er glaubt, dass er bald befördert
          my   friend has great plans for the future   he believes that he soon promoted
          wird, und ins   Ausland gehen kann.
          will.be and in.the abroad go   can
          'My friend has great plans for the future. He believes he will soon be promoted
          and can go abroad.'

      B: Und wie₁ glaubst DU, t′₁ dass es denn dann mit   euch   t₁ weitergehen soll?
          and how believe you   that it DENN then with you.PL   go.on   should
          'And how do YOU believe that it will then go on with the two of you?'

The middle link t'_1 of the chain headed by the *wh*-operator *wie* must have locally licensed the occurrence of *denn* although the matrix predicate is an essential part of B's question; that is, the question cannot be semantically reduced to the question under discussion, 'How will it go on with the two of you?'. Further evidence in this direction will be given in section 5.[13] So whatever the ultimate analysis for (17)–(19) may be, the occurrence of *denn* in (8)–(10) seems to rely on the specific syntactic dependency that characterizes long *wh*-movement.

   The difference between short and long *wh*-movement, which appears to be contradicted by examples like (17) and (18), can be further clarified if we shift our attention to the elements *schon* and *nur*, both of which may function as DiPs in *wh*-questions but—unlike *denn*—not in polar questions. Consider the interpretive difference between the pairs in (21) and (22).

(21) a. An welche Regierung   glaubst du, dass man schon gerne Steuern zahlt?
           to which government believe you that one SCHON gladly taxes   pays
           'To which government do you believe one is fond of paying taxes? (To none at
           all!)'

    b. Wer glaubt, dass man an unsere Regierung schon gerne Steuern zahlt?
       who believes that one to our government already gladly taxes pays
       'Who believes that one is already fond of paying taxes to our government?'

(22) a. Von wem glaubst du, dass der Junge das nur abgeschrieben haben könnte?
       from who.DAT believe you that the boy this NUR copied have could
       'From who on earth do you believe the boy could have copied this?'

    b. Wer glaubt, dass der Junge das nur abgeschrieben haben könnte?
       who believes that the boy this only copied have could
       'Who believes that the boy could have only copied this?'

While (21a) yields the RQ interpretation without any effort, that interpretation is very hard if not impossible to get in (21b). Even though *schon* appears in a *wh*-question, the preferred interpretation is one according to which *schon* is a regular adverb, and as such neutral about the type of its embedding sentence. The contrast in (22) may be even clearer. (22a) yields the CfvQ interpretation very naturally; the speaker signals that he or she has so far unsuccessfully tried to find an answer. However, the only interpretation of (22b) is that the speaker wants to know who believes that the boy could have done nothing else to a certain text but copy it. The only reading of *nur* here is the focus particle interpretation. In both of these cases, the interpretive distribution corroborates a syntactic account that attributes it to the fact that the distant DiP can be locally licensed under long *wh*-movement but not under short *wh*-movement.

    It may be worth mentioning here that German allows another type of long-distance dependency that involves, not a C-headed complement, but a V + T-headed one. It is standardly understood as extraction from a V2 clause as in *Wie*$_1$ [$_{C'}$ *denkst du* [$_{CP}$ *t'*$_1$ *soll es t*$_1$ *weitergehen mit euch*]]*?* 'How do you think it should go on with the two of you?'. Interestingly, Q-sensitive DiPs can freely occur in such complements, and no markedness effect obtains.

(23) Wie$_1$ [denkst du [t'$_1$ soll es denn t$_1$ weitergehen mit euch]]?
     how think you should it DENN go.on with you.PL
     'How do you think it should go on with the two of you?'

Reis (1995, 1996) proposes to reanalyze the purported matrix clause as a *verb-first integrated parenthetical* (VIP). According to Reis, *denkst du* in (23) is a VIP that may be inserted in a root *wh*-question. Her reasoning turns (23) into (24).

(24) Wie$_1$ [denkst du] soll es denn t$_1$ weitergehen mit euch?

If she is right, the occurrence of *denn* is unsurprising. The particle can access Force as in any simplex *wh*-question. Since *wh*-movement does not cross a CP boundary, *denn* is licensed without mediation by an intermediate trace of the *wh*-operator.[14] The fact that VIPs are optional and can

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[14] For more recent discussion of VIPs, see Bayer and Salzmann 2013, Pankau, Thiersch, and Würzner 2010, and Viesel 2011, and for experimental explorations, see Kiziak 2010.

''float'' in the clause, as in *Wie₁ soll es [denkst du] denn t₁ weitergehen mit euch?*, is compatible with the VIP's potential role as an evidential marker. The *wh*-questions considered in this article are different. They are complex structures in which the *wh*-operator must have moved out of the dependent CP. Of course, this does not preclude the role of a semantic factor by which the matrix predicate may in fact attain properties of an evidential marker. The bridge construction *denkst du* in (9) and the VIP *denkst du* in (24) appear to play the same semantic role in the two cases, but the syntax is different. Licensing of *denn* in a VIP-modified question is as local as in any simplex *wh*-clause, whereas licensing of *denn* in the bridge construction must be achieved by an extra syntactic step, namely, creation of an intermediate trace in the left periphery of the embedded CP. Sentences like (17)–(19), (21b), and (22b) are superficially similar to (8)–(10), (21a), and (22a) but lack this extra step. As a result, Q-sensitive DiPs are unlicensed in their complement.[15] A formal analysis will be given in section 5.

2.2.4 Intermediate Summary   In German, DiPs are distributed roughly like adverbs, they lack morphological agreement, and they do not interfere with argument/event structure. Thus, their role in the clause must be evaluated on the basis of nothing other than their pragmatic appropriateness and their syntactic environment. This distinguishes DiP licensing from gap licensing, in which Case, argument/event structure, and s-selection provide important clues for the computation of the dependency.[16] The licensing of DiPs in *wh*-questions requires access to the C/Force domain. Exactly this constellation is provided by *wh*-movement through the embedded C/Force projection. If our reasoning is on the right track, the acceptability of Q-sensitive DiPs would constitute an important new diagnostic for cyclic movement across the CP phase. The particle's dependency is superimposed on the familiar Ā-dependency and is thus crucially related to the intermediate landing site of *wh* (the C/Force projection). As such, *denn* as a diagnostic opens up a new line of research and testing.

3 Existing Evidence for Cyclic *Wh*-Movement

One of the most widely known pieces of evidence for successive-cyclic *wh*-movement is the fact that in Irish, the complementizer changes from the regular form *go* to a special form *aL* when a

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[15] They are, of course, also unlicensed in arbitrary islands. (i) is an example of an infinitival adjunct; there is no way for *denn* to access the illocutionary force of the root clause.

    (i) *Warum ist Hans [ohne   denn einen Führerschein zu haben] Auto gefahren?
        why   is Hans without DENN a   driver.license to have   car   driven
        'Why did Hans drive a car without having a driver's license?'

[16] While it is uncontroversial that a *wh*-filler must be associated with a trace position in order to satisfy restrictions of Case, argument structure, and so on, it has remained controversial which positions elements cycle through on their way out. There was an early agreement that Spec,CP must be involved (Chomsky 1973). In the *Barriers* framework (Chomsky 1986), *wh*-movement also had to pass through a position adjoined to VP. In the Minimalist Program (Chomsky 1995, 2001), this has led to the suggestion that vP is a phase in addition to CP.

wh-operator has passed through its specifier. (Examples (25)–(27) are from McCloskey 2002: 185, 189.)

(25) Creidim   gu-r   inis sé bréag.
     believe.1SG GO-PAST tell he lie
     'I believe that he told a lie.'

(26) Céacu ceann a   dhíol tú?
     which one   aL sold you
     'Which one did you sell?'

(27) an t-ainm a   hinnseadh dúinn a   bhí ar an áit
     the name aL was.told   to.us aL was on the place
     'the name that we were told that it was on the place'

See McCloskey 2002 for discussion of the Irish facts in connection with general questions of successive-cyclic movement. Overt morphological effects of successive-cyclic movement have also been reported in Chamorro by Chung (1982) and her following work. Vestiges of cyclic movement have also been identified in Malay and in Bahasa Indonesia by Saddy (1991), Cole and Hermon (2000), and Sabel (2000), and for the Bantu language Kinande by Schneider-Zioga (2009). Widely discussed examples come from connectivity effects, as first investigated by Barss (1986). (28a) is ambiguous, as shown in (28b).

(28) a. Which pictures of himself did John think (that) Fred liked?
     b. [Which pictures of himself$_{i/j}$]$_1$ did John$_i$ think [t'$_1$ (that) [Fred$_j$ liked t$_1$]]?

If the trace in the lower Spec,CP is a copy that contains [. . . *himself*], the anaphor can be bound by the next accessible subject, which is *John*. Similar examples that provide an argument for an intermediate trace/copy could be given for German.

Various languages with overt cyclic *wh*-movement have been found to employ strategies by which the moved element or part of the moved element appears overtly on the clausal edges of the CPs involved. These constructions have become known as *partial movement* and *copy movement*. Partial movement has been found in German (see (29)), including Tyrolian (Alber 2008), colloquial Dutch (Barbiers 2014), Frisian (Hiemstra 1986), Hungarian (Horvath 1997, Lipták and Zimmermann 2007), Iraqi Arabic (Wahba 1992), Romani (McDaniel 1989), Hindi (Dayal 1994, Mahajan 1990), and Bangla (Bayer 1990, 1996); see also Lutz, Müller, and von Stechow 2000.

(29) Was glaubst du, was Gerda meint, wem   wir vertrauen können?
     what believe you what Gerda thinks who.DAT we trust   can
     'Who do you believe Gerda thinks we can trust?'

In partial movement, the lower clause shows standard *wh*-movement while the scope of this *wh*-operator is recursively extended into the immediately dominating clause by the unmarked *wh*-pronoun *was*. Copy movement has been found at least in German (see (30)), including Tyrolian, Frisian, colloquial Dutch, Afrikaans, and Romani. For an overview and references, see Felser 2004; for a recent account, see Pankau 2013.

(30) Wem   glaubst du, wem   Gerda meint, wem   wir vertrauen können?
      who.DAT believe you who.DAT Gerda thinks who.DAT we trust   can
      'Who do you believe Gerda thinks we can trust?'

Copy movement shares with partial movement at least the surface effect by which a *wh*-pronoun appears in each dominating clause and thus extends the scope of the *wh*-element of the lowest cycle. In the copy construction, it is, roughly speaking, the primary *wh*-element itself that is repeated in Spec,CP. As Felser (2004) and Pankau (2013) show, partial movement, as in (29), differs in various ways from overt movement and also from copy movement, as in (30), while the latter two have more properties in common. In section 4.2, we will extend our investigation to partial movement, and we will also discuss its relation to copy movement. For the time being, it suffices to note that in each of these cases, an overt reflex of the *wh*-dependency is spelled out in the CP's edge position, which syntactic theory has traditionally claimed to host an intermediate Ā-trace in cyclic movement.[17]

In the processing literature, the assumption of traces in general and of intermediate traces in particular is controversial (Phillips and Parker 2014, Pickering and Barry 1991). Priming effects at purported in-situ trace positions, for instance, can be explained without reference to traces (e.g., as effects of simple lexical association). It is therefore desirable to search for ways of probing into long-distance dependencies that are independent of lexical influences. DiPs are independent of the clause's argument/event structure and the lexical elements that control them. In fact, they belong to the ''expressive dimension'' (Potts 2005) and thus to a distinct vocabulary. Their acceptability in an embedded noninterrogative complement requires access to the locally available C/Force projection. No lexical cue can be made responsible for the long-distance dependency. This amounts to a new and independent way of exploring the presence of intermediate traces.

4 Experimental Investigations

In this section, we present an empirical investigation of speaker judgments about German *wh*-questions containing the DiP *denn*. The corpus examples discussed in section 2 suggest that *denn* can occur not only in root *wh*-questions but also in dependent clauses when licensed by *wh*-extraction out of a *that*-clause. However, we found only a small number of corpus examples—possibly because DiPs mainly occur in less formal spoken registers—so that firm conclusions were not possible. To clarify the facts, we designed two experiments examining the acceptability of *denn* in dependent clauses.

The experiments were conducted with the help of a questionnaire using magnitude estimation (ME), a method originally developed in psychophysics (see Stevens 1975) and later adapted for collecting linguistic judgments (see Bard, Robertson, and Sorace 1996, Cowart 1997, Sorace 1992). ME has been successfully applied to studying a wide range of syntactic phenomena,

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[17] See Den Dikken 2009 for arguments against this standard view. See also section 5.2 below.

including extraction (Cowart 1997, Featherston 2005a,b, McDaniel and Cowart 1999). In an ME experiment, participants are first confronted with a so-called reference stimulus and then are asked to evaluate all further stimuli relative to this reference stimulus. They assign numerical values according to two constraints: (a) the numerical value can be arbitrarily small but must be greater than zero; (b) the ratio between the reference value and the item value should reflect the perceived acceptability ratio between the reference stimulus and the current stimulus. ME yields judgments on a continuous scale and is therefore suited to standard statistical procedures. Some of the underlying theoretical assumptions of ME have been questioned (e.g., Featherston 2008, Sprouse 2011, Weskott and Fanselow 2011), but this does not diminish its usefulness as a method for gathering fine-grained acceptability judgments (see Schütze and Sprouse 2014).

4.1 Experiment 1

Experiment 1 investigates the acceptability of *denn* in main and embedded clauses, depending on whether a sentence-initial *wh*-word originated in the main clause (''short *wh*-movement'') or in the embedded clause (''long *wh*-movement''). A sample sentence involving short *wh*-movement is provided in (31). *Denn* is licensed in the main but not in the embedded clause. Acceptability ratings should therefore be high in the former case and low in the latter.

(31) *Short* wh-*movement*
Wer$_i$ berichtete t$_i$ ihr (*denn*), dass die Einbrecher (*denn*) gefasst wurden?
who told   her DENN that the burglars   DENN caught were
'Who told her that the burglars were caught?'

Short *wh*-movement sentences contrast with long *wh*-movement sentences in which the sentence-initial *wh*-phrase relates to a variable in the embedded clause.

(32) *Long* wh-*movement*
Wen$_i$ vermutete er (*denn*), t$_i$ dass die Polizei (*denn*) t$_i$ festgenommen hat?
who.ACC suspected he DENN   that the police DENN   arrested   has
'Who did he suspect that the police arrested?'

In (32), *denn* is licensed in the main as well as in the embedded clause. It should therefore be equally acceptable in both positions. Overall, however, sentences with long *wh*-movement should be less acceptable than sentences with short *wh*-movement, given the well-known problematic status of long extraction for (some) speakers of German (Kvam 1983, Paul 1919). To control for this effect, the experiment includes sentences with the clause-type-neutral temporal adverb *damals* 'back then' in place of *denn*.

4.1.1 Method   The participants, materials, and procedure for Experiment 1 were as follows.

4.1.1.1 Participants   Ninety-seven students from the University of Konstanz completed a questionnaire for course credit or payment. All participants were native speakers of German and naive with respect to the purpose of the experiment.

4.1.1.2 *Materials*   Experiment 1 had a three-factor design. The first factor was the between-items factor Movement (short vs. long *wh*-movement). One set of 16 sentences involved short *wh*-movement as in (31) and a second set of 16 different sentences involved long *wh*-movement as in (32). We decided to realize Movement as a between-items factor because this imposed less severe constraints on the lexical materials used in the sentences. Each of the total set of 32 sentences appeared in four versions resulting from crossing the two factors Particle (*denn* vs. *damals*) and Particle Position (main clause vs. embedded clause).[18] Table 1 gives a complete set of stimuli. All experimental sentences consisted of a matrix clause and an embedded clause. The matrix clause always began with a *wh*-phrase that originated either in the matrix clause (short *wh*-movement) or in the embedded clause (long *wh*-movement). Short *wh*-movement always involved the subject *wh*-pronoun *wer* 'who', whereas long *wh*-movement involved various *wh*-words, both arguments (*wem* 'who.DAT' and *wen* 'who.ACC') and adjuncts (*wie* 'how', *wo* 'where', *woran* 'whereby'/'at what', and *wohin* 'where to'). Each sentence contained either the clause-type-sensitive DiP *denn* or the clause-type-neutral adverbial *damals* 'back then', either in the main clause or in the embedded clause.

The experimental sentences were distributed over four lists according to a Latin square design. Each list contained each sentence in only one of its four versions and contained an equal number of sentences in each condition. Finally, three versions of each list were constructed by randomizing the order in a list. The resulting twelve lists were then transformed into question-

Table 1
Sample stimuli from Experiment 1

Short wh-*movement, particle/adverb in main clause*
Wer berichtete ihr denn/damals,   dass die Einbrecher gefasst wurden?
who told   her DENN/back.then that the burglars   caught were
'Who told her DENN/back then that the burglars were caught?'

Short wh-*movement, particle/adverb in dependent clause*
Wer berichtete ihr, dass die Einbrecher denn/damals   gefasst wurden?
who told   her that the burglars   DENN/back.then caught were
'Who told her that the burglars were caught DENN/back then?'

Long wh-*movement, particle/adverb in main clause*
Wen   vermutete er denn/damals,   dass die Polizei festgenommen hat?
who.ACC suspected he DENN/back.then that the police arrested   has
'Who did he suspect DENN/back then that the police arrested?'

Long wh-*movement, particle/adverb in dependent clause*
Wen   vermutete er, dass die Polizei denn/damals   festgenommen hat?
who.ACC suspected he that the police   DENN/back.then arrested   has
'Who did he suspect that the police arrested DENN/back then?'

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[18] For ease of reference, we subsume the particle *denn* and the adverb *damals* under the label *particle*, although the two must not be confused in theory.

naires. In total, each questionnaire contained 108 sentences: 32 experimental items and 76 filler items. About half of the filler items served as experimental items in an unrelated experiment investigating argument structure alternations. Filler items were structurally related to the experimental items insofar as they also contained embedded clauses. Some of them were *wh*-questions (short and long *wh*-movement) while others were declaratives. Filler items were both grammatical and ungrammatical sentences. Ungrammatical fillers involved various kinds of violations: for example, island violations, Case violations, agreement errors, lexical deviations, and a few morphological errors. The strength of the violations was expected to range from very subtle to very strong.

4.1.1.3 Procedure   The experiment tested participants using a paper questionnaire. To familiarize the participants with the procedure, the questionnaire began with a training in which they had to judge the length of lines relative to a reference line. First, an instruction was given together with an example. Next, seven lines were given, each with a box to its left. The first line served as the reference item and was assigned the value 50. The participants' task was to estimate the length of the subsequent lines relative to the reference line and write down a value in the box. The next page of the questionnaire contained an instruction for estimating sentence acceptability together with an example. The actual experiment began on the third page. At the top of this page and all subsequent pages, the reference sentence in (33) appeared together with the reference value 50.

(33) Ich glaube, dass den   Bericht der   Chef in seinem Büro gelesen hat.
     I   think   that the.ACC report the.NOM boss in his   office read   has
     'I think that the boss read the report in his office.'

The reference sentence in (33) is adapted from the reference sentence that Keller (2000) used for his Experiment 2. The sentence is grammatical but exhibits scrambled (i.e., noncanonical) word order. In the absence of any discourse licensing of the object-before-subject order, sentences like (33) are usually perceived as somewhat degraded (see Keller 2000, Pechmann et al. 1994). The experimental sentences occurred below the reference sentence, each with a box to its left in which the participants were instructed to write their numerical judgment. The first eleven sentences were filler items.

4.1.2 Results   All analyses were run using R (R Core Team 2012). Before analysis, the ratings obtained in Experiment 1 were normalized by applying the *z*-transformation. Each participant's mean rating was subtracted from each individual rating, and the resulting value was divided by the participant's standard deviation. Positive values indicate ratings above the average value; negative values indicate ratings below the average. The averaged normalized ratings obtained in this way are shown in figure 1. They were analyzed by means of linear mixed-effect modeling using the R-package *lme4* (Bates, Maechler, and Bolker 2012). The experimental factors were coded in such a way that all contrasts reported below test whether differences between means are significant. Following the advice given in Barr et al. 2013, we first computed a model containing the full factorial design in the random slopes. Since this model did not converge, we simplified the random effect specification by removing the three-way interaction from the random item
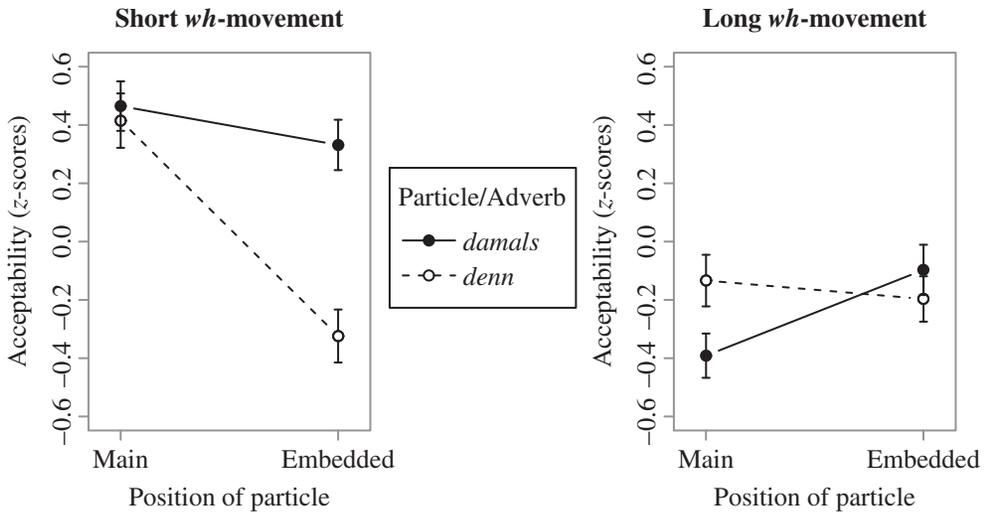
Figure 1
Acceptability ratings in Experiment 1 (*z*-scores)

factor. Table 2 shows the estimated contrasts, their standard error, and the resulting *t*-value. Since an exact *p*-value cannot be computed, we consider contrasts with an absolute *t*-value greater than 2 as significant (see Barr et al. 2013).

Table 2 shows that all main effects and all interactions are significant. To explore the data in more detail, we first computed separate statistical models for sentences with short and sentences with long *wh*-movement. The results of the two-factor mixed-effect models are shown in table 3; the exact acceptability scores and *t*-values for pairwise comparisons are given in table 4.

Figure 1 shows an interaction between Particle and Particle Position for both types of movement. This interaction is significant in both cases (see table 3). The source of the interaction,

Table 2
Summary of fixed effects in the mixed-effects model for Experiment 1

	Estimate	SE	*t*-value
(Intercept)	.01	.045	0.19
Movement (short vs. long)	.43	.090	4.82
Particle (*damals* vs. *denn*)	− .14	.046	− 3.15
ParticlePosition (main vs. embedded)	.16	.038	4.14
Movement∗Particle	− .44	.090	− 4.89
Movement∗ParticlePosition	.56	.069	8.09
Particle∗ParticlePosition	.47	.066	7.03
Movement∗Particle∗ParticlePosition	− .29	.125	2.29

Table 3
Summary of the fixed effects in the mixed-effects models for Experiment 1, separately for sentences involving short *wh*-movement and sentences involving long *wh*-movement

	Short *wh*-movement			Long *wh*-movement		
	Estimate	SE	*t*-value	Estimate	SE	*t*-value
(Intercept)	.23	.067	3.35	−.21	.061	−3.40
Particle	−.37	.084	−4.35	.08	.036	2.14
ParticlePosition	.43	.057	4.67	−.12	.045	−2.67
Particle∗ParticlePosition	.61	.101	6.07	.33	.066	4.95

however, is very different for the two types of movement. For sentences with short *wh*-movement, pairwise comparisons (see table 4) show that the acceptability of sentences with *damals* does not depend on the position of the adverb ($|t| < 2$). For sentences with *denn*, in contrast, the position of the particle has a strong effect ($|t| > 2$). When *denn* is contained in the main clause proper, it is as acceptable as *damals*. When *denn* is part of the embedded clause, however, acceptability is much reduced, not only compared with *denn* in the main clause but also compared with *damals* in the embedded clause.

For sentences with long *wh*-movement, a rather different picture emerges. For these sentences, the position of the particle has no significant effect on *denn* but does have a significant effect on *damals*. When *damals* is contained in the main clause, acceptability is reduced. The drop in acceptability is, however, not as strong as for *denn* in the embedded clause of sentences with short *wh*-movement. When contained in the embedded clause, *denn* and *damals* do not differ, whereas acceptability of *damals* is reduced in the main clause.

Turning finally to the two types of movement, we see that long *wh*-movement sentences are judged as less acceptable than short *wh*-movement sentences, with one exception: when they

Table 4
z-scores in Experiment 1 and *t*-values in mixed-effects models for each contrast (*t*-values in italics)

	damals	*denn*	*t*-value
Short *wh*-movement			
damals/*denn* in main clause	.46	.42	*−.80*
damals/*denn* in embedded clause	.35	−.33	*−5.74*
t-value	*−1.80*	*−9.25*	
Long *wh*-movement			
damals/*denn* in main clause	−.39	−.15	*4.58*
damals/*denn* in embedded clause	−.11	−.19	*−1.54*
t-value	*−5.92*	*−.55*	

contain *denn* in the embedded clause, short *wh*-movement sentences are less acceptable than long *wh*-movement sentences.

To summarize, Experiment 1 shows a general penalty for long *wh*-movement and, more importantly, interactions of Movement, Particle, and Particle Position. The temporal adverb *damals* is disliked in the main clause of sentences with long *wh*-movement, while the DiP *denn* is disliked in the embedded clause of sentences with short *wh*-movement.

4.1.3 Discussion   Let us first explain the result that the temporal adverb *damals* in sentences with long *wh*-movement is less acceptable in the main clause than in the embedded clause. We think there are two reasons for this unexpected effect. First, the presence of the temporal adverb affects the bridge property of the attitude verbs that were used in this condition. Long *wh*-movement is maximally unmarked in the context of pure bridge verbs (see Erteschik-Shir 1973). The temporal adverb reduces the bridge property of the matrix predicate—but so does the DiP *denn*. This brings us to the second reason. Obviously, it is semantically sound but in the absence of an appropriate context nevertheless poorly motivated to modify an attitude predicate with *damals*; why should someone think or believe back then (instead of right now) that p? Although merger of *denn* affects the bridge property in a comparable way, it does not have a comparable semantic effect.[19] In the short *wh*-movement condition, the matrix verbs were mainly verbs of communication, that is, eventive verbs. Neither merger of the adverb *damals* nor merger of the particle *denn* is expected to cause any awkwardness. The reduced acceptance of the adverb *damals* in the main clause of sentences with an epistemic matrix verb and long *wh*-movement must therefore be seen as a confound due to the way in which the materials for Experiment 1 were constructed.

The most important finding of Experiment 1 is the asymmetry observed for *denn*. In root clauses, *denn* is as acceptable as *damals*. This is expected because root clauses have a layer of structure that encodes illocutionary force. In dependent nonroot clauses, *denn* received substantially lower ratings, and clearly so in clauses that lacked interrogative force.[20] Crucially, however, *denn* is more acceptable in dependent clauses from which *wh*-movement has taken place. Our claim is that the licensing of *denn* is achieved by the intermediate trace/copy of *wh* in Spec,CP.

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[19] To see that merger of *denn* blocks the purely evidential interpretation of the attitude verb, consider slifting and other VIPs (see Reis 2000 and the discussion at the end of section 2.2). Compare (i) with the deviant (ii).

(i) Wen   hat die Polizei (meinst du) festgenommen (meinst du)?
     who.ACC has the police   think you caught
     'Who did the police catch, do you think?'

(ii) Wen hat die Polizei (*meinst du denn) festgenommen (*meinst du denn)?

Notice that long *wh*-movement in cases like (32), *Wen vermutete er **denn**, dass die Polizei festgenommen hat?*, is grammatical. This shows that the matrix predicate survives as a bridge even if it cannot be reduced to an evidential marker; see Simons 2007 for pertinent discussion of English.

[20] Recall that formally subordinate clauses—as signaled, for instance, by subjunctive mood—are nevertheless able to have root properties. Reconsider the contrast in (7), where we argued that the matrix predicate provides for a quotational context that reports speech.

If this reasoning is on the right track, the acceptability of *denn* provides independent evidence for the creation of intermediate traces/copies in cyclic movement.[21]

Before accepting this conclusion, we must address a potential complication of Experiment 1. This complication has to do with the fact that long *wh*-movement across the complementizer *dass* is not a preferred option in many varieties of German. As already noted by Paul (1919: 321ff.), who speaks of *Satzverschlingungen* 'sentence intertwinings', there are regional differences with respect to the acceptability of extraction from *dass*-complements (see Kvam 1983, Lühr 1988). The facts are still not totally clear. Prescriptive grammar bans it, while in practice it appears here and there. It seems to be more current in southern German dialects and regiolects than in varieties spoken in northern Germany. In a sentence completion study, Fanselow and Weskott (2010) found that speakers from southern regions in fact produced more long *wh*-extractions than speakers from northern regions. However, it is doubtful that this difference rests on a parameter.[22]

Participants in Experiment 1 had a bias against *wh*-extraction out of *dass*-clauses. Acceptance of long *wh*-extraction was relatively low. We might therefore wonder whether the lack of an additional penalty for *denn* in the embedded clause of long *wh*-extraction sentences is just a floor effect. Two arguments speak against this possibility. First, in an ME experiment it is always possible to assign a value below the lowest values assigned so far. Second, lower values were assigned in several cases. The mean ratings in two conditions are lower than the mean ratings for long *wh*-extractions with *denn* in the embedded clause: long *wh*-extractions with *damals* in the main clause and short *wh*-extractions with *denn* in the embedded clause. Furthermore, many of the ungrammatical fillers received *z*-scores lower than the mean for sentences with long *wh*-movement and *denn* in the embedded clause. Hence, we can exclude that the lack of a position effect for *denn* in sentences with long *wh*-movement is a floor effect.

Fortunately, German has an alternative construction that yields interpretive effects very similar to (albeit not the same as) overt extraction but does not involve long *wh*-extraction: partial

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[21] Notice that the *wh*-element must move overtly. LF movement, as assumed in previous theories, is insufficient.

(i) Wer sagt, dass Peter (*denn) WEN   getroffen hat?
    who says that Peter   DENN who.ACC met   has
    'Who says that Peter met who?'

By all criteria, at no stage of the derivation has the embedded CP had an interrogative Force head. The same is true for simplex clauses with *wh*-in-situ. Although they may be used as some sort of interrogatives (echo or exam questions), they can never license the particle *denn*. By formal criteria, they seem to lack interrogative force altogether.

(ii) Peter hat (*denn) WEN   getroffen?
     Peter has   DENN who.ACC met
     'Peter met who?'

According to Reis (1991) and Trissler (1999), such ''questions'' fail to be questions in any syntactic sense.

[22] *Wh*-extraction can be found in literary texts that are not of southern German origin. For example:

(i) Welchen   wollet ihr, dass ich euch   losgebe? Barrabam oder Jesum, von dem   gesagt wird, er sei
    which.one want you that I   you.PL free.give Barrabas or   Jesus of whom said   is   he be
    Christus?
    Christ
    'Which one do you want me to release? Barrabas or Jesus, of whom they say he is Christ?'
    (J. S. Bach, *St. Matthew Passion*, BWV 244)

movement, as illustrated in (34) (see Fanselow to appear, Lutz, Müller, and von Stechow 2000, and section 5.3 below).

(34) Was meint Gerda, wem   wir vertrauen können?
     what thinks Gerda who.DAT we trust   can
     'Who does Gerda think that we can trust?'

Partial movement is ''incomplete'' in the sense that the *wh*-phrase does not reach the actual scope position, which for s-selectional reasons must be outside the scope of the attitude verb *meinen* 'to think'. In (34), *wem* 'who.DAT' moves, but it moves only to the clause-initial position of the embedded clause. However, it is interpreted with scope over the matrix clause—that is, as if occurring in Spec,CP of the matrix clause. Nevertheless, DiPs appear to be licit in the dependent clause of partial movement constructions.

(35) Was meint Gerda, wem   wir {denn, nur, schon} vertrauen können?
     what thinks Gerda who.DAT we DENN NUR SCHON trust   can

The *wh*-phrases in (34) and (35) are associated with each other. *Was* in the upper clause marks the scope of the *wh*-phrase in the lower clause. The exact nature of the dependency is a matter of debate. The debate about this construction is dominated by different approaches, to which we will turn in section 5.3. What matters at this point is the partial similarity with overt movement. Q-sensitive DiPs seem to be licensed in CPs whose actual interrogative force—as signaled by *wh*-scope—is absorbed by the root clause. Importantly, this is achieved without overt *wh*-movement.

4.2 Experiment 2

Experiment 2 replaces long *wh*-extraction from Experiment 1 by partial movement, as shown in (36). This avoids the complications of long *wh*-movement that could have jeopardized Experiment 1. Apart from this, the experimental design and materials are identical with the ones in Experiment 1.

(36) a. Was vermutete er denn, wen$_i$ die Polizei t$_i$ festgenommen hat?
        what suspected he DENN who.ACC the police   arrested   has
        'Who did he suspect that the police arrested?'
     b. Was vermutete er, wen$_i$ die Polizei denn t$_i$ festgenommen hat?
        what suspected he who.ACC the police DENN arrested   has
        'Who did he suspect the police arrested?'

4.2.1 Method   The participants, materials, and procedure for Experiment 2 were as follows.

4.2.1.1 Participants   One hundred and two students at the University of Konstanz completed the questionnaire for course credit or payment. All participants were native speakers of German and naive with respect to the purpose of the experiment.

4.2.1.2 Materials   The sentence material for Experiment 2 was derived from the sentence material of Experiment 1. Experiment 2 had the same three-factor design as Experiment 1. All 16 sentences from Experiment 1 involving short *wh*-movement were imported into Experiment 2

Table 5
Sample stimuli from Experiment 2

Short wh-*movement, particle/adverb in main clause*
Wer berichtete ihr damals/denn,   dass die Einbrecher gefasst wurden?
who told   her back.then/DENN that the burglars   caught were
'Who told her back then/DENN that the burglars were caught?'

Short wh-*movement, particle/adverb in embedded clause*
Wer berichtete ihr, dass die Einbrecher damals/denn   gefasst wurden?
who told   her that the burglars   back.then/DENN caught were
'Who told her that the burglars were caught back then/DENN?'

Partial wh-*movement, particle/adverb in main clause*
Was vermutete er damals/denn,   wen   die Polizei festgenommen hat?
what suspected he back.then/DENN who.ACC the police arrested   has
'Who did he suspect back then/DENN that the police arrested?'

Partial wh-*movement, particle/adverb in embedded clause*
Was vermutete er, wen   die Polizei damals/denn   festgenommen hat?
what suspected he who.ACC the police back.then/DENN arrested   has
'Who did he suspect that the police arrested back then/DENN?'

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without any change. In the other 16 sentences, long *wh*-movement was replaced by partial move-ment. As in Experiment 1, each of the 32 sentences occurred in four versions according to the two within-item factors Particle and Particle Position. A complete stimulus sample is given in table 5.[23]

The 32 sentence quadruples were distributed over four lists according to a Latin square design. Each list was then randomized twice, and the resulting eight lists were interspersed in longer lists containing items from an unrelated experiment on argument structure alternations and the same 40 genuine filler items used in Experiment 1. Overall, each questionnaire contained 112 sentences.

4.2.1.3 Procedure   The same procedure was used as in Experiment 1. Acceptability judgments were again obtained via a questionnaire, using the ME method. The reference sentence was the same as in Experiment 1, but this time it was assigned a value of 10, which was also the value for the reference line in the preceding training. The choice of the reference value (10, rather than 50 in Experiment 1) did not affect the results.[24]

4.2.2 Results   As for Experiment 1, we used linear mixed-effects modeling for further statistical analyses. Again, we first computed a model containing the full-factorial design in the random

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[23] Because of an error in the materials, two sentences had to be excluded from the analysis.
[24] In fact, the choice was made on purpose in order to test the independence of the method from the reference value. Comparisons of the two experiments show that the reference value did not affect the results. The *z*-scores (for identical items) are comparable across the two experiments. The mean *z*-scores for the 40 genuine filler items are virtually identical ($r = .99$). Thus, as expected given that ME requires relative judgments, it did not matter whether participants worked with a reference value of 10 or of 50.
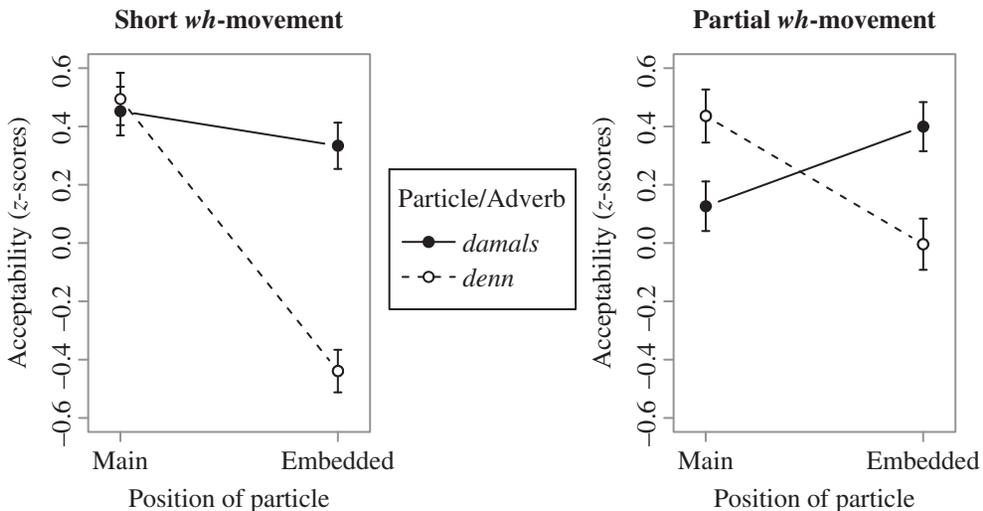
Table 6
Summary of fixed effects in the mixed-effects model for Experiment 2

	Estimate	SE	t-value
(Intercept)	.23	.040	5.72
Movement (short vs. partial)	− .04	.076	− .47
Particle (*damals* vs. *denn*)	− .21	.039	− 5.36
ParticlePosition (main vs. embedded)	.30	.039	7.77
Movement∗Particle	− .33	.070	− 4.64
Movement∗ParticlePosition	.45	.070	6.32
Particle∗ParticlePosition	.77	.049	15.79
Movement∗Particle∗ParticlePosition	.11	.098	1.12

slopes. Since this model failed convergence, we simplified the random effect specification stepwise by removing interactions from the random factors. The maximal converging model contains the addition of the three experimental factors in both the random subject factor and the random item factor. The model summary in table 6 shows main effects of Particle and Particle Position but no general effect of Movement (short vs. partial). The factor Movement interacts, however, with both Particle and Particle Position. The interaction of Particle and Particle Position is also significant. Unlike in Experiment 1, the interaction involving all three factors (Movement, Particle, and Particle Position) failed to reach significance in Experiment 2.

Figure 2 reveals that something different is going on in sentences with short *wh*-movement and sentences with partial movement. To explore this difference, we computed separate models for sentences with these two types of movement (see table 7).

Figure 2
Acceptability ratings in Experiment 2 (*z*-scores)

Table 7

Summary of the fixed effects in the mixed-effects models for Experiment 2, separately for sentences involving short *wh*-movement and sentences involving partial *wh*-movement

	Short *wh*-movement			Partial *wh*-movement		
	Estimate	SE	*t*-value	Estimate	SE	*t*-value
(Intercept)	.21	.066	3.24	− .25	.044	5.69
Particle	− .37	.054	− 6.79	− .05	.049	− .95
ParticlePosition	.53	.065	8.05	.08	.042	1.87
Particle∗ParticlePosition	.83	.110	7.57	.72	.090	7.98

For sentences with short *wh*-movement, the model (left part in table 7) indicates main effects of Particle and Particle Position as well as a significant interaction of the two factors. As in Experiment 1, the main effects have to be qualified by the interaction. Pairwise comparisons within a mixed-effects model (see table 8) show that the main effect of Particle (higher acceptability scores for *damals*) is driven by sentences in which *damals*/*denn* occurs in the embedded clause. The main effect of Position is driven by sentences containing the DiP *denn*. Only in this case is acceptability higher when the DiP occurs in the main clause than in the embedded clause. Taken together, acceptability is high in three conditions: *damals* in both the main and embedded clauses, and *denn* in the main clause. These three conditions do not differ significantly from each other. When *denn* occurs in the embedded clause, however, we see a striking decrease in acceptability.

Sentences with partial movement exhibit a different pattern. The corresponding model (right part in table 7) attests a significant interaction of Particle and Particle Position but no main effects. The acceptability of *damals* is higher in embedded clauses than in the main clause. In contrast, the acceptability of *denn* is higher when *denn* is a proper part of the main clause. In the main clause, the acceptability of *denn* is higher than the acceptability of *damals*, whereas the reverse is true when the DiP or the adverb, respectively, is contained in the embedded clause.

Table 8

z-scores in Experiment 2 and *t*-values in mixed-effects models for each contrast (*t*-values in italics)

	damals	*denn*	*t*-value
Short *wh*-movement			
damals/*denn* in main clause	.45	.42	*.88*
damals/*denn* in embedded clause	.33	− .44	*− 8.10*
t-value	*− 1.10*	*− 14.24*	
Partial *wh*-movement			
damals/*denn* in main clause	.13	.44	*4.30*
damals/*denn* in embedded clause	.40	.00	*− 6.25*
t-value	*5.50*	*− 6.03*	

In summary, the results of Experiment 2 confirm the results of Experiment 1. Overall, *denn* is less acceptable in embedded clauses, but acceptability increases strongly when the left periphery of the embedded clause contains a *wh*-element whose scope is linked to the root clause.

4.3 Discussion

Experiment 2 overcomes a potential confound in Experiment 1. Substituting partial movement for long *wh*-movement, which some speakers of German dislike, increased acceptability in general. Overall, sentences with partial movement are as acceptable as sentences with short *wh*-movement. The crucial difference between the two clause types concerns the acceptability of *denn* in embedded clauses. Sentences with short *wh*-movement received a strong penalty when *denn* occurred in the embedded clause, whereas the penalty was reduced in sentences with partial movement. Hence, Experiment 2 attests the same asymmetry as the one found in the long *wh*-movement condition of Experiment 1. Although partial movement, in contrast to long *wh*-movement in Experiment 1, does not remove the penalty for *denn* in a dependent clause, it clearly reduces the penalty.

As in Experiment 1, the acceptability of *damals* is degraded when *damals* occurs in the main clause of a sentence with short *wh*-movement. Unlike what is observed for *denn*, the penalty for *damals* is quite constant across Experiments 1 and 2—that is, comparable for long *wh*-movement and partial movement. We attribute this difference to the nature of the violation. While the licensing of *denn* depends on the syntactic environment, the acceptability of *damals* depends on the semantic environment. We can generalize that *denn* is sensitive to the syntactic difference between long *wh*-movement and partial movement whereas *damals* is not.

Taken together, Experiments 1 and 2 show that the DiP *denn* results in degraded acceptability when occurring in a dependent clause. Acceptability increases when a *wh*-phrase has been extracted from that clause (long *wh*-movement in Experiment 1) or achieves matrix scope via association with the scope-marking *wh*-pronoun *was* (partial movement in Experiment 2). In section 5, we propose how to capture this finding in syntactic theory.

5 Licensing Discourse Particles in *Wh*-Questions

5.1 Local Licensing

Fundamental to our syntactic explanation of the facts considered so far is the assumption of feature sharing between a clause-type-specific Force head and a matching DiP. A Force head with the interpretable feature *i*Q can probe in its local domain for a DiP with a corresponding unvalued and uninterpretable feature *u*Q. According to Bayer (2012) and Bayer and Obenauer (2011), *denn* is a functional element that heads a Particle Phrase (PrtP) above vP. The relevant phrase structure is shown in (37). Prt is often preceded by topics (the aboutness topic as well as discourse topics), but—for reasons not well understood so far—the space between Force and Prt may also remain empty.

(37) [$_{ForceP}$ Force [. . . [$_{PrtP}$ Prt [$_{vP}$ . . .]]]]

It is the Force feature that is interpretable, not the corresponding feature on Prt. This is one of the reasons why we adopt a feature-sharing theory rather than the standard Minimalist checking theory. In standard checking theory, the uninterpretable feature is always in the probe, while the goal bears an interpretable feature that values and ultimately deletes the probe's uninterpretable feature. This sort of directionality is abandoned in the feature-sharing version of Agree proposed by Pesetsky and Torrego (2007).[25] The novelty of their system is that an interpretable (i) feature can be unvalued, signaled by empty square brackets [ ], and an uninterpretable (u) feature can be valued, signaled by some arbitrary number in square brackets (e.g., [4]). With this in mind, an uninterpretable Q-feature on Prt will be able to value an unvalued interpretable Q-feature on Force.

(38) a. [$_{\text{ForceP}}$ Force$_{iQ\,[\,]}$ [. . . [$_{\text{PrtP}}$ Prt$_{uQ\,[\,]}$ [$_{vP}$ . . .]]]] → Agree →
      b. [$_{\text{ForceP}}$ Force$_{iQ\,[4]}$ [. . . [$_{\text{PrtP}}$ Prt$_{uQ\,[4]}$ [$_{vP}$ . . .]]]]

The unification account requires featural agreement according to which the same feature is present in both locations. In (38), this is expressed by an arbitrary shared value, here 4. It is important to see that the particle remains exactly where it is merged. It does not change its scope in the course of the derivation as it would do if it underwent LF movement or feature movement. Instead, the effect of agreement is that the particle gains access to Force at a distance and therefore can give rise to the fine-tuning of Force without becoming a phrase-structural subconstituent of Force. As Bayer and Obenauer (2011) show, *wh*-questions can be turned into special questions such as RQs, surprise-disapproval questions, and CfvQs through merger of different Q-sensitive DiPs in interrogative clauses. Force is prima facie neutral with respect to these shades of meaning. Given that questions can be interpreted in the absence of DiPs, interrogative force must be represented in some way. The observed semantic enrichment is due to a featural link, the Q-feature in (38), which establishes compositionality between Force and the particle. We assume with Rizzi (1997, 2004) and following work that Force is part of the architecture of the C domain and that it is the topmost layer of the clause. Assuming with Chomsky (2000) that CP and vP are phases and that the Phase Impenetrability Condition holds, probing from Force to Prt will not induce any locality violation.[26]

5.2 Local Licensing in Embedded Clauses

The challenging question is how to account for DiPs in dependent clauses. The experiments reported in section 4 have shown that in *wh*-questions in which *wh* and the particle occur in

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[25] Zeijlstra (2012) defends a restrictive system in which the interpretable agreeing feature, the goal, is always the upper one. In other words, he proposes the reversal of the probe-goal dependency: probing goes upward. In our account, however, the Q-sensitive particle's Q-feature is not interpretable and therefore cannot probe an uninterpretable Q-feature in the C domain.

[26] This is not to say that there are no problems; see Richards 2012 for discussion. All we want to say here is that, given its fixed pre-vP position, probing the discourse particle from Force would not require deviating from this assumption.

different clauses, the uninterpretable Q-feature on the particle cannot value its counterpart on the unvalued interpretable Force head unless *wh*-movement has taken place from the complement clause. The same is trivially true for any type of island; see footnote 15. Obviously, long *wh*-movement via Spec,CP leaves a representation of Q-Force in the intermediate Spec,CP that can be valued by the corresponding Q-feature on the particle without any violation of the Phase Impenetrability Condition. Sentence (9), repeated in (39) for convenience, is then analyzed as in (40).

(39) Wie denkst du, dass es denn weitergehen soll   mit euch?
     how think   you that it DENN go.on   should with you.PL
     'How do you think it should go on with the two of you?'

(40) Wie denkst du [_CP ~~wie~~ dass es [_PrtP denn ~~wie~~ weitergehen soll mit euch]]]?

The Q-Force feature on *denn* can be probed by Q-Force thanks to the intermediate representation of Q-Force that has been established by cyclic *wh*-movement. The question is how Q-Force can be established in the intermediate Spec,CP given that (a) the matrix verb is a propositional attitude verb that disallows interrogative interpretation of its complement, and (b) the embedded CP seems to fail as a representative of the relevant speech act altogether.

Pesetsky and Torrego (2007) suggest for long *wh*-movement that an uninterpretable feature uQ[ ] on C is valued by an uninterpretable [+interrogative] *wh*-element. Thus, C and therefore its projection will be ''[+wh]'' but without any interpretive consequence. Otherwise, the CP could not remain in the scope of the verb *denken* 'to think'. If this is correct, it is easy to see how the particle in the dependent clause can locally agree by virtue of its uninterpretable Q-feature. We propose that the Q-feature on Prt values an uninterpretable Force head. Of course, this head could in principle also be interpretable. This would be the case under merger of a verb like *fragen* 'to ask' as in (41), where CP counts as an embedded interrogative speech act.

(41) Jemand   fragte [_CP wie [_C [es [_PrtP denn ~~wie~~ weitergehen soll   mit euch]]]].
     someone asked   how   it   DENN   go.on   should with you.PL
     'Someone asked how it should go on with the two of you.'

Since there is no lookahead device, there can be no a priori determination of the interpretability of Q-Force that goes beyond what is in the relevant numeration. This is exactly what the liberalized framework of probe-goal agreement guarantees. Since interpretability and valuation are separated, there can be agreement between two uninterpretable features; that is, an unvalued uninterpretable feature of the probe can be valued by an uninterpretable feature of the goal.[27]

As the controller of the DiP, Bayer (2012) and Bayer and Obenauer (2011) suggest a single Force head that involves a specification of clause type and a related feature for illocutionary

[27] Languages with nominal agreement such as Latin and German suggest that this is required in any event.

force. Here, we follow Coniglio and Zegrean's (2012) proposal of splitting up Force into Clause Type (CT) and Speech Act (SA).[28] With this atomization of Force in mind, consider the derivation of (9)/(39) in which the embedded clause has CT but lacks SA.[29] The particle *denn* has the interrogative CT-feature Q and the SA-feature ILL(ocution). Both are uninterpretable, their interpretable correspondents being located in the root clause's left periphery. The complementizer heads a CP; the moved finite verb heads a FinP. For reasons of readability, we omit derivational steps that do not relate to the issue under discussion.

(42) a. [$_{vP}$ wie [$_{vP}$ ~~wie~~ weitergehen soll mit euch]]   → Merge *denn* →

b. [$_{PrtP}$ denn$_{uQ[\ ],\ uILL[\ ]}$ [$_{vP}$ wie [$_{vP}$ ~~wie~~ weitergehen soll mit euch]]]   → Move *wh* →

c. [$_{CTP}$ CT$_{uQ[\ ],\ uILL[\ ]}$ [$_{CP}$ wie dass [$_{TP}$ es [$_{PrtP}$ denn$_{uQ[\ ],\ uILL[\ ]}$ [$_{vP}$ ~~wie~~ [$_{vP}$ ~~wie~~ . . . weitergehen . . .]]]]]]   → Agree →

d. [$_{CTP}$ CT$_{uQ[\mathbf{1}],\ uILL[\mathbf{2}]}$ [$_{CP}$ wie dass [$_{TP}$ es [$_{PrtP}$ denn$_{\#Q[\mathbf{1}],\ \#ILL[\mathbf{2}]}$ [$_{vP}$ ~~wie~~ [$_{vP}$ ~~wie~~ . . . weitergehen . . .]]]]]]   → . . . → Move *wh* →

e. [$_{SAP}$ SA$_{uQ[\ ],\ iILL[\ ]}$ [$_{CTP}$ CT$_{iQ[\ ],\ uILL[\ ]}$ [$_{FinP}$ wie [$_{Fin'}$ denkst [$_{TP}$ du [$_{CTP}$ CT$_{uQ[\mathbf{1}],\ uILL[\mathbf{2}]}$ [$_{CP}$ ~~wie~~ dass [$_{TP}$ es [$_{PrtP}$ denn$_{\#Q[\mathbf{1}],\ \#ILL[\mathbf{2}]}$ [$_{vP}$ ~~wie~~ [$_{vP}$ ~~wie~~ . . . weitergehen . . .]]]]]]]]]]]   → Agree →

f. [$_{SAP}$ SA$_{\#Q[\mathbf{1}],\ iILL[\mathbf{2}]}$ [$_{CTP}$ CT$_{iQ[\mathbf{1}],\ \#ILL[\mathbf{2}]}$ [$_{FinP}$ wie [$_{Fin'}$ denkst [$_{TP}$ du [$_{CTP}$ CT$_{uQ[\mathbf{1}],\ uILL[\mathbf{2}]}$ [$_{CP}$ ~~wie~~ dass [$_{TP}$ es [$_{PrtP}$ denn$_{\#Q[\mathbf{1}],\ \#ILL[\mathbf{2}]}$ [$_{vP}$ ~~wie~~ [$_{vP}$ ~~wie~~ . . . weitergehen . . .]]]]]]]]]]]

The important points are these: In (42d), the particle *denn* is locally licensed by agreement for CT as well as for SA. Nevertheless, both CT and SA are uninterpretable because the numeration contains the verb *denken* 'to think', and *denken* bans a semantically interpretable *wh*-complement in its scope. On the other hand, *denn* is locally linked and therefore stays available during further

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[28] Coniglio and Zegrean's (2012) account is inspired by Haegeman's (2002, 2006) work and adopts an improved version of the agreement proposal originally suggested by Bayer (2012) and Bayer and Obenauer (2011). There are, of course, alternatives. According to Lohnstein (2007), for example, there is no motivation for a uniform Force projection, as he takes what he calls ''sentential force'' to be determined by different components of the grammatical system.

[29] As already suggested, the embedded CP may also have an SA layer; see the discussion of (7) and (41). In this regard, German offers challenges that are beyond the scope of this article. As (i) shows, *wh*-interrogatives, in which *denn* can occur felicitously, can in addition host particles like *ja* and *doch* even though the latter are incompatible with interrogative contexts.

(i) Wo   hast du [$_{DP}$ diesen [$_{AP}$ ja unwahrscheinlich begabten] Pianisten] denn gehört?
    where have you   this   JA incredibly   gifted   pianist   DENN heard
    'Where did you hear this indeed incredibly gifted pianist? (I'm wondering.)'

As Struckmeier (2014) and Viesel (to appear) point out, the DP contains an AP with a clause-like structure. This clause obviously follows the default of an assertive clause type and therefore can license a CT-feature on *ja*. On the other hand, the speaker who takes responsibility for the adequacy of *ja* is identical with the speaker who takes responsibility for the adequacy of *denn*. The proposition [incredibly gifted (x)] is presupposed. Given that *ja* requires an SA, this SA must be linked to the SA of the root clause. For further discussion of DiPs in adnominal and adverbial clauses, see Hinterhölzl and Krifka 2013.

derivational steps by which *wh* moves higher up. In (42e) (i.e., at the root level), CT is interpretable for Q; SA, which shares the feature Q with CT, provides the features that are relevant for interpreting (41) as an utterance. The link between interpretable Force (i.e., SA) and the particle is local in the sense of phase theory and strict cyclicity. Cyclic agreement with the particle's CT/ILL-features comes about as a consequence of cyclic *wh*-movement and its feature for interrogativity, be it interpretable at a certain stage of the derivation or not (yet). In (42f), the uninterpretable CT-feature on SA is valued by CT's interpretable Q-feature.[30]

Den Dikken (2009) argues that *wh*-movement to Spec,CP is terminal and can never be transient. If we keep to the split-CP theory according to which Force is represented in the top left clausal periphery, however, we can hardly avoid the conclusion that Force is established via Spec,CP and that the *wh*-phrase, having passed through Spec,CP, is the overt sign of Q-Force. Q-Force, the composition of Q and ILL in (42), is the locally available probe that agrees with the Q/ILL-feature on the particle *denn*. Assuming that vP is a phase, Den Dikken's proposal is that the *wh*-phrase passes through the vP phase but not through the CP phase; however, vP does not qualify as the locus of force. Given the structure in (37) with the particle projection above vP, Force would not even c-command its goal. Therefore, we see no reason to deviate from the standard assumption of a CP-related intermediate landing site.[31]

As the experimental results from section 4 have established, licensing of the particle in a dependent clause by means of long *wh*-movement contrasts strikingly with ungrammatical examples like (43).

(43) *Wer berichtete ~~wer~~ ihr [$_{CP}$ dass die Einbrecher [$_{PrtP}$ denn gefasst wurden]]?
     who told   ~~who~~ her   that the burglars   DENN caught were

Probe-goal agreement provides a straightforward explanation. *Wh*-movement in these cases is confined to local movement within the matrix clause, while the Q-sensitive particle *denn* is in the embedded clause. It does not matter whether the embedded CP has a Force projection or not. If it lacks such a projection altogether, the uninterpretable Q-feature on *denn* cannot be valued, and the derivation crashes. But even if the embedded CP did have a Force projection, it would be unsuitable for valuing the Q-feature on *denn*, because the CP would at best have declarative force.[32] Nevertheless, as the derivation of (42) shows, the embedded CP must have seen an

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[30] One reviewer argues that one could dispense with the CT-feature because every embedded *wh*-clause has an uninterpretable ILL-feature that can be valued under agreement with the matrix predicate or an interpretable ILL-feature in the root SA. While this may be possible in the core cases, there are many cases in which ILL requires syntactic information from CT. Since German DiPs are formally CT-dependent but at the same time in need of illocutionary interpretation, the independence of CT and ILL seems to be well-motivated. For discussion of their role in German, see Coniglio and Zegrean 2012.

[31] Using novel data from the Nilotic language Dinka, Van Urk and Richards (2015) explore which phases are involved in long-distance extraction. They show that both the vP and the CP phase are visibly involved in successive-cyclic movement.

[32] Declarative/Assertive appears to be the unmarked value created by the absence of any of the other mood types. As example (i) in footnote 29 shows, the DiP *ja* can appear in APs that express a predication and can therefore be considered declarative by default.

uninterpretable interrogative CT-feature in the CP layer. This feature is obviously responsible both for *wh*-movement to Spec,CP and for probing the Q-feature on the particle *denn*.

5.3 Local Licensing in Partial Movement

The established term *partial movement* subsumes a number of rather different proposals.[33]

The *direct dependency approach* (DDA) (see, e.g., Manetta 2011, McDaniel 1989, Müller 1997, Van Riemsdijk 1983) assumes a syntactic link between a *wh*-scope marker and the locally moved *wh* of the dependent clause. The most common version of the DDA assumes that the scope marker is an expletive that is overwritten at LF by the *wh*-phrase of the subordinate clause.

The *indirect dependency approach* (IDA) (see Dayal 1994 and much following work) assumes that the *wh*-scope marker is actually the direct object of the matrix clause. What is coindexed with the *wh*-scope marker is not the locally moved *wh* of the dependent clause but the whole *wh*-CP. In principle, examples like (36) could be simply two sequential *wh*-clauses: *What did he suspect? Who did the police arrest?* As indicated in German by V-final word order and binding facts, however, the second clause must be subordinate. On the basis of properties of Hungarian that are not at issue here, Horvath (1997) suggests that the scope marker is the direct *wh*-object of the matrix verb and that the dependent *wh*-clause undergoes LF pied-piping and adjoins to the *wh*-object. Wide scope results from *wh*-agreement.[34] Dayal (1994) and various linguists who follow her lead likewise assume that the *wh*-scope marker is the direct object of the matrix clause, but they propose a purely semantic account of the IDA. The idea is that the *wh*-object, an existential quantifier ranging over propositions, is semantically restricted by the embedded *wh*-clause. The latter, being an ''open'' proposition, is of a matching type, but it is not a question. Consider (34), *Was meint Gerda, wem wir vertrauen können?* (34) consists not of two questions but of one. A natural answer would be *Karl*. It translates into the following Hamblin/Karttunen-style logical representation: $\lambda p \exists q [\exists x [q = \hat{~} \text{we can trust x}] \& p = \hat{~} \text{thinks (Gerda, q)}]$. By virtue of asking what Gerda thinks (p), the speaker asks about the set of persons x for whom the proposition (q)—namely, that we can trust x—is true.

Of the two approaches, the DDA is immediately compatible with our finding about DiPs in partial movement constructions. Since the DDA is more or less an LF variant of overt *wh*-movement, an Ā-chain is built between the purported expletive *was* and the locally moved *wh*-phrase. The CT of the dependent clause is interrogative and probes the Q-sensitive DiP *denn*. Being selected by an attitude verb, neither CT nor ILL can be interpretable. Both are interpretable in the root clause (see (42e–f)). It is therefore predicted that the DiP enters the expanded semantic composition of Force in the same way as it does under overt *wh*-movement.

Within the IDA, nonsubordination can be excluded, not only because of the subordination-indicating V-final word order of the lower CP and other facts but also because Experiment 2 has

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[33] This section has profited from critical questions by two reviewers.
[34] See Fanselow and Mahajan 2000 for a general account along these lines that integrates German and Hindi.

demonstrated that the DiP in the second CP is, to a certain extent, degraded. Such an asymmetry would be unexpected if the second clause were simply another root *wh*-question. Assuming syntactic dependency, the IDA must express the relation between interpretable Q-Force in the root clause and the DiP in the dependent CP. According to our proposal, the dependent CP has a CT head with uninterpretable features for CT and ILL. These are responsible for the local valuation of the corresponding features on the DiP. In partial movement constructions, the dependent CP is overtly of the proper CT, so there can be no doubt about the local licenser of the DiP. The next issue is how to reach an interpretable licenser. Horvath-style CP-adjunction to *was* could do the job, but the operation may not be available under restrictive Minimalist assumptions. Within the semantic account of the IDA, the embedded CP cannot be a question. Given that in our account neither the CP's CT nor its ILL is interpretable, the presence of their uninterpretable counterparts cannot pose a semantic obstacle. If this is correct, the logical form of a version of (34) with *denn* in the embedded CP, *Was meint Gerda, wem wir **denn** vertrauen können?*, is blind to the fact that the DiP ultimately requires an interrogative context. Assume now that because of its *wh*-feature, the *wh*-CP may be probed by *was* before it moves to its ultimate destination. Full interpretation is, however, only achieved when CT/ILL become interpretable in the SAP.[35] If we are right, our explanation for the occurrence of DiPs in embedded clauses carries over to accounts of partial movement in terms of the IDA.[36]

   Recall that partial movement as investigated in Experiment 2 is but one alternative to overt movement. As mentioned in section 3, German has yet another scoping strategy: copy movement. Copy movement, illustrated in (30), differs in various respects from partial movement (see Felser 2004, Pankau 2013). The copies are something like the featural spell-out of the locally Ā-moved *wh*-phrase. The semantic mechanics of the IDA are not applicable. Nevertheless, *denn* in the dependent clause of (44) appears to us as unproblematic as it is in partial movement.[37]

(44) Wen   vermutete er, wen   die Polizei denn festgenommen hat?
      who.ACC suspected he who.ACC the police DENN arrested   has
      'Who did he suspect the police arrested?'

Uninterpretable CT in the lower CP probes the DiP. Interpretable CT and SA of the root clause agree with the relevant features of the embedded CP. Thus, it should be obvious that the DiP

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[35] As it happens, this may explain a long-standing problem: why, in multiple questions, the in-situ *was* cannot license partial movement (see Bayer 1996:228, Fanselow and Mahajan 2000:206). The reason could be that in its underlying position, *was* lacks the relevant interpretable features.

[36] The use of a DiP does not raise the embedded *wh*-CP to a higher logical type. Therefore, the extensions of the IDA suggested in Lipták and Zimmermann 2007 and Sternefeld 2001, 2002, suggested by one reviewer, do not seem to be relevant here.

[37] Consider the following example from the Internet:

(i) Wo   glaubst du wo   wir hier denn hinkommen wenn nun jeder . . .
     where believe you where we here DENN get   if   now every
     'Where do you believe we will get if now every . . .'
     http://www.elitepvpers.com/forum/off-topic/3764599-eine-gro-e-bitte.html   16 August 2015

connects to the root question and joins the composition of illocutionary force. Since copy movement was not investigated in the present study, we leave the issue here.[38]

5.4 Predicting More Data

Since long *wh*-movement is recursively iterable depending on how much structure is built, it is expected that DiPs that depend on interrogative force can show up in any pre-vP position along the chain that spans the space between the matrix *wh* and the lowest copy. An example is given in (45a), with the simplified analysis in (45b).

(45) a. Wie denkst du, dass Max denn meint, dass es weitergehen soll mit euch?
how think you that Max DENN thinks that it go.on should with you.PL
'How do you think that Max thinks that it should go on with the two of you?'

b. Wie denkst du [CP ~~wie~~ dass Max [PrtP denn meint [CP ~~wie~~ dass es ~~wie~~ weitergehen soll mit euch]]]?

According to our intuitions, examples of this type are fully grammatical. Under the current account, this is expected since the Q-sensitive particle can be probed from the left periphery of the medial CP.[39]

Coniglio (2011) and Thurmair (1989) have shown in detail how German DiPs can be combined, and that under combination they usually occur in a fixed order. In combinations of *denn* with other Q-sensitive particles such as *schon*, *nur*, *bloß*, and *wohl*, the particle *denn* always takes scope over the others.

(46) a. Wo wird er sich denn schon versteckt haben?
where will he REFL DENN SCHON hidden have
'Where after all will he be hiding? (There is only one possible place.)'

b. Wem könnte man denn dieses Auto nur verkaufen?
who.DAT could one DENN this car NUR sell
'Who on earth could one sell this car to!? (I have no answer so far.)'

Any order in which *denn* is preceded by another Q-sensitive DiP is excluded: *schon > denn*, *nur > denn*, *bloß > denn*, *wohl > denn*. The interesting point in the present connection is that particles can occur in different CPs and that the order is retained. Consider (47a), with the analysis in (47b).

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[38] In fact, we left copy movement out of the empirical studies because it does not appear to be equally available for all speakers.

[39] Example (45) is in fact another example that cannot be accounted for by a nonsyntactic theory according to which the question under discussion is *Wie soll es weitergehen mit euch?* If it were, the slifting paraphrase in (i) should be acceptable, contrary to fact.

(i) *Wie soll es weitergehen mit euch, denkst du, dass Max denn meint?
how should it go.on with you.PL think you that Max DENN thinks
'How do you think that Max thinks that it should go on with the two of you?'

(47) a. Wo   glaubst du, dass Fritz denn meint, dass man hier schon Benzin   kriegt?
         where believe you that Fritz DENN thinks that one here SCHON gasoline gets
         'Where do you believe that Fritz thinks after all that one can get gasoline here?
         (Nowhere/Hardly anywhere!)'
     b. Wo glaubst du [_{CP} wo dass Fritz [_{PrtP} denn meint [_{CP} wo dass man hier [_{PrtP} schon
         wo Benzin kriegt]]]]?

As (47b) shows, the *wh*-operator *wo* moves through the CP cycles, targeting in each cycle a
Q-Force head by which a DiP can be licensed. Complex examples in which the particles retain
their property as Q-sensitive DiPs are hard to construct. To the extent that constructing such
examples is possible, it seems that ordering violations lead to ungrammaticality.

(48) a. Wo   glaubst du, dass Fritz denn meint, dass man hier nur ein Hotelzimmer
         where believe you that Fritz DENN thinks that one here NUR a   hotel.room
         finden kann?
         find   can
         'Where do you believe Fritz thinks one can get a hotel room here? (I have so far
         not found an answer.)'
     b. *Wo glaubst du, dass Fritz nur meint, dass man hier denn ein Hotelzimmer finden
         kann?

While (48a) allows the CfvQ interpretation, and while (48b) is grammatical without *nur*, the
ordering *nur > *denn* leads to a crash. The reading of (47a) with *schon* as the trigger of the RQ
interpretation of the question and the reading of (48a) with *nur* as the trigger of the CfvQ interpre-
tation show that the lower DiP is probed via successive-cyclic *wh*-movement.

5.5 Scope

DiPs appear under strict scope requirements. The theory that has been developed so far integrates
this semantic fact straightforwardly. One classical insight is that DiPs do not move. If they are
part of the functional skeleton of the clause, as is the case in our account, this property is captured
without stipulations. How do they access what we continue to abbreviate as the ''Force layer''
(i.e., what is actually decomposed into CT and SA)? We have argued for the adoption of a version
of probe-goal agreement. Probe-goal agreement differs from LF movement in important respects.
It enables Force to communicate with the Force-sensitive particle without movement. This is
what distinguishes agreement from movement. The dependence of DiPs on illocutionary force is
uncontroversial. The technical implementation of this dependency is not. For instance, an account
in terms of LF movement has been suggested by Zimmermann (2004, 2008). In Zimmermann's
(2008) account of *wohl*, a DiP that can appear in declaratives as well as in interrogatives, the
idea of LF movement rests on the intuition that the strength of the propositional commitment is
encoded by ForceP and that the strength can be modified by a suitable DiP. It is then natural to
conclude that this modification must be brought about by LF movement. LF movement could be

a viable solution if one assumes, as Zimmermann does, that the particle is an adverb (i.e., an XP that can undergo movement) and if the modification of Force is always clause-bound. According to the present account, however, the DiPs under investigation quite consistently display properties of functional heads. Like other functional heads, they are immobile. Bayer (2012) shows that *denn* naturally turns into a clitic, that is, an X^0 element. Furthermore, our data show that Q-sensitive DiPs do arise in dependent clauses, and if they do, they must associate with interpretable Force in the root clause. This leads to a conflict with movement. LF movement across the CP boundary is generally not attested. Thus, accounts in terms of LF movement seem to be in trouble.

Whatever the merits of LF movement may be, we do not even need to go as far as theorizing about its pluses and minuses. We simply need to inspect semantic intuitions. Consider the following minimal pair of RQs, first discussed in Bayer 2011:5.

(49) a. Wo glaubst du, dass man hier nachts um 3 Uhr schon Benzin kriegt?
　　　 where believe you that one here at.night at 3 o'clock SCHON gasoline gets
　　　 'Where do you believe one can get gasoline here at 3 o'clock in the morning? (Nowhere/Hardly anywhere.)'
　　 b. Wo glaubst du schon, dass man hier nachts um 3 Uhr Benzin kriegt?
　　　 where believe you SCHON that one here at.night at 3 o'clock gasoline gets

In (49a), the speaker asks about the places x such that the addressee believes that there is a plausibility ranking of places x according to which one can get gasoline in x at 3 o'clock in the morning.[40] In (49b), however, the speaker asks about the places x such that there is a plausibility ranking of the addressee's *believing* that one can get gasoline in x at 3 o'clock in the morning. Both questions are semantically well-formed, but (49b) is awkward. The reason must be that a plausibility ranking of places with respect to the *believe*-predicate that is headed by an attitude verb is pragmatically strange. LF movement of X reorders X's scope. Thus, if the interpretation of the particle *schon* in (49a) rested on *schon* taking scope in the root, the interpretations of (49a) and (49b) should be indistinguishable, and (49a) should be as awkward as (49b). But none of this is true. (49a) and (49b) are easily distinguishable. The judgments are clear enough and corroborate the account we have developed above. This demonstrates that the DiP does not move. It is interpreted exactly where we perceive it in PF. Given the ongoing discussion of the contribution of DiPs to the full interpretation of utterances (real speech acts), this is an important clarification. It justifies the claim that the DiP has certain more or less concrete lexical properties that are semantically activated after merger. Further interpretations that have to do with its dependence on Force appear to be largely independent of these lexical properties. The relation to the high left clausal periphery is a matter of formal syntactic licensing by which Force enters a telescoping

[40] The implicature is that the space of the scale that renders ''one can get gasoline in x early in the morning'' true is very small or even nonexistent.

relation with the particle. As we hope to have shown here, this relation is parasitic on cyclic *wh*-movement.

6 Summary

Wh-questions constitute the prototypical example for syntactic dependencies that are seemingly unbounded. So far, they have been investigated mainly on the basis of intuitions about displaced and therefore locally missing constituents as definable by argument and event structure. DiPs in German *wh*-questions offer a fresh look at the topic of transclausal dependency. We have argued that DiPs provide a new kind of evidence for cyclic movement that is only indirectly dependent on displacement. We have shown that seemingly ''unbounded'' dependencies also control the licensing of DiPs by a syntactic exponent of illocutionary force. Cyclic *wh*-movement appears to license Q-sensitive DiPs across CP phases. This finding, first reported by Bayer (2012) and Bayer and Obenauer (2011), rested previously on rather infrequent examples in corpora and on the authors' individual judgments. This article has clarified the theoretically relevant part of these data with the help of two experiments. These experiments showed that German speakers are sensitive to the syntactic environment in which the Q-sensitive particle *denn* can reshape a question's illocutionary meaning. Experiment 1 demonstrated that long *wh*-movement has the effect of connecting the particle across the CP phase to the Force projection of the root clause, while short *wh*-movement in the root clause fails to do so. The interpretation of Experiment 1 was complicated by the fact that many speakers feel uncomfortable with long *wh*-movement. Therefore, Experiment 2 explored the same question by replacing overt movement with partial movement. The results replicated the results of Experiment 1 while removing the problem of the bias against long *wh*-movement. The results of both experiments are explained by a theory in which an interrogative Force feature probes a Q-sensitive subfeature of the DiP *denn*, and in which this probing can be performed cyclically. The theoretical assumptions underlying this proposal have been made explicit. The Force projection has been argued to be split into projections of Clause Type and Speech Act. *Wh*-movement to Spec,CP enables the Force features to act as probes of uninterpretable clause type and illocutionary features on the DiP. Although the experiments were limited to the particle *denn*, it is obvious that other Q-sensitive particles like *schon* behave accordingly. Thus, the licit appearance of Q-sensitive DiPs in clausal complements must be seen as a novel diagnostic of phase-bound movement. The study shows in addition that parts of ''expressive meaning'' (see Potts 2005), which appear to be idiosyncratic to some extent, are nevertheless deeply rooted in core grammar and appear to be hardwired in syntax in hitherto unexpected ways.[41]

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[41] For German, this is particularly noticeable because traditional and prescriptive grammar have long viewed DiPs as ''optional'' and more or less ''meaningless'' parts of speech.

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