Coordinating Questions

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written by

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Abstract

This thesis explores how a well-founded and uniform compositional account can be given of coordinated questions. First, the empirical picture of question coordination is explored by making a direct comparison between conjunctive, disjunctive, and polar questions. Some surprising observations are discussed, which show that conjunctive questions always correspond to conjunctions of polar questions (PolQs), while disjunctive questions can never be analyzed as disjunctions of PolQs. The proposed account allows us to express several different readings of disjunctive questions, thereby deriving the differences between those readings from the interplay between their intonation, discourse effects, and underlying syntactic structure. In particular, it is argued that the contribution of the question operator should be split up into two components: a component that introduces a presupposition and a component that deals with the at issue question meaning. The way these two components interact is taken to be the crucial difference between PolQs and AltQs. The difference between AltQs and conjunctive questions is explained by making reference to their effects on discourse.

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CONTENTS

Chapter 1

INTRODUCTION

Coordination of and within declarative clauses is a particularly productive phenomenon. When clauses with a different clause type are thrown in the mix, however, things become much less clear. In this thesis, I therefore look into coordination of questions and interrogative clauses.

The tight link between questions and disjunction has been studied extensively in different languages. The behavior of disjunction in questions is particularly interesting, not only because alternative questions (henceforth: AltQs) are formed out of disjunctions in almost any language, but also because question particles are often homophonous to, or derived from disjunctive particles. And yet, no fully satisfactory account of AltQs has been provided that deals with the meaning of these questions in a compositionally uniform way.

The focal point of this thesis will therefore most naturally be to account for the meaning of AltQs, but instead of focusing only on this particular type of question, I will look at it from a more general, compositional perspective. That is, the aim of this thesis is to derive the meaning of AltQs *as* coordinated questions, while making a more direct comparison to other types of questions that involve coordinated structures too.

I will show that, in doing so, we run into several unsolved—and thus far perhaps even unnoticed—problems. First, we simply observe a striking contrast between conjunctive and disjunctive questions that does not fall out of any account of AltQs that has been proposed in the literature so far. Moreover, we will also see differences between polar questions (PolQs) and AltQs. Finally, the literature on AltQs has mostly been concerned with questions that are pronounced with canonical intonation and subsentential disjunction, but there is a wider range of questions, which, as I will argue, should be regarded as AltQs too. To deal with all of these, we need to take a closer look at the syntax and the contribution of focus marking and intonation. I will thus attempt a more radical compositional approach in which the differences between disjunctions and conjunctions are made clear, while also paying attention to the effects of intona-

tion and the underlying syntactic structure of these questions. In doing so, it will turn out that these issues are very much interrelated and demand an account that links the different behavior of disjunctions and conjunctions with a more generally applicable account of the effect of questions on discourse.

Throughout this thesis, it will also become clear that we need many ingredients to make the right predictions in a systematic way. We will see a wide range of different phenomena that will turn out to be very relevant to the meaning of coordinated questions, like focus marking, the effect of boundary tones and the underlying syntax. I therefore hope the reader will bear with me on a tour which will take the semantics of these questions as its starting point, but will eventually cross many of its interfaces.

Even though I will show that the problems that are dealt with seem to be framework-independent, the proposed account is couched in the inquisitive semantics framework. The reason for adopting this framework is that it very naturally deals with the meaning of conjunctions and disjunctions—and it does so independently of clause type. The choice for this framework is therefore mostly one out of convenience as it allows us to make very direct comparisons between conjoined and disjoined questions, but also between specific types of interrogatives and their declarative counterparts. Moreover, the inquisitive perspective on sentence meaning interfaces very nicely with a broader notion of discourse structure, which will become useful later on in this thesis.

Before I dive into the issues that I am concerned with, I would like to add some notes on terminology. That is, throughout this thesis, I will distinguish between interrogatives and questions. With the term *interrogative* I solely refer to clauses that have an interrogative syntax, while *questions* will refer only to speech acts of questioning. The same distinction will hold for *declarative* versus *assertion*. This distinction will turn out to be of crucial importance throughout this thesis. Moreover, I will explicitly limit my attention to canonical uses of different speech acts. For instance, the English question *Can you hand me the salt?* may be pragmatically used as a request, but we will focus exclusively on its use as a question here.

1.1 Overview of the thesis

I will briefly outline the structure of this thesis here. In Chapter 2 I will first show that placing AltQs within a broader scheme of different kinds of coordinated questions will give rise to several puzzles. The aim of the subsequent chapters will be to solve the six puzzles introduced in this chapter. In doing so, I will take on an incremental approach: I will show that the solution to one puzzle can be extended to solve the next. In this way, we will gradually build up an account of coordinated questions, that deals with their meaning and discourse effects as determined by their syntactic structure and the intonational patterns they exhibit.

In Chapter 3 I will therefore show how the first two puzzles can be solved. Then,

taking these solutions as my starting point in Chapter 4, I will solve the third puzzle in two distinct steps. The solution to puzzle 3 will then be followed by a solution to the remaining three puzzles. In Chapter 5 I will conclude. In the remainder of this chapter I will go over the preliminaries of this thesis.

1.2 Preliminaries

As many accounts of coordinated questions make use of a Hamblin style framework, I will first discuss this approach to formalizing the meaning of questions at a very basic level before moving on to discuss the framework that I will be adopting, that is, the framework of inquisitive semantics. In discussing the inquisitive semantics framework, I will present both the basic version of this framework, first order InqB, as well as the typed version. Readers familiar with these frameworks can skip these sections.

1.2.1 Alternative semantics

It has been proven useful to think of the meaning of questions in terms of their suitable answers. The key intuition in the way different frameworks capture the meaning of questions is therefore that we know what a question means if we know how to answer it. Just like the meaning of assertions can be captured by its truth conditions, the meaning of a question can thus be captured in terms of its answerhood conditions. Hamblin (1973), who first made use of this way of thinking of the meaning of questions, therefore takes the meaning of a question to be a set of propositions—each corresponding to a possible answer to the question. For example, since polar questions have two possible answers, "yes" and "no", this set will always contain exactly two elements in a Hamblin style framework. In other words, the denotation of the question whether or not it is raining will contain two sets: the set in which *it is raining* is true at any world, and the set in which *it is not raining* is true at any world. These sets are generally called the *alternatives* of a question, as they represent alternative ways of answering the question. The denotation of a question as in (1) can therefore be written as in (1a). Here and in subsequent chapters, I will write the set of worlds in which a sentence φ is true, i.e. the truth set of φ as $|\varphi|$.

(1) Is it raining?

a. $[\![(1)]\!]_{Alt} = \{|\text{it is raining}|, |\neg \text{ it is raining}|\}$

Similarly, in the case of the wh-question (henceforth: WhQ) as in (2)—assuming that Ann, Bill and Charlie are the only salient individuals—the answer set would consist of the propositions that Ann let the dogs out, that Bill let the dogs out and that Chris let the dogs out. Therefore, the denotation of (2) should be the one in (2a) below.

(2) Who let the dogs out?

a. $[\![(2)]\!]_{Alt}$ = {|Ann let the dogs out |, |Bill let the dogs out|, |Chris let ...|}

Like a polar question, an alternative question like the one in (3) is usually taken to have two possible answers: "it is raining" and "it is snowing". The denotation of such a question should therefore contain two propositions or alternatives, i.e. the propositions in which each answer is true at any world. The denotation of (3) should be as in (3a).

(3) Is it raining or snowing?

a. $[\![(1)]\!]_{Alt}$ = {|it is raining|, | it is snowing|}

To derive each of these denotations compositionally, some crucial assumptions have to made. For PolQs for example, the desired denotation can be derived by making use of a polar question operator as in (4) (Hamblin, 1973). This operator takes the proposition expressed by its prejacent and turns it into a set of propositions containing the original proposition and its set-theoretical complement. It is then assumed that any PolQ contains such an operator.

(4) $[\![Q_{pol}]\!] = \lambda p_{\langle s,t\rangle}.\lambda q_{\langle s,t\rangle}.q = p \vee q = \neg p$

For AltQs, things work a bit differently: the alternatives of such a question are not introduced by a specific question operator, but by the disjunction itself. That is, it is often argued for in the literature that disjunctions always generate alternatives themselves (Aloni, 2007; Alonso-Ovalle, 2006; Simons, 2005). This means that, at least at some point in the derivation, a sentence in which two clauses are disjoined will always denote not just a classical proposition, but a set of propositions. A sentential disjunction takes two propositions, the propositions denoted by its two disjuncts, and turns it into a set which contains these two propositions. It therefore generates alternatives by taking the union of the denotation of each of its disjuncts.

(5) $[\![or]\!] = \lambda p.\lambda p'.\lambda q.q = p \vee q = p'$

Due to this crucial assumption about the nature of disjunction, the meaning of AltQs that have full clauses as their disjuncts can be derived without making use to any other AltQ-specific operators.

However, the story becomes a bit more complicated if we want to have a more flexible definition of disjunction that also deals with subsentential disjuncts. A generalized version of the entry for disjunction as defined above would look like the following:

(6) $[\![or]\!] = \lambda P_{\tau}\lambda P'_{\tau}.\{P, Q\}$

This generalized version of disjunction can now not only take disjuncts which are of type t, but also disjuncts that are of a higher type: disjunction can take disjuncts of any

type τ that is *t*-reducible, where *t*-reducible is defined as follows:

Definition 1. *A type τ is called t-reducible iff $\tau = t$ or $\tau = \langle \tau_1 \tau_2 \rangle$ where $\tau_1 \neq t$ and τ_2 is a t-reducible type*

Subsentential disjunctions now also introduce alternatives, but these alternatives are now not necessarily propositions anymore. What this means is that, in building larger constituents out of smaller disjunctions, we cannot just rely on our familiar notion of functional application. Hamblin therefore introduces a pointwise version of functional application, which applies objects of type $\langle \sigma, \tau \rangle$ to objects of type $\langle \sigma \rangle$ (Hamblin, 1973).

Pointwise Functional Application (PFA). *If $[\![\alpha]\!] \subseteq D_{\langle \sigma,\tau \rangle}$ and $[\![\beta]\!] \subseteq D_{\langle \sigma \rangle}$, then*

$$[\![\alpha(\beta)]\!] = \{c \in D_\tau \mid \exists a \in [\![\alpha]\!] \exists b \in [\![\beta]\!] : c = a(b)\}.$$

Successive applications of PFA enable the alternatives that have been introduced by the disjunction to stay intact up till the point where they become sentential expressions. At that point, an expression containing a disjunction denotes a set of propositions. For this reason, the denotation of AltQs can be defined by simply leaving these alternatives intact. That is, an AltQ operator is vacuous, and we derive the denotation of an AltQ as in (3a).

However, we want declarative disjunctions to denote propositions instead of sets of propositions. We therefore want to get rid of the alternatives introduced by the disjunction in declaratives, which is why we need an additional operator that turns the set of propositions back into a proposition. More concretely, we need an operator that flattens out the alternatives and turns it into a proposition that is true in a world *w* iff at least one of the alternatives is true in *w*:

(7) $[\![\exists \alpha]\!] = \lambda w. \exists p \in [\![\alpha]\!] : p(w) = 1$

Because it is really the disjunction doing the job for AltQs, these questions can simply be analyzed as disjoined questions in a Hamblin-style framework. Conjoining questions, however, is less straightforward in such a framework, since we cannot suggest that the denotation of (8a) is the intersection of the alternatives introduced by each of its conjuncts. That is, taking the intersection would leave us empty-handed: it would simply give us the empty set. Instead, we need to rely on pointwise intersection to derive the correct denotation of such a sentence. This is shown in (9).

(8) a. Is it windy and is it cloudy?
b. $\{|\text{it is windy}|, |\neg \text{it is windy}|\} \cap \{|\text{it is cloudy}|, |\neg \text{ it is cloudy}|\} = \emptyset$

(9) a. $[\![Q_1 \Cap Q_2]\!] := \{p \wedge q \mid p \in Q_1 \wedge q \in Q_2\}$
b. $\{|\text{it is windy}|, |\neg \text{it is windy}|\} \Cap \{|\text{it is cloudy}|, |\neg \text{ it is cloudy}|\} =$
$\{|\text{it is only windy}|, |\text{it is only cloudy}|, |\text{it is windy and cloudy}|, |\text{neither is true}|\}$

A Hamblin style system therefore runs into two important problems. The first is that it needs to rely on PFA, which means that the denotation of expressions can no longer be composed by means of the standard type-theoretic operations of function application and abstraction (see Ciardelli, Roelofsen, & Theiler, 2017 for discussion). Second, an extra notion for conjunction needs to be introduced in order to derive the meaning of conjunctive questions. Inquisitive semantics overcomes these problems, and I will therefore discuss this framework as presented in Ciardelli, Groenendijk, and Roelofsen (2013) below.

1.2.2 Inquisitive semantics

In contrast to alternative semantics, inquisitive semantics does not start out from the idea that the denotation of a question is the set of its possible answers. After all, it is often very unclear what a suitable answer to a question really is. This is why inquisitive semantics takes a slightly different perspective and looks at the meaning of questions in light of their function as requests for information. Inquisitive semantics therefore starts from the observation that one of the primary goals of language use is information exchange. The crucial difference between questions and assertions in this framework is that assertions only provide information, but usually do not request any further information, while questions request information but usually do not provide any.

Just as in alternative semantics, the denotation of a question is modeled as a set of sets of possible worlds, usually referred to as sets of *information states*. However, in inquisitive semantics these information states do not represent answers but *resolutions*. Since questions are viewed as requests for information to locate the actual world among others, resolutions are those sets of possible worlds that provide enough information to locate the actual world with a sufficient level of precision.

This focus on resolutions has an important formal consequence: it means that the denotation of a question is downward-closed. That is, if an information state provides enough information to resolve a certain issue, any information state that provides even more information will also resolve that issue. Therefore, if an information state s is a possible resolution to a question Q, the information state $s' \subseteq s$ will also be a possible resolution to Q. This means that we will both have that $s \in Q$ and $s' \in Q$.

We therefore define an inquisitive proposition as a non-empty, downward-closed set of information states. The proposition expressed by a sentence φ is denoted as $[\![\varphi]\!]$.

By using this richer notion of an inquisitive proposition, both the informative and the inquisitive content of a sentence can be captured. The union of the elements of $[\![\varphi]\!]$, $\cup[\![\varphi]\!]$, is referred to as the informative content of $[\![\varphi]\!]$, and is abbreviated as $\mathsf{info}([\![\varphi]\!])$. We call a proposition $[\![\varphi]\!]$ informative iff its informative content is non-trivial: $\mathsf{info}([\![\varphi]\!]) \neq W$. Given a finite set of worlds W, a proposition will be informative just in case its informative content does not cover the whole logical space, i.e. does not con-

tain all $w \in W$.

The maximal elements of $[\![\varphi]\!]$ will be the weakest information states that resolve the issue raised by $[\![\varphi]\!]$. I will call these the alternatives of $[\![\varphi]\!]$, written as $\mathsf{Alt}([\![\varphi]\!])$. This notion of alternatives now generally corresponds to the notion of alternatives in a Hamblin style framework. We call a proposition $[\![\varphi]\!]$ inquisitive iff its inquisitive content is non-trivial, that is iff it has multiple maximal elements. Therefore, $[\![\varphi]\!]$ expresses an inquisitive proposition iff: $\mathsf{info}([\![\varphi]\!]) \notin [\![\varphi]\!]$. Given a finite set of worlds W a proposition will be inquisitive just in case it has multiple maximal elements.

Crucially, in inquisitive semantics interrogative sentences are taken to be of the same type as declarative sentences: both denote sets of info states. The difference between the two is that the proposition expressed by interrogatives have a trivial informative content and a non-trivial inquisitive content. Propositions expressed by declaratives on the other hand, always contain a single alternative and therefore have a trivial inquisitive content while they generally have a non-trivial informative content. For the basic inquisitive semantics framework InqB this means that an atomic, declarative sentence denotes the set of all information states consisting exclusively of worlds where φ is true. For atomic sentences that consist of a 0-place predicate P without any arguments this amounts to:

(10) $\quad [\![P]\!] = \{s \mid \forall w \in s : w(P) = 1\}$

Again, I will use $|\varphi|$ to denote the set of worlds in which φ is true, while I will denote the downward-closure of this set, $\wp(|\varphi|)$, as $\{|\varphi|\}^{\downarrow}$.

First order InqB. The language of first order InqB will contain our usual connectives, as well as the inquisitive operators, ! and ?, and quantifiers, written as $\exists\!\!\!|$ and $\forall\!\!\!|$. That is, it can be defined as follows:

Definition 2. The language of first order InqB*:*

$$\varphi := R(t_1 ... t_2) \mid \neg\varphi \mid \varphi \wedge \varphi \mid \varphi \vee \varphi \mid !\varphi \mid ?\varphi \mid \forall\!\!\!|\varphi \mid \exists\!\!\!|\varphi$$

We can now recursively associate a proposition to each sentence of our first-order language. That is, the inductive clauses for first order InqB will be as follows:

(11) Semantics of first order InqB (Ciardelli et al., 2013):

$$\begin{aligned}
[\![R(t_1 \ldots t_2)]\!] &:= \{|R(t_1 \ldots t_2)|\}^{\downarrow} \\
[\![\neg\varphi]\!] &:= [\![\varphi]\!]^{*} \\
[\![\varphi \wedge \psi]\!] &:= [\![\varphi]\!] \cap [\![\psi]\!] \\
[\![\varphi \vee \psi]\!] &:= [\![\varphi]\!] \cup [\![\psi]\!] \\
[\![!\varphi]\!] &:= [\![\varphi]\!]^{**} \\
[\![?\varphi]\!] &:= [\![\varphi]\!] \cup [\![\neg\varphi]\!] \\
[\![\forall x.\varphi(x)]\!] &:= \cap_{d \in D} [\![\varphi(d)]\!] \\
[\![\exists x.\varphi(x)]\!] &:= \cup_{d \in D} [\![\varphi(d)]\!]
\end{aligned}$$

Negation. In this framework, the negation of sentence φ, $\neg\varphi$, will express the downward-closed set consisting of all states in which φ is false at any world in that state. More formally, negation will correspond to the notion of an absolute pseudo-complement: the absolute pseudo-complement of a proposition $[\![\varphi]\!]$, which will be denoted as $[\![\varphi]\!]^{*}$, is the weakest proposition $[\![\psi]\!]$ such that $[\![\psi]\!] \cap [\![\psi]\!]$ entails any other proposition. Since the only proposition that entails any other proposition is $\{\emptyset\}$, denoted as $\bot$, $[\![\varphi]\!]^{*}$ can be characterized as the weakest proposition $[\![\psi]\!]$ such that $[\![\varphi]\!] \cup [\![\psi]\!] = \bot$. In classical logic, it consists simply of all worlds that are not in $[\![\varphi]\!]$ itself, i.e. the complement of $[\![\varphi]\!]$. In InqB it can be defined as follows (Ciardelli et al., 2013):

(12) $[\![\varphi]\!]^{*} := \{s \mid \forall s' \subseteq s : \text{ if } s' \neq \emptyset, \text{ then } s' \notin [\![\varphi]\!]\}$

Conjunction, disjunction and the quantifiers. Conjunction and disjunction can be expressed in terms of the algebraic notions of *meet* and *join*, where a conjunction of two sentences is the meet of each of its conjuncts and a disjunction the join of each of its disjuncts. That is, the meet of a set of propositions Σ will be defined as the intersection of all the propositions in that set. The join of a set of propositions will be the union of all the propositions in that set (Ciardelli et al., 2013). The universal and existential quantifier can also be defined in terms of the meet and join operations, as they correspond to infinitary meet and join respectively.

(13) InqB: $\bigcap \Sigma := \{s \mid s \in P \text{ for all } P \in \Sigma\}$

(14) InqB: $\bigcup \Sigma := \{s \mid s \in P \text{ for some } P \in \Sigma\}$

The projection operators. The ? operator ensures inquisitiveness: when applied to any (informative) proposition $[\![\varphi]\!]$, it will return the union of this proposition and its complement. Since a proposition together with its complement always covers the whole logical space, this operator also trivializes the informative content of a proposition.

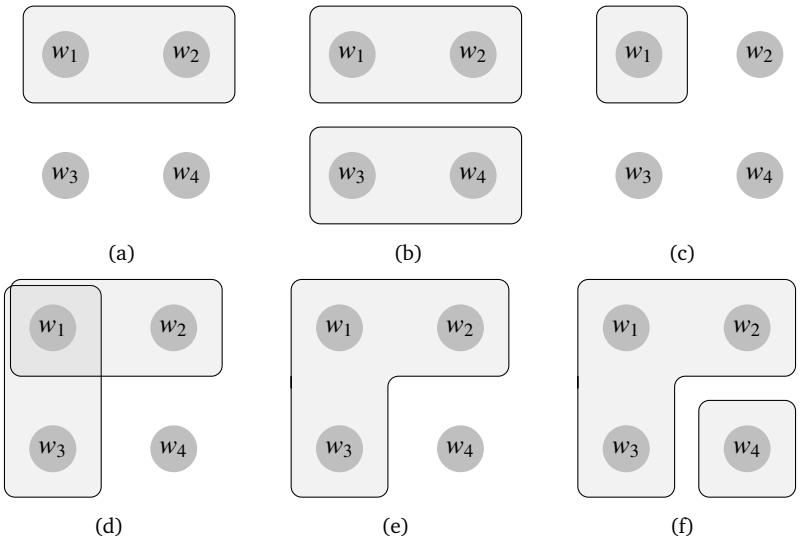


Figure 1.1: Propositions $P(j)$,$?P(j)$, $P(j) \wedge P(m)$, $P(j) \vee P(m)$, $!(P(j) \vee P(m))$, and $?!(P(j) \vee P(m))$ respectively

The ! operator, on the other hand, kills inquisitivity while leaving the informative content of an utterance intact. In this sense, it is comparable to the existential closure operation as defined in a Hamblin style system. The ! operator corresponds to double negation, and it will therefore always flatten out alternatives. That is, since the complement of a proposition will never be inquisitive, the double negation will also be non-inquisitive. This operator will therefore be equivalent to taking the powerset of the union of the proposition. It will therefore always hold that $info(\varphi) \in [\![!\varphi]\!]$.

Examples and diagrams. In a very simple setting in which we consider only one 1-placed predicate, *going to the party*, translated as P and we have only two individuals John and Mary, j and m, in our domain, we can represent the proposition expressed by the sentence, *John is going to the party*, $P(j)$ as in fig. 1.1(a). Here we interpret the topmost worlds w_1 and w_2 as the worlds in which $P(j)$ is true and the leftmost worlds w_1 and w_3 as the worlds in which $P(m)$ is true. Even though propositions are always downward-closed, to keep these figures readable, only the maximal elements of the proposition are depicted, which is in this case only a single set of worlds. I will make use of these visual representations of inquisitive propositions throughout this thesis.

The main source of inquisitiveness within this system is the join operation, and a proposition with non-trivial inquisitive content is therefore always formed out of a disjunction or an existential expression.

A PolQ like (15) can in this sense be understood as expressing an inquisitive proposition which raises the issue whether John went to the party or not, i.e. whether the

actual world is a $P(j)$ or a not $P(j)$ world.

(15) Did John go to the party?

Such a question will be modeled as the proposition $[\![?P(j)]\!]$, which is formed out of a proposition $[\![P(j)]\!]$ by taking the join of $[\![P(j)]\!]$ and its absolute pseudo-complement. In other words, the question operator, ?, that is responsible for this, takes the set of alternatives introduced by the proposition $[\![P(j)]\!]$ and adds in its negation. This can be represented as in fig. 1.1(b).

A natural language conjunction as in (16a), translated as $P(j) \wedge P(m)$ can be represented by the diagram in fig. 1.1(c), but the disjunctive sentence in (16b) cannot directly correspond to $P(j) \vee P(m)$. This is because $P(j) \vee P(m)$, represented as in fig. 1.1(d), is a proposition with non-trivial inquisitive content and should therefore be interpreted as a question.

(16) a. John and Mary went to the party.
b. John or Mary went to the party.

Just as in alternative semantics, we to get rid of the alternatives that are by default introduced by the disjunction. We thus need a flattening operation to derive the correct meaning of declarative disjunctions. Declaratives like (16b) therefore correspond to $!(P(j) \vee P(m))$, which is illustrated in fig. 1.1(e). This proposition will resemble a classical disjunction in the sense that it is a downward-closed version of the state that supports a classical proposition $P(j) \vee P(m)$.

An AltQ as in (17) will therefore roughly correspond to a sentence like $P(j) \vee P(m)$, since this sentence expresses the proposition which raises the issue whether the actual world is a world which John went to the party or a or a world in which Mary went.

(17) Did John or Mary go to the party?

Representing alternative questions as disjunctions in this way will be a serious oversimplification of the actual facts, however. In the next chapter it will become clear why.

Again foreshadowing what will be discussed in the next chapters, the question in (17) can also be understood as a PolQ. The meaning of such a disjunctive PolQ that can be derived using the !-operator and the ?-operator; the first turns its complement into a non-inquisitive proposition, while maintaining its informational content and the second turns its complement into an inquisitive proposition. The proposition denoted by $!(P(j) \vee P(m))$ will thus have the same informational content as $P(j) \vee P(m)$, but will not be inquisitive. The sentence $?!(p \vee q)$ now represents the disjunctive PolQ, as illustrated in fig. 1.1(f). The proposition expressed by this is again inquisitive in the sense that it contains two maximal elements, but in this case the alternatives are the

classical disjunction $P(j) \vee P(m)$ on the one hand and its complement on the other. Representing a polar disjunctive question in this way therefore means that in uttering such a question an issue is raised that can be resolved by either establishing that the actual world is a $P(j)$-or-$P(m)$ world or a world in which neither John nor Mary went to the party.

A WhQ also denotes a set of alternatives, and like PolQs and AltQs, these alternatives can be understood as possible resolutions. For example, a question like the one in 2 will then denote a set of alternatives which are of the form 'x let the dogs out', where x is an individual in the domain. In other words, a question like (2) will be represented as containing an existential quantifier, quantifying over individuals in the domain. In a tiny universe with only two individuals, this can also be represented as in fig. 1.1(e) below, in which w_1 and w_2 are worlds in which some individual a left, w_1 and w_3 are worlds in which some individual b left and w_4 a world in which no one left.

1.2.3 Typed inquisitive semantics

In InqB, no compositional translation procedure from natural language to semantic meaning is provided. In other words, the framework does not specify how exactly these logical formulas correspond to natural language expressions. I therefore briefly discuss the extended framework of typed inquisisive semantics, in which the denotation of sub-sentential constituents can also be derived.

Typed inquisitive semantics will simply add a type system to the basic inquisitive semantics framework, in which, as usual, e is the basic type for individuals, s is a basic type for worlds and t the basic type for truth values.

A Hamblin-style proposition expressed by a sentence like *it is raining* can be written as in (18a), and is therefore taken to be of type $\langle st\rangle$. A proposition in inquisitive semantics is like a Hamblin-style proposition except that it is of a higher type and it is downward-closed. Adding downward-closure and lifting the type will give us the denotation as in (18b) for the proposition expressed by the same sentence in inquisitive semantics. An inquisitive proposition is therefore of type $\langle\langle st\rangle t\rangle$: a set of information states (or sets of worlds) (Champollion, Ciardelli, & Roelofsen, 2015). I will abbreviate this as T throughout this thesis.

(18) a. $\lambda w.\text{raining}(w) = |raining|$
b. $\lambda p.p \subseteq \lambda w.\text{raining}(w) = \{|raining|\}^{\downarrow}$

Sub-clausal constituents will usually be of an even higher type: n-placed predicates will be of type $\langle e^n, T\rangle$, for example. That is, an one-placed predicate will be of type $\langle e, T\rangle$, and a two-placed predicate of type $\langle e, eT\rangle$. To give a concrete example, we can suggest that the predicate *talks* denotes a function from individuals to sets of info states that contain enough information that this individual talks. We can for example suggest the

following (Champollion et al., 2015). I will abbreviate this as in (20).

(19) $[\![left]\!] = \lambda x_e \lambda p.p \subseteq \lambda w.talk(x)(w).$ type $\langle e, T\rangle$

(20) $[\![left]\!] = \lambda x_e.\{|Lx|\}^{\downarrow}$

Since we want to deal with sub-clausal coordinations as well, we need to adopt a generalized notion of inquisitive disjunction and conjunction. These may be defined as in (21). Just like in a Hamblin-style compositional system, we need to restrict arguments that *and* and *or* can take to arguments of a specific type. Recall that in a Hamblin-style framework this meant that the type of conjuncts had to be t-reducible—they had to "end" in type t. Since the basic type of propositions is T in typed inquisitive semantics, we simply say that conjunctions apply to expressions that are T-reducible.

(21) a. $[\![and]\!] := \lambda P_\tau \lambda Q_\tau \lambda R_{\tau_1}.P(R) \cap Q(R)$
b. $[\![or]\!] := \lambda P_\tau \lambda Q_\tau \lambda R_{\tau_1}.P(R) \cup Q(R)$ where τ is a T-reducible type

Definition 3. *A type τ is called T-reducible iff $\tau = T$ or $\tau = \langle \tau_1 \tau_2 \rangle$ where $\tau_1 \neq T$ and τ_2 is a T-reducible type*

This will allow us to define the denotation of subsentential disjunctions. For example, an subsentential disjunction like 'sings or dances' will now denote a function from entities to propositions that contain enough information to establish that the individual sings or that the individual dances. Hence, the type of such a disjunction like 22 will be $\langle e, T\rangle$—just like each of the disjuncts. Again, I abbreviate the denotation of subsentential negation as in (22b), using a similar notation as above.

(22) [\![sings or dances]\!]
a. $= [\![or]\!]([\![sings]\!])([\![dances]\!])$
b. $= \lambda x_e\{|S\,x|, |F x|\}^{\downarrow}$

1.2.4 Concluding remarks

In short, the treatment of coordinated questions is in many ways very similar in alternative and inquisitive semantics. In both frameworks, the meaning of AltQs is crucially derived by relying on the assumption that disjunction generates alternatives. A flattening operation is required in both frameworks to account for the meaning of declarative disjunctions.

One crucial difference between alternative and inquisitive semantics is that in inquisitive semantics, disjunction and conjunction simply correspond to join and meet operations respectively. This means that inquisitive semantics allows us to treat disjunctions and conjunctions in a more uniform way—without having to rely on pointwise functional application in the case for disjunction but not for conjunctions.

Moreover, in inquisitive semantics declaratives and interrogatives are of the same type, which makes it much more straightforward to compare conjunctions and disjunctions of and in different clause types. Since propositions are always of the same type no matter their clause type, this will simplify things on the subsentential level as well.

This flexibility might be interpreted as coming with an important cost, however. As will become clear in the next chapter, it is not always felicitous to coordinate clauses of different clause types. I will therefore adopt the framework of inquisitive semantics *as a framework*, and I will crucially not interpret the compositional freedom of inquisitive semantics as having any predictive power. That is, even though it might be possible within the logical system to coordinate all kinds of clauses, I will, of course, not interpret this as a prediction that this should indeed be possible in natural language. In the next chapter, several examples of this will be discussed.

Chapter 2

SOME PUZZLES

In this section, I will lay out the empirical landscape concerning coordinated questions by presenting some puzzles related to disjoined interrogatives. Since there are several factors at play in the construction of coordinated questions (the type of coordinator, the clause type of conjuncts, the intonational pattern on each conjunct, the size of the conjuncts and so on) spelling out the full range of possibilities along with their possible meanings would be a tedious and slightly boring task, so I will spare the reader such an overview. Instead, I will only discuss some of the highlights, by presenting several minimal pairs that turn out not to have a minimally different interpretation. It will become clear that many of these puzzles are part of two more general patterns, namely (i) alternative questions behave significantly different than polar questions and (ii) conjunctive questions behave significantly different from disjunctive questions. Although the first pattern has been noted many times in the literature and is proven difficult to account for, the second pattern has received less attention. The goal of this thesis will be to account for these patterns by solving at least some of the puzzles discussed in this chapter.

2.1 Focus marking

The disjunctive question in (23) can be pronounced in at least four different ways, as shown in (23a–d). The specific way in which this question is pronounced is crucial in determining its meaning: (23a) is unambiguously a PolQ, while I will argue that both (23c) and (23d) are AltQs. In this section, I will discuss the contrast between (23a) and (23c). I will focus on the contrast between these two questions on the one and the questions in (23b) and (23d) on the other hand in the next section.

(23) Is it raining or snowing?

a. Is it raining or snowing$_{\text{H-H\%}}$ × AltQ, ✓PolQ

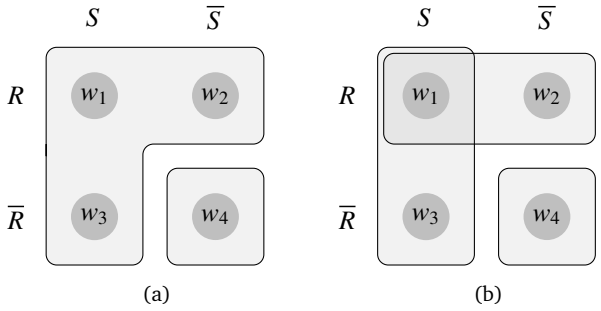


Figure 2.1: Denotation of a disjunctive PolQ and open AltQ respectively

b.	Is it raining or snowing$_{\text{L-L\%}}$	? AltQ, ? PolQ
c.	Is it raining$_{\text{L*H-}}$ or snowing $_{\text{H*H-H\%}}$	✓AltQ, × PolQ
d.	Is it raining$_{\text{L*H-}}$ or snowing $_{\text{H*L-L\%}}$	✓AltQ, × PolQ

What crucially distinguishes (23a) from (23c) is their intonational pattern. The question in (23a) should be read as a question with a rising boundary tone (indicated with H-H%) and no separate pitch accents on the disjuncts, while the question in (23c) has a rising pitch accent on the first disjunct (indicated with L*H, cf. Bartels, 1999) as well as a rising boundary tone. Also note that the questions in (23) at first sight all seem to have the same syntactic structure: they both contain disjunctions and exhibit an interrogative word order.

Semantically, these respective intonational patterns give rise to different readings: while we can think of (23a) as raising an issue which can be resolved with a "yes" or a "no" answer, this is not the case for the question in (23c). That is, we can interpret (23a) in case a speaker simply wants enough information to establish whether to expect some kind of precipitation, and, if so, does not need any more specific information about whether it is raining or snowing. This means that the meaning of this question can be represented in an inquisitive system as a proposition containing only two alternatives: the information state in which the classical disjunction is true in all worlds, and the information state in which the disjunction is false in all worlds. Similarly, in a Hamblin style system, the denotation of this question can be represented as the set of these two propositions.

The addressee has to be more specific to resolve the issue in (23c), however. In (23c), the disjunction actually introduces alternative ways of resolving this question: the only possible way of resolving this question is by establishing either that it is raining, that it is snowing, or that neither is the case. The difference between (23a) and (23c) can thus be represented in fig. 2.1(a) and fig. 2.2(b) respectively.

In the literature, a question like (23c) is sometimes referred to as an *open disjunctive question*, but I argue that such a question should be considered an AltQ too. That is,

the crucial property of an AltQ is that the disjunction itself introduces different alternatives. The disjunction introduces two out of three alternatives in this case, while in a canonical AltQ the disjunction introduces all of the alternatives denoted by question as a whole. I will therefore refer to the question here as an *open AltQ*, while I will call disjunctive questions with a final fall (as in (23d)) *closed AltQs*.

Since the questions in (23) look very similar, these different meanings must arise due their distinct intonational patterns. So what are the crucial properties of these patterns? The fact that (23c) has multiple pitch accents distinguishes it as an AltQ from (23a) as a PolQ. It therefore seems reasonable to conclude that the presence of multiple pitch accents is ultimately responsible for the different readings in these questions.[1]

In particular, a widely accepted claim is that pitch accents correspond to focus marking of the corresponding constituents: in AltQs, each disjunct is focus marked, but in PolQs it can be the whole disjunction or a different constituent that receives focus marking (Han & Romero, 2004a; Roelofsen & van Gool, 2009). Below and in subsequent chapters, I indicate focus marking using small caps. Although it is not clear whether it is the focus marking itself that is responsible for the interpretative differences between PolQs and AltQs, it seems that the presence of multiple foci is at least crucial in telling them apart. The crucial question then is: how does focus marking ultimately affect the semantics?

A possible hint to answer this question might be found in the observation that this contrast between PolQs and AltQs disappears in bi-clausal disjunctive questions: (24) always receives the same interpretation as (23c). The question in (24) must be interpreted as an open AltQ, and—no matter the intonational pattern—we will never obtain a PolQ interpretation in bi-clausal disjunctions.

(24) Is it RAINING$_{\text{L*H-}}$ or is it SNOWING$_{\text{L*H-H\%}}$ × PolQ, ✓AltQ

The fact that bi-clausal disjunctive questions always have an AltQ reading might be taken as evidence that bi-clausality is inherently linked to the availability of AltQ readings. This would mean that seemingly mono-clausal disjunctions with multiple foci are actually underlyingly bi-clausal too. If this is the case, then what is the link between focus marking and the underlying syntactic structure?

We can also compare these disjunctive questions with their conjunctive versions,

[1] Based on experimental data provided by Pruitt and Roelofsen (2013), it is often concluded that it is the final fall of disjunctive questions that distinguishes them as AltQs from PolQs. That is, in their experiments Pruitt & Roelofsen found that participants interpreted questions that looked like (23b) as AltQs too. One possible confound in interpreting this data is that in (23b), the boundary tone might still be interpreted as a pitch accent since the right edge of the negation aligns with the sentence boundary. See also Meertens, Eggers, and Romero (2018) for further discussion on this data. Most importantly, the data above shows that it cannot be the falling boundary tone that is the crucial prosodic cue if we look at a wider range of AltQs that do not have a final fall.

which will give us the mono-clausal conjunction in (25) and the bi-clausal one in (26). In doing so, we observe a similar relation between intonation and interpretation, where mono-clausal conjunctions with one pitch accent (or one focus marked constituent) are interpreted differently than the mono-clausal questions with multiple pitch accents as in (25). Just as in the disjunctive case, we also observe that the mono-clausal conjunctions with multiple pitch accents are interpreted similarly to their bi-clausal counterparts. That is, the question in (25b) have the same interpretation as the one in (26).

(25) a. Is it windy and cloudy$_{\text{L* H-}}$ in Amsterdam$_{\text{H-H\%}}$
b. Is it windy$_{\text{L*H-}}$ and cloudy$_{\text{L* H-}}$ in Amsterdam$_{\text{H-H\%}}$

(26) Is it windy$_{\text{L*H-}}$ and is it cloudy$_{\text{L*H-}}$ in Amsterdam.$_{\text{H-H\%}}$

The question is therefore why we see this difference in questions with different intonational patterns. Since I assume here that it is crucially a difference in focus marking that is indicated by these intonational patterns, I summarize this first puzzle in the following way:

Puzzle 1. Focus marking: *What is the exact relationship between focus marking, the underlying syntactic structure and the interpretation of coordinated questions?*

2.2 Rises and falls

A different but related puzzle concerns the contribution of rising and falling intonation in polar questions as exemplified in (27a) and alternative questions as exemplified in (28a). In both these cases, I indicate a final fall with L-L% and a final rise with H-H% again (Pierrehumbert, 1980; Pierrehumbert & Hirschberg, 1990). If we only focus on the boundary tone, and ignore the presence or specific nature of pitch accents, we observe that the boundary tone has an effect on the interpretation of AltQs, but not so much on PolQs. That is, the question in (27a) seems to have roughly the same resolution conditions as (27b), but we observe a difference in resolution conditions between (28a) and (28b).[2]

(27) a. Is it raining?$_{\text{L-L\%}}$
b. Is it raining?$_{\text{H-H\%}}$

(28) a. Is it raining or is it snowing?$_{\text{L-L\%}}$
b. Is it raining or is it snowing?$_{\text{H-H\%}}$

As in the previous section, I call (28b) an open AltQ, while I will refer to questions

[2] If there is a difference between (27a) and (27b) at all, this difference is mostly likely pragmatic in nature since both questions can be resolved in the exact same way.

like (28a) as closed AltQs. Before I go into their interpretational differences, I will first briefly discuss in what ways their intonational patterns are different.

The most obvious difference between (28a) and (28b) is that the first is pronounced with a falling boundary tone, while the second is pronounced with a final rise. However, the final fall in closed AltQs is usually accompanied by a falling pitch accent too, giving rise to what is often called "contrastive intonation", i.e. a rising first pitch accent and a falling final pitch accent. This is shown in (29) below.[3]

(29) a. Is it raining$_{\text{L*H-}}$ or is it snowing$_{\text{H*L-}}$ in Amsterdam$_{\text{L-L\%}}$
b. Is it raining$_{\text{L*H-}}$ or is it snowing$_{\text{L*H-}}$ in Amsterdam$_{\text{H-H\%}}$

Semantically then, there seem to be two crucial differences between open and closed AltQs.

The first difference is that closed AltQs are usually interpreted as exclusive disjunctions, whereas open AltQs are interpreted inclusively (Zimmermann, 2000; Roelofsen & van Gool, 2009; Rawlins, 2008b; Roelofsen, 2015). For AltQs, this would mean that in response to a question as in (30), it is more natural to respond with an answer like the one in (30b) than with one like (30a). By using the intonational pattern of a closed AltQ, the speaker therefore seems to assume that the addressee does not have both a dog and a cat, and it is this assumption that needs to be explicitly cancelled by using a phrase like *actually*.

(30) A: Do you have a cat$_{\text{L*H}}$ or a dog?$_{\text{H*L-L\%}}$
a. B: #Both.
b. B: Actually, I have both.

Many authors therefore conclude that contrastive intonation at least marks the disjuncts to be exclusive in the sense that the at issue content is strengthened by exhaustifying each disjunct with respect to the other disjuncts. (Roelofsen & van Gool, 2009; Rawlins, 2008b; Roelofsen, 2015).[4]

Second, closed AltQs also differ from open ones in that they are interpreted *exhaustively*. That is, in closed AltQs, the alternatives that are introduced by the disjunction exhaust the possible ways in which the question itself can be resolved. Or, in other words, not only the "both" answer is odd, the "neither" answer seems to be out too.

[3]The way the term "contrastive intonation" is used in the literature is actually vague to some extent, as it is not clear whether it specifically refers to a tune characterized by a final fall or a falling final pitch accent. Since the latter never goes without the first (see (i)), it seems difficult to really distinguish between the two.

(i) a. #Is it raining$_{\text{L*H-}}$ or is it snowing$_{\text{L*H–}}$ in Amsterdam$_{\text{L-L\%}}$
b. #Is it raining$_{\text{L*H-}}$ or is it snowing$_{\text{H*L-}}$ in Amsterdam$_{\text{H-H\%}}$

[4]Under many analyses, exclusivity comes in as a presupposition in closed AltQs, but it is not clear that it should necessarily be analyzed as such.

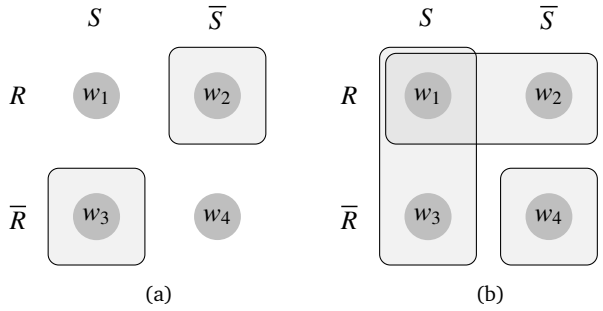


Figure 2.2: Denotation of a closed AltQ and open AltQ respectively

This is illustrated in (31) below.

(31) A: Do you have a $\text{cat}_{\text{L*H}}$ or a dog?$_{\text{H*L-L\%}}$

a. B: #I only have a goldfish.

b. B: Actually, I only have a goldfish.

For open AltQs, on the other hand, it is perfectly fine to respond with an alternative that is not introduced by the disjunction itself. That is, the following scenario is perfectly natural:

(32) A: Do you have a $\text{cat}_{\text{L*H}}$ or a dog?$_{\text{H-H\%}}$
B: I only have a goldfish.

In short, the denotation of the open and closed AltQ in (28a–b) should be as in (33a–b) below. We can also visually represent this difference as in fig. 2.2(a) and fig. 2.2(b).

(33) a. $[\![(28a)]\!] = \{|\text{ it is only raining}|^{\downarrow}, |\text{ it is only snowing}|^{\downarrow}\}$

b. $[\![(28b)]\!] = \{|\text{ it is raining}|^{\downarrow}, |\text{ it is snowing}|^{\downarrow}, |\neg\text{ it is raining} \wedge \neg\text{ it is snowing}|^{\downarrow}\}$

Interestingly, we do not see any of these "special effects" of falling intonation in simple PolQs. Even though PolQs with a rising intonation are often considered less marked than PolQs with falling intonation, this latter type of question is actually a lot more common than one might expect. In fact, a large proportion of the polar questions uttered in natural occurring speech are marked with a final fall (Geluykens, 1988; Bartels, 1999; Savino, 2012). Intuitively, however, the question in (27a) still has two possible resolutions—just like it's counterpart with a final rise.

The crucial point is that the question operator, whether we take that to be a Hamblin-style polar question operator or the ? operator in inquisitive semantics, has to be present in PolQs, independently of their intonational pattern. For AltQs this is not the case. In an open AltQ with rising intonation, we also seem to need a question oper-

ator to be present in the syntactic structure: this question operator is required to add the third alternative in (33b). On the other hand, the denotation of the closed AltQ in (28a) should only have two alternatives, each introduced by one of the disjuncts. This means that there cannot be any question operator responsible for adding the set-theoretic complement of these alternatives present at all in the syntactic structure—or at least it does not directly manifest itself in such a question. The difference between rising and falling intonation in open and closed AltQs therefore seems to express itself semantically in the presence or absence of (i) an exclusive strengthening operator and (ii) a question operator, while in PolQs intonational patterns do not seem to have such an effect at all.

Again we can make the comparison with conjunctive questions too, and we also observe that such questions behave more like PolQs, since here too, the boundary tone does not seem to make a difference in their interpretation. In other words, the questions in (34a) and (34b) have a similar interpretation, just as was the case for a simple PolQ.

(34) a. Is it raining and is it snowing?$_{\text{L-L\%}}$
b. Is it raining and is it snowing?$_{\text{H-H\%}}$

The problem is therefore that the presence of the question operator seems to be triggered by rising intonation in disjunctive questions, but this question operator is present in conjunctive questions no matter the intonational pattern. Note that this problem too is independent of the specific semantic framework that we adopt; both under an inquisitive and alternative semantics treatment of polar and alternative questions, we run into this problem since in any case the question operator should introduce a new alternative, thereby leaving us with too many unwanted alternatives for AltQs with falling intonation. I thus summarize this second puzzle in the following way:

Puzzle 2. Falling intonation: *How can we derive the semantic contribution of rising vs. falling intonation in a uniform, compositional way?*

2.3 Disjunction Lowering

Another, perhaps surprising, contrast between PolQs, AltQs and conjunctive questions is what I will call the puzzle of *Disjunction Lowering*.[5] Consider the minimal pair in (35b) and (35a):

(35) a. Is it WINDY$_{\text{L*H-}}$ and is it CLOUDY?$_{\text{L*H-H\%}}$
b. Is it WINDY$_{\text{L*H-}}$ or is it CLOUDY?$_{\text{L*H-H\%}}$

[5] I adopt this term from Gärtner and Michaelis (2010) and Krifka (2001), who use it to refer to similar phenomena.

Intuitively, in the question in (35a), the speaker wants to know whether or not it is true that it's windy and whether or not it is true that it's cloudy. In responding to such a question, an addressee must resolve both issues raised by each conjunct. In total, this gives four minimally informative resolutions: we can resolve this question as a whole either by establishing that it is both windy and cloudy, by establishing that it is only windy but not cloudy, by establishing that it is only cloudy but not windy or by establishing that neither is the case. Hence, the denotation of such a question in an inquisitive system should have of four alternatives. Similarly, in a Hamblin-style system, the denotation of this question would be a set of four classical propositions.

In order to derive this, the complement of each conjunct, i.e. the "no" answer to each conjunct should play a role in the set of info states the question as a whole denotes. In particular, this means that we need a question operator inside each conjunct. In a sense, this also means that we can derive conjunctive questions as conjunctions of PolQs: the meaning of (35a) can simply be taken to be the proposition expressed by the sentence $?w \wedge ?c$.

Crucially, however, assuming that a question operator would be present inside each disjunct in (35b), would yield the wrong denotation for such a question. Even though (35b) could be resolved by establishing that it is neither windy nor cloudy (as already discussed above), just negating one of the disjuncts is not a good answer to this question, nor does it in any way resolve the issue raised by this question. To see this, note that the dialogue in (36) seems rather odd—in giving such a response the speaker should at least provide an explanation for their lack of informativeness.

(36) A: Is it raining or is it snowing?$_{\text{H-H\%}}$
B: # It's not raining.
B: # It's not snowing.

Thus, the denotation of (35b) cannot be the one in (37a). What this means is that we do not want to assume that a question operator is applied to each disjunct in AltQs with rising intonation. This contrasts with what we saw for the conjunctive question in (35a), where we do need a question operator inside each conjunct.

In fact, for conjunctions it is exactly the other way around, in the sense that we cannot interpret (35a) with a question operator scoping over the conjunction. The question in (35a) cannot be interpreted as denoting the set of propositions in (37b), since this would mean that answering (35a) with "it's not both raining and snowing" would resolve the issue raised by this question but it clearly does not do so.

(37) a. $[\![(35b)]\!] \neq \{|\text{ it is raining}|, |\text{ it is snowing}|, |\neg\text{ it is raining}|, |\neg\text{ it is snowing}|\}$
b. $[\![(35a)]\!] \neq \{|\text{ it is raining} \wedge \text{ it is snowing}|, |\neg(\text{ it is raining} \wedge \text{ it is snowing})|\}$

So while the meaning of (35a) can be represented only as in fig. 2.3(b) and not as in

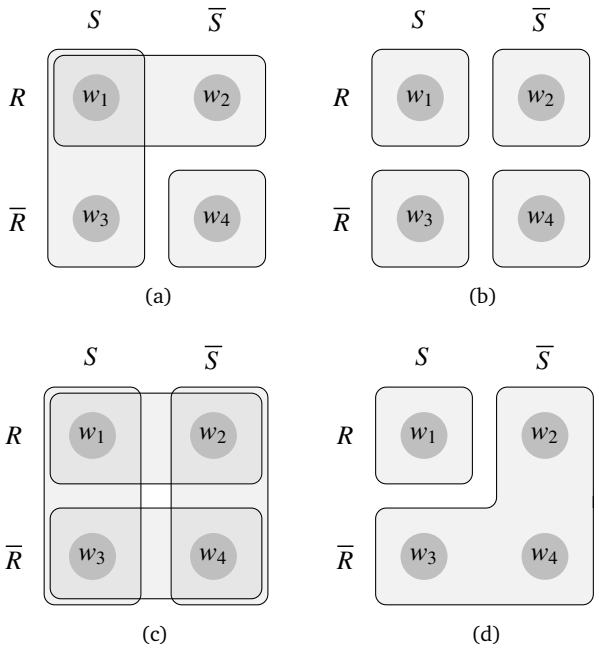


Figure 2.3: $?(S \cup R)$, $?S \cap ?R$, $?S \cup ?R$ and $?(S \cap R)$

fig. 2.3(d), the meaning of (35b) should be represented as in fig. 2.3(a), but not as in fig. 2.3(c).

This means that the underlying structure of disjunctive questions has to be crucially different from that of conjunctive questions, even though they not only receive a similar intonational pattern, but also really *look* similar in terms of their surface syntactic structure. Schematically, we can represent this difference as in (38a) and (38b) respectively: while the question operator has to scope over full disjunctions, conjunctions always take scope over question operators.

(38) a. $Q(raining \vee snowing)$
b. $Q(raining) \wedge Q(snowing)$

Both semantically and syntactically there is no reason to expect this difference to arise, because on a sub-sentential level, conjunction does not seem to behave much differently from disjunction at all. Moreover, both in a Hamblin-style and an inquisitive framework, there would be nothing intrinsically wrong with raising an issue as the one depicted in fig. 2.3(c) or fig. 2.3(d). I thus summarize this puzzle as follows:

Puzzle 3. Disjunction lowering: *Why does the question operator always take scope over disjunctions, while in conjunctive questions each conjunct contains a question operator?*

2.4 Embedding

Similar to the distinction between AltQs and PolQs, we observe a difference between the following two sentences.

(39) a. John wonders whether it's raining or snowing. ✓PolQ, ✓AltQ, ✓WS
b. John wonders whether it's raining or whether it's snowing. ✓AltQ, ✓WS

The crucial observation here is that the sentence in (39a) has three possible readings, while the sentence in (39b) only has two. Not all of these readings are immediately obvious, so I will quickly go over them below.

Under one reading of (39a), John considers both the possibility that it is either raining or snowing and the possibility that it is neither, and he wonders which of the two is the case. This means that John's state of mind is that of a disjunctive PolQ under this particular interpretation—that is, John is entertaining the issue *whether or not it is raining or snowing*.

Under the second reading of (39a), John is wondering which of the following two is true: it is raining, or it is snowing. This means that John is entertaining the issue which corresponds to a closed AltQ.

The third reading is the wide scope disjunction reading (indicated as WS above), in which the speaker expresses uncertainty about the issue John is wondering about. Under this reading, each *whether*-clause is embedded under their own *wonder* predicate, which is elided in the second disjunct. Each embedded question corresponds to a PolQ in this case.

Intonation helps in distinguishing between these readings, but seems a much weaker cue than at the matrix level. The second AltQ reading might be the stronger one if the disjunction is pronounced with contrastive pitch accents—just as in an AltQ at the matrix level, but pronouncing the disjunction with a flat, block intonation does not unambiguously turn the embedded question into a PolQ. Similarly, the third WS reading might be the stronger one if the disjunction is pronounced with a pause after the first disjunct, indicating that parts of the second disjunct are elided, although an AltQ reading would not be ruled out under such a pronunciation.

Crucially, for (39b) only the closed AltQ and the WS reading are available. This therefore parallels the root case, where a PolQ reading is generally not available if the disjuncts are full clauses. Like in a PolQ at the root level, we need a question operator under the PolQ reading of (39a). Since (39a) may also be read as a closed AltQ, but, crucially, never as an open one, we again need the question operator to be absent under the second AltQ reading of (39a).

Again, in comparing embedded disjunctive questions with embedded conjunctive ones, we observe that conjunctive questions behave as the conjunction of PolQs, while disjunctive questions cannot be analyzed as disjunctions of PolQs. That is, in (40), John

wants to find out what the answer is to the polar question *is it raining in Amsterdam* and he wants to know the answer to the polar question *is it raining in Rotterdam*.

(40) John wonders whether it is raining in Amsterdam and whether it is raining in Rotterdam.

We thus see that embedded questions pattern with root questions that are marked with a final fall in the sense that we need a question operator in PolQs and conjunctions of PolQs, but not in AltQs.

A possible way of deriving this difference is to assume a different PolQ and AltQ operator, but in both the matrix and the embedded case, there does not seem to be any morphosyntactic difference between the two at all. In fact, cases like (39b) where each disjunct contains a *whether* clause might provide evidence against such an approach. That is, for embedded interrogatives it is often assumed that it is the interrogative complementizer *whether* itself, that is responsible for the question semantics (cf. Larson, 1985; Han & Romero, 2004a; Rawlins, 2008b). Given the different questions above, *whether* should then be ambiguous between the PolQ operator, an AltQ operator and an operator that is completely vacuous. If this is the case, bi-clausal embedded AltQs with two *whether*'s should be interpreted as having two such operators, but these questions are neither interpreted as a disjunctions of PolQs, nor as a disjunction of AltQs. The problem with such an approach is therefore not only that we do not know how to determine which operator *whether* actually corresponds to, but also that a bi-clausal embedded AltQs really should only have one question operator, not two.

Now, examples such as (39b) are often done away as either being ill-formed or as different constructions than embedded AltQs with a single *whether*. However, they do seem to have the exact same meaning and they are very commonly used—especially when the disjuncts are slightly longer. For the reader who is not yet convinced, here are some examples from the 'wild' which all just have a basic AltQ reading:

(41) It can then offer a suggestion to staff about **whether** to keep in custody a few more hours, **whether** to release them on bail before a charge, or **whether** to remand them in custody.[6]

(42) The new chairman must now decide [...] **whether** to appeal to those who want war or **whether** to ignore them and forge ahead with his own road for this troubled club. [7]

(43) **Whether** that interpretation turns out to be correct, or **whether** Mr. Gandhi's swift installation as Prime Minister will exercise a stabilizing influence, is not

[6] https://www.huffingtonpost.co.uk/entry/police-are-testing-an-ai-that-can-recommend-whether-a-suspect-should-be-held-or-not_u$k_5$91427e8e4b00b643ebb54b4

[7] https://www.thecourier.co.uk/fp/sport/football/dundee-united/610967/jim-spence-new-dundee-united-chairman-decide-whether-not-appease-fans-want-war/

clear.[8]

(44) At issue is **whether** the payment the men are discussing was campaign-related and intended to influence the election [...], or **whether** it was merely meant to shield the married Trump from an embarrassing revelation harmful to his personal life.[9]

Thus, *whether* cannot straightforwardly be equated to any kind of question operator, but if that is really the case then where does the question meaning come from in embedded questions? Again we seem to have a similar problem as we saw in the root case, since bi-clausal AltQs look like disjunctions of PolQs but are really not interpreted as such. so we can perhaps ask ourselves the following question:

Puzzle 4. Q in embedded questions: *What is the semantic contribution of 'whether', and if not from this complementizer, where exactly does the question interpretation come from in embedded questions?*

2.5 Overt "or not"

In PolQs, the question operator should at least introduce the complement of the proposition expressed by its prejacent. Another way of deriving a similar meaning is to trigger this complement by overtly stating it, that is, by adding an overt "or not" clause. What is puzzling about this is that if we do so, the meaning of polar questions does not really seem to change all that much, while alternative questions become very odd or even hard to interpret. For conjunctive questions, it is unclear whether it is felicitous to add an overt "or not" clause to each conjunct. To see this, consider again a minimal pair like the one in (45)

(45) a. Is it raining or not?$_{\text{L-L\%}}$
b. #Is it raining or not or is it snowing or not?$_{\text{L-L\%}}$
c. ?Is it raining in A'dam or not and is it raining in R'dam or not$_{\text{L-L\%}}$

Semantically, it seems that (45a) denotes the same set of propositions as a polar question without the overt "or not" clause. The question in (45b) on the other hand, is almost uninterpretable, while we would expect that it would simply denote a set of propositions corresponding to each of the four disjuncts. That is, assuming that the question operator does not appear in such an alternative question, just as it does not appear in the version without the overt "or not" clauses, we would expect (45b) to denote the set of propositions in (46). This might indeed be the denotation of such a question, but somehow this turns out to be very marked.

[8] https://archive.nytimes.com/www.nytimes.com/learning/general/onthisday/991031onthisday$_{b}ig.html$

[9] https://www.washingtonpost.com/politics/secret-tape-may-not-add-to-legal-jeopardy-for-trump-or-cohen/2018/07/26/fd2ea3f8-910c-11e8-ae59-01880eac5f1d$_{s}tory.html?utm_{t}erm$ = .1b8a102080b9

(46) $[\![(45b)]\!]_{alt} = \{|\text{it is raining}|, |\text{it is snowing}|, |\neg \text{ it is raining}|, |\neg \text{ it is snowing}|\}$

Note that even if both questions are pronounced with a rising boundary tone, we observe the same contrast in which the polar question seems much more natural than the alternative question.

Turning to embedded overt "or not" questions, we see a similar effect, where adding such a clause to an embedded PolQ does not seem to have any effect on its semantics. For embedded AltQs, on the other hand, we do observe a change in meaning, but here it does not necessarily result in infelicity. Instead, such an example might be saved as the disjunction in the embedded AltQ can be reinterpreted as taking wide scope over the full sentence. Therefore, the example in (47b) only has a reading which is similar to the sentence in (47c).

(47) a. John wonders whether or not it is raining.
b. John wonders whether or not it's raining or whether or not it's snowing.
c. John wonders whether or not it's raining or John wonders whether or not it's snowing.

In both the matrix and the embedded case, it is unclear why an interpretation as in (46) results in infelicity in a Hamblin style system. Also in an inquisitive system there is no straightforward way of explaining this based on the semantics of such questions alone, since overlapping alternatives are perfectly fine in this framework. We already saw above that AltQs generally do not have a question operator inside each disjunct, and even if we explicitly force such a reading, we end up with an infelicitous sentence. The fifth puzzle can thus be summarized as follows:

Puzzle 5. Overt "or not": *Is the semantic contribution of overt "or not" clauses the same as that of covert question operators, and if so, why is this infelicitous in AltQs?*

2.6 Mixed cases

Another difference between conjunctive and disjunctive questions is that disjoining a declarative and an interrogative clause is not always grammatical, while conjoining a declarative and interrogative usually is. For example, one might say something like (48a) or (48b) in the end of a meeting, but uttering something like (49a) or (49b) seems very odd. Therefore, it seems that "mixed" conjunctions can be felicitous, while "mixed" disjunctions are not.

(48) a. I want to end this meeting with two things: Where is John and someone should book a room for the next meeting.
b. I want to end this meeting with two things: Someone should book a room for the next meeting and where is John?

(49) a. ??...where is John or someone should book a room for the next meeting.
b. ??...someone should book a room for the next meeting or where is John?

There are, however, a few exceptions to this in which mixed disjunctions do seem to be fine. One might for example say:

(50) John is going for a walk, or is it raining?

The interpretation of such a disjunction cannot be that of a declarative disjoined with a polar interrogative. In other words, in a Hamblin-style system, the denotation of (50) is not the one in (51a)—if only because disjoining a declarative and an interrogative would result in a type mismatch between the two disjuncts. Even in inquisitive semantics, where both disjuncts would be of the same type, the denotation of (50) is hard to derive, since it's clearly not the one in (51b). What (50) *does* mean is unclear, but it cannot be derived in any standard way.

(51) a. $[\![(50)]\!]_{alt} \neq |\text{John is going for a walk}| \cup \{|\text{it's raining}|, |\neg \text{ it's raining}|\}$
b. $[\![(50)]\!]_{inq} \neq \{|\text{John is going for a walk}|\}^{\downarrow} \cup \{|\text{it's raining}|, |\neg \text{ it's raining}|\}^{\downarrow}$

Moreover, such cases are very sensitive to the order of the disjuncts. That is, a mixed disjunction that consists of an interrogative followed by a declarative is clearly out, as shown in (52). This order effect does not arise for mixed conjunctions.

(52) *Is John going for a walk or it is raining.

In the embedded case, it is a bit more difficult to test whether mixed disjunctions contrast with mixed conjunctions, because there is always a way to reinterpret embedded coordinations as coordinations of matrix clauses, where parts of the second conjunct are elided. However, assuming that disjoining a declarative and interrogative was grammatical, this would mean that such a disjunction itself denotes an inquisitive proposition. We would therefore expect that such a disjunction is embeddable under a rogative verb, but, in fact, it is not:

(53) a. *John wonders whether it's raining or that it's snowing.
b. *John wonders that it's raining or whether it's snowing.

(54) a. *John wonders whether it's raining and that it's snowing.
b. *John wonders that it's raining and whether it's snowing.

Now, we also see that a mixed conjunction is out under *wonder*, as shown in (54). Although this might mean that the contrast between mixed conjunctions and mixed disjunctions does not arise in the embedded case, the infelicity of (54) may also have to do with the lexical restrictions of *wonder* itself. Also for verbs like *know* it is difficult to tell what the status of embedded mixed conjunctions is, since embedding a mixed

conjunction is equivalent to conjoining two *know* clauses that each embed a clause.

However, if we look at examples like the following, we observe that both (55a) and (55b) are fine, but in this case, while (55b) can be the elided version of (56b), (55a) cannot be the elided version of (56a). That is, (56a) sounds very odd, presumably because of the exhaustive flavor that comes with the use of a pseudocleft.

(55) a. What John learned today is that it's always cloudy in Amsterdam and where to buy an umbrella.
b. What John learned today is that it's always cloudy in Amsterdam or where to buy an umbrella.

(56) a. ??What John learned today is that it's always cloudy in Amsterdam and what John learned today is where to buy an umbrella.
b. What John learned today is that it's always cloudy in Amsterdam or what John learned today is where to buy an umbrella.

At both the embedded and matrix level we observe a distinction between conjunctions that allow for mixed cases and disjuntions that do not. We can thus summarize our last puzzle as follows:

Puzzle 6. Mixed questions: *Why is it possible to conjoin sentences with a different clause type, but does disjoining different clause types result in ungrammaticality?*

2.7 Summary

The puzzles that are discussed in this chapter, repeated here again below, will form the questions that will be addressed in the remainder of this thesis. On a more abstract level we can summarize these puzzles by suggesting that there are some crucial differences between the way disjunctions and conjunctions behave in questions. Also in comparing disjunctive questions to polar questions we observe some puzzling differences. I also showed that these six puzzles are not mere artifacts of a specific framework of dealing with questions, but instead seem to be more general in nature.

Since many of these puzzles seem to hinge on the very nature of sentential force and its reflections on the syntax, semantics/pragmatics and phonology, it is perhaps helpful to take a closer look at the representation of force at the interfaces. I will therefore do this in the next chapter. I will show that a very simple specification of the contribution of boundary tones and syntactic clause type marking will not do. Instead, we need a more fine-grained specification, which I will develop in the last two sections of the next chapter.

Puzzle 1. Focus marking: *What is the exact relationship between focus marking, the underlying syntactic structure and the interpretation of coordinated questions?*

Puzzle 2. Falling intonation: *How can we derive the semantic contribution of rising vs. falling intonation in a uniform, compositional way?*

Puzzle 3. Disjunction lowering: *Why does the question operator always take scope over disjunctions, while in conjunctive questions each conjunct contains a question operator?*

Puzzle 4. Q in embedded questions: *Where does the question interpretation come from in embedded questions?*

Puzzle 5. Overt "or not": *Is the semantic contribution of overt "or not" clauses the same as that of covert question operators, and if so, why is this infelicitous in AltQs?*

Puzzle 6. Mixed questions: *Why is it possible to conjoin sentences with a different clause type, but does disjoining different clause types result in ungrammaticality?*

Chapter 3

DECOMPOSING FORCE

In order to solve any of these puzzles, we need to take a closer look at what sentential force really is, at what point it does its job semantically, how it is represented syntactically and in what way it affects the prosody of an utterance. In chapter 2, it also became clear that the presence or absence of the question operator can be predicted on the basis of two factors: intonation and syntactic clause type marking. This means that these two aspects together determine whether a clause is interpreted as a question or as an assertion. In this chapter I will try to disentangle these aspects of force, by identifying what the possible sources of questionhood really are.

3.1 A first stab: Clause types & boundary tones

In the literature on intonation, one can find several proposals on how to interpret the effect of boundary tones (in this and other chapters indicated as H-H% and L-L%). To list a few, Pierrehumbert & Hirschberg (1990) analyze the H% boundary tone as signaling dependence on a future utterance (i.e. response elicitation in case of question, incompleteness in case of lists). Bartels (1999) associates a final falling pitch with assertiveness. In her account, this is what makes the difference between alternative questions with a final fall and ones with a final rise: in the first case the speaker not only inquires which alternatives are true, but also asserts that at least one of them must be true. In Westera (2017), the H% boundary tone is analyzed as signaling that the speaker doesn't believe themselves to be obeying the Gricean maxims. Truckenbrodt (2006) and Gunlogson (2008) argue that the difference between rising and falling intonation has to do with speaker commitments: only in cases with falling intonation the speaker commits herself to a specific proposition.

These proposals may seem very diverse, but on a more abstract level they are very similar in the sense that the different notions used to explain the difference between ris-

ing and falling intonation can often be derived from each other: non-commitment may signal a wish for the other participants in the conversation to commit to a proposition, and may therefore boil down to conveying dependence on future utterance; committing to a specific proposition may mean asserting it, or obeying Gricean maximes may be interpreted as providing information and committing to it.

It is therefore very difficult to decide between these proposals at this point, but perhaps the take-home message is that rising intonation unambiguously turns an utterance into a prototypical question along with all its semantic and pragmatic ramifications: it marks dependence on future utterance, speaker uncertainty, non-commitment and non-assertiveness.[1] It is less clear what it is that is marked by falling intonation, as it does not seem to uniquely determine the sentential force of an utterance; it is mostly the morphosyntax of a sentence that determines whether it is interpreted as a question for utterances with a final fall. The simplest hypothesis that would capture this assumes that the effect of rising intonation is to turn the utterance into a question, while falling intonation does not have any effect at all.

Syntactic clause type marking should thus affect the semantics too. Therefore, there should be a correspondence between interrogative morphosyntax—in the form of verb inversion or the presence of an interrogative complementizer like 'whether'—and some semantic operation. Under many accounts, this correspondence is ensured by a question operator which only shows up in interrogative clauses and gives rise to the question meaning (Hamblin, 1976; Groenendijk & Stokhof, 1984; Krifka, 2001; Cable, 2007; Rawlins, 2008b). Similarly, it is common to assume that declarative morphosyntax corresponds to an assertion operator. Thus combining clause type marking and intonation in this way, we will get the following basic taxonomy of questions and assertions.[2]

3.1.1 Putting things together

Restricting our attention to mono-clausal cases first, i.e. questions and assertions that consist of only one clause, we can suggest that the force head specifies whether a clause is interrogative or declarative, meaning that it either has an [INT] or [DECL] feature (see Roelofsen, 2015; Roelofsen & Farkas, 2015 for a similar proposal). Clauses with a force head that bears an [INT] feature are always interpreted as questions—no

[1] In some cases, rising intonation does not give rise to a question meaning, but as Jeong (2018) showed, these cases seem to be instances of a distinct intonational pattern. I will therefore ignore these cases here, and only focus on the specific type of rising intonational pattern that does unambiguously turn an utterance into a question.

[2] Note that I take the basic interpretation of rising declaratives to be questions, but this does not mean that rising declaratives will always have the same interpretation as canonical PolQs. As (Farkas & Bruce, 2010) showed, the marked meaning of rising declaratives can be captured even if their basic semantic meaning is that of a PolQ.

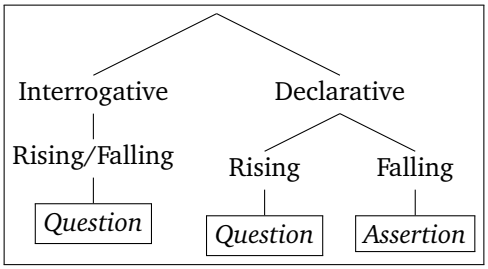


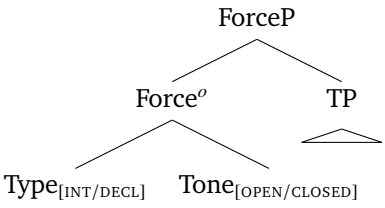
Figure 3.1: Basic taxonomy of questions and assertions

matter their intonational pattern. In an inquisitive setting, we may therefore suggest that declarative clause type marking semantically triggers a ! operator; interrogative syntax yields a ? operator in the semantics, as is initially proposed in Roelofsen (2015). Hence, both operators could be defined as in (57).

(57) a. $[\![\text{Type}_{[\text{DECL}]}]\!] = \lambda P_T.!P$
b. $[\![\text{Type}_{[\text{INT}]}]\!] = \lambda P_T.?P$

Since the illocutionary force of a sentence is also determined by the boundary tone, the force head should also specify whether the boundary tone is rising or falling. In the system as proposed by Roelofsen (2015), this means that in addition to specifying clause type, a different operator specifies boundary tone by either having an [OPEN] feature or not. This means that the presence of such an [OPEN] feature will not only have an effect on the intonational pattern, but it will also trigger a ? operator to be present in the semantics, just like the [INT] feature. Absence of this feature will have no effect (cf. Roelofsen, 2015).

Therefore, we can perhaps analyze the force head as a complex head that has a specification for clause type as well as boundary tone. That is, we could adopt the following structure for polar questions, where the semantic contribution of boundary tones comes in as a modifier of Type.



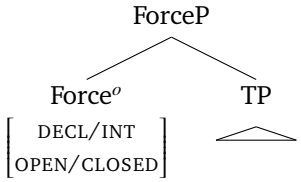
Semantically, this means that Tone is combined with Type by taking it as its argument, and is therefore of type $\langle TT, TT \rangle$. The entry for Tone$_{[\text{CLOSED}]}$ could for example be defined as follows, where the Type head would remain the same as defined in (57).

(58) a. $[\![\text{Tone}_{[\text{CLOSED}]}]\!] = \lambda M_{\langle T,T \rangle}.\lambda P_T.M(P)$
b. $[\![\text{Tone}_{[\text{OPEN}]}]\!] = \lambda M_{\langle T,T \rangle}.\lambda P_T.?M(P)$

3.1.2 Predictions

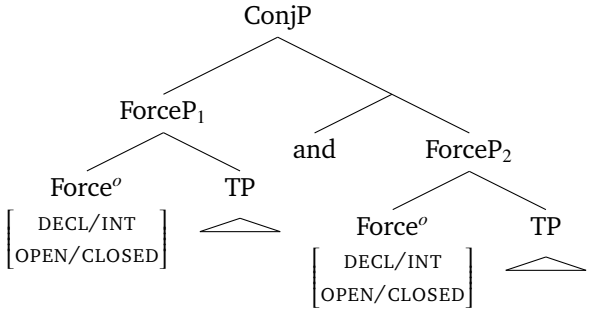
In summary, this would give us the following predictions for simple clauses. That is, if we translate a simple sentence like "it is raining" into our logical language as P, denoting a proposition $[\![P]\!]$, this sentence pronounced with a rising intonation will denote the proposition $[\![?P]\!]$, while it will denote $[\![!P]\!]$ when pronounced with a final fall, and so on.

	DECL	INT
OPEN	?P	?P
CLOSED	!P	?P



These predictions seem correct, because we now only predict declaratives with a final fall to be interpreted as an assertion; in all other cases, we predict a polar question interpretation. For interrogative clauses, the intonational pattern will not make a difference in terms of its interpretation. Finally, declarative clauses with a final rise will also receive a polar question interpretation. These predictions are indeed borne out, because this exactly corresponds to the basic taxonomy as in fig. 3.1.

This also makes the correct predictions for conjunctive questions: we can simply take them to be conjunctions of PolQs and we will derive the correct syntax, intonational patterns and interpretation. In a nutshell, assuming the syntactic structure for conjoined questions below, we would predict all combinations of INT/DECL and OPEN/CLOSED to be possible, giving rise to the full range of meanings in table 3.1.



	DECL-DECL	INT-INT	DECL-INT	INT-DECL
OPEN-OPEN	?P ∩ ?P	?P ∩ ?P	?P ∩ ?P	?P ∩ ?P
CLOSED-CLOSED	!P ∩ !P	?P ∩ ?P	!P ∩ ?P	?P ∩ !P
OPEN-CLOSED	?P ∩ ?P	?P ∩ ?P	?P ∩ ?P	?P ∩ !P
CLOSED-OPEN	!P ∩ !P	?P ∩ ?P	!P ∩ ?P	?P ∩ ?P

Table 3.1: Conjoined questions

3.1.3 Disjunctive questions: size matters

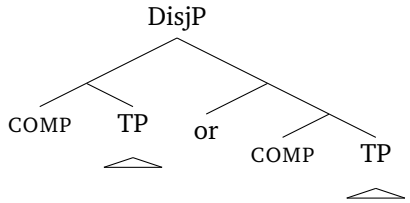
There is another ingredient that is needed to deal with the meaning of disjunctive questions: we need to distinguish between disjunctive PolQs and AltQs. In Roelofsen (2015), this is dealt with by assuming that the size of the disjuncts differs between PolQs and AltQs: AltQs have disjuncts that are always clausal, while disjuncts in PolQs are always subclausal.

One potential argument in favor of this assumption comes from the effect of *either* on disjunctive questions: questions like (59) can only be interpreted as polar questions, while the same question without *either* can be a PolQ as well as an AltQ. It is often assumed that *either* marks that disjunction takes narrow scope in this case. It is therefore conceivable that the disjuncts need to be bigger than marked by *either* for an AltQ reading to be available.

(59) Do you want either coffee or tea? × AltQ, ✓PolQ

Therefore following Roelofsen (2015), I assume that inquisitivity is always killed at the clausal level—I assume a ! operator to always be present somewhere at the CP level. Therefore, subsentential disjunctions are never inquisitive and therefore result in a PolQ (or WhQ) reading if they are part of a question. If disjuncts are the size of the projection that introduces the ! operator and they are interrogative, their inquisitivity always remains intact. I therefore assume that the structure of disjunctive PolQs always involves a subsentential disjunction. AltQs always have the structure as shown below, where the ! operator is introduced by some complementizer, which, for lack of imagination, I call COMP here.

(60) $[\![\text{COMP}]\!] = \lambda P.!P$



Subclausal disjunction will then always correspond to a non-inquisitive disjunction;

disjoining subsentential constituents will result in a disjunction $!(P \vee Q)$, while bi-clausal disjunctions are always inquisitive will be of the form $!P \vee !Q$—unless their inquisitivity is flattened out on top of the clausal disjunction. I thus adopt the following hypothesis:

Hypothesis 1. *Disjuncts of AltQs are always full clauses, disjuncts in disjunctive PolQs are subclausal.*

3.1.4 Problems

So far so good—if it wasn't for disjunctive questions to throw a monkey wrench in the works. Even with these assumptions for disjunctive questions in place, we run into several problems.

First of all, the distinction between AltQs and PolQs in terms of the size of the disjuncts remains a mere stipulation at this point. Since this distinction seems to correlate with focus marking, a proper account of disjunctive questions needs to be somehow sensitive to the distinction between questions with one or multiple foci. Thus, to get a fully worked out account of sentential force, we need to solve the first puzzle discussed in Chapter 2.

We haven't quite solved the second puzzle either. Since the effect of boundary tones differs between PolQs and AltQs, the difference between these two types of questions is important in correctly capturing the effect of these intonational patterns. Also in specifying the contribution of boundary tones we therefore need a more fine-grained taxonomy of questions and assertions that is sensitive to the distinction between different types of questions.

Third, we also need to specify what position the force head occupies in AltQs, since this position seems to be different from that in conjunctive questions. In other words, as illustrated in the third puzzle, it is clear that we cannot analyze AltQs as disjunctions of PolQs, but it remains unclear what AltQs are instead.

In the remainder of this chapter, I will first look into the link between pitch accents, focus marking and the availability of AltQ readings. It will turn out that this link can be specified in the syntax, by assuming that pitch accents indicate focus marking, which in turn indicates that the disjuncts are always clausal.

I will then tackle the second puzzle by providing a more fine-grained analysis of what we understood as the Force head. That is, I will show that it is not the falling boundary tone that has a different effect in falling AltQs and PolQs, but that instead, clause type marking itself has this effect. This means that we need to change the entry for the clause type marker in such a way that it will not have an effect on closed AltQs, while it will always change the denotation in case its prejacent is a PolQ.

The next chapter will then be devoted to the syntactic positioning of force in disjunctions as opposed to conjunctions.

3.2 Focus marking and the size of the disjuncts

The fact that each question in (23), repeated here in (61) has a different interpretation despite having a similarly looking syntactic structure raises the question what exactly distinguished them, and how these distinguishing properties ultimately affect the semantics. In the previous chapter, I assumed that the pitch accents correspond to focus marking. This seems a straightforward assumption, but how this exactly gives rise to a different interpretation is less clear. Hence puzzle 1.

(61) a. Did JOHN-OR-MARY$_{\text{L* H-}}$ come to the party$_{\text{H-H\%}}$ × AltQ, ✓PolQ
b. Did JOHN$_{\text{L*H-}}$ or MARY$_{\text{H* L-}}$ come to the party$_{\text{L-L\%}}$ ✓AltQ, × PolQ
c. Did JOHN$_{\text{L*H-}}$ or MARY$_{\text{L* H-}}$ come to the party$_{\text{H-H\%}}$ ✓AltQ, × PolQ

Puzzle 1. Focus marking: *What is the exact relationship between focus marking, the underlying syntactic structure and the interpretation of coordinated questions?*

Most authors do not claim that focus marking directly affects the semantics, but make a detour through the underlying syntax to argue for the different interpretational effects of focus marking (cf. Han & Romero, 2004b; Beck & Kim, 2006; Roelofsen, 2015). In this light it is often suggested that the presence of multiple foci indicates that parts of the second disjunct are elided, and that the interpretational difference between AltQs and PolQs arises because the disjunction in the first case takes full clauses as its disjuncts, while the disjunction in the second case is subsentential, just as I assumed above.

However, even though many authors conclude that disjuncts of AltQs have to be clausal, some authors suggest that this may also mean that they are VPs or TPs. Under the analysis as proposed above, a VP or TP is still not big enough to derive an AltQ reading. I will therefore argue against these accounts, by presenting some of the problems that they run into. To argue that disjuncts are indeed CPs, I will also discuss other proposals which provide evidence that disjuncts always have to be of that size in AltQs. I will then propose the specific analysis of the relation between focus marking and ellipsis that I will adopt here.

3.2.1 Movement and ellipsis

In Han and Romero (2004a, 2004b), the distinction between disjunctive PolQs and AltQs is that the disjunction in PolQs is subsentential, while the disjunction in AltQs is clausal. This idea goes back to Larson (1985), and is adopted by many authors ever since. On an abstract level, I will adopt this idea too.

The distinction between PolQs and AltQs in Han and Romero (2004a) is derived by suggesting that AltQs involve both movement and ellipsis, while PolQs do not. The main claim is that focus marking in AltQs is an ellipsis trait, while such questions also

show movement characteristics. That is, the main reason for adopting a movement approach is the alleged unavailability of AltQ readings in island environments: a sentence like (62) only has a PolQ interpretation.

(62) Does John believe the claim that Bill resigned or retired? ✓PolQ, × AltQ

Following Larson (1985), they therefore assume that *whether* in embedded questions is a wh-version of *either*, while in root questions a silent version of whether is taken to fulfill a similar role. Under Larson's initial analysis, *either* and *whether* are scope taking items in the sense that they are base-generated at the left edge of the disjunction and mark the scope of that disjunction in that position. While *either* can stay in its original position or move upwards, *whether/Q* always has to move upwards because of its [+WH] feature. Han and Romero (2004a) adopt this analysis too and therefore conclude that *whether/Q* always moves to SpecCP just like any other wh-item.

Han and Romero also argue that focus marking on each disjunct indicates that both disjuncts are clausal. Crucially, however, they assume that disjuncts bigger than TPs cannot be elided. If disjuncts of a question like (61b) could be underlyingly CPs for example, the prediction that islands block AltQ readings would be lost, since in that case, a possible parse of (62) would be (63), which, under their analysis would come out as an AltQ.

(63) Does John believe the claim that Bill resigned or ~~that Bill~~ retired.

Since VPs are taken to be clausal too, only two possible underlying structures are predicted for an AltQ as in (64): one with VP-ellipsis as in (64a) and one with TP-ellipsis as in (64b). In both of these analyses, *Q* has to move upwards, and parts of the second disjunct are elided.

This is not the case for PolQs. In (65) *whether/Q* originates in a (possibly unpronounced) *or not* clause, and therefore can contain disjunctions that are smaller, thus involving no ellipsis in the second disjunct. Since *whether*/*Q* is part of the disjunction, an *or not* is always assumed to be present if there is no overt disjunction.

(64) Did John read WAR AND PEACE or ANNA KARENINA? ✓AltQ

a. Q_1 Did John t_1 read WAR AND PEACE or ~~read~~ ANNA KARENINA?

b. Q_1 Did t_1 John read WAR AND PEACE or ~~John~~ ~~read~~ ANNA KARENINA?

(65) Did John read WAR AND PEACE OR ANNA KARENINA? ✓PolQ

a. Q_1 (t_1 ~~or not~~) Did John read WAR AND PEACE OR ANNA KARENINA?

Semantically, it is then assumed that if *Q* takes scope over a clausal disjunction, we derive an AltQ reading, while we will get a PolQ reading if *Q* takes scope over a disjunction that has an *or not* clause as one of its disjuncts. In other words, PolQs are basically the same as AltQs, except that they have an *or not* clause as a second disjunct.

A more specific semantic analysis is not spelled out, however, nor do Han and Romero (2004a) give an analysis of the specific nature of the *or not* clause that is necessary do derive the meaning of PolQs.

Now, Han and Romero (2004b) also note that the AltQ reading of (64) disappears when a high scope negation is added, as in (66). They argue that this observation provides evidence for their analysis, because they correctly predict such an example to lack an AltQ reading.

(66) *Didn't John read CHAPTER 1 or CHAPTER 2?

They reason as follows: this form of preposed negation triggers a VERUM operator to be present somewhere in the left periphery. Crucially, VERUM is taken to be a focus marked constituent, since questions with preposed negation are often pronounced stressing *didn't*. According to their Focus Deletion Constraint as defined below, this means that it cannot be elided and that therefore (67a) cannot be the underlying structure of (66). Moreover, an analysis in which Q moves over VERUM as in (67b) is out, because of intervention effects of focus and wh-movement, independently motivated in Kim (2002). Therefore, the underlying structure of (66) can never be bi-clausal and an AltQ reading is predicted as unavailable: Q has to be associated with a disjunction, so an overt *or not* clause has to be present in the structure.

Focus Deletion Constraint. *Focus-marked constituents at LF (or their phonological locus) cannot delete at Spell-Out.*

(67) a. *Q_1 Didn't t_1 VERUM John read CHAPTER 1 or ~~VERUM he read~~ CHAPTER 2?
b. *Q_1 Didn't VERUM t_1 John read CHAPTER 1 or ~~he read~~ CHAPTER 2?

However, the observations considering islands effects that Han & Romero base their movement account on do not seem to be as general as one might think. Already in a sentence like (68) such an effect disappears (Beck & Kim, 2006). These alleged island effects thus seem to be restricted to definite DPs as they systematically disappear for indefinites. Beck and Kim (2006) therefore propose a similar analysis of AltQs that does not involve movement.

(68) Is John looking for a person who speaks Spanish or French?

3.2.2 Intervention effects without movement

Even though Beck and Kim (2006) argue against a movement approach, they make the same assumptions in terms of ellipsis as Han and Romero (2004a) do. They base their analysis on so-called intervention effects, and argue that AltQ readings not only disappear in combination with preposed negation, but also with other types of interveners.

For example, focus marking on each disjunct—and therefore an AltQ reading— is also out in combination with elements such as *only* or *even*, as shown below.

(69) a. *Didn't John like MARY or SUE?
b. *Does only John like MARY or SUE?
c. *Does even John like MARY or SUE?

Therefore, Beck and Kim (2006) argue that the disjunctive phrase may never be c-commanded by a focusing or quantificational element. The AltQ reading disappears when this is the case. It is assumed that focus marking on the disjunction has to be licensed by an interrogative complementizer and no other focusing element may intervene between the two. Beck and Kim (2006) then suggest that the infelicity of (62) is an intervention effect too—not an island effect. The following generalization is therefore made:

Intervention Effects. *A focusing or quantificational element may not intervene between a disjunctive phrase and its licensing complementizer.*

This means that the following structure as in (70) is out. Here Q is the licensing complementizer of the disjunction and Op is the intervener.[3]

(70) * [Q ... Op[...[A or B]...]]

The link between focus marking and the meaning of AltQs is derived by adopting a Roothian analysis of focus marking in which it is assumed that expressions have both an ordinary and a focus semantic value (Rooth, 1992). Focus marked disjunctions introduce alternatives in the focus semantic value, that is, it is assumed that the disjunction in an AltQ like (71) has the ordinary and focus semantic value as in (71a) and (71b) respectively. By pointwise function application, the subject, *John* in this case, is then combined with both the ordinary and focus semantic value. The task of the complementizer Q is to turn the focus semantic value of its complement into the ordinary semantic value. In this way, the ordinary semantic value of the whole question will be Hamblin-style question containing each of the disjuncts as its alternatives.

(71) Q Did John [$_{DisjP}$ WATCH A MOVIE or GO TO THE BEACH]
a. $[\![(71)_{DisjP}]\!]^o = \lambda x \lambda w$. watch a movie $(x)(w) \vee$ go to the beach $(x)(w)$
b. $[\![(71)_{DisjP}]\!]^f = \{\lambda x \lambda w$. watch a movie $(x)(w), \lambda x \lambda w$. go to the beach $(x)(w)\}$

Crucially, the alternatives introduced by the disjunction need to to remain intact until the point where Q operates on them, since otherwise we will not derive a question meaning. The main point that Beck & Kim therefore make is that quantificational

[3]Note that Beck and Kim (2006) assume Op to be placed on the clausal spine here, but in fact, it is unclear if this is actually the case.

or focusing interveners interact with the alternatives in the focus semantic value of their complements and in doing so "rob the Q operator its of alternatives" (Beck & Kim, 2006, p. 185). However, for this analysis to work, just like Han and Romero (2004a), Beck and Kim (2006) have to assume that disjuncts cannot be analyzed as being underlyingly bigger than a TP. If such an analysis of an AltQ were possible, it would be possible to escape the intervention effects. That is, a structure as in (72a) or (72b) should be fine, because in these cases the intervener is placed within the disjuncts and therefore does not intervene *Q* and the disjunction as a whole.

(72) a. [Q...[Op[...A...]] or [Op[...B...]]
b. [Q...[Op[...A...]]] or [Q...[Op[...B...]]]

Beck and Kim (2006) therefore also rely on the contstraint that constituents containing a focused element cannot be elided, just like Han and Romero (2004a) do.

3.2.3 The problem of non-elided AltQs

AltQs that contain non-elided, clausal disjuncts are problematic for both of these proposals. For example, if we assume the analysis that Han and Romero (2004a) use to account for the unavailability of AltQ readings with preposed negation, we already run into an important problem: such a case without ellipsis or movement also seems to give rise to ungrammaticality. That is, the example in (73) sounds very odd.

(73) *Q_1 t_1 Didn't John read WAR AND PEACE or didn't he read ANNA KARENINA?

Although Han & Romero make the correct predictions for (66), their analysis fails to account for a case like (73), in which a full bi-clausal version of (66) without ellipsis clearly turns out to be infelicitous too. It therefore seems that the problem of (66) is not the fact that VERUM cannot be elided, but instead it seems to be a more general problem of preposed negation in AltQs.

Non-elided bi-clausal AltQs give trouble for Han & Romero's account on a more general level. For instance, assuming that *whether* is the overt version of *Q* will give the wrong predictions in embedded AltQs with two *whether* clauses as disjuncts. Han & Romero would predict that an embedded question as in (74) is always interpreted as a disjunction of two PolQs, but, as shown in Chapter 2, this is generally not the case. This means that semantically, the complementizer *whether* actually cannot be equated to *Q* at all, since such embedded AltQs cannot be analyzed as having two question operators. Note that this problem actually also arises for full bi-clausal AltQs at the root level, since there is no way to rule out a reading of such a question as a disjunction of PolQs. That is, Han and Romero do not provide an explanation for the fact that a non-elided AltQ cannot be interpreted as in (75).

(74) John wonders whether it's raining or whether it's snowing.

(75) [Q_1 (t_1 ~~or not~~) Did John read WAR AND PEACE] or [Q_1 (t_1 ~~or not~~) Did John read ANNA KARENINA?]

Also for Beck and Kim (2006) full bi-clausal disjunctions pose an important problem: a case like (76a) is out too, and so is (76b)—even though the intervener does not intervene Q and the disjunction in either case. That is, both sentences may either have the underlying structure in (72a) or (72b), which means that both are predicted to be fine under the proposed analysis.

(76) a. *Does only JOHN like MARY or does only JOHN like SUE?
b. *Does even JOHN like MARY or does even JOHN like SUE?

In other words, the structures in (72a–b) are ungrammatical too, so it seems that the problem is not that a focusing element is intervening the disjunction as a whole, but the foci in the individual disjuncts. We can therefore perhaps rewrite the generalization made by Beck & Kim in the following way.

Intervention Effects. *A focusing or quantificational element may not intervene between a constituent with free focus and its licensing complementizer.*

This would entail that the problem is not the disjunction, but (contrastive) focus marking itself. We would then predict that a sentence without disjunction is out too, which is indeed borne out as shown in (77).

(77) a. A: Only JOHN likes Sue.
B. #No, only JOHN likes MARY.
b. #Does even JOHN like MARY?

However, if we would indeed adopt the generalization above, we also have to conclude that each disjunct is a full CP: since "intervention effects" seem to arise in bi-clausal disjunctions too, it seems that each focus marked constituent needs it own licensing complementizer for this to work. This would therefore entail that disjuncts are CPs in AltQs with focus intonation on each disjunct.

Many pages have been filled with discussions on focus and intervention effects, and perhaps even mentioning it opens up a Pandora's box of questions. I therefore do not want to make any strong claims on these topics here, nor will I be able to provide a deep understanding of these phenomena, but I believe that the above at least suggests that bi-clausal AltQs should be treated on a par with sub-clausal AltQs. Moreover, it seems that the assumption of AltQs as disjunctions at the CP level might provide a step in the right direction here. For the sake of the argument, let's assume that AltQs indeed involve CP level disjunctions.

In fact, it has also been argued independently that disjuncts in AltQs have to be CPs, for example in Uegaki (2014) for Japanese, and in Roelofsen (2015). I will discuss these proposals below to see if they can shed light on the specific issues that we are dealing with here.

3.2.4 Disjuncts are CPs in Japanese

Uegaki (2014) argues that the disjuncts in an AltQ have to be CPs—at least in Japanese. Under his account, AltQs are analyzed as disjunctions of PolQs, and therefore need to be disjunctions of full clauses including a question operator Q. Therefore, Uegaki takes the underlying structure of AltQs to be as in (78).[4]

(78) $[\ Q\ \ \mathrm{TP}_1\ ]_{CP}$ or $[\ Q\ \ \mathrm{TP}_2\ ]_{CP}$

In a nutshell, the main reason for adopting such an analysis is the observation that sentential operators above the disjunction in an AltQ are never interpreted in both disjuncts. Instead such operators are only interpreted as being inside the first disjunct.

In Japanese, Q is expressed by a morpheme *ka*, and so is disjunction. However, disjunction can also be phonologically null in Japanese. This means that whenever we have a surface structure as in (79) with some operator, like a modal or a politeness marker (here indicated with ⊛), this could in principle both have the underlying structure as in (79a) as well as (79b). That is, the second instance of *ka* can either be analyzed as a question operator or a disjunction. From the surface structure alone, it is therefore unclear if Q scopes over the disjunction that has TPs as disjuncts, or whether each disjunct contains its own Q and is therefore a full CP. However, since the operator ⊛ can only be interpreted as taking scope within the first disjunct, the only plausible analysis is the one in (79b). Therefore, it seems that at least in Japanese, AltQs have to be disjoined CPs and cannot be smaller than that.

(79) Ka ⊛ ...]$_{TP}$ ka ...]$_{TP}$

a. Q ⊛ [...]$_{TP}$ or [...]$_{TP}$

b. [Q ⊛ ...]$_{CP}$ (or) [Q ...]$_{CP}$

Although it is unclear to what extent Uegaki's proposal can be extended to other languages, at least his data shows that in Japanese AltQs seem obligatorily to be CPs with a question operator in each disjunct.

3.2.5 AltQs and exclusive strengthening

As already discussed above, Roelofsen (2015) also argues for full CPs as disjuncts of AltQs, and argues that the disjuncts of PolQs have to be subsentential. In contrast

[4] For ease of exposition, I am writing this out schematically, inversing the Japanese word order

to Han and Romero (2004a) and Uegaki (2014), the conclusion that disjuncts of focus marked disjunctions are at least CPs is not assumed as a necessary consequence of their intonational pattern, but derived from other principles. The main reason to do this is that if a more direct link between focus marking and bi-clausality is assumed, we fail to account for cases in which we seem to have mulitple foci without having bi-clausality. As a crucial counterexample to the generalization that sentences with multiple foci are bi-clausal, Roelofsen mentions the example in (80), which is ambiguous between a reading in which *every* takes scope over the disjunction and a reading in which the disjunction takes scope over *every*. While this second reading can be derived if the underlying structure is bi-clausal, the first reading seems to require a mono-clausal syntax.

(80) Every student takes SYNTAX $\text{I}_{\text{L*H-}}$ or SEMANTICS $\text{I}_{\text{H* L-}}$ in the first semester.$_{\text{L-L\%}}$

Therefore, Roelofsen argues for a more indirect link between focus marking and the underlying syntax. The size of the disjuncts in AltQs is indirectly linked to the fact that AltQs usually have *contrastive intonation*: the specific intonational pattern that characterizes closed AltQs. As shown in the previous chapter, this intonational pattern often results in an exclusive interpretation of the disjunction—both in declaratives and interrogatives.

The link between contrastive intonation and exclusive interpretation is established via an exclusive strengthening morpheme E, which triggers both the prosodic effect of contrastive intonation as well as the semantic effect of exclusivity. The semantic contribution of E is defined as in (81). That is, when E is applied to a sentence φ, it removes any information state that is compatible with multiple alternatives of φ. It thus removes the overlaps of alternatives of φ.

(81) $[\![\varphi]\!]^{\times} := \{s \in [\![\varphi]\!] \mid \text{ there are no } \alpha, \beta \in Alt(\varphi) \text{ s.t. } \alpha \neq \beta, \alpha \cap s \neq \emptyset \text{ and } \beta \cap s \neq \emptyset\}$

Crucially, Roelofsen argues that it is also this exclusive strengthening morpheme that indicates that the underlying structure of AltQs has to be bi-clausal. The reason for this is that the morpheme E is not always licensed, and in particular it is not licensed in mono-clausal questions.

To define the licensing conditions of E, Roelofsen argues that this morpheme is a positive polarity particle, which is only licensed in upward-monotonic environments. Since E is a PPI, it has the opposite effect of what often considered the effect of NPIs, that is, weakening or domain widening. Therefore, Roelofsen argues that E always has a strengthening effect and is only licensed if it actually strengthens the meaning of its prejacent. This strengthening condition is defined in the following way:

Strengthening condition. *Let L be a logical form, and let E be an occurrence of the exclusive strengthening operator in L. Then L is licensed only if the semantic value of any*

constituent C in L that contains E entails the semantic value that would be assigned to that constituent without E.

Since we can straightforwardly understand the entailment relation as a subset relation in inquisitive semantics, E may only be applied to a particular prejacent in case the result of this application denotes a subset of the denotation of the sentence without E.

To see why E fails to strengthen the denotation of a mono-clausal interrogative list, consider the following example in (82). This sentence can be analyzed with or without the exclusive strengthening morpheme E, giving rise to the sentences in (83) (where $\boxplus$ is the semantic operator corresponding to E). Crucially, (83b) is not stronger than (83a) in this case, since $[\![(83b)]\!] \not\subseteq [\![(83a)]\!]$. This holds in general for any mono-clausal question, while it does not hold for bi-clausal questions. That is, a closed bi-clausal disjunctive question is argued to have the denotation in (84a), and it also holds that $[\![(84b)]\!] \subset [\![(84a)]\!]$.

(82) Did John read WAR AND PEACE$_{\text{L*H}}$ or ANNA KARENINA$_{\text{H*L-L\%}}$?

(83) a. $?!(p \vee q)$
b. $?! \boxplus (p \vee q)$

(84) a. $(!p \vee !q)$
b. $\boxplus(!p \vee !q)$

In short, under these assumptions we cannot derive contrastive intonation in a question that is truly mono-clausal. Hence, a question therefore has to be underlyingly bi-clausal whenever it exhibits contrastive intonation. In this way, Roelofsen establishes a quite natural link between contrastive intonation, exclusive strengthening and bi-clausality in AltQs, but this proposal runs into a some problems.

First of all, one might wonder: what about open AltQs? These questions do not exhibit contrastive intonation, and are not interpreted exclusively. It is therefore unlikely that exclusive strengthening plays any role in determining their underlying structure. And yet, to derive their meaning, we would also want these to be underlyingly bi-clausal. For this reason, one could argue for a more general application of the strengthened meaning hypothesis. It is therefore argued that these questions are underlyingly bi-clausal too, because also in these cases the reading in which each disjunct is a full clause is stronger than a reading where the disjunction is subsentential.[5] Mono-clausal open AltQs are then ruled out on the basis of this consideration, without making any reference to the licensing conditions of E.

This use of the strengthened meaning hypothesis is perhaps too broad, however. In the literature, this strengthened meaning hypothesis is mainly applied to ambiguities that arise in the interpretation of reciprocals or plurals, but it is unclear whether this hypothesis is applicable to issues related to scope outside of these domains. If

[5] That is, $?[\![(p \cup q)]\!] \subset [\![?!(p \cup q)]\!]$

the strengthened meaning hypothesis would be applicable to natural language in this broader sense, we would predict to never find ambiguities in which one reading entails the other. However, there are numerous examples in which such ambiguities do arise. We could think of classic examples like the scope ambiguity in (85) for example, in which the surface scope reading is entailed by the reading with inverse scope. Even though these two readings are not equally strong, both are still there. In fact, if anything, the strengthened meaning hypothesis would predict the inverse scope reading to be preferred over the surface scope reading, which is clearly not the case.

(85) Every man loves a woman.

The second problem is that exclusive strengthening also does not play any role in conjunctive questions, and still, such questions with focus marking on each conjunct seem to be underlyingly bi-clausal. Recall the observations discussed in section 2.1 considering conjunctive questions, repeated here below: the question in (86) seems to be interpreted as a conjunction of PolQs—not as a single PolQ.

(86) Is it $\text{WINDY}_{\text{L*H-}}$ and $\text{CLOUDY}_{\text{L*H-H\%}}$

Therefore, a similar problem as for open AltQs arises here, since we observe bi-clausality without exclusive strengthening. These cases therefore both indicate that we should assume a more direct link between focus intonation and ellipsis, since we do not get an interpretation for which we need to assume ellipsis if conjunctive questions are not pronounced with multiple pitch accents.

The third, and perhaps most important problem is that the motivating example in (80) seems to be more of an exception than a general property of the licensing conditions of contrastive intonation with respect to upward-entailing quantifiers. For upward-entailing quantifiers *some* or *two* as shown below for example, the narrow scope reading does not seem to be there—if the example below is felicitous at all.

(87) Some/two students took SYNTAX $\text{I}_{\text{L*H-}}$ or SEMANTICS $\text{I}_{\text{H* L-L\%}}$ × narrow disj.
??? wide disj.

I thus conclude that it cannot be the exclusive strengthening morpheme that is responsible for the underlying bi-clausal structure of AltQs. Instead, there has to be a more direct link between the presence of multiple foci and syntactic structure. The question is then why the presence of multiple foci always indicates ellipsis, and how large the elided disjunct actually is.

3.2.6 Split CPs

So what did we learn from all this? Perhaps we can at least conclude the following:

(i) There does not really seem to be any reason for assuming movement of Q or *whether* from the left edge of the disjunction to SpecCP.
(ii) Relying on intervention effects does not help us in accounting for similar effects in full bi-clausal disjunctions.
(iii) At least for some languages, we have evidence that disjuncts are always CPs in AltQs.
(iv) Focus marking directly indicates ellipsis—even in conjunctions.

Given these conclusions, and the assumption made above we can suggest that focus marking directly indicates ellipsis at the CP level.

This cannot be the full story, however. The assumption that disjuncts are CPs, will put us in a difficult position: if disjuncts are really bigger than TPs, then how are AltQs different from disjunctions of PolQs? Uegaki acknowledges this problem too, and therefore suggests that Q appears in both PolQs and in each disjunct of AltQs, but that it is in fact semantically vacuous. To still derive the right meaning for PolQs, an additional, covert, operator *Part* is then introduced that scopes over the full disjunction in AltQs and appears in the left periphery of PolQs as well. The full structure of an AltQ as proposed by Uegaki (2014) is therefore as in (88). Semantically, this partition operator takes over the role that is traditionally associated with Q. I will go over the details of this proposal in the next section, where I discuss different proposals of the semantic effects of the question operator.

(88) *Part* [[Q TP_1]$_{CP}$ or [Q TP_2]$_{CP}$]

In any case, it is still rather mysterious where the partition operator comes from, why it necessarily takes scope over the disjunction in AltQs. If AltQs and PolQs both consist of full CPs, where should *Part* be—especially in conjunctive questions? It seems that implicitly, Uegaki assumes a more fine-grained structure of the left periphery, in which there are several complementizer positions available. Assuming additional structure to account for the fact that operators scope over disjunctions in AltQs that are bigger than TPs is perhaps our only way out of the paradox that we have created. I therefore adopt a slightly more fine-grained notion of a CP to derive the correct predictions. I will go over the details of this proposal below.

Mostly to put my proposal in familiar terminology, I will assume Rizzi (2001)'s influential split CP analysis in which the complementizer system is split up in the following way:

(89) FORCE (TOP*) INT (TOP*) FOC (TOP*) FIN TP

In Rizzi (1997) it is assumed that Force^o marks clause type, Foc^o hosts foci and wh-phrases, Top^o hosts topics and Fin^o marks the finiteness of a clause. Following Rizzi, I also assume that the projections FocP and TopP are sandwiched in between ForceP and

FinP. Since I will not be dealing with topics and finiteness here, for ease of exposition I will leave out the projections FinP and TopP in further examples.

In a later version of this work, it is shown that a projection IntP needs to be added which also deals with interrogative clause type marking (Rizzi, 2001). I will take IntP to be a more general position of clause type marking and I will therefore rechristen it TypeP (cf. Ceong & Saxon, 2013). This gives us the following simplified structure of the left periphery.

(90) FORCE TYPE FOC TP

From a purely syntactic perspective, it is unclear why we would need two left-peripheral positions that deal with clause type, but this conclusion dovetails very nicely with the current analysis of the semantic effects of illocutionary force. This is not to say that these positions should indeed correspond to the operators I am introducing here, but the least we can say is that the more general assumption that two such positions are available allows us to account for the meaning of AltQs.

I will thus adopt the following hypothesis below.

Hypothesis 2. *Disjuncts of AltQs are always bigger than TPs but never the size of a ForceP.*

Under this hypothesis then, disjunctions with multiple foci always correspond to disjunctions of CPs since any projection bigger than TP is still part of the complementizer system. Hence, both open and closed AltQs have CP-level disjuncts.

Instead of suggesting that inquisitivity is killed at the CP level, we can now assume that the ! is introduced in any of the CP layers below ForceP. For concreteness, I will assume that this happens in FocP, and therefore that disjuncts of AltQs always correspond to FocPs.

Hypothesis 3. *Disjuncts of AltQs correspond to FocPs.*

The particular nature of this assumption is not crucial here, but one reason for making this assumption is that disjunctions in WhQs are always interpreted as non-inquisitive. That is, a question like (91) is always interpreted as (91a) (Champollion et al., 2015). At the same time, such disjunctions can never be pronounced with pitch accents on each of the disjuncts as shown in (92).

(91) Who walks or talks?

a. $\exists !x.!(\textbf{walks}(x) \vee \textbf{talks}(x))$

where **walks** an abbreviation for $\lambda x \lambda p.p \subseteq \lambda w.talk(x)(w)$

(92) *Who WALKS or TALKS?

Champollion et al. (2015) therefore assume that ! is introduced by the wh-item itself, but, since wh-items are generally assumed to move to SpecFocP, we can just as well

assume that it is introduced in FocP itself. In this way, it is not specifically wh-items that introduce !, meaning that we can deal with PolQs, AltQs and WhQs in a uniform way, without having to stipulate that the ! in PolQs comes from a (silent) wh-item or some other element too.

The assumption that disjuncts in AltQs correspond to FocPs is perhaps also natural in light of the link between focus marking within each disjunct and the head of FocP. That is, since disjuncts of AltQs always receive focus marking, this assumption entails that focus marked phrases need to be embedded within their own FocPs. In other words, a parse under which both foci are in the same FocP is unavailable, which would follow from the generalization on intervention effects as defined on p. 40.

However, going into the exact role of the FocP projection in disjunctive focus perhaps goes beyond the scope of this thesis, but in principle, establishing this link allows us to formulate some promising hypotheses. Perhaps disjuncts in AltQs correspond to FocPs because focus marked phrases need to be licensed by a complementizer that is hosted specifically by the Foc head (cf. Beck & Kim, 2006), or perhaps because focus marked phrases need to move to SpecFoc at LF, for example.

On a more abstract level, these assumptions therefore entail that focus marking always ensures inquisitivity in questions, since focus marking marks ellipsis at least at the FocP level. This is therefore very much in line with the original proposal by Beck and Kim (2006), suggesting that focus-marked disjuncts introduce alternatives.

3.2.7 A note on narrow scope readings

Under the assumption that focus marking always indicates CP-level disjunctions, we will obviously have difficulty accounting for the availability of narrow scope readings of the disjunction with respect to quantifier like *every* in declaratives. To derive a narrow scope reading for a sentence with *every*, we need *every* to scope over the disjunction of FocPs. The question then is in what position the quantifier takes it scope, and why it is specifically for quantifiers like *every* and *most* that this reading is available, but not for others.

However, recall that upward-monotonicity is not a distinguishing property of the quantifiers that allow for such a reading, since there are downward-monotonic and non-monotonic quantifiers that allow for a narrow scope readings too (*most* for example). Instead, it seems that the quantifiers that allow for a narrow scope reading can all be classified as "strong determiners", while quantifiers for which only a wide scope reading is available are usually considered "weak" (Milsark, 1977; Diesing, 1992). See table 3.2 for an overview of the available readings for disjunctions with contrastive intonation.

Although spelling out a full account of these observations goes beyond the scope of this thesis, the least we can say here is that the availability of narrow scope readings perhaps has something to do with the strong versus weak DP distinction. For example,

Quantifier	Wide scope	Narrow scope	Type of DP
Every	✓	✓	Strong
All	✓	✓	Strong
Most	✓	✓	Strong
Each	✓	✓	Strong
Some	✓	×	Weak
Two	✓	×	Weak
Many	✓	×	Weak
Few	✓	×	Weak

Table 3.2: Available readings for quantifiers with a contrastive disjunction

in Diesing (1992)'s influential work on this distinction, it is argued that only strong DPs involve quantifier raising. In this light, it might be reasonable to conclude that weak quantifiers cannot move out of the individual disjuncts, while strong DPs might take scope at a level above the disjunction boundary—for example in TopP. I leave the details for such a proposal for future work.

3.3 The question operator

Assumed that the individual disjuncts in AltQs are indeed bigger than TPs, with the question operator in ForceP scoping over the disjunction, we should still define what the semantic contribution of this force head really is. Especially in questions with falling intonation it is unclear how to derive this, as discussed in the previous chapter. Since I argued that falling intonation does not have any specific effect on its own, it needs to be the contribution of $\text{Type}_{[\text{INT}]}$ that should to be redefined. The main goal of this revision is to derive a different effect in AltQs and PolQs. I thus adopt the following reformulation of the second puzzle.

Puzzle 2. Boundary tones: *Why does interrogative clause type marking trigger a ? operator in polar questions but not in alternative questions?*

Traditionally, this problem is dealt with by introducing different question operators: an AltQ operator that, translated to an inquisitive setting, would be vacuous and a PolQ operator corresponding to the ? operator (Hamblin, 1976). However, it is very difficult to find empirical support for the claim that there actually are different operators at play here. It might therefore be more accurate to define a single operator that manifests itself differently in AltQs and PolQs.

Falling intonation is also often held responsible for exclusive strengthening in disjunctions. Before I go into the different ways to the question operator, I will first say a few words on exclusive strengthening in closed AltQs.

3.3.1 Exclusive strengthening again

Because it is only in case of closed AltQs that the question operator does not have an effect, it might be tempting to conclude that whatever triggers the exclusive interpretation in such questions also blocks the effect of the question operator. That is, assuming that it is contrastive intonation on both of the disjuncts that causes the disjuntion to be interpreted exclusively, the effect of contrastive intonation could perhaps be extended. Such an apprach has been adopted by Biezma and Rawlins (2012a) (also see Rawlins, 2008b; Biezma & Rawlins, 2015), who argue that the specific intonational pattern of closed AltQs has both an exclusivity and exhaustivity effect. What is meant with this is that, contrastive intonation not only rules out the "both" answer, but also causes the "neither" answer to be infelicitous. Closed AltQs are thus exhaustive in the sense that the mentioned alternatives exhaust the possible answers.[6]

One way of deriving this difference between open and closed AltQs is by suggesting that both exclusivity and exhaustivity come in directly as a presupposition in AltQs: closure intonation in AltQs adds a presupposition that exactly one of the disjuncts is true. An approach along those lines has been suggested by several authors (Belnap & Steel, 1976; Karttunen & Peters, 1976; Rawlins, 2008a; Biezma & Rawlins, 2012b). The problem with such an approach is that, if we think of closure intonation as a phenomenon that is independent of clause types and is directly triggered by the presence of contrastive intonation, we also predict such a presupposition to arise in declaratives. This is problematic as we will end up with the prediction that declarative disjunctions with contrastive intonation always presuppose their own at issue informative content. Clearly, such a prediction is way too strong, and I will therefore not take this route to define the contribution of the question operator.

I thus take the exclusivity effect to be a separate phenomenon from exhaustivity—both of these properties simply happen to coincide in closed AltQs, but not in contrastive declaratives. We could therefore simply adopt the exclusive strengthening operator as proposed in Roelofsen (2015), but without the licensing conditions suggested therein.[7]

3.3.2 Conditional question operator

Since we cannot let contrastive intonation do the work for us, Roelofsen (2015) proposes to adopt a question operator that is sensitive to the inquisitivity of its comple-

[6]This use of the term "exhaustive" might be confusing, however, since in discussions on the meaning of questions the term exhaustivity often refers to questions whose answers are required to be exhaustive *themselves*; questions with an "exhaustive interpretation" are usually taken to require the addressee to respond with all true alternatives (Theiler, 2014).

[7]This is not to say that constrastive intonation does not have any licensing conditions, since the distribution of this intonational pattern is in fact very limited. I will just not define these conditions, as these issues seem orthogonal to the problems dealt with here.

ment. This operator is written as ⟨?⟩ and it will be equivalent to ? in case its prejacent is a non-inquisitive proposition; it will be equivalent to the identity function in case the prejacent is already inquisitive. Adopting this in the current system would look something like the following:

(93) $\text{Type}_{\text{INT}} \rightsquigarrow \lambda P.\langle ? \rangle P = \begin{cases} \lambda P.?P & \text{if info(P)} \in P \\ \lambda P.P & \text{if info(P)} \notin P \end{cases}$

However, note that adopting such an operator basically means introducing different operators for PolQs and AltQs again. Moreover, even though the ⟨?⟩-operator can be defined in one go, it is doubtful whether such an operator is linguistically realistic. That is, it is not the case that this type of conditionality on the linguistic context expresses itself anywhere else in natural language. Therefore, the intuition that the expression of question force depends on inquisitivity might make sense, but perhaps a more natural explanation of the source of this dependence should be provided in order for this to be completely plausible. I will attempt to do this below, but I will first discuss some alternative proposals, which are, as I will show, in fact very similar to the one discussed just now.

3.3.3 Singleton PolQs

Another approach would be to change the way we think of PolQs: if we think of the denotation of PolQs as non-inquisitive propositions (singletons in a Hamblin-style system), the question operator can be vacuous in both PolQs and AltQs. Biezma & Rawlins adopts such an approach, but their analysis comes with an important cost: it complicates the way in which the meaning of PolQs is derived (Biezma Rawlins 2012, p. 33). In order to end up with a proper meaning of PolQs, they rely on an "anti-singleton coercion rule" as defined below, which can be applied to PolQs as a last resort to coerce their meaning into a Hamblin-style denotation of PolQs consisting of two alternatives. Such a coercion mechanism is then never triggered in AltQs, as these are not singletons to begin with.

Anti-singleton coercion rule. *If* $|[\![\alpha]\!]| = 1$*, where* α *is of type* $\langle s, tt \rangle$ *and denotes* $\{A\}$*, then* α *can be coerced (as a last resort) into the denotation* $\{\lambda w.A(w), \lambda w.\neg A(w)\}$

For obvious reasons, relying on a last resort coercion mechanism to account for the meaning of sentences that are in many ways the most basic type of question, is not a very pretty solution. PolQs are in no intuitive way marked or difficult to interpret.

Also note that this approach is very similar to the operator that is adopted by Roelofsen (2015), except for the fact that the complement alternative of PolQs is not added within the semantics. Especially with an eye on embedded PolQs, this might be a less attractive solution, since there is a clear difference between embedded PolQs and

embedded declaratives. Under such an approach it is unclear how to derive such a difference. This means that the contrast between interrogatives and declaratives is, most likely, semantic—not pragmatic.

Recall that in Uegaki's analysis of AltQs as disjoined PolQs, the disjuncts themselves also have to denote singletons. Therefore, Uegaki (2014) also adopts a singleton account of PolQs, but he does end up with a bipolar denotation of PolQs within the semantics. Uegaki adopts a Hamblin-style system and assumes a partition operator to be present in questions. This partition operator is defined as follows, and it scopes over the question operator in PolQs and over the full disjunction in AltQs (George, 2011).

(94) $[\![\textbf{Part}]\!] = \lambda Q.\lambda p.\exists w'[p = \lambda w.\forall p' \in Q[p'(w) = p'(w')]]$

This operator has the same effect as ? in polar questions: when it is applied to a singleton set, it will return the set of propositions containing the original proposition and its complement.

Now application of this operator has to be blocked in closed AltQs, so that the complement set is not added in those cases. The trick is that a presupposition is added to the definition of the partition operator, which presupposes that the prejacent is either a singleton set or already contains a strongest true answer to the question raised by the speaker.[8] This uniqueness presupposition on the question operator therefore only comes in play when the input of the partition operator is a question that consists of multiple alternatives. That is, if Q is a singleton, *Part* does not require that there is a true strongest answer in the context. It is only for this exception that *Part* can be defined the way it is, otherwise *Part* would be defined for $\{p\}$ only if p is true. Note that in this way, this partition operator is in a sense very similar to the $\langle ? \rangle$ operator as proposed by Roelofsen (2015)—except for the fact that in $\langle ? \rangle$ it is the at issue content that is changed dependent on whether the prejacent is inquisitive, while for *Part* it is the presupposition.

This proposal can also be seen as a reversed version of that of Biezma and Rawlins (2012a) in the sense that addition of the complement is blocked in AltQs, instead of additionally triggered in PolQs. However, in contrast to Biezma and Rawlins (2012a) this is again dealt with semantically, not pragmatically.

The problem with Uegaki's approach is not only that the case distinction in the presupposition is, again, rather stipulative, but also that we cannot account for open AltQs in this way. Since such questions should also denote non-singletons, the presupposition

[8] The original definition in Uegaki (2014) is the one below. I'm not incorporating this in the text above, since it may be unclear how this exact definition corresponds to Uegaki's informal definition. I therefore hope the intuitive story is clear enough.

(i) $[\![\textbf{Part}]\!] = \lambda C.\lambda Q.|Q| = 1 \vee \forall w'' \in C \exists p \in Q[p(w'') \wedge \forall p' \in Q[p'(w'') \rightarrow p \subseteq p']].$
$\{p \mid p = \lambda w.\exists w'[\forall p' \in Q[p'(w) = p'(w')]]\}$

makes sure that exactly one of the disjuncts is true in the context in which it is uttered, but open AltQs do not seem to presuppose this at all.

3.3.4 Taking stock

All the approaches outlined above thus seem to be variations of the same theme: the application or expression of the question operator depends on the cardinality or inquisitivity of the proposition that it applies to. The differences between these proposals lie in whether this question operator is blocked or triggered, whether its effect is semantic or pragmatic, and where the conditionality on inquisitivity is encoded.

In the next section I will outline an analysis in which I attempt to combine Biezma and Rawlins (2012a)'s intuition that question should always denote non-singletons (or inquisitive propositions), with the intuition behind the conditional question operator of Roelofsen and Farkas (2015) that this requirement has to be satisfied semantically—not through pragmatic coercion. Moreover, I will adopt Uegaki's intuition that this requirement itself comes in as a presupposition.

More precisely, I assume that instead of affecting the at issue meaning of its prejacent, interrogative clause type marking requires that the sentence we are uttering denotes an inquisitive proposition. In other words, I make the (perhaps uncontroversial) assumption that whenever we utter an interrogative, we already presuppose that what we are saying denotes a proper question. Therefore, the element that marks a clause as interrogative presupposes that the at issue meaning of a question is more than its informative content: the interrogative clause type marker triggers a presupposition that its prejacent is already inquisitive. I thus adopt the following hypothesis Uegaki, 2018.

Hypothesis 4. *Interrogative clause type marking introduces a presupposition that requires the clause that it applies to to denote an inquisitive proposition.*

I will assume that a sentence marked with an [INT] feature will only be defined in case its denotation already denotes an inquisitive proposition. I thus redefine the contribution of [INT] as in (95a). Moreover, I will assume that [DECL] has to opposite effect: it presupposes that its prejacent is non-inquisitive.

(95) a. $[\![\text{INT}]\!] = \lambda P \lambda C : C \subseteq info(P) \wedge info(P) \notin P.P$
b. $[\![\text{DECL}]\!] = \lambda P : info(P) \in P.P$

In PolQs, the complement of Force^o is never inquisitive itself. This means that we require an extra source of inquisitivity in PolQs to satisfy the presupposition: the question operator. I will call this operator Q, and it will simply be defined as in (96a). Conversely, the presupposition of [DECL] will always be satisfied when it immediately takes a TypeP as its prejacent, but not in case of a disjunction. [DECL] therefore trig-

gers the counterpart of Q, here denoted as A if it scopes over declarative disjunctions, which is defined as in below.

(96) a. $[\![Q]\!] = \lambda M.\lambda P.M(?P)$
b. $[\![A]\!] = \lambda M.\lambda P.M(!P)$

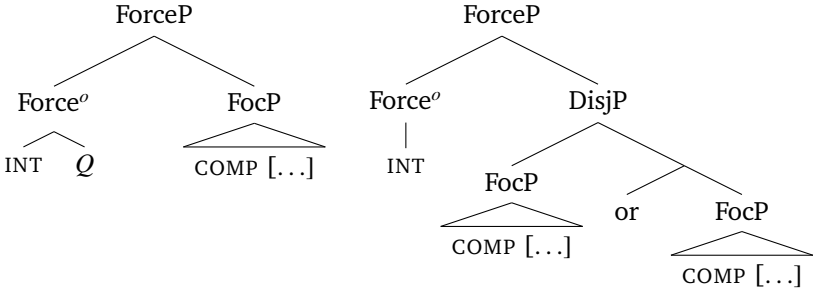
Syntactically, we could think of both Q and the clause type marker INT as being part of the same head, let's say Force^o in PolQs. The structure of PolQs will therefore look as in the tree on the left below. Since disjunction introduces inquisitivity, AltQs always already satisfy the inquisitivity presupposition. In AltQs, COMP is scoping below the disjunction, which ensures that they are inquisitive—unless each of the disjuncts entails the other disjunct, which we can rule out on independent grounds.

To account for the meaning of closed AltQs, we need to make sure that Q cannot show up in these cases. I therefore propose that Q is only licensed in a syntactic structure if the same structure without Q gives rise to a presupposition failure (Uegaki, 2018). The licensing conditions of Q are thus defined as follows:

Licensing conditions of Q. *Let φ be an LF containing Q and φ' be an LF only differing from φ in the presence of Q. Then φ is licensed only if φ' is uninterpretable.*

For this reason, AltQs are will have Q as a Force^o modifier, since the presupposition of INT is always already satisfied by the disjunction itself. AltQs will thus be assumed to have the structure on the right in (99) below.

(97)



Note that this approach is therefore very similar to that of (Biezma & Rawlins, 2012a), but the presence of Q in PolQs is not ensured using a "last resort coercion mechanism". Instead, here it is defined in terms of properties of Q itself.

Now, I still haven't said anything about the representation and effect of boundary tones. Under the current analysis, Q does not have any effect on the boundary tones of an utterance. In this way, PolQs always have a Q operator, but can either be rising or falling.

What I mean with this will become clear in the next chapter, but for now we can assume that any sentence comes, by default, with a falling boundary tone. By adding a final rise, the meaning of an utterance is enriched in a specific way. What I will assume

for now is that adding a final rise to an utterance signals that the utterance being made is non-informative. Similar to the way the interrogative clause type marker adds an inquisitivity presupposition, I will assume that a final rise adds a non-informativity presupposition:

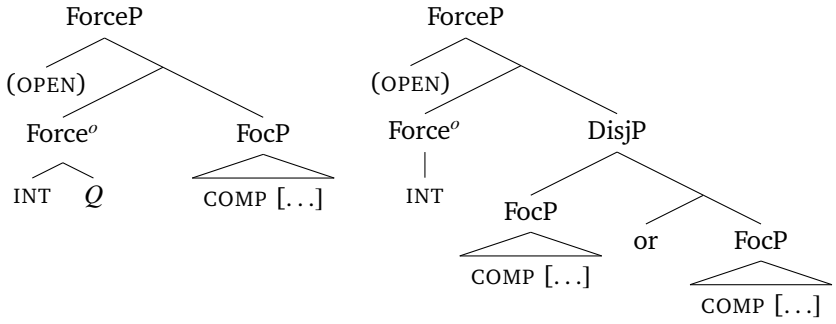
Hypothesis 5. *A final rise introduces a presupposition that requires the clause that it applies to to denote a non-informative proposition.*

Assuming that the presence of a final rise is represented syntactically (cf. Farkas & Roelofsen, 2017), I define the contribution of the morpheme responsible for a rising boundary tone, OPEN, as follows:

(98) $[\![\text{OPEN}]\!] = \lambda P.\mathcal{W} \subseteq info(P).P$

I will assume that OPEN comes in at the Force level too. This is, of course, an over-simplification of the way the specification for boundary tones should be understood. We ultimately need to explain why clauses with a final rise, like rising declaratives for example, do not embed—an observation we cannot account for now if we assume that embedded clauses are full ForcePs. I will come back to this in the next chapter, but for now, I assume the following structure:

(99)



Since INT in PolQs always already ensures the presence of Q, and because Q in turn ensures non-informativity, the boundary tone will have no effect on the meaning of PolQs. That is, OPEN will be completely optional in PolQs. Since AltQs do not usually contain Q, they are generally informative (unless one of the disjuncts is completely non-informative, or both disjuncts together cover the whole logical space). Adding a final rise in those cases, will have a crucial effect: it will license Q. In fact, it will ensure Q to be present, since we end up with a presupposition failure if it is not.

Thus, just like INT, OPEN simply triggers the question operator too, but it does so only in AltQs, while INT is crucial in PolQs. For AltQs, adding OPEN makes a difference: this will be exactly the difference between open and closed AltQs, where the complement alternative is added to open AltQs, but not to closed ones.

For the embedded case, we need to explain why OPEN is not allowed, but if we do

so we correctly predict that embedded AltQs are always closed, but embedded PolQs still contain a *Q* operator. Crucially, by splitting up the effect of the boundary tone and that of interrogative clause type marking we make this more fine-grained prediction in embedded cases.

3.4 Conclusion

We can now summarize the claims made in this chapter using the following, more fine-grained taxonomy of questions and assertions below. First, note that we still predict all sentences with interrogative syntax to be interpreted as questions, but the specific type of question now depends on the intonational contour.

To establish this, I assumed that focus marking indicates the size of the disjuncts in disjunctive interrogatives: disjunctive questions with a single focus always consist of sub-sentential disjunctions, while such questions with multiple foci consist of disjuncts with clausal disjuncts. Moreover, I assumed a ! operator to be present in the left-periphery, killing any inquisitive content below the clausal level. For any interrogative sentence, I also assumed that at the ForceP level the interrogative clause type marker adds an inquisitivity presupposition, while rising intonation adds an non-informativity presupposition.

Ignoring WhQs for now, we can say that if the question only contains one focused element, it will always be a PolQ. In these cases, the clause that INT applies to will never be inquisitive, either because it was never inquisitive to begin with, or because inquisitivity is killed at the CP level. For this reason, *Q* will also always show up in the left-periphery in subsentential disjunctive interrogatives.

If interrogatives contain multiple foci, on the other hand, they are always interpreted as bi-clausal disjunctions. Therefore, AltQs already satisfy the presupposition of INT by virtue of the alternative-generating character of (clausal) disjunction, and hence *Q* is not triggered by INT in AltQs. AltQs will therefore not be interpreted as containing a question operator—unless they are also pronounced with a rising boundary tone. In this latter case, OPEN will require the presence of *Q*, meaning that we will derive an open AltQ interpretation, but we will derive a closed AltQ reading if the boundary tone is falling.

For declaratives, we still predict that only declaratives with a rising boundary tone are interpreted as questions—more in particular as PolQs. Declaratives with a falling boundary tone are simply interpreted as assertions.

In this chapter, I assumed that a disjunction in an AltQ always has clausal disjuncts, but I did not provide an explanation of the fact that disjuncts are never full ForcePs by themselves. This contrasts with conjunctive questions, which always seem to consist of conjoined ForcePs. I did not make explicit why exactly this contrast would arise, nor did I provide an explanation of how such a contrast would be established syntactically.

I will therefore go into these issues in the next chapter.

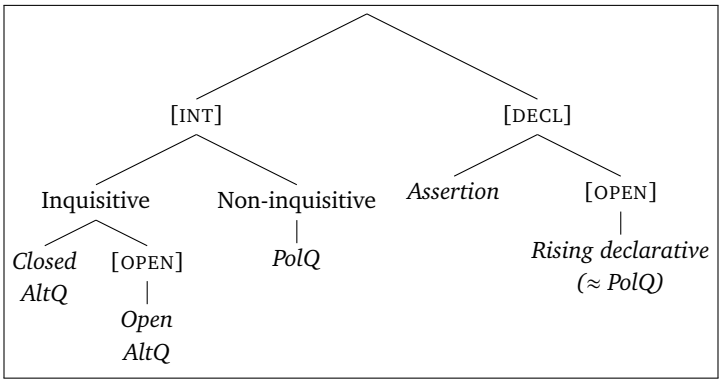


Figure 3.2: Taxonomy of questions and assertions

Chapter 4

DISJUNCTION LOWERING

Under many accounts, the question operator is housed somewhere in the complementizer system, for example in Force^0—the designated head which is often assumed to mark a clause as interrogative or declarative (Rizzi, 1997). This is what I assumed in the previous chapter and, of course, such an assumption makes sense if we think of the presence of the question operator as the semantic expression of sentential force. At the same time, I concluded in the previous chapter that in AltQs, the disjuncts are bigger than TPs. Semantically, we only require the presence of a single question operator scoping over the full disjunction in AltQs. It therefore seems that disjuncts can never be full ForcePs. This clearly contrast with conjunctive questions that, as discussed in Chapter 2, always have a question operator in each conjunct and therefore seem to consist of full, conjoined ForcePs.

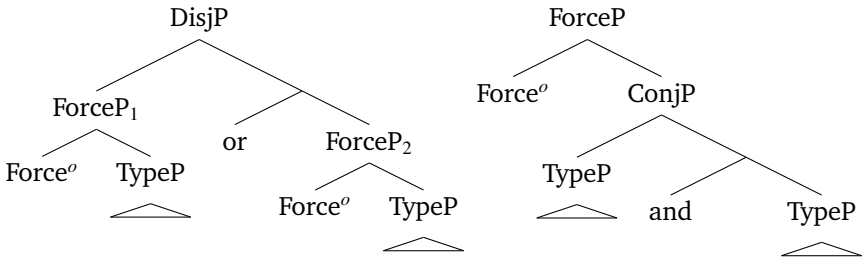
The aim of this chapter is to account for this contrast and therefore to tackle the third puzzle as discussed in Chapter 2, repeated here below.

Puzzle 3. Disjunction lowering: *Why does the question operator always take scope over disjunctions, while in conjunctive questions each conjunct contains a question operator?*

Thus taking the puzzle of *Disjunction Lowering* as our primary observation, we can ask ourselves what syntactic position the question operator really occupies in disjunctive questions, and why it does not occupy a similar position in conjunctive questions. I will show that we can split this puzzle up into two sub-problems: first, we have to explain why a structure in which the disjunction takes two ForcePs as its conjuncts is ruled out, and second we need to account for the observation that conjunctions generally consist of full ForcePs. We thus need to rule out both of the structures in (100).

I will call these sub-problems puzzle 3.1 and 3.2 respectively and I will discuss them in turn. Then, I will show that in solving both of these sub-puzzles, it turns out that we can also solve a few of the other puzzles discussed in Chapter 2.

(100)



4.1 Ruling out wide scope disjunction

Puzzle 3.1. Wide scope disjunction: *Why can the disjunction in disjunctive questions never take wide scope over Force?*

To start with the first, an important observation seems to be that the restriction on wide scope disjunction is not limited to questions: we observe similar effects for assertions or imperatives. Take for example the following sentence in (101). Here, very informally put, the speaker is not commanding the addressee to do the dishes or commanding the addressee to clean her room, but instead the speaker is commanding the addressee to do either of the two (Krifka, 2001; Franke, 2008). Similarly, in uttering the statement in (102), we do not assert that it is raining or assert that it is snowing, but we assert that it is raining or snowing instead (Gärtner & Michaelis, 2010).

(101) Do the dishes or clean your room!
$\not\rightsquigarrow$ [COMMAND(*do − dishes*)] *or* [COMMAND(*clean − room*)]
$\rightsquigarrow$ [COMMAND(*do − dishes or clean − room*)]

(102) It is raining or it is snowing.
$\not\rightsquigarrow$ [ASSERT(*raining*)] *or* [ASSERT(*snowing*)]
$\rightsquigarrow$ [ASSERT(*raining or snowing*)]

Assumed that the imperative and assertive force stems from the force head as well, we can perhaps conclude that it is a general property of disjunction to not take ForcePs as its arguments. Perhaps ForcePs are too big to be disjoined, and hence only disjunctions of smaller projections are well-formed. I therefore suggest the following generalization:

Generalization 1. *ForcePs cannot be disjoined, while they can be conjoined*

The question now is: how could we explain this generalization? A natural explanation might lie in the assumption that ForcePs do not denote propositions but speech acts and that it is the impossibility of disjoining speech acts that causes a disjunction of ForcePs to be infelicitous. Several authors have argued that only propositions, but not

speech acts in general can be disjoined (Szabolcsi, 1982; Krifka, 2001; Groenendijk & Stokhof, 1984). For this reason, Krifka (2001, p. 16) concludes that "[s]yntactic forms that look like disjunction of two speech acts typically are interpreted in special ways, for example, by lowering the disjunction to the propositional level". We therefore need to distinguish between propositions and speech acts, which I will do below.

4.1.1 The proposition/speech act distinction

Following Krifka (2004), I will make a distinction between propositions and speech acts, where I take the first to be the semantic content of a sentence and the latter the effect that an utterance has on a discourse context. This distinction is already proposed by Frege who distinguished between the thought that is expressed by a sentence and its illocutionary force. On his original account, this meant that PolQs and falling declaratives have the same semantic content but differ in their illocutionary force (Frege, 1956). I will not adopt this particular view here, but I will instead follow Farkas and Roelofsen (2017) in arguing that falling declaratives not only differ from PolQs in force, but also in their semantic content. The two are then differentiated by their semantics, but also in, what I will call the discourse component. Proposals along these lines can be found in, among others, Gunlogson (2004), Farkas and Bruce (2010) and Krifka (2014).

There are several reasons for assuming this particular "division of labor" between the semantics and the discourse component (Farkas & Roelofsen, 2017). First, in embedded clauses, the semantic content of a *that* clause is different than that of a *whether* clause. Making the straightforward assumption that *that* clauses are embedded declaratives, while *whether* clauses are embedded interrogatives, it is only natural to extend this distinction to root clauses as well. Moreover, the idea that falling declaratives and PolQs semantically differ only in their force, does not naturally extend to types of questions such as WhQs or AltQs (Farkas & Roelofsen, 2017). Since these seem to form a natural class with PolQs, the most straightforward analysis would be one that treats these questions on a par.

I will therefore follow Farkas and Roelofsen (2017) in assuming a distinction between the semantic content and the discourse effects of an utterance. I will take the semantic content to be the inquisitive proposition, i.e. a downward-closed set of info states, that a sentence expresses, while the discourse effects will be defined in terms of the changes an utterance makes with respect to a discourse context.

As I did in previous chapters, for any sentence φ of InqB, $[\![\varphi]\!]$ will be the proposition expressed by φ. Below, I will add the notion of a speech by suggesting that uttering a sentence φ will mean performing the speech act $[\varphi]$. While $[\![\varphi]\!]$ will thus denote a set of info states, $[\varphi]$ will be a function that takes a context and returns a context.

However, in contrast to more standard dynamic accounts, the discourse effects induced by a sentence are not computed recursively, but they are only determined at the

sentential level (Farkas & Roelofsen, 2017). More specifically, I will assume that the discourse component works on clauses that are ForcePs, and on ForcePs only. That is, I assume that ForceP is always the largest projection of a sentence. This will entail that the semantic content of a sentence is dealt with compositionally below the level of Force, and after the structure is build up until the Force level it will be spelled out to the discourse component. Only at the level of the ForceP itself will the discourse effects of a sentence be determined. In this way, ForcePs will always correspond to speech acts which have a dynamic effect on the context. This is in this sense perhaps reminiscent of the more commonly used speech act phrase (SAP) (Tenny & Speas, 2004).

Now, in order to make explicit what the effect of a speech act is on a discourse context, we first need to define what a discourse context is. In doing so, I will build on ideas put forward in Farkas and Roelofsen (2017), who in turn base their definition of a discourse model on previous work (cf. Stalnaker, 2002; Farkas & Bruce, 2010; Gunlogson, 2004). I will discuss this account below.

4.1.2 Discourse contexts

When we speak, we usually do not utter meaningful expressions in a vacuum. Instead, our utterances have a certain effect on the context in which we utter them—at least we may hope so. Usually when conversation progresses, interlocutors build up a shared information base. In fact, increasing the amount of shared information in the discourse context is often taken to be the main goal of conversation. Traditionally, this effect is modeled as update on the common ground (*cg*), where the common ground is defined as a set of propositions shared by all the discourse participants. Updating this *cg* simply amounts to adding the proposition expressed by the utterance to this set (Stalnaker, 2002).

However, it is not always the case that the common ground is updated immediately after an utterance is made; performing a speech act does not always immediately result in a shared commitment. Such a view of discourse effects as immediately updating the *cg* may work well for assertions, but is hard to extend to other types of speech acts. Gunlogson (2004) therefore proposes that speaker's individual commitments should be kept track of in a discourse context as well. The main effect of making an assertion is then to add its propositional content to the speaker's individual commitment set. Also in other type of speech acts, like questions, the individual commitment set is affected before any changes are made to the common ground.

Farkas and Bruce (2010) find a middle ground between the initial idea of a shared set of commitments and individual commitments by suggesting that speech acts must be viewed as proposal to update the *cg*. In making such a proposal, the speaker also makes an individual commitment that can be turned into a shared commitment by the other interlocutors by accepting the proposed update of the common ground. As is shown in Farkas and Roelofsen (2017), such a perspective on discourse contexts and

the effects of speech acts interfaces very neatly with the inquisitive semantics frameworks, since issues can be viewed as proposals to update the common ground in different ways: each info state contained in the proposition that is expressed represents a proposed update of the cg. I will adopt a version of this view on discourse contexts too.

In Farkas and Roelofsen (2017), discourse contexts keep track of the commitments of individual speakers and of the proposals that these speakers have made to update the commong ground. A discourse context is therefore defined as follows.

Definition 4. *A context C is a triple $\langle A, T, CS \rangle$, where*

a. *A is the set of discourse participants;*
b. *T is a stack of propositions, representing the proposals that have been made in the context so far.*
c. *CS is a function that maps every participant $a \in A$ to a set of info states, those info states that a is publicly committed to.*

Here, T is called the Table, and may contain both inquisitive and non-inquisitive propositions. The discourse effects of questions and assertions are the same in the sense that both have the same effects on CS and T. In other words, questions and assertions are distinguished by means of their semantics, but after the semantic content of these expressions are determined, the conventions of use of both can be defined in the exact same way. More specifically, performing a speech act always has two effects on the discourse context: (i) the commitment set of the speaker is updated and (ii) the proposition expressed by the speech act is put on the Table.

Definition 5. *If a discourse participant a utters a sentence φ, the discourse context is affected as follows:*

1. *The proposition expressed by φ, $[\![\varphi]\!]$, is added to the Table.*
2. *The informative content of φ, info(φ) is added to CS(a)*

Speech acts would then be indexed for the specific discourse participant that performs them. We therefore only update the specific commitment set of that speaker.

Some auxiliary notions are defined too. The context set of an agent a, denoted by $cs(a)$, will be the set of worlds that are compatible with the agent's public commitments at some point in the conversation. This can be derived from CS: $cs(a) = \cap CS(a)$.

Using this notion of a context set, the Stalnakerian notion of a common ground is recoverable too: $cg = \bigcup_{a \in A}\{cs(a)\}$. This means that the common ground is the smallest set of info states that all participants agree on the actual world to be part of. For example, if agent a is publicly committed to believing that the actual world is a p-world, and agent b is committing to believing the actual world to be a q-world, the common ground will consist of states $|p|$ and $|q|$.

Even when having this distinction between a proposition and a speech act in place, we can ask: why is it that speech acts cannot be disjoined? Perhaps one of the most articulated accounts of this can be found in Krifka's work, in which it is argued that uttering a disjoined speech act will result in an ill-formed commitment state. I therefore discuss this proposal below and I will show that even though this account might work well for disjoined assertions, it does not straightforwardly extend to disjoined questions in an inquisitive setting. I will therefore adjust Krifka's basic intuition in such a way that it can be implemented into a framework similar to that of Farkas and Roelofsen (2017).

4.1.3 Speech act disjunction and commitment states

In Krifka's work, the impossibility of disjoining speech acts is explained in terms of commitments. The basic intuition is that performing a speech act amounts to making a public social commitment, and in disjoined speech it becomes unclear what it is that the speaker has committed to. In his account, speech acts therefore also differ from propositions ("sentence radicals" in Krifka's own terminology) in the sense that they have a dynamic effect on the discourse context: just as in Farkas and Roelofsen (2017), commitment states are updated when a speech act is performed. Again, commitment states are modeled as sets of info states, representing those bits of information that the participants of a conversation consider to be shared at the current point in conversation (Krifka, 2015).

Updating a commitment set c with speech act $[\varphi]$ will simply amount to adding the info state $|\varphi|$ introduced by the speech act to the set of commitments c. We therefore have:

(103) $c + [\varphi] := c \cup \{|\varphi|\}$ where $|\varphi|$ is the commitment introduced by speech act $[\varphi]$

In the spirit of Farkas and Bruce (2010), who suggest that speech acts are proposals, Krifka suggests that performing a speech act has an effect on the possible continuations of the discourse contexts. Apart from a commitment state, Krifka also introduces the lifted notion of a commitment space (CSp), which is taken to be a set of commitment states and represents the expected or "legal" continuations of a commitment state (Krifka, 2015). Not only individual commitment states are affected, but speech acts also affect this commitment space.

Definition 6. *C is a Commitment Space (CSp) iff C is a set of commitment states, with $\cap C \neq \emptyset$ and $\cap C \in C$*

The commitment state $\cap C$ is called the root of C (written by Krifka as $\surd C$), and represents the set of propositions that participants have positively committed to up to the current point in the conversation. This set is therefore the same as the more commonly

used cg. There is no need to make things more complicated than they are, so I will simply write cg_C to denote the root of C.

In Krifka's system, performing a speech act has effects on the commitment space C in such a way that it restricts the set of possible continuations of the current commitment state. That is, updating a set of commitment states C with a speech act $[\varphi]$ means updating the root of C and keeping any set of propositions $c \in C$ as a possible continuation of the commitment state that contains the updated root.

(104) $C' = C[\varphi] := \{c \in C \mid cg_C + [\varphi] \subseteq c\}$

Since $cg_C + [\varphi] \subseteq cg_C + [\varphi]$, C' will always have a root, and will therefore always be a commitment space again.

The conjunction of two speech acts can now be modeled as intersection, while disjunction of two speech acts can be modeled as union. This is shown below, where I indicate speech act conjunction and speech act disjunction as $\triangle$ and $\triangledown$ respectively.

(105) a. $C' = C([\varphi]\triangle[\psi]) = C[\varphi] \cap C[\psi]$
$= \{c \in C \mid cg_C \cup \{|\varphi|\} \subseteq c \text{ and } cg_C \cup \{|\psi|\} \subseteq c\}$

b. $C'' = C([\varphi]\triangledown[\psi]) = C[\varphi] \cup C[\psi]$
$= \{c \in C \mid cg_C \cup \{|\varphi|\} \subseteq c \text{ or } cg_C \cup \{|\psi|\} \subseteq c\}$

Update with a conjunction of speech acts always results in a rooted set of commitment states, and therefore results in a set of commitment states that is itself a commitment space again. For instance, the root of the commitment space C' below would be $cg_C \cup \{|\varphi|, |\psi|\}$.

This is not the case for disjunction: the roots of the commitment space C'' would be $cg_C \cup \{|\varphi|\}$ and $cg_C \cup \{|\psi|\}$. The problem with speech act disjunction is then that it never results in a set of commitment states that has a single root—unless the disjuncts express an identical proposition for example. Krifka argues that, intuitively, this means that disjoining two speech acts is infelicitous because we do not really know what it is that the speaker has committed to; we lose track of what the root of C is and we therefore lose track of what the current commitment set amounts to.

Let's take a step back and see what all this means. The crucial assumption that underlies the distinction between disjunction and conjunction in Krifka's account is that commitment spaces need to have a single root. So how reasonable is this restriction really?

Krifka's notion of a commitment state as a set of publicly shared commitments perhaps corresponds to the more commonly used notion of a Stalnakerian common ground (cg). Putting his proposal in Stalnakerian terms then simply means that speech acts generally aim at updating the common ground. This is in no way a controversial assumption. However, note that also in Krifka's proposal the common ground is updated immediately when a speech act is performed: update on a commitment space C

always immediately affects the root of C. From the perspective of the discourse effects of questions this makes less sense, since we do not seem to affect the common ground at all in uttering a question. The whole point of dealing with the meaning of questions as consisting of multiple alternatives is that, intuitively, they present multiple ways of updating the common ground. The future common grounds that are projected when performing a questioning speech act are therefore necessarily non-rooted: if uttering a question only proposes a single update, it is not a well-formed question after all.

So indeed, it perhaps makes sense to think of the cg as "rooted", and it also makes sense to think of speech acts as having the effect of restricting the "future common grounds". However, it makes less sense to assume that speech acts always update the common ground itself, and that they do so immediately. Crucially, if we adjust Krifka's proposal and split the current common ground from its future continuations, and we also suggest that we do not update the common ground itself but only its future continuations, we completely lose Krifka's restriction of rootedness. That is, we then have to suggest that the future continuations have to be rooted, but there is no intuitive justification for adopting such a restriction.

Although the common ground itself might not be updated immediately, uttering a speech act might have a direct effect on the individual commitment state of the speaker. By performing a speech act we immediately commit to whatever it is we are uttering. Perhaps we can therefore view the condition of rootedness of a commitment set as a condition on individual speaker's commitment states instead. However, even under such an interpretation, Krifka's proposal does not quite work for questions either, since it is unclear what we would actually commit to in uttering a question. For example, in Farkas and Roelofsen (2017), questions always bring in trivial commitments, since it is assumed that we always commit to the informative content of our utterances and questions always have trivial informative content. Disjoining two questions would then mean committing to the disjunction of $|\top|$ and $|\top|$, but this will never give rise to non-rootedness. Hence, there is nothing that prevents us from performing disjoined questioning acts under the assumption that these speech acts have trivial commitments.

In short, giving an explanation for the impossibility of disjoined speech acts in terms of commitments might work out fine for assertions, but for questions it is less clear that such an approach would yield the right predictions—at least not when viewed from an inquisitive perspective. So what is the problem with disjoined questions then?

In Roelofsen and Farkas (2015) and Farkas and Roelofsen (2017) speech acts do not only affect the speakers' commitment states, they also have an effect on the QUD, or as they call it, the Table. I will therefore argue that, intuitively, when we conjoin speech acts, we simply put multiple propositions on the Table consecutively. However, we cannot define speech act disjunction in this way. We can therefore straightforwardly define a discourse move that would correspond to the conjunction of two separate discourse moves, but this is not possible for disjunctions: there is no operation that intuitively

corresponds to speech act disjunction, and that combines two discourse moves into a single move which also yields a proper context.

4.1.4 Speech act disjunction and discourse moves

I will be adopting the definition as put forward in (Farkas & Roelofsen, 2017), which means that I assume that speech acts affect both the commitment states of speakers and add a proposition to the Table.

We can think of a conversation as a game with an evolving score, and of speech acts as moves in such a game. This means that different speech acts change the score of the game in different ways: a speech act is something like a proposal to change the context set in a specific way—a proposal that is adopted if it is not rejected by one of the other parties to the conversation.

The basic intuition is that participants can only make one move at a time. While we can make up one move out of several moves by performing them in a consecutive order, we cannot perform different moves in parallel.

I therefore propose that speech act conjunction can be defined as function composition: if speech acts are functions that update contexts, we can take conjunction to be the composition of two of those functions. The result of this will always be a function from contexts to contexts itself, and will therefore be a valid conversational move.

(106) $[\varphi \text{ “}\textit{and}\text{” } \psi] := [\varphi] \circ [\psi]$

Applying a conjoined speech act to a context then, amounts to updating the original context with one conjunct and then subsequently updating the result with the second conjunct. The above therefore amounts to consecutive update of speech acts, just as is standardly assumed for conjunction in dynamic semantics.

(107) $C[\chi] = C[\varphi][\psi]$ where $[\chi] = [\varphi \text{ “}\textit{and}\text{” } \psi]$

This means that we have the following for conjunctions. In a simple setting without any anaphoric relations between the speech acts, consecutive update will give a context in which the Table simply contains both propositions expressed by each speech act, and the speaker is committed to the informative content of both speech acts.

In order to remove these propositions from the Table, the speaker needs to resolve both issues. In terms of the resolution conditions, uttering two conjoined speech acts is therefore equivalent to uttering one speech act that adds the proposition on the Table which corresponds to the conjunction of the proposition expressed by each conjunct. We thus have that $T_{C[\varphi][\psi]}$ is resolvable for a context C iff $T_{C[\varphi \wedge \psi]}$ is resolvable for C, where we say a Table is resolvable if all its issues in it can be resolved:

Definition 7. *An issue Q is resolved in a context C iff $cg_C \cap Q$ is non-inquisitive.*

Definition 8. *A Table T is resolvable in a context C iff there is an info state s s.t.* $cg_C \cap s \neq \emptyset$ *and all issues Q of T are resolved by* $cg_C \cap s$.

Conjoining questions is therefore allowed, since the hearer knows how to respond to them. So we should ask: what is the speech act that could correspond to the disjunction of two speech acts?

We cannot define disjunction of speech acts as the union of the context updated with each disjunct, as shown below. By our definition of a context, this will never yield a context again.

(108) $C' = C[\chi] := C[\varphi] \cup C[\psi]$ where $[\chi] = [\varphi$ "*or*" $\psi]$

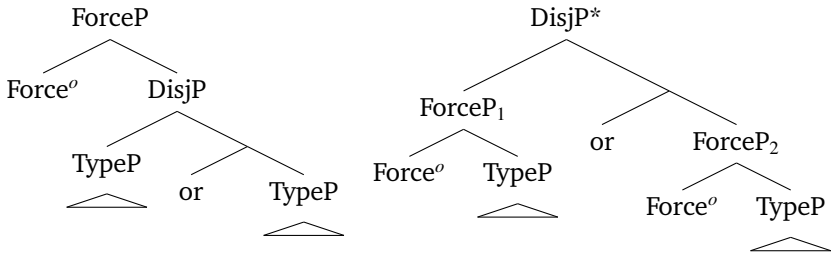
Perhaps a natural way to think of speech act disjunction is that it offers the addressee alternative contexts in some sense (cf. Krifka, 2004). For example, a speaker could offer a set of speech acts to the addressee, with the understanding that the addressee pick out one of the acts. But even in such a case, it would be unclear which issues are on the Table and how they could be resolved. That is, the only way to remove both issues from the Table is by resolving them both, but that would mean that, in terms of its resolution conditions, a disjoined speech act is equivalent to a conjoined speech act. To make sure that the addressee really has the option to resolve only one of the two issues raised, we would have to put the alternatives that each issue introduces in a single issue. But this would bring us back to our initial point: since this would require the disjunction to scope under Force.

In short, it is therefore difficult to imagine any reasonable way to define speech act disjunction. For disjunction, we may have to conclude that speech act disjunction is never a plausible operation on speech acts, because there is no disjunctive counterpart to function composition.

I thus assume that the word *and* is, in a way, ambiguous. That is, *and* may correspond to the generalized conjunction that applies on the level of the semantics to expressions of a T-reducible type, but it may also correspond to a non-boolean operation on speech acts that corresponds to function composition. This second use of *and* is perhaps similar to the way we often think of speech act-modifying adverbs, like *frankly*, or *honestly*, which specify certain aspects of the speech act itself.

The word *or*, on the other hand, only has a meaning in the semantics, and can therefore only be interpreted as generalized disjunction. This means that *or* can only be applied to constituents of a T-reducible type, below the ForceP level. Applying *or* to speech acts will therefore always result in infelicity. I assume that the discourse component operates on ForcePs, and we can therefore not construct syntactic structures that are bigger than ForcePs. In this way, we must conclude that disjuncts in AltQs are never full ForcePs. Thus, we have ruled out the wide scope disjunction as shown below on the right. Consequently, the only possible structure for AltQs is the one on the left.

(109)



Two important questions remain unanswered at this point, however. First, if we assume that INT is introduced in Force, it is not clear how each disjunct gets its interrogative clause type marking. Second, how could this proposal be extended to the embedded case? I will address both issues in the next section.

4.1.5 A note on rising intonation

Now that we have the distinction between propositions and speech acts in place, we might suggest that, instead of triggering an effect in the semantics, rising intonation can be modelled as a speech act modifier too (Heim et al., 2016). This would mean that rising intonation is specified within the discourse component, which might explain why rising intonation only applies to the root case.

A possible way of viewing the effect of rising intonation would be to think of it as signaling non-commitment (Truckenbrodt, 2009; Gunlogson, 2004; Malamud & Stephenson, 2014). Since I assumed that speakers commit to the informative content of their utterances, it is now easy to implement such a view on rising intonation. We can simply suggest that rising intonation presupposes a trivial informative content of an utterance, and thereby has the effect of cancelling any commitments.

4.2 Ruling out narrow scope conjunction

Puzzle 3.2. Narrow scope conjunction: *Why does Force not generally take scope over conjunctions?*

Even when adopting a restriction for disjunctions to only take arguments that are not full ForcePs, we still predict conjunctions to be ambiguous between a reading with one question operator and a reading with two question operators. There is no reason why the force head cannot scope over a conjunction of smaller phrases. This reading is unattested however, since the question in (110) is generally not interpreted as a PolQ. Or, in other words, the issue raised by a question like (110) cannot be resolved by answering as in (110a).

(110) A: Did John come to the party and did Mary come too?
↛ Did both Mary and John come to the party?
a. B: # No, only one of them was there.
b. B: John was there, but Mary wasn't.

We might therefore also want to add a restriction on the specific projections that conjunctions can take as their conjuncts. The problem here is that conjunctions should be fine for subsentential constituents, so we cannot rule out conjoined TypePs by suggesting that this projection is too small to be conjoined; such a restriction would rule out any subsentential use of conjunction too. It is therefore very hard—if not impossible—to rule out the reading of conjoined question as a polar question under such an approach. It thus seems that the unavailability of narrow scope conjunction cannot be explained in terms of properties of the conjunction itself.

Before going into the specific analysis, it should be noted that the picture for conjunctions seems a bit more nuanced than that of disjunctions. It seems that the restriction on the scope of conjunction with respect to Force is less strong than it is in the case of disjunctions. To see this, consider the following example in (111). As shown by Truckenbrodt (2015), stressing the conjunction itself often leads to a reading in which the conjunction takes narrow scope. This seems to be the case for conjunctive questions too in the sense that, in (111b), we will only derive a single PolQ reading as shown in (111b). That is, we can only get a reading where the speaker wants to know whether it is the case that John likes both Mary and Sue. If we stress each conjunct however, we get a double PolQ reading.

(111) a. Does John like $\text{MARY}_{\text{L*H-}}$, and $\text{SUE}_{\text{L*H-}}$?
b. Does John like Mary AND Sue?

Also note that in an example like (112), again a narrow scope reading of the conjunction is forced by stressing the conjunction itself. That is, we get a rather silly reading in (112b), in which the speaker wants to know whether John cleaned both his room and Bill. Therefore, we can perhaps conclude that stress on *and* indeed forces a narrow scope conjunction, as proposed by Truckenbrodt (2015).

(112) a. Did John clean his $\text{room}_{\text{L*H-}}$, and $\text{BILL}_{\text{L*H-}}$?
b. Did John clean his room, AND Bill?

Crucially, using a stressed *and* in bi-clausal conjunctive questions, as shown in (113), seems to give rise to single PolQ—and therefore a narrow scope conjunction too. This may indicate that even though conjunctive questions are not generally interpreted as PolQs, they have a single PolQ reading available, but that this reading is only available when explicitly marked, for example by stressing *and*.

(113) Did John clean his room AND did Bill do the dishes?

Therefore, instead of ruling out the narrow scope reading completely, we should account for the strong preference for wide scope conjunction. Below, I will argue that, in fact, this observation provides indirect evidence for our analysis considering disjoined ForcePs.

4.2.1 "Disjunction lowering" is operator movement

Because of the restriction on disjoined speech acts, Krifka (2001) argues that syntactic forms that look like speech act disjunctions involve "disjunction lowering". Taking this very literally, it is unclear what mechanism would correspond to lowering of a disjunction, since constituents generally do not lower in any syntactic structure. I will therefore argue below that the ingredients that I have assumed in this and in previous chapters may already suggest what such an operation may look like instead.

Recall that I assumed that the interrogative clause type marking introduces a presupposition that its prejacent is inquisitive. Since disjuncts can never be full ForcePs and the presupposition introduced by INT occurs in Force^o, this meant that INT always scoped over the full disjunction. However, perhaps it makes more sense to assume that INT is base-generated in a lower projection, like TypeP, in AltQs, since each disjunct of an AltQ is generally clause type marked by itself. For example, assuming that *whether* can only occur in a clause that is marked as an interrogative, we already run into a problem in AltQs that have two *whether* clauses: each disjunct must have a clause type marker in such a case.

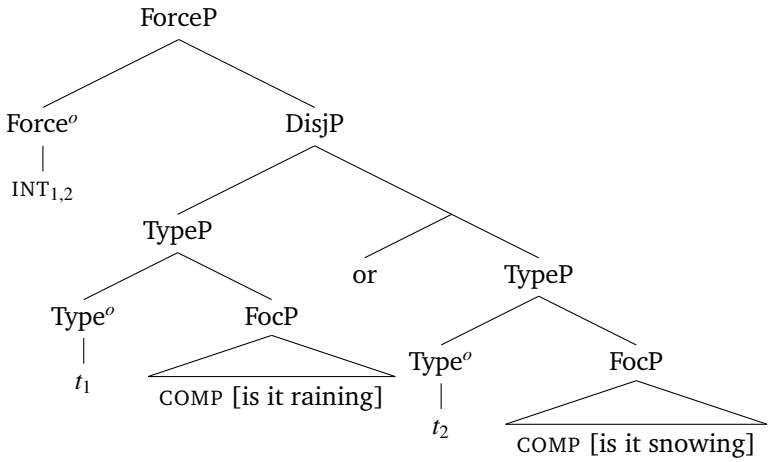
If we therefore assume that in AltQs INT appears in each disjunct, the presupposition that this clause type marker introduces can as such never be satisfied; the individual disjuncts in an AltQ will never be inquisitive. In order to satisfy the inquisitivity presupposition, we therefore need an additional operation specifically in AltQs that saves us from ending up with a presupposition failure. Since the disjunction as a whole *is* inquisitive, the inquisitivity presupposition can be satisfied when interpreted as taking scope over the disjunction. I will therefore propose that even though INT is most likely base-generated in a lower projection, like TypeP, it ends up being interpreted in ForceP.

We can for instance suggest that the interrogative clause type marker that introduces the inquisitivity presupposition has to move upward in AltQs. Inside the disjuncts it then licenses interrogative complementizers like *whether*, while it is interpreted above the disjunction. I conclude that it is this operation that corresponds to what Krifka called "disjunction lowering". This means that it is not the disjunction that lowers onto the propositional level, but instead, the operators responsible for interrogative clause type marking move upwards in AltQs.

This would require a specific kind of movement, often referred to as across-the-board movement (ATB for short) in which an identical element inside both conjuncts

simultaneously moves to a position above a coordination. This would give us the following LF in (114), which then has the denotation in (115a).[12]

(114)



(115) a. $[\![(114)]\!] = p \vee q$

b. $Presupposes : info([\![115a]\!]) \notin [\![115a]\!]$

Perhaps this additional operation is then only licensed when necessary: if a structure without ATB movement is interpretable, we will generally not interpret it as if such movement had taken place. Therefore, we will not assume INT operators to move when their presuppositions can be satisfied by the presence of a Q operator.

As I assume that Q is not an expression of clause type but of Force, such an operator cannot be present in disjuncts, but it can be present in conjuncts. Therefore, in conjunctions, we generally do not end up with a structure parallel to that of AltQs, because in conjunctions we can make sure the presupposition is satisfied by assuming that each conjunct is the size of a ForceP. Since a structure is available in which we think of a conjoined question as a conjunction of PolQs, there is no need to assume the additional operation that is necessary to interpret AltQs. I conclude that it is for this reason that conjoined questions have a very strong tendency to be interpreted as a conjunction of PolQs.

In short, for conjunctive questions, both a wide scope and a narrow scope reading are therefore strictly speaking possible, but only in the last version do we need movement of INT. The structure in which the conjunction is interpreted as a speech act conjunction will therefore be the default reading of a conjoined question, because this

[1] Equivalently, we can think of this operation as a purely semantic mechanism: perhaps the interpretation of the presupposition is postponed by triggering type lifters in each disjunct.

[2] This analysis would entail assuming that ATB movement is possible for phrases as well as heads, and moreover that head movement has an effect on the semantics. See de Vries (2017) for ATB head movement and see Vicente (2007) for arguments in favor of the possibility of head movement affecting the semantics.

is the one with the simplest structure. Hence, conjunctive questions are not normally predicted to be ambiguous—even though a narrow scope reading can be triggered when forced by stressing the conjunction. For disjunctive questions on the other hand, we strictly rule out a wide-scope reading of the disjunction, because disjunction cannot combine two full ForcePs.

4.3 Solving some more puzzles

Now that we have all this in place, we can perhaps move on and see if we can solve some more puzzles. In the remainder of this chapter I will therefore go over the last three puzzles and show that the solution to these puzzles actually fall out from the assumptions made above.

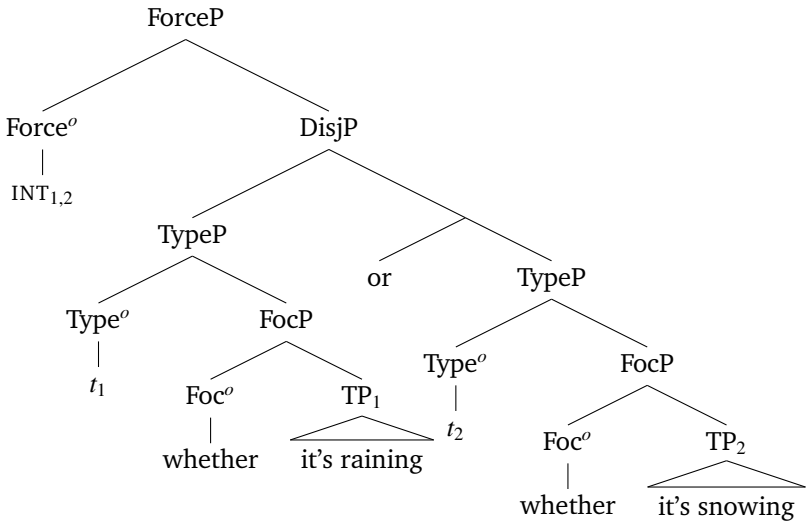
4.3.1 Q in embedded questions

The puzzle concercing *Q* in embedded questions is repeated here below. In this section I show that embedded question can mostly be treated in the exact same way as I dealt with root questions.

Puzzle 4. Q in embedded questions: *Where does the question interpretation come from in embedded questions?*

When assuming that INT is a silent version of *whether*, we run into a problem in embedded AltQs: an ATB analysis would lead us to conclude that *whether* in double *whether* AltQs ATB-moves covertly to a position above the disjunction. This is problematic, since covert ATB movement is generally not assumed to be possible (Bošović & Franks, 2000). We therefore simply need to assume that *whether* is licensed by interrogative clause type marking, but it cannot correspond to the clause type marker itself. Instead, it would follow from the above assumptions that *whether* corresponds to what I called COMP above. We can for example assume a structure as the one below, in which *whether* resides in Foc^o.

(116)



This would mean that we assume the following meaning for *whether*, in which *whether* kills inquisitivity instead of introducing it.

(117) $[\![whether]\!] = \lambda P.!P$

This move now allows us to define the entry for *whether* in a unified way in both AltQs and PolQs. Moreover, it predicts that double *whether*-disjunctions are always clausal and therefore always inquisitive. This prediction is indeed borne out, since we cannot get a PolQ reading for a disjunction in which each disjunct is a full *whether*-clause.

In embedded PolQs, the question meaning will in this way not stem from *whether* itself, but instead, the syntactic clause typing that licenses *whether* will trigger a presupposition that in turn assures the presence of Q.

Embedded conjoined questions will be dealt with in the same way as their matrix level counterparts: they will be analyzed as conjunctions of PolQs. Just as in root questions, I assume that embedded AltQs do not have a question operator at all. Moreover, since they are embedded, they cannot have a rising intonation and will therefore also not have an OPEN feature. We will therefore predict that they always have the same interpretation as closed AltQs at the root level. These predictions are also borne out. [3]

[3] Since I assumed that it is at the ForceP layer that propositions are turned into speech acts, and given that embedded questions contain a ForceP layer too, this complicates the way we think of such embedded questions: they must now be embedded speech acts. We need an operator that turns a speech act back into its propositional content.

I propose to build this into the answer operator ANS, familiar from Theiler, Roelofsen, and Aloni (2016) for example. In an inquisitive framework, ANS is uniformly applied to embedded interrogatives and declaratives, so we do not need to stipulate any additional operators. The propositional content of a speech act can always be recovered by applying it to an arbitrary context: the ANS operator can simply be applied to the proposition on top of the Table that results from such an update.

4.3.2 Overt "or not"

Puzzle 5. Overt "or not": *Is the semantic contribution of overt "or not" clauses the same as that of covert question operators, and if so, why is this infelicitous in AltQs?*

The main point here will be that overt "or not" clauses always force the disjunction as a whole to be a full ForceP. Since we argued that ForcePs cannot be disjoined, we thus correctly predict AltQs with an "or not" clause in each disjunct to be out.

The crucial assumption in the underlying structure of "or not" disjunctions is that the disjuncts are always clausal. That is, I adopt the following, perhaps rather uncontroversial structure for "or not" disjunctions.

(118) $[_{ForceP}$ Force^{o} $[_{DisjP}$ $[_{PolP}$ TypeP/FocP] or $[_{PolP}$ not TypeP/FocP]]]]]]

Here, the second disjunct contains an elided clause which—since it is generally assumed that disjunctions only take symmetric disjuncts—is always the same size as the first disjunct. The first disjunct is a full interrogative and hence, the disjuncts are both have to be bigger than a TP. Semantically, this means that "or not" clauses are always part of a disjunction that is inquisitive—the inquisitivity that is introduced by the disjunction is never flattened out on top of the disjunction. Consequently, the presupposition of the interrogative clause type marking is only satisfied by moving INT into Force. But this means that such a Force head needs to be available above the disjunction to yield a structure that does not give a presupposition failure.

If we therefore add an "or not" clause to each disjunct in an AltQ, we turn the individual disjuncts of such an AltQ into ForcePs. That is, an AltQ with an "or not" clause in each disjunct is predicted to have the following structure:

(119) $[_{ForceP}$ Force^{o} [PolP] or [PolP]] or $[_{ForceP}$ Force^{o} [PolP] or [PolP]]]

Now clearly, the assumptions above already rule out such a structure on the basis that ForcePs are too big to be disjoined. At the root level, adding an overt "or not" clause to AltQs therefore results infelicity, while for embedded questions, we derive a full wide scope reading in which the disjunction takes scope over the clause embedding predicate.

4.3.3 Mixed cases

Puzzle 6. Mixed questions: *Why is it possible to conjoin sentences with a different clause type, but does disjoining different clause types result in ungrammaticality?*

By assuming that force moves in disjunctions and not in conjunctions, we may now also be able to predict that mixed disjunctions are usually out, since the force operator

(i) $\text{ANS}([\alpha]) = top(T_{C[\alpha]})$

can only ATB-move out of each disjunct if it is the identical in both disjuncts (Hein & Murphy, 2016). In contrast, mixed conjunctions are not necessarily predicted to be infelicitous, since no ATB movement has to take place in these cases. This prediction is borne out, since we indeed observe that mixed conjunctions are grammatical, both in the embedded and in the root case.

4.4 Conclusion

In this chapter I first attempted to solve the puzzle of *Disjunction Lowering* as presented in Chapter 2, based on the assumptions made in Chapter 3. I showed that the impossibility of disjoining questions may stem from a more general restriction on disjoining ForcePs. I suggested a possible explanation for this restriction in terms of the discourse effects that are associated with ForcePs. That is, ForcePs correspond to speech acts, and there is no such thing as speech act disjunction. Then, I suggested that the mechanism of "disjunction lowering" in AltQs may in fact boil down to upward movement of the operators responsible for the interrogative clause type marking. The degradedness of single PolQ readings for conjunctive questions can then also be explained using this principle and the assumptions previously adopted for independent reasons. Finally, I showed that the hypotheses made in this chapter may find additional support in the fact that, under these particular assumptions, a solution to the last three puzzles easily falls out.

Chapter 5

CONCLUSIONS

I started this thesis with laying out six puzzles related to the semantics of coordinated questions, repeated here below. Throughout this thesis I have showed that even though the solutions to these puzzles may come from different corners of linguistic theory, they are also very much interrelated. That is, I showed that, in order to solve these puzzles one needs to make reference to mechanisms related to the prosody of the relevant sentences, and constraints need to be defined with respect to the discourse effects and at the syntax-semantics interface. By solving these puzzles one by one, I have build up a way in which the meaning coordinated questions can be accounted for in a uniform way. I first explained what ingredients are needed and how they may interact to yield to right meaning and discourse effects of such questions.

In Chapter 3, I showed that focus marking is related to the size of the conjuncts in both disjunctive and conjunctive questions. By assuming that focus marking indicates ellipsis at the CP level, we can account for the difference in meaning of disjunctive questions with a single and with multiple foci: the first type of question will turn out to be AltQs, while the latter type will be PolQs. Moreover, I assumed that interrogative clause type marking introduces a presupposition that its prejacent is inquisitive. This presupposition can be satisfied in multiple ways: either by triggering a question operator, *Q*, or by taking scope over a constituent that already denotes an inquisitive proposition. I argued that the first mechanism is employed in PolQs, while the latter is employed in AltQs.

In Chapter 4 I then showed that the difference between disjunction and conjunction as put forward in puzzle 3 can be explained by relying on the discourse effects brought in by speech acts. I assumed that ForcePs always denote speech acts, and I showed that, for this reason, disjunction can never take two ForcePs as its disjuncts since speech acts cannot be disjoined. For this reason, the inquisitivity presupposition introduced by the interrogative clause type marker INT cannot be satisfied *in situ*, and the element introducing this presupposition has to move upwards to scope over the disjunction.

Puzzle 1. Focus marking: *What is the exact relationship between focus marking, the underlying syntactic structure and the interpretation of coordinated questions?*

Puzzle 2. Falling intonation: *How can we derive the semantic contribution of rising vs. falling intonation in a uniform, compositional way?*

Puzzle 3. Disjunction lowering: *Why does the question operator always take scope over disjunctions, while in conjunctive questions each conjunct contains a question operator?*

Puzzle 4. Q in embedded questions: *Where does the question interpretation come from in embedded questions?*

Puzzle 5. Overt "or not": *Is the semantic contribution of overt "or not" clauses the same as that of covert question operators, and if so, why is this infelicitous in AltQs?*

Puzzle 6. Mixed questions: *Why is it possible to conjoin sentences with a different clause type, but does disjoining different clause types result in ungrammaticality?*

Table 5.1: Puzzles

In contrast, I showed that speech acts can be conjoined, and I modeled this using a simplified version of a discourse context in spirit of Farkas and Bruce (2010). For this reason, no movement is required in conjoined questions, which correctly predicts that a reading that requires no movement will turn out to be the preferred one.

I then showed that these assumptions also help in accounting for the last three puzzles. The assumptions made for root cases can easily be extended to embedded questions. While assuming a standard structure of "or not" clauses, we make the right predictions for questions containing such clauses under the suggested assumptions. Lastly, the restriction on mixed disjunction will fall out of the assumptions on movement of INT immediately.

5.1 Future directions

This thesis is rich in potential future work. Some possible directions are considered here.

First, the specific relation between focus marking and the size of the disjuncts could be made more concrete in future work. Specifying the exact relation will perhaps also shed light on the effect of pitch accents on the semantics in general, and perhaps it could even tell us something about the nature of contrastive pitch accents more specifically. That is, the fact that contrastive intonation on the disjuntion allows for a narrow scope reading only in combinations with a very restricted set of quantifiers demands an explanation. The distribution of contrastive intonation also seems to be

highly restricted in declaratives, but I left implicit here what factors may determine this restriction.

Moreover, as mentioned in Chapter 2, only "mixed" disjunctions in which a declarative precedes an interrogative are grammatical, while mixed disjunctions in the opposite order are very degraded. It seems that this observation might be explained using a 'unary' version of 'or' (see for example Biezma & Rawlins, 2012a or Rawlins, 2016 for an idea along these lines). Defining a non-binary version of 'or' might help in explaining the observed order effects in disjunctions as well as their non-standard explanation.

Finally, I considered one effect of the restriction of disjoined speech acts here in terms of upward movement, but the issues concerning disjoined speech acts might also be escaped in different ways: for example by taking a conjunctive or conditional reading of the disjunction (Krifka, 2001; Franke, 2008). It might be interesting to see if we can find examples of these phenomena too.

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