SQUIB

The *why-how* alternation and a new test for sentential negation—on negated *how*-questions

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It has been argued that negated *how*-questions are, in contrast to negated *why*-questions, ill-formed. Based on this generalization it was proposed that *how* is located in a structural position below negation. In this squib, I will show that negated *how*-questions exist and that they instantiate a case of sentential negation by using data from German and English. For this purpose, a new test for sentential negation that can be applied to questions is introduced. I will show that the reason why negated *how*-questions have been argued to be ill-formed is not necessarily syntactic, but pragmatic (or semantic) in nature. However, I will also show that negative contraction in English negated *how*-questions is blocked.

1 On negated *how*-questions

The asymmetry between *why* and *how* concerning negative island effects has received some attention in the literature (e.g., Rizzi 2001; Tsai 2008; Shlonsky & Soare 2011; Endo 2015; van Gelderen 2015). The basic claim is that while *why* can be extracted across a negative, *how* cannot. This *why-how* asymmetry is illustrated in (1). What (1) is supposed to show is that *why* is located (or is base-generated according to e.g., Rizzi 2001) above negation in the CP layer, while *how* is located in a structurally lower position below negation.

(1)   The *why-how*-alternation (Shlonsky & Soare 2011: 656)
        a.   Why didn't Geraldine fix her bike?
        b.   *How didn't Geraldine fix her bike?

Note that the negation in (1b) probably occupies a head position but that the same effect can be observed when the negator occupies a specifier position:[1]

(2)   *How did Geraldine not fix her bike?

Similar observations, viz. that instrumental and manner readings of *how* are blocked by sentential negation, have been made for other languages as well, e.g., for Chinese (Tsai 2008). Note that (2), and for some speakers also (1b), is fine with a mirative intonation, but this is not the reading we aim for here.[2]

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[1] *Not* is a phrase according to Merchant's (2006) *why-not* test, while the contracted form should not be. However, nothing hinges on this analysis.

[2] In this case one could assume that *how* is base-generated in a high mirative focus projection or (see Cruschina 2011).

Contrary to the authors cited above, I claim that examples like (2) are, in fact, not ungrammatical at a syntactic level, but only pragmatically/semantically odd. The reason for this oddness is that the examples describe a result state. *How*-questions, however, are used to ask in what way a result came into being. Inserting negation into a *how*-question leads to a meaning in which the speaker asks how a non-existing result came into being. This makes no sense, at least when past tense is used. However, given an appropriate future (or conditional) context *how*-questions with sentential negation can be well-formed, as illustrated in (3) (also note the well-formedness of the embedded use of *how* in B's reply in (3a)).

(3) a. A: How do I not get hacked (if my password has leaked)?
             (B: I can show you five easy steps how to not get hacked.)
     b. How do I not get caught without a ticket?
     c. How will my paper not get rejected?

The examples illustrate that negated *how*-questions can be felicitously used as real information-seeking questions when they refer to a future (or hypothetical) event. That negated *how*-questions indeed exist is additionally shown by the attested English and German examples in (4) and (5).

(4) *English*
     a. When or how will it not be wrong in any way for a high school teacher to date his female student?[3]
     b. How do self-driving cars work, and how will they not be prone to malfunctioning?[4]
     c. How big are Google Loon Balloons, and how will they not burst at critical height?[5]

(5) *German*
     a. Autoschlüssel, Geld und Handy   sollten am   See oder am
         car keys   money and cellphone should at.the lake or   at.the
         Meer dabei sein. Nur: Wie werden sie   nicht gestohlen? Einige Ideen,
         sea with be   only how will   they not   stolen   some   ideas
         von   denen die sicherste leider   die unbequemste   ist.
         from which the safest   unfortunately the uncomfortable.COMP is
         'You should always have your car keys, your money, and your cellphone with you when you are at the beach. But: How will they not get stolen? Some ideas of which the safest is, unfortunately, also the most uncomfortable one.'[6]
     b. Babys – Wie warden sie   nicht gefressen?
         Babies   how will   they not   eaten
         'Babies—How will they not get eaten up?'[7]

The English examples in (4) all come from internet forums. In all cases, users asked real information-seeking questions expecting an answer. That these examples are real infor-

[3] https://www.quora.com/When-or-how-will-it-not-be-wrong-in-any-way-for-a-high-school-teacher-to-date-his-female-student, received 08-17-2019.
[4] https://www.reddit.com/r/explainlikeimfive/comments/6pljp2/eli5_how_do_selfdriving_cars_work_and_how_will/, received 08-17-2019.
[5] https://www.quora.com/How-big-are-Google-Loon-Balloons-and-how-will-they-not-burst-at-critical-height, received 08-17-2019.
[6] https://www.sueddeutsche.de/reise/wertsachen-am-strand-1.3621996, received 08-17-2019.
[7] https://www.aquaristik-live.de/threads/babies-wie-werden-sie-nicht-gefressen.24095/, received 08-17-2019.

mation-seeking questions and not rhetorical questions or miratives can be additionally seen from the fact that they involve coordination with another real information-seeking question (cf. especially (4b) and (4c)).

Example (5a) is taken from a German newspaper. Although we are not dealing with a real information-seeking question in this case (as the author already gives the answer), the negated *how*-question could be felicitously used for information-seeking purposes. Example (5b) is from a fishkeeping forum (note that I adapted the spelling a little bit). In this case, we are dealing with a real information-seeking question. The user wants to know how it will be achieved that the newborn fish babies will not be eaten up by other fish (the first word, *Babys* serves as a topic-setting device here).

Although the data presented suggest that negated *how*-questions do exist, they are indeed different from regular negated questions in that negative contraction seems to be banned for most speakers of English, as illustrated in (6).[8]

(6) ??How won't I get hacked?

Now the question is why contraction is blocked in cases like this. An anonymous reviewer correctly pointed out that the underlying mechanism may be the same as with *wanna* contraction: In general, *want to* in English can be pronounced *wanna*, as illustrated in (7).

(7) What$_i$ do you wanna drink t_i?

Wanna contraction is blocked in cases in which a *wh*-phrase was extracted from a position interviewing between *want* and *to*. Contraction is blocked because of an intervening trace between *want* and *to* (cf. Chomsky & Lasnik 1978; Jaeggli 1980):

(8) (Comparative example: I want Paul to drink beer.)
    a. Who$_i$ do you want t_i to drink beer?
    b. *Who do you wanna drink beer?

Applying the same reasoning to examples like (6) one would arrive at a representation as in (9) in a non-contracted case. *How* is base-generated in a position above NegP (marked by t_i) adjacent to the original position of *will* (marked by t_j). Negative contraction is blocked because the trace of *how* intervenes between the original position of *will* and NegP.

(9) [$_{CP}$ How$_i$ will$_j$ [$_{TP}$ I t_j t_i [$_{NegP}$ not [$_{VP}$ get hacked?]]]]

However, there may be another reason. Contracted auxiliaries or modals, like *don't* or *won't*, are assumed not to be the result of clitization by some authors (e.g., Zwicky & Pullum 1983; Biberauer & Roberts 2015). Instead, it is assumed that they are grammaticalized lexical items merged in a structurally higher position than the lower *not*. If one follows this line of thinking it can be argued that *how* (on the relevant reading) originates in a position below the base-generation site of contracted forms like *won't*, but above *not*.

Additionally, another reviewer correctly remarked that contracted and non-contracted forms of negation are known to be used for different purposes. For polar questions, for example, it is assumed that contracted forms express a speaker bias for *p*, while non-contracted

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[8] Most of the native speakers of English I consulted on the question whether negative *how*-questions involving negative contraction are well-formed agreed that examples like (6) are ill-formed. However, for some this and similar examples are well-formed. For this reason the example was not marked with an asterisk, but with question marks.

forms are thus compatible with there being no bias (e.g., Romero & Han 2002; 2004).[9] One reason for (6) to be out may be that there is a similar epistemic bias related to negative *wh*-questions, but this line of argumentation would have to be worked out.

It has to be noted that the idea of a structurally high position of *how* is not new. Tsai (2008), distinguishing different readings of *how*, proposed that at least some functions of *how* should be located in the left periphery. Tsai (2008) distinguishes manner, instrumental, resultative, causal, and denial readings of *how*. This is illustrated in (10) and (11) (all examples from Tsai 2008: 84).

(10)   How did John handle this matter?
        a.   Quite skillfully, I think.   MANNER
        b.   By pulling quite a few strings.   INSTRUMENTAL
        c.   Rather successfully, I would say.   RESULTATIVE

(11)   a.   How come/is it that John arrived so late?   CAUSAL
        b.   How could John do this to me?   CAUSAL/DENIAL

Based on data from Chinese, Tsai (2008) proposes the hierarchy in (12).

(12)   [$_{ForceP}$ denial *how*
            [$_{IntP}$ causal *how*
                [$_{ModP}$ instrumental/manner *how*
                    [$_{VP}$ resultative *how*]]]]

Depending on the exact position of NegP in a given language, the hierarchy in (12) suggests that (some readings of) *how* should be located above NegP in languages like English or German in which negation is thought to be located approximately at the vP-border. Thus, (12) predicts negated *how*-questions to be well-formed in these languages.

To account for sentences like the one in (1b), repeated here in (13), two possibilities are thus conceivable: either *how* originates in a position below NegP or in a position above, depending on the reading of *how* (cf. the hierarchy in (12)). The example in (13a) shows an option with a structurally low position of *how*. The question is ill-formed on a syntactic level because *how* was extracted out of a negative island. This may be correct for some readings of *how*, but not for all of them. Alternatively, *how* may originate in a position above negation as shown in (13b). In this case, there is no syntactic reason for the example being unnatural, but the question is simply odd for pragmato-semantic reasons sketched above.

(13)   a.   *How$_i$ didn't Geraldine fix her bike t_i?
        b.   #How$_i$ t_i didn't Geraldine fix her bike?

It is important to stress that the question whether the resulting structure will be syntactically ill-formed in the end does not only depend on the base-position of *how*, but also on the position of NegP in a given language (see the discussion in Section 3).

2 Sentential negation or constituent negation?

One argument against the claim that negated *how*-questions exist would be to argue that they instantiate a case of constituent negation. While this would explain why negative contraction seems to be blocked, I will show that negated *how*-questions, in fact, involve sentential negation.

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[9] With *p* being the possible affirmative answer to the polar question as opposed to ¬*p* as the possible negative answer.

Several tests to tell constituent and sentential negation apart have been proposed in the literature. Klima (1964), for example, proposed that positive tag questions, like *did he*, *neither* tags, and the appositive tag *not even* can only be attached to sentences including sentential negation. Another test, proposed by Penka (2015), is based on the fact that instances of constituent negation can be paraphrased by a relative clause involving sentential negation.[10] The examples in (14), (15), and (16), from Penka (2015), illustrate these tests.

(14)   *Sentential negation:*
    a.   John didn't find a job, did he/*didn't he?
    b.   John didn't find a job, and neither did Mary/*and so did Mary.
    c.   John didn't find a job, not even a part time one/*even a part time one.

(15)   *Constituent negation:*
    a.   John found a job not far away, didn't he/*did he?
    b.   John found a job not far away, and so did Mary/*and neither does Mary.
    c.   John found a job not far away, even a well-paid one/*not even a well-paid one.

(16)   *Relative clause paraphrase:*
    John found a job at a place that is not located far away.

The problem with these tests is that they cannot be applied to *wh*-questions and are thus not suitable for the present purpose.

There is, however, another way of telling constituent negation and sentential negation apart that has, to the best of my knowledge, not been described in the literature. This test is based on the well-known fact that logically $\neg(p \vee q)$ is equivalent to $\neg p \wedge \neg q$ (i.e., De Morgan's second law, cf., for example Horn 1989: 222–225): When coordinating a sentence including sentential negation with a disjunctive coordinator (as with English *or*) with a non-negated VP, this VP will be interpreted as negated as well. At the same time, the disjunctive coordinator is interpreted as a conjunctive coordinator. The same is not true for constituent negation. This is illustrated in (17) and (18).[11]

(17)   *Sentential negation:*
    Paul did not look at the fragile objects or touch them.
    'Paul did not look at the fragile objects and did not touch them.'

(18)   *Constituent negation:*
    I will find a job not far away or win the lottery.
    'Either I will find a job not far away or I will win the lottery.'
    '~~I will find a job not far away and I will not win the lottery~~.'

While in (17) both verbs, i.e., *look* and *touch*, are in the scope of negation, the second VP in (18), i.e., *win the lottery*, is not in the scope of negation. Additionally, (17) allows for a *neither …nor* paraphrase, while (18) allows for an *either …or* paraphrase. Note that the test also works if a sentence includes narrow verbal negation. In the case of narrow verbal negation, the verb is focused, as in (19).

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[10] This test works because with sentential negation the negation operator has the main predicate in its scope. This is different with constituent negation. However, the constituent in the scope of constituent negation can be paraphrased by introducing an additional clause and, thus, an additional main predicate. Thus, the pattern created by this test is [clause + constituent negation] → [clause] + [clause + sentential negation].

[11] The examples in this section were carefully checked with native speakers of English. The results of the test presented similarly work for German and probably any other language.

(19)   Paul did not LOOK at the fragile objects (but did something else to them).

Coordinating a second VP to a sentence including narrow verbal negation leads to an ill-formed structure if the second conjunct is not focused too:

(20)   *Paul did not LOOK at the fragile objects or touch them.

Crucially, this test also works for questions:

(21)   a.   What did Paul not see or touch?
                'What did Paul not see and not touch?'

         b.   Who will find a job not far away or win the lottery?
                'Who will either find a job not far away or win the lottery?'
                'Who will find a job not far away and not win the lottery?'

Applying this test to a negated *how*-question shows that the second conjunct is also interpreted as negated:

(22)   How will my account not get hacked or otherwise compromised?
         'How will my account not get hacked and how will it not get otherwise
         compromised?'

Again, a *neither …nor* paraphrase is possible. I take the fact that the coordination test works well with negated *how*-questions, as illustrated in (22), as evidence that we are dealing with sentential and not with constituent negation.

3 Conclusion

Taken together, I have argued that the claim that negated *how*-questions are not well-formed has been based on examples which were illicit because of pragmatic/semantic and not syntactic reasons. In fact, given a proper context, negated *how*-questions can be well-formed as real information-seeking questions, although negative contraction is blocked. Additionally, a coordination test to tell sentential and constituent negation apart was proposed. The result of this test suggested that negated *how*-questions indeed include sentential negation. On the whole, the discussion presented highlights the point that semanto-pragmatic considerations need to be taken into account when studying island data (cf., for example, Truswell 2008 for a similar point).

In sum, the discussion presented in this squib casts doubt on the claim that *how* is necessarily located in a structural position below NegP—at least in English and German. Instead, the data presented provides further evidence for a high merge site of *how* as proposed, for example, by Tsai (2008). The facts presented here, however, may well be subject to cross-linguistic variation. While, according to Cartographic models (e.g., Rizzi 1997; Cinque 1999), the positions of *how* should be the same across languages, it is well-known that the position of negation can differ from language to language and sometimes also intra-language variation is found (e.g., Ouhalla 1990; 1991; Zanuttini 1991; 1997; Cormack & Smith 2000; 2002; Poletto 2017). It is thus possible that there indeed are languages which do not allow negative *how*-questions, namely languages in which sentential negation is hosted in a position above the position in which *how* is base-generated. Additionally, it may be that a language has different positions for negations, some higher than *how* and some lower than *how*. The result would be that some types of negation might not allow negative *how*-questions, while others do.

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Competing Interests

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