Vorlesung

Sprachdialogsysteme

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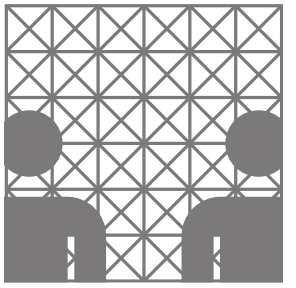
Language Technology Group



Heute

- Überblick über Struktur der Veranstaltung und Formalia
- erster Überblick über die Themen der Veranstaltung
- das sprachliche Kommunikationssystem

https://nats-www.informatik.uni-hamburg.de/SDS19

auf der Webseite:

- up-to-date Informationen, Aktualisierungen, ...
- Lernziele
- Aufschlüsselung der erwarteten Arbeitsbelastung
- session breakdown:
  - hier finden Sie (kurz vor oder nach) der Vorlesung die Folien
  - Material der Leseaufträge
  - relevante Termine
- später: **Ihre** Vorschläge für Klausurfragen

über mich

- Timo Baumann (baumann@inf..., F-403)
  - 2001-2007: Studium in Hamburg (Informatik, Phonetik, ...)
    - Auslandsstudien in Genf und Granada
  - 2007-2013: Promotion in Computerlinguistik
    (Potsdam, Stockholm, Bielefeld, Hamburg)
    Thema: Incremental Spoken Dialogue Processing
  - 2011-2017 und seit 2019: PostDoc in Hamburg
    Arbeitsbereiche LT und (vorher) NATS
  - 2017-2018: Systems Scientist am Language Technologies Institute der Carnegie Mellon University: responsive virtuelle Agenten
- akademische Interessen:
  - interaktive und kollaborative Sprachtechnologieanwendungen
  - holistische Lehre der Informatik am Beispiel Sprachtechnologie

how about you?

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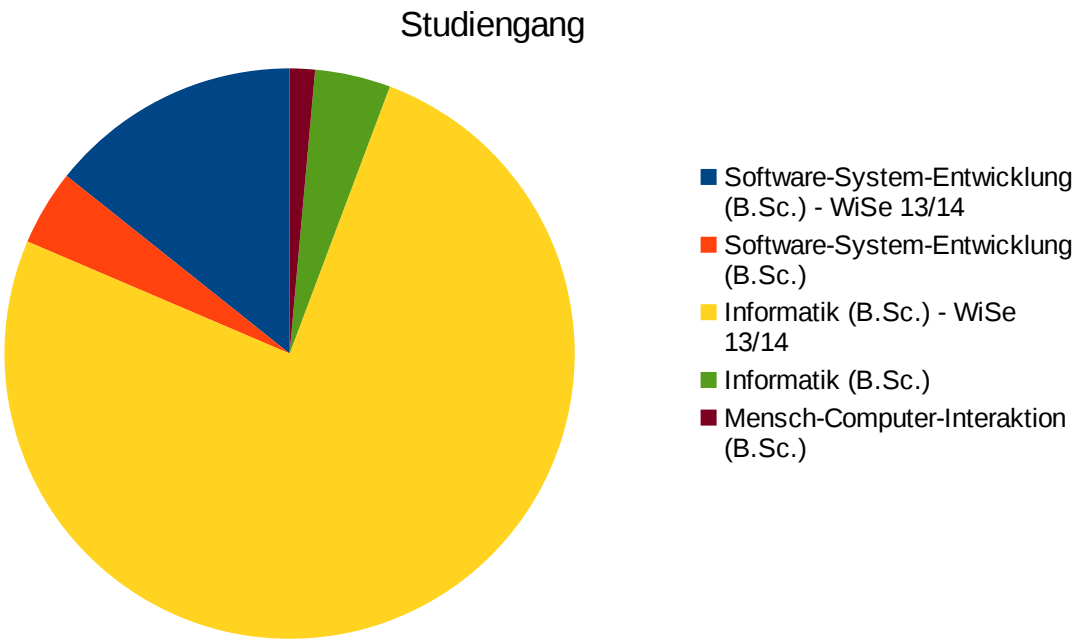

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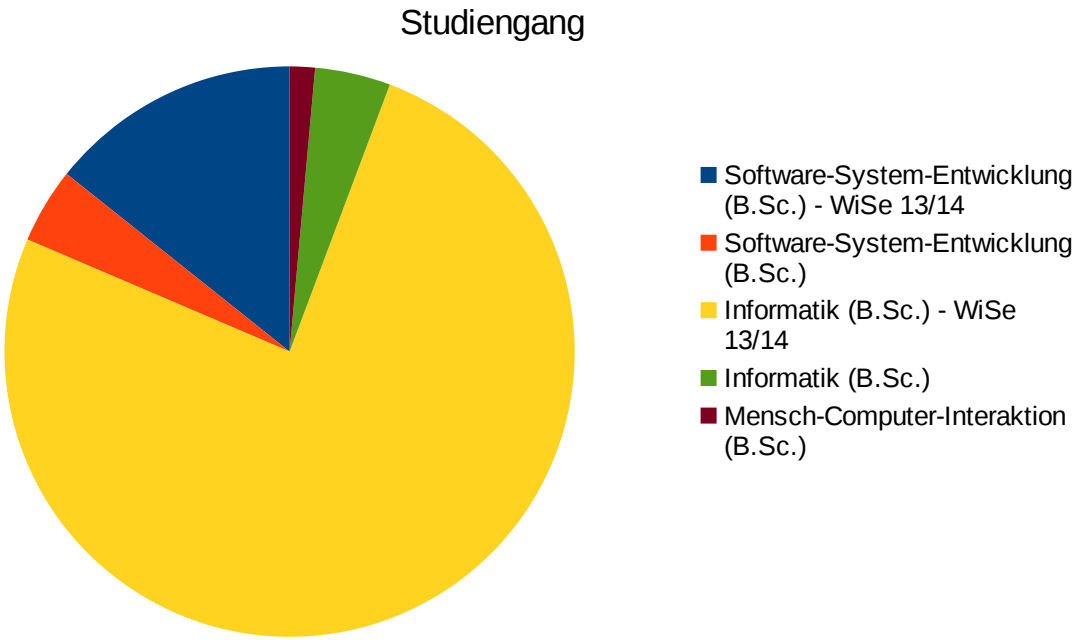

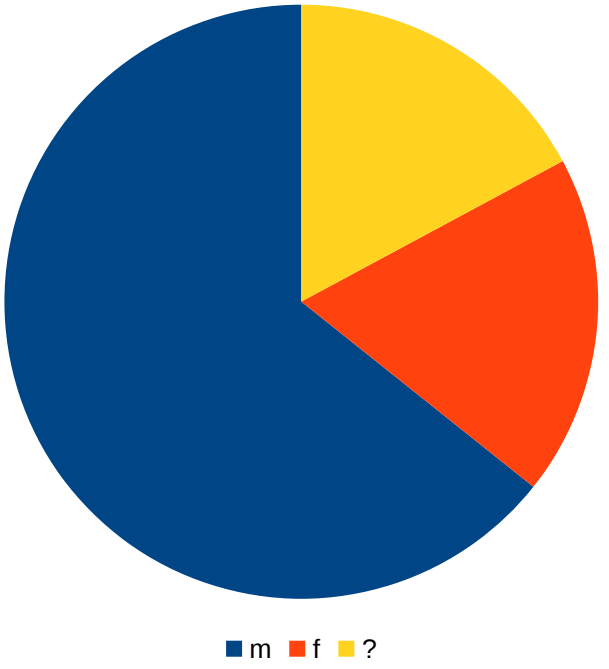

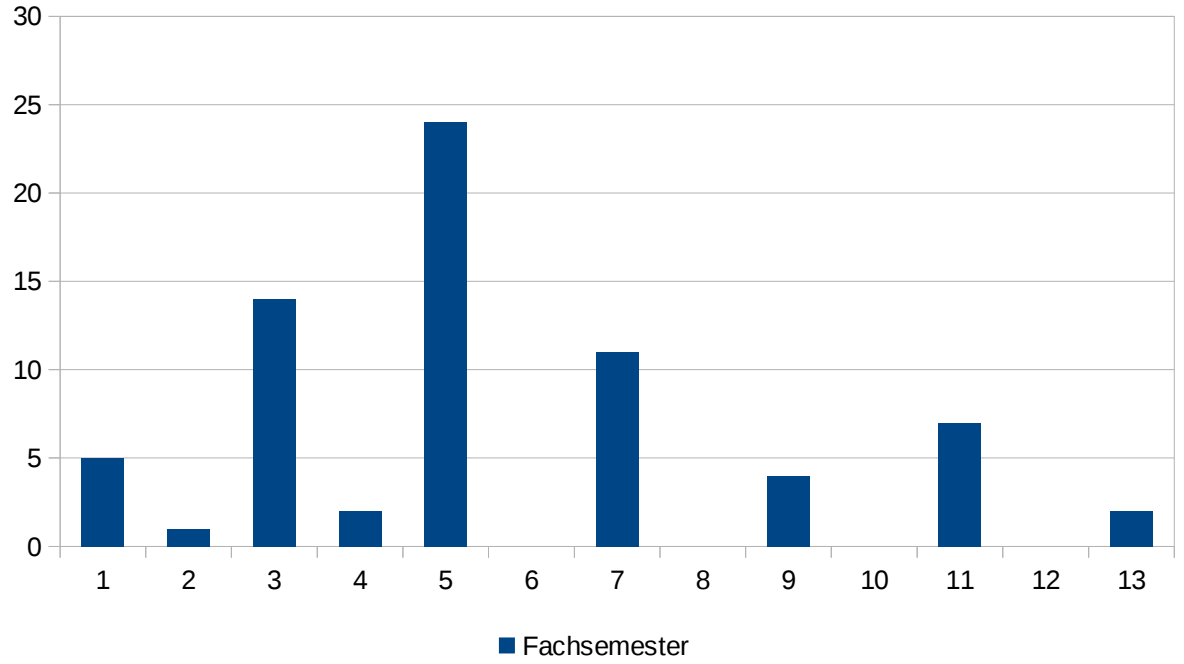

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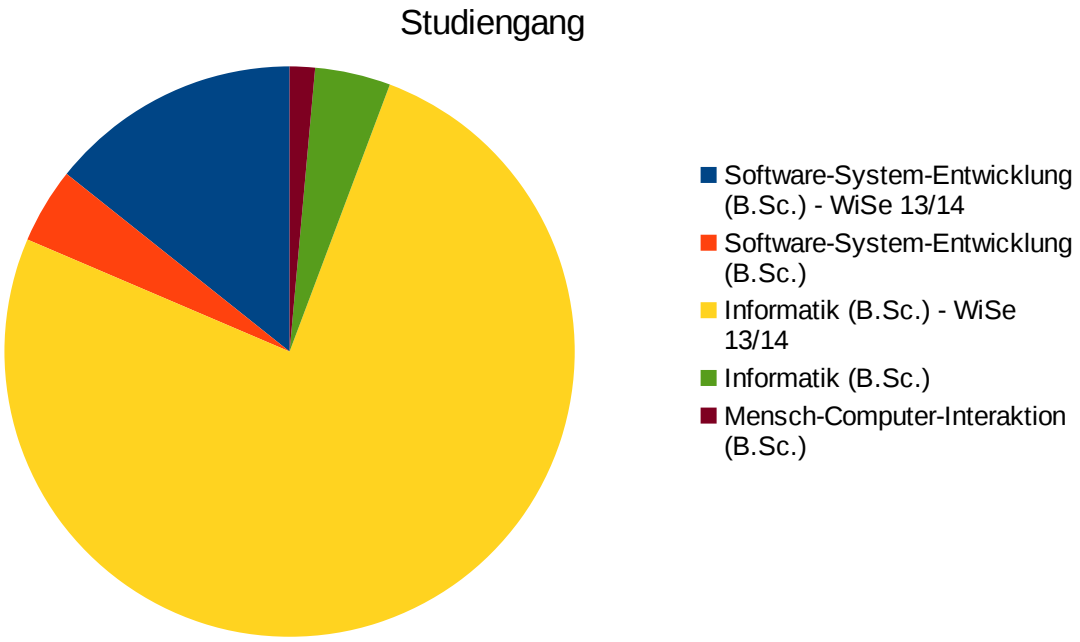
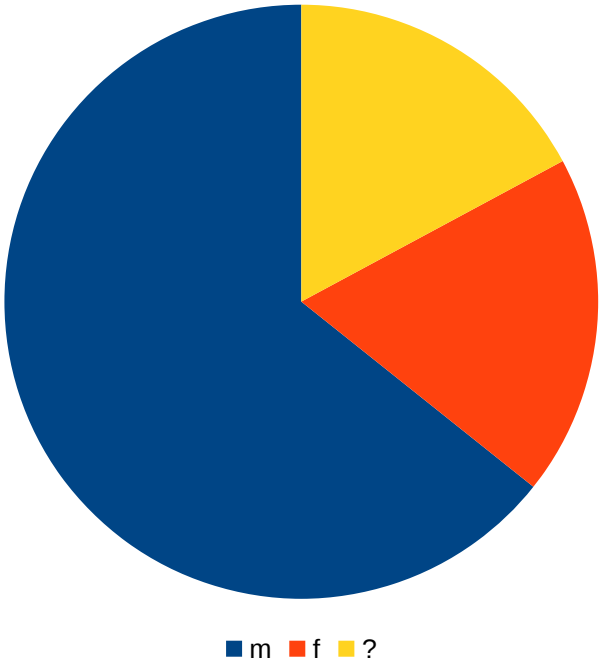




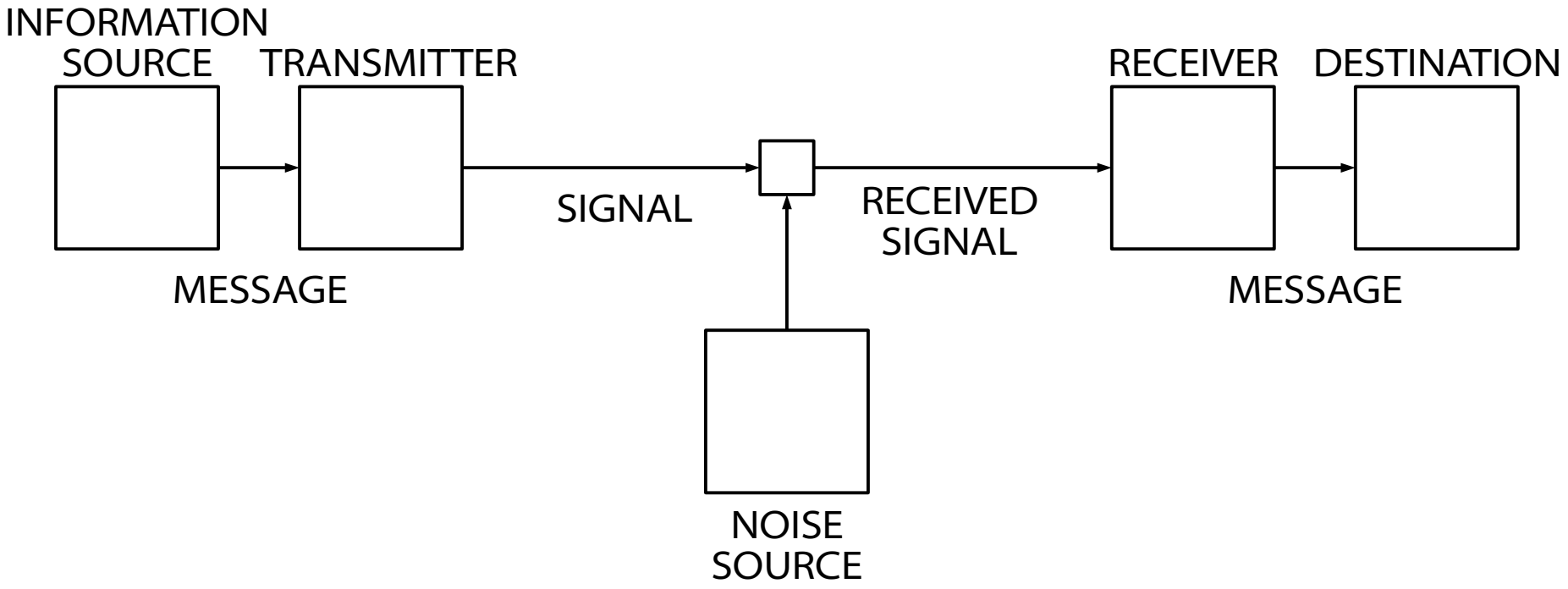
how about you:

where do you want to be in 5 years from now?

what do you have to do to get there (and stay there)?
how does this class contribute? → write 5 simple requirements

Das sprachliche Kommunikationssystem

Ein formales Kommunikationsmodell



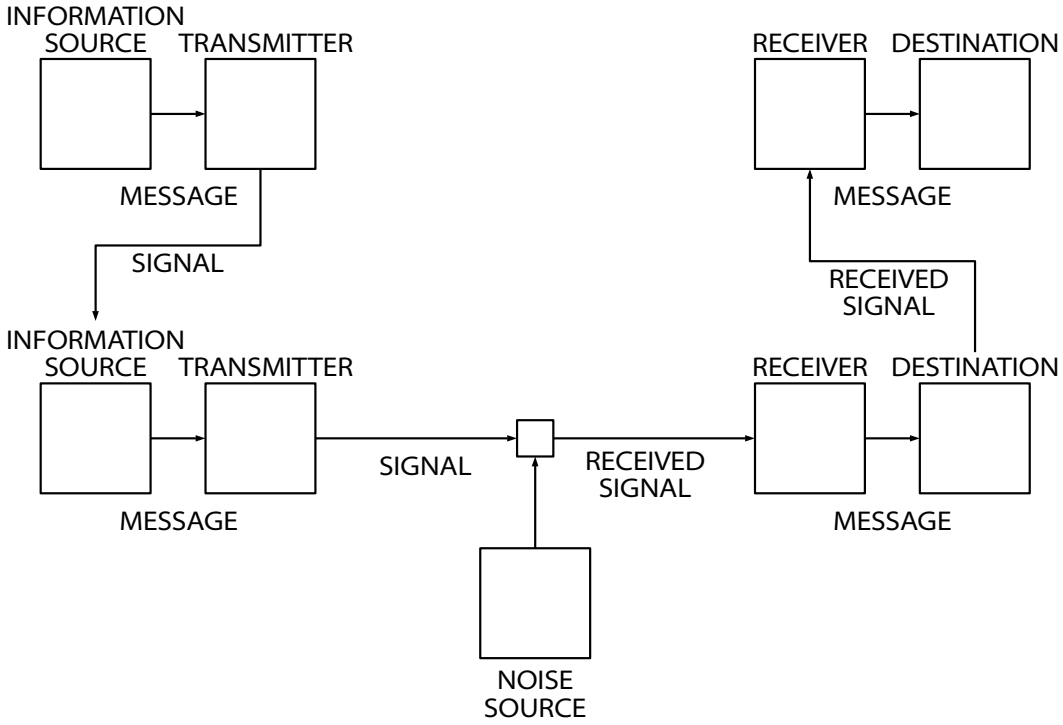
- Shannon-Weaver's (1949) model of communication
  - Annahmen: Störungen von Nachrichten werden als solche erkannt, Sender und Empfänger passen genau zusammen
  - Lösungen: Störquelle modellieren, redundante Informationsübertragung

Schichtung (“Stratifizierung”) des sprachlichen Systems

- Kommunikation ist selten direkt

- Beispiel Telefon:
- das Signal der oberen Ebene wird Nachricht der Ebene darunter

- Schichtung verfolgt das grundlegende wissen-schaftliche Analyseprinzip (Descartes 1637; repr. 1824)



Schichtenmodell der Kommunikation

find message that describes idea

determine structure to convey meaning

sequentialize structure to word stream

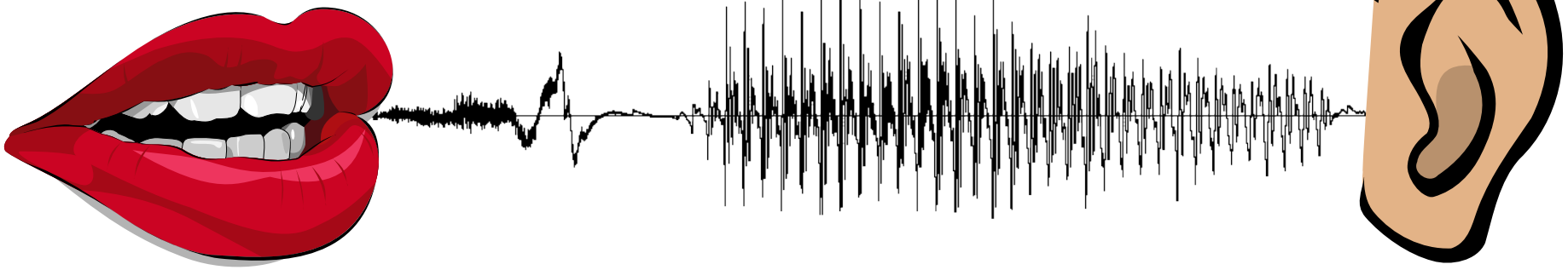
represent words through sounds

recover idea described by message

determine meaning of structure

recover structure of sequence

recombine sounds to words



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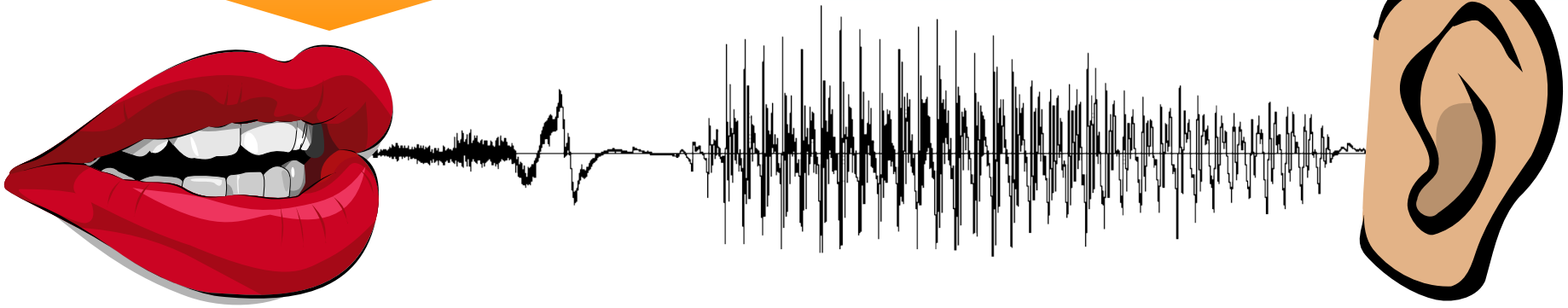

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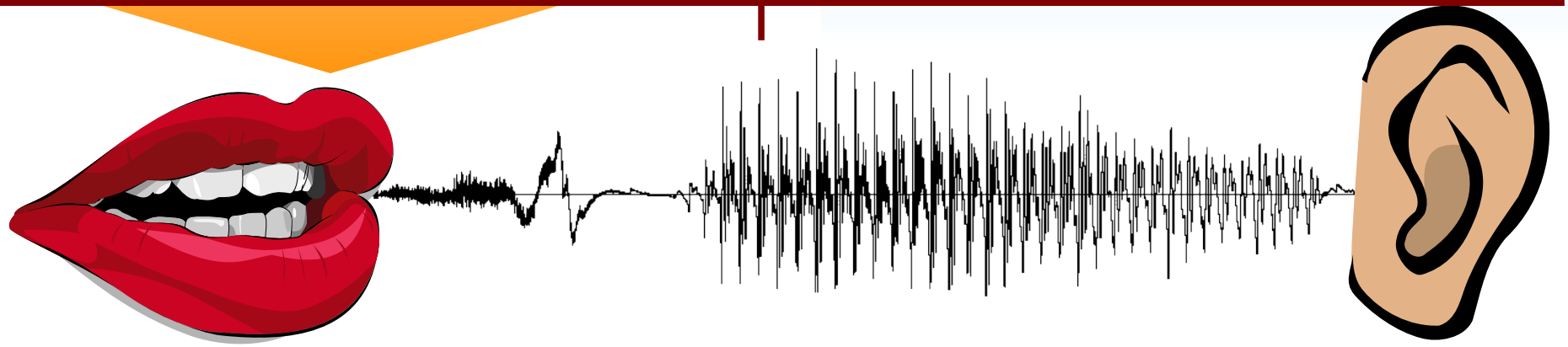

Conventional division of linguistics into subdisciplines

area	objective
pragmatics	the study of meaning in context
semantics	the study of meaning
syntax	the study of sentence structure
lexicology	the study of words
morphology	the study of forming words
phonology	the study of a language's sound system
phonetics	the study of speech sounds

- ist diese Einteilung *richtig*?
  Führt sie also zur bestmöglichen Analyse?
- Wie sind die Schnittstellen zwischen den Schichten?
- Sind alle sprachlichen Phänomene verortet?

Systems theory research on linguistics

- Serébrennikov et al. (1975) give a detailed account of why the aforementioned layers (strata) are reasonable
  - however, often strong interdependence between layers and the layers' elements (e.g., words are represented by phonemes *in a complex way*, e.g. based on the words' context)
- Levelt (1989): psycholinguistic proof for layering
  - (for speaking: conceptualization, formulation, articulation)

- we'll often resort to simple interfaces between layers, when we build technical systems
- what's better: many simple modules, or fewer complex modules? What are the dimensions of „better“?

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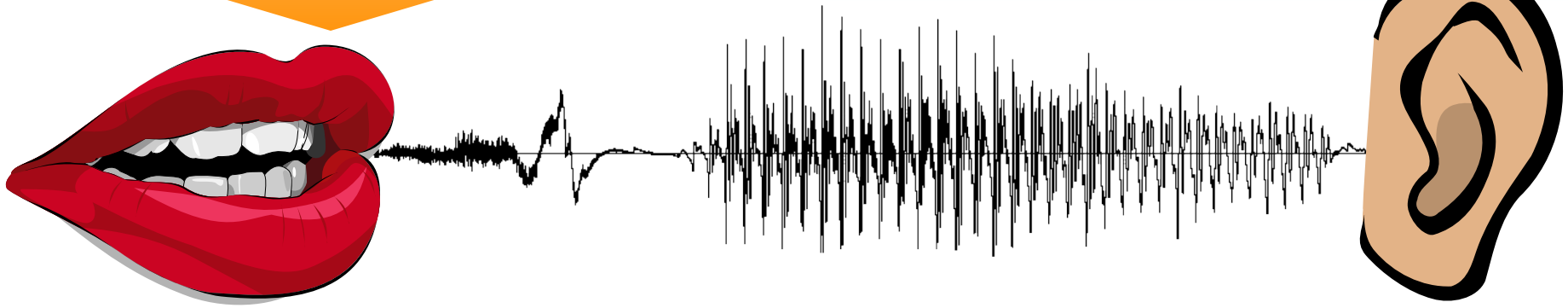

Ein Beispiel

- A: <Ich möchte, dass meine Suppe salziger schmeckt.>

  A: <Da steht ein Salzstreuer am anderen Ende des Tischs.>

  A: <Eine Person sitzt zwischen mir und dem Salzstreuer.>
- A: <Ich könnte sie bitten ihn mir zu geben!>
- A sendet: „Could you pass the saltshaker, please?“
- channel: [kUd ju: pa:s T@ sAltSEk@6 pli:z]
- B empfängt: „Could you pass the saltshaker, please?“
- B: <Ha, er will wohl den Salzstreuer haben!>
- B: <Den kann ich ihm ja geben.>
- B: gibt A den Salzstreuer.

Small group exercise:

Develop and sketch out ways of how
the worked example can go wrong.
Describe in what ways it's going wrong.
What parts of the system are failing?

Vielen Dank.

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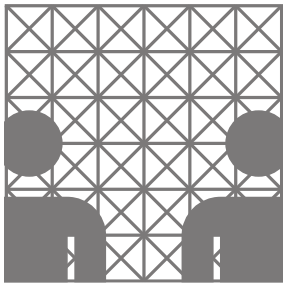

Further Reading

- Noisy-channel model, chain model of communication:
  - Shannon and Weaver (1969): *The Mathematical Theory of Communication*, paperback edition, reprinted from the Bell System Technical Journal, July and October 1948. The University of Illinois Press. InfBib: T SHA 148 (also in StaBi and on the Web).
  - M. Pétursson & J. Neppert (1996): Elementarbuch der Phonetik. Buske. StaBi: F Ling 062/6.
- Introduction to (German) Linguistics:
  - Grewendorf, Hamm and Sternefeld (1989): *Sprachliches Wissen. Eine Einführung in moderne Theorien der grammatischen Beschreibung*, Suhrkamp. InfBib: A GRE 49762.
  - ... or any other introduction to linguistics; or the relevant chapter in: Jurafsky and Martin (2009): *Speech and Language Processing*. Pearson International. InfBib: A JUR 4204x.
- Systems theoretic views on complex systems in general and on language in particular:
  - Serébrennikov et al. (1975): *Allgemeine Sprachwissenschaft* (translated and edited by Zikmund and Feudel), Volume 2. Akademie-Verlag Berlin. StaBi: A 1974/563: 2.
  - Bertalanffy (1972): „The History and Status of General Systems Theory". In: *The Academy of Management Journal* 15(4), pp. 407-426. via Google Scholar.
  - Larsen-Freeman and Cameron (2008): *Complex Systems and Applied Linguistics*, Oxford University Press. StaBi: A 2009 / 7836.
- zur Versprecherforschung: zur Versprecherforschung:
  - Marx (2006): "Gewißt wu - gewußt wie! Was die Versprecherforschung über Sprachproduktion weiß" *Psychologische Rundschau* **52**(4), 195-204. https://econtent.hogrefe.com/doi/full/10.1026//0033-3042.52.4.195

Notizen

- knapp > 90 Minuten, inklusive ausführliche Besprechung der Webseite und Durchführung eines Beispiels zu Folie 17.

Desired Learning Outcomes

- students have understood the formalia and structure of the planned coursework and the evaluation of their performance
- students have thought about their own goals wrt. to academic study and this class
- verstehen das technische Kommunikationsmodell und kennen seine Beschränkungen
- verstehen die wissenschaftliche Methode nach Descartes
- kennen die linguistischen Disziplinen, insb. jene die gut ins Schichtenmodell passen
- sind sich über die vielschichten Möglichkeiten bewusst, wie Kommunikation partiell oder vollständig misslingen kann und können diese Möglichkeiten begründet kategorisieren