

* **Stereotypical inferences prevail even after defeating pre-verbal context** * **due to linguistic salience bias affecting irregular polysemy processing**

MAIN INGREDIENTS

EXPERIMENTAL ARGUMENT ANALYSIS (EAA)

- examines how automatic language processing shapes verbal reasoning

Default inferences: automatically triggered by verbal stimuli, regardless of context

- invokes comprehension & aims to explain and expose fallacies in philosophical arguments of hallucination, illusion and the ‘zombie argument’

► **focus on salience effects: how salience biases inferences**

LINGUISTIC SALIENCE of *word senses*: how easy is it to retrieve relevant semantic information in language comprehension and verbal reasoning?

TODAY’S PRESENTATION

When and why does the linguistic salience of word senses unduly influence inferences and lead to fallacious inferences?

1. Linguistic salience bias hypothesis – evidence from perception and appearance verbs with disambiguating context following the verb (Fischer & Engelhardt, 2016, 2017a, 2017b, 2019, 2020, in press; Fischer & Sytsma, 2021; Fischer et al., 2021a, 2021b, 2022)

2. **New evidence: two eye tracking studies with appearance-verbs**

BACKGROUND

LINGUISTIC SALIENCE BIAS

Fischer & Engelhardt, 2020; Fischer & Sytsma, 2021

When

i. **[Salience imbalance]** one sense of a polysemous word has far higher linguistic salience than all others,

ii. the **retention/suppression strategy** is used to interpret utterances with a subordinate use,

iii. and **some**, not all, **features** associated with the dominant sense are **relevant** for interpreting the subordinate use,

Then

1. contextually inappropriate stereotypical inferences supported by dominant sense are triggered by the subordinate use *and*

2. influence further judgment and reasoning.

APPEARANCE VERBS ‘look’, ‘appear’, and ‘seem’

Polysemous: (a) generic use (b) phenomenal sense

Generic use: **‘look’, ‘appear’, ‘seem’ used to attribute beliefs to patients** (Brogaart, 2013; 2014).

‘Jack appears dirty to Cath’ ~ Cath believes that Jack is dirty.

- Nearest neighbour analysis** of a parsed Wikipedia snapshot: (Fischer, Engelhardt & Herbelot, 2015): most frequent intransitive use, esp. for ‘appear’ and ‘seem’

- Sentence production task**

H₀: Generic belief-attributing sense is the most salient

- 21 native speakers

- Generate five sentences each:

% of generic uses

Unconstrained completions	
Look	30%
Appear	33%
seem	50%
Constrained completions	
Look... to....	68%
Appear... to....	68%
Seem ...to	76%

3 annotators classified uses:

Initial good agreement

(Fleiss’ κ = .633)

further improved upon discussion

(κ = .935)

HYPOTHESIS

Inappropriate doxastic inferences from phenomenal uses of appearance verbs

Phenomenal sense

- describes viewers’ subjective experience
- cancels all belief-implications (Ayer, 1956/90; Maund, 1986).
- familiar to ordinary speakers (acceptability ratings from a lay sample: Fischer, Engelhardt, & Sytsma, 2021, App. D)

Processing

- Retention/suppression strategy** (Giora 2003): doxastic patient features initially activated as part of the dominant situation schema (Rumelhardt 1978) need to be suppressed

- Linguistic salience bias**

► H1: Suppression will remain incomplete and people will make belief inferences from appearance-verbs, even where pre-verbal contexts invite phenomenal readings from the start.

EXPERIMENTS

Participants English native Psychology Undergraduates: **Study 1:** n=45 **Study 2:** n=48

Experimental procedure Eye tracking study with cancellation paradigm, presented in EyeLink 1000

Design Within-subjects 2x3x2: veridicality in S1 x verb in S2 x s-consistency in S3

Veridicality (viewing condition): Study 1: non-veridical vs veridical **Study 2:** non-veridical vs neutral

Verb: look / appear / seem

Stereotype-consistency: s-consistent vs. s-inconsistent

Materials Participants read 96 three-sentence items (48 critical) normed and controlled for length and word frequency in regions of interest, across conditions:

Non-veridical (negative)	Veridical (positive)	Neutral
The fishing rod was immersed in the water. The rod looked bent to the fisherman. He thought it was bent / straight.	The car windows were tinted. The autumn leaves looked red to Dan. He believed they were red / orange.	The lighting in the room was odd. The hostess’s dress looked blue to Hannah. She thought it was blue / green.

Measures

Fixation times in 5 regions of interest; plausibility ratings on a 5-point Likert scale

The vessels waited far out at sea.¹ They looked² small³ to Eve⁴. She thought they were small / big⁵.

¹Pre-verbal context ²Source verb ³Source adjective ⁴Source object ⁵Conflict adj

PREDICTIONS

1) Higher rereading times for source [2-4] or conflict [5] regions in stereotype-inconsistent items than in stereotype-consistent counterparts, even where pre-verbal contexts specify non-veridical viewing conditions. (INCON > CON)

2) Lower plausibility ratings for s-inconsistent than s-consistent items, even for items with non-veridical pre-verbal contexts. (INCON < CON)

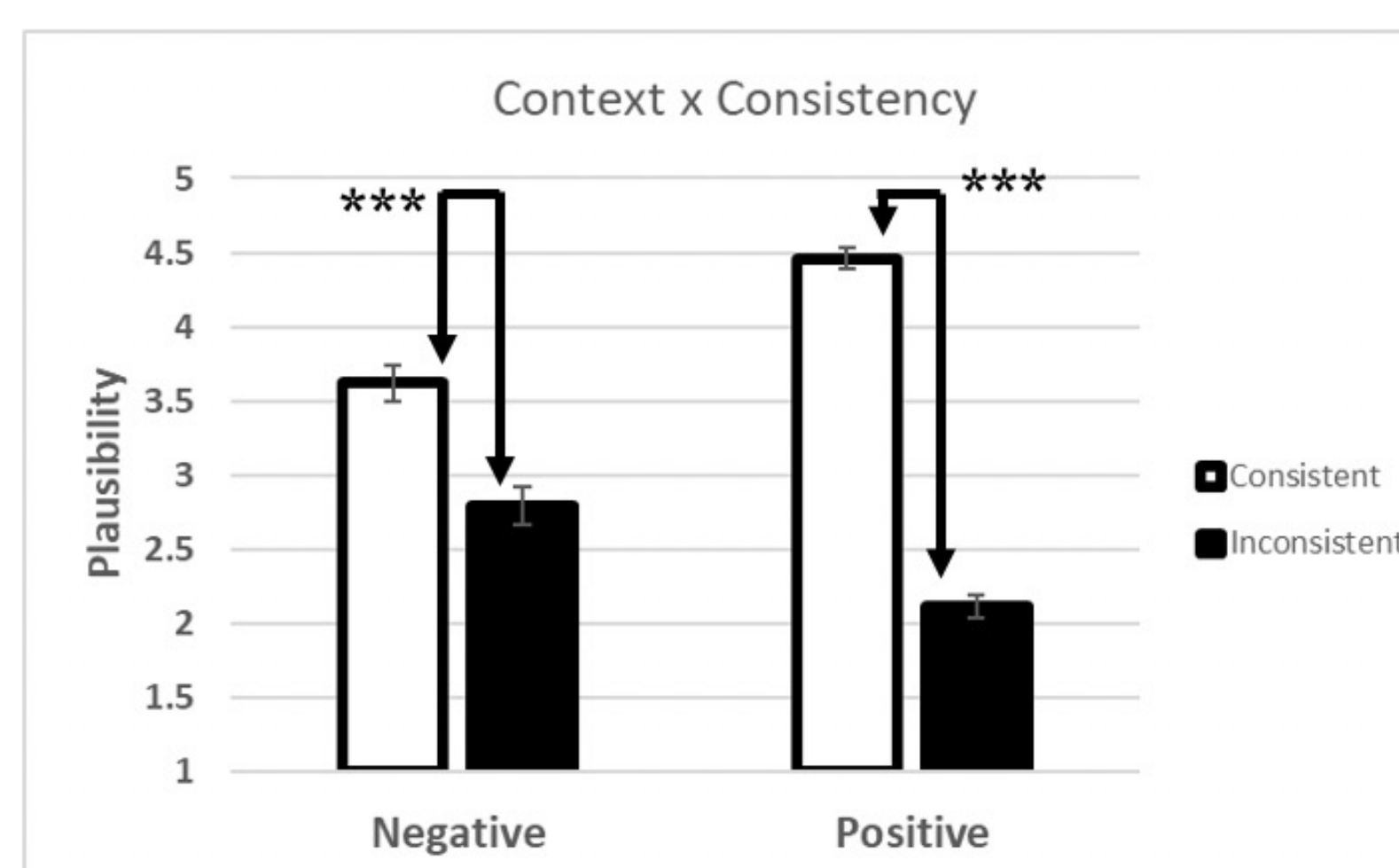
Normatively correct ratings in familiar non-veridical contexts: INCON ≥ CON.

RESULTS – STUDY 1: SUMMARY OF READING TIME DATA

		1	3	4	5	7
		PREVERBAL CONTEXT	SOURCE VERB	SOURCE ADJ	SOURCE OBJ	CONFLICT ADJ
1ST PASS	CONTEXT	p = .008 p > n			p = .009 p > n	
	CONSIST					p < .001 I > C
	VERB					p = .009
	CONTEXT X CONSIST					
	CONTEXT X VERB					
	CONSIST X VERB					
	3-WAY INTERACT					
RE-READ	CONTEXT		p < .001 p > n		p < .001 p > n	
	CONSIST			p < .001 I > C	p < .001 I > C	p < .001 I > C
	VERB		p < .001 a > I = S			p = .002
	CONTEXT X CONSIST					
	CONTEXT X VERB				p = .037	
	CONSIST X VERB					
	3-WAY INTERACT					p = .005

Main effects of consistency in the source region and conflict region

RESULTS – STUDY 1: PLAUSIBILITY



Interaction $p < .001$

Main effects:

context $p = .022$

consistency $p < .001$

POS (veridical) CON > INCON $d = 2.82$

NEG (non-veridical) CON > INCON $d = .52$

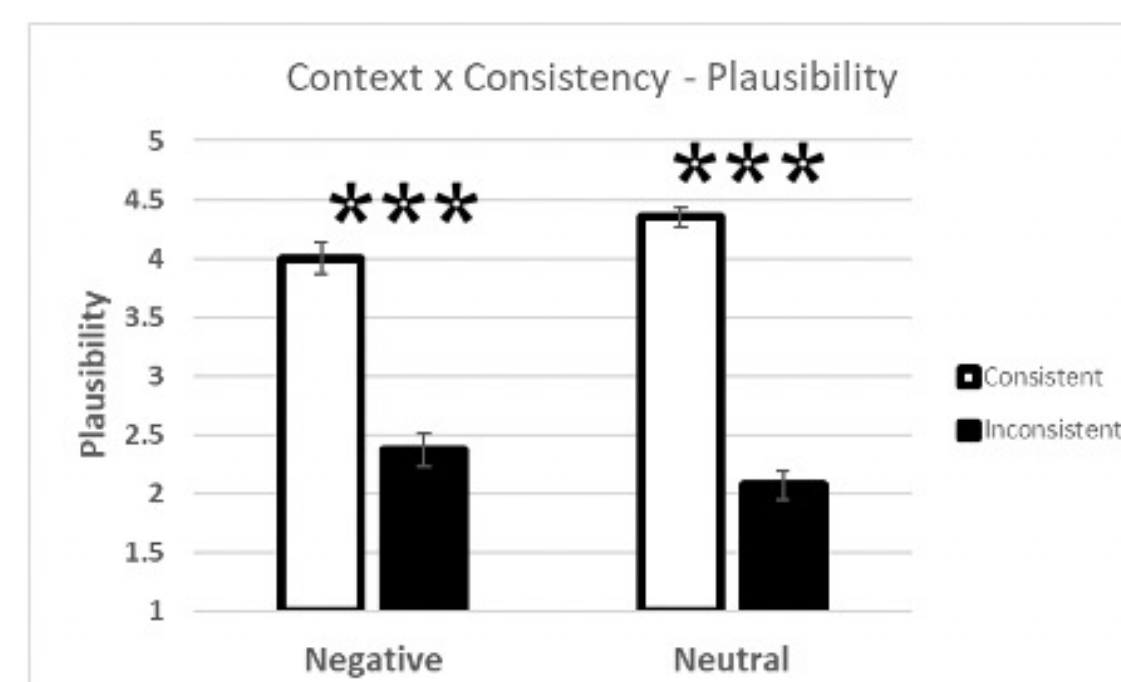
RESULTS – STUDY 2: SUMMARY OF READING TIME DATA

		1	3	4	5	7
		PREVERBAL CONTEXT	SOURCE VERB	SOURCE ADJ	SOURCE OBJ	CONFLICT ADJ
1ST PASS	CONTEXT	P = .002 NEU > NEG		p < .001 NEU > NEG	p < .001 NEU > NEG	
	CONSIST					p = .023 I > C
	VERB					
	CONTEXT X CONSIST					
	CONTEXT X VERB					
	CONSIST X VERB					
	3-WAY INTERACT					
RE-READ	CONTEXT	P = .012 NEU > NEG		p < .001 NEU > NEG	p < .001 NEU > NEG	
	CONSIST		p = .005 I > C	p < .001 I > C	p = .005 I > C	p = .001 I > C
	VERB		p = .023 A > L = S			
	CONTEXT X CONSIST			p = .04		
	CONTEXT X VERB					
	CONSIST X VERB					
	3-WAY INTERACT	P = .023				
GROUP				P = .029 26 > 22	P = .021 26 > 22	
				CONTEXT X GROUP		

Whole group; interactions and main effects replicated by each group

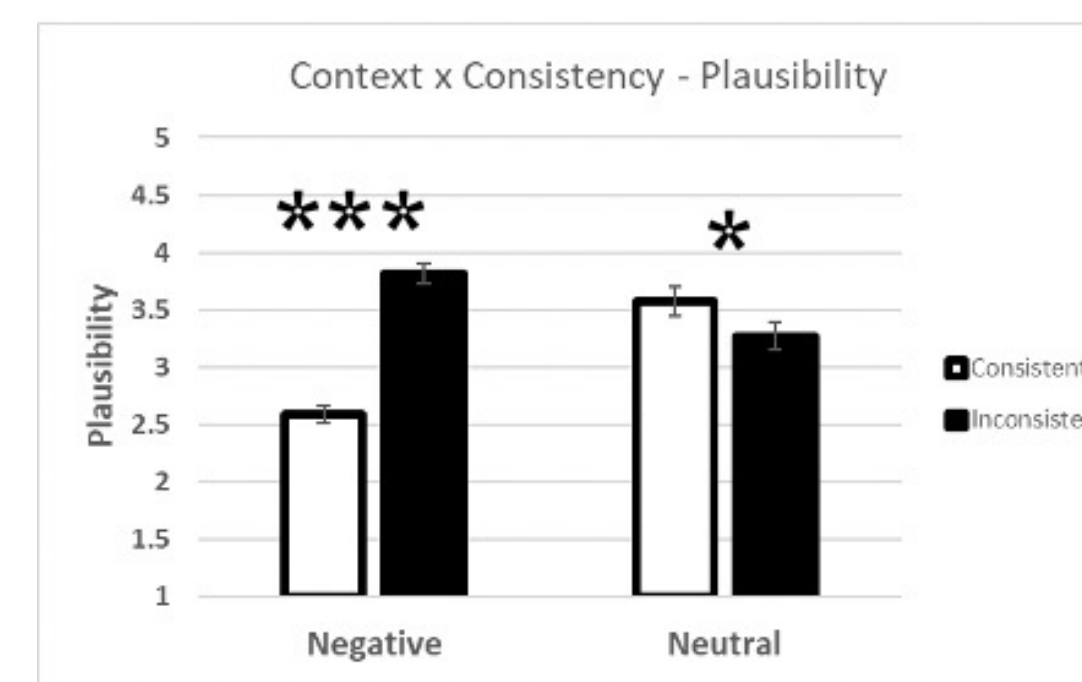
RESULTS – STUDY 2: PLAUSIBILITY BIASED RESPONDERS (N=22)

Criterion: CON ≥ INCON in Non-Veridical



CORRECT RESPONDERS (N=26)

Criterion: CON < INCON in Non-veridical



N=22
Non-veridical
CON-INCON:
 $d = 1.46$
N=26
Non-veridical
CON-INCON
 $d = -1.918$

FINDINGS AND CONCLUSION

Study 1: Competent language users make stereotypical belief inferences from philosophically relevant phenomenal uses of appearance verbs, even where pre-verbal context challenges them & invites phenomenal interpretation from the start -> linguistic salience bias

Study 2: High levels of dysfluency and inhibition need to come together to neutralise the bias.

► Linguistic salience can make a difference not just to processing, but to its philosophically relevant outcomes, incl. inferences in philosophical argument.

► Future directions: x-phi research on individual differences.