

# Proseminar Computational Pragmatics: Introduction

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Winter 2021/2022

[https://www.lsv.uni-saarland.de/upcoming-courses/  
proseminar-computational-pragmatics-winter-2021-2022/](https://www.lsv.uni-saarland.de/upcoming-courses/proseminar-computational-pragmatics-winter-2021-2022/)

# Outline

- ▶ Course Structure: formalities (and informalities)
- ▶ Historical background
- ▶ Defining computational pragmatics
- ▶ Topics/Themen

# Course Structure

## Formalities

- ▶ Format:
  - ▶ 26.10 (today): topics introduction (lecturer)
  - ▶ 27.10-03.11: topics selection (doodle)
  - ▶ 03.11 - 15.11: define research question, identify keywords, find background information & study papers, and refine your topic
  - ▶ 16.11.2021 - 01.02.2021:
    1. present your research topic, based on a paper ‘situated’ in related work (30 minutes + 15 minutes discussion; 40% of the final scores);
    2. exercises, experiments and group assignments (20% of the final scores).
- ▶ Report: based on your research paper and related work, 10 pages, deadline: 31.03.2022 (40% of the final scores)
- ▶ Questions: E-Mail

# Course Structure

## Informalities

Please do:

- ▶ Ask when you have questions (in German or English)
- ▶ Say something **right away** if I'm speaking too quickly or if there are terms you don't know or understand
- ▶ Be present when you are present

# Course Structure

## Basic reading

- ▶ Bunt, Harry (2015) **Computational Pragmatics**. Chapter 19, Oxford Handbook of Pragmatics, Yan Huang, editor. Oxford University Press.
- ▶ Bunt, Harry and William Black (2000) **The ABC of Computational Pragmatics**. In Harry Bunt and William Black (eds.) Abduction, Belief and Context in Dialogue. Studies in Computational Pragmatics. Amsterdam: Benjamins, pp. 1-46.
- ▶ Jurafsky, Daniel, and James H. Martin. 2009. **Speech and language processing: An introduction to natural language processing, speech recognition, and computational linguistics**. Chapters 24 & 25 of the online 3rd edition draft.  
<https://web.stanford.edu/~jurafsky/slp3/>.

# Situating Pragmatics

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Linguistics is the study of correct use of language

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Today is Friday but I don't believe it. => 'infelicitous' - > pragmatic problem

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Pragmatics is the study of felicitous language use

# Situating Pragmatics

Semantics is about **truth** conditions and is **compositional**

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Example:

“Alexander gave her a bouquet of red roses”

“You have a green light”



# What then is pragmatics?

A. Broad sense of the term: the study of psycholinguistic and sociolinguistic phenomena in sign systems in general

B. Narrower sense of the term: since around 1960, narrowing in scope due to anglo-American analytic philosophers and linguists

- ▶ **syntax:** combinatorics of words and their parts
- ▶ **semantics:** meaning (traditionally: truth conditions)
- ▶ **pragmatics:** language usage, further interpretation of **meaning in context**
  - ▶ what speakers mean when they use linguistic expressions
  - ▶ what kind of reasoning is used by speakers and hearers to understand meaning in context

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3. Or it could be indicating that you can go ahead with the project.

# Situating Pragmatics

Pragmatics is the study of principles for the use and interpretation of **utterances in context**

You have a green light

1. It could mean you are holding a green light bulb.
2. Or that you have a green light to drive your car.
3. Or it could be indicating that you can go ahead with the project.
4. Or that your body has a green glow

# Situating Pragmatics

It's raining

Do you know what time is it?

Go to hell!

I will bring it tomorrow.

Be careful.

Good morning.

Sorry.

Got a light?



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Pragmatics is the study of those aspects of meaning that semantics does not cover

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An 'utterance' is a physical realization of a sentence (or phrase, or...) in a certain context

A sound, a writing on the wall, a black/white pattern of screen pixels,...

# Context

What is context?

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- ▶ providing semantic content - referential determination



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John and Mary are eating an ice cream.

... Are they sharing it?

The two man lifted the piano.

... That was part 1 of the strongest man competition.

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- ▶ providing referents for anaphora
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Be back **in an hour**

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- ▶ Social deictic expression



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- ▶ Social deictic expression
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- ▶ Temporal deictic expressions
- ▶ Discourse deictic expressions

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Examples:

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Presupposition: that you have done it already, at least once

# Context: presupposition

Exercise:



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- ▶ John's children speak French

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## Context: presupposition

### Exercise:

- ▶ John's children speak French
- ▶ Jane no longer writes fiction
- ▶ It was Henry that kissed Rosie
- ▶ John didn't manage to be on time
- ▶ While Chomsky was revolutionizing linguistics, the rest of social science was asleep

# Pragmatics and world knowledge

## Example (Charniak 1972)

Jill wanted to get Bill a birthday present, so she went and found her piggy-bank (**Sparschwein**). She shook it, but there was so noise. She would have to make Bill a present.

Understanding the story requires understanding several things about the world:

# Pragmatics and world knowledge

## Example (Charniak 1972)

Jill wanted to get Bill a birthday present, so she went and found her piggy-bank (**Sparschwein**). She shook it, but there was so noise. She would have to make Bill a present.

Understanding the story requires understanding several things about the world:

- ▶ normally gifts are bought with money
- ▶ piggy-banks can be used to hold money
- ▶ if you shake a piggy-bank with money in it, you hear a noise
- ▶ ...

Which are linguistically-relevant aspects of context? i.e.

Which phenomena should be part of the study of pragmatics?

# Context: communicative intentions

Understanding of communicative intentions



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Example:

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Example:

A1: A question

A2: What's wrong with my suggestion?

# Summing up for now

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- ▶ common ground (Clark)

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## C. Context triggers utterances

- ▶ acknowledgement, feedback
- ▶ social communicative acts
- ▶ questions, answers, informs, commands,...

# Communicative meaning

What does it mean to understand an utterance?

Paul Grice (1957):

- ▶ To understand an utterance implies:
  - ▶ sentence meaning = semantic content (is compositional)
  - ▶ speaker-dependent meaning = pragmatic content (irony, metaphoric expressions, implicit communicative content)
- ▶ Propositional and speaker-dependent meaning can differ:
  - ▶ Mutter: Wie oft muss ich dir noch sagen, dass du das Zimmer aufräumen sollst?
  - ▶ Kind: Noch vier mal, bitte.
- ▶ What is actually meant:
  - ▶ Mutter: Raum endlich dein Zimmer auf.
  - ▶ Kind: Lass mich in Ruhe, ich will mein Zimmer nicht aufräumen.

# Pragmatic inferences

- ▶ Speaker intentions go beyond semantic content of an utterance
- ▶ are more than just linguistic meaning
- ▶ Pragmatic inferences are based on the following mechanisms and phenomena:
  - ▶ Common Ground
  - ▶ Implicatures (conventional and conversational)
  - ▶ References
  - ▶ Discourse structures
  - ▶ Presuppositions
  - ▶ Information structure
  - ▶ Structure of conversation/dialogue
  - ▶ Dialogue acts
- ▶ → Topics in this seminar

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- ▶ Discuss algorithms that enable the use of theoretical concepts in practical applications

Learn how to perform research in computational pragmatics

# What is Computational Pragmatics

Adapted from (Bunt & Black, 2000):

“Computational pragmatics studies, from an explicitly computational point of view, how relations between linguistic phenomena and their context of use govern speakers’ abilities to interpret and generate utterances in conversation”

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The key question: How to compute these relations in terms of explicit representations.

- ▶ given a linguistic expressions, how to compute the relevant contextual properties
- ▶ given a particular context, how to compute the relevant linguistic expression

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- ▶ What is meaning in dialogue? What does it depend on?
- ▶ What mechanisms govern communicative behaviour in dialogue? How do dialogue participants transfer and process information?
- ▶ Why and how do they interpret, understand and react to each others' behaviour in the way they do?

Computational dialogue modelling analyses these and related questions with computational means, and aims to cast potential answers in the form of computational models

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Work on computational pragmatics often takes place within research on [dialogue systems](#)

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The design of systems that are able to interact with human users in natural language forces one to make decisions on how to deal in an operational way with all phenomena related to language use

# And now ... TOPICS

## 16.11 - Conversational Analysis (CA)

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- ▶ Adjacency pairs
  - ▶ Schegloff, E. (1968). [Sequencing in conversational openings](#). *American Anthropologist*, 70:1075-1095

# And now ... TOPICS

## 16.11 - Conversational Analysis (CA)

- ▶ Adjacency pairs
  - ▶ Schegloff, E. (1968). [Sequencing in conversational openings](#). *American Anthropologist*, 70:1075-1095
- ▶ Turn-taking behaviour
  - ▶ Sacks, H., Schegloff, E., and Jefferson, G. (1974). [A simplest systematics for the organization of turn-taking for conversation](#). *Language*, 50(4):696-735

# TOPICS

## 23.11 - Language as Action



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- ▶ Speech acts
  - ▶ Searle, J. (1975a). *The structure of illocutionary acts*. University of Minnesota Press.
  - ▶ Searle, J. (1975b). *A taxonomy of illocutionary acts*. University of Minnesota Press.
  - ▶ Allwood, J. (1977). *A critical look at speech act theory*. *Logic, Pragmatics and Grammar*, pages 5369.

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  - ▶ Allwood, J. (1977). [A critical look at speech act theory](#). *Logic, Pragmatics and Grammar*, pages 5369.
- ▶ Activity-based approach
  - ▶ Allwood, J. (2000). [An activity-based approach to pragmatics](#). *Abduction, Belief and Context in Dialogue*, pages 4781.
  - ▶ Bunt, H. (2000). [Dialogue pragmatics and context specification](#). In Bunt, H. and Black, W., editors, *Abduction, Belief and Context in Dialogue; studies in computational pragmatics*, pages 81105. John Benjamins, Amsterdam.

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## 30.11 - Dialogue Acts and Context

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- ▶ Harry Bunt (2011). [Interpretation and generation of dialogue with multidimensional context models](#). In: A. Esposito (ed.) (Toward Autonomous, Adaptive, and Context-Aware Multimedia Interfaces: Theoretical and Practical Issues. Berlin: Springer 2011, pp. 214-242

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- ▶ Harry Bunt(2011). [The Semantics of Dialogue Acts](#). In Proceedings 9th International Conference on Computational Semantics (IWCS 2011), Oxford, UK January 12-14, 2011, pp. 1-14.

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## 07.12 - Feedback and Grounding

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- ▶ Allwood, J., Nivre, J., and E, A. (1993). [On the semantics and pragmatics of linguistic feedback](#). *Journal of Semantics*, 9-1:126

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- ▶ Allwood, J., Nivre, J., and E, A. (1993). [On the semantics and pragmatics of linguistic feedback](#). *Journal of Semantics*, 9-1:126
- ▶ Clark, H. and Schaefer, E. (1989). [Contributing to discourse](#). *Cognitive Science*, 13:259-294.



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- ▶ Traum, D. (1999). [Computational models of grounding in collaborative systems](#). In Brennen, S.E. Giboin, A. and Traum, D., editors, *Working Papers of the AAAI Fall Symposium on Psychological Models of Communication in Collaborative Systems*, pages 124131.

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- ▶ Harry Bunt, Roser Morante, and Simon Keizer (2007). [An empirically based computational model of grounding in dialogue](#). In *Proceedings of the Eighth SIGDIAL Conference on Discourse and Dialogue (SIGDIAL 2007)*. Antwerp, pp. 283-290.

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14.12., 21.12.2021 & 04.01- Computational Dialogue Models

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- ▶ Allen, J., Ferguson, G., and Stent, A. (2001). [An architecture for more realistic conversational systems](#). In Proceedings of the 6th International Conference on Intelligent User Interfaces (IUI01), Santa Fe, New Mexico, USA, pages 18.

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- ▶ Bos, J., Klein, E., Lemon, O., and Oka, T. (2003). [DIPPER: description and formalisation of an information-state update dialogue system architecture](#). In Proceedings of the 4th SIGdial Workshop on Discourse and Dialogue, pages 115124.

# TOPICS

14.12., 21.12.2021 & 04.01- Computational Dialogue Models

- ▶ Ginzburg, J., & Fernandez, R. (2010). [Computational Models of Dialogue](#). The handbook of computational linguistics and natural language processing, 57, 1.
- ▶ Van Zanten, G. V. (1996). [Pragmatic interpretation and dialogue management in spoken-language systems](#). In Proceedings of the Twente Workshop on Language Technology.
- ▶ Allen, J., Ferguson, G., and Stent, A. (2001). [An architecture for more realistic conversational systems](#). In Proceedings of the 6th International Conference on Intelligent User Interfaces (IUI01), Santa Fe, New Mexico, USA, pages 18.
- ▶ Bos, J., Klein, E., Lemon, O., and Oka, T. (2003). [DIPPER: description and formalisation of an information-state update dialogue system architecture](#). In Proceedings of the 4th SIGdial Workshop on Discourse and Dialogue, pages 115124.
- ▶ Bohus, D., & Rudnicky, A. I. (2009). [The RavenClaw dialog management framework: Architecture and systems](#). Computer Speech & Language, 23(3), 332-361.



# TOPICS

## 11.01- Resources for Data-Driven Dialogue Modelling

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- ▶ Bunt et al. (2010). [Towards and ISO standard for dialogue act annotation](#). In Proceedings of LREC 2010, the Seventh International Conference on Language Resources and Evaluation, Malta, May 16-23, 2010. Paris: ELDA, pp. 2548-2558.

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- ▶ Bunt et al. (2010). [Towards and ISO standard for dialogue act annotation](#). In Proceedings of LREC 2010, the Seventh International Conference on Language Resources and Evaluation, Malta, May 16-23, 2010. Paris: ELDA, pp. 2548-2558.
- ▶ Serban et al. (2015). [A survey of available corpora for building data-driven dialogue systems](#). arXiv preprint arXiv:1512.05742.

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17.01- Machine Learning in Dialogue Modelling: Dialogue Act Recognition

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## 17.01- Machine Learning in Dialogue Modelling: Dialogue Act Recognition

- ▶ Stolcke et al. (2000). [Dialogue act modeling for automatic tagging and recognition of conversational speech.](#)  
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## 17.01- Machine Learning in Dialogue Modelling: Dialogue Act Recognition

- ▶ Stolcke et al. (2000). [Dialogue act modeling for automatic tagging and recognition of conversational speech](#). *Computational Linguistics*, 26(3):339-373.
- ▶ Kumar et al. (2018). [Dialogue act sequence labeling using hierarchical encoder with CRF](#). In *Thirty-Second AAAI Conference on Artificial Intelligence*.

# TOPICS

25.01- Machine Learning in Dialogue Modelling: Statistical and Neural Models

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## 25.01- Machine Learning in Dialogue Modelling: Statistical and Neural Models

- ▶ Young et al. (2013). [POMDP-based statistical spoken dialog systems: A review](#). Proceedings of the IEEE, 101(5):11601179.



# TOPICS

## 25.01- Machine Learning in Dialogue Modelling: Statistical and Neural Models

- ▶ Young et al. (2013). [POMDP-based statistical spoken dialog systems: A review](#). Proceedings of the IEEE, 101(5):11601179.
- ▶ Serban et al. (2015). [Building End-To-End Dialogue Systems Using Generative Hierarchical Neural Network Models](#). In Thirtieth AAAI Conference on Artificial Intelligence.

# TOPICS

01.02.- Authoring tools and development environments

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- ▶ Gabriel Skantze and Samer Al Moubayed (2012) [Iristk: a statechart-based toolkit for multi-party face-to-face interaction](#). In Proceedings of the 14th ACM international conference on Multimodal interaction, pages 6976.

# TOPICS

## 01.02.- Authoring tools and development environments

- ▶ Gabriel Skantze and Samer Al Moubayed (2012) [Iristk: a statechart-based toolkit for multi-party face-to-face interaction](#). In Proceedings of the 14th ACM international conference on Multimodal interaction, pages 6976.
- ▶ Rudnicky et al. (2020) [Task and domain specific modelling in the Carnegie Mellon Communicator system](#). Technical report, CMU, Pittsburgh PA School of Computer Science.

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- ▶ Anton Leuski and David Traum. (2011) [NPCeditor: Creating virtual human dialogue using information retrieval techniques](#). Ai Magazine, 32(2):4256.

## Topic selection

Go through suggested papers. Choose a topic that interests you and will hold your attention. If you do, the research will be more enjoyable!

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Prepare presentation (30 minutes = 30 slides)