

Speakers' preference for (dis)fluency and its consequence for listeners

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October 7th, 2011

Outline

- 1 An introduction to disfluency (in dialogue)
 - What are disfluencies?
 - Two open questions
- 2 Production of disfluent speech
 - Strategic stopping
 - Corpus evidence
- 3 Comprehension of disfluent speech
 - Misrecognition of repairs?
 - Experimental evidence

Defining disfluency

phenomena that interrupt the flow of speech and do not add propositional content to an utterance (Fox Tree, 1995, p. 709)

Defining disfluency

A symptom of, or response to, difficulties in communication which interrupt the smooth flow of speech

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- Repairs

I don't suppose you've got [the balloons] the baboons

Defining disfluency

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- Repairs
- Repetitions

Right there's a there's a line about quarter of the way down

Defining disfluency

A symptom of, or response to, difficulties in communication which interrupt the smooth flow of speech

- Repairs
- Repetitions
- Fillers

Where is the top of the lemon grove uh in relation to the pyramid

Defining disfluency

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- Silent pauses

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- Repairs
- Repetitions
- Fillers
- Silent pauses
- Prolongations/Non-reduced vowels

Disfluencies in dialogue

- Disfluencies are a common part of spontaneous speech
 - 6 in every 100 words affected by disfluency (Fox Tree, 1995)
- Most spontaneous speech occurs in dialogue
- Important to understand production *and* comprehension of disfluent speech
 - And the role of certain disfluencies in dialogue

Are certain disfluencies used by speakers as signals?

- Hesitations may provide a commentary on linguistic performance (Clark, 1996)
 - Tend to precede descriptions of items with ambiguous, or low frequency, names (Schnadt & Corley, 2006; Hartsuiker & Notebaert, 2010)
 - More likely at the beginning of longer phrases and new clauses (Shriberg, 1996; Clark & Wasow, 1998)
 - The form a filler takes indicates the length of pause that will follow (Clark & Fox Tree, 2002)

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 - More likely at the beginning of longer phrases and new clauses (Shriberg, 1996; Clark & Wasow, 1998)
 - The form a filler takes indicates the length of pause that will follow (Clark & Fox Tree, 2002)
- No evidence that patterns of disfluencies differ between monologue and dialogue (Finlayson & Corley, submitted)

Can listeners use certain disfluencies to make predictions about upcoming speech?

- Fillers heighten attention toward the speech stream

(Collard et al., 2008)

- Unpredictable words are less “surprising” when preceded by a filler or silence

(Corley et al., 2007; MacGregor et al., 2010)

- May influence prediction when faced with a limited set of possible referents

(Arnold et al., 2004, 2007)

- However, original predictions may just be abandoned

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Correcting errors

When speakers make errors they must coordinate the task of interrupting themselves and replanning the utterance

I don't suppose you've got [the balloons] the baboons

- Main Interruption Rule: (Levelt, 1983)
 - Speakers interrupt themselves immediately upon detecting an error
 - And only then can they begin to replan

Zero cut-off-to-repair intervals

- Repairs frequently immediately follow interruptions

(Blackmer & Mitton, 1991)

- This shouldn't be possible according to MIR
- Suggests that replanning commences prior to interruption
- Raising the possibility of strategic stopping

Fluency vs Accuracy

- MIR encourages *accuracy* by minimising errorful speech
 - At the cost of increased silent pauses
- Speakers may, however, prefer to maintain *fluency* (i.e. minimise pauses)
 - By only interrupting when they're ready to resume
- Evidence has so far been mixed

(Hartsuiker et al., 2008; Seyfeddinipur et al., 2008)

Predictions I

Each account makes predictions about the relationship between cut-off-to-repair intervals and:

- Locus of interruption
 - mid-word or word-final
- Severity of repair
 - was original utterance abandoned entirely?

Predictions II

Locus of interruption

- Accuracy
 - Locus will have no effect on interval length
- Fluency
 - Word-final interruptions will have longer intervals

Predictions III

Severity of repair

- Accuracy
 - Intervals will be longer following major repairs
- Fluency
 - Major repairs will lead to longer intervals, but only for word-final interruptions

Predictions IV

Zero cut-off-to-repair intervals following mid-word interruptions

- Accuracy
 - Only possible with minor repairs
- Fluency
 - Severity has no effect on likelihood

Replanning

Do speakers retrace through erroneous content as part of the process of replanning?

- Cut-off-to-repair intervals reflect time spent replanning

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I don't suppose you've got [the balloons] the baboons
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Replanning

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I don't suppose you've got [the balloons] the baboons

I don't suppose you've got the [balloons] baboons

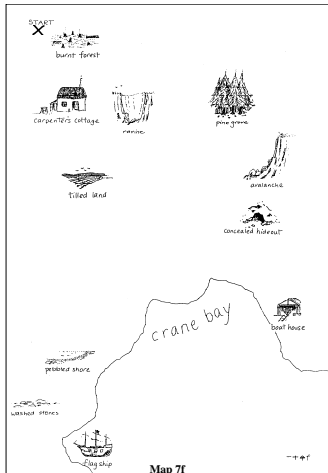
I don't suppose you've got [the big balloons] the big baboons

Replanning

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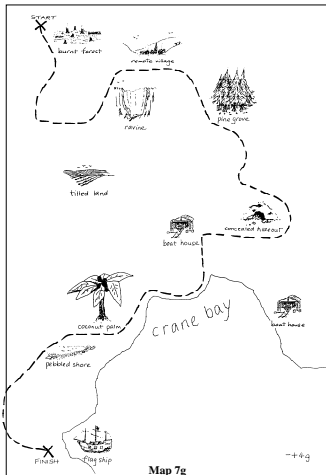
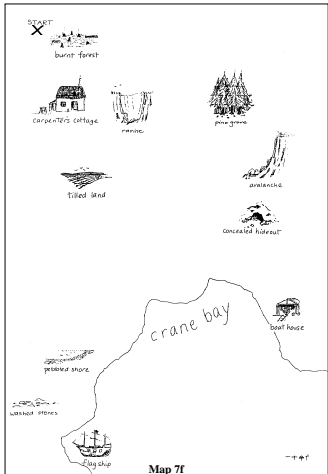
- Cut-off-to-repair intervals reflect time spent replanning
- If replanning involves retracing then we may expect a correlation between intervals and reparanda

Map Task corpus (Anderson et al., 1991)

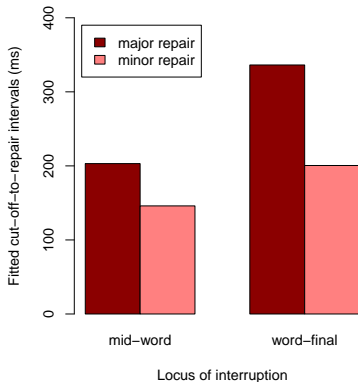


- 64 participants act as giver/follower of instructions
- Grouped in quads, consisting of pairs of friends/strangers
- Half of the quads performed task while unable to see each other
- 3020 self-corrected errors

Map Task corpus (Anderson et al., 1991)



Locus of interruption & Severity of repair



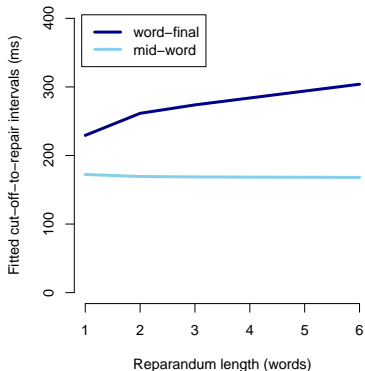
- Intervals were longer following word-final interruptions than mid-word ($p < .001$)
- Locus of interruption interacted with the severity of repair ($p < .05$)
- Effect of severity is greater for word-final interruptions, as predicted by the fluency account

Zero cut-off-to-repair intervals

The *accuracy* account, unlike the *fluency* account, predicts a difference between the frequency of minor and major repairs following mid-word interruptions

- 83 within-word zero cut-off-to-repair errors
 - Major: 34
 - Minor: 49
- Difference between major and minor repairs not significant ($\chi^2(1) = 2.706, p > .1$)

Retracing during replanning



- A linear relationship was found between reparandum length and cut-off-to-repair interval ($p < .01$)
- This interacted with locus of interruption ($p < .05$)
- Post-hoc tests reveal relationship is only present for major repairs

Discussion I

- Speakers in the MTC appear to prefer to maintain *fluency* when interrupting themselves following an error
 - Longer pauses following word-final interruptions
 - Severity of repair has a stronger influence for word-final interruptions
 - Zero cut-off-to-repair intervals equally likely for major and minor repairs
- When an utterance is abandoned entirely, replanning appears to involve retracing word-by-word through utterance
 - An interaction with locus further supports the *fluency* account

Discussion II

Why have previous studies found mixed results?

- Seyfeddinipur's *fluency* favouring evidence came from a corpus of dialogue
- Hartsuiker found evidence compatible with the *accuracy* account in an experimental monologue picture naming task
- In dialogue fluency may be more important
 - Pauses may cause speaker to lose their turn
- When the speaker's turn is "safe" (e.g. in monologue) accuracy may be preferable

How do listeners cope with speakers' preference for (dis)fluency?

An efficient solution

Listeners may not recognise erroneous speech

- They miss disfluencies deleted from transcribed speech

(Lickley, 1995)

- Fail to recognise repairs in “chunked” sentences

(Lickley & Bard, 1998)

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There's about ...

There's about ... You've

There's about ... You've got

There's about ... You've got a yacht club right

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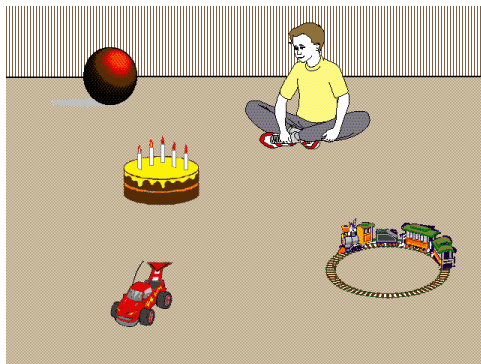
There's about ... You've got a yacht club right

However, these tasks test **offline** processes

Lingering effects of repairs

- Erroneous speech may influence comprehension (Corley, 2010)

Altmann and Kamide (1999)



The boy will eat the cake
The boy will move the cake

Lingering effects of repairs

- Erroneous speech may influence comprehension (Corley, 2010)
- Listeners' heard either:
 - *The boy will [eat uh] move the cake*
 - *The boy will eat and move the cake*
 - *The boy will eat the cake*
 - *The boy will move the cake*

Lingering effects of repairs

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- Listeners' heard either:
 - *The boy will [eat uh] move the cake*
 - *The boy will eat and move the cake*
 - *The boy will eat the cake*
 - *The boy will move the cake*
- More fixations to the cake where restrictive verb was present
 - Even if it was repaired
- “Deleted” words may inform comprehension (Lau & Ferreira, 2005)

What about **repeated** words?

Repetition deafness

- Repetitions are particularly sensitive to being misrecognised (Lickley, 1995; Lickley & Bard, 1998)
- Consequences for comprehension
- What happens to listeners' predictions when relevant information is disfluently repeated?

Some preliminary data. . .

Multiple sources of information



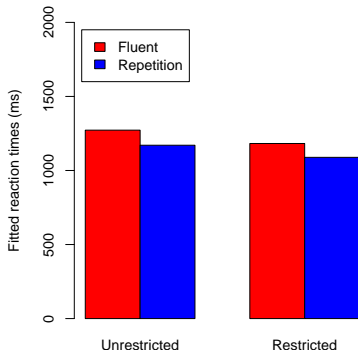
The boy will eat a eat a cake

The boy will move a move a cake

The boy will eat a cake

The boy will move a cake

Results



- Listeners' clicked on the target faster with a restrictive verb ($p < .001$)
- Responses were *faster* with repetitions ($p < .01$)
- However, no interaction between the two ($p = .92$)

Discussion I

- Identification of target is facilitated by the presence of a restrictive verb
- Repetitions appear to also have facilitatory powers
 - Despite generally being more-likely to be misrecognised

... Eye-movement data to come!

Discussion II

Why might repetitions facilitate identification?

- 1 Hearing the material twice?
- 2 Repetitions “grab” attention?

Discussion III

- Absence of an interaction
 - No help from hearing restrictive verb twice
- Hearing any verb twice helps
- Supports “attention grabbing” account
 - However, ERP evidence suggests fillers and repetitions are different
- Still an open question!

(MacGregor, Corley, & Donaldson, 2009)

Conclusion

Pulling together the loose threads. . .

- Speakers have a preference for (dis)fluency
 - In how they manage repairs
 - Perhaps also in how they manage dialogue more generally

Conclusion

Pulling together the loose threads. . .

- Speakers have a preference for (dis)fluency
 - In how they manage repairs
 - Perhaps also in how they manage dialogue more generally
- Listeners' cope with this
 - Maybe even receiving benefits
 - But a lot still to learn about *how*

Thanks!

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