THE COMMON GROUND CORPUS

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IACS Student Seminar, Spring 2022

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  GS: *This is pretty interesting, Steller's sea eagle is the heaviest of all eagles. It can weight up to 20 lbs.*

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  J: *What are you talking about?*

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- **common ground** – a set of mutual beliefs between interlocutors
  - ϕ = *Biden won the 2020 presidential elections*
  - "It is common ground that ϕ in a group if all members accept (for the purpose of the conversation)' that ϕ, and all believe that all accept that ϕ, and all believe that all believe that all accept that ϕ, ..." (Stalnaker, 2002)
  - "Two people's common ground is [...] the sum of their mutual, common, or joint knowledge, beliefs, and suppositions" (Clark, 1996)

COMMON GROUND (CG)

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  - "Two people's common ground is [...] the sum of their mutual, common, or joint knowledge, beliefs, and suppositions" (Clark, 1996)
  - our understanding: ϕ will become a part of the CG between A&B, if A(B) believes ϕ, and A believes that B(A) believes ϕ, and ...
    - Two Generals' Problem

NLP CORPORA

- In the past two decades, multiple corpora have been constructed to explore the notion of belief (factivity)
  - LU (Diab et al., 2009)
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  - MPQA 3.0 (Deng and Wiebe, 2015)
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LEXICAL SEMANTICS

- initial hypothesis:
  - matrix predicates can be subdivided into groups based on the inferences regarding the embedded event

1. factive vs. non-factive (Kiparsky and Kiparsky, 1968)

   +/+ *Does John know that Mary's cat eats too much?* → Mary's cat eats too much

   ∘/∘ *Does John think that Mary's cat eats too much?* ↛ Mary's cat eats too much

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2. Semi-factive (Karttunen, 1971b)
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   - +/− *John managed to feed Mary's cat* → Mary's was fed
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   - +/− *John managed to feed Mary's cat* → Mary's was fed
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   - ∘/− *John attempted to feed Mary's cat* → Mary's was/wasn't fed
     John didn't attempt to feed Mary's cat → Mary's was not fed

LEXICAL SEMANTICS IS NOT ENOUGH

- while looking at verb signatures is a good start to look into one's cognitive state, there are multiple other factors to consider
  - gerund vs. infinitive
    - *John didn't remember feeding Mary's cat* → Mary's cat was fed by John
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  - 1SG vs. 3SG
    - *If I discover that Mary didn't lock the door, I will be angry* ↛ Mary didn't lock the door.
      If he discovers that Mary didn't lock the door, he will be angry → Mary didn't lock the door

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  - Private judgement vs. public commitment (Krifka, 2021)
    - *Max müsste zuhause sein* (subjective reading)
      Max must.SUBJ at.home be
      "Max must be at home"
      Max muss zuhause sein (objective reading)
      Max must at.home be
      "Max must be at home"

How good are we at recognizing such magic?

- RP corpus (Ross and Pavlick, 2019)
  - affirmative sentences with verb complement: $verb\{that|to\}\{VP|S\}$
  - generation of negative equivalents
    - *You've not got to be kidding me.*
    - *I did not begin to feel quite big.*
  - premise/hypothesis pair ($< p, h >$):
    - $< S, C >$
    - $< \neg S, C >$

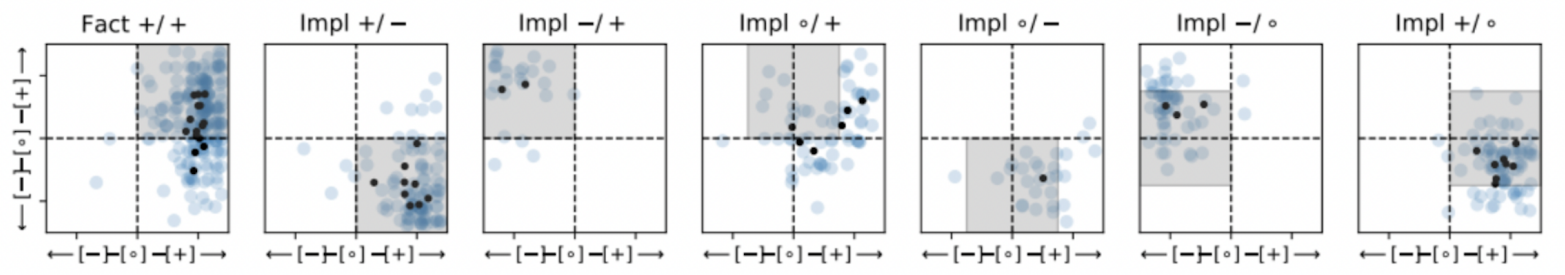
VARIETY OF HUMAN JUDGEMENTS

[+] (1.7)	Everyone **knows that** the CPI is the most accurate. → The CPI is the most accurate.
[+] (1.7)	Everyone **does not know that** the CPI is the most accurate. → The CPI is the most accurate.
[+] (0.7)	I **know that** I was born to succeed. → I was born to succeed.
[○] (0.3)	I **do not know that** I was born to succeed. ↛ I was born to succeed.

- human judgements: [1,2,2], [1,2,2], [0,1,1], [0,0,1]

HUMAN JUDGEMENTS

know manage fail suspect attempt refuse confirm



TAKEAWAYS FROM THE RP CORPUS

- verb signatures are good indicator on average, however we must allow for some gradience
- having context could explain the gradience
- data should not be automatically generated
- annotators were asked to make judgements from their perspectives

HOW GOOD ARE WE AT RECOGNIZING THE INFERENCE MAGIC?

- The Commitment Bank (de Marneffe et al., 2019)
  - Family of Sentences – entailment cancelling environment
    - *Jane doesn't know that it is snowing.*
    - *Does Jane know that it is snowing?*
    - *Jane may know that it is snowing.*
    - *If Jane knows that it is snowing, she will wear her snow boots, hat and gloves.*
  - discourse segments: target sentence + 2 prior sentences for context

GRADIENCE WITHIN A FACTIVE VERB: *know*

Sally: "*and at that point, the warehouse was over across the road and it wasn't air conditioned, and, we were there like in the middle of the summer, it's unair-conditioned, it was dusty and dirty, uh, there was like a fan at the very end of the row and that was it. And so, we didn't really know we weren't supposed to, we thought TI dress code was just dress appropriate to your job,*
Jim: *Uh-huh.*
Sally: *we wore shorts.****"We didn't know that was a big no, no."***

Tell us how certain Sally was that wearing shorts was a big no no.

Sally is certain that it is true			Sally is not certain whether it is true or false			Sally is certain that it is false
○	○	○	○	○	○	○

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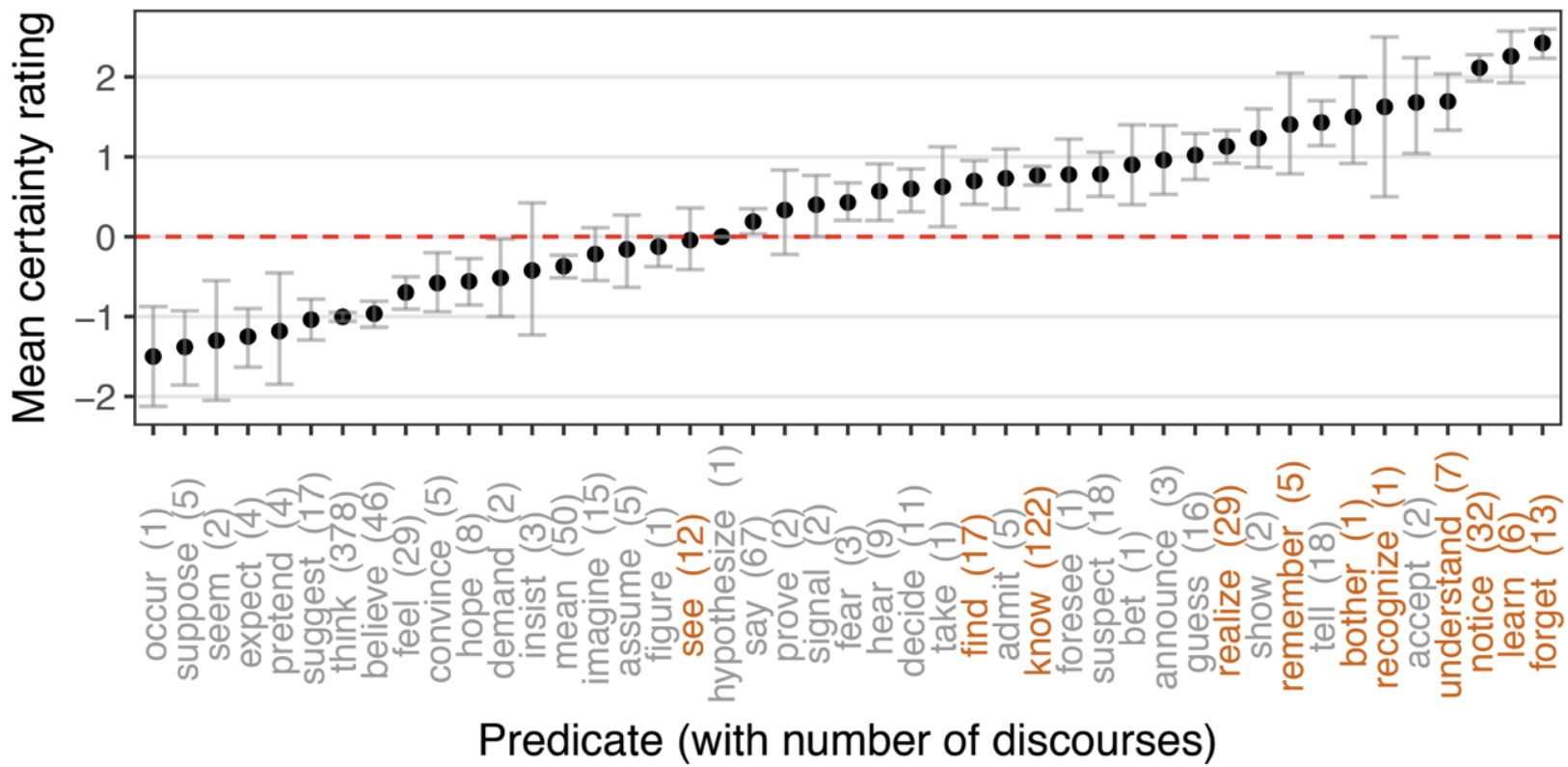
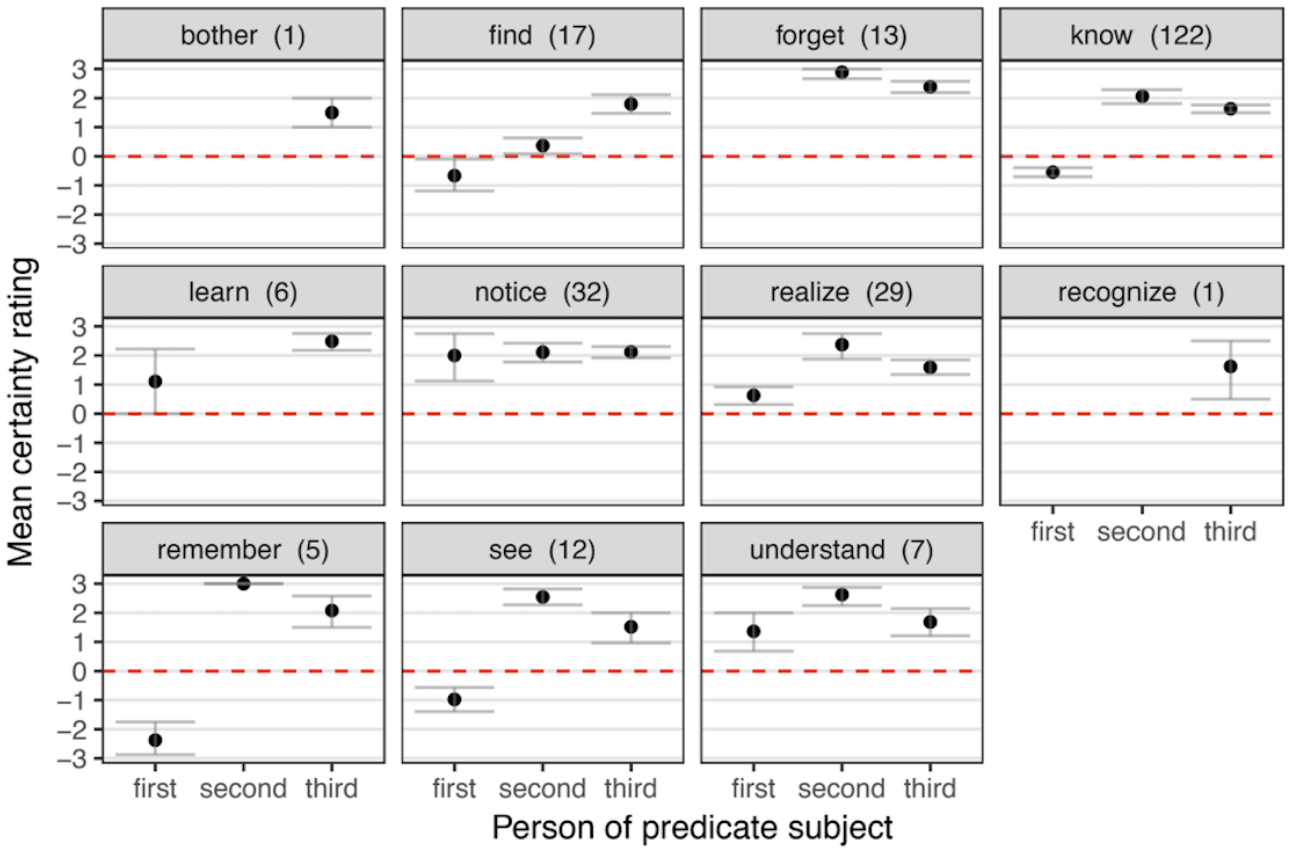
1	2		5		2	2

NO CLEAR DIVISION BETWEEN FACTIVE AND NON-FACTIVE VERBS



- *factive*
- *non – factive*

SUBJECT OF THE PREDICATE CAN AFFECT THE STATUS OF BELIEF



SUBJECT OF THE PREDICATE: EXAMPLES

- *Her priggishness. I admire it.,I know she does wrong things she tries to organize other people's lives* ***she can't see Mr Knightley is a man in a million.***
  - → Mr Knightley is a man in a million
    - judgements: [-2, 1, 1, 2, 2, 3, 3, 3, 3]
- A: *I'll let you go first.*
  B: *Oh, well, what's there to say? Doesn't seem like it's being carried out very well in my opinion.",Seems like it takes so long between conviction and carrying out the penalty that* ***I don't see that it makes any difference to sentence anybody.***
  - → it makes any difference to sentence someone
    - judgements: [-1, -2, -2, -2, -2, -2, -3, -3]

DIRECTIONS MATTER

- CB: How confident *A* is that *p* happened?
  "But even as he spoke he doubted if Excepcionales Chicas would, when the plain Excepcionales was a stand-by, his favourite being Albeans or Invincibles. She turned and faced him again and on a high note she said, "We have a few Dominicoes.", ***She did not say it was a sample of five.*** *"*
  - → the few Dominicoes were a sample of five
  - judgements: [0, 0, 2, -3, 0, 1, 3, 0, -3]
- FactBank (Saurí and Pustejovsky, 2012):
  rigorous instructions, where annotators cannot use world knowledge
  - judgement: cannot be determined
    - 0 in CB = UU in FB

TAKEAWAYS FROM THE CB CORPUS

- predicates themselves cannot explain the speaker's belief
- grammar plays an important role
- context is essential but the between annotator variability suggests that more context is perhaps necessary
- annotation instructions should be detailed and unambiguous
- no explanation of the extreme judgements

TOWARDS THE NEW CORPUS

- Summary of the previous corpora's shortcomings:
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  - examining selected syntactic structures, as opposed to continuous speech
  - no explanation of the variability among annotators
  - no consideration of discourse analysis from the cognitive perspective

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- a new corpus is needed!

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A. We're going to play tennis with **Mr. President**
Great, he is a good player!

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A. We're going to play tennis with **Mr. President**
   Great, he is a good player!
B. We're going to play tennis with **Gaurav, a CS student from IACS**
   Is he a good player?

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- We are annotating CG from the perspective of both speaker
- We are interested to know why the annotators made a particular judgement
  - WK - world knowledge
  - C - context
  - LI - lexical item, e.g. *mhm*, *really*, etc

EXAMPLE

A: *Well I think, no you know what I think you should do.*
B: *(( )) [distortion].*
A: *Dorota please. Really.*
B: *uh. [distorted]*
A: *The package of henna, share it with Magda.*
B: *{laugh} Magda is gone*

Annotators

Many thanks to the undergraduate linguistics students:

* Clara Dunlop
* Alana Gill
* Lawrence Ma
* Erica Solis

EXAMPLE

	Sentence	Entity	Event	Bel: A	Bel: B	CG: A	CG: B	Why	Pragmatics
1.	A: *Well I think, no you know what I think you should do.*	I=A, you=B	A thinks that B knows what A thinks B should do	✓	✓	JA	JA	C	
2.			B knows what A thinks B should do	✓	✓	IN	IN	C	
3.			A thinks B should share the henna package	✓	✓	IN	IN	C	
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6.	A: *Dorota please. Really.*	Dorota=B		✓	✗	IN→RT	RT 4	C	A is once again implying that B should share the henna package with Magda
7.	B: *uh. [distorted]*			✓	✗	RT 4	RT 4	C/LI	another implicit rejection of 4

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3.			A thinks B should share the henna package	✓	✓	IN	IN	C	
4.			B should share the henna package	✓	✗	IN→RT	RT	C	
5.	B: *(( )) [distortion]*			✓	✗	RT 4	RT 4	C	The silence is treated as a rejection of Event in 4
6.	A: *Dorota please. Really.*	Dorota=B		✓	✗	IN→RT	RT 4	C	A is once again implying that B should share the henna package with Magda
7.	B: *uh. [distorted]*			✓	✗	RT 4	RT 4	C/LI	another implicit rejection of 4
8.	A: *The package of henna, share it with Magda.*	package, Magda	A tells B to share the henna package with Magda	✓	✓	JA	JA	C	
9.			B should share the henna package with Magda	✗	✗	IN	RT 4	C	

EXAMPLE

	Sentence	Entity	Event	Bel: A	Bel: B	CG: A	CG: B	Why	Pragmatics
1.	A: *Well I think, no you know what I think you should do.*	I=A, you=B	A thinks that B knows what A thinks B should do	✓	✓	JA	JA	C	
2.			B knows what A thinks B should do	✓	✓	IN	IN	C	
3.			A thinks B should share the henna package	✓	✓	IN	IN	C	
4.			B should share the henna package	✓	✗	IN→RT	RT	C	
5.	B: *(( )) [distortion]*			✓	✗	RT 4	RT 4	C	The silence is treated as a rejection of Event in 4
6.	A: *Dorota please. Really.*	Dorota=B		✓	✗	IN→RT	RT 4	C	A is once again implying that B should share the henna package with Magda
7.	B: *uh. [distorted]*			✓	✗	RT 4	RT 4	C/LI	another implicit rejection of 4
8.	A: *The package of henna, share it with Magda.*	package, Magda	A tells B to share the henna package with Magda	✓	✓	JA	JA	C	
9.			B should share the henna package with Magda	✗	✗	IN→RT 4	RT 4	C	
10.	B: *Magda is gone*	Magda	Magda is gone	✓	✓	JA	JA	C	

NEXT STEPS

- Listen to the audio recordings
- Complete annotation manual
  - Assess how much information was hidden in the audio
- Create interface to automate further annotations
- Move the annotation to Amazon Mechanical Turkers
- Construct a detailed analysis

WHO CAN BENEFIT?

- ✓ theoretical linguists
- ✓ NLP researchers
- ✓ AI machine developers
- ✓ cognitive psychologists

WHEN CG DOES NOT CONVERGE

Thank you!

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