**Annotation Guidelines for Questions under Discussion and Information Structure**

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**Abstract**

We present a pragmatic, i.e. meaning-based, method for the information-structural analysis of corpus data, which is built on the idea that for any assertion contained in a text (or transcript of spoken discourse) there is an implicit Question under Discussion (QU...
example for this is focus projection in English (Selkirk 1995; Gussenhoven 1999), but also morphosyntactic means like fronting and clefting normally do not uniquely identify a single information-structural constellation within or across languages. In other words, the way information is conveyed by an utterance in isolation may often remain linguistically opaque. Yet, the information structure can be largely recovered by the listener/reader when the whole discourse in which the utterance is inserted is taken into account, namely when the utterances that precede and (to a minor extent) follow the target utterance are considered.

In the present paper, we want to make explicit the way the listener/reader recovers the information structure of the utterances of a text. In order to do that, we need to make assumptions concerning the way discourse is organized. Our main assumption is that discourse is not linear but hierarchically organized in the form of a discourse tree. This assumption is at the heart of many theories of discourse structure (Hobbs 1985, Grosz and Sidner 1986, Mann and Thompson 1988, Asher and Lascarides 2003, Taboada and Mann 2006) and information structure (Roberts 1996/2012, Büring 2003, Beaver and Clark 2008) but the implementations of the actual trees (and sometimes graphs) differ. On the one hand, theories of discourse structure usually assume that text is built from so-called elementary discourse units (roughly: clauses), which themselves represent the nodes of discourse trees and which are connected via discourse (or rhetorical) relations (Elaboration, Narration, Explanation, etc.) On the other hand, theories of information structure based on Questions under Discussion (QUDs), following Roberts (1996/2012), typically postulate the existence of QUD stacks, which are abstract objects that contain increasingly specific questions, ordered by an entailment relation.

The discourse trees we have in mind combine elements from both discourse structure theories and theories of Questions under Discussion. Our goal is to transform natural discourse into a compact tree representation whose non-terminal elements are questions and whose terminal elements are the assertions contained in the text, in their linear order, as shown in Figure 1.

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1 Throughout most of this document, when we speak about text we do not only refer to written text, such as narratives, newspaper articles etc., but we also include transcripts of spoken discourse or dialogue.

2 Note that the earliest relevant work on the discourse-structuring properties of implicit questions is Klein and von Stutterheim (1987). In this work, what later became known as QUDs are called Quaestiones.
When faced with the task of reconstructing the information structure of the sentences of a text, the analyst must first reconstruct the QUDs of the text, and, in the course of this, the geometry of the discourse tree. Then, via linking rules between discourse structure and informational categories, the information structure of each utterance will be derived. In the remainder of this paper, we are going to explicitly spell out the necessary steps for a procedure of such an analysis.

Notice that we intend to provide a method to recover the information structure of the sentence independently from its form, i.e., only by looking at its place, informational content and function within the discourse. If we prove this to be possible, our procedure will be a valuable instrument for scholars who study the interface between information structure and its linguistic realization by morphological, syntactic and/or prosodic means. Furthermore, the procedure, which is by definition independent from linguistic marking, will be applicable to any language. Finally, the procedure also intends to be a tool for the study of discourse itself. As we will mention at the end of the paper, the discourse tree resulting from it can be used to make hypotheses concerning the specificities of a text’s genre. In order to make the procedure clear, we will provide examples taken from different texts and in different languages (French, German and English). Reference to corpora will be indicated above the examples. The corpus resources are listed in Appendix 1.

As a final note before we present our annotation procedure, the resulting tree structures are meant to essentially represent the same kind of discourse structure that is the outcome of analyses along the lines of theories involving rhetorical relations, although we will neither elaborate this point in any way, nor will we spend time to work out systematic theoretical differences. Obviously, the analyses suggested in this article have very little to say about discourse relations but, instead, aim to integrate QUDs into the discourse-structural representations. A formalism that maps our analyses onto RST or SDRT analyses has to await further work.
2 Preliminaries for the reconstruction of QUDs (and the creation of a discourse tree).

In this Section and the following one, we will describe the necessary steps of the proposed procedure in terms of QUD reconstruction. We will start with the preparation of the text, i.e. the segmentation into separate assertions. Then (Section 3) we will present the principles constraining the adequate formulation of QUDs. In Section 4 we will specify the linking rules between discourse structure and information structure. Section 5 is dedicated to a discussion on parallel structures and their special properties with respect to the formulation of QUDs. Section 6 discusses the criteria necessary for the identification of not-at-issue content, and Section 7 proposes an analysis for conditionals.

2.1 First step: Understanding the text.

The annotator will read the entire text carefully, in order to make sure that s/he understands what it is about and whether it makes sense. It is difficult or entirely impossible to analyze a text that is incoherent or incomprehensible.

2.2 Second step: Preparing the text.

The annotator will then split the text into clauses at sentence-level conjunctions, in order to isolate single assertions, as in examples (1)-(3). Each separate assertion is marked by an A.

(1) [German, SWR]
A: Wir haben ja nun alle von Konflikten gehört,
   We have in fact now all of conflicts heard
   ‘Now, we have all heard of conflicts’
A: aber es gibt immer Konflikte
   but there are always conflicts
   ‘but there are always conflicts’
A: und das bedeutet nicht automatisch, dass dann Tausende von
   and that means not automatically that then thousands of
   Flüchtlingen bis nach Deutschland kommen.
   refugees until to Germany come
   ‘and that doesn’t mean per se, that thousands of refugees will be coming to
   Germany.’
(2) [German, SWR]
A: Viele Menschen sehen zu wenig Demokratie,
   many people see too little democracy
   ‘Many people are experiencing too little democracy’
A: und deshalb laufen sie zum Teil falschen Propheten hinterher.
   and therefore run they for a part false prophets after
   ‘and, therefore, some of them are following false prophets.’

(3) [French, www.leberry.fr]
A: La clientèle habituelle est partie en vacances,
   the clients usual has left on holidays
   ‘The usual clients have gone on vacation,’
A: mais les touristes ont aussi apprécié les soldes.
   but the tourists have too appreciated the sales.
   ‘but the tourists appreciated the sales as well.’

Coordinated sentences are treated like separate sentences. The same applies to other types of coordinations, e.g. NP- or VP-coordinations. For such coordinations in particular, it may be helpful to reconstruct the elided material, which we mark as crossed out and gray in example (4).

(4) [German, SWR]
A: Da sollen Fenster in Teeküchen vorgeschrieben werden
   there shall windows in staff.kitchens prescribed be
   ‘They are going to prescribe having windows in staff kitchens’
A: oder auch die Helligkeit am Heimarbeitsplatz soll vorgeschrieben werden.
   or also the brightness at the home.workplace shall prescribed be
   ‘or even the brightness of the home workplace.’

3 In all cases, we assume that the second conjunct has an illocutionary force on its own, even if it is not syntactically independent.
In principle, all coordinations, even at the NP level, may be dealt with according to this procedure of separation and elliptic reconstruction, compare example (5). In doing so, we account for the common assumption that coordination is a means to efficiently communicate a series of parallel statements (more on parallelism in Section 5) and the idea that coordinated material is often contrastive in an information-structural sense, cf. Lang and Umbach (2002), Jasinskaja and Zeevat (2009).

(5) [French, EUR]

A: La construction européenne c’était un moyen d’assurer la paix
the construction European it was a means to ensure the peace
entre les pays d’Europe de l’Ouest
between the countries of Europe of the West
‘The construction of Europe was a means to ensure peace among the Western European countries’

A: et c’était en même temps un moyen d’assurer une prospérité commune
and it was at same time a means to ensure a prosperity common
‘and at the same time a means to ensure a common prosperity’

A: et c’était un moyen d’assurer une défense vis-à-vis la menace soviétique.
and it was a means to ensure a defense towards the threat Sovietic
‘and a defense against the Sovietic threat.’

At this stage of the annotation, subordinate clauses (argument or adjunct clauses) will not be separated from their verbal heads, as shown in (6) (see also (1) and (7)).

(6) [German, SWR]

A: Ich glaube, viele Menschen sind mit vielem, was in Europa läuft,
I believe many people are with a lot that in Europe goes on
unzufrieden.
unhappy
‘I believe that many people are unhappy with a lot of things that are happening in Europe.’

(7) [French, www.monde-diplomatique.fr ]

A: Bien que les règles statutaires définissent des langues officielles
even though the rules statutory define INDEF languages official


due to fact’s impose peu à peu.

a monolingualism of fact itself establish little to little

‘Although statutory rules define official languages (…), monolingualism is in fact establishing itself little by little’

This last point will be revised at a later stage of the annotation procedure, namely in Section 6, where we will discuss the notion of ‘not-at-issue’ content. As a matter of fact, whether a subordinate clause is separated from the root clause or not depends on whether its content is at issue or not, and as we will see, many instances of not-at-issue content are expressed by subordinate clauses (and adjunct ones in particular, such as temporal, conditional, concessive, causal or relative clauses).

3 Third step: formulating Questions under Discussion

The annotator is now ready to formulate a QUD for each utterance of the text. In the following, we will provide a number of explicit principles meant to constrain the formulation of QUDs and to make the analysis transparent and reproducible by other analysts.

Primarily and most importantly, the QUD must be such that an assertion below the question is congruent with it (i.e. it must indeed answer the question).

Q-A-Congruence:
QUDs must be answerable by the assertion(s) that they immediately dominate.

The principle of Q-A-Congruence allows that the QUD can, at the outset, target any constituent of the assertion. For instance, the first clause of (3), The usual clients have gone on vacation, when uttered in isolation, could be the answer to any of the following questions: What happened? Who has gone on vacation? Where have the usual clients gone? Have the usual clients gone on vacation? and perhaps others. The typical situation we are faced with, however, is that assertions are not made in isolation but occur within context. In this situation, the formulation of QUDs is subject to further constraints. The most important of these
constraints is that QUDs should make reference to the immediately preceding discourse, i.e. a QUD should contain as much given material as possible.⁴

**Maximize-Q-Anaphoricity:**
Implicit QUDs should contain as much given material as possible.

Consider example (1), repeated below (without glosses) as (8). After utterance A₃, several questions could be formulated, for instance a very general question like *What is the way things are?*, to which A₄ would be an answer. However, our principle instructs us to integrate the available given material (*conflicts*), as shown in Q₄ below. We will adopt the convention in this article to indicate implicit QUDs in curly brackets. Furthermore, each assertion is assigned a number that matches the number of its respective question. By means of indentations ( > symbols) we symbolize the tree structure. The abstract representation of the tree in (8) is provided in Figure 2.

(8) [German, SWR]

A₃: Wir haben ja nun alle von Konflikten gehört,
   ‘Now, we have all heard of conflicts’
Q₄: {What about conflicts?}
   > A₄: aber es gibt immer Konflikte
      ‘but there are always conflicts’
   > Q₅: {What does it mean, that there are always conflicts?}
   > > A₅: und das bedeutet nicht automatisch, dass dann Tausende von
          Flüchtlingen bis nach Deutschland kommen.
          ‘and that doesn’t mean per se, that thousands of refugees will be coming to
          Germany.’

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⁴ This principle is a variant of earlier linguistic principles with different names, discussed by, among others, Heim (1991), Williams (1997), Schwarzchild (1999) and Büring (2008), which require that discourse should be made maximally coherent by the use of presuppositions and the marking of anaphoric material.
If QUDs cannot be formulated using given material, this means that a section of text is not very coherent, i.e. that the writer or speaker randomly switches to a completely different topic. This does not happen very often in rational discourse. If it happens that no connection to previous discourse can be established, then the only possible question is a very general one, which only contains general concepts like *to happen* (i.e. a question like *What happened?*). This will also essentially mean the start of a new, separate discourse tree.

While the MAXIMIZE-ANAPHORICITY principle instructs us to integrate as much material as possible from previous discourse, we still need a principle that regulates what *cannot* be included into the question, viz. completely new material.

**Q-Givenness:**

Implicit QUDs can only consist of given (or, at least, highly salient) material.

The principle of Q-GIVENNESS is derived from the GIVENNESS principle by Schwarzschild (1999).\(^5\) The constraint offers an important lesson, since it puts forward the claim that implicit QUDs differ from explicit ones. Only explicit QUDs may introduce new material into the discourse.

Consider example (9). In principle we could imagine a question targeting any constituent of utterance A\(_8\). Possible questions are: *What about this multilateral agreement?*, *Who is known as the Five Eyes?*, *What about the Five Eyes?*, etc. However, only *What about this multilateral agreement?* contains given material, provided that a *multilateral agreement for co-operation* and *this alliance of intelligence operations* refer to the same entity. Only this question thereby provides a link between A\(_7\) and A\(_8\).

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\(^5\) Schwarzschild (1999) requires non-given information to be focused (F-marked). Since the focused material in an assertion is replaced by a wh-phrase in its corresponding question, we conclude that an implicit question cannot contain discourse-new (or, at least, non-salient) information.
A7: There is a multilateral agreement for co-operation among the services
Q8: {What about this co-operation of the services?}
> A8: and this alliance of intelligence operations is known as the Five Eyes.

According to the principle of Q-Givenness, a QUD can also consist of ‘highly salient’ material. The salience of a word simply means its active presence in the hearer’s or reader’s mind right before its actual occurrence in the text. Note that it is difficult to provide a general account of what may count as salient. Certainly, all function words and very general concepts like, status, name, event, or property, may always be used in the formulation of a QUD, but it is not excluded that certain specific information may become active in a situation without having been explicitly mentioned. As an illustration, consider utterance A7 in ex. (10).

(10) A6: Mein Opa hat eine Staublunge gehabt.
my grandpa has a black lung had
‘My grandpa suffered from silicosis.’
> Q7: {What did grandpa do (after the war)?}
> > A7: Der war im Schieferbergwerk nach dem Krieg.
that one was in the slate mine after the war
‘He was working in a slate mine after the war.’

Assertion A7 in (10) contains the phrase after the war, which might arguably be classified as salient (rather than truly new) information after the mention of the speaker’s grandfather, although the phrase itself was not mentioned before. However, as we said, it is difficult to establish a general rule for this.

Notable exceptions to the only-given/salient material rule are the beginnings of discourses, and parallelisms. The latter will be discussed in details in Section 5 below. According to the theory formulated in Roberts (1996/2012), the initial question of a text should always be the so-called Big Question What is the way things are? (alternatively: What is going on? What happened? etc.) However, it may often be the case that the first sentence of a text contains easily recoverable material that gives the background to start the discourse, such as temporal or spatial expressions. If there are several of these expressions, one could think of a series of sub-questions from less to more specific ones. Two examples of this kind are given in (11) and (12).
Q0: {What is going on?}
> Q0.1: {How is the CDU planning to tackle the problem of unethical mini wages?}
> > A0.1: In der CDU wächst die Bereitschaft, gegen sittenwidrige Minilöhne notfalls per Gesetz vorzugehen.

‘In the Christian Democratic Party, there is a growing willingness to tackle the problem of unethical mini wages by law, if necessary.’

Q0: {What is the way things are?}
> Q0.1: {What is happening inside international organizations?}
> > Q0.1.1: {What is happening inside international organizations, concerning linguistic policy?}
> > > A0.1.1: Au sein des organisations internationales, la politique linguistique fait l’objet de débats intenses.

‘Within international organisations, linguistic policy is the object of intense debates.’

More rarely, a discourse-initial assertion may contain a so-called presupposition trigger (cf. van der Sandt 1992, Beaver and Geurts 2011), e.g. a cleft, which lets the hearer accommodate a more specific question. We may find a case like this at the beginning of written texts, for instance at the beginning of a novel, where the obligatory presupposition usually gives rise to a stylistic effect of some sort (cf. (13), first sentence of the novel *Vivement dimanche!*, French translation of Charles Williams’ novel The long Saturday night).

(13) [French, *Vivement dimanche!*] 6

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6 *Vivement dimanche!* by Charles Williams, Gallimard, 1963 (page 7).
Q0:  {What happened?}
>  Q0:1:  {When did it begin?}
>  >  A0:1:  C’est le 5 janvier que tout a commencé.
    it.is the 5 January that all has begun
    ‘It’s on January 5th that everything began.’

4 Fourth step: Adding information-structural markup

Before presenting other (more indirect) ways to define QUDs in a text (and in particular, the role of parallelism, see Section 5), we show in this Section how the information structure of the assertions of a text can be straightforwardly derived on the basis of the structural information obtained in the previous steps. In line with contemporary approaches to information structure theory following the paradigm of Alternative Semantics (Rooth 1985, 1992, 1996), such as Krifka (2007), Beaver and Clark (2008), and especially Büring (2008), we assume that assertions contain an obligatory focus and an optional background. The combination of the focus and the (potentially empty) background is called a focus domain (marked by the ~ symbol). The availability of QUDs allows us to identify the focus (F) as that part of an assertion that answers its respective QUD, while the background (unmarked) corresponds to the lexical material which is already present in the QUD, and which was gained as given material (Step 3). As a further category, we define an aboutness topic (T) (Reinhart 1981, Krifka 2007) as a referential expression (term) inside the background denoting the referent about which the QUD asks for information. While all aboutness topics are necessarily backgrounded, not all material in the background qualifies as a topic. One might argue that not all referential expressions inside the background are actually aboutness topics (as the procedure currently does) but at this point we do not intend to provide any rules to distinguish between better and worse topic candidates. With these specifications at hand, we are able to make an information-structural analysis of our data. For instance, the answers in (9) and (12) are analyzed as (14) and (15) respectively.

(14)  [English, SNO]
    A7:  There is a multilateral agreement for co-operation among the services

7 Or as the repeated material in case of parallel sentences, see Section 5.
Q8: {What about this co-operation of the services?}
A8: and [[this alliance of intelligence operations]T [is known as the Five Eyes]F]~.

(15) [French, www.monde-diplomatique.fr]
Q0. {What is the way things are?}
> Q0.1: {What is happening inside international organizations?}
> Q0.1.1: {What is happening inside international organizations, concerning linguistic policy?}
‘Within international organisations, linguistic policy is the object of intense debates.’

In the rest of the paper, all examples with a QUD structure will also display the corresponding information-structural markup.

5 Fifth step: QUDs in parallel structures

5.1 Parallel structures with a single variable

We have said in Section 2 that an (implicit) QUD can only consist of given (or, at least, highly salient) material. However, in cases where it is impossible to link an assertion directly to the previous discourse, this can be the signal that the assertion occurs within a parallel structure, i.e. a QUD that is answered by a series of structurally analogous assertions. In these cases, the QUD is defined by the parallelism. For instance, in (16), the phrase you can wire tap is not present in the discourse preceding A15, but its presence in Q15 is motivated by the parallelism between A15' and A15". Structurally, the example corresponds to the tree in Figure 3.

(16) [English, SNO]
A14: When you are on the inside and you go into work everyday and you sit down at
the desk and then you realize the power you have.

Q₁₅:  {What power do [employees of the NSA] have?}

> Q₁₅.₁:  {Whom can you wire tap?}

>  > A₁₅.₁':  [You can wire tap [the President of the United States]₁]~

>  > A₁₅.₁'':  [you can wire tap [a Federal Judge]₁]~

Figure 3 Question under Discussion with two partial answers

The parallelism can consist of two or more utterances. In the simplest case, two utterances are identified as parallel because they contain semantically identical (synonymous or coreferent) material and one syntactic position in which they differ (the focus variable). The identical material, in turn, helps us formulate their common QUD: the constant material must re-occur inside the QUD, while the alternating parts of the assertions correspond to the wh-word in the QUD. Parallel answers to the same question are marked by A₁, A₁', A₁'', etc., see ex. (16) and the following ones. Note, furthermore, that we shall assume that discourse connectors at the beginning of an utterance, such as and, or, but, although etc., stand outside the focus domain. While they are essentially the signposts of discourse structure, they do not themselves take part in the information structure of a sentence. The same rule applies to discourse particles (like even or also), as far as possible.

(17)  [German, SWR]

A₀:  Ein anderes Projekt, bei dem, die Arbeitgeber Sie mit dem Bürokratievorwurf überziehen, ist die Arbeitsstättenverordnung.

‘Another project for which employers are accusing you of bureaucratization is your workplace regulation bill.’

Q₁:  {What will be prescribed/regulated?}

> A₁':  [Dat sollen [Fenster in Teeküchen]₁ vorgeschrieben werden]~

  there shall windows in staff.kitchens prescribed be

  ‘They are going to prescribe having windows in staff kitchens’

> A₁'':  oder auch [[Helligkeit am Heimarbeitsplatz]₁ soll vorgeschrieben werden]~

  or also the brightness at.the home.workplace shall prescribed be

  ‘There also shall be brightness at the home workplace prescribed’
The goal for an optimal annotation is to identify as many parallelisms as possible, thus capturing a maximum of coherence in the text. We can say that finding a common question to two or more assertions means to identify “the lowest common denominator” of all the answers, i.e. a semantically constant element that is contained in all answers, while the alternating parts are replaced by a wh-phrase. A slightly more complex example is given below.

(18) [French, www.monde-diplomatique.fr]

Q₁₂: {In what way is export good as well?}

> A₁₂*: […] [[l’export]ᵀ permet également à l’État de réduire quelque peu ses engagements consentis au titre du soutien à des industries nationales d’importance stratégique]ᵀ~

national of: importance strategic

‘(arms) export also allows the state to reduce a little its commitments to support national industries of strategic importance’

> A₁₂*: et [[contribute donc à alléger ses dépenses budgétaires en matière de défense]ᵀ~.

in matter of defense

‘and it therefore contributes to reduce the government’s budgetary expenses in terms of defense.’

Consider finally ex. (19).

(19) [German, SWR]

A₃₈: Weil, es ist natürlich schon so, von 2600 Euro, wenn man da

because it is of course indeed such of 2600 Euro if you there calculate...
‘Because, of course, with € 2600, if you start calculating ...’

Q39: {What do you need to reckon in?}

A39\textsuperscript{v}: [\textit{Man hat eine Wohnung}]\textsubscript{F},~
\textit{one has an apartment}

‘You’ve got an apartment,’

A39\textsuperscript{v}: [\textit{man will was essen}]\textsubscript{F},~
\textit{one wants something eat}

‘you want to eat something,’

A39\textsuperscript{iv}: [\textit{man braucht Klamotten}]\textsubscript{F},~
\textit{one needs clothes}

‘you need clothes,’

A39\textsuperscript{v}: [\textit{man hat Steuern}]\textsubscript{F},~
\textit{one has taxes}

‘you’ve got to pay taxes,’

A39\textsuperscript{vi}: [\textit{man hat Versicherung}]\textsubscript{F},~
\textit{one has insurance}

‘insurance’

A39\textsuperscript{vi}: und [\textit{man hat Telefon}]\textsubscript{F},~
\textit{and one has telephone}

‘and telephone.’

In (19), not just two but several clauses are parallel, to the extent that they have the same subject, the generic pronoun \textit{man}, which is expressed overtly in A39\textsuperscript{v} to A39\textsuperscript{iv}, and implicitly in the last two assertions.

5.2 \textit{Parallel structures with two variables: contrastive topic + focus}

There is a more complex case of parallelism we need to discuss. Such a parallelism involves two (or more) assertions which are contrasted against each other at two different positions. An example is given in (19).

(20) [French, CFPP2000]

Q15: spk1: \textit{et ils travaillaient dans quelle profession?}
\textit{and they worked in what profession}

‘and what was their profession?’
> Q_{15.1}: {What did your mother do?}
> > A_{15.1}: spk2: [[[maman]_{CT} [elle]_{T} (...) était [soudeuse (...) des agrafes (...)]\}
> mum she was welder of staples
> ‘My mum was a staple welder’
> > Q_{15.2}: spk1: Et votre père?
> and your father
> ‘And your father?’
> > A_{15.2}: spk2: [[[mon père]_{CT} [il]_{T} était [monteur en bronze]_{F}]
> my father he was fitter in bronze
> ‘My father was a bronze fitter’

A question about some entity – the second speaker’s parents in (20) – is sometimes not answered directly but broken down into partial answers about smaller parts or elements of the original term. Following the influential work of Büring (2003), these parts are called contrastive topics (actually, they are topics which contain a variable, and they are indexed in the annotation as CT). Their structure is given in Figure 4.

![Figure 4 QUD with two entailed/entailing sub-questions and answers](image)

The reason why we use sub-numbers in such constellations is that the super-question Q_{15} and the sub-questions Q_{15.1}, Q_{15.2} stand in an entailment relation. This means that any answer to the sub-questions is, at the same time, a (partial) answer to the super-question, cf. Roberts (1996/2012).

Note that in example (20), overt and implicit QUDs alternate in the text. An overt question coincides with the QUD when, trivially, the answer given in the text actually answers the overt question (as it is the case with Q_{15.2} in (20)). Sometimes, however, the interlocutor may decide not to answer an overt question but to say something else – that is, to answer a different implicit question. In that case, an implicit QUD is inserted. In (20), the question about the interlocutor’s parents is not answered immediately: the interlocutor rather answers a question about the mother, and then, after an explicit sub-question about the father, he
completes his answer to the question about his parents.\(^8\)

A QUD structure similar to the one shown above is constructed when a referent is semantically related to an antecedent in the previous discourse by some kind of *bridging* relation (Clark 1977, Asher and Lascarides 1998). The only difference with respect to the double contrastive-topic construction is that there aren’t several parallel sub-questions but just one sub-question. Consider the French example in (20) about arms sale by France. *Le ministre de la défense* (‘the defense minister’) in A\(_{10.1}\) is linked by a bridging relation to *le gouvernement actuel* (‘the present government’) in the preceding assertion (A\(_9\)): the government’s action is done through the action put forward by the defense minister. In order to account for the link between *le gouvernement actuel* (‘the present government’) and *le ministre de la défense* (‘the defense minister’), the question preceding A\(_{10.1}\) is taken to be a sub-question of Q\(_{10}\). Note that *le ministre de défense* is marked as a contrastive topic although it does not actually *contrast* overtly with some other minister. The resulting tree is given in Figure 5.

\[(21) \quad \text{[French, www.monde-diplomatique.fr]}
\]

Q\(_9\): {What about the present government?}

> A\(_9\): [[Le gouvernement actuel]\(_T\) [s’est fortement impliqué dans la
    "The government current itself is strongly committed in the"
    conquête de marchés]\(_F\).~

    ‘The present government has strongly committed itself to conquering markets.’

> Q\(_{10}\): {What have different people in the government done to achieve this?}

> > Q\(_{10.1}\): {What has the defense minister done?}

> > > A\(_{10.1}\): [[Le ministre de la défense]\(_C\), [a payé de
    "The minister of the defense has paid of"
    sa personne, multipliant les déplacements et
    "his person multiplying the displacements and"

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\(^8\) An overt question may sometimes not receive an answer at all. This is common in dialogues and conversations, where the goals and intentions of the participants may be different and sometimes contradictory (consider, for instance, an interview of a journalist to a politician who wants to hide or gloss over some fact). In this case, again, an implicit QUD must be reconstructed while the overt question is a terminal node in the tree.
‘The Secretary of Defense put in a lot of effort, by multiplying trips and meetings.’

‘He got State services into action to support companies.’

Figure 5. A QUD followed by a sub-question that is followed by two parallel answers.

5.3 Embedded focus

Recall that it is part of the procedure discussed in Section 2 that we split coordinated structures, which may make it necessary to reconstruct elided material. In this Section, we talk about a special case of coordination which occurs in subordinate clauses. In this case, the reconstructed material will involve (at least) the entire matrix clause. Note that, as in the previous Sections, we are again dealing with a kind of parallelism, which allows us to account for the ellipsis and to reconstruct the QUD. A simple example which illustrates this is given in (22).

(22) [German, Stuttgart21]

A_{18}: Das Ziel des Aktionsbündnisses, wie es immer erzählt wird, wie es vermittelt wird, ist einen integralen Taktfahrplan in Stuttgart durchzuführen.

The goal of the cooperation is, how it is always told, to have an integral timetable in Stuttgart.

> Q_{19}: {What does that mean, an integral time table?}

> > A_{19}: [Das heißt, dass [alle Züge zu einem bestimmten Zeitpunkt ... bis that means that all trains to a certain point of time until zu einem bestimmten Zeitpunkt eintreffen.]}
to a certain point of time arrive

‘This means that all trains will arrive at a certain point of time.’

> > A19′′: [Das heißt, dass dann zwischen allen Zügen ein Umsteigen möglich ist]~

this means that then between all trains a change possible is

‘that there will then be the possibility to transfer between all the trains’

> > A19″:  und [das heißt, dass dann alle Züge nach und nach den Bahnhof wieder verlassen]~

train station again leave

‘and the trains will then leave the station again one by one.’

In this example, the focus of the three utterances coincides with the subordinate declarative clauses, while the matrix part coincides with the common background. In the example below, the focus is only part of the subordinate clause. The parallelism between A25.1′ and A25.1′′ imposes a common question whose answer is given by the narrow focus inside the embedded clause. Due to syntactic constraints in English, the question answered by an embedded narrow focus looks generally like an echo question (see Q25.1).

(23) [French, EUR]

Q25: {Which countries are knocking at the door of the European Union?}

> Q25.1′: {Countries which are not European in WHAT sense are knocking at the door?}

> > A25.1′: mais voilà que [maintenant des pays qui ne sont pas européens au sens [géographique] du terme frappent à la porte]~

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9 Here, the Complex NP Constraint (Ross 1967), which does not allow for extraction out of a clause (here, a relative one) modifying the Noun head of an NP. In Q25.1 ‘Countries which are not European in WHAT sense are knocking at the door?’, the phrase in what sense cannot be extracted out of the relative clause modifying the Noun countries, so it remains in situ. Such a position is though only allowed with an echo interpretation of the question.
‘But now countries that aren’t European in the geographical sense’

> > A_{25.1}:


\begin{verbatim}
ni même parfois [des pays qui ne sont pas not even sometimes INDEF Countries that not are not
européens au sens [historique] du terme frappent à la European in the sense historical of the term knock at the
porte[s]~
\end{verbatim}

‘and sometimes not even in the historical sense of the word are knocking at the door’

In the previous example, the question is simply defined in the usual way, by the parallelism of the utterances. In the next example, we can see how the size of the focus constituent can sometimes shrink during a sequence of parallel assertions.

(24) [German, SWR]

Q_{18}: {What kind of people is the speaker dealing with?}

> A_{18}: \[Ich beschäftige mich mit denjenigen, [die in diese concern myself with those who into these
Unterkünfte hineingehen,] F_{18} \]

accommodations enter

‘I am dealing with those people who go into these accommodations,’

> Q_{18.1}: {The speaker deals with people who do WHAT with the refugees?}

> > A_{18.1}:

\[Ich beschäftige mich mit denjenigen, [die mit den concern myself with those who with the
Flüchtlingen reden,] F_{18.1} \]

refugees talk

‘who talk to the refugees,’

> > Q_{18.1.1}: {The speaker deals with people who take the refugees WHERE?}

> > > A_{18.1.1}:

\[Ich beschäftige mich mit denjenigen, [die sie concern myself with those who them
mitnehmen auch zu sich] F_{18.1.1} \]

take also to themselves

‘take them home to themselves’
The QUD-tree is represented in Figure 6.

![Diagram of QUD-tree](image)

Figure 6. A QUD followed by several sub-questions. Each assertion answers both its own QUD as well as the higher questions.

In (24) it is necessary to introduce increasingly specific sub-questions in order to capture the fact that, firstly, we are still dealing with a parallelism albeit, secondly, one in which the focus is getting narrower and narrower. The outermost focus, the answer to Q₁₈, consists of the two relative clauses in A₁₈ and A₁₈.₁ respectively; however, a narrower focus (on the verb) must be assumed in order to account for the parallelism between the last three assertions, which all talk about the refugees; finally, a yet narrower focus is needed for the last two assertions, whose parallelism concerns taking the refugees to different locations. The subscripts of the foci indicate which of the questions they are answering. As can be seen, there is one focus in A₁₈, two in A₁₈.₁, and three in A₁₈.₁.₁' and A₁₈.₁.₁'' (nested inside each other). The purpose of the embedded focus domains is to successively extend the background. The elided material has again been reconstructed in order to make the interpretation of this complex example transparent.

6 Not-At-Issue Content

The parts of a clause that do not answer the current QUD can be grouped together under the notion of *not-at-issue content* (Simons et al. 2010). Note that there is some terminological confusion in the literature since, sometimes, backgrounded (as opposed to focal) material is
also called *not-at-issue* (and focal material is called *at-issue*). However, in our approach we would like to exclude background material from the class of not-at-issue content. What we have in mind is a stricter definition of not-at-issue content, equivalent to the notion of *conventional implicature* (Potts, 2005). In general, this term refers to *optional information* that does not contribute to the truth or falsity of the assertion. With respect to the QUD annotation procedure, not-at-issue content can be defined as a part of the utterance that does not relate to the current QUD, or in other words, a part of the utterance that remains outside the focus domain.

**NOT-AT-ISSUE (relative to Q)**

An expression X in an utterance U is Not-At-Issue with respect to the current Question under Discussion Q iff the deletion of X has no effect on the truth-conditions of the main proposition denoted by U.

It is probably impossible to define not-at-issue content by referring to the syntactic form of an expression, because at-issueness mostly depends on the context in which the expression occurs. Nevertheless, there is a list of expressions which typically take the role of not-at-issue content in a sentence, and whose optional status the annotator should therefore always check.

The two major types of not-at-issue material are, firstly, *supplements* such as parentheticals, non-restrictive modifiers and other adjunct-like material. The second type of not-at-issue content consists of *evidentials* and other speaker-oriented material. In our annotations, we mark not-at-issue content by the feature nai. A gray background additionally signals that this is material which – for the time being – does not contribute to the main structure of our discourse tree.

Examples of different kinds of supplements are given below: an apposition and a temporal adjunct phrase in (25), two appositions in (26), parentheticals in (27), and a concessive adjunct clause in (7), repeated below as (28).


Q6: {What did Patrice Bouveret do?}

> A6: **[Animateur de l’Observatoire des armements]** nai **[Patrice Bouveret]**

*leader of the Monitoring center of the arms Patrice Bouveret*

*avait relancé, lors du colloque organisé le mois dernier*
had revived at the time of the conference organized the month last

As the leader of the Arms Monitoring Center, Patrice Bouveret revived, during a conference organized last month by some communist senators in front of an audience of trade unionists, a series of propositions for a better control (…)

(26) [English, www.nytimes.com]

Q26: {Who was among those named in the Panama Papers?}
> A26: [Among those named (in the Panama Papers) were (...) [Mr Gunnlaugsson,]—
> 
> A26": (and) [among those named were [the former emir of Qatar]— [Hamad bin
Khalifa bin Thani]]

(27) [French, www.monde-diplomatique.fr]

Q1: {What about French arms export?}
> A1: Les exportations françaises d’armement ne font l’objet d’aucun débat en France

‘French arms export isn’t the object of any debate in France’

Q2: {What are the exceptions to this?}
> > A2: sinon [en cas [de scandale]— ([frégates de Taiwan ou Angolagate])

except in case of scandal frigates of Taiwan or Angolagate

‘except in case of scandal (frigates of Taiwan or Angolagate)’

> > A2": [de drame]— ([l’attentat de Karachi])

of drama the attack of Karachi

‘of drama (the suicide attack in Karachi)’

> > A2": ou [lorsque l’exécutif se prend les pieds dans le tapis]

or when the executive itself takes the feet in the carpet

(comme avec cette vente de navires de projection et de commandement)
like with this sale of ship of projection and of commandment à la Russie (…))
to the Russia
‘or when the executive stumbles over (as with that projection and commandment ship sale to Russia)’

Examples of evidentials are given in (29), (30), and an expressive in (31).

(29) [German, SWR]
Q: {What is the current status of the bill?}
> A: [Jetzt heißt es, dass das Kanzleramt hat diese Verordnung gestoppt.]

‘Now they are saying that the Chancellery has stopped this bill.’

(30) [French, www.monde-diplomatique.fr]
Q: {What about the use of English in international organisations?}
> A: [Les défenseurs de l’anglais affirment qu’il [s’est internationalisé].]

‘The defenders of the English language maintain that it has become internationalised.’
It might sometimes seem difficult to decide which part of an utterance is at-issue and which one isn’t. Once the QUD is formulated, however, the ambiguity should disappear.

Note that we do not analyze not-at-issue content in more detail, although it can be assumed that it has an information structure of its own (and therefore also its own QUD); for a discussion see Riester and Baumann (2013). Importantly, however, we will analyze sentence-final not-at-issue material simply as if it represented a separate assertion (which it arguably is), cf. AnderBois et al. (2010), Syrett and Koev (2015). An example, already mentioned in (26), is shown in (32).

7 Conditionals

In this Section we briefly address the treatment and analysis of conditionals. No new categories or structures will be introduced. Instead, we make use of concepts already introduced in Sections 5.2 (on contrastive topics) and 6 (on not-at-issue content). Following Iatridou (1991) and Haegeman (2003), we distinguish between (at least) two types of conditionals. So-called factual conditionals present their antecedent clause as taken for granted. An example is given in (33).
Q33: {What about the passion concerning Europe?}

‘If you look at the current ARD Europe Trend (on German TV), then the passion leaves much to be desired.’

As can be seen in (33), the antecedent is simply treated as an – optional – adjunct clause, which is not-at-issue. The situation is different in so-called relevance conditionals, ex. (34). These conditionals provide the reader with a true choice. We realize this using the pattern and discourse structure familiar from CT-F pairs.

(34) [German, SWR]

Q11: {What are the speaker’s reactions to peoples’ attitudes?}
> Q11.1: {What if someone is upset because of a few lockers?}
> > A11.1: [Wenn man da jetzt sich aufregt wegen einem abschließbaren Spind,]CT (...) dann wäre ich [der Letzte der lockable locker then would be I the last person who sagt, da kann man nicht über einzelne Punkte reden]F~.

‘says there can one not about individual points talk

‘If someone is upset because of a few lockers, then I’d be the last person to say that we couldn’t talk about individual issues there.’

> Q11.2: {What if someone is fundamentally opposed?}
> > A11.2: Aber [[wenn man das grundsätzlich in Frage stellt,]CT dann werde ich (...) [ernst]F~

‘But if someone calls the whole thing into question, then I will get really stern.’

Note that the CT-F pattern, and its associated structure consisting of a super-question and several sub-questions is a very useful analysis tool, which is also applicable to other kinds of discourse-structuring expressions like ordinals (Firstly, Secondly, ...), contrast markers
(on the one hand, on the other hand), which can all function as (semantically rather thin) contrastive topics (What happened first? What happened second?) Finally, it is likely that even subsequent events in narratives can be analyzed in this way (What happened at time 1? What happened at time 2?), but this clearly needs to be investigated more carefully.

8 Conclusion

In this paper, we introduced our methodology for a combined analysis of naturally occurring data in terms of both discourse structure and information structure, using Questions under Discussion. We identified the necessary steps of a procedure based on QUDs and demonstrated the method on authentic data taken from spoken and written English, French, and German corpora. We formulated pragmatic principles that allow us to analyze the discourse structure, formulate adequate QUDs, and analyze the information structure of individual utterances in the discourse. Based on an authentic data analysis, we illustrated that the formulation of QUDs can be successfully guided by the formulated principles, and that QUDs play a crucial role in accounting for discourse structural configurations. At the same time, they also provide an objective means to determine the information structure, including both the focus-background divide as well as not-at-issue content.

This research has interesting applications in at least two respects. On the one hand, a precise methodology for the analysis of the information structure in naturally occurring data provides the opportunity to empirically evaluate theoretical notions such as focus. Moreover, being independent from linguistic form, it constitutes a valuable instrument to discover and analyze linguistic means to express information structure. This point is particularly important if the language is poorly described. On the other hand, this research may provide the opportunity to study the characteristics of texts themselves, namely their coherence and clarity, their genre, etc. We said for instance in Section 5 that parallelism is a way to create text cohesion. Thus, a working hypothesis might be that the more the parallelisms reconstructed in a text by the QUD annotation, the more the text is coherent. This will show up in the shape of the discourse trees. (Do the speakers answer overt questions or rather their own implicit ones? Does a speaker return to her original question or not? Is the discourse actually a set of separate mini-discourses? etc.) The QUD-structure may also help identifying the specific features of different text genres. For instance, a narrative text might be recognizable by the high frequency of sequences of QUDs at the same level and of similar
form (What happened? What happened next? etc.). By contrast, we may suppose that an expository or descriptive text will contain more variety concerning both the presence of sub-questions and the depth of their embedding, or that an argumentative text will contain more parallel structures and in particular more parallel structures with two variables, which help expressing contrast and comparison. We will leave such a thorough investigation of possible links between QUD structures and genuine text properties to future research.

References

Grosz, Barbara and Sidner, Candace (1986). Attention, intentions, and the structure of


Reinhart, Tanya (1981). Pragmatics and linguistics: An analysis of sentence topics in


**Appendix 1**

Data were chosen from the following spoken corpora:
SWR: Stuttgart SFB 732 Silver Standard Collection; German radio interviews from SWR2 public radio
EUR: Europe corpus; French radio debates (Portes 2004)
SNO: Interview with Edward Snowden (English), ARD TV, January 2014

Some scattered examples were also taken from written texts (see relevant examples in the text for specific references).

Appendix 2: Summary of instructions

a) Read the entire text carefully and make sure to understand what it is about and whether it makes sense.

b) Split the text at sentence-level conjunctions so to isolate utterances.
   b') Do not separate sentential arguments from their verbal heads.
   b'') Do not separate sentential adjuncts from their verbal heads, except when they are at the end of the clause. In that case, the clause will answer a sub-question of the previous QUD.
   b''') Keep coordinated sentences and coordinated VPs separated.

c) For each assertion, formulate the respective QUD, in accordance with the principles below:
   
   **Q-A-Congruence:**
   
   QUDs must be answerable by the assertion(s) that they immediately dominate.

   **Maximize-Q-Anaphoricity:**
   
   Implicit QUDs should contain as much given material as possible.

   **Q-Givenness:**
   
   Implicit QUDs can only consist of given (or, at least, highly salient) material.

   **Corollaries**
   
   c') An assertion at the very beginning of a text should be preceded by a very general QUD, such as: *What is the way things are?*,
   c'') An overt question may coincide with the QUD, if the answer is coherent to it.
d) Parallelism.
Find a common QUD to two or more assertions such that it contains “the lowest common
denominator” of all the answers, i.e. a semantically constant element that is contained in all
answers, while the alternating parts are replaced by a wh-phrase.

\[
\begin{array}{c}
Q_{15} \\
A_{15'} & A_{15''}
\end{array}
\]

d') Utterances that contain an expression that denotes a member of the same set, are
considered as answers to sub-questions of the same QUD.

\[
\begin{array}{c}
Q_{15} \\
Q_{15.1} & Q_{15.2} \\
A_{15.1} & A_{15.2}
\end{array}
\]

e) Not-At-Issue content (relative to \( Q \))
An expression \( X \) in an utterance \( U \) is Not-At-Issue with respect to the current Question under
Discussion \( Q \) iff the deletion of \( X \) has no effect on the truth-conditions of the main
proposition denoted by \( U \).

   Typical nai content:
   - supplements: parentheticals, non-restrictive modifiers and other adjunct-like material.
   - evidentials and other speaker-oriented material

f) Annotating information structure: Label inventory
<table>
<thead>
<tr>
<th>Tag</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus (F)</td>
<td>The part of a clause that answers the current QUD</td>
</tr>
<tr>
<td>Focus domain (~)</td>
<td>A piece of discourse which contains both a focus and, usually, some background. In general, the focus domain directly corresponds to the QUD. If a sentence is thetic (i.e. all-focus), the focus and focus-domain coincide, and the respective QUD is of the kind <em>What happened?</em> or <em>What is the way things are?</em></td>
</tr>
<tr>
<td>Background</td>
<td>The non-focal part of a focus domain (that part which is already mentioned in the current QUD)</td>
</tr>
<tr>
<td>(Aboutness) topic (T)</td>
<td>A referential entity (“term”) in the background which constitutes what the utterance is about.</td>
</tr>
<tr>
<td>Contrastive topic (CT)</td>
<td>A topic that represents a variable and which signals the existence of a more complex (hierarchically higher) question.</td>
</tr>
<tr>
<td>Not-at-issue content (nai)</td>
<td>The part of a clause which provides optional information with respect to the current QUD</td>
</tr>
</tbody>
</table>

*Table 1 Inventory of information-structure labels*