Language and Perception, University of Bern, September 2017

KAI-UWE CARSTENSEN (UNI SIEGEN)

WWW.KAI-UWE-CARSTENSEN.DE

A COGNITIVIST ATTENTION-BASED SEMANTICS OF DIRECTIONALS

DMW Dialektatlas Mittleres Westdeutschland

UNION DER DEUTSCHEN AKADEMIEN DER WISSENSCHAFTEN

AKADEMIE WISSENSCHAFTEN UND KÜNSTE NORDRHEIN-WESTFALEN

LOCATIONALS VS. DIRECTIONALS

- Locationals:
  - e.g., *in the house*
  - somehow static
  - description of the place of some object
- Directionals
  - e.g., *into/out of/through the house, from the roof,…*
  - somehow dynamic
  - description of the path of some object
  - typically associated with locomotion (verbs)

All *along the watch tower*

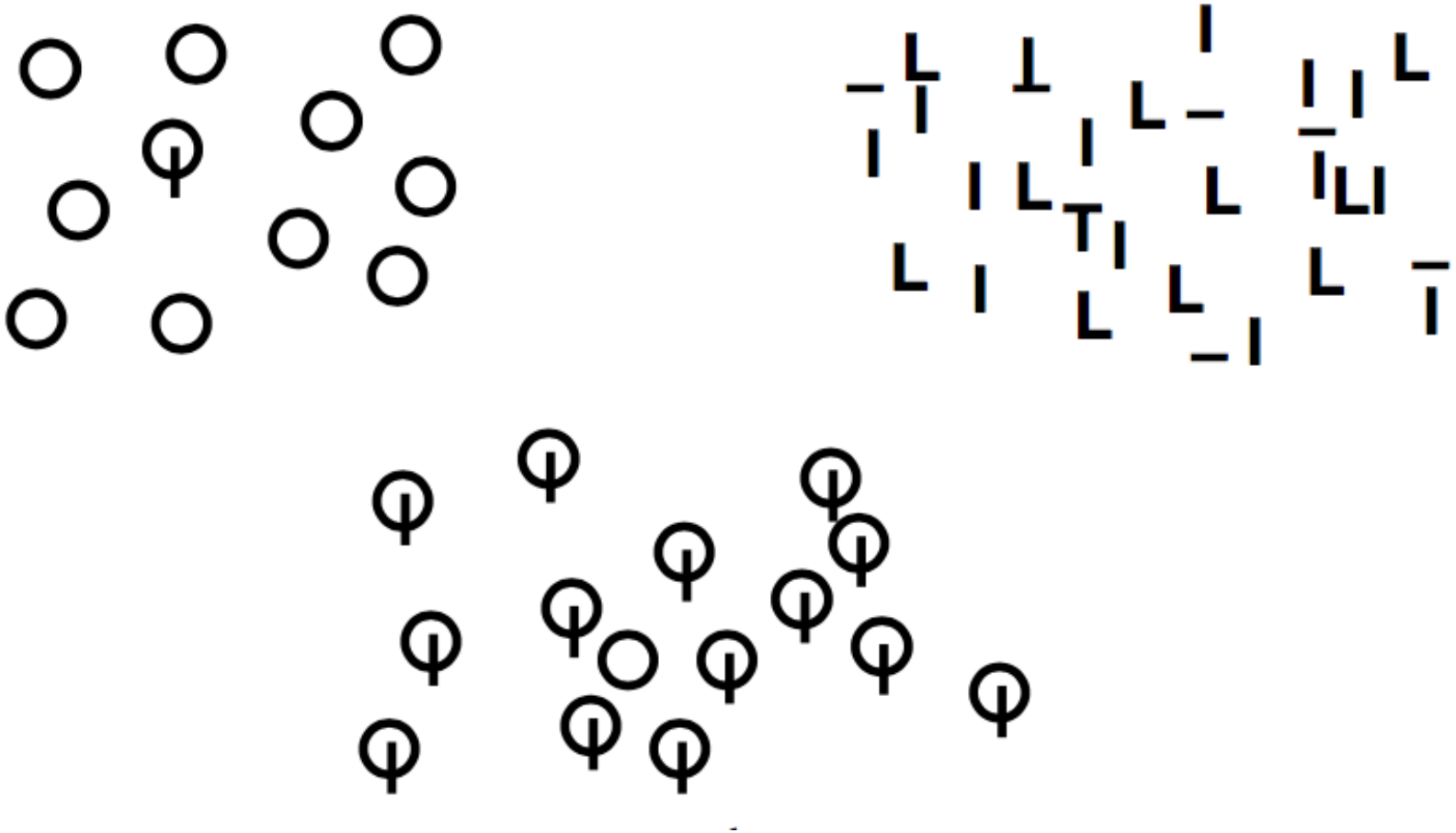
princes kept the view

BOB DYLAN

ANSWERING THREE QUESTIONS

- What's „attention" and „attention-based"?
- What's „Cognitivist"?
- What does that have to do with „Semantics(of directionals)"?
- taking three perspectives
  - the linguistic
  - the philosophical
  - the (neuro-)psychological

MOTIVATION: SELECTIVE ATTENTION: POP-OUT-PHENOMENON

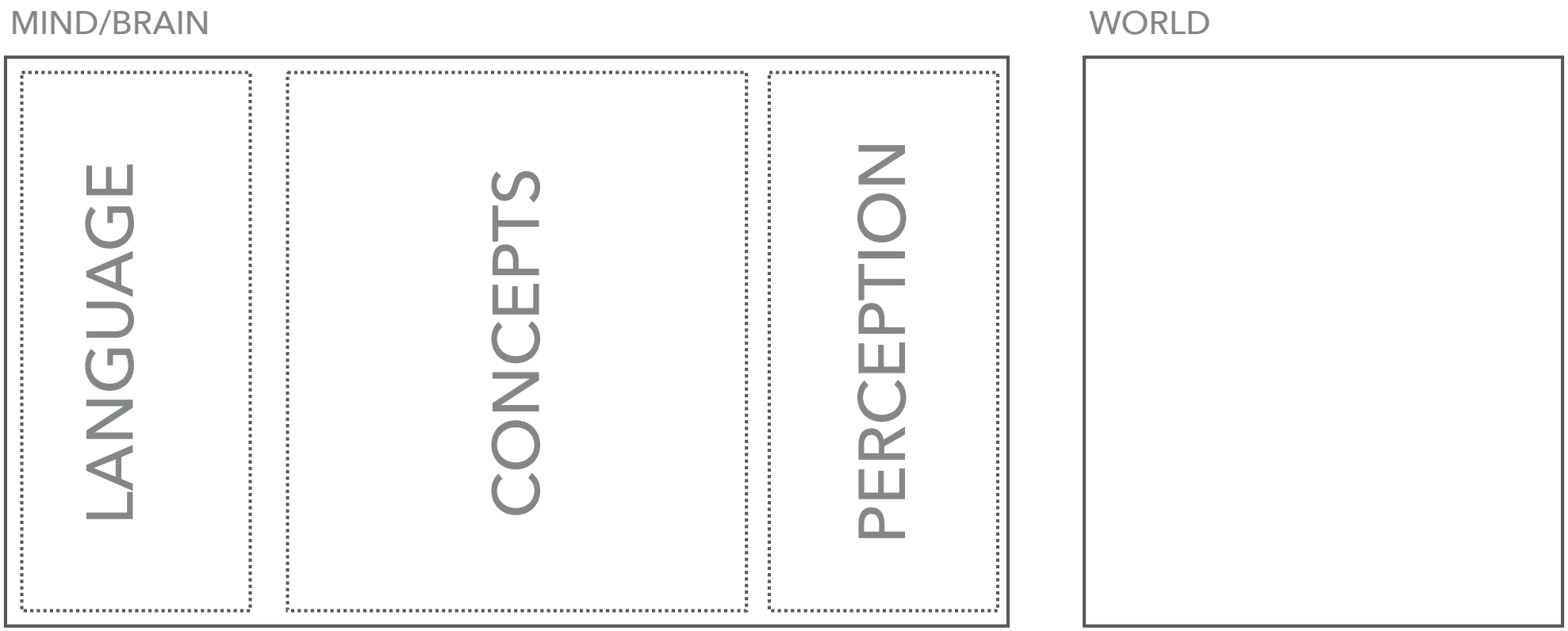


Carstensen (2001): *Sprache, Raum und* Aufmerksamkeit (Tübingen: Niemeyer), p.101.

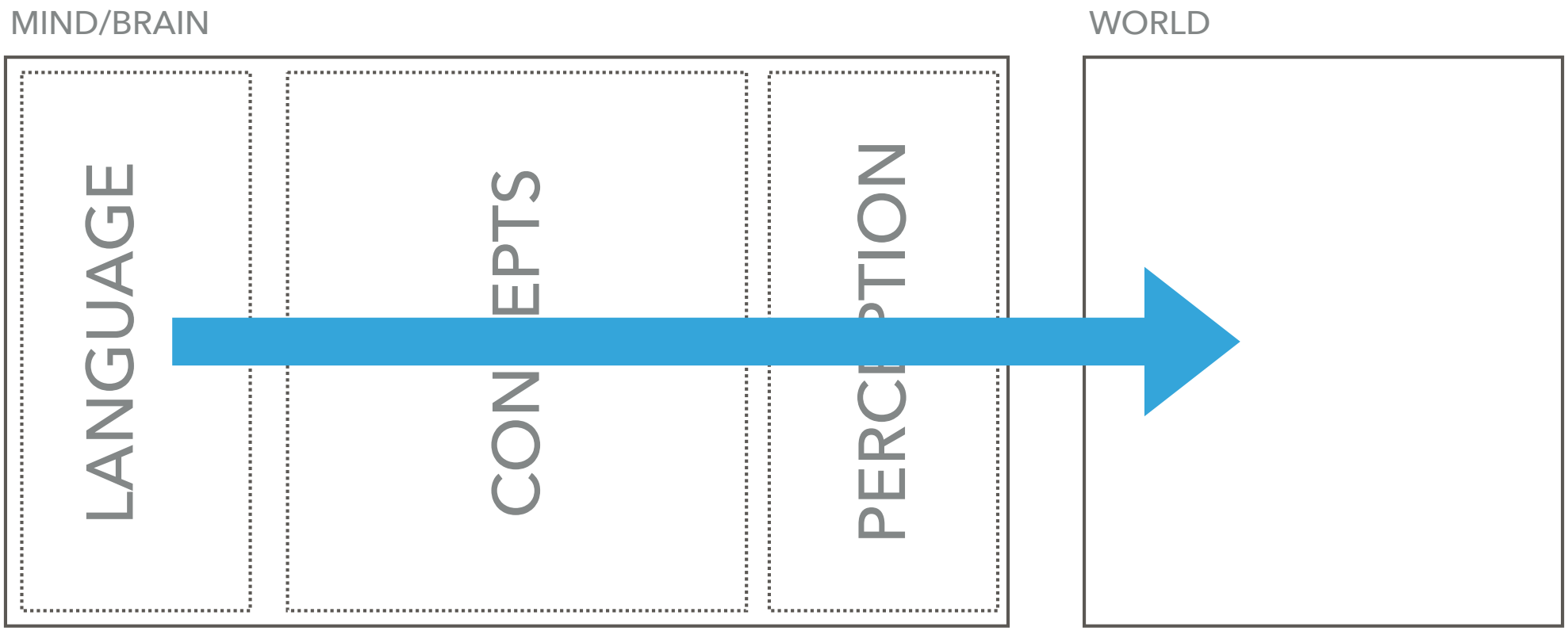
INSIGHT:

- not everything we see/perceive is (fully) processed
- not everything we see/perceive is available for conception and language
- selective attention **determines** what and how we conceptualize and linguistically categorize the world

LANGUAGE AND PERCEPTION (AND THE WORLD)

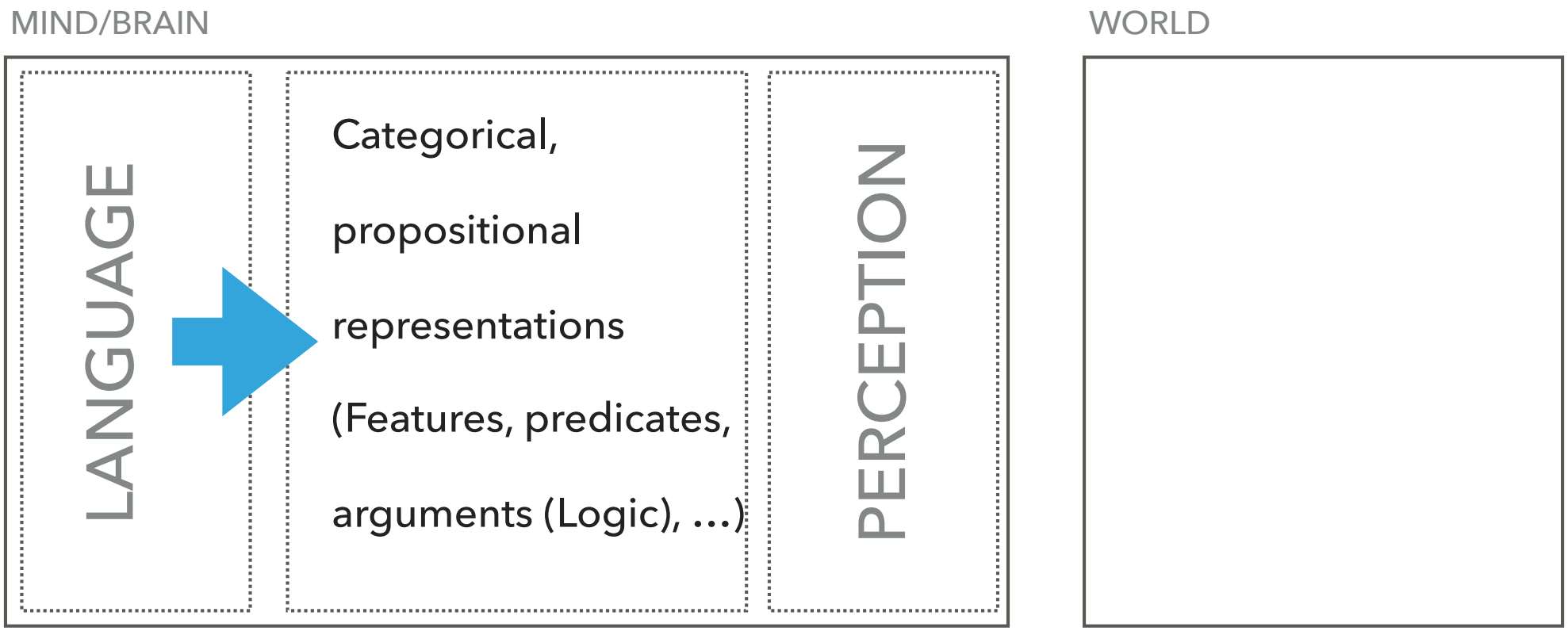


THE SEMANTIC PROBLEM: HOW LANGUAGE RELATES TO …



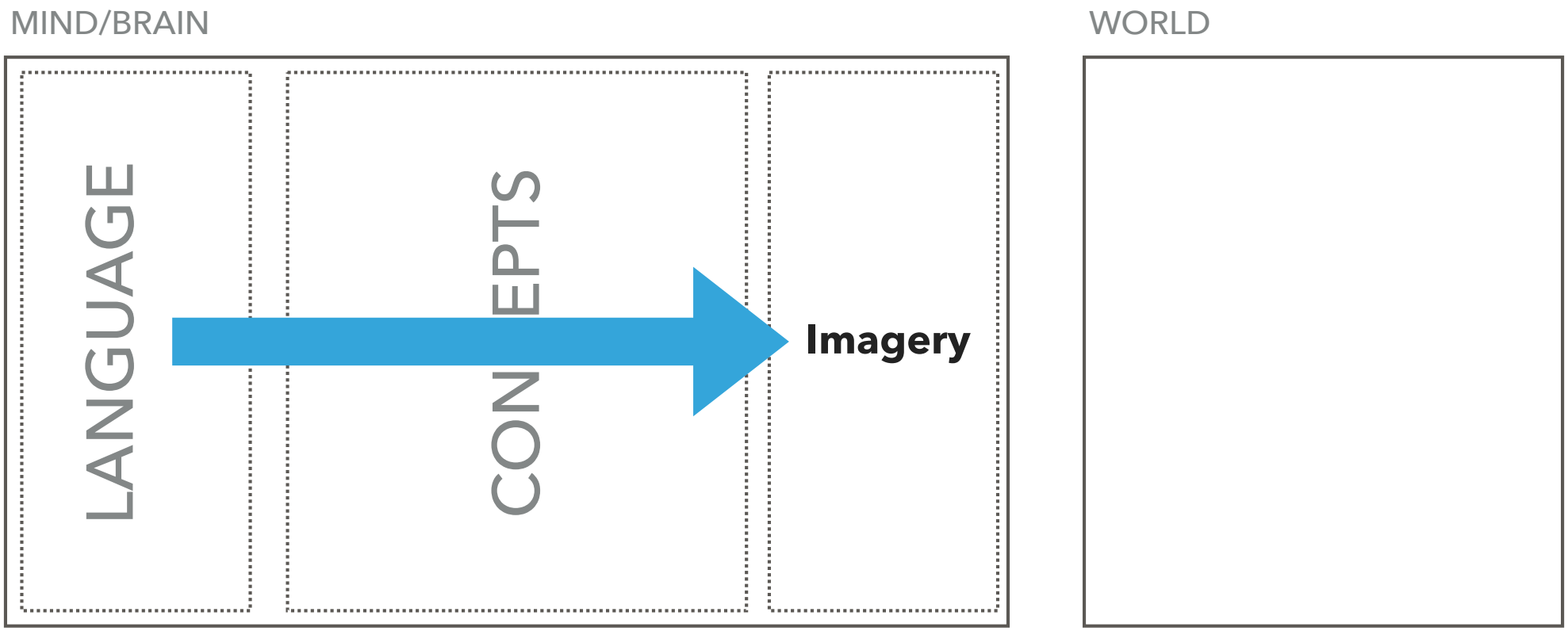
Logical semantics

THE SEMANTIC PROBLEM: HOW LANGUAGE RELATES TO …



Classical, non-logical semantics (e.g., Miller/Johnson-Laird 1976)

THE SEMANTIC PROBLEM: HOW LANGUAGE RELATES TO …



Cognitive semantics (e.g., Lakoff 1987)

THE PHILOSOPHICAL PROBLEM: WHAT EXISTS IN THE WORLD?

MIND

WORLD

Particulars

(EIGER, BERN,

BARACK_OBAMA, …)

Universals

((BEING_A_)PERSON,

RED, BEAUTY…)

Realism (e.g., Barry Smith)

THE PHILOSOPHICAL PROBLEM: WHAT EXISTS IN THE WORLD?

MIND

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WORLD

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(EIGER, BERN,

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Conceptualism (e.g., Ockham)

THE PHILOSOPHICAL PROBLEM: WHAT EXISTS IN THE WORLD?

MIND

Particulars

(EIGER, BERN,

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Universals

((BEING_A_)PERSON,

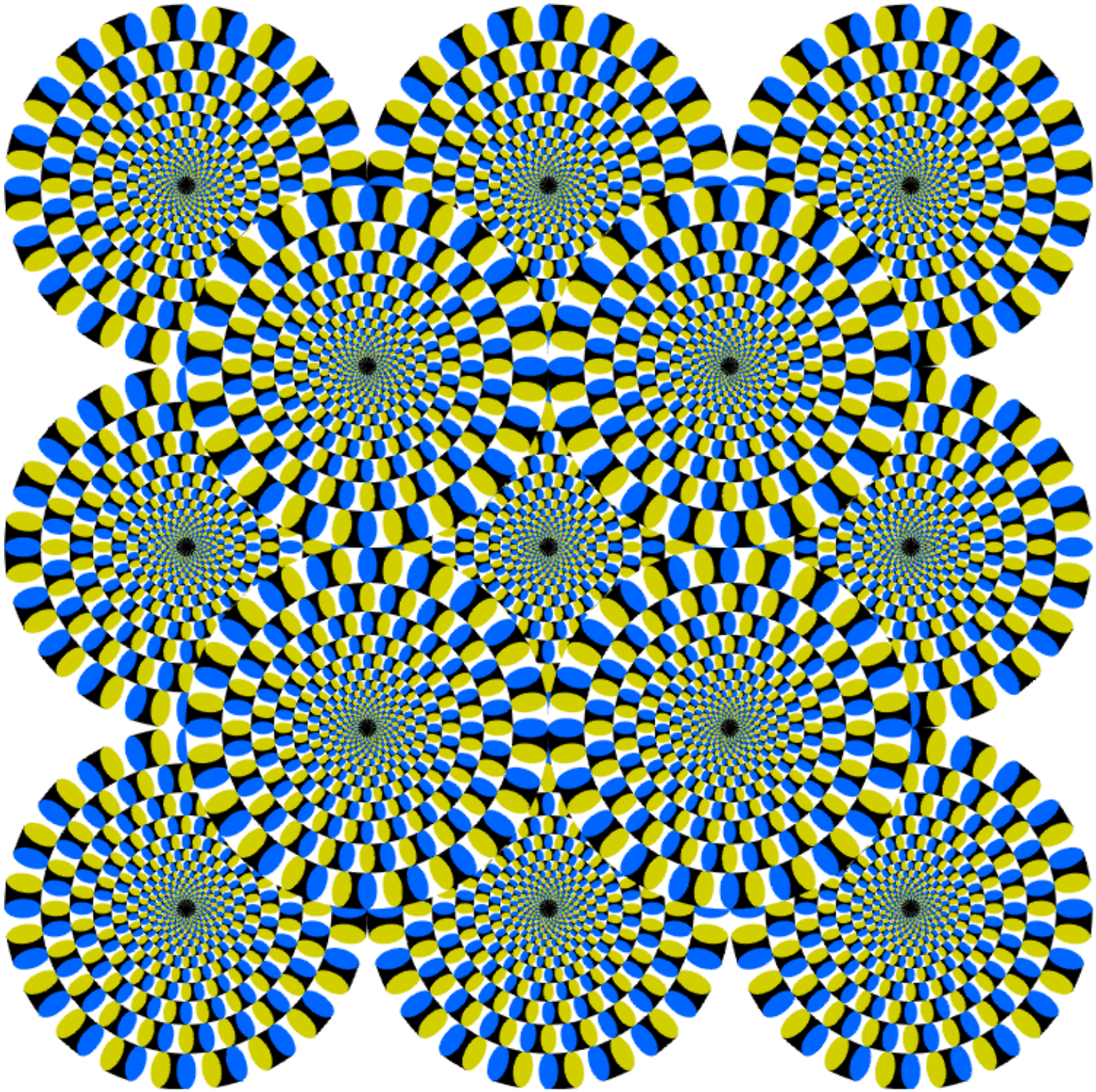
RED, BEAUTY…)

WORLD

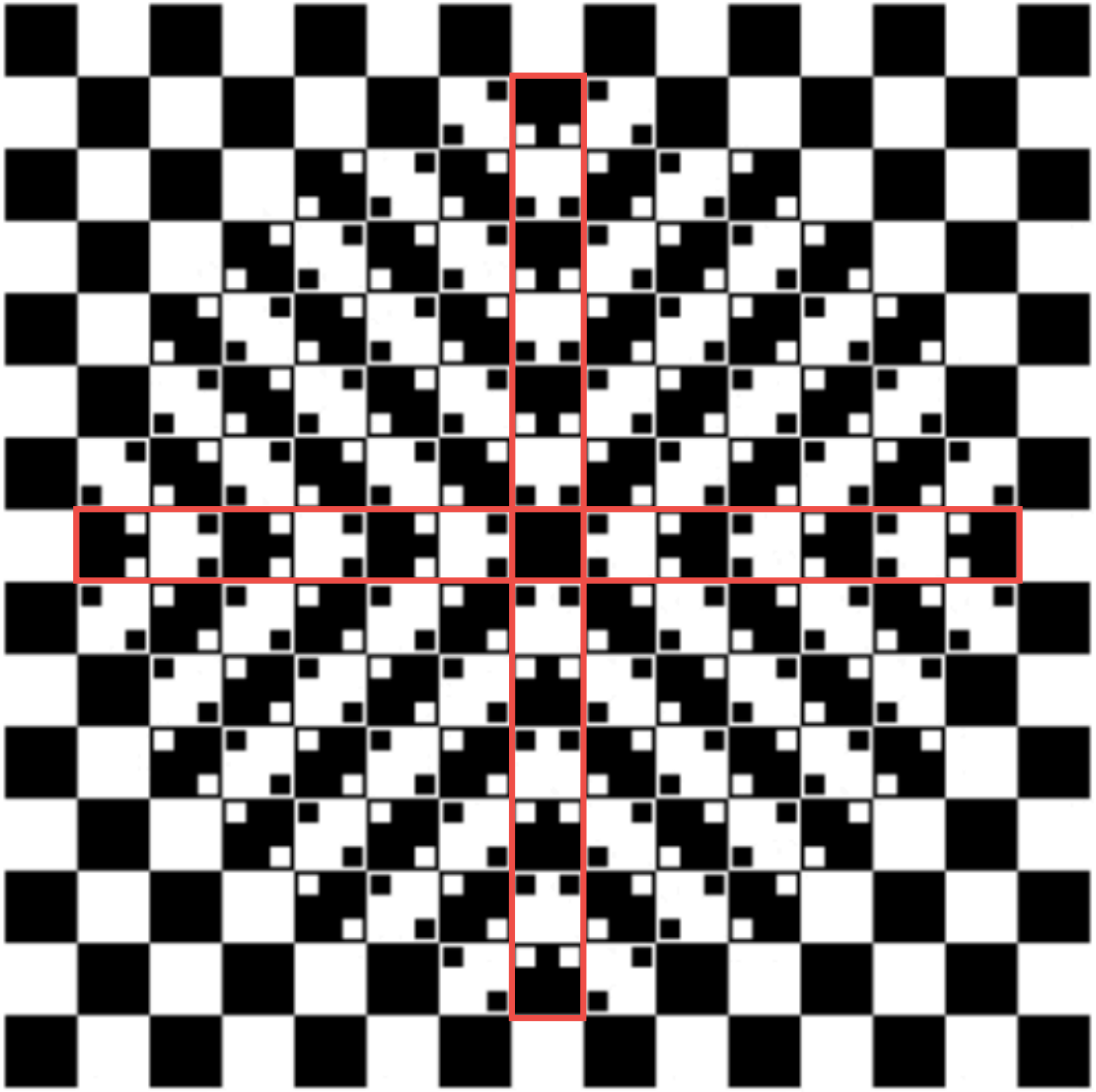
Cognitivism (e.g., Carstensen)

THE PROBLEM OF COGNITIVISM

- where do the structural distinctions of mental representations come from?
- (leaving aside ridiculous nativist assumptions)



by Akiyoshi Kitaoka



by Akiyoshi Kitaoka

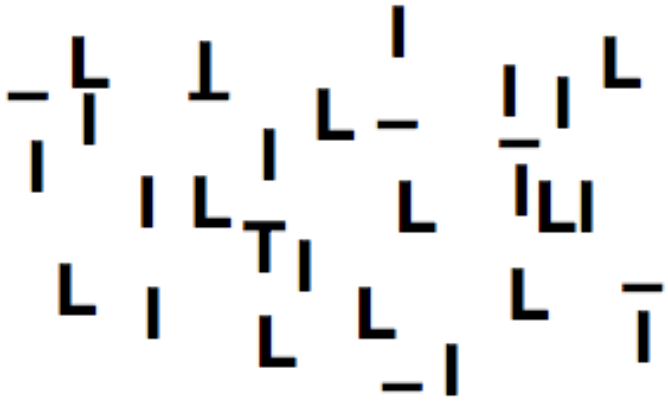
for more on visual illusions visit Michael Bach's page at http://www.michaelbach.de/ot/

http://www.michaelbach.de/ot/mot-motionBinding/index.html

LESSON LEARNED

- our perception is evolutionarily adapted to the world „out there“
- some aspects of the world are represented and processed **pre-attentively**
- strange input or missing context leads to von-veridical interpretation

http://www.michaelbach.de/ot/mot-sam/index.html



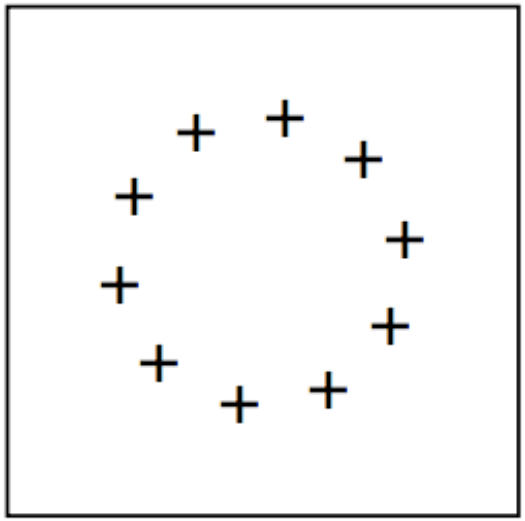
the time to identify a complex item (conjunctive search)

increases with the number of items

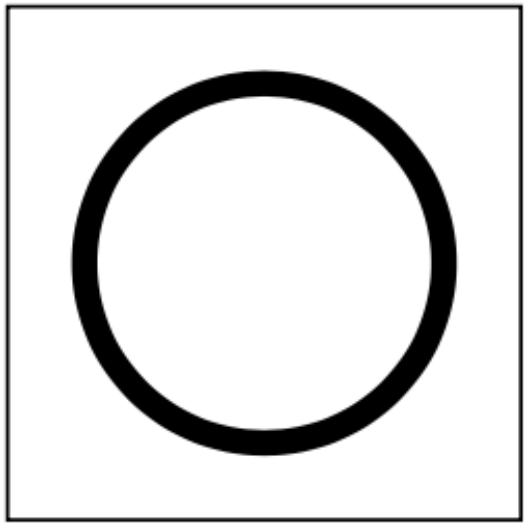
SELECTIVE ATTENTION I

- is necessary for conscious/higher representation
  - selects information for further processing, representation, learning, consciousness, language
- makes selected implicit information **explicit**
- imposes further structure on pre-attentively processed input
- categorical distinction:
  - focused attention
  - distributed attention

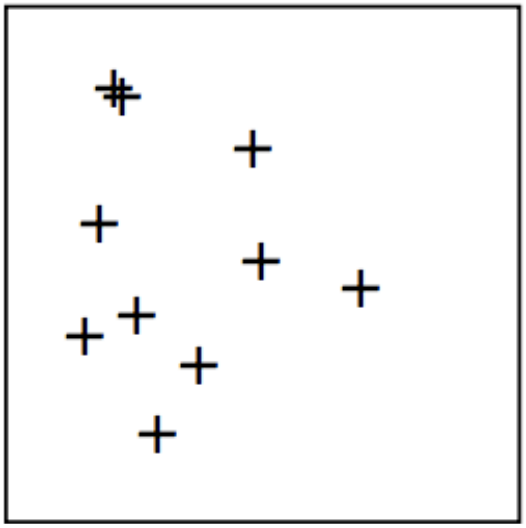
EXPERIMENTAL EVIDENCE (BELLUGI ET AL. 2001)



Stimulus



typical reproduction of
Downs-syndrome person



typical reproduction of
Williams-syndrome person

SELECTIVE ATTENTION II

- seems to operate on two levels simultaneously
  - global level
  - local level

SELECTIVE ATTENTION III

- attentional engagement is temporally restricted (in a temporal „window“ or „frame“)
  - followed by „disengagement“
    - disorder: simultanagnosia
  - with a „don’t go directly back to where you just were“-mechanism („inhibition of return“)
- acts on different levels of representation („reference frames“)

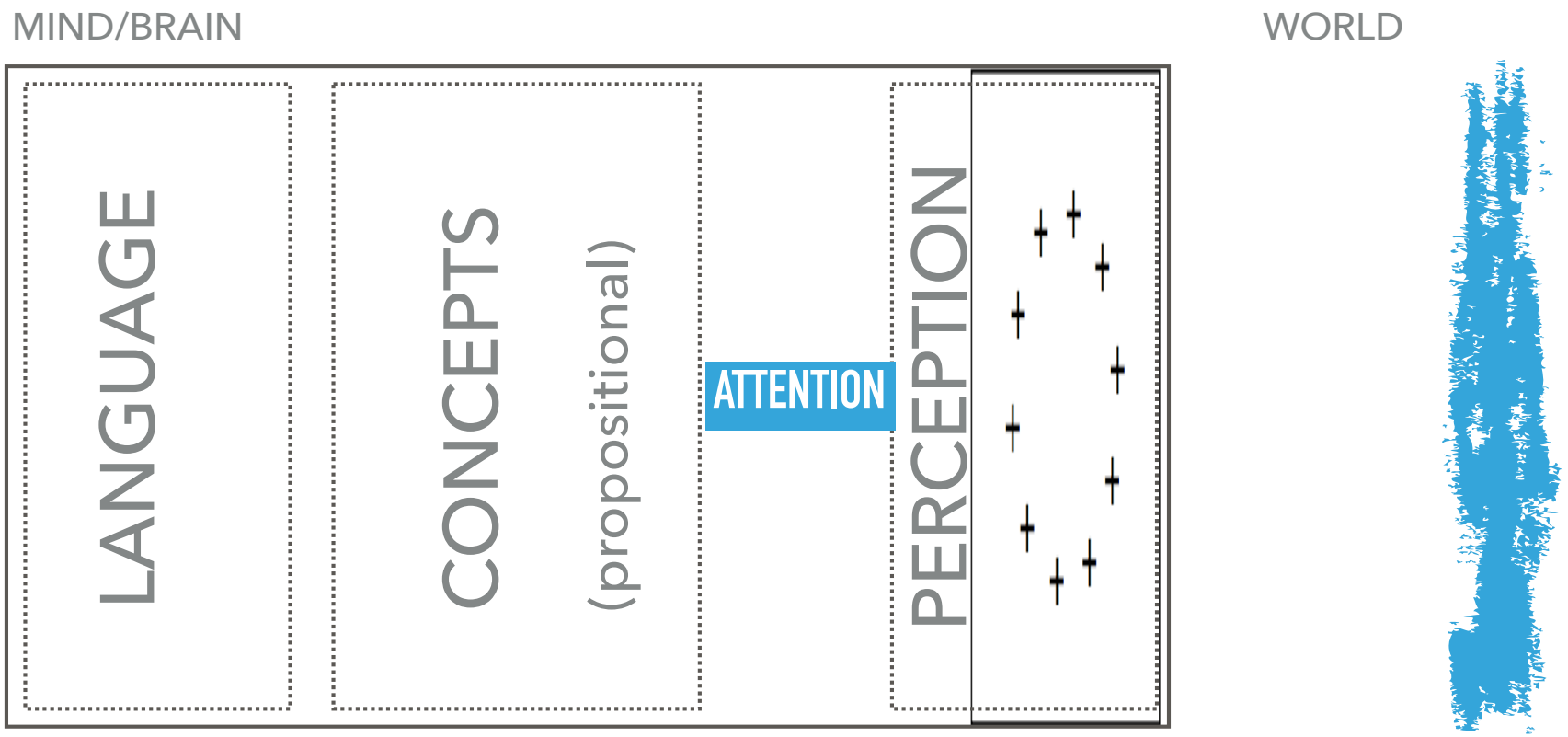
SELECTIVE ATTENTION

- leads to the construction / re-cognition of
  - representations of the attended information
  - so-called „object-files“ (~particulars)
    - which are conceptually categorized by „concepts“ (~universals)

DYNAMIC SELECTIVE ATTENTION

- sequential attention („scanning“)
  - nb: not necessarily the same as eye fixations (scan paths)
- tracing an entity along some dimension
- tracking moving entities

THE COGNITIVIST PICTURE (SIMPLIFIED)

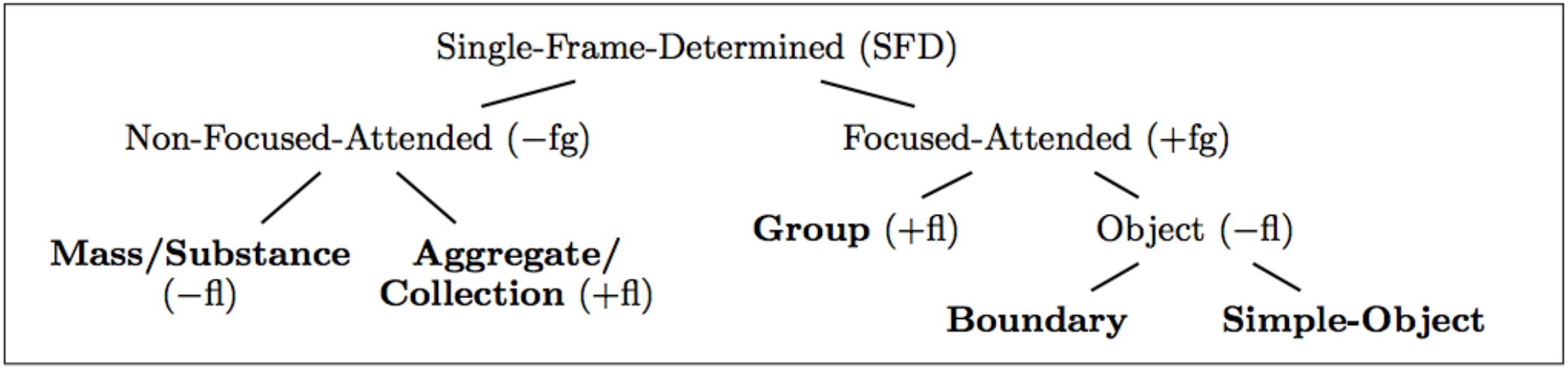


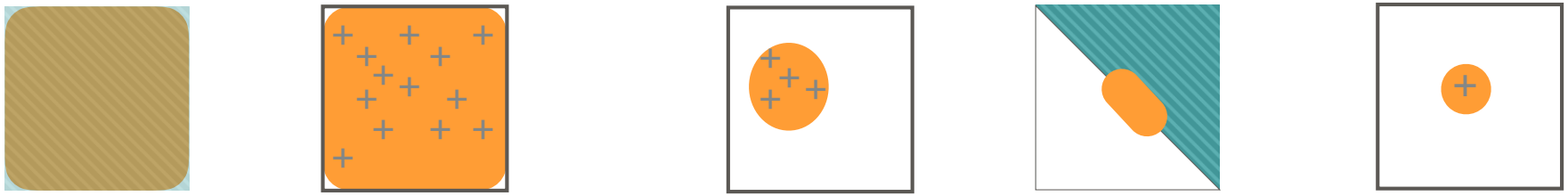
COGNITIVIST ONTOLOGY

- i.e., the coarse structure of „what there is“ in the world from human perspective
- is based on aspects introduced
  - (focused/distributed,global/local, frames)
    - ±**f**ocused**g**lobal, ±**f**ocused**l**ocal
- Distinctions:
  - entities defined wrt. a single frame (~“Object“)
  - entities defined wrt. multiple frames (~“Event“)

Carstensen, Kai-Uwe (2010). Nicht-sprachliches Wissen. In: Kai-Uwe Carstensen, Christian Ebert, Cornelia Ebert, Susanne Jekat, Ralf Klabunde & Hagen Langer (eds.), *Computerlinguistik und Sprachtechnologie – Eine Einführung.* 3rd rev. ext. Springer Verlag, 532–543.
Carstensen, Kai-Uwe (2011).“Toward Cognitivist Ontologies”. In: *Cognitive Processing* 12 (4). 379– 393.

„OBJECTS“, UPPER LEVEL

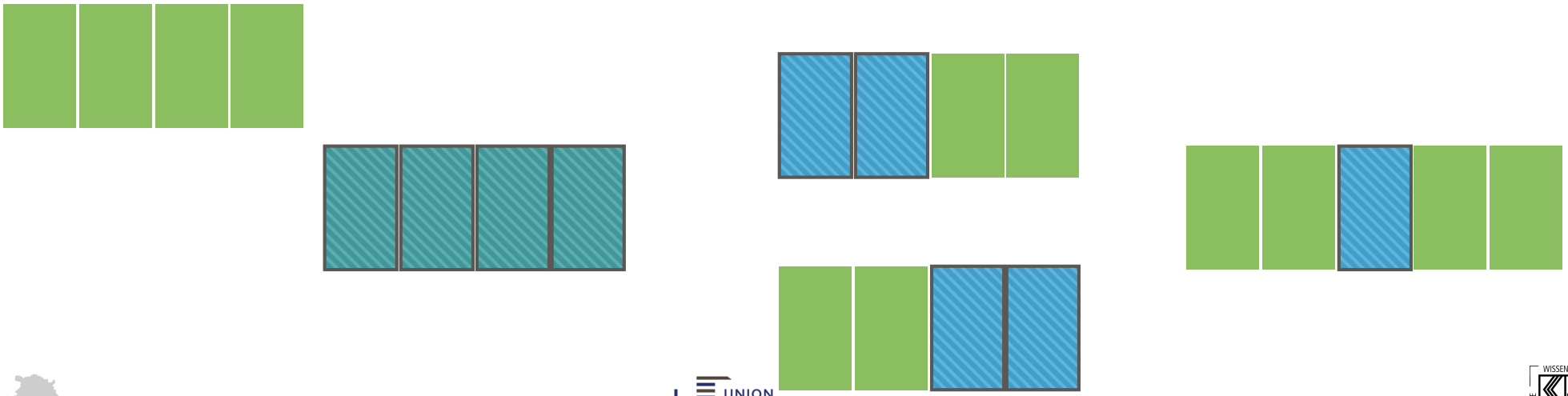




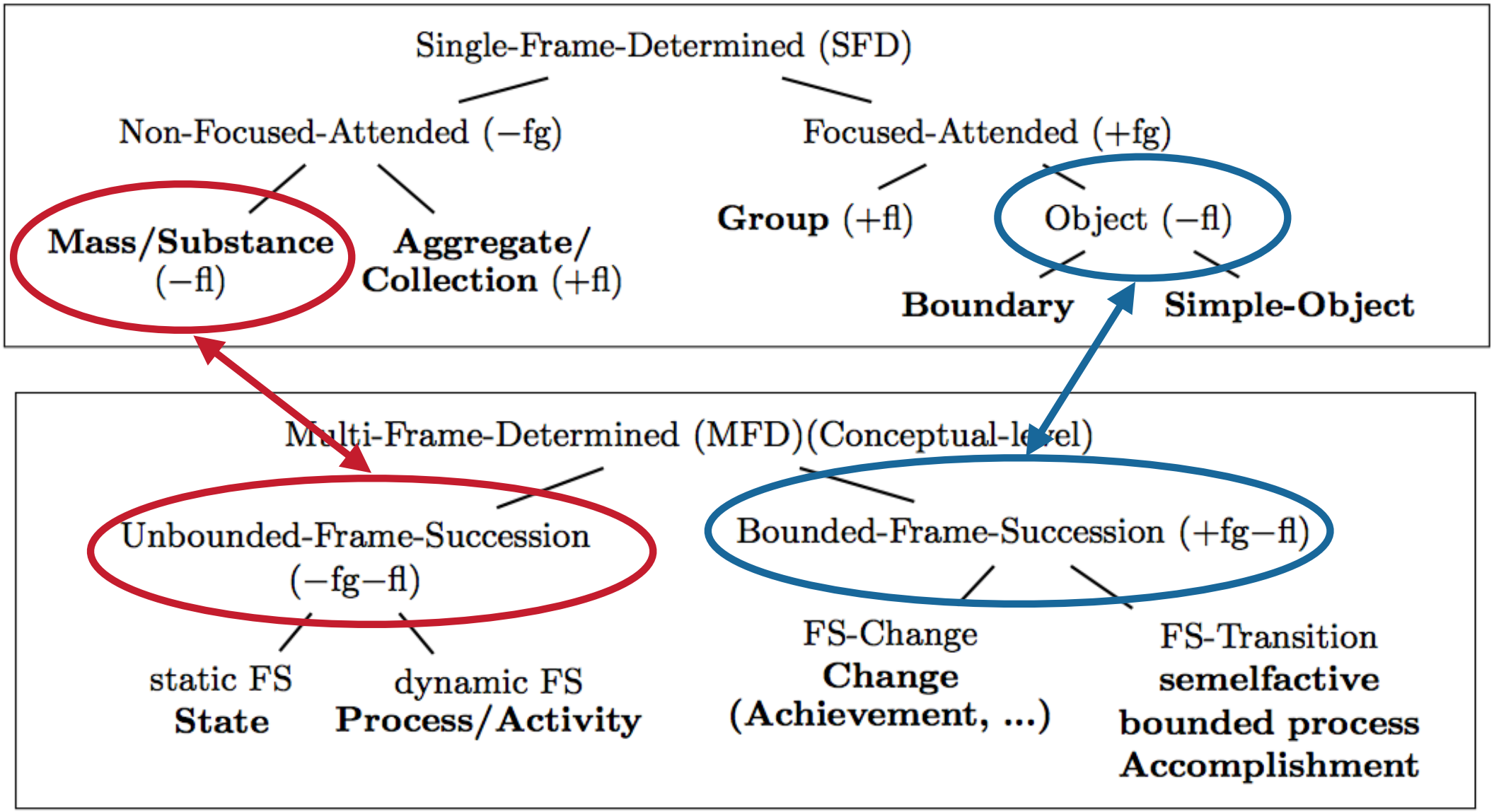
„EVENTS“, UPPER LEVEL

Multi-Frame-Determined (MFD)(Conceptual-level)

- Unbounded-Frame-Succession (−fg−fl)
  - static FS **State**
  - dynamic FS **Process/Activity**
- Bounded-Frame-Succession (+fg−fl)
  - FS-Change **Change (Achievement, ...)**
  - FS-Transition **semelfactive bounded process Accomplishment**

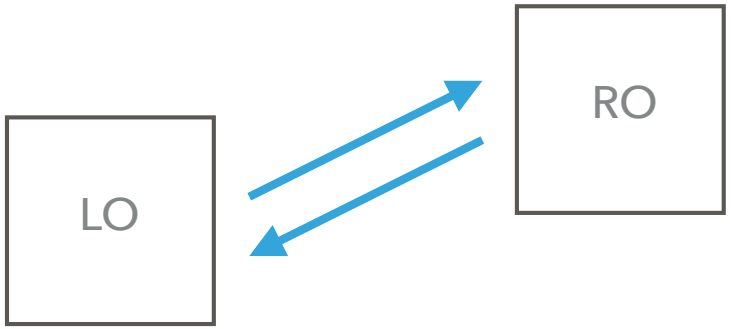


EVENTS ARE DIFFERENT...



LOCATIONALS ARE INTERMEDIATE

- **x over/at/behind... y**
- attentional changes between SFD-entities
  - two possible directions!
  - for more cf.
    Carstensen (2015), A Cognitivist Attentional Semantics of Locative Prepositions. In: *Attention and Meaning. The Attentional Basis of Meaning*. Ed. by Giorgio Marchetti, Giulio Benedetti, and Ahlam Alharbi (Hauppauge, NY: Nova Science Publishers), pp. 93–132.



LO: Located Object / Trajector

RO: Reference Object /Landmark

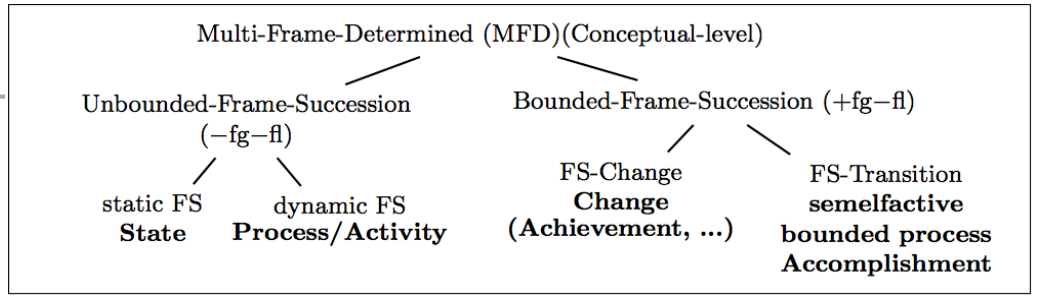
DIRECTIONALS

- ***out of/ through/ along/ past/ into/ towards/… y, from x to y***
- not necessarily having a ‚direction':
  - *around/through the house*
- typically associated with locomotion (verbs)
  - and typically modelled wrt. time
- but: fictive motion
  - *the mountain range goes from Canada to Mexico*
  - *the river runs through the valley*

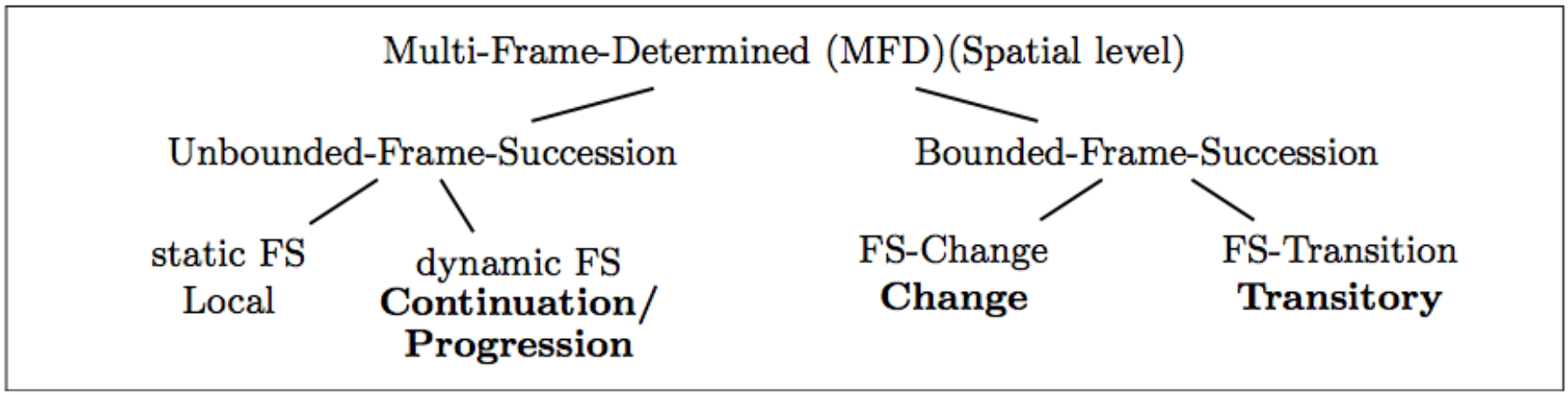
PROBLEM #1: CLASSIFICATION OF DIRECTIONALS

- Zwarts' (2008) proposal (only graphical definition):
  - **Source** expressions (*from X, out of X,…*): [++++++ – – – – – –]
  - **Goal** expressions (*to X, into X,…*): [– – – – – – ++++++]
  - **Route** expressions (*past X, over X,…*): [– – – – ++++ – – – –]
  - **Comparative** expressions (*towards X, away from X, up, down,…*): [++++++++++++]
  - **Constant** expressions (*along/through X,…*): [++++++++++++]
  - **Geometric** expressions (*around X,…*): (no pattern diagram)
- Pantcheva (2010)'s extension:
  - **Egressive** expressions (*starting from X,…*): [+ – – – – – – – – – – –]
  - **Terminative** expressions (*up to X,…*): [– – – – – – – – – – – +]

COGNITIVIST PROPOSAL I

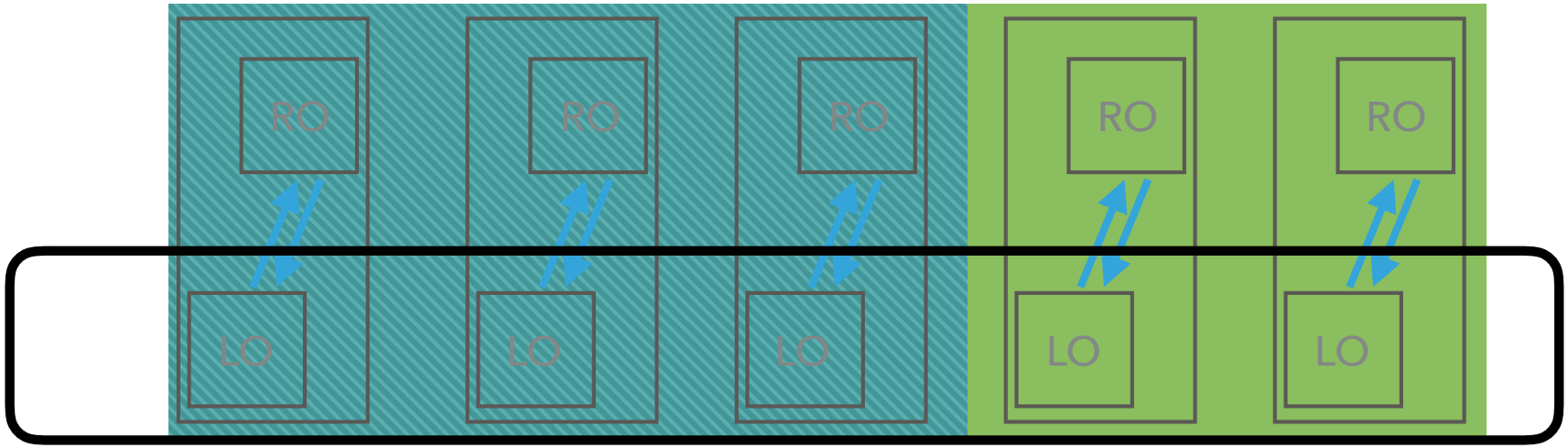


- Some directionals are **inherently phasal**, locationals fit in the scheme!
  - they code the „situational" spatial structure wrt. some object
    - multiple (MFD) description of its spatial property (change)



Constants, Comparatives **Source, Goal (both)** **Route**

INHERENT ASPECTS OF DIRECTIONALS, Z.B.



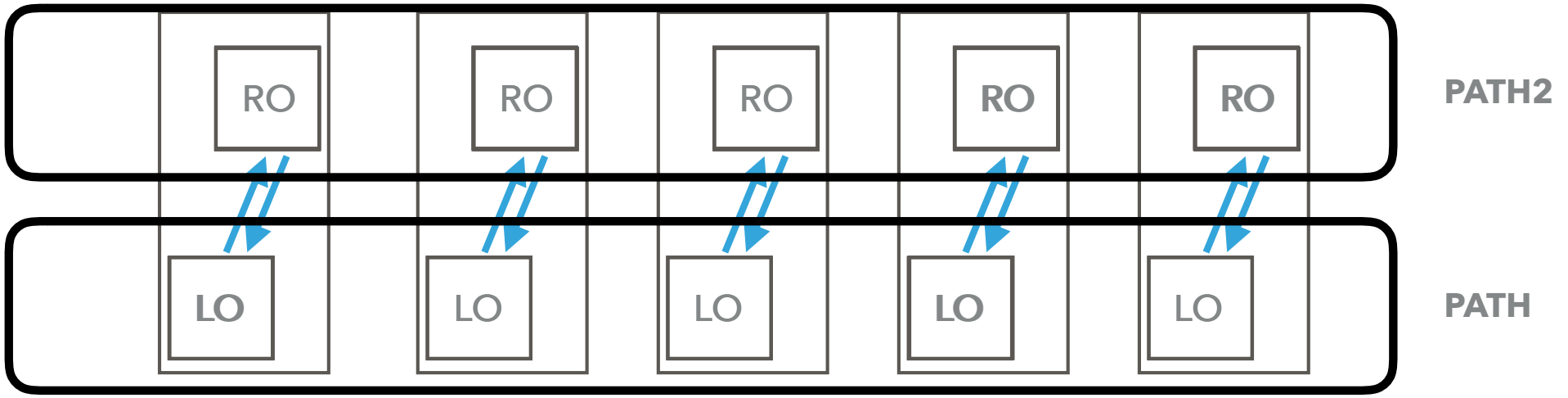
COGNITIVIST PROPOSAL II

- Some directionals are to be characterized **exherently**
  - wrt. **form** aspects: *a**round** the house*
  - *wrt. **gestalt** aspects (i.e. to relevant dimensions):*
    - *a**long**/a**cross**/ **up**/ **down** the street*
  - wrt. the **previous phase (exherently phasal)**:
    - *go **back***

EXHERENT ASPECTS OF DIRECTIONALS, AXIAL

- Sequential attention to subject's/object's spatial referent
- **and** some collinear one-dimensional path (e.g. *down*)
- **or** some one-dimensional path of RO (e.g. *across the street*)
- **or** some collinear one-dimensional path of RO (e.g. *along the street*)

Lang, Ewald, Kai-Uwe Carstensen, and Geoffrey Simmons (1991): *Modelling Spatial Knowledge on a Linguistic Basis: Theory - Prototype - Integration*. Lecture Notes in Artificial Intelligence 481. Springer.



COGNITIVIST PROPOSAL III

- In addition:
  - static („ATT“) vs. dynamic („SCAN“, „TRACK“, „TRACE“) attention is assumed to be represented
  - usable for semantic distinctions

CLASSIFICATION GRID/DECISION TABLE AS IN MILLER/J.–L.

linguistic expressions (senses)	standard type	Dynamicity of attention wrt. LO	MFD-category	exherent property	Dynamicity of attention wrt. RO
Locationals	Place	ATT	Local	no	ATT
through/over/ towards	Constant	SCAN	Continuation	no	ATT
along/across/up/ around/alongside	Geometric/ Constant	SCAN	Continuation	yes	TRACE
alongside/ahead of	Constant	SCAN	Continuation	no	TRACK
from/to/ into/ out of	Source/Goal	SCAN	Change	no	ATT
past/over	Route	SCAN	Transitory	no	ATT
across	Route	SCAN	Transitory	yes	ATT

btw.: there is evidence that ***from/to*** are the sides of a Change-coin

cp.: *We went out of the house (and) into the garden*

We drove from Hamburg (*and) to Berlin

WE'VE COME TO THE END, THANK YOU!