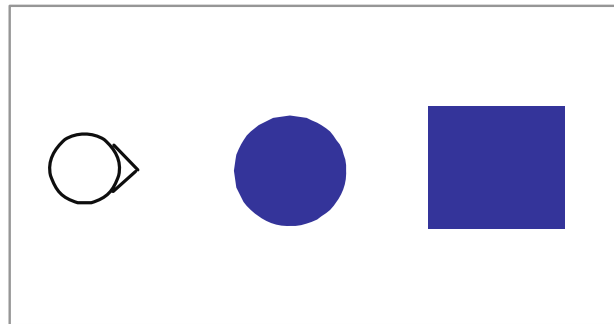


# **Localising objects and events:**

**Discoursal applicability conditions  
for spatiotemporal expressions in  
English and German**

# Time is Space....



... circle represents ball,  
square represents house:

The ball is in front of  
("before") the house

Der Ball ist **vor** dem  
Haus

... circle represents Christmas,  
square represents New Year's Eve:

Christmas is **before**  
New Year's Eve

Weihnachten ist **vor**  
Silvester

# Does temporal language depend on spatial language?



- “Spatialist view”, e.g. Haspelmath (1997:3):
  - “Spatial expression of temporal notions is extremely widespread in the world’s languages, being limited neither genetically (e.g. to Indo-European), nor geographically (e.g. to Europe), nor typologically (e.g. to languages with SVO word order). In this sense, the transfer from space to time can be said to be universal.”
- Reasons for this widespread assumption:
  - Similarity of temporal and spatial language
  - Etymology
  - Existence of metaphors

# Approach



## Can we find a dependency relation in the *application* of temporal and spatial terms?

- Terms under analysis:
  - “dimensional” – representing the relation of entities on a spatial or temporal dimension
  - semantic, not syntactic criterion
- Distinction between ‘core semantics’ and ‘pragmatics’
  - semantics: valid across discourse contexts
  - pragmatics: discourse factors systematically influencing applicability
- Identification of the applicability conditions of spatial and temporal dimensional terms
  - method: cognitively motivated discourse analysis
- Comparison of the applicability conditions

# Cognitively motivated discourse analysis

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- There must be a reason for any systematic differences in language use
  - individual / sociological / dialectal / ... preferences (not analysed here)
  - general discourse principles
  - cognitively motivated differences
- Application of established methods of discourse analysis motivated by findings from cognitive science

# Discourse analysis

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- Discourse relations between linguistic strings
  - temporal, causal, conditional, additive, comparative...  
(but: rarely spatial)
- Information structure
  - what is presented as given?
  - what is in the current focus of attention?
- Underspecification / presuppositions
  - what is not represented explicitly at all?
- Dialogue situation
  - partner adaptation
  - Interactive Alignment

# Cognitive Science: Knowledge about Space and Time



- Abstractness of domains
  - but: difference with respect to concreteness of entities in each domain (objects vs. events)
- Representation depends on
  - focus of attention
  - saliency
  - level of granularity
  - qualitative or quantitative information ...
- Neighborhood structures, topology, proximity
- Space is associated with simultaneity (also in perception), time with sequence
- Objects have different kinds of relations to each other than events do: functionality vs. causality

# Key notions and method

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- Systematic account of findings in the literature
  - temporal terms signal discourse relations – application is influenced by conceptualised relationship between events
  - spatial terms are based on reference systems – application is influenced by the discourse task, the relationship of the objects to each other, and by the conceptualisation of the situation
- Temporal terms: Qualitative analysis of existing corpora of natural discourse
  - consideration of wider discourse contexts
  - identification of cognitive categories of application situations
- Spatial terms: Qualitative analysis resulting in relative frequencies of data collected in specifically designed empirical studies
  - consideration of systematic differences in the discourse situation and spatial configuration



# Some reference systems

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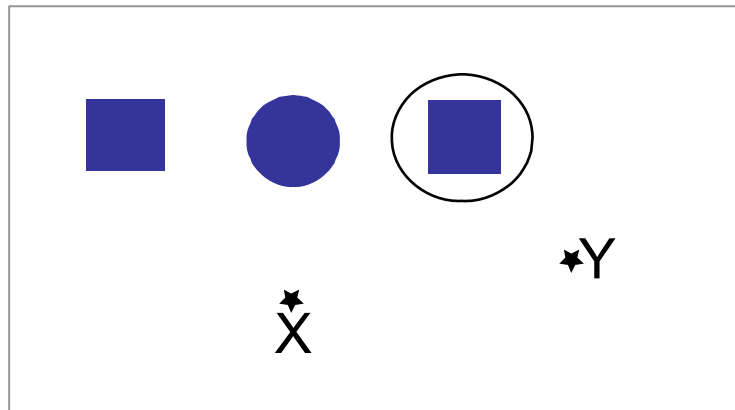


- Intrinsic reference systems
  - “The ball is in front of me / you / the church”
  - conflation of relatum and origin
  - the origin/relatum must have an intrinsic front
- Relative reference systems
  - no intrinsic fronts required (but perception)
  - the origin’s position defines the view direction
  - “The ball is in front of the table from my / your point of view / viewed from the entrance”
- Internal regions
  - A certain area is partitioned into internal regions
  - viewed from the inside (e.g., a car) or the outside (e.g., a picture)
  - “The circle is on the left (side of the picture)”

# Identifiability of reference systems



Literature: often basic assumption of identifiability



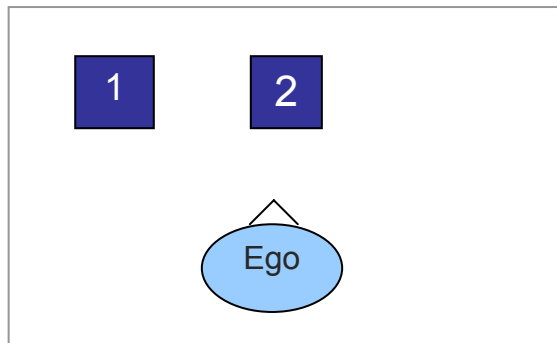
“The square to the right of X”  
- intrinsic reference system  
using “X” as relatum / origin

default case with a person as  
relatum

**But also:** the square that is located to the right of X viewed  
from Y’s position!

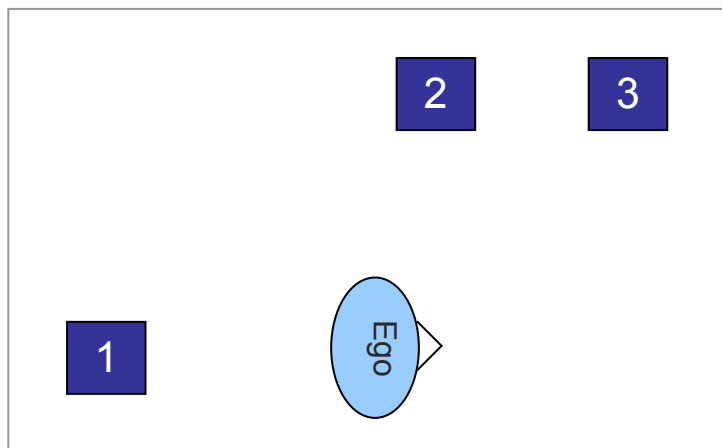
- relative reference system using Y as origin and X as relatum

# Ambiguity with respect to reference system or identification



“the square on the left” –  
must be square 1, but what is the  
relatum?

either square 2 or observer

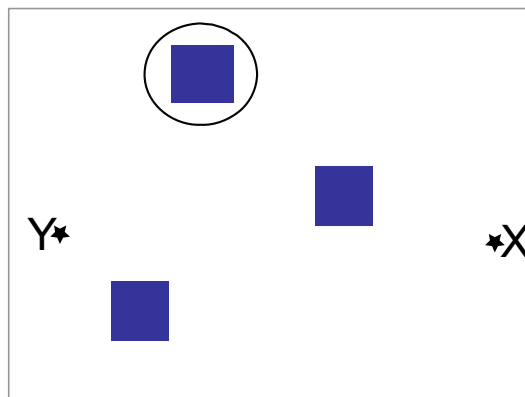


“das hintere Viereck” –  
(‘the square in back’)  
square 3 or square 1?

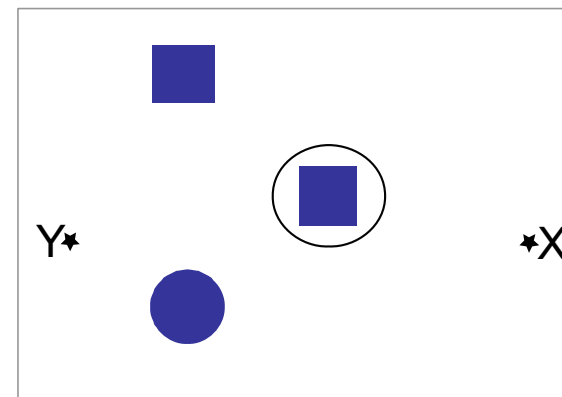
# Explicitness and identifiability



- Analysis of explicit references
  - “the square on the right from my point of view” – explicit origin (perspective)
  - “the square to the right of you” – explicit relatum
- Restricted identifiability of implicit relations
  - perspectives exclude each other if partners are situated at opposite positions – but only on the lateral axis!



“the square on the left” –  
origin cannot be X

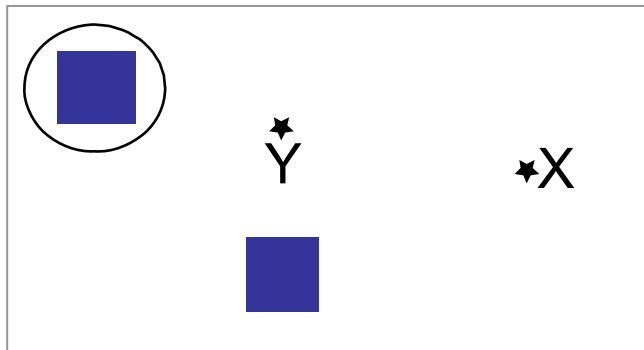


“the square in front of X” –  
origin is ambiguous

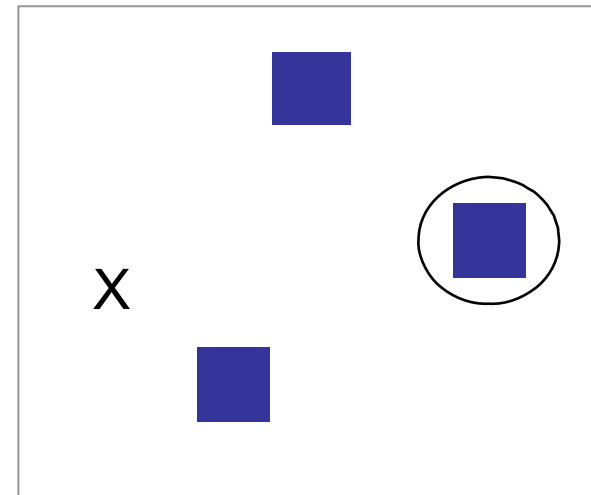
# Reference systems and linguistic form



- Adverbs for internal reference systems, adjectives for group based ones?



“das linke Quadrat” (the left square) – rare but possible



“das vordere Quadrat” does not occur in corpus; but “das Quadrat vorn” (rare)

more often: “das hintere Quadrat”, “das Quadrat geradeaus”

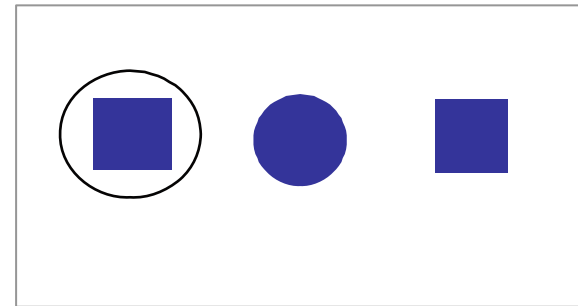
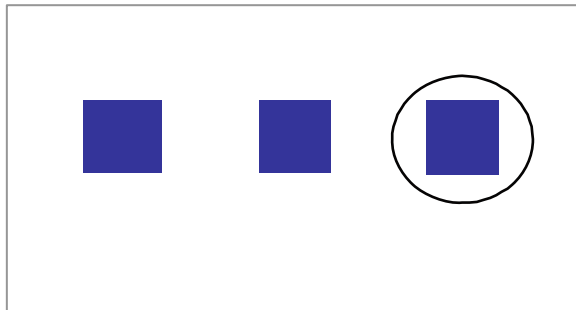
# Results

## (for spatial terms)

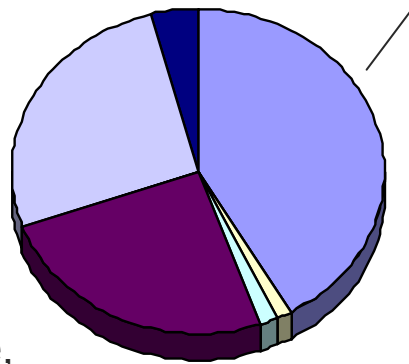


- Differences between English and German
  - preference of adjectives in German, but nouns in prepositional phrases in English
  - much higher preference in English for intrinsic reference systems
- General principles:
  - contrastivity in the choice of axis and relatum
  - partner adaptation in the choice of perspective
  - minimal effort
    - descriptions are as simple as possible
    - omission of explicit references if this does not cause ambiguity
  - direct impact of small changes of configuration and discourse context
    - differing variability of available linguistic representations that speakers choose from (according to above principles)
    - human-robot interaction: impact of discourse history

# Small changes...

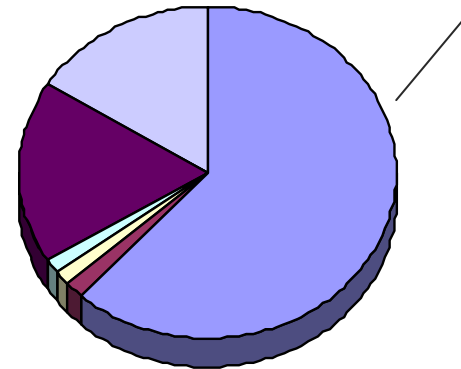


distance,  
e.g., "far  
right"



unmodified

superlative,  
e.g., "right-  
most"



unmodified

# Spatial and temporal dimensional terms



- Relations between entities affect application in different ways
  - spatial terms:
    - object functions
    - co-presence of competing objects
  - temporal terms:
    - causal (or other) relationship between events
- Application conditions similar if the (spatial or temporal) relationship itself is in focus
  - “Monday is before Tuesday”
  - “The square is in front of the circle”



# Parallels in applicability



- Proximity is central
  - Space: defined by functional aspects (accessibility, salience, primacy...)
    - The bike is in front of the house.
  - Time: defined by the conceptual categories for causal event relations
    - He fell after he stumbled over a stone.
- Level of granularity is central
  - Space: Granularity determines precision with regard to the graded applicability structure
  - Time: Granularity is influenced by the conceptual relevance relationship between the events
- Different kinds of underspecification
  - Space: Involved entities (relatum, origin) are often not mentioned explicitly, enabling different kinds of reference systems
  - Time: Involved entities (events) are mentioned explicitly, but conceptual relevance relation is underspecified

# Is there a dependency relation?



- Clear morphosyntactical and semantic relation (might be dependency)
- But decisively different – independent – application contexts
  - conceptual differences between objects and events lead to differences in the representation of their relative position
  - no reference systems / no graded applicability structure in temporal language
  - no discourse relations in spatial language
- Similarities in the applicability can be explained
  - by conceptual similarity between the domains
  - by general discourse principles
- No indication of a metaphorical relationship (with respect to application)

# Central contributions

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- Systematic representation and classification of the semantics and applicability structure of spatial and temporal dimensional terms
- Refinement of the methodology of cognitively motivated discourse analysis
  - Application of the methodology for a detailed analysis of natural language data
  - Refinement of earlier results concerning the application of spatial and temporal dimensional terms
- Enhancement of knowledge about the relation between spatial and temporal language

# Application and Outlook

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- Application of the methodology for different research questions concerning the relation between concepts and language use
  - for example: wayfinding and route instructions
- Analysis of the application of spatial and temporal terms in human-computer / human-robot interaction
  - for example: applying the knowledge about systematic speaker preferences in dialogue systems
- Refinement of findings by psycholinguistic research methods
  - for example: statistical proof for the identified tendencies
  - for example: relation between the activation of more than one reference system and linguistic underspecification
- Exploration of further languages with respect to the findings

# Discussion ....



Many thanks for your attention!

- Time for questions -