Dialogue act classification is a laughing matter

Vladislav Maraev*
Bill Noble*
Chiara Mazzocconi†
Christine Howes*

*Centre for Linguistic Theory and Studies in Probability (CLASP), Department of Philosophy, Linguistics and Theory of Science, University of Gothenburg

†Institute of Language, Communication, and the Brain, Laboratoire Parole et Langage, Aix-Marseille University

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Why laughter?

- We laugh a lot: laughter can make up to 17% of conversation.*
- It is social: we are 30 times more likely† to laugh in presence of others.
- Kids laugh before they learn to speak; laughter can be informative about their development.‡

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* Tian, Y., Mazzocconi, C., & Ginzburg, J. (2016). *When do we laugh?* In Proc. of SemDial-2016.

† Provine, R. R. (2004). *Laughing, tickling, and the evolution of speech and self.* Current Directions in Psychological Science, 13(6):215–218.

‡ Mazzocconi, C., & Ginzburg, J. (2020). *Laughter growing up*. In Laughter and Other Non-Verbal Vocalisations Workshop: Proceedings (2020).

What is laughter?

- Laughter is not the same as humour.
- Laughter can convey a wide spectrum of emotions: from embarrassment to joy.
- Laughter can express (or interplay with) a communicative intent.
- Laughter can be a subject of clarification request.*

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* Mazzocconi, C., Maraev, V., & Ginzburg, J. (2018). *Laughter Repair*. In Proceedings of the 22nd Workshop on the Semantics and Pragmatics of Dialogue. Aix-en-Provence, France.

Communicative intent

- Laughter can help determining sincerity of an utterance (e.g. sarcasm).*
- Listeners can be influenced towards non-literal interpretation of sentences accompanied by laughter.†
- We explore the role of laughter in attributing communicative intents to utterances.

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* Tepperman, J., Traum, D., & Narayanan, S. (2006). *'Yeah right': sarcasm recognition for spoken dialogue systems*. In , Ninth International Conference on Spoken Language Processing.

† Bryant, G. A. (2016). *How do laughter and language interact?* In Proceedings of EVOLANG11.

The concept of a dialogue act (DA)

- based on Austin's concept of a speech act*
- considers not only a propositional content of an utterance but also performed action
- Dialogue act is an extension of speech act, focussing on interaction.
- Dialogue act recognition (DAR) is task of labelling sequence of utterances with DAs.

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* Austin, J. L. (1975). *How to do things with words.* Oxford university press.

Example SWDA-2827

	Utterance	Dialogue act
A:	Well, I'm the kind of cook that I don't normally measure things,	Statement-non-opinion (sd)
A:	I just kind of throw them in	sd
A:	and, you know, I don't to the point of, you know, measuring down to the exact amount that they say.	sd
B:	That means that you are real cook.	Statement-opinion
A:	<Laughter> Oh, is that what it means	Downplayer
A:	Uh-huh.	Backchannel
A:	<Laughter>	Non-verbal

In this work

- We explore collocation of laughs and dialogue acts.
- We investigate whether laughter is helpful for the computational task of dialogue act recognition (DAR).

Data

- Switchboard Dialogue Act Corpus (SWDA)*
- 220 dialogue acts according to DAMSL schema† clustered into 42 DAs
- 1155 conversations, 400k utterances, 3M tokens

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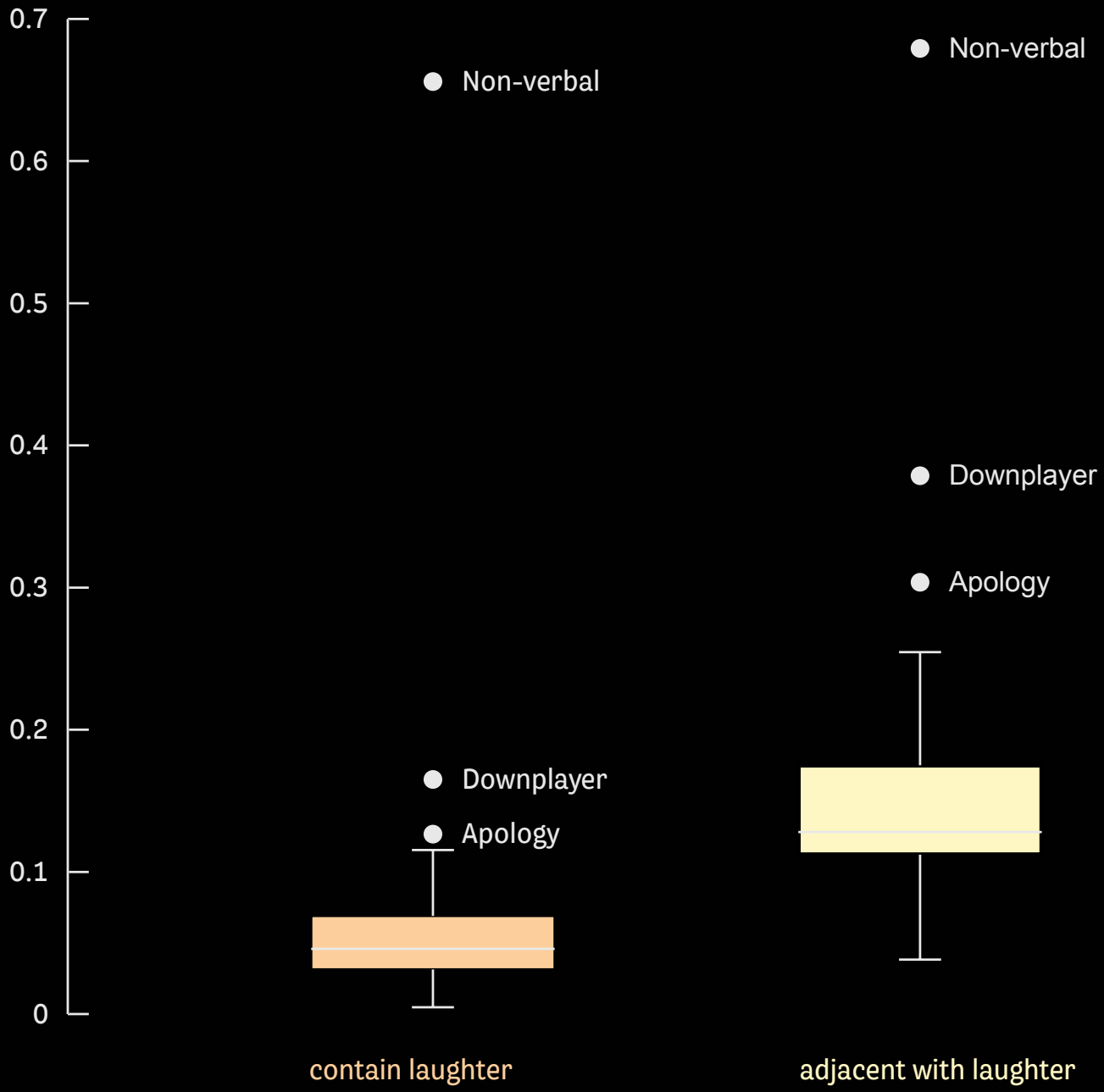
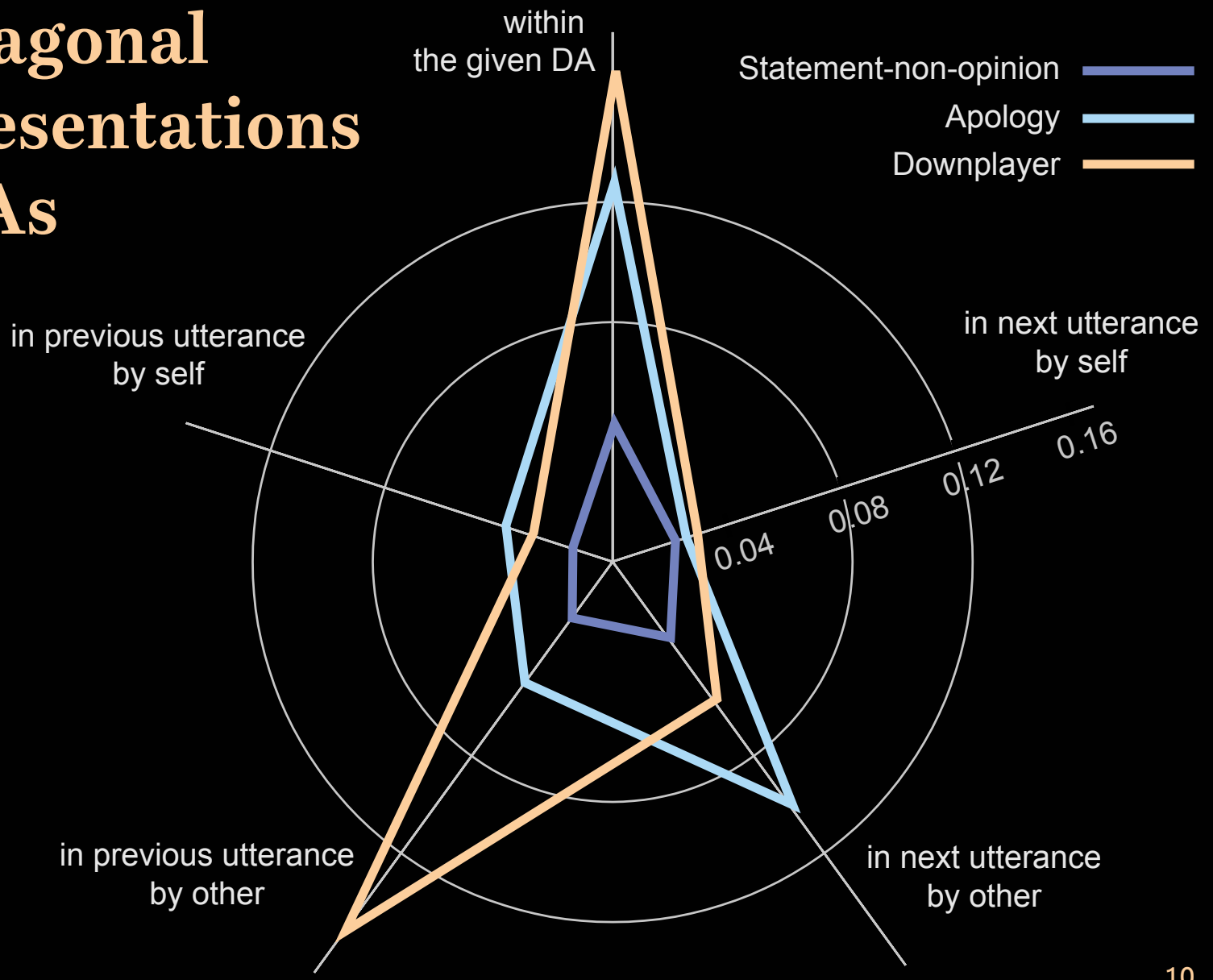
* Jurafsky, D., Shriberg, E., & Biasca, D. (1997). Switchboard Dialog Act Corpus. International Computer Science Inst. Berkeley CA, Tech. Rep.

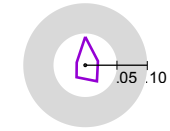
† Jurafsky, D., Shriberg, L., & Biasca, D. (1997). Switchboard SWBD-DAMSL Shallow-Discourse-Function Annotation Coders Manual.


0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Non-verbal
Downplayer
Apology
Non-verbal
Downplayer
Apology
contain laughter
adjacent with laughter

Pentagonal representations of DAs

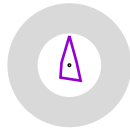


Tag-Question
Apology
Summarize/reformulate
Rhetorical-Questions
Negative non-no answers
Self-talk
Or-Clause
Statement-non-opinion
Statement-opinion
Dispreferred answers
Action-directive
Offers/Options/Commits
Thanking
Conventional-opening
Hedge
Collaborative Completion
Abandoned or Turn-Exit or Uninterpretable
Declarative Yes-No-Question
Other answers
Open-Question
Affirmative non-yes answers
3rd-party-talk
Hold before answer/agreement
Backchannel in question form
Other
No answers
Wh-Question
Repeat-phrase
Yes answers
Reject
Yes-No-Question
Declarative Wh-Question
Conventional-closing
Response Acknowledgement
Acknowledge (Backchannel)
Segment (multi-utterance)
Appreciation
Quotation
Agree/Accept
Maybe/Accept-part
Signal-non-understanding
Downplayer
0.06
0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
-0.04
-0.05
-0.1
-0.05
0
0.05
0.1
0.15



Statement-non-opinion

Acknowledge (Backchannel)


Statement-opinion

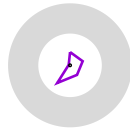
Segment (multi-utterance)

Abandoned or Turn-Exit or Uninterpretable

Agree/Accept

Appreciation

Yes-No-Question

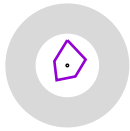

Yes answers

Conventional-closing

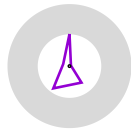
Wh-Question

No answers

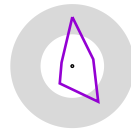
Response Acknowledgement

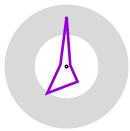

Hedge

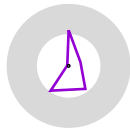
Declarative Yes-No-Question

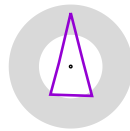

Backchannel in question form

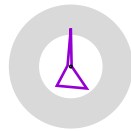
Quotation


Summarize/reformulate


Other

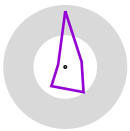

Affirmative non-yes answers


Action-directive


Collaborative Completion

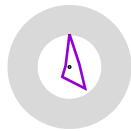
Repeat-phrase

Open-Question


Rhetorical-Questions

Hold before answer/agreement

Reject

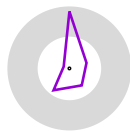

Negative non-no answers

Signal-non-understanding

Other answers

Conventional-opening

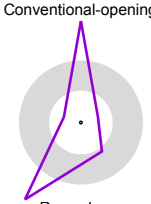
Or-Clause

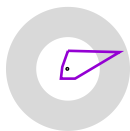

Dispreferred answers

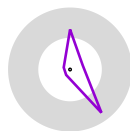
3rd-party-talk

Offers, Options Commits

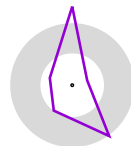
Maybe/Accept-part

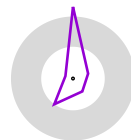

Downplayer


Self-talk


Tag-Question

Declarative Wh-Question


Apology


Thanking

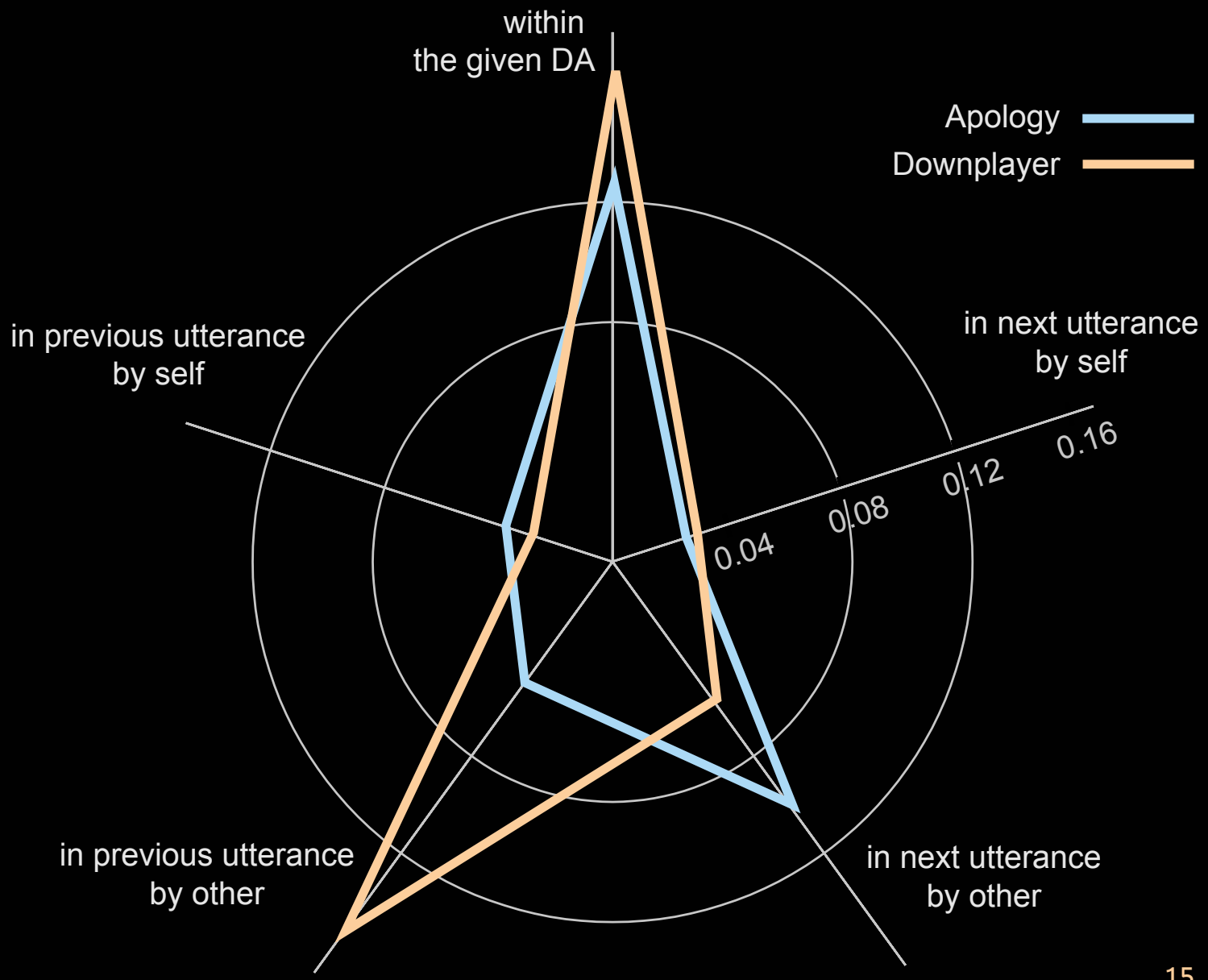
Modification and enrichment of current DA (with a degree of urgency)

- smoothing/softening: Action-directive, Reject, Dispreferred answer, Apology
- stress positive disposition: Appreciation, Downplayer, Thanking
- cue less probable, non-literal meaning: Rhetorical questions

Benevolence induction

- Laughter can induce or invite a determinate response (Downplayer, Appreciation).
- Self-talk: signals ‘social’ incongruity of the action

A:	Well, I don’t have a Mexi-, -	Statement n/o
A:	I don’t, shouldn’t say that,	Self-talk
A:	I don’t have an ethnic maid <laughter>.	Statement n/o


within
the given DA
Apology
Downplayer
in next utterance
by self
0.16
0.12
0.08
0.04
in next utterance
by other
in previous utterance
by other
in previous utterance
by self

Apology and Downplayer

A:	I'm sorry to keep you waiting #<laughter>.#	Apology
B:	Okay <laughter>	Downplayer
A:	Uh, I was calling from work	Statement n/o

- The positive effect of laughter is attained and successful.
- We also recently discovered that in case of social incongruity laughter is likely to be followed by gaze ‘check’.*

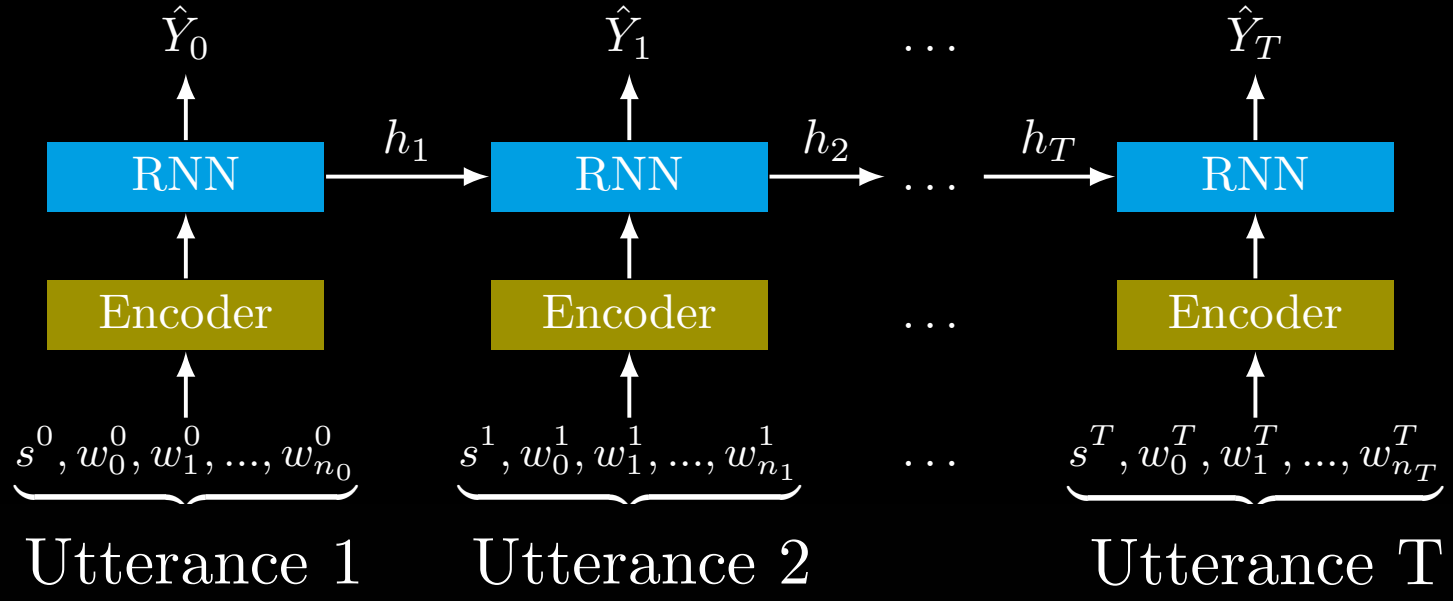
* Mazzocconi C., Maraev V., Somahekarappa V., Howes C. *Looking for laughs: Gaze interaction with laughter pragmatics and coordination*, accepted at ICMI 2021

Intermediate conclusion

- Laughter is tightly related to dialogue information structure.
- ...should it then be an important cue for a computational model?

Dialogue act recognition model

- We are using BERT pre-trained on massive non-dialogical data (see Noble and Maraev, 2021).*

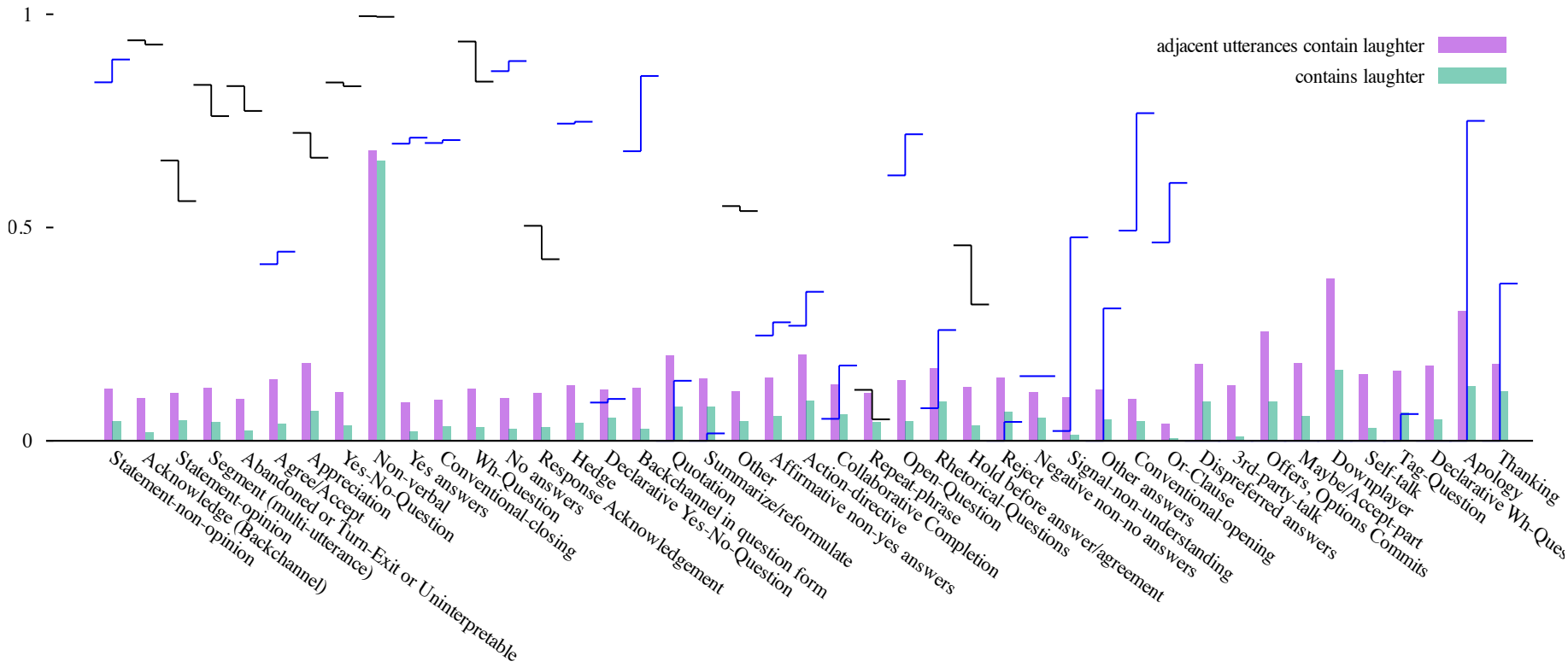


* Noble, B., & Maraev, V. (2021). *Large-scale text pre-training helps with dialogue act recognition, but not without fine-tuning.* In Proceedings of the 14th International Conference on Computational Semantics (IWCS) (pp. 166–172).

Results

	macro F1	accuracy
BERT-NL	36.48	76.00
BERT-L	36.75	76.60
BERT-L+OSNL	43.71	76.95
BERT-L+OSL	41.43	77.09

- OS = OpenSubtitles, 350M tokens, 0.3% laughter tokens


1
0.5
0
adjacent utterances contain laughter
contains laughter
Statement-non-opinion
Acknowledge (Backchannel)
Statement-opinion
Segment (multi-utterance)
Abandoned or Turn-Exit or Uninterpretable
Agree/Accept
Appreciation
Yes-No-Question
Non-verbal
Yes answers
Conventional-closing
Wh-Question
No answers
Response Acknowledgement
Hedge
Declarative Yes-No-Question
Backchannel in question form
Quotation
Summarize/reformulate
Other
Affirmative non-yes answers
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Rhetorical-Questions
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Negative non-no answers
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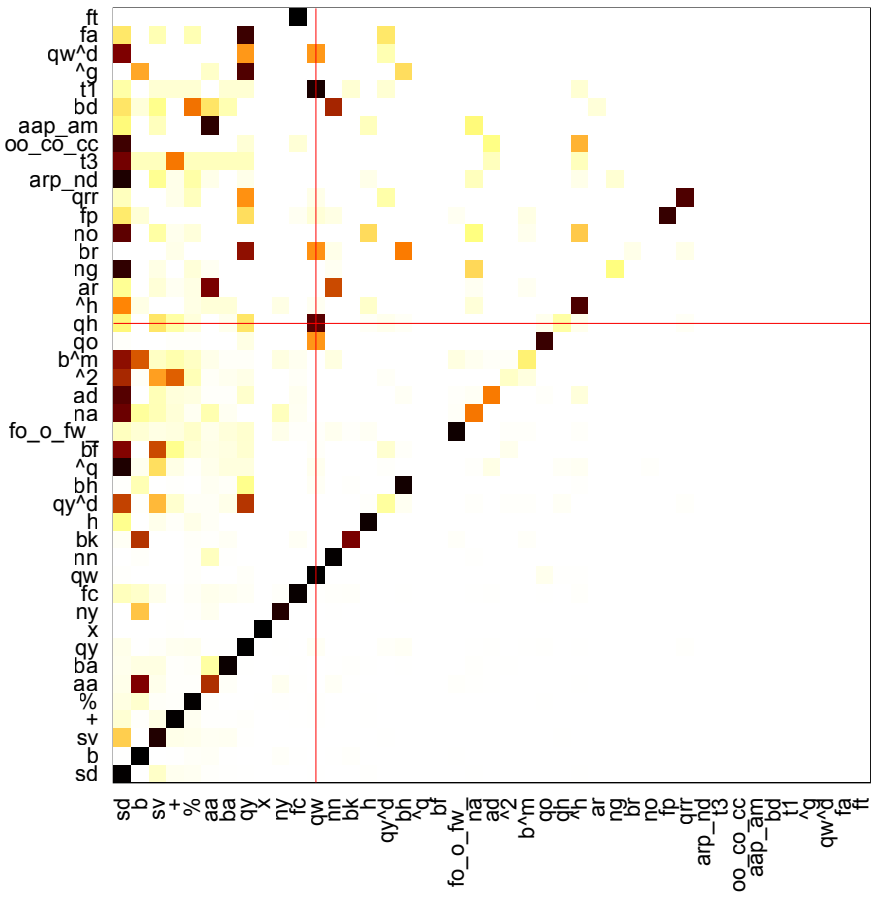
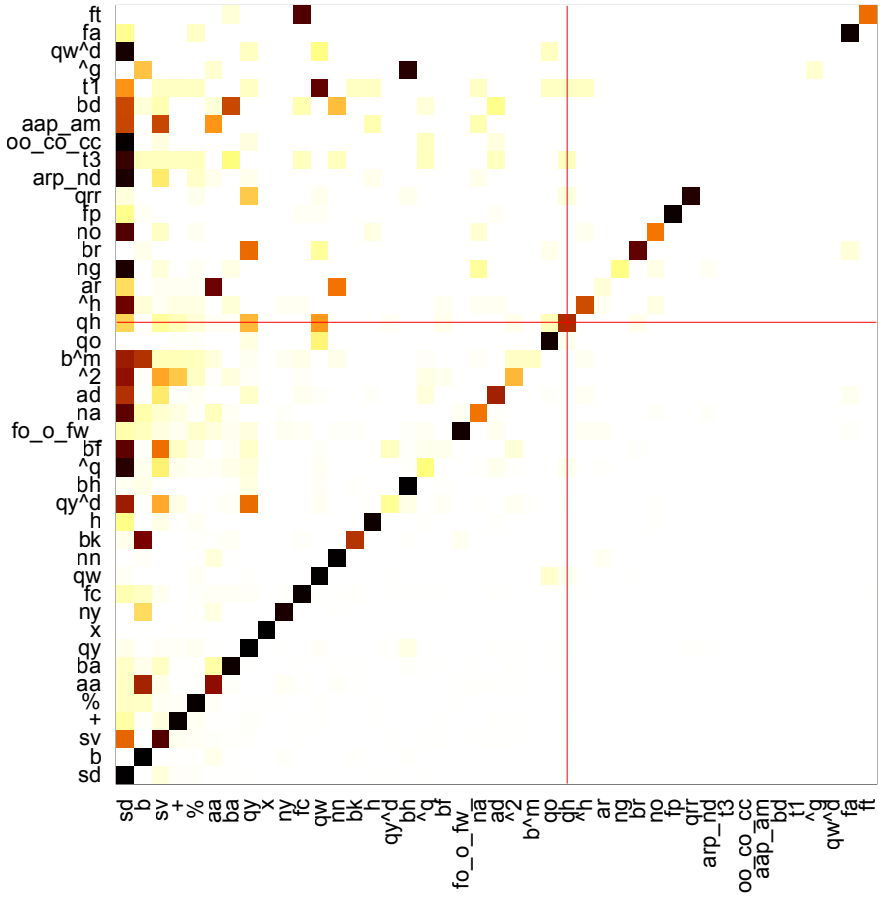
Maybe/Accept-part
Downplayer
Self-talk
Tag-Question
Declarative Wh-Ques
Apology
Thanking



BERT-NL



BERT-L

Rhetorical questions

- are misclassified by BERT-NL as Wh-q.
- Laughter cancels seriousness and reduces commitment to literal meaning.*†

B:	Um, as far as spare time, they talked about,	Statement n/o
B:	I don't, + I think,	Statement n/o
B:	who has any spare time <laughter>?	Rhetorical q.

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* Tepperman, J., Traum, D., & Narayanan, S. (2006). *'Yeah right': sarcasm recognition for spoken dialogue systems*. In , Ninth International Conference on Spoken Language Processing.

† Ginzburg, J., Breitholtz, E., Cooper, R., Hough, J., & Tian, Y. (2015). Understanding Laughter. In , Proceedings of the 20th Amsterdam Colloquium (pp. 137–146). : .

What about non-verbals?

- What if out model was unaware of this class?
- We mask the outputs where the desired class was Non-verbal.
- We test on 659 non-verbals (413 of which contain laughters)
- Predicted: Acknowledge/Backchannel (76%), continuation of previous DA (11%)

Example

	B:	I would go from one side of the boat to the other,	Statement n/o
	B:	and, uh,	+
👉	A:	<laughter>	Backchannel
	B:	the, uh, the party boat captain could not understand, you know,	+
	B:	he even, even he started baiting my hook <laughter>,	Statement n/o
👉	A:	<laughter>	Backchannel
	B:	and holding, holding the, uh, the fishing rod.	+
	A:	How funny,	Appreciation

Conclusions

- Laughter is tightly related to dialogue information structure.
- Laughter is a valuable cue for DAR task (implications for NLU).
- Laughter can help disambiguating literal and non-literal interpretation (a struggle for many NLP tasks).
- Future models need meaningful DAs for standalone laughs.

Thank you!

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Bill Noble

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Chris Howes