Topics in Experimental Pragmatics

UCL Linguistics Short Courses 25/26

Instructors:

- Erying Qin
- Shenshen Wang
- Joseph Keir Petrie

Outline of the course

Session 1: Introduction to experimental pragmatics & Scalar Inferences/Scalar Implicatures (SIs)

Session 2: Why Are Negative Sentences Hard to Process?

Session 3: Context and More: Open Questions for the Dynamic Pragmatic Theory

Session 4: Question: what questions tell us about pragmatic language skills?

Session 5: Perspective-taking in implicature derivation: what developmental studies tell us about pragmatic inferences

Session 2 & 3

02.17:

This session will present various experimental findings and review current accounts of negation processing. Why are negative sentences generally more demanding to process than affirmative ones? How can we explain this difficulty? Specifically, we will explore the extra cognitive effort required to interpret negative sentences and examine the role that positive arguments play in this process.

02.18:

In this session, we will introduce and evaluate the dynamic pragmatic view of negation processing, drawing on evidence from various experimental pragmatics tasks. In particular, we will focus on a study of the sentence-picture verification task. Additionally, we will review many factors at play in verification tasks when negation is involved, highlighting how these factors may influence the processes in negation comprehension.

Session 4 & 5

02.19:

This session explores what questions can tell us about pragmatic language skills. It provides insight into (experimental) pragmatics from the perspective of questions. The game *Guess Who*, which helps develop pragmatic language skills, including turn-taking, formulating targeted questions, and deductive reasoning, will be introduced.

02.20:

By now, you have probably realised that implicature derivation is a central topic in pragmatics, and that experimental pragmatics investigates how interlocutors behave in tasks designed to test it. In this session, we will look at developmental research on implicature derivation/inferences. Since pragmatics concerns how meaning varies depending on the speaker's and listener's perspectives, and since there are usually developmental differences in perspective-taking between children and adults, research that incorporates these factors adds another piece to the puzzle of pragmatic inference.

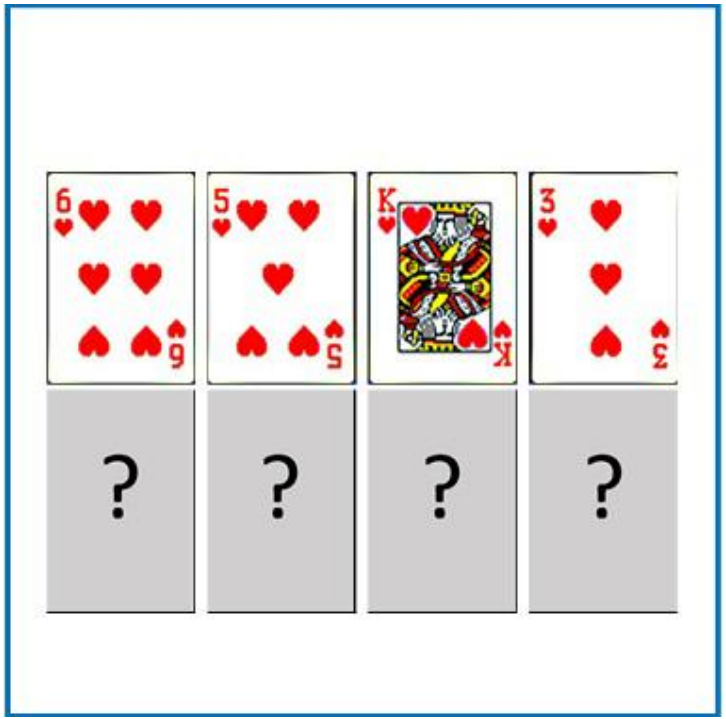
Today's Roadmap

- **Experimental Pragmatics**

- **Scalar Inference/Scalar Implicature (SI)**

What is Experimental Pragmatics?

Can you use ‘some of the cards are hearts’ to describe the picture?



Pragmatics

The branch of linguistics that is concerned with the relationship between linguistic representations (e.g. words and sentences) and the people who make use of them, as well as the context in which they do.

Pragmatics focuses on context-dependent meaning, compared to semantics that deals with the meaning of words and sentences in isolation.

A bit of history

Initially, academic studies on meaning were concerned with truth conditions.

In formal semantics, research on meaning often focuses on truth-conditional statements, which can be evaluated as either true or false based on the facts of the world.

BUT what about:

‘My lawyer is a shark’

With examples like this, scholars soon realised that human communication is more complicated than simple logic, and establishing truth conditions in natural languages requires a number of factors.

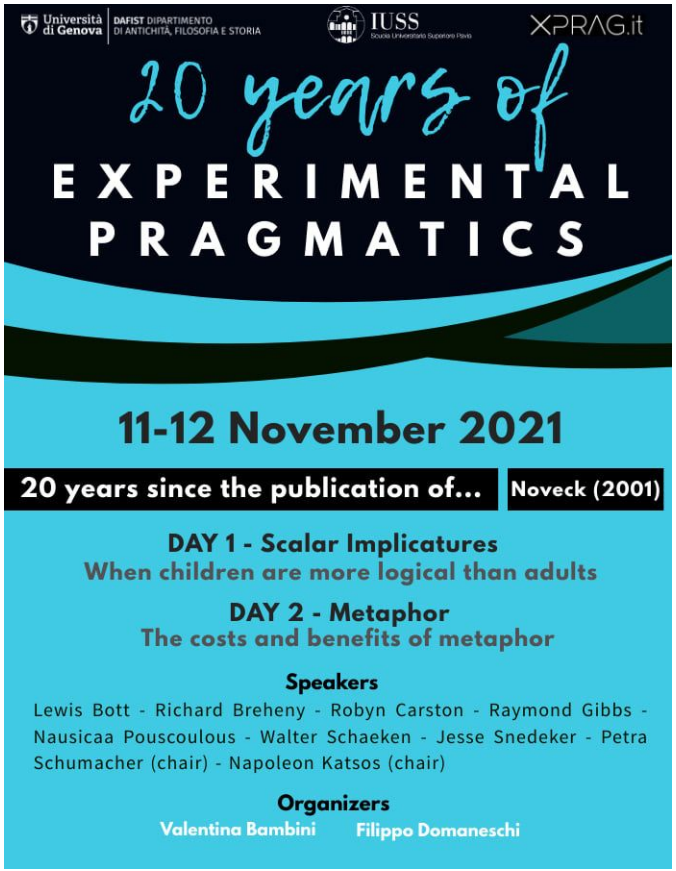
A bit of history

Paul Grice was pioneering in proposing a new approach to meaning:
The meaning of a sentence is determined by what is said, but also by what is implied.

Words with their literal (logical) meaning matter, but are sometimes not enough to determine the meaning of an utterance. You also need to consider the speaker's intentions, the listener's interpretation, the context of the conversation, social norms, etc.

This establishes an interaction between literal meaning and context.

Experimental Pragmatics



'This volume lays down the bases for a new field, Experimental Pragmatics, that draws on pragmatics, psycholinguistics and also on the psychology of reasoning.'

Noveck & Sperber (2004)

Although there is some experimental work on pragmatic meaning that was conducted before, the publication of Noveck (2001) is often perceived as a starting point for Experimental Pragmatics.

ELSEVIER

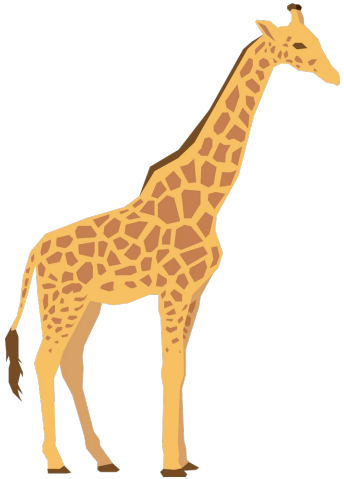
Cognition

Volume 78, Issue 2, February 2001, Pages 165-188

COGNITION

When children are more logical than adults: experimental investigations of scalar implicature

Ira A Noveck



Noveck investigated children's and adults' interpretations of **Scalar Implicatures**. Example of test sentence:

'Some giraffes have long necks'
Is the sentence true or false?

Children and adults respond differently.

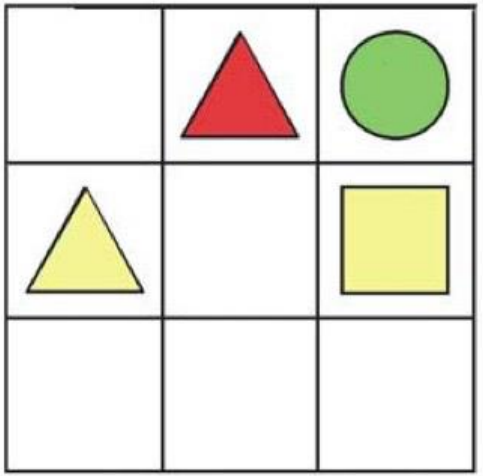
Why do we need experimental pragmatics?

‘Psycholinguistics has developed sophisticated experimental methods in the study of verbal communication, but has not used them to test systematic pragmatic theories.’

Noveck & Sperber (2004)

Topics in Experimental Pragmatics

- Reference resolution
- Figurative language (metaphors, irony...)
- Negation
- Scalar Inference/Scalar Implicature
- ...



A variety of methodologies and approaches

- Judgment tasks
- Selection tasks
- Action-based tasks
- Reaction and reading times
- Mouse-tracking
- Eye-tracking
- Neuroimaging: ERP, fMRI
- ...

Scalar Implicature + Selection tasks

Some of the symbols are diamonds

some:

1. at least some and possibly all →shown

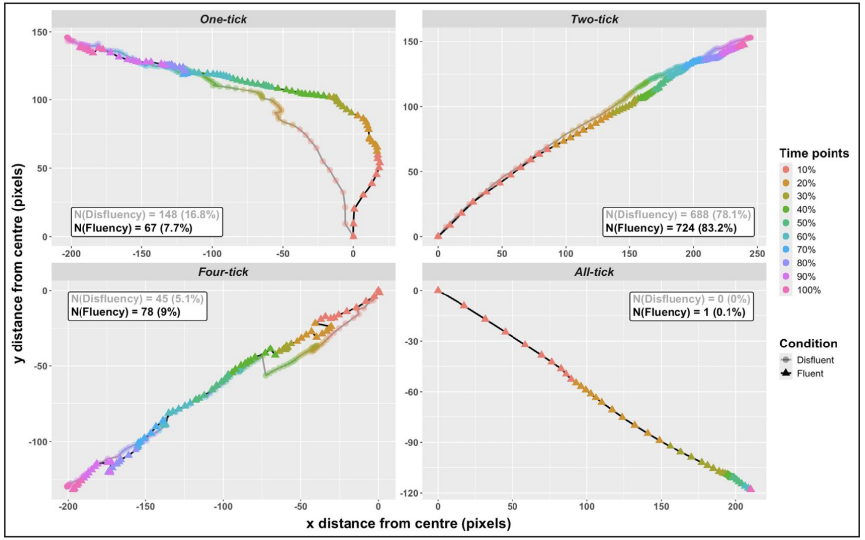
2. not all (scalar inferencing) →better

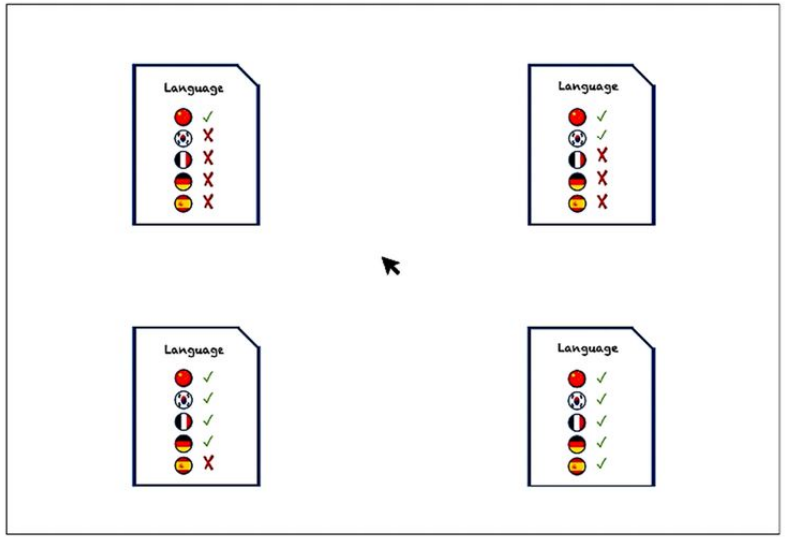
Bott & Chemla (2016)

‘some’ + Mouse-tracking

Table 1: Total number and distribution of mouse clicks recorded on each image (one-tick, two-tick, four-tick, or all-tick) by manner of delivery (disfluent/fluent).

	One-tick	Two-tick	Four-tick	All-tick
Disfluent	148 (17%)	688 (78%)	45 (5%)	0 (0%)
Fluent	67 (8%)	724 (83%)	78 (9%)	1 (≈ 0%)





- Interviewer ‘How familiar are you with the listed languages?’
- Interviewee ‘I can speak [uh] some of them.’

Li et al. (2024)

Reference resolution + Action-based tasks + Eye-tracking

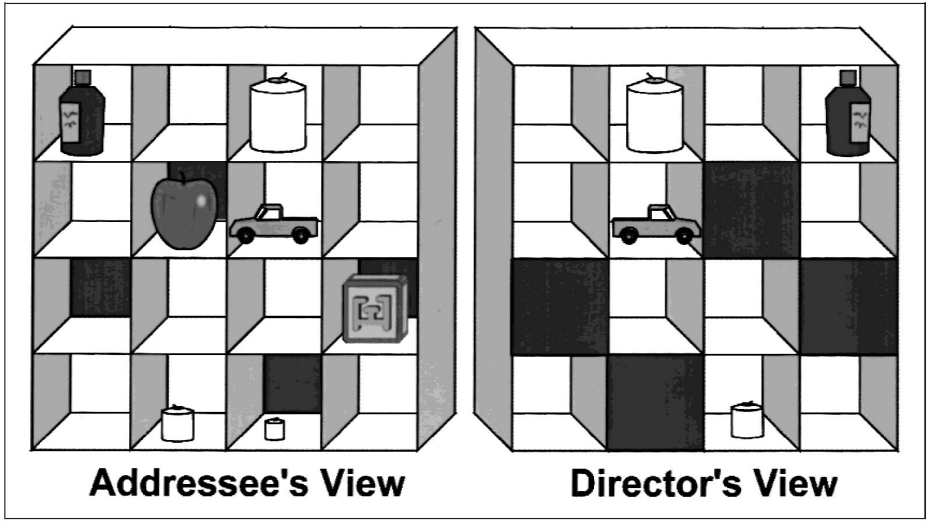


Fig. 1. The 16 slots with a typical set of objects. The addressee's and director's views are distinct because of the occluded slots. The critical instruction (referring to "the small candle") picks out a different candle from the director's perspective (shared candle) than from the addressee's perspective (occluded candle).

Keysar et al. (2000)

Director 'Put the truck one slot down. Now put the small candle above it.'

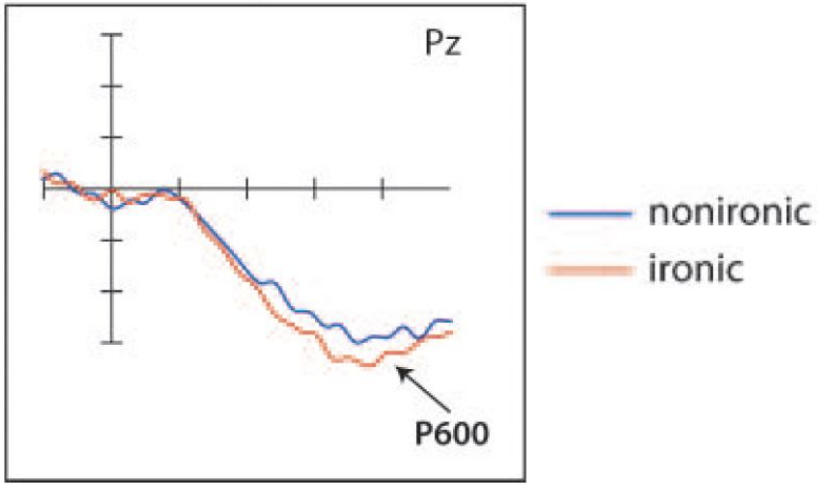
If the listeners' reference resolution proceeds initially relative to their egocentric perspective, they may consider the smallest hidden candle as the intended referent.

If the listeners take the speaker's perspective into account, their eyes initially fixate on the target object.

Figurative language + Neuroimaging

Event-Related brain Potentials (ERPs) are time-sensitive measurements in the order of milliseconds, and this imaging method also allows a differentiation between the neurocognitive processes underlying comprehension present at a particular time.

As a language-related ERP component, P600 is related to irony processing, and might be a reflection of pragmatic interpretation processes.



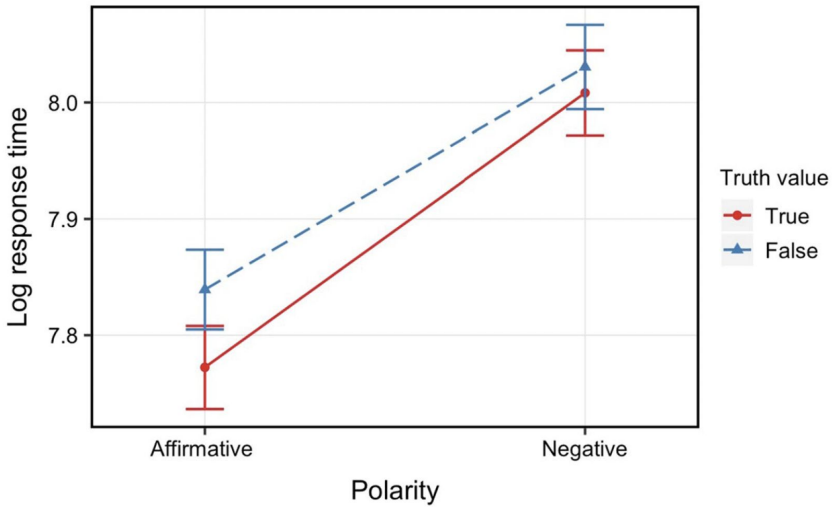
← the scalp distribution of the ERP effects in response to irony

The presence of P600 suggests that late inferential processes appear to be necessary for understanding ironic meanings.

Regel et al. (2011)

Negation + Reaction and reading times

Polarity	Truth value	Sentence	Display
Affm	True	The apple is peeled	
Neg	False	The apple isn't peeled	
Affm	False	The apple is peeled	
Neg	True	The apple isn't peeled	



"verifying negative sentences took longer than verifying positive sentences, and 'false' responses took longer than 'true' responses"

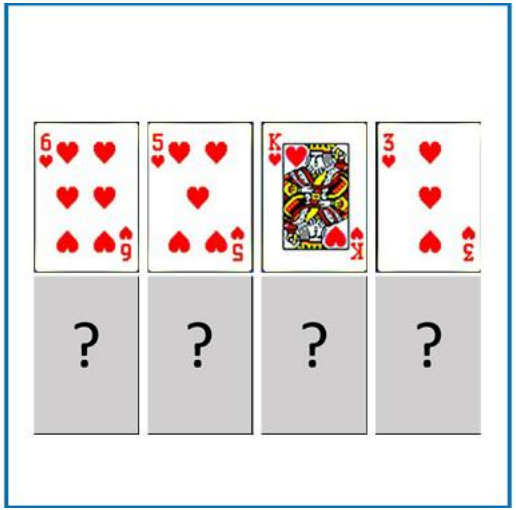
Wang et al. (2021)

Scalar Inference/Scalar Implicature (SI)

Scalar Inference/Scalar Implicature (SI)

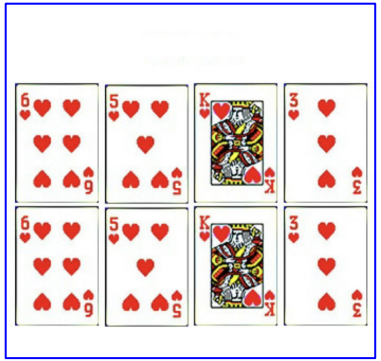
Can you use ‘some of the cards are hearts’ to describe the picture?

+> ‘Some, but not all, of the cards are hearts’

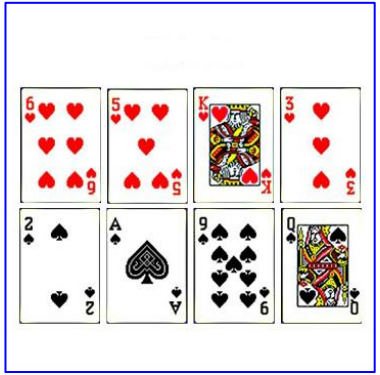


Scalar Inference/Scalar Implicature (SI)

(1) Some of the cards are hearts.
a. Literal: Some (and possibly all) of the cards are hearts
b. Alternative: All of the cards are hearts



c. SI: Not all of the cards are hearts
+> ‘Some but not all of the cards are hearts’



Horn scales

(2) a. Quantifiers <some, many, most, all>

b. Connectives <or, and>

c. Adjectives <attractive, pretty, beautiful>

d. Adverbs <sometimes, often, usually, always>

e. Cardinal numbers <1, 2, 3, 4, 5, 6, …, n>

f. Modals <possible that p, probable that p, certain that p>

g. Verbs <like, love, adore>

(Horn 1972)

Within-scale Variation

(3) a. I like some country music.

b. I like some, but not all, country music.

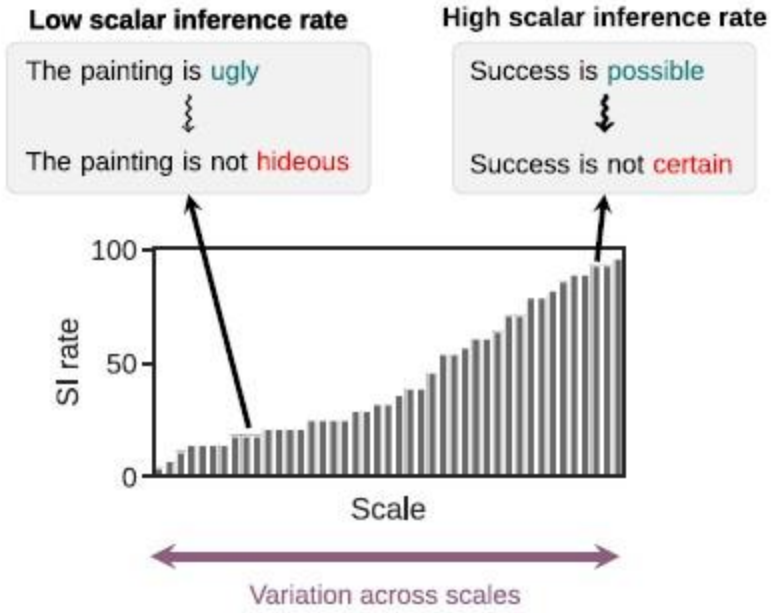
(4) a. It would certainly help them to appreciate some of the things that we have here.

b. It would certainly help them to appreciate some, but not all, of the things that we have here.

(Degen 2015)

Degen (2015) finds that humans are highly likely to consider (3-a) as conveying a similar meaning as (3-b), but unlikely to consider (4-a) as conveying a similar meaning as (4-b).

Cross-scale Variation (Scalar Diversity)



Average SI rates across scales formed by different lexical items

(van Tiel et al. 2016)

SI & language model (Hu et al. 2023)

some, but not all

[WEAK], but not [STRONG]

‘To test how expected [STRONG] is as an alternative to [WEAK], we need to estimate how likely a human would predict [STRONG] to appear in the [STRONG] position…we approximate this with neural language models. We measure how unexpected [STRONG] is by computing its surprisal (negative log probability) under a language model, conditioned on the rest of the sentence. Since surprisal measures unexpectedness, we predict a negative relationship between SI rate and the surprisal of the strong scalemate’

(Hu et al. 2023)

SI & language model (Hu et al. 2023)

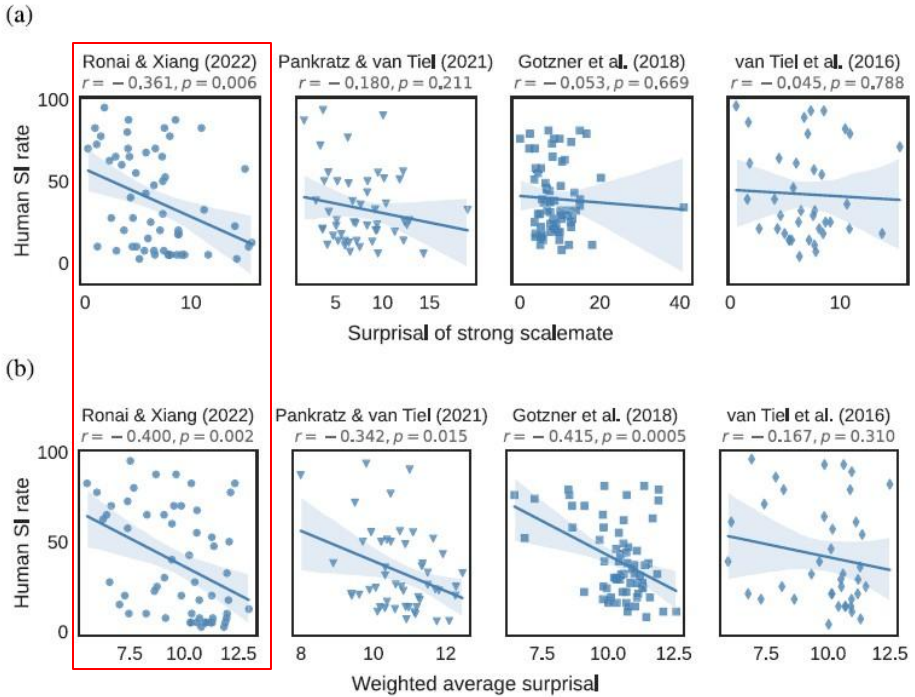


Figure 3: Relationship between human SI rates and GPT-2-derived predictors across scales, for four datasets. Each point represents a single scale. Shaded region denotes 95% CI. (a) SI rate vs. surprisal of strong scalemate in the scalar construction. (b) SI rate vs. weighted average surprisal over the full set of candidate alternatives (Section 5.3).

Hu et al. (2023) find that surprisal is a significant predictor only for Ronai and Xiang's dataset (Pearson ρ = −0.361, p = 0.006).

References

Bott, L., & Chemla, E. (2016). ‘Shared and distinct mechanisms in deriving linguistic enrichment’. *Journal of Memory and Language* 91: 117-140.

Degen, J. (2015). ‘Investigating the distribution of some (but not all) implicatures using corpora and web-based methods’. *Semantics and Pragmatics*, 8(11):1–55.

Horn, L. R. (1972), *On the Semantic Properties of Logical Operators in English.* Distributed by Indiana University Linguistics Club Ph.D. thesis, UCLA.

Hu, J., Levy, R., Degen, J., & Sebastian, S. (2023). ‘Expectations over Unspoken Alternatives Predict Pragmatic Inferences’. *Transactions of the Association for Computational Linguistics*, vol. 11, pp. 885–901.

Keysar, B., Barr, D. J., Balin, J. A., & Brauner, J. S. (2000). ‘Taking perspective in conversation: The role of mutual knowledge in comprehension’. *Psychological Science*, *11*(1), 32-38.

Li, W., Rohde, H., & Corley, M. (2024). ‘Non-plural interpretations of ‘some’: Mouse-tracking evidence for quick social reasoning in real-time’. *Glossa Psycholinguistics*.

References

Noveck, I. A. (2001). ‘When children are more logical than adults: experimental investigations of scalar implicature’. *Cognition*, 78(2), 165–188.

Noveck, I. A., & Sperber, D. (2004), *Experimental Pragmatics*. Palgrave MacMillan.

Regel, S., Gunter, T. C., & Friederici, A. D. (2011). ‘Isn't it ironic? An electrophysiological exploration of figurative language processing.’ *Journal of cognitive neuroscience*, *23*(2), 277-293.

van Tiel, B., van Miltenburg, E., Zevakhina, N., & Geurts B. (2016). ‘Scalar Diversity’ *Journal of Semantics*, 33, 2016: 137–175.

Wang, S., Sun, C., Tian, Y., & Breheny, R. (2021). ‘Verifying negative sentences’. *Journal of Psycholinguistic Research*, *50*(6), 1511-1534.