

# *Attentive might*

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based on joint work with  
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[www.illc.uva.nl/inquisitive-semantics](http://www.illc.uva.nl/inquisitive-semantics)

# Overview

- Two puzzles for the standard modal account of *might*
- Attentive *might* in inquisitive semantics
- Attentive *might* in inquisitive pragmatics
- Comparison with modal and dynamic accounts

## Puzzle 1: *might* meets disjunction and conjunction

Zimmermann's (2000)

The following are all **equivalent**:

(1) John might be in London **or** in Paris.  $\diamond(p \vee q)$

(2) John might be in London **or** he might be in Paris.  $\diamond p \vee \diamond q$

(3) John might be in London **and** he might be in Paris.  $\diamond p \wedge \diamond q$

## Puzzle 1: *might* meets disjunction and conjunction

### Crucially

- *Might* behaves differently in this respect from clear-cut epistemic modals
- The following are clearly **not equivalent**:
  - (4) It is consistent with my beliefs that John is in London **or** it is consistent with my beliefs that he is in Paris.
  - (5) It is consistent with my beliefs that John is in London **and** it is consistent with my beliefs that he is in Paris.
- This is problematic if *might* is analyzed as an epistemic modal

# Puzzle 1: *might* meets disjunction and conjunction

## Further observation

- For the equivalence to go through, it is crucial that John **cannot** be **both** in London and in Paris at the same time

## Szabolcsi's scenario

- We need an English-French translator, i.e., someone who speaks *both* languages. In that context, (8) is perceived as a useful recommendation, while (6) and (7) are not.

(6) John might speak English **or** French.  $\diamond(p \vee q)$

(7) John might speak English **or** he might speak French.  $\diamond p \vee \diamond q$

(8) John might speak English **and** he might speak French.  $\diamond p \wedge \diamond q$

## Puzzle 2: *might* meets negation

### Basic observation

Standard sentential negation never takes scope over *might*

(9) John might not be in London.  $\diamond \neg p$

### Crucially

*Might*  $\neq$  'it is consistent with my information that'

(10) It is not consistent with my information  
that John is in London.  $\neg \text{CONSISTENT } p$

## Main point

- The notion of meaning that we are exploring in inquisitive semantics is not only suited to capture informative and inquisitive content in a uniform way, but also a sentence's potential to **draw attention** to certain possibilities
- This allows for a novel analysis of *might*

## Driving intuition

- (11) John might be in London.  
(12) John is in London.  
(13) Is John in London?

### Main contrasts

- (11) differs from (12) in that it **does not provide** the **information** that John is in London
- (11) differs from (13) in that it **does not request information**
- 'ok' is an appropriate response to (11), but not to (13)

### Main intuition

- The semantic contribution of (11) lies in its potential to **draw attention** to the possibility that John is in London



## Attentive content in inquisitive semantics

- The conception of a proposition as a **set of possibilities** is ideally suited to capture attentive content
  - We can simply think of a sentence  $\varphi$  as **drawing attention** to all the possibilities in  $[\varphi]$
  - At the same time, we can still think of  $\varphi$  as **providing** and **requesting information**, just as before
- ⇒ informative, inquisitive, and attentive content  
are all captured by a single semantic object

# A propositional language

## Basic ingredients

- Finite set of atomic sentences  $\mathcal{A}$
- Connectives  $\neg, \wedge, \vee, \diamond$

## Question and assertion operators

- $!\varphi := \varphi \vee \neg\neg\varphi$
- $?\varphi := !\varphi \vee \neg\varphi$

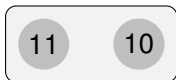
# Worlds, possibilities, and propositions

- **Possible worlds:** functions from  $\mathcal{A}$  to  $\{0, 1\}$
- **Possibilities:** sets of possible worlds
- **Propositions:** sets of possibilities

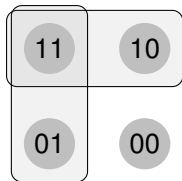
## Illustration



worlds



possibility

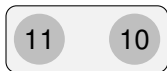


proposition

# Atomic sentences

For any atomic sentence  $p$ :  $[p] = \{ \{w \mid w(p) = 1\} \}$

Example:



$p$

## Negation, disjunction, conjunction, and *might*

- We will consider here a straightforward analysis of  $\neg$ ,  $\vee$ ,  $\wedge$ , and  $\diamond$  that solves the puzzles we started out with (from Ciardelli, Groenendijk and Roelofsen, SALT 2009)
- It must be noted, however, that the analysis has certain undesirable consequences
- We are currently working on a more principled account that avoids these problems

# Negation

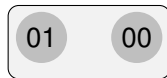
## Definition

- $[\neg\varphi] = \{ \overline{U[\varphi]} \}$
- Take the union of all the possibilities for  $\varphi$ ;  
then take the complement

Example,  $\varphi$  classical:



$[p]$



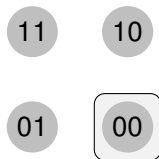
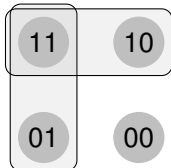
$[\neg p]$

# Negation

## Definition

- $[\neg\varphi] = \{ \overline{U[\varphi]} \}$
- Take the union of all the possibilities for  $\varphi$ ;  
then take the complement

Example,  $\varphi$  inquisitive:

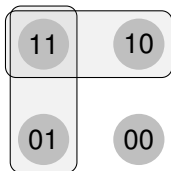


# Disjunction

## Definition

- $[\varphi \vee \psi] = [\varphi] \cup [\psi]$

## Examples:



$p \vee q$



$?p (= p \vee \neg p)$

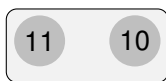


# Conjunction

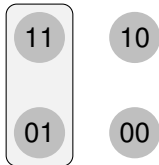
## Definition

- $[\varphi \wedge \psi] = \{\alpha \cap \beta \mid \alpha \in [\varphi] \text{ and } \beta \in [\psi]\}$
- Pointwise intersection

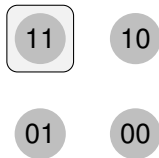
Example,  $\varphi$  and  $\psi$  classical:



$p$



$q$



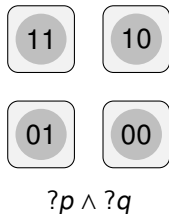
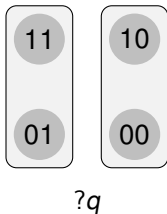
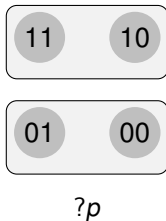
$p \wedge q$

# Conjunction

## Definition

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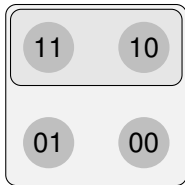
Example,  $\varphi$  and  $\psi$  inquisitive:



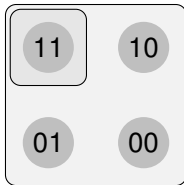
# Might

- $[\diamond\varphi] = [\varphi] \cup \{W\}$
- **Intuition:**  $\diamond\varphi$  proposes exactly the same updates as  $\varphi$ , but also offers the option to keep the common ground just as it is

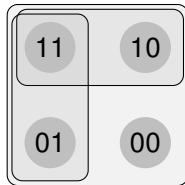
## Examples



$\diamond p$

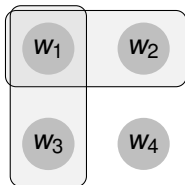


$\diamond(p \wedge q)$



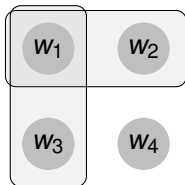
$\diamond(p \vee q)$

## Informative, inquisitive, and attentive content



- A sentence  $\varphi$  **draws attention** to all the possibilities in  $[\varphi]$
- Moreover, it **provides the information** that the actual world is contained in at least one of the possibilities in  $[\varphi]$
- and it **requests a response** that provides enough information to establish at least one of these possibilities

## Informative, inquisitive, and attentive content

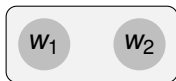


- A sentence  $\varphi$  **draws attention** to all the possibilities in  $[\varphi]$
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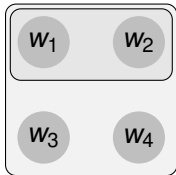
⇒ a single semantic object embodies informative, inquisitive, and attentive content

## Inquisitive content

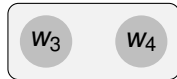
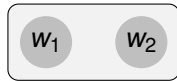
- $\varphi$  **requests a response** that provides enough information to establish at least one of the possibilities in  $[\varphi]$
- Sometimes, it suffices to **accept** the information that  $\varphi$  itself already provides
- If **additional information** is required, we call  $\varphi$  **inquisitive**



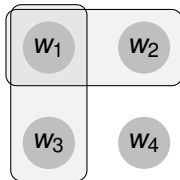
non-inquisitive



non-inquisitive

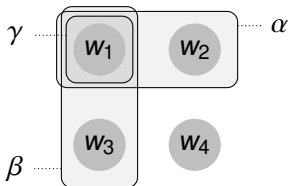


inquisitive



inquisitive

## Alternative and residual possibilities



Three possibilities:

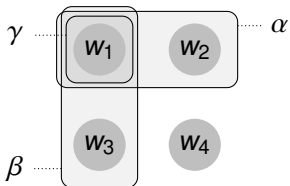
$$\alpha = \{w_1, w_2\}$$

$$\beta = \{w_1, w_3\}$$

$$\gamma = \{w_1\}$$

- Providing the information that at least one of  $\{\alpha, \beta, \gamma\}$  contains the actual world is the same as providing the information that at least one of  $\{\alpha, \beta\}$  contains the actual world
- Requesting a response that establishes at least one of  $\{\alpha, \beta, \gamma\}$  is the same as requesting a response that establishes at least one of  $\{\alpha, \beta\}$
- So  $\gamma$  does not play a role in determining the informative or inquisitive content of this proposition

## Alternative and residual possibilities



Three possibilities:

$$\alpha = \{w_1, w_2\}$$

$$\beta = \{w_1, w_3\}$$

$$\gamma = \{w_1\}$$

- In general, for any proposition  $[\varphi]$ , we can distinguish:
- **Alternative possibilities**
  - not properly contained in a maximal possibility in  $[\varphi]$
  - completely determine the **informative & inquisitive content** of  $\varphi$
- **Residual possibilities**
  - properly contained in a maximal possibility in  $[\varphi]$
  - only play a role in capturing the **attentive content** of  $\varphi$



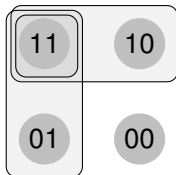
# Inquisitive, informative, and attentive sentences

## Definitions

- $\varphi$  is **informative** iff it eliminates at least one world, i.e.,  $\cup[\varphi] \neq W$
- $\varphi$  is **inquisitive** iff  $[\varphi]$  contains at least two alternative possibilities
- $\varphi$  is **attentive** iff  $[\varphi]$  contains at least one residual possibility

## Example

- $p \vee q \vee (p \wedge q)$  “ $p$  or  $q$  or both”  
informative, inquisitive, and attentive

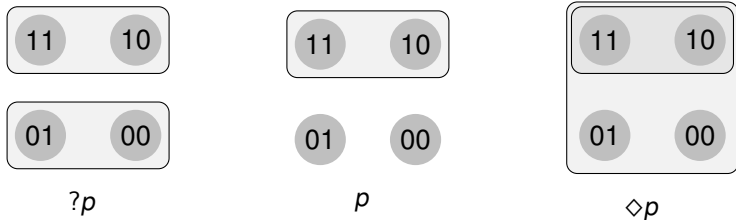


# Questions, Assertions, and Conjectures

## Definitions

- $\varphi$  is a **question** iff it is **neither informative nor attentive**
- $\varphi$  is an **assertion** iff it is **neither inquisitive nor attentive**
- $\varphi$  is a **conjecture** iff it is **neither informative nor inquisitive**

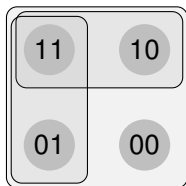
## Examples



## Might and conjectures

Every *might* sentence is a conjecture

- $\diamond\varphi$  is never informative
- $\diamond\varphi$  is never inquisitive
- So  $\diamond\varphi$  is always a conjecture



$\diamond(p \vee q)$

Every conjecture can be expressed by a *might* sentence

- $\varphi$  is a **conjecture** if and only if  $\varphi \equiv \diamond\varphi$

# Closure properties of conjectures

For any  $\varphi$  and  $\psi$ :

- $\diamond\varphi$  is a conjecture;
- if  $\varphi$  and  $\psi$  are conjectures, then so is  $\varphi \wedge \psi$ ;
- if at least one of  $\varphi$  and  $\psi$  is a conjecture, so is  $\varphi \vee \psi$ ;

## Examples

- |      |   |                                |
|------|---|--------------------------------|
| (14) | John might be in London.                    | $\diamond p$                   |
| (15) | John might be in London and Bill in Paris.  | $\diamond p \wedge \diamond q$ |
| (16) | John is in London, or he might be in Paris. | $p \vee \diamond q$            |

## *Might* meets disjunction and conjunction

Zimmermann's (2000)

The following are all **equivalent**:

- (1) John might be in London **or** in Paris.  $\diamond(p \vee q)$
- (2) John might be in London **or** he might be in Paris.  $\diamond p \vee \diamond q$
- (3) John might be in London **and** he might be in Paris.  $\diamond p \wedge \diamond q$

# Might meets disjunction and conjunction

## Further observation

- For the equivalence to go through, it is crucial that John **cannot** be **both** in London and in Paris at the same time

## Szabolcsi's scenario

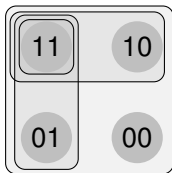
- We need an English-French translator, i.e., someone who speaks *both* languages. In that context, (8) is perceived as a useful recommendation, while (6) and (7) are not.

(6) John might speak English **or** French.  $\diamond(p \vee q)$

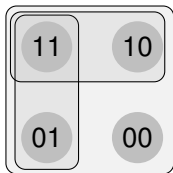
(7) John might speak English **or** he might speak French.  $\diamond p \vee \diamond q$

(8) John might speak English **and** he might speak French.  $\diamond p \wedge \diamond q$

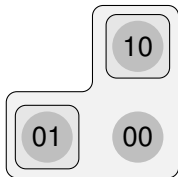
## Might meets disjunction and conjunction



(a)  $\diamond p \wedge \diamond q$



(b)  $\diamond p \vee \diamond q$   
 $\equiv \diamond(p \vee q)$



(c)  $\diamond p \wedge \diamond q$   
 $\equiv \diamond p \vee \diamond q$   
 $\equiv \diamond(p \vee q)$

- Whenever the disjuncts are mutually exclusive, as in (c), all three sentences are indeed equivalent
- If the disjuncts are not mutually exclusive, then  $\diamond p \wedge \diamond q$  differs from the other two in that it draws attention to the possibility that  $p$  and  $q$  both hold.
- This is what makes  $\diamond p \wedge \diamond q$  a useful recommendation in Szabolcsi's scenario

## Might meets negation

### Basic observation

Standard sentential negation never takes scope over *might*

(17) John might not be in London.  $\diamond\neg p$

### Crucially

*Might*  $\neq$  'it is consistent with my information that'

(18) It is not consistent with my information  
that John is in London.  $\neg \text{CONSISTENT } p$

### Explanation

$\neg\diamond\varphi$  is always a contradiction

See the paper for similar, but more complex effects in conditionals



# Pragmatics

- Gricean pragmatics generally assumes a truth-conditional semantics, which captures only informative content
- Gricean pragmatics is a pragmatics of providing information
- Inquisitive semantics enriches the notion of semantic meaning
- This requires an enrichment of the pragmatics as well
- We need not just a pragmatics of providing information, but rather a pragmatics of exchanging information

# Inquisitive pragmatics (sketch)

## Quality

Maintain the common ground and your own information state.

- **Be sincere** (speaker oriented)
  - Only assert what you take yourself to know
  - Only ask what you don't know
  - Only draw attention to 'live' possibilities
- **Be transparent: signal inconsistency** (hearer oriented)  
Reject an update if it is inconsistent with your information state

# Inquisitive pragmatics (sketch)

## Relatedness/compliance

- The semantics naturally gives rise to a formal notion of **relatedness/compliance**

## Quantity

- Among all the compliant and sincere responses to a given (possibly implicit) question under discussion, there is a general preference for **more informative** responses

## Back to *might*: three basic observations

(19) John might be in London.

### Possibility

- (19) signals that the speaker considers it **possible** that John is in London  
  
⇒ point of departure for a **modal** analysis of *might*

## Back to *might*: three basic observations

(19) John might be in London.

### Consistency test

- (19) imposes a **consistency test** on the hearer: if her information state is inconsistent with John being in London, she must report this

⇒ point of departure for Veltman's **update semantics** of *might*

## Back to *might*: three basic observations

(19) John might be in London.

### Ignorance

- (19) typically signals that the speaker is **ignorant** as to whether John is in London or not  
⇒ typically analyzed as a **Gricean implicature**

# The inquisitive account

(19) John might be in London.

## Possibility

- (19) signals that the speaker considers it **possible** that John is in London
- Follows directly from **sincerity**
- Unlike the modal analysis, this account directly extends to:

(20) John might be in London or in Paris.

# The inquisitive account

(19) John might be in London.

## Consistency test

- (20) imposes a **consistency test** on the hearer: if her information state is inconsistent with John being in London, she must report this
- Follows directly from **transparency**
- Unlike update semantics, this account directly extends to:

(20) John might be in London or in Paris.



# The inquisitive account

(19) John might be in London.

## Ignorance

- (20) typically signals that the speaker is **ignorant** as to whether John is in London or not
- Follows from the **quantitative preference** for more informative compliant moves

# Division of labor

## Inquisitive semantics

- Specifies which proposals are expressed by which sentences

## Inquisitive pragmatics

- Specifies what a context—in particular, the common ground and the speaker's information state—must be like in order for a certain proposal to be made
- ... and how a hearer is supposed to react to a given proposal, depending on the common ground and her own information state.

## Final remarks

- The idea that the core semantic contribution of *might- $\varphi$*  lies in its potential to draw attention to certain possibilities has been entertained before
- For instance, Groenendijk, Stokhof, and Veltman (1996) write:

*“in many cases, a sentence of the form might- $\varphi$  will have the effect that one becomes aware of the possibility of  $\varphi$ .”*

- Similar ideas can be found in more recent work:  
e.g. Swanson (2006), Franke and de Jager (2008),  
Brumwell (2009), Dekker (2009)
- Related ideas in the literature on evidentials  
(Murray, 2010; Faller, 2002)

## Final remarks

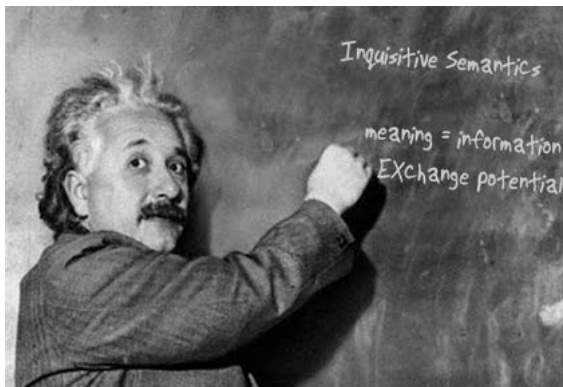
- However, Groenendijk, Stokhof, and Veltman continue to point out that their framework

*“is one in which possible worlds are total objects, and in which growth of information about the world is explicated in terms of elimination of worlds. Becoming aware of a possibility cannot be accounted for in a natural fashion in such an eliminative approach. It would amount to extending partial worlds, rather than eliminating total ones. To account for that aspect of the meaning of might a constructive approach seems to be called for.”*

## Final remarks

- We have taken a different route
- Possible worlds are still total objects
- Growth of information still amounts to eliminating worlds
- **What has changed is the very notion of meaning**
- No truth-conditions, no information change potential, but rather **information exchange potential**
- This shift in perspective immediately facilitates a perspicuous account of *might*, and of attentive content more generally

Thank you



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