You may like or dislike this thesis, and I do care which. An inquiry into sluicing and free choice

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written by

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Abstract

This thesis deals with the different meanings generated by the following two sentences:

(1) a. You may have coffee or tea, but I don't know which.
b. You may have coffee or tea, but I don't care which.

Whereas the former seems to presuppose that only one alternative is possible (and the speaker cannot tell which one it is), the latter appears to entail that both alternatives are possible to the addressee (and the speaker does not care which one the addressee will actually choose). In technical terms, while (1b) licenses Free Choice inferences, (1a) blocks them. We follow Aloni's (2019) and Fusco's (2019) intuition that the different readings are tied to the presence of the modal in the sluice (the partially elided *wh*-question) in (1a), and to the absence of the modal in the sluice of (1b). We ground this assumption through the notion of temporal orientation: leaving out the modal in the sluice in (1a) would result in an infelicitous sentence (such as '#You may have coffee or tea, but I don't know which you have.'), creating a contrast with the future time of evaluation given to *have* by the modal *may* in the antecedent, and the present time of evaluation provided to the same event *have* by *know* in the consequent. Repeating the modal insures a match between the two event times. On the contrary, *care* in the consequent of (1b) is able to provide future time of evaluation even if the event in its scope is expressed with a present. It is so because while *may* and *care* both have future orientation, *know* has present orientation. From this we derive the different FC readings assuming a uniqueness presupposition triggered by singular *which* clauses. In (1a) this presupposition applies to the modal and generates a contrast with the FC reading of the antecedent according to which the possibility modal applies to multiple elements. Therefore, the Non-FC reading of the antecedent in (1a) is selected. On the other hand, in (1b) the uniqueness presupposition applies to the event itself and not to its possibility. Therefore, no contradiction is detected with the FC reading of the antecedent and FC inferences are thus permitted.

While this thesis is designed to provide an analysis of the puzzle in (1) for semantic denotations as such, without assuming any specific theory of FC derivation, we do improve the syntactic and semantic conditions that play a role in the licensing of sluicing.

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I dedicate this thesis to my parents. Thank you for the support and joy you tirelessly donate me. I hope you are proud of the direction the arrow you have shot from your bow has taken.

Contents

Chapter 1

Introduction

Sometimes - quite often, to be fair - language behaves in very mysterious ways. Compare the inferences generated in (1) and in (2):

(1) a. Mary ate ice cream or cake.
b. $\rightsquigarrow$ Mary didn't eat both.

(2) a. Mary may eat ice cream or cake.
b. $\rightsquigarrow$ Mary may eat ice cream and Mary may eat cake.

If from (1a) we tend to exclude the conjunction of the two disjuncts, as in (1b), what we assume from (2a) is almost the opposite. In fact, people tend to distribute the possibility over the two disjuncts as in (2b), assuming they can freely choose between the alternatives. Hence, this phenomenon is called Free Choice (FC). FC inferences cannot be accounted for with simple classical logic translations and numerous theories have tried to account for this phenomenon in over 50 years.

Now, if what is said can be tricky, let alone what is not said. Consider the following example:

(3) I went to the supermarket, but I can't remember when.

Even if we do not immediately see it, in (3) something has been deleted. *when* should have something following it to complete its meaning, but this 'something' is absent. Nonetheless, as mysteriously as for (1) and (2), we intuitively manage to reconstruct the missing bit of information. In particular, it seems quite natural to reconstruct (3) in the following way:

(4) I went to the supermarket, but I can't remember when I went to the supermarket.

Linguistic phenomena in which some parts are deleted from the speech signals are commonly referred to with the name of *ellipses*. To be specific, sentences like (3) in which an embedded question has been deleted except for the *wh*-word constitute the phenomenon called *sluicing*, where the *sluice* is the compound of *wh*-word and the elided material. This is also a topic that has been debated by academics for over 50 years. And it is no wonder. I remember a talk in which Jason Merchant compared the study of ellipses to the study of black holes. They both constitute invisible material, a sort of void that can be understood only looking at the objects surrounding it. For example, people can understand the missing bit in (3) only because 'I went to the supermarket' has already been overtly introduced.

The aim of this thesis is to inquire the linguistic expressions that involve both the topics we mentioned, FC and sluicing. In particular, we are interested in understanding how it is possible that two very similar sentences like (5a) and (5b) carry so different meanings:

(5) a. You may have coffee or tea, but I don't know which.
b. You may have coffee or tea, but I don't care which.

While common intuitions say that in (5a) FC does not arise (or, better, it is blocked), it seems that in (5b) FC inferences are still there. Concretely, from (5a) it seems to the addressee that only one between coffee and tea is possible and the speaker cannot tell her which one it is. On the other hand, from (5b) the addressee assumes that both are possible options and the speaker does not care which one the addressee will eventually have. We will dub this conundrum the *Free Choice in Sluicing* (FC-in-S) puzzle.

The contrast seems to be even stronger in:

(6) a. #You may sit in any chair, I don't know which.
b. You may sit in any chair, I don't care which.

If instead of a FC disjunction the sentence presents a FC indefinite like *any*, the *know* sentence becomes really bad, while the *care* sentence continues to be perfectly fine. To our knowledge, the only work that has tried to systematically account for these contrasts is Fusco (2019). In our thesis we will provide alternative motivations for the FC-in-S puzzle showing the connections of this puzzle with modality, tense, and singular *which* clauses. We believe the FC-in-S puzzle is interesting not only because it lies in the rather challenging interface between syntax and semantics, but because of the way it does so: in fact its existence seems to be a real paradox for how ellipsis in commonly conceived. Consider that a very widespread assumption

is that ellipsis has to rely on the overt material introduced in the ellipsis' antecedent to be licensed.[1] In other words, it is what is said that affects the interpretation of what is left unpronounced. However, FC-in-S reverses this pattern, showing that the opposite also holds. Indeed, it is the continuation 'I don't know which one [...]' in (5a) that tells us how to interpret its antecedent, blocking the FC meaning that would otherwise be generated, that same FC meaning that is actually permitted in (5b). Thus, there must be something in the structural and semantic properties of the elided material that, combined with *know* and *care*, affects the meaning of the antecedent from which the elided material itself should gain its meaning. Recalling Merchant's metaphor, if ellipses are similar to black holes in that they can be observed as a void compared to what they have around, an inquiry into the FC-in-S puzzle can be compared to a study into that peculiar properties of black holes that affect the visible astronomical objects around them. Before starting, let us briefly present then a summary of how we proceed in this spatial enterprise.

1.1 Blueprint

In chapter 2 we present the main findings on sluicing in a historical manner. We start in 2.1 introducing the phenomenon and the most common terminologies related to it. Then, in 2.2, we show how Merchant (2001) assumes sluicing to be a mainly semantic phenomenon, in contrast with the previous literature, and how he accounts for it through *e-GIVENness*. We also claim that little syntactic constraints are needed nonetheless, following Chung (2006) and Chung (2013). In this section we also present a condition that will play a pivotal role for our analysis of the FC-in-S puzzle, Dayal's and Schwarzschild's (2010) *Well-Formedness* condition. In 2.3 we discuss the most recent identity conditions that have been formulated by the literature. AnderBois's (2010; 2014) Inquisitive Semantics-based *e-GIVENness*, Kroll's (2019) *Local Givenness* and *Rudin's Generalization* (Rudin, 2019). In 2.4 we show how an Inquisitive Semantics-based *e-GIVENness* contrasts with

[1] In the thesis we equally treat the FC-in-S puzzle from the speaker's and from the addressee's perspective. With this it is meant that we interchangeably use *sluicing licensing* and *sluicing reconstruction*, where the former is the operation of deleting syntactic material from the speech signal and the latter is the reverse engineered operation of reconstructing the unheard syntactic material, and with it a plausible interpretation from an ellipsis. Similarly, we interchangeably use *presluice* and *sluice reconstruction*, where the former is the syntactic material before undergoing deletion and the latter is the deleted material supposed by the addressee.

the main empirical data motivating *Local Givenness* and with some other original examples involving multiple discourse participants. Through these observations we motivate our choice to adopt for the present work classical logic paired with semantic denotations that represent questions (the embedded *wh*-clauses) as sets of propositional alternatives.

In chapter 3 we present the other main topic involved in the puzzle we are interested in, Free Choice. In 3.1, we present the main issue for which this topic is so challenging, namely the Paradox of Free Choice, that roots back to von Wright (1968) and Kamp (1973). In 3.2 we briefly present three different approaches. First, we discuss the semantic theory of Aloni (2007), showing how it falls short in accounting for FC in downward entailing environments (3.2.1). This highlights that some pragmatics is needed to fully derive the phenomena in which FC is involved. Therefore we introduce two of the most recent theories on FC, the grammatico-pragmatic approach of Bar-Lev and Fox (2020) and the hybrid quasi-semantic approach by Aloni (2021), in 3.2.2. We do not express a preference for one over the other since we aim at providing a general analysis that applies to semantic denotations as such, regardless of the theory we use to derive them. In 3.3, the last section of this chapter, we introduce the work that inspired this thesis, Fusco (2019). In particular, both this thesis and Fusco's work are grounded on a fundamental intuition first proposed by Aloni (2019): namely that the different FC readings in (5a) and (5b) are tied to the presence of the modal in the ellipsis site of the former, and to the absence of the modal in the ellipsis site of the latter. We then proceed criticizing two other assumptions on which Fusco (2019) is built. Whereas Fusco assumes a semantic analysis of FC that derives it whenever the disjunction takes narrow scope with respect to the modal, we show following Bar-Lev (2018) and Klinedinst and Rothschild (2012), in particular, that there actually exist cases in which FC is generated when disjunction takes wide scope (3.3.1). This observation has also experimental confirmations, such as Cremers et al. (2017). We also show that there are strong counterexamples to Fusco's assumption that the blocking of FC in (5a) is tied to ignorance (3.3.2).

In chapter 4 we introduce our explanation to ground Aloni's and Fusco's intuition on the presence of the sluice in (5a). In 4.1 we summarize the chapter, while in 4.2 we make crucial observations on the interplay between modality and tense and how they affect FC inferences. In 4.3 we discuss the difference between temporal perspective and temporal orientation of epistemic modals, as presented in Condoravdi (2001). With the help of previous literature such as Enç (1996) and Laca (2012), we extend the two notions to the deontic modal *may* and to the question embedding verbs *know* and

care. In 4.4, we apply these notions to our sluicing cases, explaining how the different orientations of *know* and *care* (present for the former and future for the latter) can (or cannot) cause a mismatch between the time of evaluation of the event in their scope and the time of evaluation the same event receives from *may* in the antecedent (future). These observations bring us to formulate a couple of constraints that affect the already mentioned *Well-Formedness* condition (4.4.1). In 4.4.2 other constraints are introduced, to discuss how they all come into play in selecting the optimal sluice among several alternatives. As a result, we do observe that the modal *may* is present in the *know*-sluice and absent in the *care*-sluice. We then use these constraints to derive the impossibility of epistemic FC cancellation (4.4.3) and the infelicity of (6a), the indefinite *any* example (4.4.4). As a result of this last section, we will acknowledge that one of the constraints we introduced is actually the weak version of a syntactic generalization previously introduced in chapter 2, *Chung's Generalization* (Chung, 2006).

Once we have grounded Aloni's and Fusco's intuition, in chapter 5 we finally show how from this we derive different FC readings for (5a) and (5b). In 5.1, exploiting again the indefinite *any* example, we provide evidence that the FC-in-S puzzle seems to be tied to the contrast singular *which* clauses generate with antecedents that assume the modality to be applied to a plurality of elements. Therefore, in 5.2 we display the history of the uniqueness presupposition triggered by singular *which* clauses. Showing how from the analysis of Dayal (1996) we arrive to the analysis of Kobayashi and Rouillard (2021), through Hirsch and Schwarz (2020). Finally, in 5.3 we apply this idea to the cases of *know* (5.3.1) and *care* (5.3.2). The uniqueness presupposition of singular *which* clauses scopes above the modal in the former case, generating a contrast with its FC reading. Therefore, the non-FC reading is selected. On the other hand, the modal is absent from the *care*-sluice and the uniqueness applies to the event that will actually take place rather than to its possibility. Therefore, FC inferences are not blocked in the case of *care*. To correctly derive the blocking of FC for *know* in this chapter we slightly improve both Kroll's (2019) *Local Givenness* and *Rudin's Generalization* (Rudin, 2019).

To conclude, in chapter 6 we briefly summarize the thesis and its main findings, suggesting a couple of directions for future work.

Chapter 2

Sluicing and its Licensing Conditions

2.1 Introducing Sluicing

Let us start presenting three different examples of sluicing, an ellipsis phenomenon that involves embedded *wh*-questions:

(1) a. I met somebody yesterday... guess who!
b. John is drinking, and I'm sure you know what.
c. She ran away, and I wonder why.

The term *sluicing*, coined by Ross (1969), is used for the linguistic phenomenon as a whole, while *sluice* identifies the linguistic structure compound by the ellipsis site and the *wh*-word that survives the deletion. The dangling *wh*-word is commonly referred to as the *remnant* (*who* in (3a)), and it usually has a *correlate*[1] (*somebody* in (3a)) in the antecedent, the unelided sentence that precedes the ellipsis (*I met somebody yesterday* in (3a)).[2] Still, whereas the presence of an antecedent is obligatory, the presence of a correlate in it is optional. In fact, in (3b), the *wh*-word corresponds to an implicit argument (the object of *drinking*) that is covert, while in (3c) the question is even more radical since the *wh*-word has no correlate at all in the antecedent clause (Chung et al., 1995).

[1] Called *inner antecedent* by part of the literature, such as Chung et al. (1995).

[2] Sometimes we will adopt Barros's (2014) conventions marking sluices as $[_{CP}...[_{TP_E}...]]$ and corresponding antecedents as $[_{XP_A}...]$. Moreover, from time to time, we will use the word *consequent* to refer to everything that comes after the dots in examples like (3a) or after the comma in examples like (3b).

The present work focuses on sluices of the first kind, those who have an overt correlate. However, regardless of the group, the mainstream assumption concerning sluicing is that elided constituents are syntactically present but not phonetically realized.[3]

(3) a. I met somebody yesterday... guess who [...]!
b. John is drinking, and I'm sure you know what [...].
c. She ran away, and I wonder why [...].

The seminal work of Ross (1969) already claimed that deletion, save for the *wh*-word, is possible 'under the condition that the remainder of the question is identical to some other part of the sentence, or of a preceding sentence'. Since then, the debate on sluicing (like other kinds of ellipsis) can be conceived as the search for the optimal *Identity Condition*. Such condition is the rule that allows the licensing of elision. In other terms, from the addressee's perspective, it is the rule that allows the reconstruction of the material that has been deleted from the phonological form by the speaker. In Ross and in Chung et al. (1995) the identity between the antecedent and the elided material was conceived as syntactic in nature. Sluicing was thought to be licensed whenever the elided clause is a syntactic copy of the antecedent clause. The sentences in our example (3) would then be reconstructed in the following way:

(3) a. I met somebody yesterday... guess who [~~I met yesterday~~]!
b. John is drinking, and I'm sure you know what [~~John is drinking~~].
c. She ran away, and I wonder why [~~she ran away~~].

Because of this formal identity between antecedents and ellipsis sites, this approach has been referred to as the *isomorphism hypothesis* (Barros, 2014). Isomorphism can account for basic cases providing very straightforward interpretations of the *presluice*, the sluice before undergoing deletion. However, at the turn of the millennium, more complex examples cast doubts on the isomorphism hypothesis, and merely-syntactic approaches were proven to be faulty and, thus, refutable.

[3]The idea that ellipsis sites are only lacking phonetic content is a widespread assumption for all kind of ellipsis, not only sluicing. There are of course alternative views such as Ginzburg and Sag (2000) and Barker (2013).

2.2 The Semantic Turn: Merchant (2001)

The syntactic approach to ellipsis has been first undermined by Merchant (2001) through some striking counterexamples. Consider the following, reported in Barros (2014):

(2) a. The boss is going to fire Sally$_i$, but she$_i$ doesn't think he will #fire Sally.
b. First, Jack left, then Sally did #left.

If we try to reconstruct the elided material with a syntactic copy of the antecedent, as prescribed by isomorphism, we end up with semantically ill formed sentences such as (2a) and (2b).

On the contrary, common intuitions are that the examples in (2) should be recovered in the following way:

(3) a. The boss is going to fire Sally$_i$, but she$_i$ doesn't think he will fire her$_i$.
b. First, Jack left, then Sally did leave.

The limits of the isomorphism hypothesis appear to both misinterpret some ellipses ((2a) instead of (3a)) and to rule out some others solid intuitions would perfectly find acceptable ((3b)).

The motivating examples in (3) brought Merchant (2001) to consider a purely semantic identity condition (Barros, 2014). Such condition is constituted by a relation of mutual entailment between the Focus Closure (*F-clo*) of the antecedent and the Existential Focus Closure (*F-clo*) of the ellipsis site; with Merchant's terminology, sluicing is licensed whenever the elided clause is e-GIVEN. This notion is built on Schwarzschild's (1999) *Givenness*.[4] Existential Focus Closure constitutes the existential closure (modulo ∃-type-shifting) of a phrase after having replaced F(ocus)-marked parts with variables. On the one hand, ellipsis is closely tied to deaccenting (hence the 'focus' part), on the other, since sluicing deals with questions, existential closure is needed whenever we are using a semantics that does not treat declaratives and questions in the same manner, (hence the 'existential' part). Merchant's semantic identity condition can therefore be summarized in the following:

[4]The first to apply this notion to ellipsis was Romero (1998), as reported by Barros (2014).

- **e-GIVENness**
  An expression E counts as e-GIVEN iff E has a salient antecedent A and, modulo $\exists$ type-shifting:
  - A entails F-$clo(E)$
  - E entails F-$clo(A)$

(Merchant, 2001)

It is important to stress that Merchant's approach, as well as other semantic approaches we will discuss in the next paragraph and throughout the thesis, do not deny the importance of syntax in sluicing. Even though the main licensing condition is thought to be one of semantic entailment, there is a small number of syntactic constraints that are well established and universally accepted. In particular, two constraints are widely acknowledged. The first one is sometimes referred to as *No New Words* or *Chung's Generalization* (Barros, 2014) from Chung (2006), and states that the ellipsis site must not contain new words with regards to the words that are present in the antecedent. Consider the following adaptation of an example of Chung (2006):

(4) a. Mary was flirting, but they wouldn't say with who.
    b. Mary was flirting with someone, but they wouldn't say who.
    c. *Mary was flirting, but they wouldn't say who.

In (4a), the sluice is licensed because even though the preposition *with* is absent in the antecedent, it has not been deleted and introduces *who* overtly. In (4b), *with* is part of the elided material but the sluice is licensed anyway, because the preposition had already been introduced in the antecedent and can therefore be recovered in the ellipsis site from the overt material. In contrast with these two cases, in (4c) the sluice is not licensed. It is so because *with* has been deleted, but it has no identical lexical item in the antecedent allowing its reconstruction. *e-GIVENness* would not help us in ruling out (4c), if we take *flirting* to semantically denote a binary relation.

The second constraint involves *diathesis* (also called *voice*), or more generally *argument structure*. Consider this pair of sentences from Barros (2014):

(5) a. *She loaded something with hay, but I don't know onto what ~~she loaded hay~~.
    b. *She loaded something onto the truck, but I don't know with what ~~she loaded the truck~~.

Even though each elided clause share the same semantic denotation with its respective antecedent clause, and Chung's Generalization (CG) is respected, (5a) and (5b) result to be ungrammatical.

It is so because not only must the antecedent and the elided clause match in semantic denotation, the two have also to share the same argument structure. If the antecedent introduces a *goal - theme* structure (*something - with hay*), the deleted material cannot replace with a semantically equivalent *theme - goal* structure (*hay - onto the truck*). Following Barros (2014) we call such constraint Fixed Diathesis (FD). We can now summarize the two minor syntactic requirements that undeniably play a role in sluicing:

- **Chung's Generalization**
  The numeration of the sluice must be a subset of the numeration of the antecedent.[5]

  (Chung, 2006)

- **Fixed Diathesis**
  Antecedent and elided clause must match in argument structure.

  (Chung, 2013)

There is actually a third constraint intertwined with the two we mentioned, that was already noticed by Ross (1969) and it deals with case marking.

(6) a. Mary kissed someone but I don't know whom.
    b. *Someone kissed Mary but I don't know whom.

In English we actually observe more and more occurrences of *who* in place of *whom*, even though the opposite is not true. We can however notice a contrast between (7a) and (7b) concerning the pronoun. While in (7a) *whom* is accepted (maybe even preferred), in (7b) the same pronoun makes the sentence ungrammatical. Constituting an additional argument for the presence of silent syntactic structure, the contrast arises from the fact that *whom* would be the object in the presluice in (7a) and the subject in (7b):

(7) a. Mary kissed someone but I don't know whom Mary kissed.
    b. *Someone kissed Mary but I don't know whom kissed Mary.

[5]Where the *numeration* is the set containing the lexical items used in a syntactic derivation each paired with the number of times it is used.

Another constraint can therefore be identified:

- **Case Matching**
  The morphological case of the remnant and its correlate must match.

(Chung, 2013)

Before moving on, we would like to introduce another general but fundamental condition on sluicing.

- **Well-Formedness**
  If a pre-sluice is infelicitous, then the corresponding sluice will not be well-formed.

(Dayal and Schwarzschild, 2010)

This constraint will play a crucial role in our analysis of the blocking of Free Choice in sluicing in chapters 4 and 5.

In the next paragraph we will briefly present a couple of improvements to Merchant's (2001) semantic identity condition.

2.3 Refining the Identity Condition

In the previous paragraph we have shown how, save for some minor constraints, the Identity Condition for sluicing has to be conceived in semantic terms. This is now universally accepted, but nonetheless, Merchant's (2001) specific approach has not been immune from challenging counterexamples. In particular, AnderBois (2010; 2014) seems to make a crucial point. Problems with e-GIVENness seem to rise when double negation is involved, in particular when correlates are doubly negated:[6]

(8) a. *Sally didn't see no one, but I don't know who ~~Sally saw~~.
    b. *It's not the case that no one left, but I don't know who ~~left~~.

Apparently, plain semantic entailment falls short in accounting for the ungrammaticality of such examples. If doubly negated sentences are equal to their positive counterparts, as in classical logic, it does hold that the antecedent clause in (8a) and in (8b) entails the elided clause, and vice versa.

[6]The examples come from Barros (2014) and AnderBois (2010).

It is the case that the other constraints we presented in 2.2 are satisfied too. As a result, it is not clear why the sluice should not be licensed.

To face this issue, AnderBois appeals to Inquisitive Semantics (Ciardelli et al., 2018). In Inquisitive Semantics propositions have two components, the *informative content* and the *inquisitive content*. Whereas *informative content* is the information bit conveyed by a proposition and can be equated with standard truth conditions (AnderBois, 2010), *inquisitive content* pertains the issue raised by the proposition. Crucially, in Inquisitive Semantics doubly negated propositions are not always equivalent to their positive counterparts. It is so because, if on the hand double negation preserves the *informative content*, on the other hand it kills inquisitive content. To AnderBois this constitutes evidence that the semantic identity condition includes issues and has to be considered in the Inquisitive Semantics framework.

In our opinion this is one of the most notable refinements of the semantic identity condition, and we will return to it at the end of this chapter, but there are others. Following the classification proposed by Kroll et al. (2017), we can say that AnderBois (2010; 2014) belongs to the *Semantics+* theories of sluicing, i.e. those theories that try to implement sluicing analysis reinforcing the semantic machinery.[7]

Opposed to this line of thought, according to Kroll and Rudin, there are the *Hybrid* theories of sluicing, those that put the accent on the syntactic constraints we mentioned before, balancing in an almost equal way syntax and semantics. The main hybrid theory is the one proposed by Chung (2013).

Before moving on to the next chapter, which presents the other main character of our story, Free Choice, let us briefly introduce a third kind of sluicing theory that we will discuss and improve later. That is the *Dual-Perspective Theory* of Kroll et al. (2017) itself. This Dual-Perspective is named after the idea that 'there is both a syntax and a pragmatics of sluicing' (Kroll et al., 2017) that provide different independent constraints that play together in licensing sluicing.[8]

As usual, let us start with the motivating examples.

(9) a. Your plant is alive, but you can never be sure for how long ~~it will be alive~~. (Merchant, 2005)

b. Either John didn't do an extra credit problem, or he didn't mark which one ~~he did do~~. (Kroll, 2019)

[7] While maintaining few syntactic constraints. Another work belonging to this group is Barker's (2013) scopability theory.

[8] For deeper understanding we suggest also the autonomous works in which the constrains are deeply discussed: Rudin (2019) and Kroll (2019), respectively.

The key observation is that there exist possible and impossible mismatches between the antecedent and the elided material. While diathesis[9] mismatches are banned, as we saw in 2.1, tense ((9a)) and polar mismatches ((9b)) are not.[10] In (9a), for example, the antecedent shows a present verb, while a future verb has been elided in the sluice. In (9b), even though the antecedent is a negative sentence, the sluice has to be reconstructed without negation. It is clear that any kind of mutual entailment (be it inquisitive or not) between antecedents and elided sites would fail in accounting for such cases. According to Kroll et al. (2017) we need therefore a syntactic condition, identifying the possible mismatches, and a pragmatic condition, providing the selection of the intended reading among the possible ones (in fact, the mismatch reconstructions are not the only possible alternatives).

The generalization is that mismatches are possible whenever the mismatch involves material that originates outside the *eventive core*, where the *eventive core* is defined as 'the vP of a clause — the complete verbal complex, including the origin sites of verbs and their internal and external arguments' (Rudin, 2019). This reflects an intuition already presented in Langacker (1974), namely that 'sluicing privileges content that originates within the verbal domain (the verb and its arguments) over content that doesn't' (Kroll et al., 2017). Therefore the syntactic constraint on mismatches can be formulated as:

- **Rudin's Generalization**
  Given a prospective ellipsis site E and its antecedent A, nonpronunciation of the phonological content associated with any head $h \in E$ is licit if at least one of the following conditions holds:
  - h did not originate within E's eventive core.
  - h has a structure-matching correlate $i \in A$.

(Rudin, 2019)

Once that this generalization provides us with the set of admitted mismatches, a pragmatic way to disambiguate between possible readings is needed. We have already seen that double entailment between antecedents and ellipsis sites is too strong. To avoid this problem, Kroll (2019) exploits the dynamic semantics notion of 'local context', the 'context at which the

[9] Diathesis stands for grammatical voice, for example *active* or *passive*.

[10] Together with finiteness, illocutionary force, and modality mismatches, among others.

current clause (or possibly some smaller constituent) is interpreted'. The entire overt material up to the sluice would then constitute a context update, and the sluice would be licensed whenever it is entailed by this update, the local context c_L. For this reason, Kroll et al. (2017) call such a principle *Local Givenness*:

- **Local Givenness**
  A Tense Phrase α can be deleted iff the existential closure of α, $(ExClo([\![\alpha]\!]^g))$ expresses a proposition p, such that $c_L \subseteq p$ and p is maximally salient.

(Kroll, 2019)

Being the most recent theory of sluicing, the Dual-Perspective approach provides important tools to deal with crucial cases that could not be accounted for by previous works. As we will see, from Kroll et al. (2017) it's not completely clear how the two constraints play together and how they can cope with some of the mismatches, like the modality one.

This is why, in some sense, we won't take a strong stand in our thesis for one approach or the other. On the one hand will show the need for new syntactic constraints (Hybrid approach), on the other hand we will test our analysis with both AnderBois's (2010; 2014) Inquisitive Entailment and Kroll's (2019) Contextual Entailment. Hopefully we will provide both an adaptable theory that can be widely accepted and some motivations for even improving Contextual Entailment as conceived in Kroll et al. (2017) and Kroll (2019).

2.4 Threats to the Inquisitive Approach

In §2.3 we have seen that the ungrammaticality of examples involving double negation constituted the main evidence AnderBois (2010, 2014) presented to adopt an inquisitive framework. However, if we follow the examples that brought Kroll (2019) and Kroll et al. (2017) to formulate their identity condition, we come across cases that are problematic for an inquisitive semantics account. Consider the following example of polarity mismatch from Kroll (2019):

(10) Either John didn't do an extra credit problem, or he didn't mark which one [~~he did~~].

If we had to reconstruct the sluice with the antecedent *per se* we would end up with the non-sensical:

(11) #Either John didn't do an extra credit problem, or he didn't mark which one [~~he didn't do~~].

It is clear that we need instead the negation of the antecedent, introduced in the context by the disjunction, which is known to presuppose for the second disjunct the negation of the first one. For the Local Givenness proposed in Kroll (2019) and Kroll et al. (2017), we have therefore to update the context with the negation of the first disjunct, rather than with its positive version. This generates the following:

(12) Local Context for the ellipsis site:
$c_{\text{LE}} = W \cap \{w : \neg\neg\exists x[\text{extra credit problem}(x)(w) \wedge \text{do}(x)(j)(w)]\}$

Where W is the starting context, the set of all possible worlds. According to Kroll (2019), this has to entail:

(13) Elided material:
$\{w : \exists x[\text{extra credit problem}(x)(w) \wedge \text{do}(x)(j)(w)]\}$

Unfortunately, however, this is not the case in the inquisitive semantics framework. In fact, in inquisitive semantics $\neg\neg\phi \models \phi$ (which means $\neg\neg\phi \subseteq \phi$) only if ϕ is non inquisitive and existentially quantified propositions are inquisitive indeed. Therefore, (36) does not entail (37).

There is also a second kind of examples that makes AnderBois (2010, 2014) proposal unsound. If it is indeed true that double negation results in infelicitous sentences in examples like (8a) and (8b), it does not do so when it is split between discourse participants, as in (14).

(8) a. *Sally didn't see no one, but I don't know who ~~Sally saw~~.
b. *It's not the case that no one left, but I don't know who ~~left~~.

(14) A: Nobody met John.
B: No, we simply don't know who ~~met John~~.

From these examples it is clear that AnderBois's theory cannot be simply accepted but needs some little refinement, in particular it cannot be compatible with contextual entailment as proposed in Kroll (2019) and Kroll et al. (2017).

On the one hand we know that these counterexamples do not constitute big issues for inquisitive semantics and they may be solved in some way, for

example applying the flattening operator ! to the the elided clauses.[11] On the other hand, however, we reserve such improvement for the future adopting in this thesis classical logic augmented with any question semantics representing the meaning of questions (the sluiced *wh-clauses*) as sets of propositional alternatives, as in the following:

(15) $[\![\text{who met John}]\!] = \{\text{John met Mary, John met Paul, ...}\}$

We now move on to the next chapter introducing the other protagonist of this thesis, Free Choice.

[11] The flattening operator ! preserves the informative content of a proposition while killing its inquisitive content. Actually, note that $!\phi \equiv \neg\neg\phi$ (Ciardelli et al., 2018, p.64). However, note that if we adopt ! systematically we fail to account for (8), which is still ungrammatical. So the interaction with double negation constitutes a really challenging issue to account for in future research.

Chapter 3

Free Choice and Sluicing

3.1 Introducing Free Choice

Like sluicing, the history of Free Choice (henceforth FC) is half a century old. It roots back to Kamp (1973), who first noted how (1a) seems to entail (1b) and (1c).

(1) a. You may go to the beach or to the cinema.
b. You may go to the beach.
c. You may go to the cinema.

From the fact that when hearing (1a) the addressee can freely choose the permission she prefers to realize from the two disjuncts, this phenomenon takes the name of *free choice permission* or *free choice effect*. This entailment pattern is the opposite of what classical modal logic would suggest. In fact, while the formula in (2a) is logically valid, the one (2b) is not.

(2) a. $\vDash \Diamond a \rightarrow \Diamond(a \vee b)$
b. $\nvDash \Diamond(a \vee b) \rightarrow \Diamond a$

The same validity holds for simple disjunction (i.e. disjunction without modality), and in that case the law seems to be actually reflected in natural language:

(3) a. $\vDash a \rightarrow a \vee b$
Martha ate pasta. $\rightarrow$ Martha ate pasta or pizza.
b. $\nvDash a \vee b \rightarrow a$
Martha ate pasta or pizza. $\nrightarrow$ Martha ate pasta.

Furthermore, the contrast is even more striking if we compare the FC effect we just introduced with the common implicature triggered by a simple disjunction:

FC disjunction:

(4) Mary may eat ice cream or cake. $\rightsquigarrow$ Mary may eat ice cream and Mary may eat cake.
$\Diamond(a \vee b) \rightsquigarrow \Diamond a \wedge \Diamond b$

Simple disjunction:

(5) Mary ate ice cream or cake. $\rightsquigarrow$ Mary didn't eat both.
$a \vee b \rightsquigarrow \neg(a \wedge b)$

If FC lets people infer that both disjuncts are possible, a simple disjunction in natural language triggers the assumption that only one of the disjunct is true.

Provided with the fact that FC inferences exist, cannot we simply add the inference in (4) as a rule in our logic system? This solution is highly undesirable, since it would create the so-called Paradox of Free Choice (Kamp, 1973; von Wright, 1968). From $\Diamond a$ we can infer through classical modal logic $\Diamond(a \vee b)$ (that is the reasoning used in (2a)), and from that if we use FC as a rule, we can conclude $\Diamond b$. In a nutshell, the point is that once a permission is granted, any other permission would be granted too. It is therefore glaring that other ways to account for FC must be found.

In deciding how this phenomenon must be accounted for, a preliminary question arises, namely whether FC pertains to the semantics or to the pragmatics of what is said/inferred. Historically, there have been three different approaches: those accounting for FC inferences on purely semantic grounds Aloni (2007) and Simons (2005), those basing their theory on pragmatics, including the influential localist accounts of Fox (2007) and more recently (Bar-Lev and Fox, 2020), and new hybrid approaches combining semantic and pragmatic factors Aloni (2021) and Goldstein (2019). For the purposes of this work, we will focus on one per group and we will start presenting the semantic account of Aloni (2007). After that, other two very recent accounts will be introduced, Bar-Lev and Fox (2020) and Aloni (2021), without providing here a definitive reason to prefer one over the other.

3.2 Theories of Free Choice

3.2.1 A Semantic Theory

The first theory we want to take into consideration is the one defended by Aloni (2007). It is a semantic approach to FC, since according to her theory 'free choice implications of possibility disjunctive statements do have the status of a semantic entailment' (Aloni, 2007). Aloni's approach revolves around non-standard semantic definitions of modalities.

(6) a. $\textsc{may}\phi \equiv [\Diamond](\textsc{alt}(\phi))$
b. $\textsc{must}\phi \equiv \langle\Box\rangle(\textsc{alt}(\phi))$

where $[\Diamond](\textsc{alt}(\phi))$ means that every proposition in $\textsc{alt}(\phi)$ is possible and $\langle\Box\rangle(\textsc{alt}(\phi))$ means that at least one proposition in $\textsc{alt}(\phi)$ is necessary. Where $\textsc{alt}(\phi)$ are the alternatives induced by ϕ, which are defined employing a dynamic semantics with propositional quantification. It is clear then that understanding how alternatives are generated from different logical forms is fundamental for FC. In particular, a pivotal role is played by the way disjunction and modality combine in different scope configurations. Consider the two different scopes in (7):

(7) a. **modality > disjunction**
$[\Diamond](a \vee b)$
b. **disjunction > modality**
$[\Diamond]a \vee [\Diamond]b$

In (7a) disjunction takes narrow scope with respect to modality, while in (7b) the disjunction takes wide scope, since the modal scopes below it. As a result, in (7a) modality applies to the disjunction as a whole, meaning that every proposition in $\textsc{alt}((a \vee b))$ is possible, i.e. a is possible *and* b is possible.On the contrary, in (7b) modality is distributed over the two conjuncts, meaning that every proposition in $\textsc{alt}(a)$ is possible or every proposition in $\textsc{alt}(b)$ is possible, i.e. a is possible *or* b is possible.

With a new formal definition of the two modalities and with the exploitation of alternatives, Aloni (2007) manages to produce a semantic account that predicts FC whenever we are facing the narrow scope configuration of the disjunction with respect to the modal.

However, this approach encounters some shortcomings, the main of which concerns the possibility of accounting for the fact that FC tends to disappear in downward entailing (DE) environments. Consider the following example:

(8) John is not allowed to eat the cake or the ice cream.
$\neg\Diamond(a \vee b)$

In this case the intuition is to infer that John is not allowed to eat the cake and John is not allowed to eat ice cream. This means that the generated inference is $\neg\Diamond(a \vee b) \rightsquigarrow \neg\Diamond a \wedge \neg\Diamond b$, rather than $\neg\Diamond(a \vee b) \rightsquigarrow \neg(\Diamond a \wedge \Diamond b)$. The case for DE environments scores a point in favor of the view that some extent of pragmatics is needed to account for FC. In fact, to account for negation-involving cases, Aloni (2007) proposed a pragmatic hypothesis of disambiguation that selects the stronger meaning among competing alternatives (Chierchia et al., 2004; Chierchia, 2006). This solution has also been adopted by pragmatic frameworks of FC like Fox (2007) and Bar-Lev and Fox (2020). For the pragmatic nature of this hypothesis, it results to be less problematic in such frameworks than in Aloni (2007), where it slightly betray the spirit of the account. On the other hand, the new quasi-semantic approaches like Aloni (2021) and Goldstein (2019) managed to account for DE environments cases without adding this assumption to their systems. In §3.2.2 we will present two of the up-to-date systems we just mentioned.

3.2.2 State-of-the-Art Theories

Two competing types of analysis seem to dominate the landscape nowadays: the grammatico-pragmatic analysis provided by Bar-Lev and Fox (2020) and the hybrid quasi-semantic analyses proposed by Aloni (2021) and Goldstein (2019). Being an improvement on Fox (2007), the pragmatic observations of the former are tied to the presence of the *exh* operator in the syntax. The hybrid nature of the latter relies, on the other hand, on the combination of both semantic and pragmatic mechanisms. We will proceed with a presentation of the two approaches that will briefly give an idea of their character without betraying them, hopefully. For more detailed expositions we send back to the original papers.

Bar-Lev and Fox (2020): A Grammatico-Pragmatic Theory

Fox (2007) derived FC through the recursive application of the exhaustification operator Exh, a covert but syntactically present version of *only*. Exh operates on the alternatives generated by propositions and it is commonly used to derive scalar implicatures. The way this operator works can be summarized in the following two steps, adapted from Bar-Lev and Fox (2020):

1. Take all maximal sets of alternatives that can be assigned *false* consis-

tently with the prejacent.[1]

2. Only exclude the alternatives belonging to the intersection of these sets.

Such procedure is called Innocent Exclusion (IE), since it excludes (assigns *false* to) the greatest possible number of alternatives while preserving the truth of the prejacent. Consider the case of the scalar implicature for simple disjunction (5). Let's start considering the alternatives generated by the prejacent $a \vee b$: $\text{ALT}(a \vee b) = \{a \vee b, a, b, a \wedge b\}$. Then apply the Innocent Exclusion procedure:

1. Step 1 gives us the following two maximal sets: $\{a, a \wedge b\}$ and $\{b, a \wedge b\}$;
2. Step 2 excludes the alternatives in their intersection, namely $a \wedge b$,

We are therefore left with the two alternatives $\{a \wedge \neg b, b \wedge \neg a\}$, precisely what the implicature suggests. To generate FC, Fox (2007) supposed a recursive application of Exh. While this strategy can account for both scalar implicatures in simple disjunctions like (5) and basic FC inferences like (4), it falls short in providing a satisfying analysis for some complex FC cases like (9) and (10):[2]

(9) Every boy is allowed to eat ice cream or cake.
   a. $\rightsquigarrow$ Every boy is allowed to eat ice cream.
   b. $\rightsquigarrow$ Every boy is allowed to eat cake.

(10) If you eat ice cream or cake, you will feel guilty.
   a. $\rightsquigarrow$ If you eat ice cream, you will feel guilty.
   b. $\rightsquigarrow$ If you eat cake, you will feel guilty.

In order to account for so-called Universal FC[3] (9) and Simplification of Disjunctive Antecedent (10), Bar-Lev and Fox (2020) develop a new conception of the exhaustification operator in such a way that the whole work is done with a single application, i.e. with no recursion. The Innocent Exclusion procedure described above is only the first of the two two-step procedures the new Exh is compound of. In fact, after Innocent Exclusion, Innocent

[1] In the case of $Exh\Diamond(a \vee b)$ the prejacent is $\Diamond(a \vee b)$.

[2] We recommend Bar-Lev and Fox (2020) for the full analysis of the failure of Fox (2007) in (9) and (10).

[3] Universal FC is sometimes regarded as an argument against (globalist) pragmatic approaches to FC (Aloni, 2021).

Inclusion (II) is to be applied. Here is the two-step procedure as explained in Bar-Lev and Fox (2020):

1. Take all maximal sets of alternatives that can be assigned *true* consistently with the prejacent and the falsity of all IE alternatives.

2. Only include (assign *true* to) the alternatives belonging to the intersection of these sets.

Consider now the FC generating $\Diamond(a \vee b)$. IE leaves us with the truth of the prejacent and the falsity of $\Diamond(a \wedge b)$. We can then apply Innocent Inlcusion:

1. Step 1 gives us the following unique maximal set:
   $\{\Diamond(a \vee b), \Diamond a, \Diamond b\}$

2. Step 2 includes all these alternatives,
   $\Diamond(a \vee b), \Diamond a, \Diamond b$

Since after Step 2 we assigned *true* to both $\Diamond a$ and $\Diamond b$, we are left with the FC meaning $\Diamond a \wedge \Diamond b$. One fascinating aspect of Bar-Lev and Fox's theory is the exploitation of a widespread tool commonly used to account for several pragmatics phenomena, such as scalar implicatures: the Exh operator.

If on the one hand it has become clear in the history of FC that a purely semantic account cannot be appropriate for the phenomenon, on the other hand purely pragmatic approaches like Bar-Lev and Fox (2020) are not the only possible solution. It is indeed possible to provide hybrid accounts mixing semantic and pragmatic elements that can better reflect the multifaceted nature of FC inferences.[4] While Goldstein (2019) is also worth to be mentioned, we will mainly focus on Aloni (2021).

Aloni (2021): A Hybrid Theory

If the DE environments constraint pushed for abandoning a purely semantic account, there are other properties that seem to draw a line between FC inferences and pragmatic implicatures. These are mainly the processing cost (low for the former and high for the latter, Chemla and Bott (2014)) and the acquisition time (early for the former and late for the latter, Tieu et

[4] As Aloni (2021) puts it: 'The overall goal [...] is to develop logics for these hybrid inferences that can capture their quasi-semantic behaviour while accounting for their pragmatic nature.'

al. (2016)). Aloni (2021) tries to provide an account of FC that takes into consideration all these various properties, and does so by letting pragmatic factors intrude in a bilateral state-based logic system, designed to model assertion and rejection conditions rather than truth.

The modal logic on which Aloni (2021) is grounded has two fundamental characteristics: it is state-based (propositions are not interpreted with respect to possible worlds but to information states, i.e. sets of possible worlds) and it is bilateral (conditions are defined for both assertability and rejectability of sentences, such that the two are not the mere negation of one another). In this system, Aloni exploits the definition of disjunction provided by team logic:

- $s \vDash \phi \vee \psi$ *iff* $\exists t, t' : t \cup t' = s$ *and* $t \vDash \psi$ *and* $t' \vDash \psi$

where s, t and t' are information states. Along with this notion of disjunction, Aloni uses the notion of modality exploited also in inquisitive semantics Ciardelli et al. (2018):

- $M, s \vDash \Diamond\phi$ iff $\forall w \in s : \exists t \subseteq R[w] : t \neq \emptyset$ and $M, t \vDash \phi$

This whole semantic apparatus is implemented with a very precise notion of pragmatic enrichment, from which the claim that Aloni's is a semantico-pragmatic hybrid theory of FC. A pragmatically enriched proposition p^+ is a proposition p to which the 'Non-Emptyness atom' NE has been added. NE is the warranty that we are not dealing with the empty information state $\emptyset$ which vacuously supports every proposition. Such constant is therefore conceived by Aloni (2021) as 'a formal counterpart of [the principle] 'avoid $\bot$".

- $M, s \vDash \text{NE}$ iff $s \neq \emptyset$
- $p^+ = p \wedge \text{NE}$

As a result, in Aloni's system we obtain that FC is always generated from the pragmatic enrichment of the narrow scope configuration $(\Diamond(\phi \vee \psi))^+$.[5]

Instead, from the wide scope configuration $(\Diamond\phi \vee \Diamond\psi)^+$ FC arises only postulating an indisputable accessability relation, where indisputability is defined as that property according to which any two worlds in our information state s access the same worlds conforming to that accessability relation R.

[5]For a complete proof that $(\Diamond(\phi \vee \psi))^+ \models \Diamond\phi \wedge \Diamond\psi$ please consult Aloni (2021), p.16.

- R is indisputable in (M, s) iff for all $w, v \in s : R(w) = R(v)$

This constraint makes sure that both ϕ-worlds and ψ-worlds are accessible at the same time if the wide scope configuration holds.[6]

This hybrid theory accomplishes the task of accounting not only for FC but also for the multiple properties that make these kind of inferences so particular.

The solution we will provide to the FC-in-Sluicing puzzle is general and we believe it can be equally applied to both the theories of Bar-Lev and Fox (2020) and Aloni (2021). Let us now present Fusco's (2019) analysis of the FC-in-Sluicing puzzle, which is built on the ambiguity account in the style of Aloni (2007) we presented above.

3.3 Free Choice-in-Sluicing

The main predecessor of our work is Fusco (2019). In her paper, Fusco aims at providing an account for FC in sluicing by means of a scope-based account. Fusco's account departs from a crucial intuition. The intuition, attributed to Aloni (2019), is that FC is blocked in sluicing constructions when the modal is 'at-least-semantically' present in the elided material (Fusco, 2019).

(11) a. You may have coffee or tea, but I don't know which you **may have**.
b. You may have coffee or tea, but I don't care which you **have**.

Starting from this observation, Fusco's theory is grounded on three assumptions. The **first assumption** is that FC can only be generated when the disjunction takes narrow scope (NS) with respect to the modal. In other words, FC arises whenever we have a logical form of the kind $\Diamond(a \vee b)$, and does not arise whenever the logical form is $\Diamond a \vee \Diamond b$.

The **second assumption** follows the semantic account of sluicing proposed in Chung et al. (1995), and states that the elided material in the sluice is constituted by a semantic copy of the material in the antecedent (*LF copying*), except for some minor syntactic constraints (such as case inflection). The combination of the first two assumptions predicts FC blocking whenever the modal is present in the elided material and the configuration of the sluice is wide scope (WS). Such configuration would trigger a reinterpretation of

[6] Again, for a proof that $(\Diamond\phi \vee \Diamond\psi))^+ \models_I \Diamond\phi \wedge \Diamond\psi$ please see Aloni (2021), p.17.

the disjunction in the antecedent, in which the modal scopes below the disjunction, not giving rise to FC. In fact, the denotation of the sluice with the modal would be

⟦Which you may have⟧ = {you may have coffee, you may have tea}

and (after the application of existential closure, in classical accounts) it would be identical to the semantic denotation of the antecedent if interpreted with WS configuration.[7]

The **third assumption** concerns the motivations behind which such configuration would be triggered. The configuration seems to be tied to the fact that the modal is present in the sluice. However, Fusco does not explain properly why some sentences would contain the modal in the sluice and some would not. A couple of remarks seem to tie the phenomenon to the notion of *ignorance*. It is the ignorance declaration of the speaker to give rise to Moorean tension with a FC (i.e. narrow scope, for Fusco) reading of the antecedent. To resolve the tension, the wide scope reinterpretation mentioned above would do the job. However, we believe this point should be further clarified. In the next subsections we will take a closer look at the details, in order to accomplish two tasks:

1. Providing evidence from existing literature on the existence of wide scope Free Choice, we will challenge the first assumption, posing serious threats to Fusco's overall theory on the licensing of FC cancellation;[8]

2. Through a series of counterexamples, we will oppose the third assumption, showing that ignorance cannot be taken to be the reason for the blocking of Free Choice.

3.3.1 Wide Scope Free Choice

When combined, disjunction and modality might assume two different configurations, as we said in 3.2.1.

Some FC accounts, like Aloni (2007), on which Fusco (2019) is based, predict that FC is licensed only in case of NS configuration. Given this

[7] As emerged in the previous chapter, remember that to account for this identity we need either to apply existential closure to the sluice, in the style of Merchant (2001) (among others), or to exploit a semantic framework treating declaratives and questions in the same way.

[8] The second assumption, the semantic theory of sluicing by Chung et al. (1995) exploited by Fusco (2019), has been criticized too. However, we already treated the semantic theories of sluicing in chapter 2, and we think leaving it aside for the moment would make the discussion clearer.

assumption, it is clear how Fusco would only need a theory of sluicing able to predict, in cases in which FC is blocked, that the antecedent is somehow forced to have WS configuration.

Fusco finds such a theory in the semantic account of Chung et al. (1995), from which she borrows two very clear examples on FC indefinites:

(12) a. She always reads a book at dinnertime... we can't figure out which one.
b. Each student wrote a paper on a Mayan language... but I don't remember which one.

The antecedents in both (12a) and (12b) are ambiguous between two readings. One is the *non-specific* reading, in which the existential (*a book/a paper*) scopes low (below *always* and *each student*, respectively), and the other is the *specific* reading, in which the existential scopes high (above *always* and *each student*). The consequents in (12a) and (12b) make somehow clear that we are dealing with the latter, the *specific* reading. The disambiguation brought by the consequents in the two examples made Chung et al. (1995) realize that in the ellipsis site we are not dealing with a syntactic copy of the antecedent material, but rather with a semantic copy. To Fusco (2019), these two examples have even a bigger resonance, hinting at a possible solution for the FC-in-sluicing puzzle. Consider the following novel examples by Fusco (2019):

(13) Reginald wants to marry a millionaire... guess which.
(De Re)

(14) Reginald wants to marry a millionaire... he doesn't care which.
(De Dicto)

While in (12a) and (12b) we had two theoretical possible antecedents disambiguated in favor of the *de re* reading, in (13) and (14) the two sentences *as a whole* constitute two realized different readings. It is so because the ambiguous antecedent has been desambiguated in two different ways, and the 'structural disambiguation of the antecedent is being driven by the meaning of the verb ('guess' vs. '(don't) care')' (Fusco, 2019).[9] In particular, Fusco

[9]However from these examples we can already make two crucial observations that will be deepened in the next subsection. In (13), FC is cancelled even if we are not facing an ignorance sluice. In fact, 'guess which' seems to even presuppose that the speaker *knows* the answer, deleting any possibility of Moorean tension with its antecedent. In (14), 'he doesn't care which' gives rise to FC. However, we might ask: what would be the interpretation if instead the continuation was '*I don't care which*'? In that case, it

reports that the presluice in (13) would contain the modal *wants*, whether the presluice in (14) would not. This parallelism drives the second bridge to the FC cases involving disjunction: like *want*, *may* might be present or absent in the presluice.[10] Fusco's theory therefore relies on the idea that the absence of the modal in the sluice would trigger the NS configuration of the sluice in (7a) giving rise to FC, while presence of the modal in the sluice would trigger the WS configuration in (7b) blocking FC, or, phrased in a better way, inducing a non-FC re-interpretation of the antecedent.

However, we believe Fusco is too fast in dismissing the possibility of WS Free Choice. Since Zimmermann's (2000) groundbreaking example (*Detectives may go by bus or they may go by boat.*), WS Free Choice has been an open issue, and most recent FC theories aim at accounting for wide-scope FC together with the its narrow-scope counterpart, as in Aloni (2021) and Bar-Lev (2018).

Let us briefly consider the latter, in order to make the point on WS FC. Even though WS FC sentences are widespread, as in the aforementioned Zimmermann's example, a crucial step in the debate is to properly isolate examples of WS FC. What we mean is that surface scope might just be apparent, and WS examples might reveal to result from movement applied to a NS LF. In order to find the desired examples, it is important to detect cases in which scope is fixed and overt. Bar-Lev (2018) reports the following example:

(15) Either Mary can have a pizza or else (=if she doesn't have a pizza) she can have a hamburger.

The claim is that *or else* fixes WS, while preserving FC. Even more, every time that sentences with WS surface give rise to FC inferences, they remain grammatical whenever we overtly introduce *or else* (Bar-Lev, 2018). As a consequence, building on the theory of Klinedinst and Rothschild (2012), Bar-Lev (2018) claims that every wide-scope FC involves a covert *or else*. According to Klinedinst and Rothschild (2012), the use of *or* with the meaning of *or else* is a non truth tabular disjunction. Namely, *or* has two different uses: one in which it behaves as the commonly acknowledged truth tabular disjunction, and one in which it means *and if not*. In particular the idea is that in WS FC *and* scopes above the modal, while *if not* takes a non modal argument, introducing for the second disjunct a scenario in which the

seems that FC would be blocked even with the relevance verb *care*.

[10]The first bridge between FC disjunction and FC indefinites sluicing was the NS/WS observation.

event in the scope of the first modal (but not the possibility itself) is not realized. If we have this conjunctive meaning in wide-scope FC disjunctions, then the derivation of FC comes straightforwardly. '*(possible a) and, if not a, (possible b)*' gives us the FC meaning $\Diamond a \wedge \Diamond b$. Therefore, even if with important assumptions, it is undeniable that WS FC does exist. The same conclusion has also been achieved through experimental methods by Cremers et al. (2017).

Fusco's assumptions become then problematic. Recall our starting examples with the addition of *else* and fixed WS:

(16) a. #You may have coffee or else you may have tea, but I don't know which [you **may have**].[11]
b. You may have coffee or else you may have tea, but I don't care which [you **have**].

Fusco's theory fails to make the right predictions in (16b), since even though we have a WS antecedent, FC goes through. As (16b) shows then, a WS configuration would be perfectly compatible with a FC antecedent in which we have covert *or else*. It seems that Fusco has hard time explaining the oddness of (16a) too, created by the (mandatory) WS-FC reading of the antecedent, and the FC-blocking sluice. However, in this second case, Fusco might find a way out adopting the covert *or else* analysis. She might then reply that there is a strong contrast between the FC permission in the antecedent (caused by the conjuntive reading of the two disjunct) and the *ignorance* declaration in the consequent. Nonetheless, in the next section we will show that *ignorance* cannot be the culprit of FC cancellation (and thus of the contrast in (16a)). We believe these examples are too big of an obstacle for Fusco (2019) and it is not clear how a scope-based account of FC would be able to properly account for FC cancellation in cases like (16a).

In this subsection we have shown that Fusco's method to derive FC cancellation falls short when dealing with wide-scope configurations. In the next subsection we will present several counterexamples to challenge the general idea backing Fusco, namely that FC cancellation is related to Moorean tension or, more generally, to ignorance.

[11] It has to be specified that, while most of our informants agree with this judgment, some others consider the sentence to be fine. However, they also acknowledge some sort of epistemic meaning in the modal. This would be in line with the widespread idea that epistemic FC cannot be cancelled, as well as with an analysis in the style of Zimmermann (2000) according to which the antecedent of (16a) would mean *It is epistemically possible that you may have coffee and it is epistemically possible that you may have tea* ($\Diamond_E \Diamond_D a \wedge \Diamond_E \Diamond_D b$).

3.3.2 You Can't Blame Ignorance

Building on a consideration by Aloni (2019), Fusco's (2019) theory on sluicing and FC is grounded on the belief that FC is blocked whenever ignorance ascription to the speaker in the consequent triggers Moorean tension with the possible FC configuration of the antecedent. As a result, only the so-called 'ignorance sluices' would be responsible for FC cancellation, while 'other types of sluices, such as the indifference sluice [...] and the encouragement sluice [...], do not appear to cancel FC.' We believe that this observation is at least misleading. In fact in cases of FC disjunction, 'indifference sluices' and 'encouragement sluices' are the *only* sluice types that do not block FC. Even more importantly, it is not the case that the blocking of FC is always connected to ignorance and Moorean tension. Consider the following counterexamples:

(17) You may have coffee or tea
   a. ...guess which!
   b. ...and I'm surprised you don't even wonder which.

In examples like these the intuition is that we do not have FC. However, it can be noted that there is no ignorance ascription to the speaker, therefore there cannot be any Moorean tension between the antecedent and the consequence.

After this observation, some might redefine the theory, objecting then that maybe Moorean tension ascribed to the speaker is not a necessary element, but a general connection with some kind ignorance is, nonetheless. In fact, avoiding *knowledge* verbs is not a guarantee that we are not facing ignorance ascription. The imperative *guess* in (17a) presupposes the ignorance of the addressee. Similarly, the verb *wonder* in (17b) might be connected to ignorance, although in a more vague way.

However, any sort of indirect ignorance ascription is not necessary either, as can be seen in (18):

(18) You may have coffee or tea
   a. ...and I'm sure you (already) know which.
   b. ...and even Susie can tell which.

Not only are these examples missing direct or indirect ignorance ascription, but they are precisely attributing knowledge. Crucially, even in these knowledge ascription sluices the prominent reading is FC blocking.

The counterexamples we presented show that different FC readings in sluicing are not linked to direct or indirect ignorance attributed to the

speaker, to the addressee, or to a third person. It has to be nonetheless recognized that a line is drawn between relevance (and encouragement) verbs and all the other ones. We have therefore to research the origin of FC cancellation on some crucial grammatical or pragmatic feature that divides these two classes.

To sum up, if in 3.3.1 we have shown that any framework reducing FC effects to NS configurations is faulty in accounting for the FC-in-sluicing puzzle, in 3.3.2 we have presented cases that brought us to reconsider Aloni's (2019) and Fusco's (2019) idea that FC blocking is linked to ignorance. While making crucial remarks and observations which have inspired this thesis, we believe Fusco's theory is built on wrong assumptions, and lacks a proper explanation on reasons for the presence or absence of the modal in the sluice. In the next chapter we will try to determine the grammatical (or pragmatic) features that separate relevance verbs from the others, focusing on the connections with the different presluice reconstructions.

Chapter 4

Temporal Orientation

4.1 Overview

Recall the examples we started with to present the FC-in-Sluicing puzzle:

(1) a. You may have coffee or tea, but I don't know which.
b. You may have coffee or tea, but I don't care which.

We have seen that, even though these examples look very similar, they carry quite different interpretations. On the one hand, from (1a) we get that the possibility for the addressee to have coffee or tea is probably limited to one of the two, and which one of the two is possible is unbeknownst to the speaker. From (1b) we get that the possibility is extended to both and the addressee can freely choose which one to have. In other words, while in the consequent of (1a), the speaker intends to say that she does not know which beverage the addressee *may have*, in the consequent of (1b), the speaker intends to say that she does not care which beverage the addressee *will* (actually) *have*. Along these lines, following the intuition of Aloni (2019), (Fusco, 2019) presents the following reconstructions, claiming that FC is blocked in sluicing whenever the modal is 'at-least-semantically' present in the elided material.

(2) a. You may have coffee or tea, but I don't know which you **may have**.
b. You may have coffee or tea, but I don't care which you **have**.

We follow the same path and in this chapter we aim at grounding this intuition on grammatical bases. Instead of connecting it to the notion of ignorance and to the difference of narrow/wide scope, like Fusco (2019), we

believe that the difference in presluices can be traced to the tense-related properties of the verbs *know* and *care*, and how they relate with the verbs they embed. To pursue this objective we will introduce the notions of modal and embedding verbs orientation. In §4.2 we will further inquire into possible presluices in cases similar to (1), in §4.3 we will present the notion of temporal orientation and we will extend it to question embedding verbs, and finally, in §4.4 we will apply these notions to sluicing, presenting one hard and two soft constraints that emerge, grounding Aloni's and Fusco's intuition.

4.2 Free Choice, Modality, Tense

As a preliminary step, we might ask what class/es of verbs allow/s FC. As can be appreciated from the examples below, sluicing is licensed by both extensional (as in (3b)) and intensional (as in (3c) and in (3a)) complement embedding verbs.[1]

(3) a. I met somebody yesterday... guess who!
b. John is drinking, and I'm sure you know what.
c. She ran away, and I wonder why.

Then, at first glance one might think that the difference concerning FC in (1) relies on the aforementioned distinction: *know* is in fact extensional, while *care* is intensional. However, this is not the case. Actually, if on one hand it is out of question that extensional complement embedding verbs block FC, on the other hand it is also true that most intensional verbs do it as well. Consider the following intensional complement embedding verbs:

(4) a. You may have coffee or tea, and I don't *bet* on which.
b. You may have coffee or tea, but I *wonder* which.

In both examples (4a) and (4b), presenting respectively what Karttunen (1977) classifies as a conjecture verb and an inquisitive verb, FC is ruled out. At a closer inspection, one realizes that the only verbal class giving rise to FC in the inquired sluicings is the intensional class of relevance verbs, namely *care*, *matter*, *be relevant/important/significant*.[2]

[1] For a discussion on this distinction we recommend Groenendijk and Stokhof (1982).

[2] Fusco (2019) defines sluices generated by these verbs as 'indifference sluices', while other sluices she acknowledged to not cancel FC are the 'encouragement sluices' (for example 'You may have coffee or tea, feel free to choose which'.) We will focus on 'indifference sluices'. For 'encouragement sluices' we shall limit ourselves noticing that both

It is therefore clear that the reason for the non-cancellation of FC must be researched in the specific semantics and/or pragmatics of this class of verbs.

Let us try to reconstruct the elided part in (1a) and (1b).

(2) a. You may have coffee or tea, but I don't know which you **may have**.
b. You may have coffee or tea, but I don't care which you **have**.

As already said in §4.1, the interpretation leads us to maintain the modal in (1a) and to discard it in (1b). This kind of mismatch is allowed by the theory of Rudin (2019), whose generalization, stated in chapter 2, claims that mismatches are possible whenever they involve material that originates outside the *eventive core*, i.e. 'the complete verbal complex, including the origin sites of verbs and their internal and external arguments' (Rudin, 2019). In our case, the modal *may* is merged as head of a ModP_{Root} outside of the vP, and therefore it can be absent from the sluice. It is particularly interesting that the modal mismatch between the sluice and the antecedent appears to be the default reading for (1b), but not for (1a). Crucially then, for some reason, not only contexts, as claimed by Kroll et al. (2017) and Kroll (2019), but also lexical verbs are responsible for selecting mismatches in ellipsis. Before moving on, let us now examine what happens if we force the opposite readings, i.e. giving rise to Free Choice (+FC) for *know* and cancelling it (-FC) for *care*. We can do so by explicitly stating a different continuation, re-phrased in such a way that the desired interpretation is obtained.

(5) a. $^{(+FC)}$ You may have coffee or tea, but I don't know which you **will have**.
b. $^{(-FC)}$ You may have coffee or tea, but I don't care which you **may have**.

To have a -FC reading of (1b), it has been sufficient to explicitly re-introduce the modal *may*. On the other hand, however, to have a +FC version of (1a) leaving the modal out was not enough, it has been necessary to introduce

possible presluices give rise to FC inferences. In fact, '...feel free to choose which you will have (between a and b)' presupposes $\Diamond a \wedge \Diamond b$ and '...feel free to choose which you may have (between a and b)' presupposes $\Diamond\Diamond a \wedge \Diamond\Diamond b$ which, according to common linguistic intuitions about modality, would imply $\Diamond a \wedge \Diamond b$. Therefore, both presluices would require FC licensing antecedents.

the future modal *will*, to not originate the semantically ill-formed:

(6) #You may have coffee or tea, but I don't know which you have.

This behaviour is observable for any -FC complement embedding verbs, i.e. for any complement embedding verbs that do not belong to the class of *relevance verbs*. It seems then licit to draw a connection between these two characteristics, FC rising and tense expression.

To further pursue this direction, it proves to be useful to observe examples of epistemic modals:

(7) a. You might have voted for John or for Paul, but I don't know which.
b. You might have voted for John or for Paul, but I don't care which.

(7a) and (7b), other than stating the two possibilities, also claims their indistinguishability to some extent - it is equally possible that the addressee voted for John and for Paul - in contrast with (1a). (7a) do not presuppose a single 'preferred'/'allowed' alternative between the two to which the wh-word *which* combined with *know* may refer to. In other words, we do see FC effects in both (7a) and (7b) without any distinction. This observation is in line with the widely accepted claim that epistemic FC cannot be cancelled (Aloni, 2021). If we try to reconstruct the elided material as previously done for (1), then both sentences require us to delete the modal and reconstruct the sluicing just with lexical verb in its present perfect form.

(8) a. You might have voted for John or for Paul, but I don't know which you **have voted** for.
b. You might have voted for John or for Paul, but I don't care which you **have voted** for.

So far, following Aloni (2019) and Fusco (2019), we have claimed that the FC difference in the default readings of (1a) and (1b), is tied to the reconstructions of the elided material. In particular, FC is blocked when the modal is present in the sluice. In the previous chapter we have shown that FC blocking is not linked to ignorance. In this chapter, thanks to (7), we have shown that the opposite does not hold either: *know*, *per se*, is not connected to FC-cancellation since we have constructions in which it does not block (epistemic) FC. We believe there must be something related to how these verbs, *know* and *care*, combine with tenses.

In the following sections, we argue that the analysis of the interplay

between modals, question embedding verbs, and tense, and consequently the analysis of FC in sluicing, has to be faced through the distinction between perspective and orientation. The aim of the next section is to present this distinction.

4.3 Perspective and Orientation

The distinction between *perspective* and *orientation* has gained resonance after Condoravdi (2001). Condoravdi draws this terminological distinction with regards to non-root modals (i.e. epistemic and metaphysical modals, in contrast with root modals, i.e. dynamic, deontic, and quantificational modals). The term *perspective* refers to the time of evaluation of the modal. On the other hand, the term *orientation* concerns the state of affairs of the event under the scope of the modal, and its time of evaluation may be different than the time of evaluation of the modal. These considerations are obviously intertwined with the debate on whether modals combine with tensed or untensed sentences, i.e. 'how the temporal parameter for the evaluation of sentences in their scope gets fixed' (Condoravdi, 2001). Consider the following examples from Condoravdi (2001):

(9) a. He may be sick.
b. He may have been sick.

The fact that there is no morphological difference allowing a distinction between present and future in non-finite clauses, may trigger in (9a) the ambiguity exemplified by the two following translations:

(10) a. MAY(PRES(he be sick))
b. MAY(FUT(he be sick))

While in (9b) the past is clearly expressed by the perfect:

(11) a. MAY(PERF(he be sick))

The idea here is to extend the orientation category to root modals (specifically, the deontic ones) and question embedding verbs, in order to explain the different reconstructions of the elided material in the sluice.[3]

Previous literature helps us to accomplish the first task. Enç (1996)

[3]In general, from a grammatical point of view, while perspective depends on the tense in which the modal auxiliary is expressed, orientation is generally determined by the *Aktionsart* of the verb under the modal's scope (Condoravdi, 2001).

points out that deontic *must* and *may* have future orientation, i.e. the time of the eventuality in the scope of the modal follows the time of evaluation of the modal. Indeed, exploiting Condoravdi's (2001) analysis concerning the role of *Aktionsart* in determining orientation, Fălăuş and Laca (2020) confirm that eventive predicates in English always give rise to future orientation in modal constructions,[4] while stative predicates show a default present orientation, which can be converted into a future one by means of adverbials.

This appears clear in the way we use deontic *may*, *can*, and *could*. Consider the following examples:

(12) a. May I have another glass of water, please?
b. Sure, you may have as many as you want.

Both in interrogatives and declaratives, the deontic use of *may* is generally thought as asking for, or granting, a permission, that is valid from the moment of utterance onward. The event of having a glass of water stricly follows the deontic possibility of having it.

To confirm this, we can imagine examples in which the fact that the eventuality under the scope of the modal is simultaneous with the time of utterance of the modal triggers a shift to the past for the modal.

(13) Imagine a context in which John finds a burger on the table and starts eating it. While he is chewing the first bite, Mary enters the room. John, who suspects that the burger was prepared by Mary, asks (while chewing):
a. **Could** I?

In this example we witness again the intuition that the evaluation of the permission, expressed with the modal, needs to strictly precede the permitted action. Even though the fact that the event of eating the burger is simultaneous with the act of asking, the possibility to express the modal in the present tense is eliminated.

The only example that comes to our mind in which the evaluation time of a deontic possibility is simultaneous with the event under its scope is as polite marker in question. But precisely because of the oddness of this combination, sassy ironic replies may be triggered, as in the following:[5]

[4] 'Unless they receive a habitual interpretation, and thus function as derived statives' (Fălăuş and Laca, 2020).

[5] There seem to be also counterexamples involving teleological modals as in *To teach this course you must be Spanish* in which *must* has past orientation. We leave the analysis of such examples for future research. The example was suggested in a personal com-

(14) a. May I please ask you what time it is?
b. Yes, you just did.

It is therefore clear that deontic *may* has to be treated as Condoravdi's (2001) *forward-shifting modal*, formalized as:

(15) $\text{MAY}_{MB}\phi$ is true at $\langle w, t\rangle$ iff there exist w', t' such that $w' \in MB(w,t), t \prec t'$ and ϕ is true at $\langle w', t'\rangle$[6]

Let us now turn to the extension of the notion of *orientation* to question embedding verbs. The underlying idea here is very simple, in this section we will recall and slightly extend Enç (1996)'s observations on the 'orientation' provided to embedding verbs by their embedded clauses. Laca (2012) constitutes also an important predecessor, attributing to *know* and other attitudes verb present orientation. In particular, Laca (2012) highlights 'a correlation between attitudes of preference (which assert an ordering among alternatives) and future temporal orientation'. We could then treat *care* equally to the attitudes of preference Laca (2012) refers to, like *want*. *Care* indeed introduces a sort of preference order between alternatives. If on the one hand using the term *orientation* may sound as an unnecessary stretch, on the other we believe it turns out to be useful for the present chapter.

In the same fashion as *orientation* has been referred to the 'inner tense' (Condoravdi, 2001) of the modal (i.e. the time referring to the event under the modal scope), we will talk about the *orientation* of a question embedding verb to address the time conferred to the embedded question. We hope the following examples will clarify this basic idea:

(16) a. I know what happened yesterday.
b. I guess the neighbour is playing the drum...
c. I wonder how you will explain this to the boss.

In all three sentences in (16) the perspective of the question embedding verbs is present. However, their orientation is different. In (16a) the orientation is past, since the agent has a present knowledge of a past event. Similarly, in (16b) the orientation is present, for the agent is making a present guess on a present event. Finally, (16c) introduces a future orientation, since the agent is now wondering about a future event. It is almost obvious that when a verb V_2 is embedded by a verb V_1, what would be the perspective of V_2, becomes the orientation of V_1. From this it seems that *orientation* is not

munication by Maria Aloni, who attributes it to Paul Portner.

[6]Where MB stands for the modal base.

a property of question embedding verbs *per se*, but rather something that embedded verbs confer. However cases are not always clear-cut and the *care* example show that the embedding verb does play a role.

Return to consider the question embedding verbs we are mainly inquiring, *know* and *care*. We want to empirically check how these verbs express present and future orientations. In (10a) and (10b), we have seen that present tense in English can sometimes generate ambiguous readings between present and future (so-called futurates) events. However, this does not seem to be the case for *know*. In fact, in order to express the knowledge about a future event an explicit future marker is required, as in (17d). If the clause embedded under *know* is expressed by the present tense, then the known event can only be contemporary to the knowledge (17a) or, at the very most, be generic (17b).

(17) a. I know you are confused.[7]

[present]

b. I know that Sarah talks with her mouth full.[8]

[generic]

c. #I know what you do tomorrow.[9]

[future]

d. I know what you *are going to*/*will* do tomorrow.

[future]

On the contrary of what holds for *know*, when *care* embeds a present tense clause, the reading of the embedded clause might be ambiguous between a present and a future reading, as in (18a) and (18b) respectively.

(18) a. I care what you ignore about your life.

[present]

b. I care what they bring for dinner.

[future]

[7]We can also notice that with eventive predicates, some special markers seem to be required by *know* to express present, simultaneous events. *I know what you are doing* seems to be preferred to *I know what you do*, which suggests for the latter a default generic reading.

[8]Example adapted from Enç (1996), just to stick to people talking and chewing at the same time as in (13).

[9]The infelicity of this sentence has been confirmed by Dean McHugh, native English speaker, in a personal communication.

c. I care what you do for living.

[generic]

Crucially, if we replaced *care* with *know* in (18b) only a generic reading would be possible, generalizing on situations with an implicit adverbial like 'usually' or 'standardly'.

(19) a. I know what they bring for dinner.

[generic]

To sum up, the following bullet points summarize the main remarks provided by this section, the temporal orientation of deontic *may* (MO), and the orientation of *know* and *care* (KC) with respect to present embedded verbs:

1. **MO**: *may* has future orientation;
2. **KC**: while *care* can express future orientation when it embeds a present tense, *know* cannot.

We have now all the tools we need to attempt an answer to the question on the motivations behind the different sluice reconstructions that are linked to the presence or absence of FC.

4.4 Structure of Ellipsis Sites

4.4.1 Applying Orientation to Sluicing

We have argued, on the lines of Aloni (2019) and Fusco (2019), that the element blocking FC is the repetition of the modal in the sluice. However, so far it has not emerged not only *why* this is the case,[10] but also *why* (1a) and (1b) are default readings. The aim of this section is to provide a tentative answer to the latter *why*. The next chapter will be entirely dedicated to the former.

Recall our example (1) with the overt presluices:

(1) a. You may have coffee or tea, but I don't know which you **may have**.
b. You may have coffee or tea, but I don't care which you **have**.

[10] In the previous chapter we have shown that the narrow scope/wide scope distinction cannot be the main actor in the FC-in-Sluicing puzzle.

While (1a) blocks FC, (1b) does not. Now compare them again with their counterparts we made up in §4.1 to force the opposite FC readings.

(5) a. $^{(+FC)}$ You may have coffee or tea, but I don't know which you **will have**.

b. $^{(-FC)}$ You may have coffee or tea, but I don't care which you **may have**.

As already mentioned in §4.1, to block FC in (5b) it has been sufficient to reintroduce the modal in the sluice, in other words (5b) perfectly mirrors the elided structure of (1a). On the other hand, to have FC in (5a) we have been forced to introduce a new element, *will*. In fact, recall that trying the trick to make (5a) mirror the elided structure of (1b) would result in the odd sentence:

(6) #You may have coffee or tea, but I don't know which you have.

Because of its infelicity, sluicing cannot take place in the case of (6) for the Well-Formedness condition we presented in chapter 2.

- **Well-Formedness (WF)**
  If a pre-sluice is infelicitous, then the corresponding sluice will not be well-formed.

(Dayal and Schwarzschild, 2010)

Note that the same condition does not apply to (1b) since the continuation with plain *have* after *care* is felicitous. By now it should be clear why (1b) is felicitous while (6) is not. The reason behind this is precisely tied to the observations we made in §4.3 about orientation. On the one hand we saw that *may* is future oriented, which means that the event in its scope receives future time of evaluation. On the other hand, we underlined the possibility for *care* to express future orientation when embedding a present tense, as it is in the case of (1b), while this possibility is denied to *know*. Which means that no event in the scope of *know* can receive future time of evaluation if expressed with a present tense. There is pivotal difference between the possible structures that *know* and *care* permit.

If we consider the antecedent for (1a) and (1b) we have:

(1_A) You may have coffee or tea $\rightsquigarrow$ MAY(FUT(have coffee or tea))

Where the lexical verb *have* receives a future evaluation time, thanks to the future orientation of deontic *may*. Now let us take a look to the reconstructed presluices without the repetition of the modal.

($1b_E$) I don't care which you have $\rightsquigarrow$ CARE(FUT(which you have))

(6_E) I don't know which you have $\rightsquigarrow$ KNOW(PRES(which you have))

It appears now clear why ($1b_E$) is an acceptable continuation and (6_E) is not. While *have* in ($1b_E$) can felicitously receive future time of evaluation, preserving the time assigned to this event by the modal, in (6_E) there is a mismatch and *have* gets assigned two different times of evaluation: future in the antecedent and present in the sluice.

It is necessary for *know* to apply to another strategy, in order to confer *have* its future evaluation time. The simplest strategy is than to fully copy the material already present in the antecedent, including the modal. We then get:

($1a_E$) I don't know which you may have
$\rightsquigarrow$ KNOW(MAY(FUT(which you have)))

If we take as established the fact that FC is blocked by the repetition of the modal in the sluice,[11] now it appears clear also why (5a) and (5b) can felicitously be the opposite-FC readings with respect to the default interpretations of what would be the elided material.

In (5a) we had to introduce the future marker *will*, and the need for this precisely relies in the necessity to attribute a future time of evaluation to *have*. We then have:

(5a) You may have coffee or tea, but I don't know which you **will have**.
You MAY(FUT(have coffee or tea)), but I don't
KNOW(FUT(which you have)).

It is trivial then to say why (5b) is an acceptable blocking-FC version of (1b). Introducing the modal is sufficient, since it preserves the structure of the antecedent along with the future time of evaluation of the event in the scope of the modal, as it does for (1a).

(5b) You may have coffee or tea, but I don't care which you **may have**.
You MAY(FUT(have coffee or tea)), but I don't
KNOW(MAY(FUT(which you have))).

[11] Even though we will show only in the next chapter why it is so.

It seems that we now have a new suitable rule that plays a role in felicity of sentences, and indirectly in sluices reconstructions.

- **Events Evaluation Time Matching (EETM)**
  The time of evaluation of the event in the (pre-)sluice must match the time of evaluation of the same event in the antecedent.

When this matching is possible with a present simple, it will be the first choice. As second option, there is the repetition of the antecedent, granting orientation (and therefore event) matching by default. As a third and more costly option, we have the introduction of a new modal that cannot be found in the overt available material. In this third case, however, sluicing is not permitted in the cases we are evaluating, since the repetition of the modal is not only a possible alternative for (1a), but also the preferred one. We then need to formulate a clear constraint governing this preference. Before doing so, let us take a step back.

We claimed that our EETM constraint governs felicity, and only indirectly sluicing. In particular, it is important to stress that it is a soft constraint, since there actually exist cases in which the time of evaluation of the event in the antecedent is different from the time of evaluation of the same event in the consequent. We are however committed to the claim that such mismatches are possible only if they are explicitly required by other lexical material that shows up in the consequent containing the sluice. Take for instance those cases in which modal *will* is absent from the antecedent and yet added to the sluice, like the following example from Kroll et al. (2017):

(20) Your plant is alive, but you can never be sure for how long ~~it will be alive~~.

As mentioned few lines above, in such cases sluicing is possible only if the tense marker addition is required by overt material that precedes the ellipsis. In fact, *how long* cannot precede present tenses because it would otherwise originate an infelicitous sentence, analogously to *know* in (6):

(21) #Your plant is alive, but you can never be sure for how long it is alive.

The infelicity of (21) requires the sluice to be reconstructed in some other way because of WF, and this can be fixed combining *how long* with a future tense. It follows then that EETM is crucial because most times it is fundamental to accommodate WF. In this sense EETM is a soft constraint and WF is a hard one. EETM is often fundamental to WF, but while the

former can be violated, the latter cannot.[12] From now on we will focus on Well-Formedness, but we hope we made clear the important role played by EETM in this regard, in particular for our cases of interest. Similarly, it is important to stress that the two remarks we made in 4.3, the orientation of *may* (MO) and the orientation of *know* and *care* (KC), have on their turn pivotal consequences for the evaluation of EETM. What links the constraints we introduced is then a sort of 'cascade'-like relation in which MO and KC affect EETM, and EETM affects WF. We will now go back to our original cases, discussing how WF, together with two soft constraints, plays a role in the reconstruction of their elided material.

4.4.2 Constraints at Play

If it is indeed possible to add *will* in sluices, it is not yet clear why it does not show in the default sluices of (1a) and (1b). Therefore, we now have to formulate the two soft constraint motivating

1. the preference of (22a) over (22b) and (22c) on the one hand,
2. and the preference of (22b) over (22c), provided that (22a) is not an available option for *know*, on the other.

(22) You may have coffee or tea, but I don't know/care which
   a. you have.
   b. you may have.
   c. you will have.

The first constraint we propose is the formalization of the observation by Langacker (1974), mentioned by Kroll et al. (2017), we introduced in chapter 2, namely that 'sluicing privileges content that originates within the verbal domain (the verb and its arguments) over content that doesn't'. We will call it the Minimal Material (MM) constraint:

- **Minimal Material (MM)**
  Ellipsis sites in sluicing privilege content merged inside the vP.

MM can be seen as a stronger, specific case of our second constraint, another economy principle that states the preference for ellipsis sites to be reconstructed with material that can be recovered from what is already overtly

[12] This means that we may have WF sluices where EETM is not met, like (20).

present. This constraint can be seen as a weak version of *Chung's Generalization*, we mentioned in Chapter 1.[13]

We called it the Copyable Content (CC) constraint:

- **Copyable Content (CC)**
  Ellipsis sites in sluicing privilege content already introduced in the lexicon.

It is fundamental to highlight that these rules are not the ultimate rules governing sluices, but they have to be conceived as soft constraints. These constraints have always to be put in interplay with the other constraints the literature has established, the main of which we briefly mentioned in §4.1, in particular with those that can generate various kind of mismatches. Nonetheless, we believe these constraints provide an original contribution, clarifying the rationale behind which certain mismatch-cases happen to be the default reading for some sluices.

In the light of the above, only one constraint has been taken to be strong, the Well-Formedness (WF) condition on the felicity of presluices. This condition acts as a filter, determining what is a possible mismatch and what is not. If a possible sluice α satisfies MM but not WF then the sluice is ruled out, and another possible sluice β not accommodating MM but still satisfying WF will be selected. The soft constraints on their turn might have their own weight. In our case a specific ranking in weights is not needed since constraints' violations are cumulative between the possible sluices we are evaluating.

Let us start, once again, with the case of *know*. (22a) constitutes an infelicitous presluice, and WF rules it out. On the contrary, (22b) and (22c) are both felicitous even though, obviously, they violates MM. However, (22b) also violates CC. Therefore (22b) is the licensed sluice. The following table sum up the constraints' violations in the case of *know*.

[13]The constraint, also called *No New Words*, says that 'the numeration of the sluice must be a subset of the numeration of the antecedent' (Chung, 2006).

KNOW			
You may have coffee or tea, I don't know which	WF	MM	CC
(22a) you have	X	-	-
(22b) you may have	-	X	-
(22c) you will have	-	X	X

Let us now move to the case of *care*. As before, (22b) and (22c) are both felicitous, but this time also (22a) is. Since (22a) meets both MM and CC, it prevails over the competing constraints violating (22b) and (22c). The following table sum up the constraints' violations for *care*.

CARE			
You may have coffee or tea, I don't care which	WF	MM	CC
(22a) you have	-	-	-
(22b) you may have	-	X	-
(22c) you will have	-	X	X

4.4.3 The Epistemic Case

To conclude the chapter let us examine how these constraints work in the case of epistemic modals referring to past events, like example (7) presented in §4.2. In particular, we want to check whether our hypothesis can fit the intuitions we have with regards to FC in this sentence. Recall example (7):

(7) a. You might have voted for John or for Paul, but I don't know which.
b. You might have voted for John or for Paul, but I don't care which.

Our intuition is that in both (7a) and (7b) FC arises, i.e. $\Diamond A \wedge \Diamond B$ holds, where A is 'you have voted for John' and B is 'you have voted for Paul'. This sentence involves what Condoravdi (2001) refers to as 'modals for the past', and in particular, this being an epistemic reading, she reports that

such modals have present perspective and past orientation. From this we know that the time of evaluation of the modal is present, while the event under the modal scope gets a time of evaluation in the past. For WF we want the presluice to be felicitous, and therefore, for the EETM condition, we want that the event of voting receives past time of evaluation in the consequent as well. The first preferred option is to recover material from within the verbal domain, without using the modal and the tense/aspect, following MM. Doing so originates in the following unfelicitous sentences:

(23) a. #You might have voted for John or for Paul, but I don't know which you vote for.
b. #You might have voted for John or for Paul, but I don't care which you vote for.

(23a) and (23b) are unfelicitous because the event of voting receives past time of evaluation in the antecedent and present time of evaluation in the consequent. Therefore, they are both ruled out, because of WF. It follows that, to satisfy WF we have to violate MM. The first step is therefore to reconstruct the sluice with the material already introduced in the antecedent. However, things are not so simple since we have two available candidates, one in which the modal is absent in the sluice, one in which it is present.

(8) You might have voted for John or for Paul, but I don't know/care which you have voted for.

(24) You might have voted for John or for Paul, but I don't know/care which you might have voted for.

They are both felicitous, since EETM is met; namely, in both cases the event of voting receives past time of evaluation in the consequent.

(8) You might have voted for John or for Paul, but I don't know/care which you have voted for.
You MIGHT(**PAST**(vote for John or for Paul)),
but I don't KNOW/CARE(**PAST**(which you vote for))

(24) You might have voted for John or for Paul, but I don't know/care which you might have voted for.
You MIGHT(**PAST**(vote for John or for Paul)),
but I don't KNOW/CARE(MIGHT(**PAST**(which you vote for)))

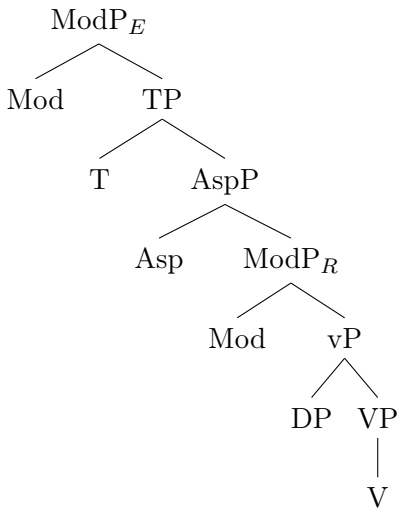
They both satisfy WF and violate MM; to decide which to use we have to start evaluating the other constraint, CC. However, crucially, both sentences

satisfy it, i.e. both sentences violate and satisfy the same constraints.

EPISTEMIC			
You might have voted for John or for Paul, but I don't know/care which	WF	MM	CC
you vote for	X	-	-
you have voted for	-	X	-
you might have voted for	-	X	-

Our intuitions tells us that the correct reconstruction is (8), namely that without the modal, giving rise to FC. Therefore, the double-candidate problem highlights a fundamental property of CC and MM. Once MM has been violated, the domain from which the recovery material is borrowed from the antecedent expands *progressively*. This means that when MM cannot be satisfied, the probe moves *progressively* up the tree from phrase to phrase until it finds a suitable candidate generating a sluice that meets WF. As can be seen from (25), Epistemic Modal Phrases are very high and moving up from vP, Root Modal Phrases, Aspectual Phrases and Tense Phrases come first.

(25)



In our epistemic case, once AspP/TP are reached, EETM and, accordingly, WF are met. There is no need to search further. This is also one independent reason why we cannot have FC blocking with epistemic modals in sluicing.

It is never the case that the modal is repeated in the sluice, since it will always be possible to form a WF sluice borrowing material merged lower than ModP_E. In our specific case, both *know* and *care* can embed events expressed with a present perfect giving them a past time of evaluation. Therefore, the modal can felicitously be omitted in the sluice, but the tense/aspect cannot. As a consequence, we have FC, as our intuition suggested.

In the light of what we just said, it appears clear that MM and CC can actually be treated as a unique constraint that selects the smaller meaningful available unit and progressively tries with larger portions of meaning taken from what is given by the antecedent. In the next section we will analyze another case that will tell us even more about CC.

4.4.4 The *any* Case

Consider the following example, in which the *know*-case of our FC-in-Sluicing puzzle presents a FC indefinite instead of FC disjunction:

(26) #You may sit in any chair, I don't know which (one).[14]

Any in (3) is a FC element that, like the disjunction in the FC-in-Sluicing puzzle, introduces several elements to which the modal applies. In particular, in (3) the modal is applied to every member of the set ⟦chair⟧. As the non-FC reading of *know*-cases in the original puzzle, we claim that the infelicity of (3) is caused by the presence of the modal in the sluice:

(27) #You may sit in any chair, I don't know which (one) you may sit in.

Note however that a *will*-presluice would be perfectly fine:

(28) You may sit in any chair, I don't know which (one) you will sit in.

What is therefore challenging for our theory is that an infelicitous presluice like (27) is not discarded in favor of the felicitous presluice in (28). According to our constraints the optimal candidate would be precisely (28), since, even though it violates MM and CC, it is the only candidate that meets WF.[15]

Up to this point we treated MM and CC equally as soft constraints. However, this example with indefinite *any* forces us to review the theory and highlights the fact that CC is really a strong constraint that can be

[14] This example is also presented in Fusco (2019), with a '?'-judgement.

[15] It is so because it respects EETM and does not create the semantic contrast (27) for the reasons we will discuss in the next chapter.

violated only in exceptional cases if the additional material that is needed in the sluice is explicitly required by some lexical item in the consequent. This was indeed the case of example (20), where *will* was not present in the numeration of the antecedent but was explicitly requested by *how long*. From this it emerges that CC is indeed (a soft version of) *Chung's Generalization*, as supposed in 4.4.2. In fact, in example (3) an infelicitous sentence is preferred to a felicitous one that would violate CC. From these observations we also understand that the *will*-presluice was never an option also for the previous cases we have discussed, even though it is able to confer to the event in its scope the same time of evaluation given to the same event by *may*.

To sum up, in this chapter we have grounded Aloni's (2019) and Fusco's (2019) intuition that (1a) and (1b) involve different presluices, with and without the modal, respectively. We exploited Enç (1996) and Condoravdi (2001) to present the notion of temporal orientation, and we showed how this grammatical features can cause mismatches between different time of evaluations provided by question embedding verbs. To fix this mismatches, verbs like *know* extend the portion of material borrowed from the sluice antecedent up to the modal. These facts, summarized in our EETM (connected to the strong WF), MM and CC constraints, motivate the different presluices conjectured in (1a) and (1b).[16] From this chapter, the importance of lexical verbs in giving rise to ellipsis mismatches arises. Now that we have grounded Aloni's and Fusco's assumption, we will proceed in the next chapter presenting our solution on why different presluices would give rise or cancel FC inferences.

[16]We might even go further in the theory supporting a strong claim stating that mismatches are required if and only if, i.e. whenever, MM leads to violation of WF.

Chapter 5

The Uniqueness Presupposition

5.1 Overview

In the previous chapter we provided motivations to ground Aloni's (2019) and Fusco's (2019) intuition according to which the contrast between *know* and *care* when it comes to FC-in-Sluicing is tied to two different presluices:

(1) a. You may have coffee or tea, but I don't know which you **may have**.
b. You may have coffee or tea, but I don't care which you **have**.

While in (1a) the modal is present in the sluice, in (1b) it is absent. It is therefore natural that the two sluices have different meanings, regardless of the question semantics we prefer.

(2) $[\![\text{which you may have}]\!] \neq [\![\text{which you have}]\!]$

Now, let us recall the other puzzle mentioned in the introduction, the one on FC-indefinites. If in (1) we have a difference in FC readings, in examples (3) and (4) the contrast is even stronger:

(3) a. #John may sit in any chair, I don't know which one.
b. John may sit in any chair, I don't care which one.

(4) a. #You may sit in any chair, I don't know which one you may sit in.
b. You may sit in any chair, I don't care which one you sit in.

In both cases we see again that the fact that the sluice is licensed in the case

of *care* is tied to the absence of the modal in the sluice.

Moreover, considering the following examples, the crucial point seems to be connected to the number of elements we are considering.

(5) a. There's (only) one chair you can sit in, I don't know which one it is.
b. There's (only) one chair you can sit in, I don't care which one it is.
c. #There are multiple chairs you can sit in, I don't know which one it is.
d. #There are multiple chairs you can sit in, I don't care which one it is.

Our claim is that the oddness of these sentences is caused by a uniquess presupposition brought up by *which* that creates a contradiction-like contrast with the antecedent. While the antecedent states the possibility of sitting in multiple chairs in (5c) and (5d), in the consequent the presupposition claims that there is only one chair in which sitting is possible (with the cleft *it is* in the consequent we made sure that *which* scoped over the modal). It should appear clear now why (3a) is bad and (3b) is not. *Any* is a FC indefinite and thus it also introduces a plurality of elements, claiming in both (3a) and (3b) that every chair is a possible candidate for John to sit in. Crucially though, in the former case, (3a), *which* scopes over the modal, for the reasons mentioned in chapter 4. This creates the same contrast we analyzed in (5c) and (5d). On the other hand, in (3b) *which* combines directly with the lexical verb and thus uniqueness is not applied to the possibility but to the event itself.

This observation is pivotal for the analysis of (1) too. But then why is (3a) infelicitous, while (1a) is fine? The only difference is that the antecedent of (1a) might have two different readings, therefore the contrast with FC brought up by uniqueness scoping over the modal in (1a) does not create an incurable contrast, but rather selects the Non-Free-Choice reading of the antecedent. On the contrary, for the FC indefinite *any* only FC readings are possible, because of its obligatory narrow scope configuration (Chierchia, 2006, 2013; Fusco, 2019).

The aim of the present chapter is to discuss the role of *which* in the interplay with modality. In particular, we want to understand the two different meanings in (2) and evaluate their sluicing contribution. Our belief is that the crucial difference for our puzzle lurks in some part of its denotation and in the fact that in (1a) it is the object of *you may have* and in (1b) of *you*

have.

Whereas the meanings of *you* and *may* can be very tricky too, the first part of this chapter will be devoted to study the meaning of *which*.

The second part will focus on inquiring into how different denotations of the sluices can satisfy the sluicing identity condition needed by the ellipsis to be licensed. In doing so, we will improve Kroll et al.'s (2017, 2019) condition based on the notion of contextual entailment. Let us now start presenting an analysis of *which*.

5.2 The Uniqueness Presupposition

5.2.1 Dayal (1996)

Singular *which*-clauses are generally thought to bear a uniqueness presupposition For instance, the question

(6) Which cat purred?

presupposes that there exists a unique x such that x is a cat and x purred. The traditional analysis of the aforementioned presupposition is the one by Dayal (1996), that assumes uniqueness to be triggered by ANS, an answer operator applying at the highest level, above CP, to the whole question. For this reason, Hirsch and Schwarz (2020) refers to it as a globalist approach.

ANS operates on question extensions, presupposing that there exists a maximally informative member in the Hamblin set of possible answers.[1] Clearly, if we are dealing with a singular question possible answers are all disjoint and ANS presupposes therefore that there is *exactly one* true answer (Hirsch and Schwarz, 2020).

(7) $\exists! p[p(w) \wedge p \in \{purred(felix), purred(kitty), ...\}$

In other words, there is a unique x in $\{felix, kitty, ...\}$, such that x purred in w. Going back to our presluices in (1), letting x be contextually restricted to *coffee* and *tea*, we get the following two presuppositions:

(8) a. ...which [you may have]
b. $\exists! x[x \in \{coffee, tea\} \wedge \Diamond^{u}_{w} have_{u}(x)]$

(9) a. ...which [you have]
b. $\exists! x[x \in \{coffee, tea\} \wedge have_{w}(x)]$

[1] i.e. 'a proposition that is true and entails any other proposition that is true' (Hirsch and Schwarz, 2020).

We have obtained what we were looking for: while (8) presupposes that there is a unique x in $\{coffee, tea, ...\}$, such that the addressee *may* have x, (9) presupposes that there is a unique x in $\{coffee, tea, ...\}$, such that the addressee will *actually* have x. Whereas the latter states nothing about the possibilities the addressee has, the former creates a conflict with a multiple choice scenario, such as our FC reading of the antecedent. (10a) and (10b) cannot be true at the same time.

(10) a. $\Diamond^u_w have_u(coffee) \wedge \Diamond^u_w have_u(tea)$
b. $\exists! x[x \in \{coffee, tea\} \wedge \Diamond^u_w have_u(x)]$

The presupposition triggered by the sluice in (1a) would then contradict the meaning of the antecedent clause in its FC reading. Since the antecedent can be ambiguous between two readings, FC and non-FC, the latter would be selected since it does not create a conflict with the presupposition of the sluice. Not only would the non-FC antecedent be compatible with the sluice, but there would be complete semantic identity between the two if we calculate the scalar implicature linked to normal disjunctions, assuming exh, and if we existentially close the sluice question as in (11):

(11) $(\Diamond^u_w have_u(coffee) \wedge \neg\Diamond^u_w have_u(tea)) \vee$
$(\Diamond^u_w have_u(tea) \wedge \neg\Diamond^u_w have_u(coffee))$

Complete semantic identity between the antecedent (11) and the consequent (8b), one of the strongest identity conditions, is thus met. With Dayal's (1996) approach, ruling out the FC reading in the case of *know* would come straightforward from the uniqueness presupposition on singular *which* questions, provided that the sluice in (1a) does contain the modal. However, unfortunately, things are not so simple since Dayal's account has recently been challenged by Hirsch and Schwarz (2020), who cast some doubts on the interpretation of a singular *which* question when modality is involved. [2]

5.2.2 Hirsch and Schwarz (2020)

Consider (12) from Hirsch and Schwarz (2020), well exemplifying the kind of counterexamples to Dayal (1996) they found:

(12) The skeleton of a word with a missing letter is *fo_m*.
a. Which letter could we add to make a word?

[2] We thank Floris Roelofsen for pointing out this research to us during an early presentation of the present work.

b. *A* or *r*.

The reply in (12b) has to be intended to have a FC reading, meaning that both *a* and *r* are possible letters to complete the word. Sentences of this kind threaten Dayal's (1996) approach to the uniqueness presupposition of singular *which*-clauses since a global derivation would predict that a question like (12a) presupposes that there is only one letter that can complete the word, ruling out FC responses as (12b). This was indeed the analysis we presented in (8).

For this reason, Hirsch and Schwarz (2020) develop a local approach that can generate uniqueness in two different positions, one of which being under the modal. They manage to do so by conjecturing that it is *which* itself the element that conveys the presupposition and not the answer operator ANS.

On the one hand, there is the High Uniqueness (HU) reading, generated when *which* scopes high, above the modal, and, on the other hand, there is the Low Uniqueness (LU) reading, generated when *which* scopes low, below the modal. According to Hirsch and Schwarz (2020) the logical forms of the HU and the LU reading of (12a) are respectively:

(13) a. **HU**: which > may
b. **LU**: may > which

(14) a. **HU**: ...$\exists!$...$\Diamond$...
b. **LU**: ...$\Diamond$...$\exists!$...

HU for (12a) says that there is a unique x such that x is a letter and it is possible to add x to make a word. On the contrary, LU in (12a) says something like 'it is possible to complete a word inserting a unique x such that x is a letter'.

On the one hand then, the semantic denotation for a HU reading of (12a) would be identical to the one we presented in (8), where *which* presupposes that there is a unique x to which the possibility applies, and the question denotes the set of answers for every element over which x ranges:

(15) $\{\lambda w : \exists!x \Diamond^u_w [letter_u(x) \wedge add_u(x)].\ \Diamond^u_w (letter_u(a) \wedge add_u(a)),$
$\lambda w : \exists!x \Diamond^u_w [letter_u(x) \wedge add_u(x)].\ \Diamond^u_w (letter_u(b) \wedge add_u(b)),$
$...\}$

On the other hand, the semantic denotation for the low uniqueness reading of (12a) would then be:

(16) $\{\lambda w : \Diamond^u_w \exists!x [letter_u(x) \wedge add_u(x)].\Diamond^u_w (letter_u(a) \wedge add_u(a)),$

$\lambda w : \Diamond^u_w \exists! x[letter_u(x) \wedge add_u(x)].\Diamond^u_w(letter_u(b) \wedge add_u(b)),$
$...\}$

Note that the proper question extension for HU in (15) and LU in (16) is always the same:

(17) $\{\lambda w.\Diamond^u_w(letter_u(a) \wedge add_u(a)),$
$\lambda w.\Diamond^u_w(letter_u(b) \wedge add_u(b)),$
$...\}$

and only the presupposition changes between the two variants.

We are now facing an issue for our analysis of FC-in-S presented in 5.2.1, namely: not only we have an ambiguous antecedent between FC and non-FC readings, but the consequent is ambiguous itself between a HU and a LU reading. Before showing how we will solve the possible complications arising from this ambiguity, a third work on the uniqueness presupposition needs to be mentioned.

In fact, Kobayashi and Rouillard (2021) have shown that Hirsch and Schwarz's analysis is too weak with respect to the presupposition.

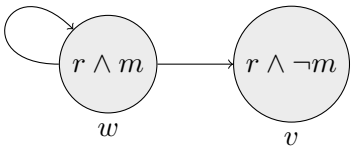
5.2.3 Kobayashi and Rouillard (2021)

Consider again the LU presupposition as introduced in Hirsch and Schwarz (2020):

(18) $\Diamond \exists! x[letter(x) \wedge add(x)]$

Since the possibility modal quantifies existentially over worlds, such presupposition allows for contexts in which it is possible that multiple letters could be added to form a word. In other words, according to Kobayashi and Rouillard (2021), if (18) was the right formula for the presupposition, then the singular *which*-question *Which letter could we add to make a word?* would be acceptable even in contexts where multiple letters are missing from the skeleton word in example (12).

Consider the skeleton *fo*_ _ and the following model:



Take w to be the actual world. In w the presupposition $\Diamond\exists!x[letter(x) \wedge add(x)]$ is satisfied since there exists a world v accessible from w such that $v \vDash \exists!x[letter_v(r) \wedge add_v(r)]$, i.e. in v it is possible to complete the word *fo__* adding just one letter, r (*for*). However, from w it is also possible to complete the word adding two letters, r and m (*form*). Therefore, the set of possible answers would contain an answer in which the presupposition is met and two letters can be added to form a word.

(19) $\lambda w : \exists!x\Diamond^u_w[letter(x)\wedge add(x)].\ \Diamond^u_w((letter(r)\wedge add(r))\wedge(letter(m)\wedge add(m)) \in [\![$Which letter could we add to make a word?$]\!]$

However, our intuition tells us that *Which letter could we add to make a word?* cannot be followed by such a reply. In order to fix this problem and refine Hirsch and Schwarz's theory, Kobayashi and Rouillard assume the modal in the presupposition to quantify universally and not existentially. To obtain this modal, they exploit a presuppositional variant of the exhaustification operator, P-EXH.[3] Therefore, their main claim is that the lexical trigger of the uniqueness presupposition is not the *wh*-word, but rather P-EXH. According to their framework we still get two different uniqueness readings, one when P-EXH scopes above the modal and one when it scopes below the modal.[4]

(20) Which letter could we add to make a word? (HU)
$\{\lambda w : \Diamond^u_w add_u(x) \rightarrow w \in exh(\lambda v.\Diamond^u_v add_u(x), C).\Diamond^u_w add_u(x) | x \in \{a, b, c, ...\}\}$

(21) Which letter could we add to make a word? (LU)
$\{\lambda w : \Box^u_w(add_u(x) \rightarrow w \in exh(\lambda v.add_u(x), C)).\Diamond^u_w add_u(x) | x \in \{a, b, c, ...\}\}$

As can be noted, the Low Presupposition is spelled out in a slightly different way than before, and it allows to avoid the problem of a too weak presupposition detected in Hirsch and Schwarz (2020). More clearly, in the case of only two elements over which x can range, like our FC case, the two

[3] *pex* in the terminology of Bassi et al. (2019), who first introduced an operator of this kind.

[4] We recommend Hirsch and Schwarz (2020), as well as previous works like Bar-Lev and Fox (2020), Bassi et al. (2019), and Fox (2007) to deepen the mechanics of this operator, in particular to check how its meaning is built on the notions of Innocently Excludable and Innocently Includable alternatives, mentioned here in the previous chapter, which are on their turn based on the notions of compatibility and maximal compatibility.

extensions amount to the following set of propositions:[5]

(22) ...which between coffee and tea you could have. (HU)
$\{\lambda w : \Diamond^u_w have_u(c) \rightarrow \neg\Diamond^u_w have_u(t).\Diamond^u_w have_u(c),$
$\lambda w : \Diamond^u_w have_u(t) \rightarrow \neg\Diamond^u_w have_u(c).\Diamond^u_w have_u(t)\}$

(23) ...which between coffee and tea you could have. (LU)
$\{\lambda w : \Box^u_w(have_u(c) \rightarrow \neg have_u(t)).\Diamond^u_w have_u(c),$
$\lambda w : \Box^u_w(have_u(t) \rightarrow \neg have_u(c)).\Diamond^u_w have_u(t)\}$

Even more concisely, bringing the presupposition on the same semantic level of what is asserted, we get the following alternatives.

(24) ...which between coffee and tea you could have. (HU)
$\{\lambda w.\Diamond^u_w have_u(c) \wedge \neg\Diamond^u_w have_u(t),$
$\lambda w.\Diamond^u_w have_u(t) \wedge \neg\Diamond^u_w have_u(c)\}$

(25) ...which between coffee and tea you could have. (LU)
$\{\lambda w.\Diamond^u_w have_u(c \wedge \neg t),$
$\lambda w.\Diamond^u_w have_u(t \wedge \neg c)\}$

For the sake of simplicity, in what follows we will just write $\Diamond x \wedge \neg\Diamond y$ to refer to alternatives of the kind of (24) and $\Diamond(x \wedge \neg y)$ to refer to alternatives of the kind of (25).

Before moving on discussing how this analysis combines with our sluicing explanation, a remark has to be made. It is not clear if Hirsch and Schwarz's LU reading is indeed available for deontic modals, such as our (1). If uniqueness can 'be introduced beneath operators other than existential teleological and epistemic modals' is still an open issue (Hirsch and Schwarz, 2020). If LU is not available in such cases our solution is even more straightforward than what comes next, as we sketched at the end of 5.2.1. However, to us it seems that LU is available in similar cases, since we can imagine examples of existential teleological modals in which the FC-in-S puzzle revives:

(26) To go to the mountains, you may take the bus or the train, but I don't know which.

[5] It is important to stress that we are reporting Kobayashi and Rouillard's work on the uniqueness presupposition of *which*. Similar results can be obtained in alternative semantics without this presupposition but rather adopting Menéndez-Benito's (2005) *Excl* operator or Aloni's (2007) *exh* operator, which can be assumed to be triggered by the *wh*-pronoun and can occur either inside or outside of the scope of the modal operator.

While experimental inquiry is certainly needed for a better view on these data, our intuition is that the reading is the same as (1a), namely with cancellation of FC and the puzzle has to be accounted for anyway. We will now proceed examining the interplay of HU and LU readings the constraints ruling sluicing licensing.

5.3 Uniqueness(es) in Sluicing

To study the effects of these presuppositions in sluicing, we will adopt the most recent theory on contextual entailment as licensing condition. We will use Kroll's (2019) contextual entailment to check for semantic "identity" between the antecedent and the consequent.

- **Local Givenness**
  A Tense Phrase α can be deleted iff the Existential Closure of α ($ExClo([\![\alpha]\!]^g)$) expresses a proposition p, such that the local context entails it ($c_L \subseteq p$) and p is maximally salient.

(Kroll, 2019)

For the reasons we mentioned in chapter 2, we will adopt classical logic and semantic denotations that represent questions (the sluiced *wh*-clause) as a set of propositional alternatives.[6] Moreover, as we mentioned in the previous chapter we are not aiming at providing a solution for a specific FC framework, so we will just analyze the semantic denotations of the clause we are considering.

Recall out starting examples:

(27) a. You may have coffee or tea, but I don't know which.
b. You may have coffee or tea, but I don't care which.

We know from the previous chapter that their optimal sluices are as follows:

(1) a. You may have coffee or tea, but I don't know which you **may have**.

[6] We need therefore to apply Existential Closure to questions' denotations. We could exploit Inquisitive Semantics (Ciardelli et al., 2018) and get rid of the Existential Closure. However, not only do not we find AnderBois's (2010; 2014) empirical data to adopt Inquisitive Semantics for sluicing convincing enough, but Inquisitive Semantics would also create problems with the current notion of Local Givenness, as discussed in Chapter 2.

b. You may have coffee or tea, but I don't care which you **have**.

Since we are facing two different consequents, we must check two different identities. On the one hand, for (27a) we will check the contextual entailment between possible logical forms of the whole antecedent and possible logical form of the consequent. On the other hand, for (27b) we will check the contextual entailment between the antecedent without the modal and the consequent, following Rudin (2019) in the claim that 'the eventive core is the domain of identity calculation in sluicing'. As we will see, we will need to improve Rudin's claim, since the reason we do not limit ourselves to the eventive core in the first case is not yet clear. Our novel contribution will be roughly this: the idea that we cannot do so if the sluice cannot be reconstructed in any case with the eventive core alone but the additional material it uses is still part of the numeration of the antecedent, as in our (27a).[7]

5.3.1 The Case of *know*

Let us start with (1a). The antecedent might have two different semantic denotations: (28a), giving rise to FC, and (28b), a normal disjunction from which we calculate an implicature that exclude the conjunction of the disjunct.

(28) You may have coffee or tea
   a. $\{\Diamond a \wedge \Diamond b\}$
   b. $\{(\Diamond a \wedge \neg\Diamond b) \vee (\Diamond b \wedge \neg\Diamond a)\}$

For its consequent we have again two readings, the HU interpretation in (29a), and the LU one in (29b), each of which provides us with two alternatives.

(29) but I don't know which [you may have]
   a. $\{\Diamond a \wedge \neg\Diamond b, \Diamond b \wedge \neg\Diamond a\}$
   b. $\{\Diamond(a \wedge \neg b), \Diamond(b \wedge \neg a)\}$

We have therefore the following four semantic denotations from which we have to calculate contextual entailment from left to right. From the FC antecedent to the HU and LU, and from the NF (Non-Free Choice) antecedent

[7] Remember that *#You may have coffee or tea, I don't know which you have* would be infelicitous.

to the HU and LU sluices.

FC $\boxed{\diamond a \wedge \diamond b}$ **HU** $\boxed{\begin{array}{c}\diamond a \wedge \neg \diamond b \\ \hline \diamond b \wedge \neg \diamond a\end{array}}$

NF $\boxed{(\diamond a \wedge \neg \diamond b) \vee (\diamond b \wedge \neg \diamond a)}$ **LU** $\boxed{\begin{array}{c}\diamond(a \wedge \neg b) \\ \hline \diamond(b \wedge \neg a)\end{array}}$

To calculate entailments we need to existentially close HU and LU, which means that we will take the disjunction of the two alternatives for each question. (29a) and (29b) becomes therefore (30a) and (30b), respectively.

(30) a. $(\Diamond a \wedge \neg \Diamond b) \vee (\Diamond b \wedge \neg \Diamond a)$
b. $\Diamond(a \wedge \neg b) \vee \Diamond(b \wedge \neg a)$

We can immediately see that contextual entailment between **FC** and **HU** does not hold, since the presupposition triggered by **HU**, that there is one non possible thing, can never be satisfied by **FC**:

(31) $\Diamond a \wedge \Diamond b \nvDash (\Diamond a \wedge \neg \Diamond b) \vee (\Diamond b \wedge \neg \Diamond a)$.

Therefore there is no world w that can satisfy both **FC** and **HU** since one contradicts the other.

Things are a bit more complicated when it comes to check for contextual entailment between **FC** and **LU**. On the one hand, there might be a world w in which only $\Diamond(a \wedge b)$ holds, in this case **FC** would hold but **LU** would not. Therefore, **LU** does not follow from **FC**.

(32) a. $\Diamond(a \wedge b) \vDash \Diamond a \wedge \Diamond b$
b. $\Diamond(a \wedge b) \nvDash \Diamond(a \wedge \neg b) \vee \Diamond(b \wedge \neg a)$

However, this argument holds for most FC theories, like Zimmermann (2000), Simons (2005), Aloni (2007), Fusco (2019), Aloni (2021), but not for all. If we take an implicature theory of FC, like Bar-Lev and Fox (2020) this is not valid anymore. It is so because in Bar-Lev and Fox's derivation of FC the formula $\Diamond(a \wedge b)$ has been explicitly excluded. If the semantic denotation of FC comes together with the negation of every excluded proposition than we do have contextual entailment between **FC** and **LU**.

(33) $\Diamond a \wedge \Diamond b \wedge \neg \Diamond(a \wedge b) \vDash \Diamond(a \wedge \neg b) \wedge \Diamond(b \wedge \neg a) \vDash \Diamond(a \wedge \neg b) \vee \Diamond(b \wedge \neg a)$

Before saying something more about this let us move on in checking contextual entailment between **NF** and the sluices **HU** and **LU**.

Contextual entailment between **NF** and the existential closure of **HU** is almost obvious since the semantic denotations of the two are identical. Contextual entailment between **NF** and the existential closure of **LU** also holds, since for any world that satisfies one disjunct in **NF** that world also satisfies one alternative in **LU**. A small proof by contradiction, assuming a world that satisfies a disjunct of **NF** and that does not satisfy an alternative in **LU**, goes as follow:

(34) Suppose $s \vDash \Diamond a \wedge \neg\Diamond b$ and suppose $s \nvDash \Diamond(a \wedge \neg b)$. Since $s \vDash \Diamond a \wedge \neg\Diamond b$, then $s \vDash \Diamond a$. Since $s \vDash \Diamond a$ and $s \nvDash \Diamond(a \wedge \neg b)$ by assumption, then $s \vDash \Diamond(a \wedge b)$. But if $s \vDash \Diamond(a \wedge b)$, then $s \vDash \Diamond a \wedge \Diamond b$. But this contradicts our first assumption, namely $s \vDash \Diamond a \wedge \neg\Diamond b$. Therefore, $s \vDash \Diamond(a \wedge \neg b)$. Since $s \vDash \Diamond(a \wedge \neg b)$, $s \vDash \Diamond(a \wedge \neg b) \vee \Diamond(b \wedge \neg a)$ The same proof by contradiction can be given using the other disjunct in NF: $\Diamond b \wedge \neg\Diamond a$.

We are therefore left with 2 licensed combinations of antecedent-sluice for an hybrid theory such as Aloni (2021): **NF-HU** and **NF-LU**. In any of the two combinations FC is cancelled, and therefore the Non-Free Choice reading of (27a) is correctly derived, regardless of the interpretation of the sluice. Things are more challenging for the pragmatic approach of Bar-Lev and Fox (2020), since we have 3 licensed combinations of antecedent-sluice: **FC-LU**, **NF-HU**, and **NF-LU**. We have therefore to improve the theory to correctly derive the FC cancellation of (27a). There are two possible ways to do so. The first one would be to rule out Low Uniqueness. One way to do so could be assuming that, since the Low Uniqueness reading is very similar to the only possible reading the sluice would have if the modal was absent, then the modal in the sluice somehow stresses the High Uniqueness reading. The judgments we obtained so far seem indeed to confirm that the Low Uniqueness reading is not available for embedded questions.[8] However, we are not pursuing this path here. We are rather improving on Kroll's semantic condition of contextual entailment.

Note that, if on the one hand it is true that we might have three pairs of antecedent-sluice for which a relation of contextual entailment holds, only the sluice of one of them is semantically identical to its antecedent. If we would take double entailment as a semantic condition for sluicing, as historically

[8] In fact, a sentence like '#I know which letter we could add. A or R.' results to be infelicitous (Dean McHugh, p.c.).

done, then we would be left only with the pair **NF**-**HU**. Imagine in fact a world w that satisfies $\Diamond a \wedge \neg\Diamond b$ then **LU** would be satisfied as we showed before but a **FC** antecedent would not. On the other hand **LU** might be satisfied in a world w in which both $\Diamond(a\wedge\neg b)$ and $\Diamond(b\wedge\neg a)$ hold. In such case, a **NF** antecedent would not hold either, since it explicitly requires either $\neg\Diamond a$ or $\neg\Diamond b$. Therefore from **LU** neither **FC** nor **NF** necessarily follow. **NF**-**HU** would be on the contrary in a relation of double entailment since the two semantic denotations are identical. Unfortunately, however, there were good reasons to decide for Local Givenness over double entailment. Let us remind the following example from Kroll (2019) we cited in Chapter 2:

(35) Either John didn't do an extra credit problem, or he didn't mark which one [~~he did~~].

The crucial point is that the ellipsis site does not require the antecedent but rather its negation. To give an account of these cases, Kroll (2019) improved the traditional semantic identity condition, e-GIVENness, with its contextual counterpart, Local Givenness. The disjunction *or* updates the context not with the first disjunct, but with the negation of the first disjunct. Kroll's intuition is therefore that ellipsis sites accesses what the context introduces up to the ellipsis sites themselves. It follows that the sluice in (35) does not have to be entailed by the antecedent (*John didn't do an extra credit problem*), but by the local context, which, through *or*, introduces *John did do an extra credit problem.*

(36) Local Context for the ellipsis site:
$c_{\text{LE}} = W \cap \{w : \neg\neg\exists x[\text{extra credit problem}(x)(w)\wedge\text{do}(x)(j)(w)]\}$

In fact (36) entails (37):

(37) Elided material:
$\{w : \exists x[\text{extra credit problem}(x)(w)\wedge\text{do}(x)(j)(w)]\}$

If there is strong empirical evidence for Local Givenness, it is also true, as we showed in this section, that it is too weak to disambiguate between different alternatives for ellipsis sites.

What we have to do then is to improve Kroll's contextual entailment in such a way that it is made more similar to double semantic entailment. Our claim is that in the same way the local context has to entail the elided material, the elided material also has to entail the local context, given the context c coming before the sluicing antecedent.

- **Local Givenness$^+$**
  A TP α can be deleted iff $ExClo([\![\alpha]\!]^g)$ expresses a proposition p,

  1. such that $\mathrm{C}_L \subseteq p$ and p is maximally salient.
  2. $\mathrm{C} + p \subseteq \mathrm{C}_L$

Where the initial context C is the minimal information one (i.e. the one starting 'from zero' before the antecedent, as it seems from Kroll (2019). It follows that $\mathrm{C} + \alpha$ amounts to α. We propose Local Givenness$^+$ as the semantic licensing condition for sluicing, as a sort of midpoint between double entailment (e-GIVENness, which is too strong) and unidirectional contextual entailment (Local Givenness, which is too weak).

It might be argued that this constraint we propose is an *ad hoc* rule aimed at accounting for our cases. However we do believe there are theoretical motivations supporting this implementation. We have already stressed in the Introduction how the FC-in-S puzzle is relevant in particular because it highlights the fact that the meaning of the antecedent of an ellipsis site can be affected by the ellipsis site itself.

(38) a. You may have coffee or tea,
b. but I don't know which.
c. but I don't care which.

Reading only (38a) one might interpret it as FC licensing and be surprised and re-evaluate its meaning after hearing (38b). If the elided material affect indeed the antecedent it is clear that a bidirectional identity condition is needed, since unidirectional conditions would not explain why sluices can determine (disambiguate between different) antecedents. More data are needed to determine whether this is indeed the ultimate condition, but so far we have not found any counterexample. In fact, before moving on to the next section, it is important to show that the implementation on Local Givenness does not affect the previous examples for which this identity condition was thought.

As (36) entails (37), for our improvement we also want

(39) Original context + elided material:
$\mathrm{C}_{\mathrm{E}} = W \cap \{w : \exists x[\text{extra credit problem}(x)(w) \wedge \text{do}(x)(j)(w)]\}$

to entail (36).

(36) Local Context for the ellipsis site:
$\mathrm{C}_{\mathrm{LE}} = W \cap \{w : \neg\neg\exists x[\text{extra credit problem}(x)(w) \wedge \text{do}(x)(j)(w)]\}$

This is indeed the case, (39) entails (36), and we can therefore affirm that our addition to Kroll's Local Givenness is safe.

In the same way in this section we analyzed the case of *know* and we implemented Kroll's Local Givenness, in the next section we will evaluate sluices in the case of *care* and we will provide a slight improvement to Rudin's Generalization (Rudin, 2019).

5.3.2 The Case of *care*

In the case of (27b), repeated down here as (40), we have a mismatch between the antecedent and the sluice, since in the latter the modal is absent.

(40) You may have coffee or tea, but I don't care which.

Following Rudin (2019) we check for identity only between the eventive cores.

(41) You have coffee or tea
   a. $\{a \vee b\}$

(42) but I don't care which [you have]
   a. $\{a, b\}$

It is clear that local givenness$^+$ is met since we have full semantic identity between the antecedent and the sluice, once existential closure is applied to (42a). Any world w that satisfies one alternative in the antecedent or in the consequent also satisfies one, and exactly one, alternative in the other. The full antecedent, with the modal receives its default reading then, that we take to be the FC licensing one.

As we anticipated before, we need to refine a bit the constraint proposed in Rudin (2019), since it is not clear why we did not examined only eventive cores in the case of *know*.

The importance of the match between eventive cores is definitely a crucial observation by Rudin (2019). However, we would like to expand the view claiming that it is a minimal requirement to which one must apply once a mismatch between the antecedent and the consequent has been detected, i.e. once it has already been established that full identity is not possible. If full identity turns out to be indeed possible, than it will prevail as condition for sluicing calculation.

- **Rudin's Generalization$^+$**
  Given a prospective ellipsis site E and its antecedent A, the identity

condition applies to any head $h \in E$ that has an identical matching correlate $i \in A$.

Obviously, whenever we have full identity we also have identity between eventive cores, and most of the times checking for full identity does not make any difference. However, sometimes full identity does play a role, since, as in our FC-in-S puzzle, it can become pivotal for disambiguating between different possible readings of the antecedent and/or the consequent.

In the present chapter we have shown how the uniqueness presupposition triggered in singular *which* clauses affect the meaning of sluices, and how this, on its turn, may determine the meaning of the sluices' antecedents. To do so, we slightly improved both the semantic condition of Kroll (2019) and the syntactic condition of Rudin (2019).

Chapter 6

Conclusions

In this thesis we have provided an explanation for the different inferences triggered by the following two sentences:

(1) a. You may have coffee or tea, but I don't know which.
b. You may have coffee or tea, but I don't care which.

While from (1a) the addressee gets that she has only one available alternative, from (1b) she understands that the available alternatives are two, from which she can freely choose. Following an intuition present in Aloni (2019) and Fusco (2019) we claimed that these different readings are tied to the presence of the modal in the ellipsis site in (1a), whereas in the sluice of (1b) the modal is absent. We grounded this assumption on the notion of temporal orientation. We connected then the cancellation of Free Choice inferences with the uniqueness presupposition triggered in the *which*-questions. On the one hand, the presupposition applies to the modal in (1a), claiming that there is only one possible alternative. On the other hand, the presupposition applies to the event inside the modal in (1b), stating that there is only one alternative that will actually be chosen.

In chapter 1 we introduced the topic and we provided a blueprint of the present thesis. In chapter 2 we reviewed the main constraints that play a role in the licensing of sluicing. We presented them in a historical manner, showing how the literature came to acknowledge that the licensing of sluicing must meet both syntactic and semantic constraints. In particular we focused on the most recent approaches, describing *Local Givenness*, proposed by Kroll (2019) and Kroll et al. (2017) and *Rudin's Generalization*, introduced in Kroll et al. (2017) and Rudin (2019). These two constraints, after a slight refinement, played a crucial role in blocking (or not) FC in the last chapter.

In this second chapter we also provided arguments against the Inquisitive Semantics version of *e-GIVENness* advanced by AnderBois (2010, 2014). Our motivations are twofold: on the one hand Inquisitive *e-GIVENness* would create issues to *Local Givenness* as proposed in Kroll (2019); on the other hand the infelicity of doubly-negated sluicing antecedents (AnderBois's main data to propose Inquisitive *e-GIVENness*) is not there when negations are shared between discourse participants.

After this discussion we moved on in chapter 3 introducing the debate on FC. We started briefly summarizing the account of Aloni (2007), as representative of the semantic theories of FC, to show that a certain extent of pragmatics is actually needed. From this, we presented two state-of-the-art theories, the grammatico-pragmatic account of Bar-Lev and Fox (2020) (improving on Fox (2007)) and the hybrid quasi-semantic account of Aloni (2021). We did not take a stand in favor of one over the other, since we believe our explanation to the FC-in-S puzzle can be equally applied to both. The second part of the chapter has been devoted to the exposition of Fusco (2019), the main predecessor of this thesis. While praising Fusco's intuition on the presence of the modal in the *know*-cases and on the absence of the modal in the *care*-cases we provided arguments against her two main assumptions: that FC is generated only when disjunction takes narrow scope and that FC-blocking in *know*-cases is tied to *ignorance*.

In chapter 4 we introduced the notion of temporal orientation (Condoravdi, 2001) applied to modals and we extended it to the verbs *know* (as previously done in Laca (2012)) and *care*. This notion provided us with a reason for the presence of the modal in (1a). Leaving out the modal in the sluice would create a contrast with the future event time given to *have* by the modal *may* in the antecedent, and the present event time provided to the same event *have* by *know* in the consequent. Repeating the modal insures a match between the two event times. On the contrary, *care* in the consequent is able to provide future time of evaluation even if the event in its scope is expressed with a present. From these observations we formulated some constraints concerning the time of evaluation of the events and the material available to sluices. The interplay of these constraints, together with *Well-Formedness* (a licensing condition on top of the other constraints), selects the optimal sluice between several alternatives, constituting thus the core of our optimality account.

Once the presence or the absence of the modal in the sluice had been theoretically grounded, we proceeded in chapter 5 proposing our solution to the FC-in-S puzzle. Departing from indefinite *any* examples, we linked the puzzle to the uniqueness presupposition triggered by singular *which* clauses. To

account for this presupposition we built on Dayal (1996), Hirsch and Schwarz (2020) and Kobayashi and Rouillard (2021). On the one hand, when it ranges over the modal, as in the case of *know*, this presupposition creates a conflict between FC readings of the antecedents and their consequents. If FC antecedents affirm that multiple things are possible, the consequents restrict this possibility to one unique element. The Non-FC reading of antecedent for disjunctions is thus selected. FC indefinites generate on the contrary infelicity, since they are not ambiguous between a FC and a Non-FC reading. On the other hand, when it does not range over the modal, as in the case of *care*, the presupposition applies to the event that will actually take place. In such cases, there is no contrast with the FC meaning of the antecedents and FC inferences are not blocked. To accomplish our task we improved two existing constraints. First, since Hirsch and Schwarz (2020) and Kobayashi and Rouillard (2021) predict that the uniqueness presupposition can be triggered in two different positions when modality is involved (above and below the modal), too many combinations of antecedent-consequent in the case of *know* where permitted. To solve this issue we improved *Local Givenness* (Kroll, 2019; Kroll et al., 2017), requiring it to be bidirectional. As the local context has to entail the elided material, the original context plus the elided material has to entail the antecedent. Our *Local Givenness*$^{+}$ is thus in between *Local Givenness* and *e-GIVENness* and it is able to select only one possible pair of antecedent-consequent for the *know* case. Second, since according to Rudin (2019) 'the eventive core is the domain of identity calculation in sluicing' it was not clear why we included the modal in the 'identity' calculation in the *know* case. We thus proposed that 'identity' is calculated between any material that antecedents and consequents have in common (which indeed amounts to the eventive cores in cases of strong mismatches).

Overall, we believe the two-step solution we proposed can account for the FC-in-S puzzle. In particular, it accounts for it in a modular way: the reasons for which the modal is present in sluices (or not) and the reasons why FC is blocked in sluices (or not) are independent. This independence ensures a certain flexibility in the following sense: if one of the two explanations would reveal to be faulty, the other would remain untouched and could still be applied to analyze the phenomenon it pertains. This is particularly relevant for the works to come.

In fact, we do think there is some work left to be done and such work might follow two main lines of research: experimental and theoretical.

In the future, we would like to experimentally test our predictions. In particular, we would like to collect data on the FC-in-S puzzle from numerous languages. As supposed by Laca (2012) for attitudes of preference, the

correlation between *care* and future orientation might be universal.[1] However, if this is not the case and some languages in which *care* shows different properties still generate the same judgments for FC-in-S sentences, a pragmatic explanation for the presence or the absence of the modal in the sluice would be needed. This more pragmatic solution might be tied to the maxim of relevance. In some sense, if someone is wondering 'What can I drink?' the fact that her addressee says 'I don't care what you drink' is definitely more relevant to her choice than the addressee saying 'I don't care what you *can* drink'. Similarly, a 'I don't know what you *can* drink' claim by the addressee would definitely be more useful than the rather obvious 'I don't know what you *will* drink'.

While we think the relations between our approach and pragmatic maxims are definitely something to inquire in the future, from a theoretical perspective we would like to deepen three areas, the first two directly related to our proposal. First, we would like to improve our account with a full compositional derivation of the FC-in-S sentences. Second, we would like to test our improved constraints in chapter 5 (*Local Givenness*$^+$ and *Rudin's Generalization*$^+$) on a large set of examples. So far we did not find any counterexamples, but we remain open to the possibility of refining and reformulating them in different ways.[2] As third and last point we would like to study the cases of sluicing involving doubly negated antecedents. In particular, we would like to formulate a proper syntactic condition motivating why doubly negated antecedents are bad in the sentences that brought AnderBois (2010, 2014) to formulate an Inquisitive Semantics version of *e-GIVENness*, like (2), but perfectly fine in cases in which negations are shared between discourse participants, (3).

(2) a. *Sally didn't see no one, but I don't know who ~~Sally saw~~.
b. *It's not the case that no one left, but I don't know who ~~left~~.

(3) A: Nobody met John.
B: No, we simply don't know who ~~met John~~.

Our stand is that sentences like (2) might be somehow too hard to compute.

[1] An experiment designed to check if *care* has future orientation in a certain language could consist in asking native speakers to evaluate sentences in which future time adverbs are explicitly inserted in present-tense clauses embedded under *care*, e.g. 'I care what you do tomorrow.'.

[2] For example we might need a weaker version of *Local Givenness*$^+$ that assumes normal *Local Givenness* between the antecedent and the consequent to be a sufficient semantic 'identity condition' to license sluicing whenever *Local Givenness*$^+$ between two formulas is not possible at all.

We hope future research on this topic might also create room for possible new employments of Inquisitive Semantics to sluicing.

To conclude, we hope that the present work shed light on the rather peculiar black holes constituted by sluices in FC-in-S sentences. While the flexibility mentioned above is also reflected in the fact that subscribing to one specific theory of FC is not requested in order to accept our analysis (and this might also be somehow disappointing), we believe we clarified some of the structural and semantic properties that affect not only sluicing licensing but also antecedents' interpretations. In particular, the interplay of modality and tense, depending on the nature of lexical verbs, seems to be a key player in what is permitted (well-formed) and what is not. This, paired with the uniqueness presupposition triggered by singular *which* clauses, constitutes a possible explanation for our FC-in-S puzzle. We hope that the ideas expressed in this thesis may be either a positive or negative source for future work, but to some extent *it is not important which*.

Bibliography

Aloni, M. (2007). "Free choice, modals, and imperatives". In: *Natural Language Semantics* 15.1, pp. 65–94.

— (2019). *FC disjunction in state-based semantics*. Ms., ILLC, University of Amsterdam. `http://maloni.humanities.uva.nl/resources/draft-nyu(revised).pdf`.

— (2021). *Logic and conversation: the case of free choice*.

AnderBois, S. (2010). "Sluicing as anaphora to issues". In: *Semantics and linguistic theory*. Vol. 20, pp. 451–470.

— (2014). "The semantics of sluicing: Beyond truth conditions". In: *Language*, pp. 887–926.

Bar-Lev, M. E. (2018). "Free choice, homogeneity, and innocent inclusion". PhD thesis. Hebrew University of Jerusalem.

Bar-Lev, M. E. and D. Fox (2020). "Free choice, simplification, and innocent inclusion". In: *Natural Language Semantics*, pp. 1–49.

Barker, C. (2013). "Scopability and sluicing". In: *Linguistics and Philosophy* 36.3, pp. 187–223.

Barros, M. (2014). "Sluicing and identity in ellipsis". PhD thesis. Rutgers University-Graduate School-New Brunswick.

Bassi, I. et al. (2019). *Presuppositional Exhaustification, ms.*

Chemla, E. and L. Bott (2014). "Processing inferences at the semantics/pragmatics frontier: Disjunctions and free choice". In: *Cognition* 130.3, pp. 380–396.

Chierchia, G. et al. (2004). "Scalar implicatures, polarity phenomena, and the syntax/pragmatics interface". In: *Structures and beyond* 3, pp. 39–103.

Chierchia, G. (2006). "Broaden your views: Implicatures of domain widening and the "logicality" of language". In: *Linguistic inquiry* 37.4, pp. 535–590.

— (2013). *Logic in grammar: Polarity, free choice, and intervention*. OUP Oxford.

Chung, S. (2006). "Sluicing and the lexicon: The point of no return". In: *Proceedings of the annual meeting of the Berkeley Linguistics Society*. Vol. 31, pp. 73–91.

— (2013). "Syntactic identity in sluicing: How much and why". In: *Linguistic Inquiry* 44.1, pp. 1–44.

Chung, S. et al. (1995). "Sluicing and logical form". In: *Natural language semantics* 3.3, pp. 239–282.

Ciardelli, I. et al. (2018). *Inquisitive semantics*. Oxford University Press.

Condoravdi, C. (2001). "Temporal Interpretation of Modals - Modals for the Present and for the Past". In: *The Construction of Meaning*. CSLI Publications, pp. 59–88.

Cremers, A. et al. (2017). *Experimental evidence for a semantic account of free choice*. Colloque de Syntaxe et Semantique à Paris.

Dayal, V. (1996). "Locality in wh quantification". In: *Studies in Linguistics and Philosophy, vol. 62*.

Dayal, V. and R. Schwarzschild (2010). "Definite inner antecedents and wh-correlates in sluices". In: *Rutgers working papers in linguistics* 3, pp. 92–114.

Enç, M. (1996). "Tense and modality". In: *The Handbook of Contemporary Semantic Theory*, pp. 345–358.

Fălăuş, A. and B. Laca (2020). "Modal–Temporal Interactions". In: *The Wiley Blackwell Companion to Semantics*, pp. 1–33.

Fox, D. (2007). "Free choice and the theory of scalar implicatures". In: *Presupposition and implicature in compositional semantics*. Springer, pp. 71–120.

Fusco, M. (2019). "Sluicing on free choice". In: *Semantics and Pragmatics* 12(20), pp. 1–20.

Ginzburg, J. and I. Sag (2000). *Interrogative investigations*. Stanford: CSLI publications.

Goldstein, S. (2019). "Free choice and homogeneity". In: *Semantics and Pragmatics* 12(23), pp. 1–47.

Groenendijk, J. and M. Stokhof (1982). "Semantic analysis of wh-complements". In: *Linguistics and philosophy* 5.2, pp. 175–233.

Hirsch, A. and B. Schwarz (2020). "Singular which, mention-some, and variable scope uniqueness". In: *Semantics and Linguistic Theory*. Vol. 29, pp. 748–767.

Kamp, H. (1973). "Free Choice Permission". In: *Proceedings of the Aristotelian Society*. Vol. 74. JSTOR, pp. 57–74.

Karttunen, L. (1977). "Syntax and semantics of questions". In: *Linguistics and philosophy* 1.1, pp. 3–44.

Klinedinst, N. and D. Rothschild (2012). "Connectives without truth tables". In: *Natural language semantics* 20.2, pp. 137–175.

Kobayashi, F. H. and V. Rouillard (2021). "High and low uniqueness in singular wh-interrogatives". In: *Semantics and Linguistic Theory*. Vol. 30, pp. 714–733.

Kroll, M. (2019). "Polarity reversals under sluicing". In: *Semantics and Pragmatics* 12(18), pp. 1–49.

Kroll, M. et al. (2017). "Identity and interpretation: Syntactic and pragmatic constraints on the acceptability of sluicing". In: *Proceedings of the 47th annual meeting of the North East Linguistics Society. Amherst, MA: Graduate Linguistics Student Association*.

Laca, B. (2012). *Temporal orientation and the semantics of attitude verbs*. International Meeting on Syntax, Semantics, and their Interfaces, Porto Alegre, Brazil `https://hal.archives-ouvertes.fr/hal-00773226`.

Langacker, R. W. (1974). "Movement rules in functional perspective". In: *Language*, pp. 630–664.

Menéndez-Benito, P. (2005). *The grammar of choice*. University of Massachusetts Amherst.

Merchant, J. (2001). *The syntax of silence: Sluicing, islands, and the theory of ellipsis*. Oxford University Press on Demand.

— (2005). "Revisiting syntactic identity conditions". In: *Workshop on Identity in Ellipsis. University of California, Berkeley*.

Romero, M. (1998). "Focus and reconstruction effects in wh-phrases". PhD thesis. University of Massachusetts at Amherst.

Ross, J. R. (1969). "Guess Who?" In: *Proceedings from the Annual Meeting of the Chicago Linguistic Society*. Vol. 5. 1. Chicago Linguistic Society, pp. 252–286.

Rudin, D. (2019). "Head-based syntactic identity in sluicing". In: *Linguistic Inquiry* 50.2, pp. 253–283.

Schwarzschild, R. (1999). "GIVENness, AvoidF and other constraints on the placement of accent". In: *Natural language semantics* 7.2, pp. 141–177.

Simons, M. (2005). "Dividing things up: The semantics of or and the modal/or interaction". In: *Natural Language Semantics* 13.3, pp. 271–316.

Tieu, L. et al. (2016). "Children's knowledge of free choice inferences and scalar implicatures". In: *Journal of Semantics* 33.2, pp. 269–298.

von Wright, G. H. (1968). *An essay in deontic logic and the general theory of action*. Amsterdam: North-Holland Pub. Co.

Zimmermann, T. E. (2000). "Free choice disjunction and epistemic possibility". In: *Natural language semantics* 8.4, pp. 255–290.