Scalar Inference and Rise-Fall-Rise in American English: Towards a Priming Perspective

Thomas Sostarics
Eszter Ronai  Jennifer Cole
Northwestern University

PRESENTED AT
Voices in Contexts, University of Cologne
@t_sostarics  tsostarics
tsostarics@u.northwestern.edu
Rise-Fall-Rise Literature

Adjacent Literature


Notable Work

Important Work

Related Work

Experimental Work
The general themes of rise-fall-rise

Has something to do with “higher alternatives”

"John ate some of the cookies".

But what is rise-fall-rise?
What is rise-fall-rise?

In AM terms: *Usually* an L*+H pitch accent with a fall-rise edge tone configuration.
How do these pitch accents contrast?

Frequently investigated in prosodic focus literature

Selkirk (1984)
Rooth (1985)
Pierrehumbert and Hirschberg (1990)
Ito and Speer (2008)
Braun and Tagliapietra (2010)
Husband and Ferreira (2016)
Tonhauser (2017) i.a.
Gotzner and Spalek (2019) i.a.
Sostarics and Cole (2023)
c.f. Watson et al. (2008)

Only really appears in rise-fall-rise literature

c.f. Prominence literature:
Im et al. (2018, 2023)
Roettger et al. (2019)

c.f. L*+H in German:
Baumann and Rohr (2019) i.a.
Braun and Biezma (2019)
Einfeldt and Braun (2021)
Zahner-Ritter et al. (2022)

Varied usage in rise-fall-rise literature
High-level questions

Is there something special about rise-fall-rise, or about L*+H?

Is there a specific RFR? Or would any RFR-shaped tune be fine?

What kinds of methods can we use to look at higher alternatives?

Let’s exploit adjectival lexical scales in...

Cross-modal priming

Inference task
Cross-Modal Lexical Decision

What factors affect the activation status of the target?

(1) The relation between the prime and the target
(2) The prosody used with the auditory prime

Braun and Tagliapietra (2010)
Husband and Ferreira (2016)
Yap et al. (2015) i.a.
Relations in the target set

Prime

cold

{TARGETS}
Relations in the target set

Prime

cold

{TARGETS}

Unrelated Words

register

Semantic Associates

Invoked by prime
Relations in the target set

Prime
- cold

{TARGETS}

Unrelated Words
- register

Semantic Associates

Non-contrastive Associates
- ice

Contrastive Associates

Invoked by prime

Selection mechanism invoked by focus (L+H*)
(Husband and Ferreira 2016)
Relations in the target set

Prime

\textit{cold}

\{TARGETS\}

Unrelated Words

\textit{register}

Semantic Associates

Non-contrastive Associates \textit{ice}

Contrastive Associates

Resolved Alternatives

Disputable Alternatives

Invoked by prime

Selection mechanism invoked by focus (L+H*)

(A husband and Ferreira 2016)

Affected by RFR/L*+H?

(cf Goebel 2019)
Relations in the target set

Prime 
- \textit{cold}

{TARGETS}

Unrelated Words
- \textit{register}

Semantic Associates

Non-contrastive Associates
- \textit{ice}

Contrastive Associates

Resolved Alternatives
- Oppositely Valenced Scalar Alternatives
  - \textit{hot}

Lower Scalar Alternatives
- \textit{cool}

Higher Scalar Alternatives
- \textit{freezing}

Disputable Alternatives

Invoked by prime

Selection mechanism
invoked by focus (L+H*)
(Husband and Ferreira 2016)

Affected by RFR/L*+H?
(cf Goebel 2019)

Would \textit{cold}+RFR facilitate \textit{freezing}?
Would \textit{freezing}+RFR not facilitate \textit{cold}?
Scalar Inference task

Jane ate some of the cookies \(\Rightarrow\) some, but not all of the cookies

- \(<\text{some, all}>\) comprise a lexical scale (Horn 1972)
- Likelihood of SI-enriched interpretations varies \(\Rightarrow\) scalar diversity (van Tiel et al. 2016, Gotzner et al. 2018, Ronai 2022)

What pragmatic factors encourage SI-enriched interpretations?

QUD matters
(Ronai & Xiang 2021)

Prosody matters
(de Marneffe & Tonhauser 2019, Ronai & Goebel 2023)

Does the office feel freezing?
The office feels cold.

Would you conclude the office does not feel freezing?
Yes  No
A general prediction

If RFR is all about the higher alternatives, then there should be some asymmetry in how it affects lower alternatives.

The design is unwieldy... but not unfeasible.
Methodological challenges

Meaning Side
• Many items for lexical decision and scalar diversity
• Need to make the task conditions comparable
• Need to write controlled contexts for all the items
• Do the contexts make sense?

Sound Side
• Need recordings of all materials!
• Recordings should be characteristic of the tunes
• Constrain the amount of phonetic variation
• Resynthesis doesn’t always work perfectly
Norming Study for Contexts

Prior work: *Does the office feel freezing? The office feels cold.*
- But if we want to probe *freezing* we can’t say it directly!

Mary: Did someone leave a window open in the office overnight?  
John: The office feels cold

Are *these* indirect answers acceptable enough to use?  
Do we still find scalar diversity with these indirect answers?
Acceptability results (n=48)

Mary: Did you do the extra readings for class?
John: There used to be a burger king

Mary: Did someone leave a window open in the office overnight?
John: The office feels cold/freezing

\[
\hat{\beta}_{\text{Filler-Critical}} = -6.14, \quad 95\% \text{ CI } [-7.15, -5.18] \\
\hat{\beta}_{\text{Low-High}} = -0.37, \quad 95\% \text{ CI } [-0.57, -0.19]
\]

\(\hat{\beta}_{A-B}\) : Odds of a higher rating are lower for A than B

(see McCullough 1980, Agresti 2010, Taylor et al. 2022)
SI Results for 72 scales

Mary: Did someone leave a window open in the office overnight?

John: The office feels cold/freezing

Would you conclude the office does not feel freezing?
Would you conclude the office does not merely feel cold?

We do find variation among adjectival scales

Based on norming results, we retain 65 scales

Ronai and Xiang (2022)

*not all of these are adjectives
Scope of the Recordings

Did someone leave a window open in the office overnight?

- The office feels cold
- The office feels freezing

65 scales that need...

- A question
  - \(\times 2\) A lower/higher answer
  - \(\times 6\) Each of our target tunes

780
Challenges of Recording

We could record once and resynthesize to 6 new tunes...
  • But then we don’t get any non-F0 cues that co-occur with the tunes

We could record all sentences with all 6 tunes and move on...
  • But there will be variation, how can we understand and constrain it?

We can standardize our recordings with resynthesis...
  • But resynthesis is fickle: some recordings just don’t work well
  • What parameters do we even use?
Many takes of 780 utterances

3980 recordings of 130 sentences with 6 different tunes

How can we tame this variation?
Nuclear Region GAMM Modeling

Modeling the shape of the onglide to the peak and the offglide to the end

Peak alignment is important but modeled separately
Final 780 “Best” Recordings

“Best” based on resynthesizing all tokens and picking the one that was most natural.
Final 780 Resynthesized contours

We’ve tamed much of the variation!
Prenuclear region was not forgotten!

Prenuclear peak height is normalized across utterances
Revisiting our challenges

Meaning Side
How can we control and norm our written contexts?

Sound Side
How can we understand and constrain phonetic variation?
Take homes

We’re combining two lines of work in psycholinguistics to learn about contrasts between pitch accents and RFR-shaped tunes.

Trying to do work on intonational meaning has substantial methodological challenges on both the sound and meaning side.

The scope of writing and recording the materials is massive, but we can constrain variation while still respecting it.
Acknowledgments

- Jennifer Cole & Eszter Ronai
- Gregory Ward & Duane Watson
- Ming Xiang & Chris Kennedy
- Kate Sandberg & Mike Tabatowski
- Chun Chang
- ProSD Lab at Northwestern

...for support, feedback, stimuli help, and experiment assistance
Take homes

We’re combining two lines of work in psycholinguistics to learn about contrasts between pitch accents and RFR-shaped tunes.

Trying to do work on intonational meaning has substantial methodological challenges on both the sound and meaning side.

The scope of writing and recording the materials is massive, but we can constrain variation while still respecting it.

@t_sostarics  tsostarics  tsostarics@u.northwestern.edu