Toward a psycholinguistic model of irony comprehension

Rachel Adler

Dissertation Defense

June 26, 2018

BACKGROUND

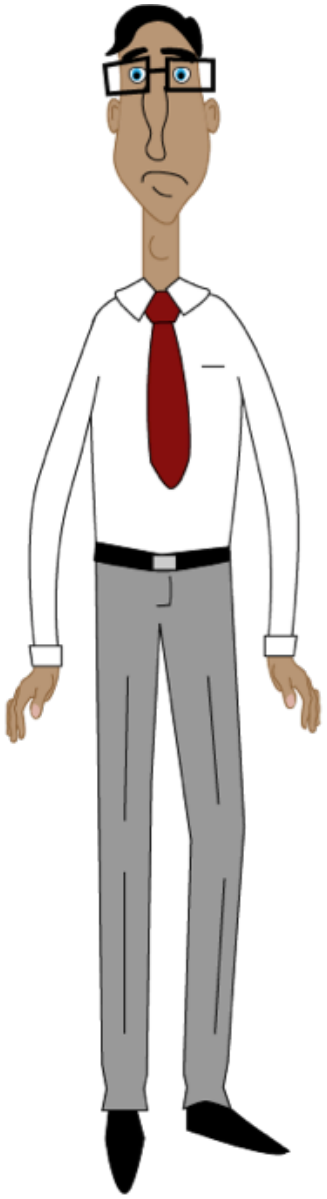
What a fabulous chef she is!

LITERAL INTERPRETATION

Sally is a good chef

BACKGROUND

What a fabulous chef he is!



IRONIC INTERPRETATION

Fred is a bad chef

BACKGROUND

IRONY AS A SOCIAL DEVICE

- Testing and bolstering common ground
- Saving face when criticizing
- Politeness
- Humor
- Sophistication

Attardo, 2001; Boylan & Katz, 2013; Brown, 1995; Dews & Winner, 1995; Gibbs et al., 2014; Jorgensen, 1996; Kreuz et al., 1999; Kumon-Nakamura et al., 1995; Lakoff, 1990; Matthews et al., 2006

BACKGROUND

EXISTING COMPREHENSION ACCOUNTS

- Standard pragmatic view

  Comprehension occurs in stages: literal, then ironic

- Direct access view

  Given context, irony is accessed directly

- Graded salience hypothesis

  Salient interpretation accessed first

  Familiar ironies accessed directly, unfamiliar in stages

Giora, 1997; Giora & Fein, 2007; Filik, Leuthold, Wallington, & Page, 2014

BACKGROUND

LIMITATIONS OF PRIOR WORK

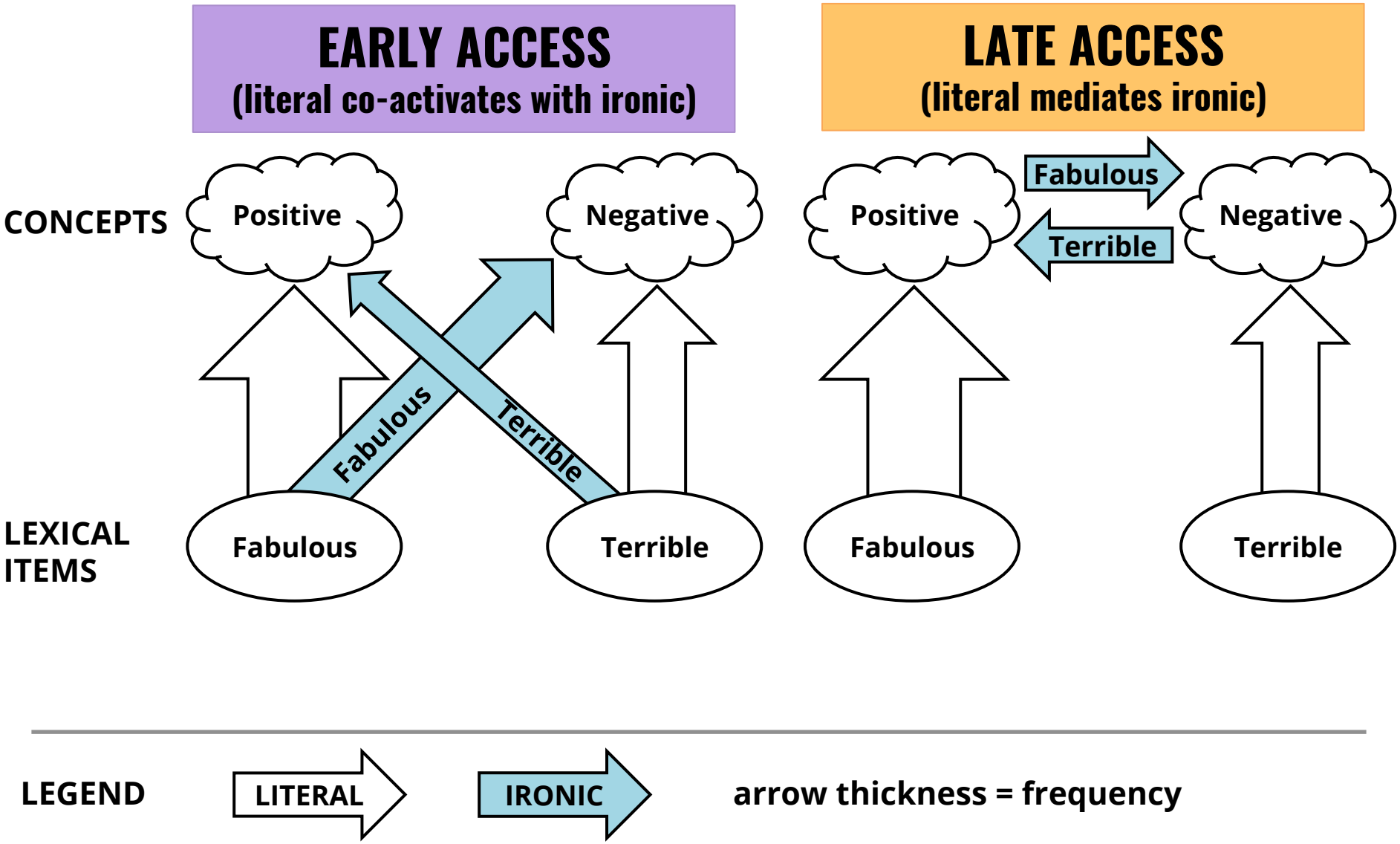
- Inadequate context
- Coarse-grained measures of time-course
- Little consideration of frequency
  - Ironic criticisms (frequent)

    What a fabulous chef he is
  - Ironic compliments (infrequent)

    What a terrible chef she is
- Don’t compare irony to appropriate baseline
  - Positive adjectives accessed faster than negative
- Unnatural task demands

Dews & Winner, 1999; Gibbs, 1986; Giora & Fein, 2007

MODELS


EARLY ACCESS
(literal co-activates with ironic)
LATE ACCESS
(literal mediates ironic)
CONCEPTS
LEXICAL ITEMS
Positive
Negative
Fabulous
Terrible
Positive
Negative
Fabulous
Terrible
Fabulous
Terrible
LEGEND
LITERAL
IRONIC
arrow thickness = frequency

EXPERIMENT 1

GOAL

- Test Early Access and Late Access models by manipulating context and frequency

DESIGN

- Visual world eye-tracking paradigm
- Adjective x Interpretation x Speaker Gender (2 x 2 x 2)
- Two speakers: literal and ironic

EXPERIMENT 1

POSITIVE LITERAL

What a fabulous chef she is.

POSITIVE IRONIC

FREQUENT CRITICISM

What a fabulous chef he is.

NEGATIVE LITERAL

What a terrible chef he is.

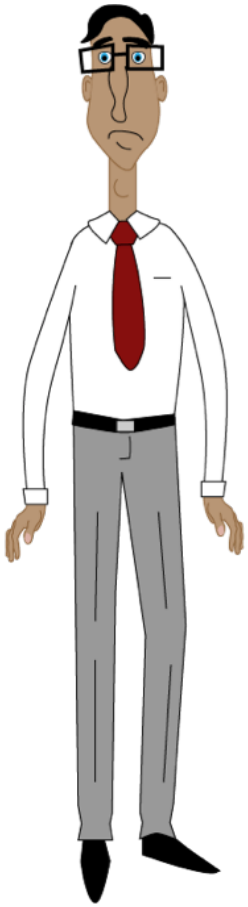
NEGATIVE IRONIC

INFREQUENT COMPLIMENT

What a terrible chef she is.

EXPERIMENT 1

What a fabulous chef he is.



EXPERIMENT 1

PARTICIPANTS

- 32 total (4 per list)

STIMULI

- 5 each of 4 critical trial types

ANALYSIS

- Analyzed proportion of looks to Target character
- Divided looks into three time regions: pre-adjective, adjective-noun, pronoun
- Created 50ms time bins

PREDICTIONS

EARLY ACCESS
(literal co-activates with ironic)

POSITIVE IRONIC (frequent)
Ironic as fast as literal

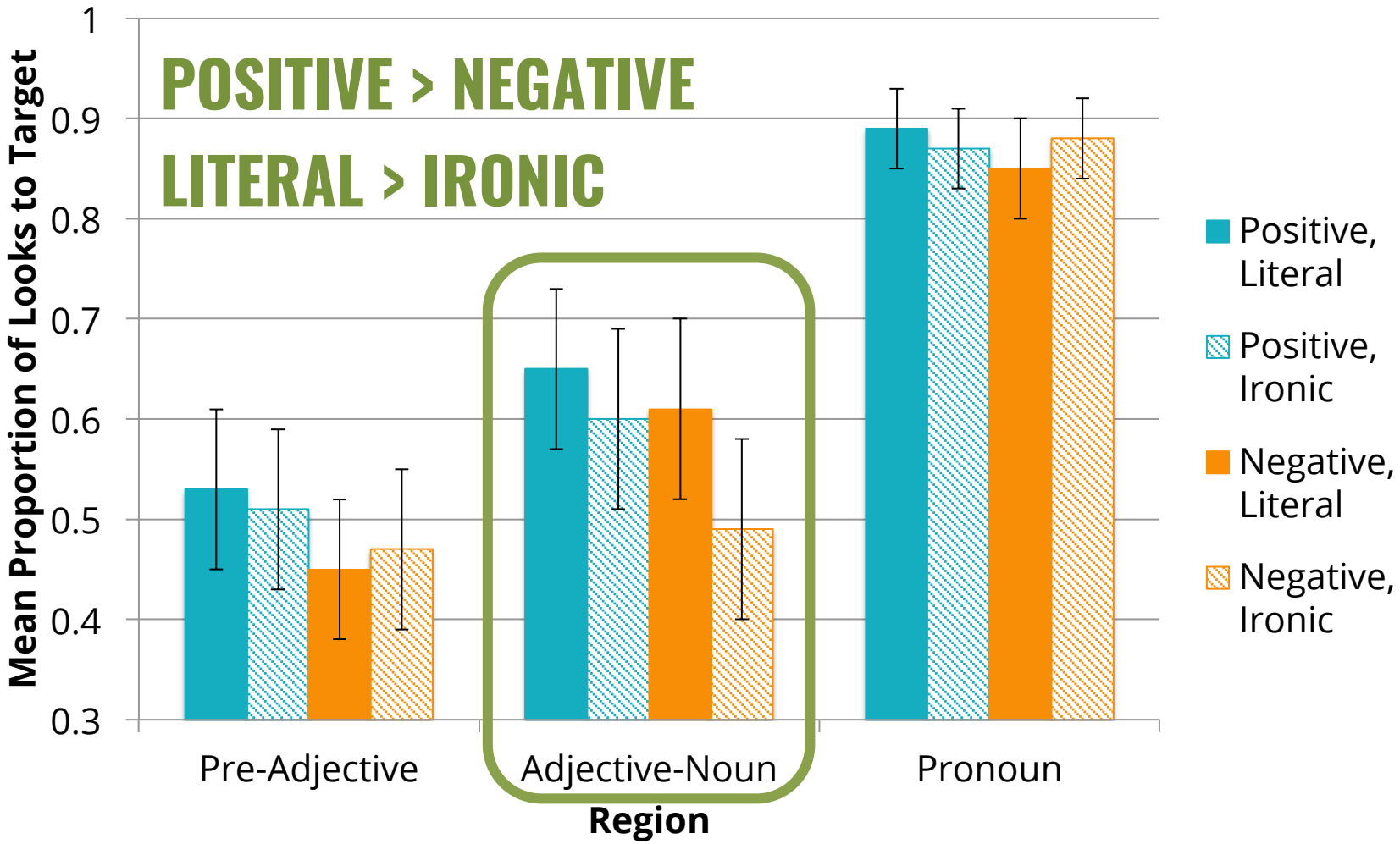
NEGATIVE IRONIC (infrequent)
Ironic slower than literal

LATE ACCESS
(literal mediates ironic)

POSITIVE IRONIC (frequent)
Ironic slower than literal

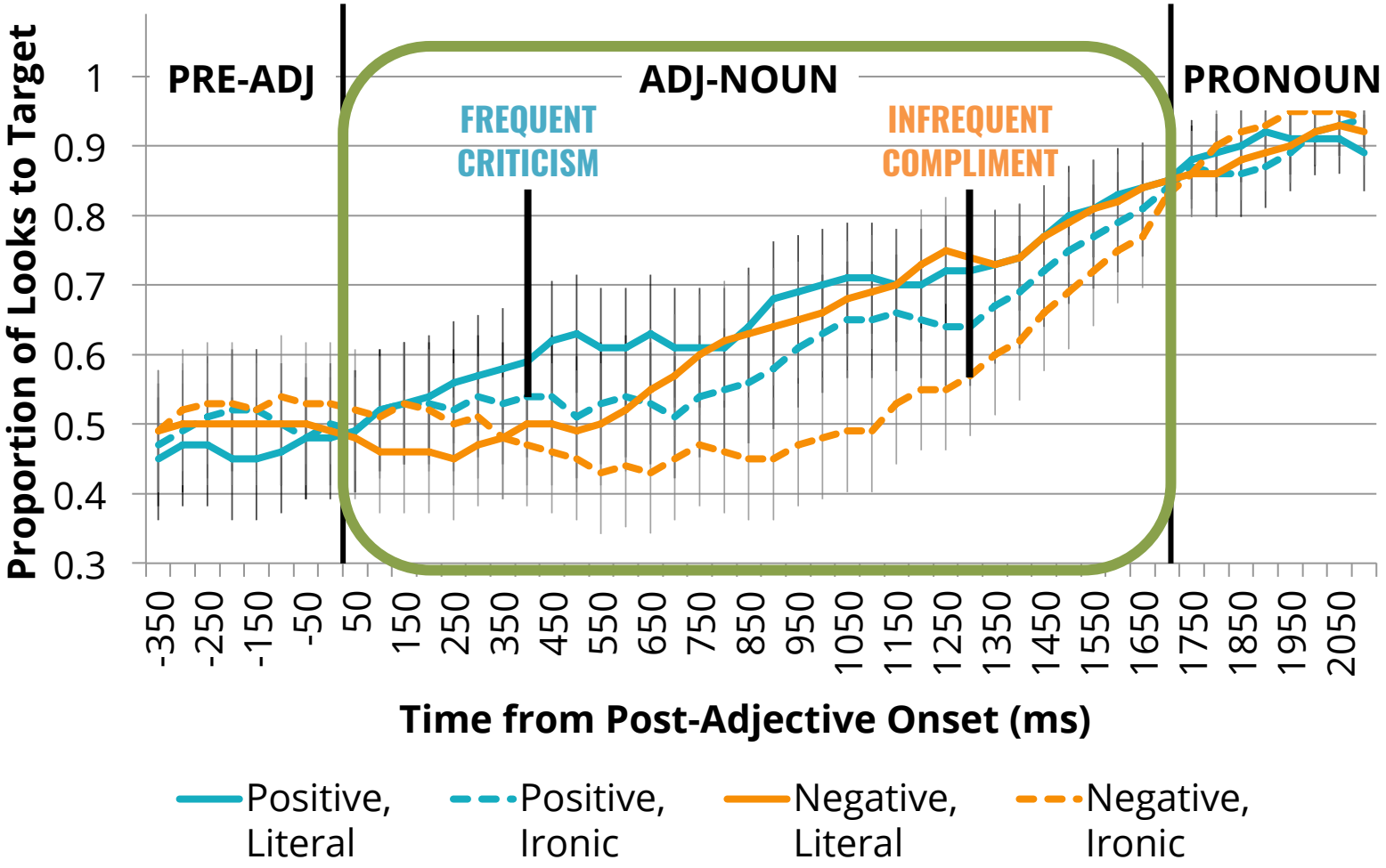
NEGATIVE IRONIC (infrequent)
Ironic slower than literal

EXPERIMENT 1



EXPERIMENT 1

IRONIC CRITICISM > IRONIC COMPLIMENT



EXPERIMENT 1

SUMMARY

- Magnitude effect: Target looks greater for literal vs. ironic, regardless of frequency
- Rate effect: Target looks increased more quickly for ironic criticism (frequent) vs. ironic compliment (infrequent)

CONCLUSIONS

- Results do not fully support Early or Late Access accounts
- Context (speaker identity) *not* used early
- But irony frequency *does* modulate access of interpretation

OPEN QUESTIONS

- Is this really irony? (Exp. 2)
- Why overall delay for irony/use of context? (Exp. 3)

EXPERIMENT 2A

GOAL

- Test whether interpretation of irony is same as opposites

DESIGN

- Visual world eye-tracking paradigm
- Adjective x Interpretation x Speaker Gender (2 x 2 x 2)
- Two speakers: literal and opposite

EXPERIMENT 2A

PARTICIPANTS

- 32 total (4 per list)

STIMULI

- 5 each of 4 critical trial types (see next slide)

ANALYSIS

- Analyzed proportion of looks to Target character
- Divided looks into three time regions: pre-adjective, adjective-noun, pronoun
- Created 50ms time bins

EXPERIMENT 2A

POSITIVE LITERAL

What a fabulous chef she is.

POSITIVE OPPOSITE

FREQUENT IRONY

What a fabulous chef he is.

NEGATIVE LITERAL

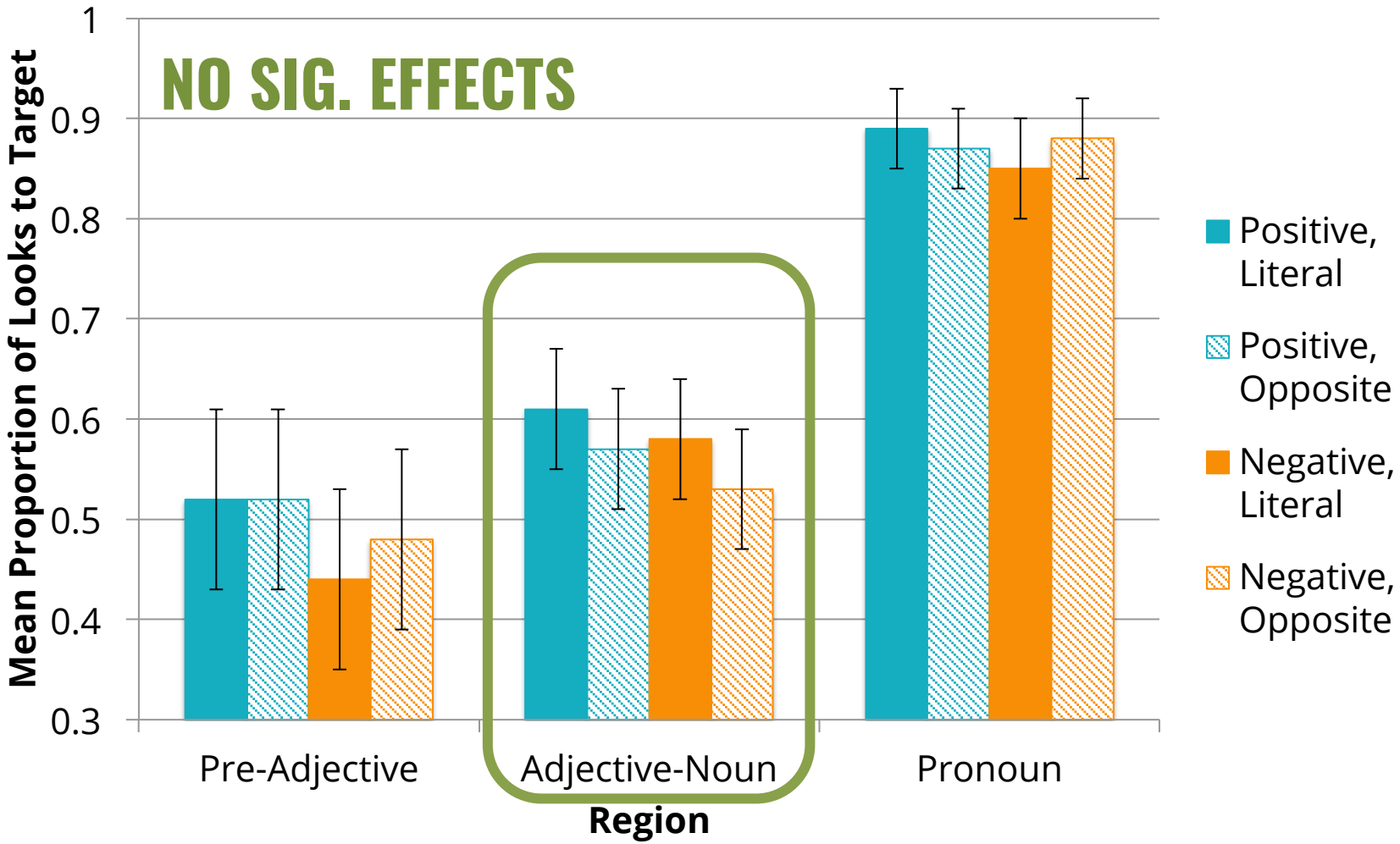
What a terrible chef he is.

NEGATIVE OPPOSITE

INFREQUENT IRONY

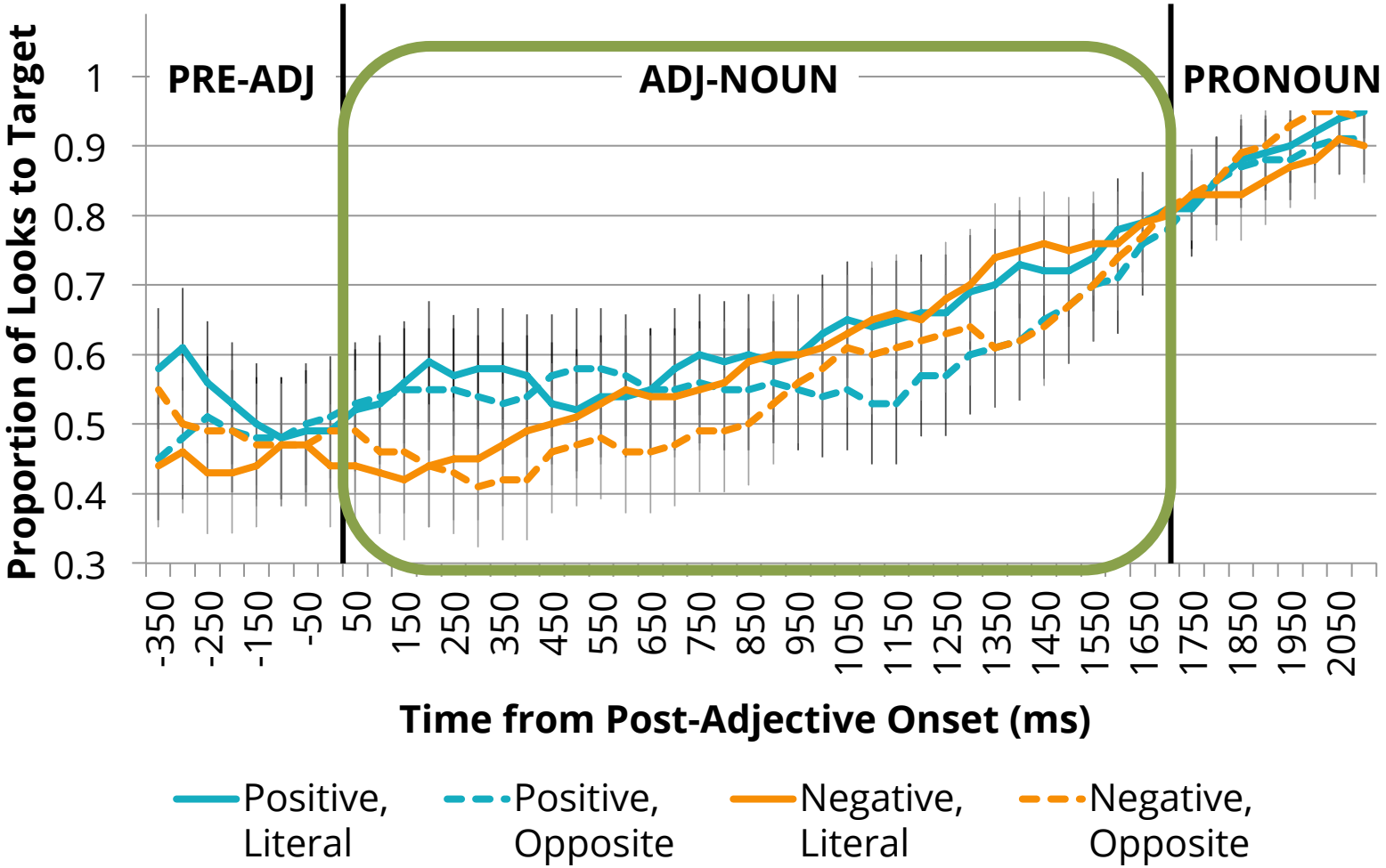
What a terrible chef she is.

EXPERIMENT 2A



EXPERIMENT 2A

POSITIVE OPPOSITE = NEGATIVE OPPOSITE



EXPERIMENT 2A

SUMMARY

- NO magnitude effect: Target looks equal for literal vs. opposite (and positive opposite vs. negative opposite)
- NO rate effect: Target looks increased at same rate for positive opposites vs. negative opposites

CONCLUSIONS

- Difference in eye movements vs. Exp. 1 suggests different underlying processes

OPEN QUESTIONS

- What is different about irony?
- What conclusions do listeners draw about speakers?

EXPERIMENT 2B

GOAL

- Investigate the conclusions that speakers draw about literal, ironic, and opposite speakers

DESIGN

- Amazon Mechanical Turk rating study
- Speaker Group x Interpretation x Speaker Gender (2 x 2 x 2)
  - Group A: literal and ironic
  - Group B: literal and opposite

EXPERIMENT 2B

PARTICIPANTS

- 192 total (2 per list)

STIMULI

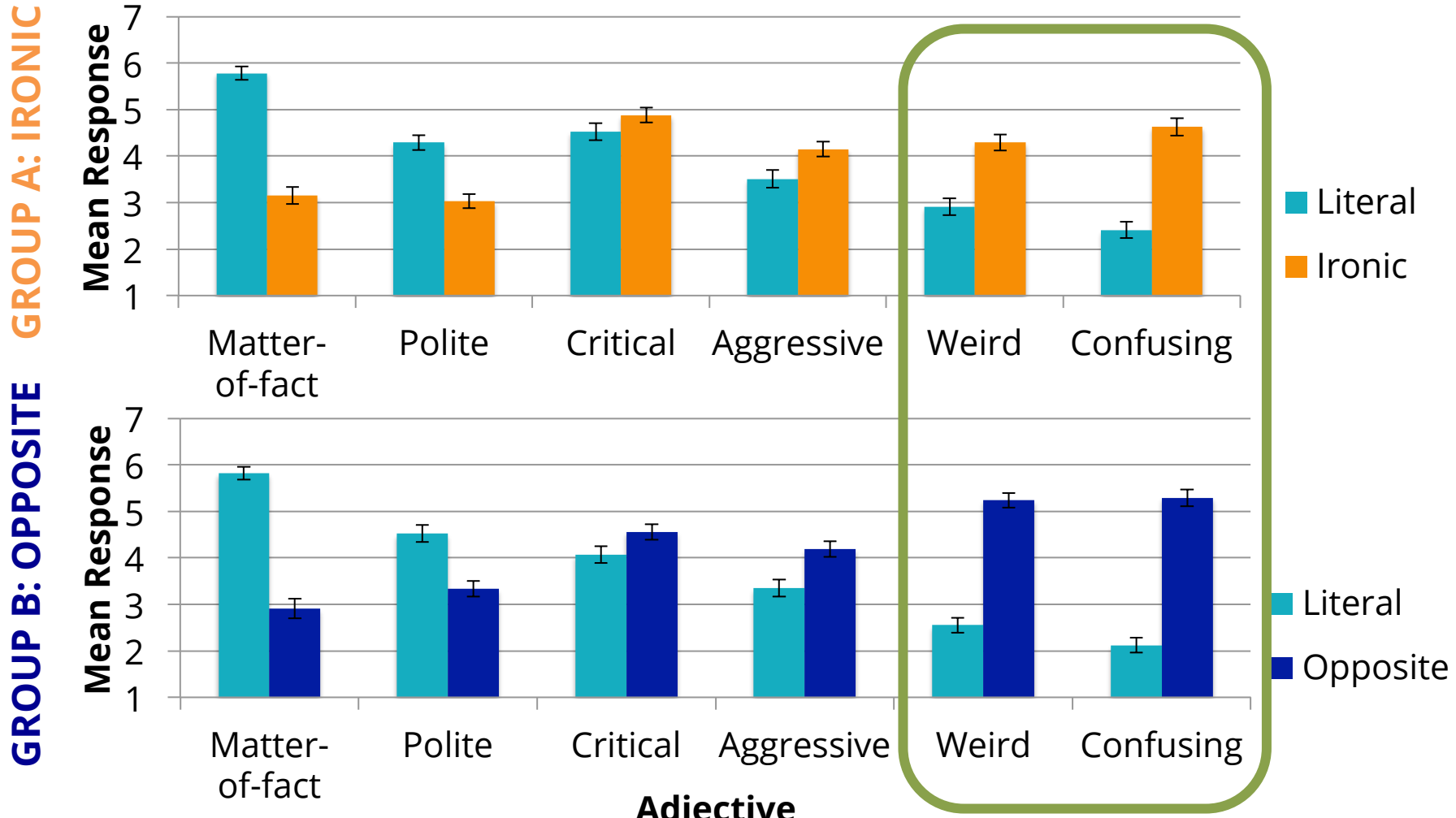
- 8 videos: four literal, four non-literal (ironic or opposite)
- Rate videos on six adjectives: matter-of-fact, aggressive, critical, polite, weird, confusing

ANALYSIS

- Analyzed average ratings (scale of 1-7)
- Compared non-literal ratings to literal baselines

EXPERIMENT 2B

OPPOSITES: MORE WEIRD & CONFUSING



EXPERIMENT 2B

SUMMARY

- Opposite speakers rated as more weird and confusing vs. ironic speakers

CONCLUSIONS

- Listeners draw different conclusions about ironic vs. opposite speakers

OPEN QUESTIONS

- Why overall delay for irony?

EXPERIMENT 3

SYNTACTIC AMBIGUITY

PICTURE NAMING

The basketball player accepted the contract would have to be negotiated.

HIGH CONFLICT

The basketball player accepted that the contract would have to be negotiated.

LOW CONFLICT

Hsu & Novick, 2016; Kan et al., 2013; Novick, Kan, Trueswell, & Thompson-Schill, 2009

EXPERIMENT 3

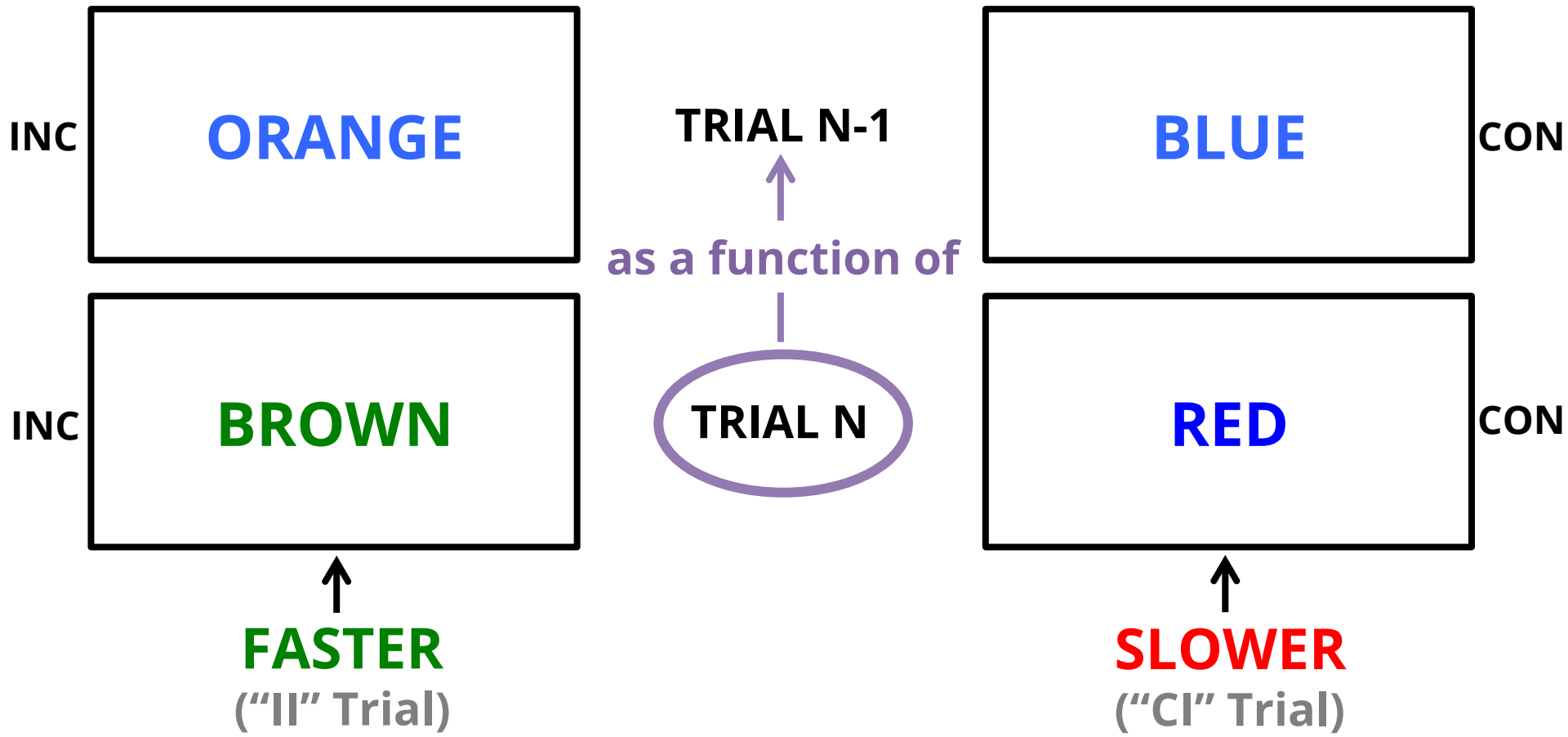
COGNITIVE CONTROL

- Domain-general mechanism that detects and resolves conflict during information processing
- Used in variety of linguistic and non-linguistic tasks
- Once engaged, can be sustained to facilitate performance on subsequent high-conflict task

Botvinick et al., 2001; Gratton et al., 1992; Hsu & Novick, 2016; Kan et al., 2013; Ullsperger et al., 2005

EXPERIMENT 3

CONFLICT ADAPTATION



Botvinick et al., 2001; Gratton et al., 1992; Ullsperger et al., 2005

EXPERIMENT 3

CONFLICT ADAPTATION

INC

INC

BROWN

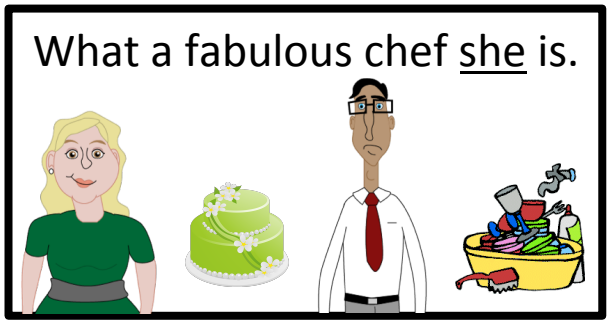
FASTER?

("II" Trial)

TRIAL N-1

as a function of

TRIAL N



CON

RED

SLOWER?

("CI" Trial)

CON

Botvinick et al., 2001; Gratton et al., 1992; Ullsperger et al., 2005

EXPERIMENT 3

GOAL

- Investigate source of delay for irony in Exp. 1
- Test whether processing irony engages cognitive control and facilitates subsequent performance on a high-conflict task

DESIGN

- Visual world eye-tracking within conflict adaptation paradigm (Stroop → sentence)
- Current Stroop x Previous Sentence x Speaker Gender (2 x 2 x 2)
- Two speakers: Literal and ironic

EXPERIMENT 3

PARTICIPANTS

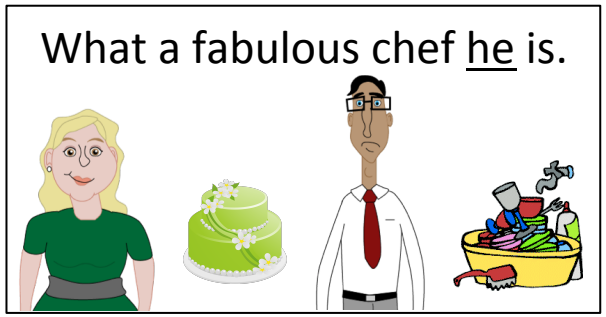
- 32 total (8 per list)

STIMULI

- 12 each of 4 critical trial types (see next slide)
- Critical trials only use positive adjectives

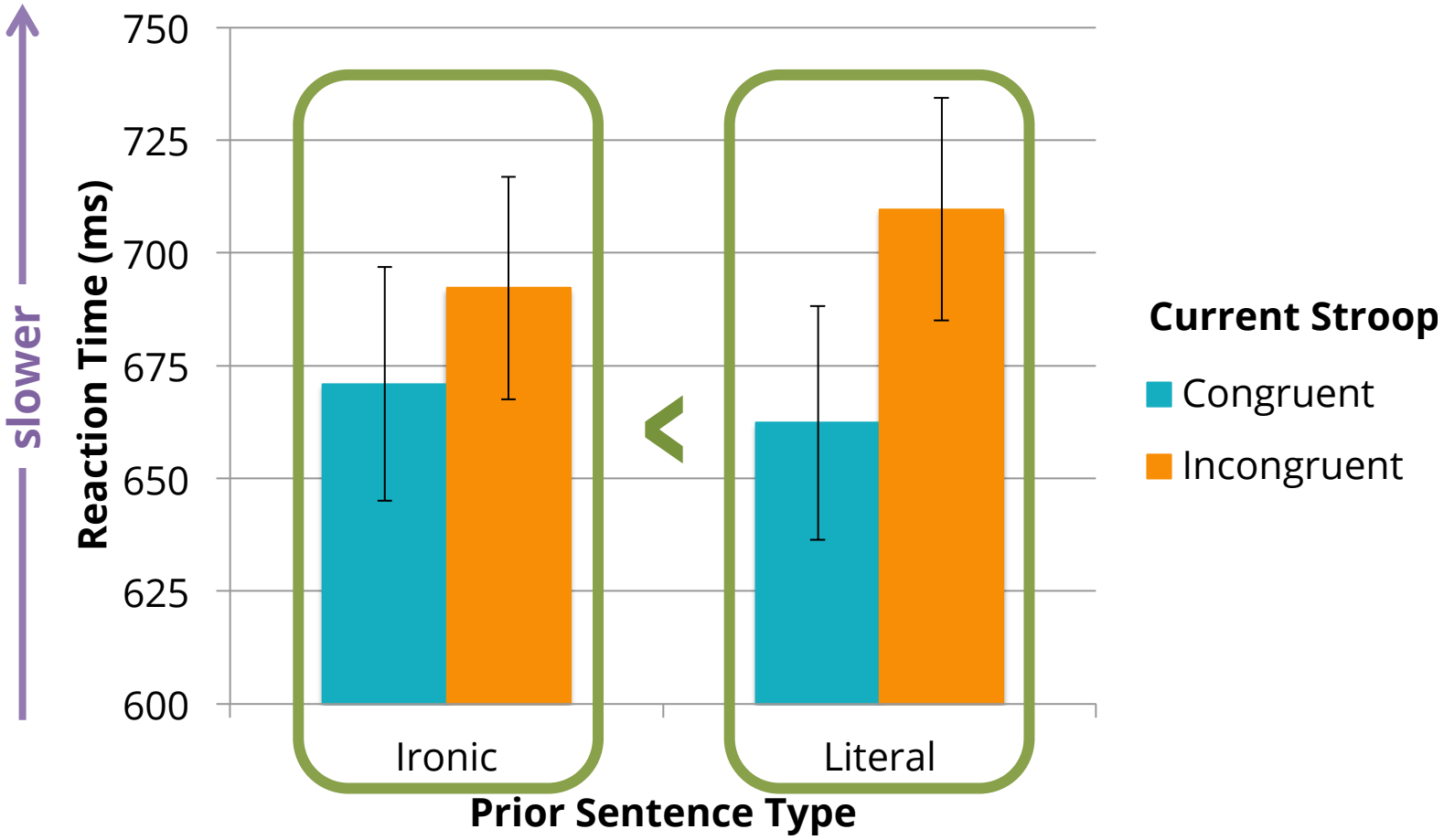
ANALYSIS

- Analyzed reaction time on Stroop as a function of prior sentence

	TRIAL N-1	TRIAL N
IRONIC-INCONGRUENT (II)		**ORANGE**
IRONIC-CONGRUENT (IC)		**BLUE**
LITERAL-INCONGRUENT (CI)		**ORANGE**
LITERAL-CONGRUENT (CC)		**BLUE**

EXPERIMENT 3

CONFLICT EFFECT REDUCED AFTER IRONY



EXPERIMENT 3

SUMMARY

- Stroop conflict effect reduced after ironic (vs. literal) trial
- Looks to Target in adjective-noun region greater for literal vs. ironic (corroborates Exp. 1 findings)

CONCLUSIONS

- Conflict adaptation from sentence to Stroop suggests presence of conflict in irony processing and engagement of cognitive control

OPEN QUESTIONS

- Do effects go in other direction (from Stroop to sentence)?

EXPERIMENT 4

GOAL

- Investigate whether engaging cognitive control facilitates subsequent irony processing

DESIGN

- Visual world eye-tracking within conflict adaptation paradigm (Stroop → sentence)
- Current Sentence x Previous Stroop x Speaker Gender (2 x 2 x 2)
- Two speakers: Literal and ironic

EXPERIMENT 4

PARTICIPANTS

- 32 total (8 per list)

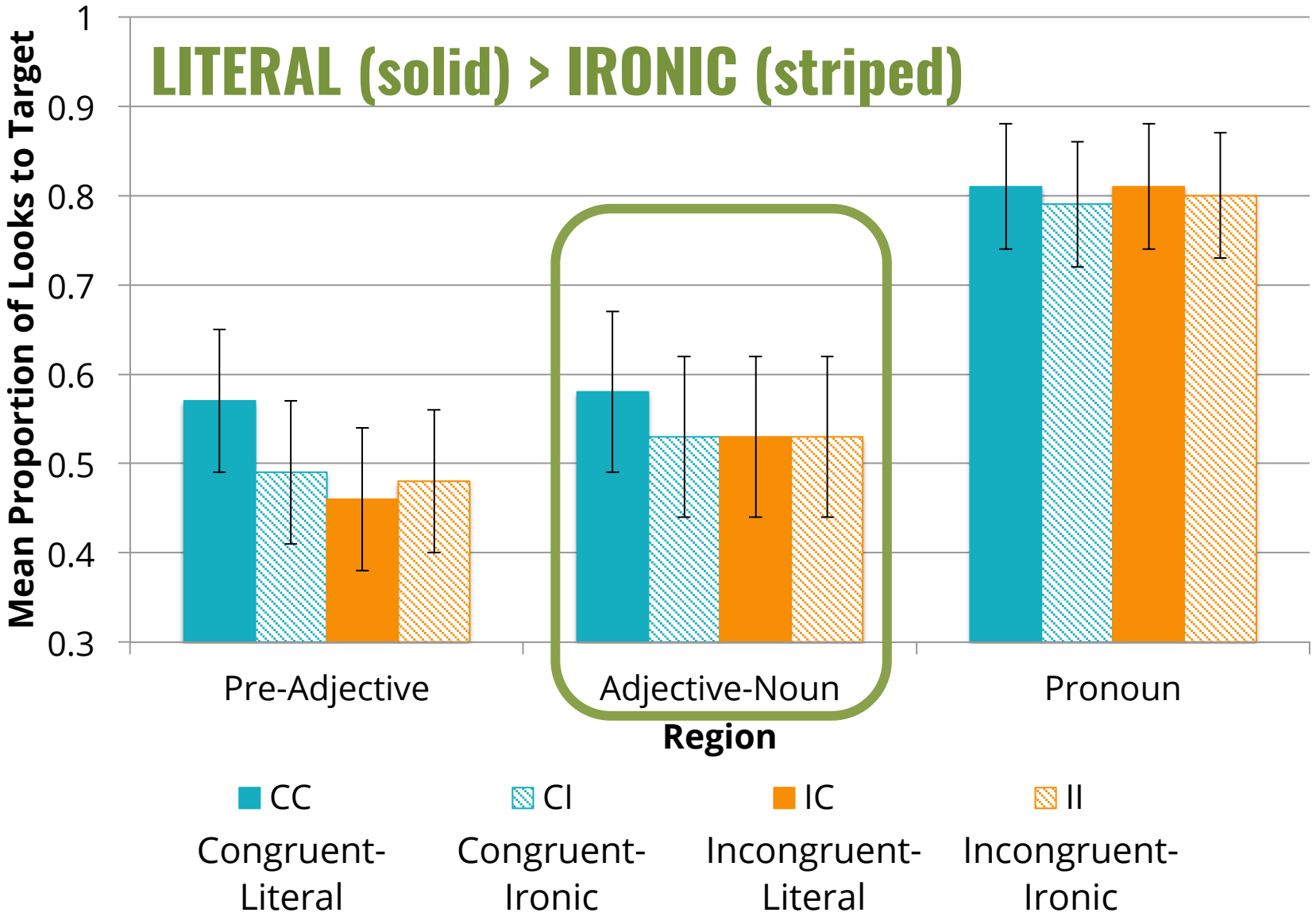
STIMULI

- 12 each of 4 critical trial types
- Critical trials only use positive adjectives

ANALYSIS

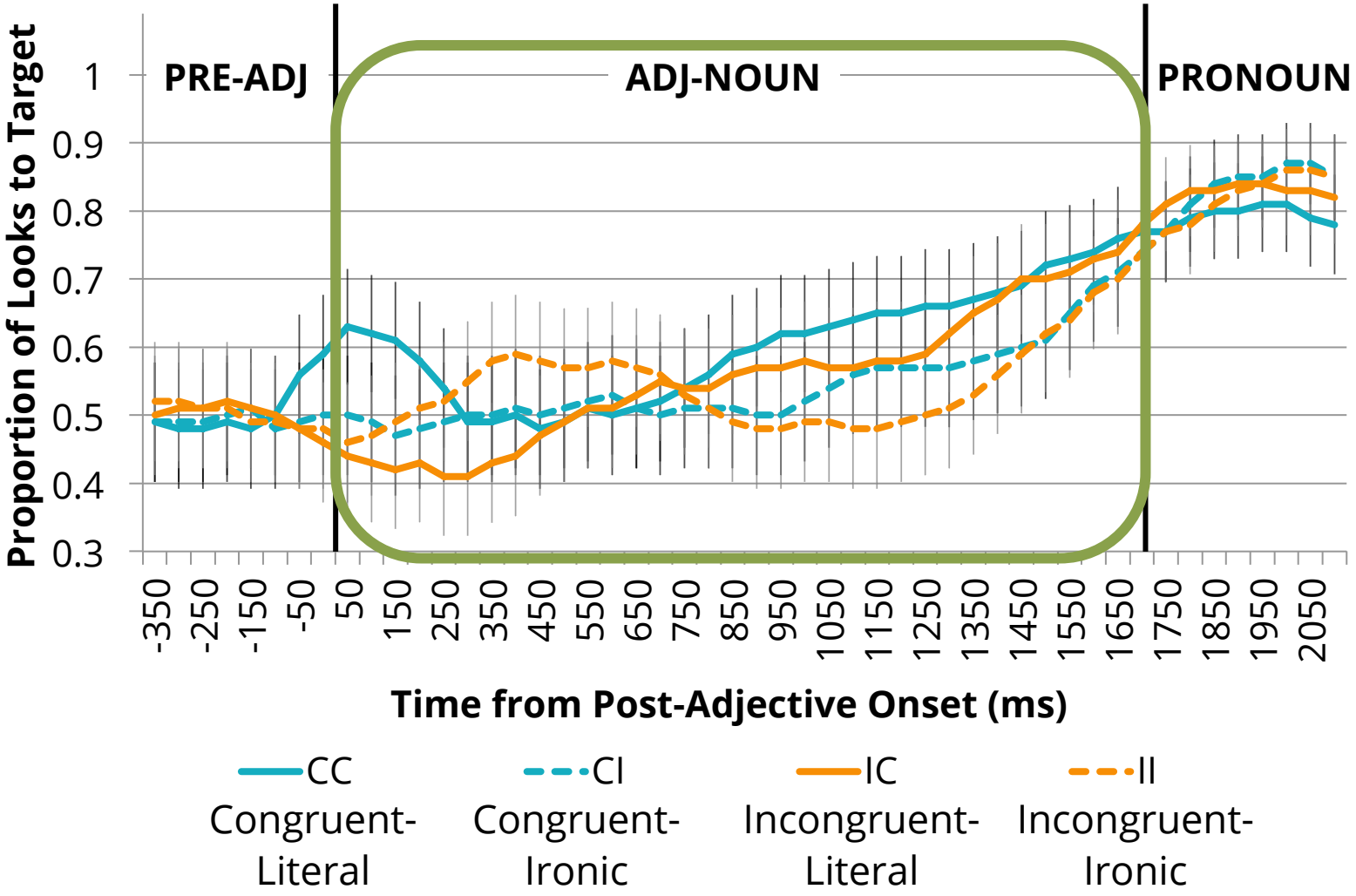
- Analyzed proportion of looks to Target on sentence trials as a function of prior Stroop trial

EXPERIMENT 4



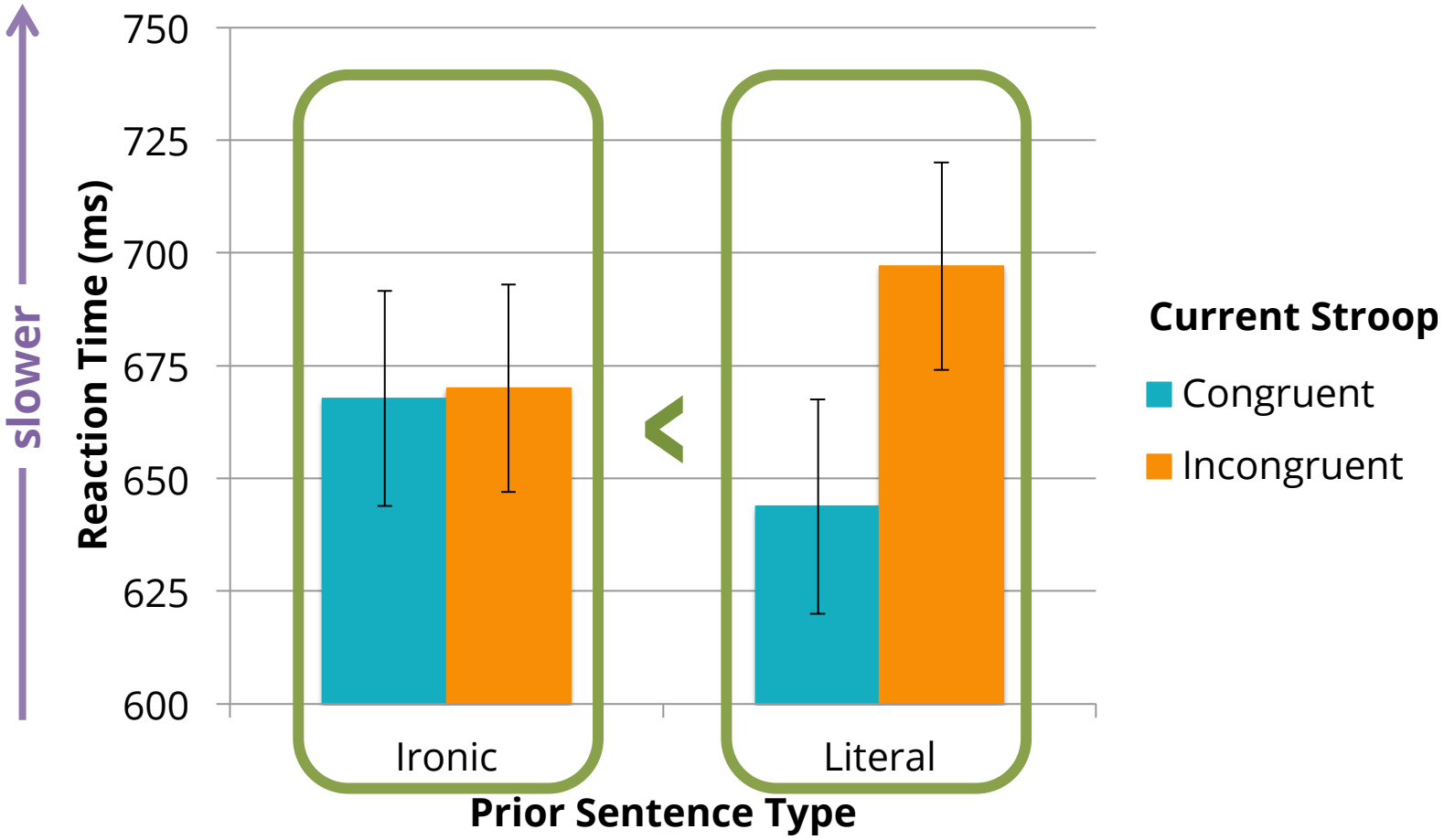
EXPERIMENT 4

II not > CI



EXPERIMENT 4

CONFLICT EFFECT REDUCED AFTER IRONY



EXPERIMENT 4

SUMMARY

- No evidence for conflict adaptation from Stroop to sentence
- Stroop conflict effect reduced after ironic (vs. literal) trial (corroborates Exp. 3 findings)

CONCLUSIONS

- Lack of adaptation could have several causes (experimental & theoretical)
  - Experimental: two-alternative forced choice, task difficulty
  - Theoretical: late vs. early conflict

SUMMARY

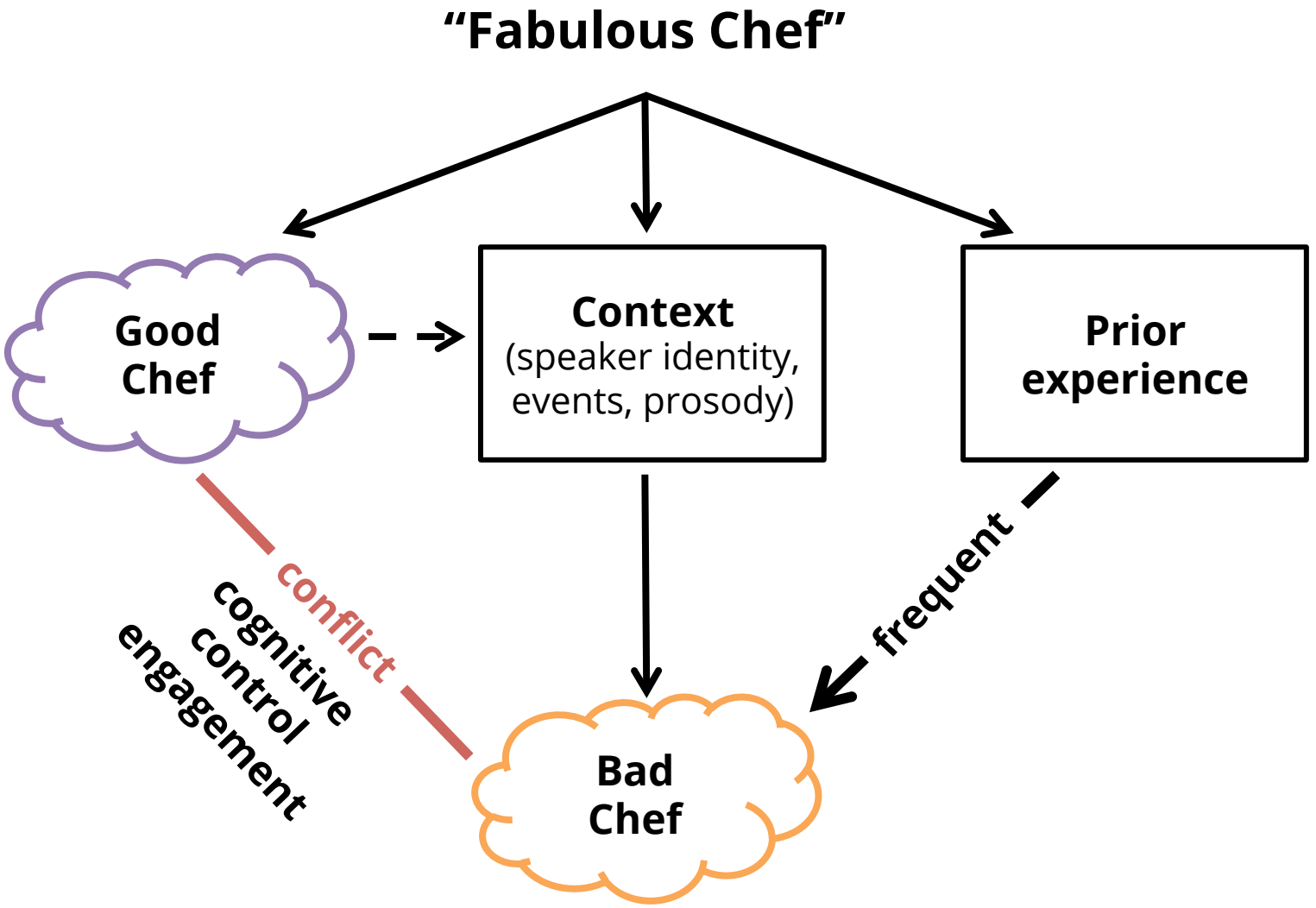
- Evidence does not completely support Early Access or Late Access accounts
  - Exps. 1 & 3: magnitude effect of interpretation
  - Exp. 1: rate effect of frequency
- Listeners process irony differently from opposites (Exp. 2A) and view social pragmatic goals of ironic speakers differently from opposite ones (Exp. 2B)
- Conflict adaptation (sentence to Stroop; Exp. 3) and overall delay for irony (Exp. 1) suggests even frequent form of irony generates conflict

CONCLUSIONS

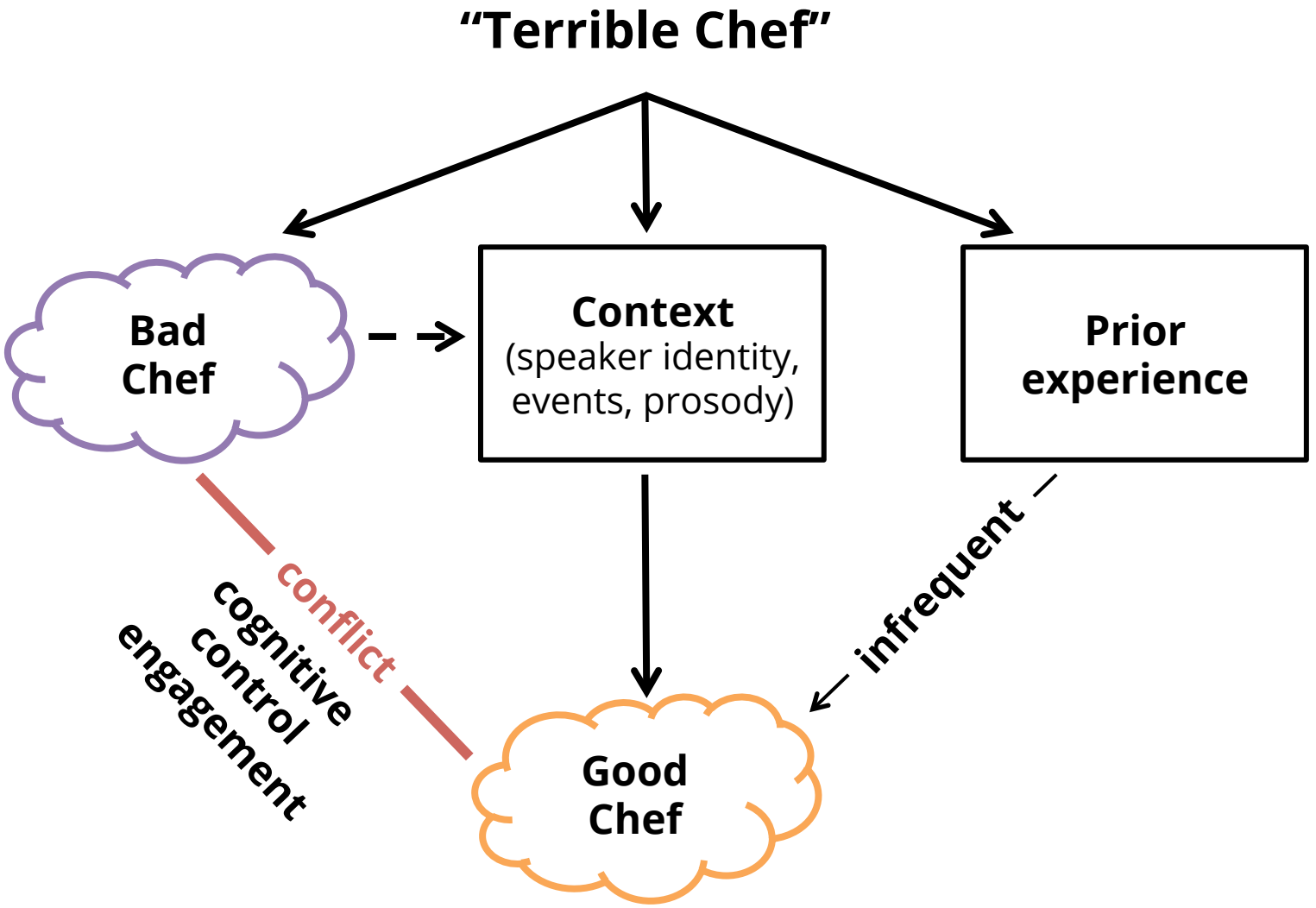
ACCOUNTS OF IRONY

- Results align most closely with graded salience account
  - Greater delay for less frequent irony than more frequent (Exp. 1 rate effect)
  - BUT overall delay for irony, regardless of frequency (Exp. 1 magnitude effect) → if ironic criticisms lexicalized, should see no delay compared to literal

NEW MODEL: IRONIC CRITICISMS



NEW MODEL: IRONIC COMPLIMENTS



CONCLUSIONS

SEMANTICS-PRAGMATICS INTERFACE

- Findings consistent with work on scalar implicatures
  - Listeners access semantic meaning of "some" (*some and possibly all*) before pragmatic meaning (*some but not all*)
  - Some work suggests sequential access for irony: for less familiar ironies, literal interpretation available immediately and ironic interpretation later

Bott & Noveck, 2004; Giora & Fein, 2007; Huang & Snedeker, 2009; Huang & Snedeker, 2011; Tomlinson et al., 2013

CONCLUSIONS

CONTEXT & FREQUENCY

- Why is context slow here, but fast for elsewhere?
  - Results differ from homophone findings, where context for equibiased homophones activates relevant meaning only (here, criticisms still activate literal)
  - Irony is not stored, pre-compiled in lexicon
- Where is frequency info stored, if not in lexicon?
  - Social cognition; serves as another cue to interpretation

Altmann & Steedman; Altmann, Garnham, & Dennis, 1992; Tanenhaus, Spivey-Knowlton, Eberhard, & Sedivy, 1995; Trueswell & Tanenhaus, 1991

FUTURE WORK

- Provide more context in Exp. 1 to see if delay for irony can be eliminated (and add time prior to adjective onset to identify speaker)
- Re-run Exp. 3 with difficult but non-conflict task to rule out difficulty effects
- Add additional practice items for Exp. 4
- Re-run Exp. 4 with negative adjectives

THANK YOU!