

A Logic for “Reading Between the Lines”

Human Communication 1
Lecture 24

12/03/09

Susen Rabold

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What We’ll Do

- Review Grice’s Maxims.
- Observe how they can give conflicting clues about what a text means, with the conflict arising from:
 - World knowledge;
 - Conflict within the maxims themselves.
- Suggest a way of dealing with this conflict systematically, so that we “automate” reading between the lines.

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Grice’s Maxims (a)

- **The Maxim of Quality**
 - Try to make your contribution one that is true, specifically:
 - (i) do not say anything you think is false.
 - (ii) do not say anything for which you lack adequate evidence.
- **The Maxim of Quantity**
 - Make your contribution as informative as is required for the current purposes of the exchange, and no more.

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Grice’s Maxims (b)

- **The Maxim of Relevance**
 - Make your contributions relevant.
- **The Maxim of Manner**
 - Be perspicuous, and specifically:
 - (i) avoid obscurity
 - (ii) avoid ambiguity
 - (iii) be brief
 - (iv) be orderly

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Review: Examples (a)

- They show us how to “read between the lines”.
(1) *Max stood up. John greeted him.*
 - **Be orderly**: standing up before greeting.
- They allow us to infer things from what’s not said.
(2) A: *Can you tell me the time?*
B: *The milkman has come*
 - **Quality and Quantity**: B doesn’t know the exact time, because he doesn’t say it!

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Review: Examples (b)

- (3) Alf: *Keith supervises 12 students.*
- **Quality and Quantity**: Alf believes Keith supervises exactly 12 students, because if he believed that he supervised more, he would have said so.

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Conflict (a)

- Clues about meaning from the maxims sometimes conflict with other clues from other information.
- Sometimes, the conflicting clue is “hard and fast”, and the information it stems from is certain.

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Conflict (b)

- Sometimes the conflicting information is like the maxims, in that it also is a rule with exceptions.
- Sometimes, the maxims conflict with themselves: e.g., be orderly conflicts with be relevant.

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Conflict with “Hard and Fast” Rule (a)

- (4) a. *The lone ranger jumped on his horse.*
b. *He rode into the sunset.*
→ **Be Orderly**: (4a) is before (4b)

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Conflict with “Hard and Fast” Rule (b)

- (5) a. *Before the lone ranger rode into the sunset,*
b. *he jumped on his horse in a reckless fashion.*
→ **Be Orderly**: (5a) is before (5b)
→ **“Before”**: (5b) is before (5a)
→ **Before** wins, because there are no exceptions to **Before a, b** meaning that b is before a, whereas **Be orderly** is just a rule of thumb.

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When the Conflicting Information isn't Explicit (a)

- (1) a. *Max stood up.*
b. *John greeted him.*
→ **Be Orderly**: a is before b.
(6) a. *Max fell.*
b. *John pushed him.*
→ **Be Orderly**: a is before b.
→ **Be Relevant**: pushing and falling connected somehow. . .

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When the Conflicting Information isn't Explicit (b)

- **World Knowledge**: . . . and most plausible connection is pushing caused the falling.
- **Be Orderly**: a is before b World Knowledge and
- **Be relevant**: b is before a
- **WK and be relevant** win, in this discourse context.

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Discourse Context

The discourse context can change the result

→ Pushing is **before** falling:

(6) *Max fell. John pushed him.*

→ Falling is **before** pushing:

(7) *John and Max were at the edge of the cliff.
Max felt a sharp blow on the back of his neck.
He fell.*

John pushed him.

Max fell over the edge of the cliff.

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The Conflicting Information isn't Explicit Again

(8) a. *Max ate a huge meal last night.*

b. *He devoured lots of salmon.*

→ **Be Orderly**: a is before b

→ **WK** and **be relevant**: b is part of a

→ **WK** and **relevance** win again.

– Why?

– How can we model this?

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Review: What Syntax Tells Us About Meaning

- TIME is central to (1), (6) and (8).
- TENSE tells us about time.
- Our grammar hasn't encoded how tense affects meaning.

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Assumptions About What Syntax Tells Us (a)

We will assume syntax tells us:

1. The bits of meaning our grammar has encoded so far.
2. The following things about time:
 - (a) If the sentence is in the past tense: event is prior to time of speech, *Max fell*.
 - (b) If the sentence is in the present tense: event is at the time of speech, *Max falls*.
 - (c) If the sentence is in the future tense: event is after the time of speech, *Max will fall*.

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Assumptions About What Syntax Tells Us (b)

3. The textual order of the events described.
 4. That events described in juxtaposed sentences must be connected somehow:
 - causal relation; or
 - part/whole relation; or . . .
- Other knowledge tells us more about meaning.
- The order in which the events occur.

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Reasoning with Rules that Have Exceptions (a)

- Rules with exceptions are **DEFAULT RULES**.
- **Be Orderly** is a default rule.
- Exceptions can stem from:
 - tense of the sentence;
 - connective like before or while
 - world knowledge about causation
 - and more. . .

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Reasoning with Rules that Have Exceptions (b)

- We need to reason “automatically” about when the default clue wins out.
- If we had to resolve conflict “manually” a computer couldn’t do it.

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The Patterns Of Inference We Need to Model (a)

- *Birds fly* is another rule with exceptions. . .
- **Defeasible Modus Ponens**
 - Birds fly
 - Tweety is a bird
 - So: Tweety flies
- **Defeat of Defeasible Modus Ponens**
 - Birds fly
 - Tweety is a bird
 - Tweety doesn't fly
 - So: Tweety doesn't fly

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The Patterns Of Inference We Need to Model (b)

- **The Penguin Principle**

All birds are penguins

Birds fly

Penguins don't fly

Tweety is a penguin

So: Tweety doesn't fly

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More Patterns of Inference (a)

- **The Nixon Diamond**

Quakers are pacifists

Republicans are hawks

Nixon is a Quaker

Nixon is a Republican

So: we conclude nothing about whether Nixon is a pacifist or not

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More Patterns of Inference (b)

- *Birds fly* \approx *If Tweety is a bird, then normally Tweety flies*

A Gricean Maxim as a Default rule:

- **Be Orderly**: If the event e_1 is described in a text just before the event e_2 is described, then normally, e_1 occurs before e_2 in the world.

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More Default Rules for Extracting Meaning From Text

A Mixture of Relevance and Causal Knowledge:

- **Push Law**: If the event e_1 is described in a text just before the event e_2 , and moreover, e_1 is an x falling event, and e_2 is a y pushing x event, then normally, e_2 caused e_1 .

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More Default Rules for Extracting Meaning From Text

Indefeasible Causal Knowledge:

- **Causes Precede Effects:** If e_2 causes e_1 , then (without exception), e_2 precedes e_1 .

Things to Note:

- **Push Law** is quite specific, but it could be generalised.
- The consequents of **Be Orderly** and **Push Law** conflict.
- The *if*-clause of the **Push Law** entails that of **Be Orderly**.

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Working Out What a Text Means (a)

- (1) a. *Max stood up.*
b. *John greeted him.*
- (6) a. *Max fell.*
b. *John pushed him.*
- (1) and (6) have same syntax, and so you extract similar meaning from this:
 - two events are connected, and happen in the past.

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Working Out What a Text Means (b)

- Default rules and reasoning distinguish them.

(1):

- Rules that apply: **Be Orderly**
- Inference Pattern: **Defeasible Modus Ponens**
- Result: the standup precedes the greeting.

(6):

- Rules that apply: **Be Orderly**, **Push Law**
- Inference Pattern: **The Penguin Principle**
- Result: the pushing causes/precedes the falling.

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Changing Context Can Change Meaning

- (7) *John and Max were at the edge of the cliff.*
Max felt a sharp blow on the back of his neck.
He fell.
John pushed him.
Max fell over the edge of the cliff.
- Things in discourse context will make other default rules apply.
 - This changes the inference pattern.
 - This changes the conclusions.

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More Penguins (a)

- (8) a. *Max ate a gourmet meal.*
b. *He devoured lots of salmon.*
- **Meal Law:** If an event e_1 is described just before the event e_2 , where e_1 is the event of x eating a meal, and e_2 is the event of x devouring something, then normally:
 - (i) e_2 is part of the event e_1 , and
 - (ii) the devoured item was part of the meal.

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More Penguins (b)

- Rules that apply: **Be Orderly, Meal Law.**
 - Inference Pattern: **The Penguin Principle.**
 - Result:
 - (i) devouring salmon is part of eating the meal.
 - (ii) salmon is part of the meal.
- The Penguin Principle means you never ignore clues that are relevant for working out what a text means.*

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Nixon Diamonds and Odd Texts/Jokes (a)

- (9) a. *Max ate a gourmet meal.*
b. *?He devoured a rubber tyre.*
- Rubber Tyre: If x is a gourmet meal and y is a rubber tyre, then normally, y is not part of x .
 - Rules that apply: **Be Orderly, Meal Law, Rubber Tyre**

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Nixon Diamonds and Odd Texts/Jokes (b)

- Inference Pattern: **Irresolvable Conflict/ "Nixon Diamond"**
 - Result: No conclusions about the connection.
- ➔ This makes the text sound odd, or like a joke.

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Another “Joke” (a)

(10) *John likes mustard on his thighs, but Bill prefers suntan lotion.*

- Clues for how to interpret thighs:
 - Mustard: favour chicken.
 - Suntan tan lotion: favour human.
 - Both clues are default.
 - They conflict with each other.
- Inference Pattern: **Nixon Diamond**.

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Another “Joke” (b)

- Conclusion: Don’t know if the thighs are chicken or human.
- Word pun!

Nixon Diamond is the key to jokes!

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Bigger Discourse (a)

- So far, we’ve only looked at connections between sentences that are next to each other.
- But sometimes, a sentence connects with an earlier sentence than the previous one.
- (11) a. *I have several hobbies.*
b. *I collect classic cars.*
c. *My favourite car is a 1968 Alfa Romeo spider.*
d. *I also take Ceroc classes every Wednesday night.*

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Bigger Discourse (b)

- (11d) elaborates hobbies I have (i.e., (11a)), rather than talk about cars.
- Evidence for this discourse popping:
 - (11c,d) on its own would sound odd.
 - (11a,b,d) makes sense.

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Summary (a)

- People read a lot of information between the lines.
- Lots of background knowledge helps us do this.
- Grice's maxims;
 - world knowledge;
 - knowledge of the speaker's beliefs;
 - and more. . .
- Sometimes, they give conflicting clues.

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Summary (b)

- Grice didn't explain how to deal with this conflict.
- One way is to do it with logics designed to reason with conflicting defaults:
 - The Penguin Principle means you never ignore relevant information for working out what a text means.
 - The Nixon Diamond underlies word puns.
- When you get bigger spans of text, you must decide which sentences go together.

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