Contextual Effects on Prosodic Prominence: Why Accessibility is no Alternative to Alternatives

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Outline

1. Focus Theory vs. Processing Explanations
2. Some Experimental Evidence for Alternatives
3. Cross-linguistic differences: English vs. French
In English, the last word in a sentence is typically ‘accented’—it is relatively prominent and there is a pitch excursion on it (marked by small caps):

– Anything you’d like?
– I’d love some COFFEE.
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However, if a constituent refers to information that is salient in the discourse (a ‘given’ constituent), it is typically less prominent and often left unaccented (marked by underlining):

– Would you like some coffee?
– I would LOVE some coffee.
Contextual Effects on Prosody: Givenness

Leaving words that encode salient information unaccented (‘marking givenness’ or ‘anaphoric destressing’) is often obligatory:

– Would you like some coffee?
– # I would like/love SOME COFFEE.
Contextual Effects on Prosody: Givenness

Leaving words that encode salient information unaccented (‘marking givenness’ or ‘anaphoric destressing’) is often obligatory:

– Would you like some coffee?
– # I would like/love SOME COFFEE.

...unless there is a contrast, which overrides the need to mark givenness:
– Coffee or tea?
– I would love SOME COFFEE.
Another typical contextual effect on prosody is what is often called ‘question-answer-congruence’:
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- Who invited Sally?
- Jill invited Sally.

- Who did Jill invite?
- Jill invited SALLY.
Another typical contextual effect on prosody is what is often called ‘question-answer-congruence’:

- Who invited Sally?
- JILL invited Sally.

- Who did Jill invite?
- Jill invited SALLY.

Whether this effect is the same as the givenness-effect is controversial, and we’ll get back to this in the last lecture (but I will assume that they are for the time being).
Outlook for the Class

- Friday: Contextual Effects on Prosodic Prominence: Why Accessibility is no Alternative to Alternatives
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- Saturday: A givenness illusion and its repercussions for focus theory.
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- Saturday: A givenness illusion and its repercussions for focus theory.
- Sunday: Givenness/Question-Answer Congruence/Contrastive Focus: Are they the same or not?
1 Focus Theory vs. Processing Explanations

2 Some Experimental Evidence for Alternatives

3 Cross-linguistic differences: English vs. French
We can distinguish (at least) two types of approaches that try to explain contextual effects on prosody:
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- Accounts that posit a grammatical mechanism of encoding focus and/or givenness
- Accounts that try to explain contextual effects by processing factors.
The Alternatives Theory of Focus

- The grammatical theory we'll assume is the alternatives-theory of focus of Rooth (1992), with some modifications.
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- It's based on the idea that the interpretation of certain utterances involves linguistic meaning above and beyond their literal meaning: They require reference to a set of alternatives.
- With prominence on an adjective rather than the head noun, e.g., a set of propositions with varying adjectives is evoked:

  – She owns a **blue** bicycle.

  Alternatives:
  `{ She owns a yellow bicycle, She owns a red bicycle, She owns a green bicycle, ... }"
The alternatives theory of focus makes particular assumptions about how to implement this basic idea:

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- An alternatives-set for each constituent constituent is created by substituting any focus-marked constituents within it by alternatives.
- Rooth (1992) uses a the focus operator $\sim$, which takes the alternative set of the constituent it attaches to as an argument and introduces the presupposition that an antecedent for the alternatives has to be salient in context.
The Alternatives Theory of Focus

(1) Does she own a yellow bicycle?
No, ∼[She owns a BLUE bicycle].
Focus condition introduced by ∼: There is an antecedent in the discourse context that is an element of the following set of alternatives:
{ She owns a yellow bicycle, She owns a red bicycle, ... }.
The Alternatives Theory of Focus

How does this account for Question-Answer Congruence?
The Alternatives Theory of Focus

How does this account for Question-Answer Congruence?
– Who invited Sally? → Question denotation: Set of alternatives of the form \{x \text{ invited Sally}\}
– \sim[JILLF invited Sally]. → Focus operator creates anaphoric relation to question denotation.
The Alternatives Theory of Focus

Experimental Evidence for focus theory: Breen et al. (2010), among many others.

(2)  – What did Damon fry last night?
     – **Damon fried** AN OMELETTE.
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- In this experiment and many others, the non-focused material is repeated.
- Could it be that repetition alone is responsible for prosodic reduction?
- ... or maybe the salience or *accessibility* of what the repeated string refers to?
Chafe (1974) related prosodic prominence to whether or not a constituent was already in the ‘conscience’ of a speaker.
Accessibility

- Chafe (1974) related prosodic prominence to whether or not a constituent was already in the ‘conscience’ of a speaker.
- Other authors attribute the effects to attentional ‘focus,’ as in work on ‘centering theory’ (Grosz et al., 1983, 1995) or ‘accessibility’ (Terken, 1984; Ariel, 1988).
Accessibility

Terken (1984) reports evidence that words that refer to previously mentioned topical referents tend to remain unaccented, and concludes that

‘speakers used accentuation to signal to the listener the degree of availability of the information conveyed: an accented expression signals to the listener that he cannot easily map the expression onto the information it refers to in the context; an unaccented expression signals to the listener that he can map the expression directly onto the intended information, since the information at that point in the utterance may be supposed to be maximally activated due to the preceding context.’
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Can this arguably extra-grammatical explanation replace theories of focus and givenness?
Accessibility

Dahan et al. (2002):

(3)  
   a. Antecedent in Theme Position:  
High Accessibility of *candle*:

Put the candle below the triangle.  
Now put the candle above THE SQUARE.

b. Antecedent in Goal Position:  
Low Accessibility of *candle*:

Put the necklace below the candle.  
Now put the CANDLE above THE SQUARE.
But: This could be an effect of focus:

(4)  a. Put the candle below the triangle.
Now, \(\sim[\text{put the candle above the } [\text{SQUARE}]_F]\).

b. Put the necklace below the candle.
Now, \(\sim[\text{put the } [\text{CANDLE}]_F \text{ above the } [\text{SQUARE}]_F]\).
Accessibility

Is it the intrinsic salience of certain thematic roles or focus? Let’s change the examples a bit:

(5)  
  a. Put the candle below the triangle.
  Now, ∼[put the \([\text{SQUARE}]_F\) above the \([\text{CANDLE}]_F\)].

  b. Put the necklace below the candle.
  Now, ∼[put the \([\text{SQUARE}]_F\) above the candle.]
Accessibility

Is it the intrinsic salience of certain thematic roles or focus? Let’s change the examples a bit:

(5)  

a. Put the candle below the triangle. 
   Now, \( \sim [\text{put the } [\text{SQUARE}]_F \text{ above the } [\text{CANDLE}]_F] \).

b. Put the necklace below the candle. 
   Now, \( \sim [\text{put the } [\text{SQUARE}]_F \text{ above the candle.}] \).

Clearly, the evidence that was used for accessibility was confounded in this case (and many others), and arguably a focus effect was at actually at play.
An important study within accessibility approach: Terken and Hirschberg (1994):

(6)  
**Given, Same Thematic Role**  
a. The cone touches the ball.  
The cross touches the ball.  
The diamond touches the ball.  
The star touches the ball.

b. **Given, Different Thematic Role**  
The ball touches the cone.  
The ball touches the cross.  
The ball touches the diamond.  
The star touches the ball.

c. **New**  
The cone touches the square.  
The cross touches the square.  
The diamoned touches the square.  
The star touches the ball.
Results:

<table>
<thead>
<tr>
<th>Position in Context</th>
<th>Position in Target Utterance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subject</td>
</tr>
<tr>
<td>Subject</td>
<td>2.1</td>
</tr>
<tr>
<td>Object</td>
<td>3.3</td>
</tr>
<tr>
<td>New</td>
<td>3.3</td>
</tr>
</tbody>
</table>

**Table:** Accentedness scores from Terken and Hirschberg (1994). A higher number reflects a higher rate of accentuation of the target word according to the scores of two annotators.
The hypothesis offered in Terken and Hirschberg (1994) in light of these results is framed in terms of accessibility: Antecedents that share certain properties are more accessible.
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The idea, based on a related proposal in Kameyama (1986), is that a target word is accessible only if its antecedent shared the properties of thematic role.

But: There is nothing in the accessibility view itself that would lead one to expect such a property-sharing restriction.
Furthermore: Even with this modification of accessibility theory it still remains unclear why there is no effect of previous mention when thematic roles were not shared.
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Especially in the case of subjects this goes against one of the main observations that centering theory and accessibility accounts were based on: Subjects are more likely to be pronominalized (Grosz et al., 1983, et. seq.).
Furthermore: Even with this modification of accessibility theory it still remains unclear why there is no effect of previous mention when thematic roles were not shared.

Especially in the case of subjects this goes against one of the main observations that centering theory and accessibility accounts were based on: Subjects are more likely to be pronominalized (Grosz et al., 1983, et. seq.).

Moreover, when thematic role was shared, why was it the case of an object-antecedent that lead to a greater rate of deaccentuation?
The observed effects can be accounted for in terms of focus theory:

(7)  

**Given, Same Thematic Role**  

a. The cone touches the ball.  
The cross touches the ball.  
The diamond touches the ball.  
\[\sim [[\text{The star}]] \text{ touches the ball}\]  

b. **Given, Different Thematic Role**  
The ball touches the cone.  
The ball touches the cross.  
The ball touches the diamond.  
\[\sim [[\text{The star}]] \text{ touches } [[\text{the ball}]]\]  

c. **New**  
The cone touches the square.  
The cross touches the square.  
The diamoned touches the square.  
\[\sim [[\text{The star}]] \text{ touches } [[\text{the ball}]]\]
Another Effect observed by Terken and Hirschberg (1994) is that persistence of surface position seems to matter:

(8) Effect of Surface Position
   a. **Object Antecedent, Target PP**
      The cone touches the ball.
      The cross touches the ball.
      The diamond touches the ball.
      The star pushes the square against the ball.
   b. **PP antecedent, Target Object**
      The cone pushes the rectangle against the ball.
      The cross pushes the line against the ball.
      The diamond pushes the triangle against the ball.
      *Target sentences:*
      The star touches the ball.
Accessibility

These effect of surface structure position might actually reveal focus structure as well, as long as we allow non-standard constituent structures (as they are needed for right-node raising anyway):
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These effects of surface structure position might actually reveal focus structure as well, as long as we allow non-standard constituent structures (as they are needed for right-node raising anyway):

(9) a. \(~[\text{The star } [\text{touches}]_F \text{ the ball}]\)
b. \(~[\text{The star } [\text{pushes the square against}]_F \text{ the ball}]\)
Lam and Watson (2010, 1140) argue that prosodic differences in the following types of examples show an effect of repetition:

(10)  
a. Repeated noun
The axe is shrinking . . . The axe is flashing.
b. Non-repeated noun
The penguin is shrinking . . . The axe is flashing.
Repetition

...but this could also be an effect of focus:

(11)  a. $\sim [\text{The axe is } [\text{flashing}]_F]$
        b. $\sim [\text{The } [\text{axe}]_F \text{ is } [\text{flashing}]_F]$
...but this could also be an effect of focus:

(11)  a. \( \sim [\text{The axe is } [\text{flashing}]_F] \)
b. \( \sim [\text{The [axe]}_F \text{ is } [\text{flashing}]_F] \)

In sum: Various studies arguing for accessibility effects on prosody were confounded with focus.
Outline

1. Focus Theory vs. Processing Explanations
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(12) a. 2 Repetitions, Antecedent in Same Position
Move the bed above the flag.
Now, move the bed above the house.
Now, move the bed above the pineapple.

b. 1 Repetition, Antecedent in Same Position
Move the piano above the flag.
Now, move the bed above the house.
Now, move the bed above the pineapple.

c. 2 Repetitions, Antecedent in Different Position
Move the piano above the bed.
Now, move the house above the bed.
Now, move the bed above the pineapple.

d. 1 Repetition, Antecedent in Different Position
Move the piano above the flag.
Now, move the house above the bed.
Now, move the bed above the pineapple.

e. New (No Repetition, No Antecedent for Reduction)
Move the piano above the flag.
Now, move the house above the bell.
Now, move the pineapple above the bed.
Predictions of Watson (2010):

\[(13) \quad 2\text{-Theme (a)} < 1\text{-Theme (b)} < 1\text{-Goal (d)} < \text{New (e)}\]
(14) Predictions of Focus Theory

a. 2 Repetitions, Different Position
Move the piano above the bed.
Now, move the house above the bed.
Now, $\sim$[move [the bed]$_F$ above [the pineapple]$_F$].

b. 1 Repetition, Different Position
Move the piano above the flag.
Now, move the house above the bed.
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c. 2 Repetitions, Same Position
Move the bed above the flag.
Now, move the bed above the house.
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Move the piano above the flag.
Now, move the bed above the house.
Now, $\sim$[move the bed above [the pineapple]$_F$].

e. No Antecedent
Move the piano above the flag.
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Now, $\sim$[move [the pineapple]$_F$ above [the bed]$_F$].
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Mixed model regressions were fitted to test for effects.
Results from Wagner & Klassen 2012

- **Intensity**
  - No Antecedent
  - Different
  - Same

- **Duration**
  - No Antecedent
  - Different
  - Same

- **Pitch**
  - No Antecedent
  - Different
  - Same
There was significant effect of focus.
There was significant effect of focus.
There was no effect of repetition or accessibility.
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But: The predictions of accessibility and focus were partially aligned.
Focus Theory vs. Processing Explanations
Some Experimental Evidence for Alternatives
Cross-linguistic differences: English vs. French

Results from Wagner & Klassen (2012)

- There was significant effect of focus.
- There was no effect of repetition or accessibility.
- But: The predictions of accessibility and focus were partially aligned.
- A simple variation on the data set pits accessibility and focus more directly against each other.
Study 2 from Wagner & Klassen (2012)

Example Items, Experiment 2

a. 2 Repetitions, Antecedent in Same Position
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Now, move the house above the bed.
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There was clear evidence for a Focus Effect.
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There was no effect of repetition or accessibility based on thematic role of antecedent.
There was clear evidence for a Focus Effect.

There was no effect of repetition or accessibilty based on thematic role of antecedent.

This replicates some of the findings in Terken and Hirschberg (1994)—who didn’t interpret them in terms of focus however, but sought to modify accessibility theory.
The Information-Theoretic View

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- If one uses a log base 2: the minimal number of digits necessary to encode the information that a word carries.
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- In series of words, we can formalize the information of the next word as: $\log \frac{1}{p(w_n|w_1,w_2,w_3,...)}$
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- If one uses a log base 2: the minimal number of digits necessary to encode the information that a word carries.
- In series of words, we can formalize the information of the next word as: \( \log \frac{1}{p(w_n|w_1,w_2,w_3,...)} \)
- The probability of carrying an accent has been claimed to be correlated with the amount information encoded by a word.
The Information-Theoretic View

This makes a lot of sense. We know from many phenomena that predictability effects on prosodic prominence exist:

- Frequent words tend to be short in terms of number of segments (observed by Zipf 1936).
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- Frequent words tend to be short in terms of number of segments (observed by Zipf 1936).
- Frequent words are also phonetically shorter than expected based on the number of their segments, e.g., homophonous words differ in length based on their frequency, *thyme time* (Gahl 2008).
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- Highly frequent words tend to develop prosodically weak allomorphs (’m, ’s, ’f …) (Jurafsky 2003)
- An even better predictor of word length than frequency is predictability (Piantadosi et al. 2010).
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The Information-Theoretic View

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- ...so plausibly, accent placement could be modulated by predictability just as gradient variations of phonetic length (Aylett and Turk, 2004).
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...so plausibly, accent placement could be modulated by predictability just as gradient variations of phonetic length (Aylett and Turk, 2004).

However, when it comes to accent placement, a simple-minded information-theoretic approach in terms of frequency or local predictability fails spectacularly.
The Information-Theoretic View

Many words that are essentially completely predictable are happily accented:

- Mary tried to stay calm but in the end she threw a *
- It’s only a goal if the ball crosses the *
- Of course the flashlight doesn’t work, you forgot to change the *
The Information-Theoretic View

One example of how predictability effects one might expect fail to surface:

- An ERP study by Fischler et al. 1983 found a differential response in N400 depending on predictability between words (what they call ‘semantic match’ vs. ‘mismatch’):
  - A sparrow is a **bird/vehicle**.
  - A car is a **bird/vehicle**.
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  - A sparrow is a *bird/vehicle*.
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- We ran 40 participants on a variation of their stimuli and found no phonetic reduction of the target word of interest depending on whether the word was expected.
- Various other experiments testing for predictability we ran found very small effects, tiny compared to the effects of anaphoric destressing.
But: We know that once focus is controlled for, we sometimes do find effects of repetition: Wagner et al. (2010):

(16) a. Repeated:
[...] Grandma didn’t give a scarf to Maryanne, and she didn’t give either a bunny or a scarf to John.
~Grandma only gave a diamond$_F$ to Lauren$_F$.

b. Not Repeated:
[...] Grandma picked one present and gave it to her favorite grandchild.
~Grandma only gave a diamond$_F$ to Lauren$_F$.

There was an effect of repetition.
Kahn and Arnold (2012): In this experiment, the manipulation of repetition was orthogonal to repetition.

(17) Auditory Prime: the three nouns in random order a. 
    $\sim[\text{The windmill}]_F \text{shinks}_F$.  
    b. $\sim[\text{The tomato}]_F \text{rotates}_F$.  
    c. $\sim[\text{The candle}]_F \text{fades}_F$.  

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While repetition and predictability do exist (see also Bard et al. 2000, Aylett & Turk 2004, Jaeger 2006, Bell et al. 2009), they appear to be weak effects compared to the prosodic effects of shifting prominence for focus reasons.
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The lesson from the work on extra-grammatical factors is that when looking for differences between the encoding of different types of focus of givenness, we have to control for gradient effects due to other factors, such as repetition, predictability or informativeness, and other factors that might result in additional emphasis or reduction.
Compare the following three examples, all end with the word *wine*:

- **new**: My friend Mary has pretty high standards when it comes to food and drink. So guess what she brought for last night’s dinner: A good wine.

- **given, no real alternative**: My friend Mary knows everything about French wine, and has pretty high standards when it comes to food and drink. So guess what she brought for last night’s dinner: A good wine.

- **given, alternative**: My friend Mary is a bit of a snob, and despises bad wine, and also bad food. So guess what she brought for last night’s dinner: A good wine.

In which of these do speakers end up saying: “a GOOD wine”? 
Being Given isn’t Good Enough

We can quantify whether a stress-shift has occurred by looking at the measures of *relative prominence* between *good* and *wine* (12 items, 24 speakers, latin square design):
It is not good enough for a constituent (here: *wine*) to be given in order for it to be marked as such by anaphoric destressing.

Its sister constituent (here: *good*) also needs to find a contrasting alternative (here: *bad*) in the antecedent (Rooth 1992: Alternative Semantics for Focus and givenness marking).

Therefore, being given is not enough, a contrast is also necessary.
Outline

1. Focus Theory vs. Processing Explanations
2. Some Experimental Evidence for Alternatives
3. Cross-linguistic differences: English vs. French
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The precise nature of the differences is not obvious however.
Cross-linguistic differences

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Does a language like French simply lack the phonological tool of shifting prominence?

Or does a shift in prominence in French exist but mean something different?
3 Types of Focus (Joint work with Jozina Vander Klok)

Parallelism:
- I heard that Tracy went to the zoo.
- Yeah, she saw an ugly giraffe and a cute giraffe.

Contrastive:
- Last week when Tracy went to the zoo, she saw an ugly giraffe.
- Really? The other day, Marcin saw a cute giraffe.

Corrective:
- Last week when Tracy went to the zoo, she saw an ugly giraffe.
- No, she saw a cute giraffe.

Control:
- Last week Tracy went to the zoo.
- Yeah, she saw a cute giraffe.
3 Types of Focus (Joint work with Jozina Vander Klok)

Parallelism:
- J’ai entendu dire que Guillaume irait à un pique-nique.
- Ouais, il va apporter une salade froide et une soupe froide.

Contrastive:
- Pour le pique-nique de cet après-midi, Guillaume va apporter une salade froide.
- C’est vrai ? Marie va apporter une soupe froide.

Corrective:
- Pour le pique-nique de cet après-midi, Guillaume va apporter une salade froide.
- Non, il va apporter une soupe froide.

Control:
- Guillaume ira à un pique-nique.
- Ouais, il va apporter une soupe froide.
3 Types of Focus (Joint work with Jozina Vander Klok)

- 32 items, 16 participants each in English, European French and Québec French.
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- The data were annotated using forced alignment, various acoustic measures were extracted in Praat, and then we analyzed it using a mixed model regression.
- Three acoustic factors that were significant in distinguishing conditions were duration, mean/max pitch and mean intensity. We’re plotting relative measures (e.g., ‘cute giraffe’: duration of ‘cute’ - duration of ‘giraffe’)
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![Graphs showing relative duration, pitch, and intensity for English, QuFrench, and EuFrench with different focus conditions.](image-url)
European French (Joint work with Jozina Vander Klok)

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- English differs from European French and Québec French in how context affects prosody.
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- English differs from European French and Québec French in how context affects prosody.
- Stress-shift in parallelism happens systematically but rarely in European French and Québec French.
- Only in corrective focus and to a less frequently in contrastive focus are there acoustic differences encoding focus to a comparable degree as in English.
- But this means that French does have the phonological means of shifting prominence—but it simply means something different than in English.
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This difference might be a property of the semantic denotation of the operator that binds focus in English vs. in French: The source of the cross-linguistic variation might be located in $\sim$. 
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This difference might be a property of the semantic denotation of the operator that binds focus in English vs. in French: The source of the cross-linguistic variation might be located in ∼.

The prosodic effects in French where they do exist look similar to those in English.
Outlook

- Saturday: A Givenness-Illusion, and what it tells us about Focus and Givenness (and about certain rhymes in English and French).

Thanks to members of prosody.lab. Funded by McGill, SSHRC, FQRSC, CFI, and the Canada research chair program.
Outlook

- Saturday: A Givenness-Illusion, and what it tells us about Focus and Givenness (and about certain rhymes in English and French).
- Sunday: Are Givenness, Contrast and Question-answer-congruence all the same thing?

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