

University of Iowa
Mind Context-Divide Workshop

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**Towards a Model of Contextual Relevance:
The Role of the Question under Discussion from
Children to Adults and Back Again**

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Outline

The Question-Answer Requirement for Scope Assignment.

Extending the role of the Question under Discussion to scope resolution in adults.

Extending the role of the Question under Discussion to implicature computation in adults.

A new experiment on implicature computation in children.

The acquisition of scope as a case study in learnability.

all that glitters isn't gold

Not all that glitters isn't gold



The pizza story



Gualmini (2004)



Expectation: The Troll should deliver all the pizzas

(1) The Troll didn't deliver some pizzas

Gualmini (2004)



Expectation: The Troll should deliver all the pizzas

(1) The Troll didn't deliver some pizzas

Fifteen English-speaking children (age: 4;0-5;5 - mean: 4;10) accepted the target sentence 54 times out of 60 (90%).

But then ...



Expectation: The Troll should deliver all the pizzas

(2) The Troll didn't lose some pizzas

But then ...



Expectation: The Troll should deliver all the pizzas

(2) The Troll didn't lose some pizzas

Fifteen English-speaking children (age: 4;2-5;8 - mean: 4;11) accepted the target sentence 27 times out of 60 (45%).

Hulsey et al. (2004) – Condition I



Expectation: The Troll should deliver all the pizzas

(3) Some pizzas were not delivered

12 children from 2;10 to 5;3 (mean age 4;7) accepted the target sentences 45 times out of 48 (94%).

Hulsey et al. (2004) – Condition II



Expectation: The Troll should deliver all the pizzas

(4) Some pizzas were not lost

15 children from 2;10 to 6;01 (mean age 4;9) accepted the target sentences 26 times out of 60 (41%).

Summary of the Findings

Expectation: The Troll should deliver all the pizzas

Children's response

Some pizzas were not delivered
The Troll didn't lose some pizzas

Surface scope
Surface scope

The Troll didn't deliver some pizzas
Some pizzas were not lost

Inverse scope
Inverse scope

How is scope resolution influenced by contextual information?

The question-answer requirement

The policeman killed the robber with the handgun

The question-answer requirement

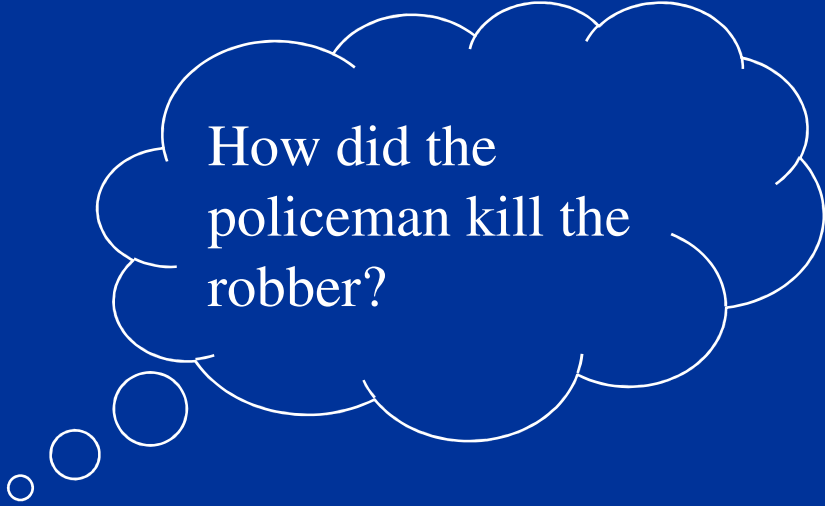
The policeman killed the robber with the handgun



The policeman killed the robber by means of the handgun

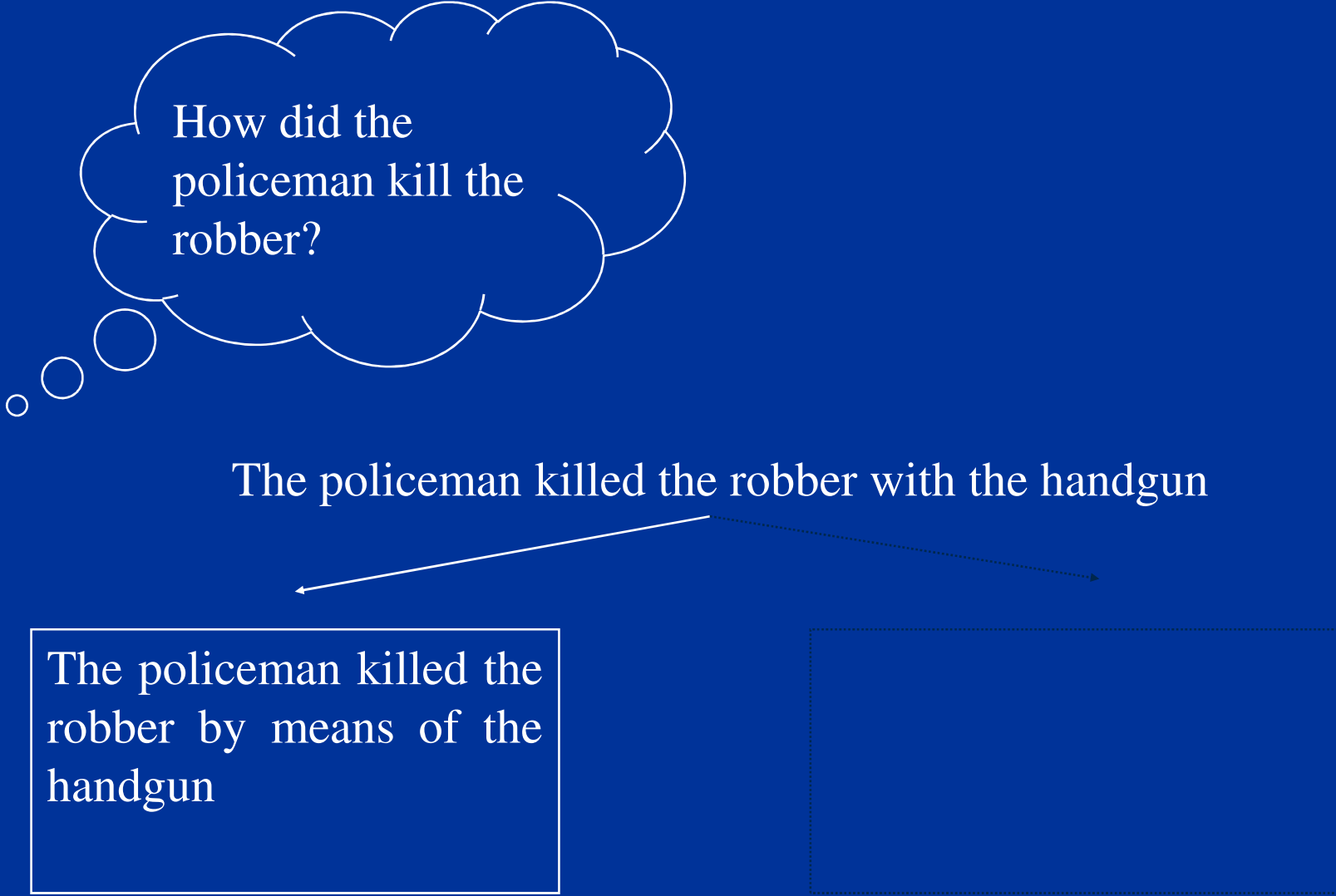
The policeman killed the robber who had a handgun

The question-answer requirement



How did the
policeman kill the
robber?

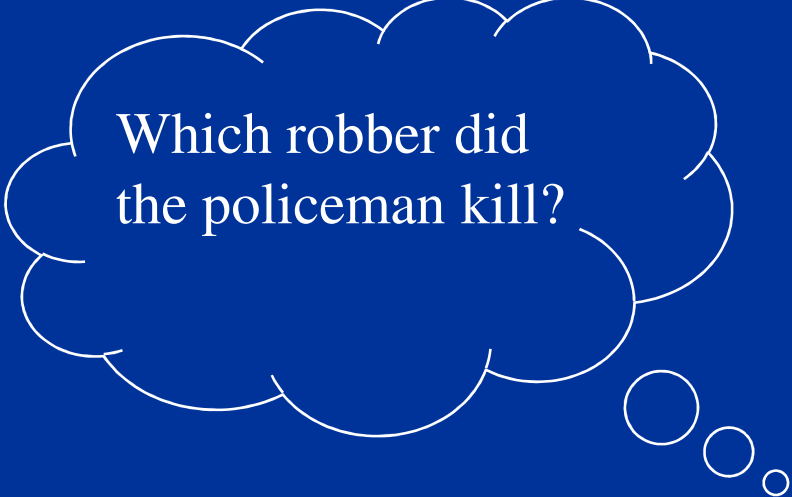
The policeman killed the robber with the handgun



The policeman killed the
robber by means of the
handgun

The policeman killed the
robber by means of the
handgun

The question-answer requirement



Which robber did
the policeman kill?

The policeman killed the robber with the handgun



The policeman killed the
robber who had a
handgun

Hulsey et al. (2004)

The Question-Answer Requirement (Hulsey et al., 2004)

Underlying Question

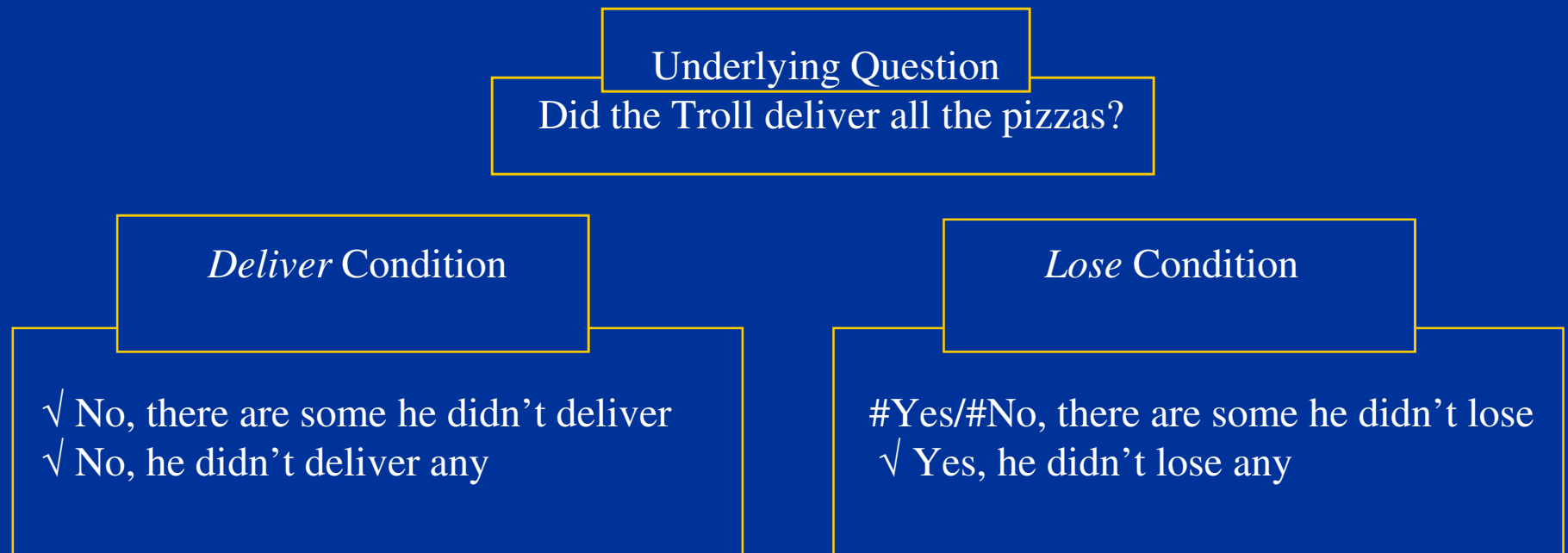
Did the Troll deliver all the pizzas?

Deliver Condition

- ✓ No, there are some he didn't deliver
- ✓ No, he didn't deliver any

Hulsey et al. (2004)

The Question-Answer Requirement (Hulsey et al., 2004)



Thus children's behavior is dictated by the contextual relevance of each interpretation rather than by the syntax/semantics mapping that is involved.

Outline

Extending the role of the Question under Discussion to scope resolution in adults.

Adults and QAR

Hulsey et al. (2004): children first and foremost select the interpretation that entails an answer to the Question under Discussion (QUD), which may or may not be explicit.

What about adults?

In presence of an ambiguity, would adults also privilege the interpretation that entails an answer to the Question under Discussion?

Is the QAR strong enough to over-ride the Maxim of Charity?

Zondervan, Meroni and Gualmini (2008)

(3) I think all the pizzas were not delivered

Inverse scope

(Not all...)

Surface scope

(None...)

Zondervan, Meroni and Gualmini (2008)

(3) I think all the pizzas were not delivered

Inverse scope

(Not all...)

Surface scope

(None...)

Were all pizzas delivered ?

Zondervan, Meroni and Gualmini (2008)

(3) I think all the pizzas were not delivered

Inverse scope

(Not all...)

Surface scope

(None...)

Were all pizzas delivered ?



Both interpretations entail an answer to the Question under Discussion, so the parser makes use of other criteria to select one interpretation (e.g., the Maxim of Charity).

Zondervan, Meroni and Gualmini (2008)

(3) I think all the pizzas were not delivered

Inverse scope

(Not all...)

Surface scope

(None...)

Were all pizzas delivered ?



Were some pizzas delivered?

Zondervan, Meroni and Gualmini (2008)

(3) I think all the pizzas were not delivered

Inverse scope

(Not all...)

Surface scope

(None...)

Were some pizzas delivered?



Only one interpretation entails an answer to the Question under Discussion (i.e., surface scope), so the parser selects that interpretation.

Zondervan, Meroni and Gualmini (2008)

Kermit, were all
pizzas delivered?



(3) I think all the pizzas were not delivered

Inverse scope makes the sentence true and addresses the QUD, so adult speakers should accept the target sentence.

Zondervan, Meroni and Gualmini (2008)

Kermit, were all
pizzas delivered?



(3) I think all the pizzas were not delivered

Fifteen subjects said the target sentence was 'RIGHT' 98.3% of the time (59/60).

Zondervan, Meroni and Gualmini (2008)

Kermit, were some pizzas delivered?



(3) I think all the pizzas were not delivered

Only surface scope addresses the QUD, but it makes the sentence false. Children would reject the target sentence; what about adults?

Zondervan, Meroni and Gualmini (2008)

Kermit, were some pizzas delivered?



(3) I think all the pizzas were not delivered

Sixteen subjects said the target sentence was 'RIGHT' only 23.4% of the time (15/64).

Gibson, Fedorenko and Gualmini (in progress)

Ten novice computer gamers were asked to test a new piece of gaming software. They were not expected to be able to win the game, because it was designed to be very difficult. In the end, every tester didn't win the game.

How many players won the game?

None

Many

Gibson, Fedorenko and Gualmini (in progress)

Ten novice computer gamers were asked to test a new piece of gaming software. They were not expected to be able to win the game, because it was designed to be very difficult. In the end, every tester didn't win the game.

| | | |
|---------------------------------------|-------------|-------------|
| | 60% | 40% |
| <i>How many players won the game?</i> | <i>None</i> | <i>Many</i> |

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Ten expert computer gamers were asked to test a new piece of gaming software. They were expected to be able to win the game, because it was designed to be easy. In the end, every tester didn't win the game.

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| | | |
|---------------------------------------|-------------|-------------|
| | 60% | 40% |
| <i>How many players won the game?</i> | <i>None</i> | <i>Many</i> |
| | 40% | 60% |

Ten expert computer gamers were asked to test a new piece of gaming software. They were expected to be able to win the game, because it was designed to be easy. In the end, every tester didn't win the game.

Outline

Extending the role of the Question under Discussion to implicature computation in adults.

Why SIs?

Recent work by Zondervan (2007) revealed that the QUD of the context has an effect on the calculation of scalar implicatures

(4) A: “Who brought bread or chips?”

B: “Harry brought bread or chips.”

(5) A: “What did Harry bring?”

B: “Harry brought bread or chips.”

Why SIs?

Recent work by Zondervan (2007) revealed that the QUD of the context has an effect on the calculation of scalar implicatures

- (4) A: “*Who* brought bread or chips?”
B: “[[↓]*Harry*] brought bread or chips.”
FOCUS
- (5) A: “*What* did Harry bring?”
B: “Harry brought [*bread* [↓]*or chips*].”
FOCUS

As expected, the percentage of scalar implicatures in condition (5) as significantly higher (73%) than in condition (4) (55%), reflecting the effect of the QUD on scalar implicature calculation.

Zondervan, Meroni and Gualmini (2008)

(6) I think some pizzas were delivered



- a. Some (but not all) of the pizzas were delivered -- NO
- b. Some (and possibly all) of the pizzas were delivered -- YES

Does the QUD exerts an effect on scalar implicatures' calculation as it does on scope ambiguity resolution?

Experiment I – condition *a*

Kermit, were some pizzas delivered?



(6) I think some pizzas were delivered

Out of the 40 trials, 10 adults said the sentence was RIGHT 95% of the time.

Experiment I – condition *b*

Kermit, were all the pizzas delivered?



(6) I think some pizzas were delivered

Out of the 24 trials, 6 adults always rejected the target sentence. Moreover they all commented that ‘all pizzas were delivered’ thereby showing that the scalar implicature had been calculated.

Outline

A new experiment on implicature computation in children.

Chierchia et al. (2000)



(7) Every space-guy took a strawberry or an onion ring

15 English-speaking children (age: 3;4 to 6;2 – mean 5;2) accepted the target sentence 30 times out of 60 trials (50%). Control group (8 adults) always rejected the target sentences.

But they know something!



Every space-guy
took a
strawberry or an
onion ring

Every space-guy
took a strawberry
and an onion ring



- (8) Every space-guy took a strawberry or an onion ring.
Every space-guy took a strawberry and an onion ring.

15 children (age from 3;2 to 6;0 – mean: 4;7) rewarded only the puppet who had used the conjunction *and* 93.3% of the time (56/60).

A working hypothesis

Children can in principle compute the implicature, but this needs to be motivated. In turn, this means that children have to accommodate a Question under Discussion which could not be answered by the basic meaning of the scalar term .

This is the problematic step, which can be avoided if the QUD is immediately accessible to them...as in the paradigm used by Zondervan et al. (2008).

A New Experiment – condition *a*

Kermit, were some pizzas delivered?



(6) I think some pizzas were delivered

15 4- and 5-year-olds accepted the target sentence 51 times out of 60 trials (85%)

A New Experiment – condition *b*

Kermit, were all the pizzas delivered?



(6) I think some pizzas were delivered

10 4- and 5-year-olds accepted the target sentence only 2 times out of 40 trials (5%)

Outline

The acquisition of scope as a case study in learnability.

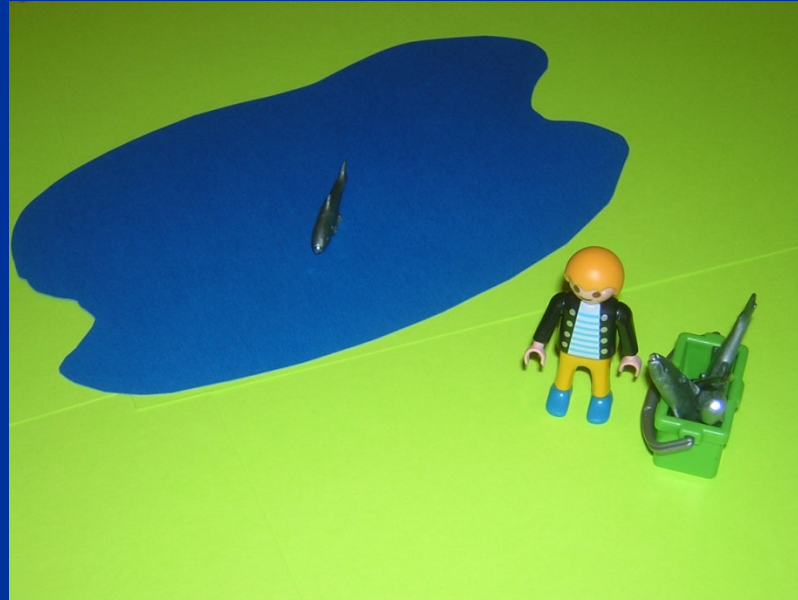
Let us focus on this ...



(4) Some pizzas were not lost

15 children from 2;10 to 6;01 (mean age 4;9) accepted the target sentences 26 times out of 60 (41%). 8 adult controls: 93%

... and this



- (9) De jongen heeft een vis niet gevangen
The boy has a fish not caught
There is a fish the boy didn't catch

Krämer (2000) and Unsworth (2005) found that Dutch-speaking children as old as 9 interpret the scrambled indefinite in the scope of negation, reaching an interpretation that is unavailable to adults.

The Problem

Let us put aside the issue of how children resolve scope ambiguities.

The data suggest we may also need to address a different and perhaps more complicated problem: children have to get rid of one interpretation.

In absence of negative evidence, this seems to be a logically impossible task. In fact, devices like the Subset Principle are designed to ensure that scenarios of this kind would never arise!

Solving the Expunction Problem

Gualmini and Schwarz (2009): when it comes to meaning, the ‘expunction problem’ is solvable, once we take into consideration the role of dialogues.

We agree with the standard assumption that children do not receive negative evidence.

However, once we acknowledge children’s pragmatic competence, one can think of different cases of communication failure which could be taken by the child as evidence for the unavailability of specific readings.

Solving the Expunction Problem

One expunction problem that children apparently need to solve.

(4) Some pizzas were not lost

Hulsey et al. (2004) showed that children – but not adults – can interpret the indefinite *some* in the scope of negation.

The following dialogue might provide children with evidence for the fact that *some* cannot be interpreted in the scope of negation.

Speaker A: *Some pizzas were not lost*

Speaker B: *What do you mean? No pizza was lost!*

Spelling out the reasoning...

Speaker A: *Some pizzas were not lost*

Speaker B: *What do you mean? No pizza was lost!*

Spelling out the reasoning...

Speaker A: *Some pizzas were not lost*

Speaker B: *What do you mean? No pizza was lost!*

If Speaker A's contribution is interpreted on its surface scope interpretation, it triggers an implicature, i.e., some pizzas were lost.

Speaker B is objecting that the implicature is not met.

Spelling out the reasoning...

Speaker A: *Some pizzas were not lost*

Speaker B: *What do you mean? No pizza was lost!*

If Speaker A's contribution is interpreted on its surface scope interpretation, it triggers an implicature, i.e., some pizzas were lost.

Speaker B is objecting that the implicature is not met.

If Speaker A's contribution is interpreted on its inverse scope interpretation, the sentence is true and felicitous in the context.

Speaker B would have no reasons to object.

Spelling out the reasoning...

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But then why doesn't Speaker B interpret Speaker A's contribution on its surface scope?

Spelling out the reasoning...

Speaker A: *Some pizzas were not lost*

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Speaker B is objecting that the implicature is not met.

If Speaker A's contribution is interpreted on its inverse scope interpretation, the sentence is true and felicitous in the context.

Speaker B would have no reasons to object.

But then why doesn't Speaker B interpret Speaker A's contribution on its surface scope? Because he can't!

Solving the Expunction Problem

Some questions that immediately arise:

Do dialogue participants object when an implicature is not satisfied in a context?

Are children ever exposed to dialogues in which a speaker is challenged because an implicature is not met?

Solving the Expunction Problem

i like it what do you mean ok??? i think it's great. the pics look good too. you're the first five i've given in a while. lol i better start giving more. (5 stars)

<http://www.blogskins.com/skincomments/41621/4/>

What do you mean "most"? Are there some banks they wouldn't have controlled?

<http://www.wellingtonpublications.com/hpr/taso/banking/part2.html>

WARM?! WARM?!?!? What do you mean it's warm?? It's HOTTER than hell out here

<http://profile.myspace.com/index.cfm?fuseaction=user.viewprofile&friendid=10546126>

Solving the Expunction Problem

In fact, even parents object to their children's statements, when the implicature triggered by their statement is not met!

Here is one example from file #2 of the Brown corpus in the CHILDES database (MacWhinney, 2000).

MOT: until he met how many men ?

CHI: two men .

MOT: three [!!] men

Solving the Expunction Problem

So, this is what the child could use:

what do you mean somebody didn't show up to work....are you still showing up?!

<http://profile.myspace.com/index.cfm?fuseaction=user.viewprofile&friendID=158324>

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