

You may like or dislike this talk,
and we do care which.

Sluicing and free choice

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Introduction

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Temporal Orientation

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Introduction

Topic of the talk

- (1) You may have coffee or tea, I don't know which.
- (2) You may have coffee or tea, I don't care which.

While (1) seems to suggest that only one drink is possible for the addressee, (2) tells that both options are possible and the addressee can freely choose. Question: why?

Why is this puzzle interesting?

- It will show us that changing a lexical item (*know* vs *care*) outside the so-called sluicing antecedent, affects the interpretation of unpronounced material.
- Contrary to traditional assumptions, to some extent it is the unpronounced material that tells us how to interpret its antecedent.

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What is sluicing?

Sluicing is a phenomenon in which a constituent question goes missing from the speech signal, save for the *wh*-phrase.

(3) John likes someone, but I don't know who [_{TP_E} ...].

Sluice: The CP containing the TP_E

In the example: [who [_{TP_E} ...]]

Remnants: *wh*-phrases in sluices

In the example: who

What's in a sluice

The big question: what is the content of the sluice?

- We need some semantics! (Merchant, 2001)
- We need some syntax! (Chung, 2006; 2013)

Latest theories, hybrid approaches (Kroll and Rudin, 2017; Kroll, 2019; Rudin, 2019)

- we need the syntactic copy of certain material;
- we need semantic contextual entailment between antecedent and sluice;
- we need pragmatics principle to regulate which sluices are generated.

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FC Disjunction

Free Choice (FC) disjunction is an entailment pattern that contrasts with what is valid in classical modal logic.

Simple disjunction:

(4) Mary ate ice cream or cake.

\rightsquigarrow Mary didn't eat both.

$$a \vee b \rightsquigarrow \neg(a \wedge b)$$

FC disjunction:

(5) Mary may eat ice cream or cake.

\rightsquigarrow Mary may eat ice cream and Mary may eat cake.

$$\diamond(a \vee b) \rightsquigarrow \diamond a \wedge \diamond b \wedge \neg \diamond(a \wedge b)$$

How do we get Free Choice?

Again, various theories:

- Semantic accounts: Aloni (2007), ...
- Syntactico-pragmatic accounts: Fox (2007), Bar-Lev and Fox (2020), ...
- Quasi-semantic (hybrid) accounts: Goldstein (2019), Aloni (2022), ...

The FC-in-Sluicing Puzzle

Sluicing and Free Choice: a striking contrast

Consider the following sentences:

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

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

While (6) does not give rise to FC effects, (7) does.

The contrast is even stronger in:

(8) #John may sit in any chair, I don't know which one.

(9) John may sit in any chair, I don't care which one.

Know and Care: different sluices?

Aloni (2018) and Fusco (2019) observed that free choice is blocked in sluicing constructions when the modal is ‘at least semantically’ present in the elided material:

- (10) You may have coffee or tea, but I don’t know which [you may have].
- (11) You may have coffee or tea, but I don’t care which [you have].

This works accomplishes two tasks:

1. Ground this intuition, inquiring into the reasons behind the modal mismatch
2. Provide a new explanation of why such difference would generate different FC readings

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An existing account of FC-in-S: Fusco (2019)

Fusco (2019) is grounded on two main assumptions:

1. The **first assumption** is that FC can only be generated when the disjunction takes Narrow Scope with respect to the modal (Aloni, 2007)
2. The **second assumption** connects the blocking of FC to Moorean tension generated by *ignorance* ascriptions

Tackling the first assumption: Wide Scope Free Choice

Since Zimmermann (2000) WS Free Choice has been an open issue.

However recent research shows that WS Free Choice exists indeed:

- **Theoretical** ground: Klinedinst and Rothschild (2012) and Bar-Lev (2018) say that WS is possible whenever there is an overt or covert *else*
- **Experimental** ground: Cremers et al. (2017) showed that WS Free Choice is indeed admitted by their subjects

Tackling the second assumption: not ignorance

There exist counterexamples showing that the blocking of FC is not always connected to ignorance and Moorean tension:

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

Indirect ignorance ascriptions are not necessary either:

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

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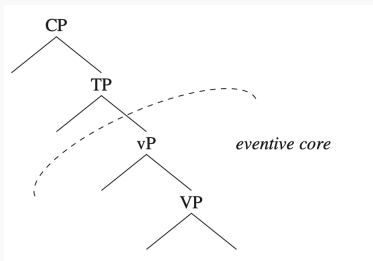
Solution (Step I): Temporal Orientation

Are modality mismatches possible?

(14) You may have coffee or tea, I don't care which [you **have**].

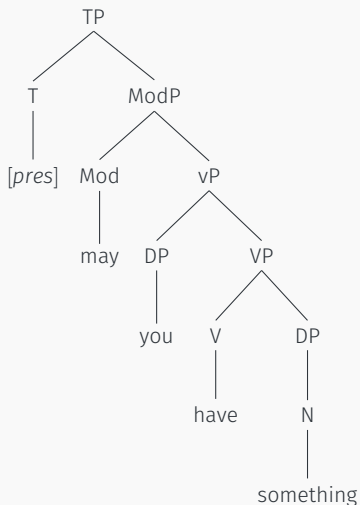
Rudin (2019): sluices are licensed whenever the mismatch involves phrases merged above the 'eventive core'.

'eventive core' = 'the vP of a clause — the complete verbal complex, including the origin sites of verbs and their internal and external arguments.'

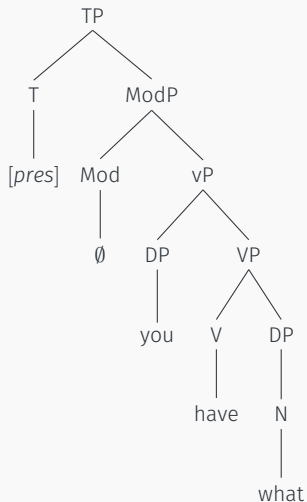


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(15) Antecedent

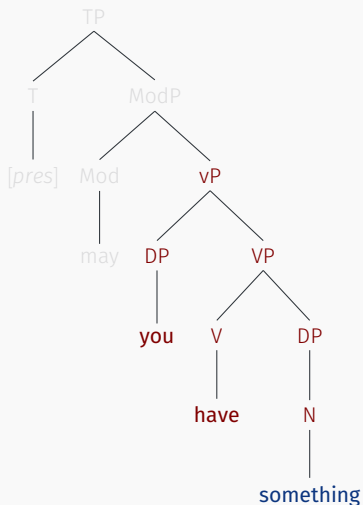


Consequent

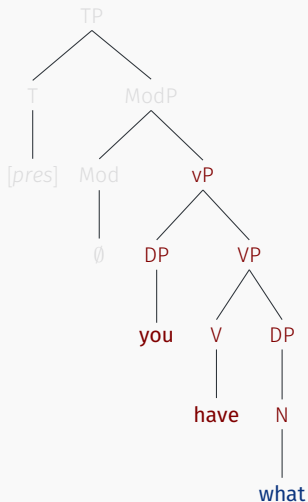


Are modality mismatches possible?

(15) Antecedent



Consequent



Minimal Material and Copyable Content

We have reasons (see Appendix A) to believe that the interpretation of the sluice might be driven by the following constraints, which place little burden on contextual factors.

(16) **Economy Principle (Minimal Material, MM)**

Since the identity we are interested in is the identity of little vPs (or of something strictly bigger, Appendix A), that will be the default interpretation for the ellipsis site, i.e. don't add more than needed! Only when this is not possible (for well-formedness conditions) extend the ellipsis site.

(17) **Copyable Content (CC)**

Ellipsis sites in sluicing privilege content already introduced in the lexicon, if you need more material than the one in the vPs start from what you already have in the antecedent.

The case of *know*

We may ask, why do we reconstruct the *know*-sluice with the modal?

(18) **The Well-Formedness Condition (WF)**

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

(Dayal & Schwarzschild, 2010)

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

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

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Temporal Orientation

The notion of *temporal orientation* (Condoravdi, 2001) concerns the time of evaluation conferred by modals and question embedding verbs to the events in their scope.

(21) #You may *have_F* coffee or tea, but I don't know which you *have_P*.

There is a clash between *have_F* and *have_P*.

(22) You may *have_F* coffee or tea, but I don't know which you may *have_F*.

While *relevance verbs* can have future orientation:

(23) You may *have_F* coffee or tea, but I don't care which you *have_F*.

Know

KNOW			
You may have coffee or tea, I don't know which	WF	MM	CC
a. you have	*!		
b. you may have		*	
c. you will have		*	*!

- WF = Well-Formedness
- MM = Minimal Material
- CC = Copyable Content

Know

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Care

CARE			
You may have coffee or tea, I don't care which	WF	MM	CC
a. you have			
b. you may have		*!	
c. you will have		*!	*

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Solution (Step II): Uniqueness Presupposition

Where does the problem lie?

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

(25) You may sit in any chair, I don't care which one you sit in.

The problem seems to be tied to the number of elements we are considering.

(26) There's (only) one chair you can sit in, I don't know which one it is.

(27) There's (only) one chair you can sit in, I don't care which one it is.

(28) #There are multiple chairs you can sit in, I don't know which one it is.

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Uniqueness presupposition in singular *which*-clauses

Singular *which*-clauses are generally thought to bear a uniqueness presupposition.

- (30) I know which student left.
presupposes only one student left.

Dayal (1996) places the source of the presupposition in the global answer operator ANS, but there are other stories (Hirsch & Schwarz, 2020; Kobayashi & Rouillard, 2021), more in Appendix B.

Different sluices, different presuppositions

It is clear that having two different sluices will trigger two completely different presuppositions!

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

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

The sluice in (31) triggers the presupposition that there exists a unique x s.t. it's possible for you to have x ;

$\exists!x \Diamond Hx$

while the sluice in (32) triggers the presupposition that there exists a unique x s.t. you will have x .

$\exists!x Hx$

Declaratives and questions

Since we adopt a state-based semantics for FC (BSML from Aloni (2022)), we also adopt a state-based semantics for questions: inquisitive semantics (Ciardelli et al., 2018).

To calculate entailments between declaratives and questions we apply the flattening operator $!$ from inquisitive semantics (defined as $!P := \wp(\text{info}(P)) := P^{**}$) which will serve as existential closure.

NOTE: Other semantics that allow for wide-scope FC can be used to correctly analyze this puzzle.

Going back to the puzzle: two possible antecedents

The sentence *You may have coffee or tea* might have two different logical forms:

Narrow Scope

$$\diamond(Ha \vee Hb)$$

Wide scope

$$\diamond Ha \vee \diamond Hb$$

In BSMML, both forms can trigger FC inferences when pragmatically enriched (Aloni, 2022):

- $[\diamond(\alpha \vee \beta)]^+ \models \diamond\alpha \wedge \diamond\beta$
- $[\diamond\alpha \vee \diamond\beta]^+ \models \diamond\alpha \wedge \diamond\beta$ (if the relation is indisputable)

On the other hand, Non-FC readings are only compatible with wide-scope configurations

Going back to the puzzle: *know*

In the case of *know*, we know that the sluice has wide-scope, and by scopal parallelism we also need wide scope in the antecedent:

You may have coffee or tea...

$$\diamond Ha \vee \diamond Hb$$

...which you may have ($\exists x \diamond Hx$)

$$\begin{array}{|c|} \hline \diamond Ha \\ \hline \diamond Hb \\ \hline \end{array}$$

At this point, we still don't know if FC is licensed or not, we only know that antecedent and sluice have the same configuration, but...

We know that the sluice for the *know*-case triggers the following presupposition $\exists!x \diamond Hx$, which is incompatible with the FC inferences:

$$\diamond Ha \wedge \diamond Hb$$

Figure 1: FC Inference

$$\begin{array}{|c|} \hline \diamond Ha \wedge \neg \diamond Hb \\ \hline \diamond Hb \wedge \neg \diamond Ha \\ \hline \end{array}$$

Figure 2: Uniqueness Presupposition

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FL

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Figure 3: FC Inference

$$\begin{array}{l} \diamond Ha \wedge \neg \diamond Hb \\ \diamond Hb \wedge \neg \diamond Ha \end{array}$$

Figure 4: Uniqueness Presupposition

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Figure 4: Uniqueness Presupposition

Going back to the puzzle: *care*

In the case of *care*, we know that the sluice has narrow-scope, and by scopal parallelism we also need narrow scope in the antecedent:

You may have coffee or tea...

...which you have ($Ha \vee Hb$)

$\diamond(Ha \vee Hb)$

FL

Ha
Hb

From this, we know that FC is licensed since there is no other meaning for narrow scope configurations.

The uniqueness presupposition applies below the modal and thus it does not interfere with a FC meaning.

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You may have coffee or tea...

$\diamond(Ha \vee Hb)$

...which you have ($Ha \vee Hb$)

$Ha \vee Hb$

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Comparison with Fusco

know case:

- Like Fusco, we assume that whenever we have FC-cancellation we also have wide scope;
- but, unlike Fusco, it's not the wide scope *per se* that blocks FC, since it could be compatible with it, but rather the uniqueness presupposition of singular which clauses.

care case:

- Like Fusco, we assume that narrow scope is only compatible with FC.

Conclusions and Future Work

Conclusions

Contributions:

- Grounding the mismatch intuition by Aloni (2018) and Fusco (2019)
- Showing the dynamics of the various constraints intervening in mismatches and identity, highlighting the role of temporal orientation
- Improving in slight reasonable ways recently-proposed constraints on sluicing
- Providing an explanation for the FC-in-sluicing puzzle based on previous literature on the uniqueness presupposition

Future Work

Further goals:

- Collecting cross-linguistic data on the FC-in-S puzzle and check our predictions: in particular, either establishing future orientation of relevance verbs as universal or finding new pragmatic solutions to the puzzle
- Providing compositional analysis of the FC-in-S puzzle
- Exploring cases of sluices with doubly negated antecedents

Thank you for your attention!

Appendix A

Default interpretations:

The default interpretation for the ellipsis site is the full antecedent. Only when this interpretations are not contextually available / logically possible, there the need of a mismatch.

Pragmatic principle to govern sluicing reconstructions:

If a perfectly antecedent-matching ellipsis site yields an interpretation that is plausible in context, that interpretation should be strongly preferred to interpretations generated via imperfectly antecedent-matching ellipsis sites.

The syntax of sluicing

- (33) You can have any drink, I don't care which.
- (34) #You are allowed to have any drink, I don't care which.
- (35) You are allowed to have any drink, I don't care which you have.
- (36) #You are allowed to have any drink, I don't care which you are allowed to have.

Where is the boundary?

Consider the following scenario:

- (37) SCENARIO: You're at a concert and your friend Susan is about to perform on the stage. This is a special concert: on the stage there are a lot of instruments and the instrument that each performer is going to play is assigned randomly by a computer one minute before the performance takes place. A friend of yours that doesn't know Susan very well and thinks that Susan is only very good at violin says 'I hope Susan will be assigned the violin!'. At this point you reply:
- a. Susan can play any instrument, I don't care which one she plays.
 - b. #Susan can play any instrument, I don't care which.

It seems that while (37-a) is a perfect sentence to utter, (37-b) is deviant.

Predictions 1

(38) CELERATIVE ASP

- a. The letter has arrived early, but I know why ~~the letter has arrived early~~.
- b. The letter has arrived early, but I know why ~~the letter has arrived~~.

(39) CONTINUATIVE ASP

- a. Somebody is still smoking and we don't know who ~~is still smoking~~.
- b. Somebody is still smoking and we don't know who ~~is smoking~~.

(40) HABITUAL ASP

- a. He's usually late, but nobody knows why ~~he's usually late~~.
- b. He's usually late, but nobody knows why ~~he's late~~.

Predictions 2

(41) IRREALIS MOOD

- a. Perhaps he kicked the ball, but I don't know when ~~per-~~
~~haps he kicked the ball.~~
- b. Perhaps he kicked the ball, but I don't know when ~~he~~
~~kicked the ball.~~

(42) EPISTEMIC MOOD

- a. Somebody is probably smiling, but we don't know who ~~is~~
~~probably smiling.~~
- b. Somebody is probably smiling, but we don't know who ~~is~~
~~smiling.~~

Sluicing in retrospective

(43) Passive antecedent

- a. *Jack was mugged, but we don't know who ~~mugged Jack~~.
- b. Jack was mugged, but we don't know by whom ~~Jack was mugged~~.

(44) Active antecedent

- a. *Someone mugged Jack, but we don't know by whom ~~Jack was mugged~~.
- b. Someone mugged Jack, but we don't know who ~~mugged Jack~~.

Appendix B

FC disjunction vs ignorance

On the one hand, FC disjunction seems to pattern with ignorance replies when embedded:

- (45) a. A: Which key opens this door?
B: The first one or the second one (I don't know which).
b. # I know which key open this door: the first one or the second one.

However there is a crucial difference: while there exists a felicitous question that can be embedded under *know* for FC disjunctions, there is no such question for ignorance disjunctions:

- (46) a. I know which letters we could add to make a word: *a* or *r*.
b. # I know which keys open this door: the first one or the second one.

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Uniqueness presupposition in singular *which*-clauses

Singular *which*-clauses are generally thought to bear a uniqueness presupposition.

- (47) Which student arrived late?
a. Lorenzo.
b. #Lorenzo and Christopher.

Dayal (1996) derives the UP from the **global** answer operator ANS
However, things are not so straightforward when we have modals:

- (48) The skeleton of a word with a missing letter is *fo_m*.
A: Which letter could we add to make a word?
B: 'A' or 'R'.

Hirsch & Schwarz (2020)

Therefore, Hirsch & Schwarz (2020) identifies *which* as the lexical trigger of the presupposition, that can take two possible positions: above and below the modal.

A question like 'Which letter could we add to make a word?' ends up with two different logical forms:

(49) a. **High Uniqueness** *which* > *may*

b. ... $\exists!$!... \diamond ...

(50) a. **Low Uniqueness** *may* > *which*

b. ... \diamond ... $\exists!$!...

Hirsch and Schwarz's theory predicts the presupposition to be too weak

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b. ... \diamond ... $\exists!$!...

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Too weak presuppositions

$$(51) \quad \text{HU: } \{ \lambda w : \exists! x \diamond_w^u [\text{letter}_u(x) \wedge \text{add}_u(x)]. \diamond_w^u (\text{letter}_u(a) \wedge \text{add}_u(a)), \\ \lambda w : \exists! x \diamond_w^u [\text{letter}_u(x) \wedge \text{add}_u(x)]. \diamond_w^u (\text{letter}_u(b) \wedge \text{add}_u(b)), \\ \dots \}$$

$$(52) \quad \text{LU: } \{ \lambda w : \diamond_w^u \exists! x [\text{letter}_u(x) \wedge \text{add}_u(x)]. \diamond_w^u (\text{letter}_u(a) \wedge \text{add}_u(a)), \\ \lambda w : \diamond_w^u \exists! x [\text{letter}_u(x) \wedge \text{add}_u(x)]. \diamond_w^u (\text{letter}_u(b) \wedge \text{add}_u(b)), \\ \dots \}$$

Note that the modal in the presupposition quantifies existentially!

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Note that the modal in the presupposition quantifies **existentially!**

Kobayashi & Rouillard (2021)

However, our intuition tells us that the following reply is not grammatical:

- (53) A: Which letter could we add to make a word?
B: #*r* and *m*.

Therefore Kobayashi & Rouillard (2021), exploit a presuppositional variant of Exh to obtain the following presuppositions:

- (54) **HU**: $\{\lambda w : \diamond_w^u \text{add}_u(x) \rightarrow w \in \text{exh}(\lambda v. \diamond_v^u \text{add}_u(x), C). \diamond_w^u \text{add}_u(x) | x \in \{a, b, c, \dots\}\}$
- (55) **LU**: $\{\lambda w : \square_w^u (\text{add}_u(x) \rightarrow w \in \text{exh}(\lambda v. \text{add}_u(x), C)). \diamond_w^u \text{add}_u(x) | x \in \{a, b, c, \dots\}\}$

Syntactic (im)plausibility I

(56) I know which letter we can add to make a word: 'A' or 'R'.

Argument

- **Premise 1:** Assume that 'Low Uniqueness' is generated with a local operator in the syntax;
- **Premise 2:** Assume the empirical fact that FC disjunction replies to singular *which* resist embedding (see (56));
- **Conclusion:** It follows that certain structures available for matrix questions are not available for embedded questions.

Syntactic (im)plausibility II

[Which [NP ...]] can indeed be interpreted in different positions:

- (57) a. [Which story that he loved] can John rewrite t to become famous?
b. $_$ can John _{i} rewrite [which story that he _{i} loved] to become famous?

Positions available in matrix questions are also available in embedded questions (examples from Fox (1999):

- (58) How many people has Laura decided to invite t ?
- (59) I know how many people Laura has decided to invite t :
- a. four, but she hasn't chosen who.
b. all her classmates plus John, therefore eight.

Argument

- **Premise 1:** Assume that questions denote the set of their answers;
- **Premise 2:** Assume the empirical fact that FC disjunction replies to singular *which* resist embedding (see (56)), meaning that FC disjunction replies are in the set of answers for the matrix questions but not in the set of answers for the embedded question;
- **Conclusion:** It follows that the matrix question and the embedded question have different denotations, and therefore they are two different questions.

Semantic (im)plausibility II

Consider the case of veridical predicates as analysed in Spector & Egré, (2015):

- The meaning of responsive *know* is derivable by its declarative counterpart;
- The meaning of declarative *know* describes a specific relation between an attitude holder and the proposition that is the true complete answer to the question, since *know* is factive;
- If 'A or R' is an answer to (56), than it must be the true complete answer.

The picture

- (60) a. Which letter can we add to make a word?
b. 'A' or 'R'.

The puzzle is now explaining why (60-b) is regarded as a good answer even though all the hints suggest it is not.

answers in the answer-set \neq answers that are accepted

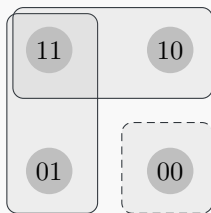
The solution will be twofold:

- semantic component
- syntactic component

Issue resolution

A question can be seen as a request for a piece of information that resolves a certain issue (Ciardelli, Groenendijk, Roelofsen, 2018)

In other words, it is a request to obtain information that helps us shrinking the context set and identifying the world we are in (Stalnaker, 1978; von Stechow, 2011)



(a)

Figure 3: Who closed the door slowly?

Issue resolution

We already know that there are acceptable answers that do not meet the question's presupposition but resolve the issue felicitously:

- (61) a. Who closed the door slowly?
b. Nobody closed the door.

- (62) a. Was it Martha that planted that tree?
b. No, nobody did, it grew spontaneously.

What determines if an answer is acceptable on a *semantic level*?

If it help us understanding the world we are in wrt to the specific issue that has been raised.

Issue resolution only?

It seems that issue resolution is not enough:

- (63) a. Which student among A and B went to the store?
- b. #Both A and B.
- c. Actually, both A and B went.

Syntactic requirement

The answer must be syntactically recognizable as an answer to the question, roughly: the numeration of the answer must match the numeration of the sluice, save for the substitution of the *wh*-phrase with an alternative item of the same category.

- (64) a. Who went to the store?
b. DP went to the store.

There should be no obvious clash.

Singulars and Disjunction

- (65) a. The person that went to the shop *is* John or Paul.
b. *The person that went to the shop *is* John and Paul.
- (66) a. I don't remember whether pasta or pizza *has* been invented in Italy.
b. *I don't remember whether pasta and pizza *has* been invented in Italy.

Disjunction is compatible with singular agreement, while conjunction is not. Answers involving FC disjunctions are syntactically (linearly?) isomorphic to answers involving ignorance disjunctions, that are perfectly grammatical.

- (67) a. Which wine could be poisoned?
b. The Porto or the Chardonet... I don't know which.

Necessity of both components

Can we say that issue-resolution is enough?

- (68)
- a. Which letter can we add to make a word?
 - b. We can add 'A' or 'R'.
 - c. #We can add 'A' and we can add 'R'.

Can we say that having a 'well-formed' answer is enough?

- (69)
- a. Which student went to the store?
 - b. #A student went to the store.
 - c. #Exactly one student went to the store.

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Questions in discourse

Answer-set \subset Acceptable answers

Answer-set := $\{p \mid p \text{ is an acceptable answer \&}$
 $p \text{ satisfies the question's presupposition}\}$

The puzzle's solution:

1. In a question-answer exchange the answer-seeker is interested in resolving the issue, i.e. because of their ignorance they are less committed to the well-formedness of the question's presupposition;
2. In a question embedding environment there is no real exchange and thus the question is strictly taken to denote its denotation, i.e. the speaker is fully committed to the well-formedness of the question's presupposition.

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Is this plausible?

There is other evidence that embedded questions are somehow 'stricter' wrt to answers:

- *Nobody*-like answers:

- (70) a. Was it Martha that planted that tree?
b. No, nobody did, it grew spontaneously.

(71) I know who was it that planted that tree, #namely, nobody.

- Pragmatic answers:

- (72) a. A: I would like to book a flight to New York for Monday morning?
b. B: What time would you like your flight to be?
c. A: I have a conference in Manhattan at 11:30 am.

(73) I know what time John would like his flight to be: #namely, he has a conference in Manhattan at 11:30.