“On the one hand” as a Cue in the Comprehension of Discourse Structure

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Prediction during language comprehension:

- ample evidence for anticipation within sentence
- **prediction of sounds**: prediction of onset sound given constraining context (DeLong et al., 2005)
- **prediction of words**: anticipatory eye-movements (Kamide et al.)
- **prediction of structure**: structural prediction (Staub and Clifton, 2006)
Prediction during language comprehension:

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- prediction of sounds: prediction of onset sound given constraining context (DeLong et al., 2005)
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- prediction of structure: structural prediction (Staub and Clifton, 2006)
Empirical Evidence forIncrementality and Prediction

Visual world experiment: **anticipatory eye-movements** show that people predict subsequent input (Kamide et al. 2003)

Experimental Findings: Incrementality and Prediction

“Der Hase frisst gleich den Kohl.”
The Hare-nom will eat soon the cabbage-acc.

“Den Hasen frisst gleich der Fuchs.”
The Hare-acc will eat soon the fox-nom.
Either...or processing: faster reading at or-NP (Staub & Clifton, 2006)

Experimental Finding: Prediction

- **processing facilitation** through prediction
- The presence of “either” leads to shorter fixation times on “or” and the second conjunct.

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Peter read either a book or an essay in the school magazine.
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Peter read a book or an essay in the school magazine.
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Can we find evidence for prediction of discourse relations between sentences?

- in discourse distances can be much longer
- discourse is structurally not as constraining as syntax
Prediction of Discourse Relations

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But:

- evidence for prediction from general context onto content
  (van Berkum et al., 2005)
- there are examples of strong constraints
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  **On the one hand ... on the other hand.**
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**On the one hand ... on the other hand.**

Questions:

- Is there evidence for prediction of “on the other hand” specifically?
- Is there evidence for prediction of CONTRAST more generally?
- Do people construct fine-grained expectations of the scope of contrast?
What we do know

What we know:

- local cues can affect anticipation of discourse relations
  (Kehler et al., 2008; Rohde & Horton, 2014)

- discourse connectors can constrain expectations on upcoming content
  (Köhne & Demberg, 2013; Drenhaus et al, 2014; Xiang & Kuperberg, 2014)
Local Cues drive expectations of discourse relations

Verb semantics

Implicit causality / non-IC contexts:

John detested / babysat Mary

Verb aspect

Transfer-of-possession contexts:

John handed / was handing a book to Bob

(Kehler, Kertz, Rohde, & Elman, 2008)
Evidence of expectations during online processing

Rohde & Horton 2014:

- Eyetracking paradigm with one region=Explanation and other region=Occasion
- Cause-favoring verbs (Implicit causality) vs Occasion-favoring (transfer-of possession)

John detested Mary.

Joe handed a book to Sue.
Steffen would like a small snack. He’d like something sweet/salty. **Therefore** / **However**, he gets from the kitchen a yummy waffle / cake / cheese / pretzel.

(Köhne and Demberg, 2013)
Mr. Brown was planning to look for new glasses and shoes today. The glasses really are more urgent.

*Causal*

- **Therefore**, he now heads towards an optician / a shoe shop

*Concessive*

- **However**, he now heads towards a shoe shop / an optician that a friend recommended.

(Drenhaus, Demberg, Köhne, Delogu 2014)
concessive vs. causal condition on discourse connector.

Late positivity at concessive connector compared to causal connector.
concessive vs. causal condition on discourse connector.

Late positivity at concessive connector compared to causal connector.
ERPs on connector (0 – 1200ms)

**concessive** vs. **causal** condition on discourse connector.

Late positivity at **concessive connector** compared to causal connector.
- re-interpretation / reconstruction of inner representation
- search for alternatives
Experiment 1: Self-paced reading

Objectives

- Does “On the one hand” predict “On the other hand”? 
- If there is a non-OTOH contrast in between, what happens to the prediction?

1) Introduction  Joe was interested in a car.
2) OT1H        On the one hand, he would like to buy it,
   a) Cause      because it looks flashy.
   b) Contrast   but he might try leasing it first.
3) OTOH         On the other hand, it doesn’t get very good milage.
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   Joe was interested in a car.

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   On the one hand, he would like to buy it,
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      but he might try leasing it first.

3) OTOH
   On the other hand, it doesn’t get very good milage.

   critical region ↑
Method and Results

- region-by-region self-paced reading
- 60 participants, 20 items, each participant saw 6 items
- IbexFarm

Longer reading times on "on the other hand" if preceded by contrast. RT effect on "on the other hand", signif. at $p < 0.05$.
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Conclusions and Open Questions

- longer reading times of “on the other hand” following a contrast → expectation of contrast already satisfied.

Open Questions:

- Structural detail of contrast prediction: Would we find higher difficulty for a global contrast than a local contrast?
- Prediction of “On the one hand”: Do we find faster reading times when “On the one hand” is present?
Conclusions and Open Questions

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  → expectation of contrast already satisfied.

Open Questions:

- **Structural detail of contrast prediction:**
  Would we find higher difficulty for a global contrast than a local contrast?

- **Prediction of “On the other hand”:**
  Do we find faster reading times when “On the one hand” is present?
1) **Introduction**

Jon is from Spain and is considering going to a Scottish ceilidh, to dance and listen to music.

2) **OT1H**

On the one hand, he thinks it might be a lot of fun, because he’s heard great stories about these parties from his brother.

   a) **But local**

   But he does not have the same taste in music as his brother.

   b) **But global**

   But he doesn’t know anybody else who will be there.

   c) **Also**

   Also, he would like to learn more about Scottish culture.

3) **OTOH**

**On the other hand,** he’s really worried about other people seeing his underwear when dancing with a kilt.

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Demberg, Rohde, Scholman et al. (DE, UK, NL)

Expectations in Discourse

Louvain, 26 Jan 2015
Jon is from Spain and is considering going to a Scottish ceilidh, to dance and listen to music.

On the one hand, he thinks it might be a lot of fun, because he’s heard great stories about these parties from his brother.

  a) But local But he does not have the same taste in music as his brother.
  b) But global But he doesn’t know anybody else who will be there.
  c) Also Also, he would like to learn more about Scottish culture.

On the other hand, he’s really worried about other people seeing his underwear when dancing with a kilt.

Predictions for On the other hand

if structural prediction of contrast: But global > But local = Also
if structure-agnostic prediction of contrast: But global = But local > Also
Method, Participants

- Eye-tracking with Eyelink 1000 tracker
- at the University of Edinburgh
- 39 participants (7 excluded before analysis)
- 24 items
Results: Global / Local contrast

Local But

- Intro
- OT1H
- Cause
- But

Global But

- Intro
- OT1H
- Cause
- But
- OTOH

The graph below illustrates the contrast between local and global "But". The x-axis represents different regions of the discourse: 'Other hand pre-critical region', 'On the other hand', and 'Other hand spillover'. The y-axis represents the number of occurrence. The lines show the frequency of 'But' usage in both local and global contexts, with 'Also' one hand present also indicated.
1) Introduction

Jon is from Spain and is considering going to a Scottish ceilidh, to dance and listen to music.

2a) OT1H present
On the one hand, he thinks it might be a lot of fun,

2b) OT1H absent
He thinks it might be a lot of fun,

Cause
because he’s heard great stories about these parties from his brother.

Also
Also, he would like to learn more about Scottish culture.

3) OTOH

On the other hand, he’s really worried about other people seeing his underwear when dancing with a kilt.
1) Introduction
Jon is from Spain and is considering going to a Scottish ceilidh, to dance and listen to music.

2a) OT1H present
On the one hand, he thinks it might be a lot of fun,

2b) OT1H absent
He thinks it might be a lot of fun, because he’s heard great stories about these parties from his brother.

Also
Also, he would like to learn more about Scottish culture.

3) OTOH
On the other hand, he’s really worried about other people seeing his underwear when dancing with a kilt.

Predictions
if prediction of OTOH at OT1H: OT1H present < OT1H absent
if no prediction of OTOH at OT1H: OT1H present = OT1H absent
Results Eye-tracking Expt Prediction

No evidence for facilitation of OT1H when readers get to OTOH.

Demberg, Rohde, Scholman et al. (DE, UK, NL)
Result:
No evidence for facilitation of OT1H when readers get to OTOH.
Conclusions

Questions we wanted to answer:

- Prediction from OT1H for OTOH?
- Prediction of Contrast relation given OT1H?
- Online discourse structure processing: flat expectations or structure-sensitive?

Results:

- SPR study: prediction of contrast relation, which is satisfied by encountering some contrast (even if not marked with OTOH).
- ET study: structure-sensitive: local “but” does not interfere with OT1H expectation.
- ET study: no evidence for facilitation on OTOH given OT1H (null effect).
Thank you!
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