Seminarium Filozofii Nauki dr-a Pawła STACEWICZA
Wydział Administracji i Nauk Społecznych (WAINS)
Politechnika Warszawska

Mini-konferencja lingwistyczno-filozoficzna

Wypowiedź jako kompleks różnych rodzajów informacji

(ku pamięci polskich cybernetyków Henryka Greniewskiego i Mariana Mazura)

Triada MOP (*meta-, orto- i para-informacja*)
jako zasadnicze składniki znaczenia wypowiedzi językowych

André Włodarczyk, Warszawa 28.10.2021 r.

ORTHO-INFORMATION

Ortho-information : FRAMES

(a) **Frame** (the scope of a situation)

The situation frames are of two kinds: *states-of-affairs* (static situations) and *actions* (dynamic situations). Time, progression and granularity determine three types of actions: *events*, *ordinary processes* and *granular processes,* respectively (Włodarczyk, A. & Włodarczyk, H. 2006c, 2013, p. 193-230).

Ortho-information
TYPES OF SITUATIONS FRAMES

SEMANTIC TYPES OF SITUATIONS				
Characteristic properties (dimensions)	**Static Situations**	**Dynamic Situations (ACTIONS)**		
	STATE	**EVENT**	**Ordinary PROCESS**	**Refined PROCESS**
Space (3D)	+	+	+	+
Time	-	+	+	+
Progression	-	-	+	+
Granularity	-	-	-	+

Ortho-information : ROLES

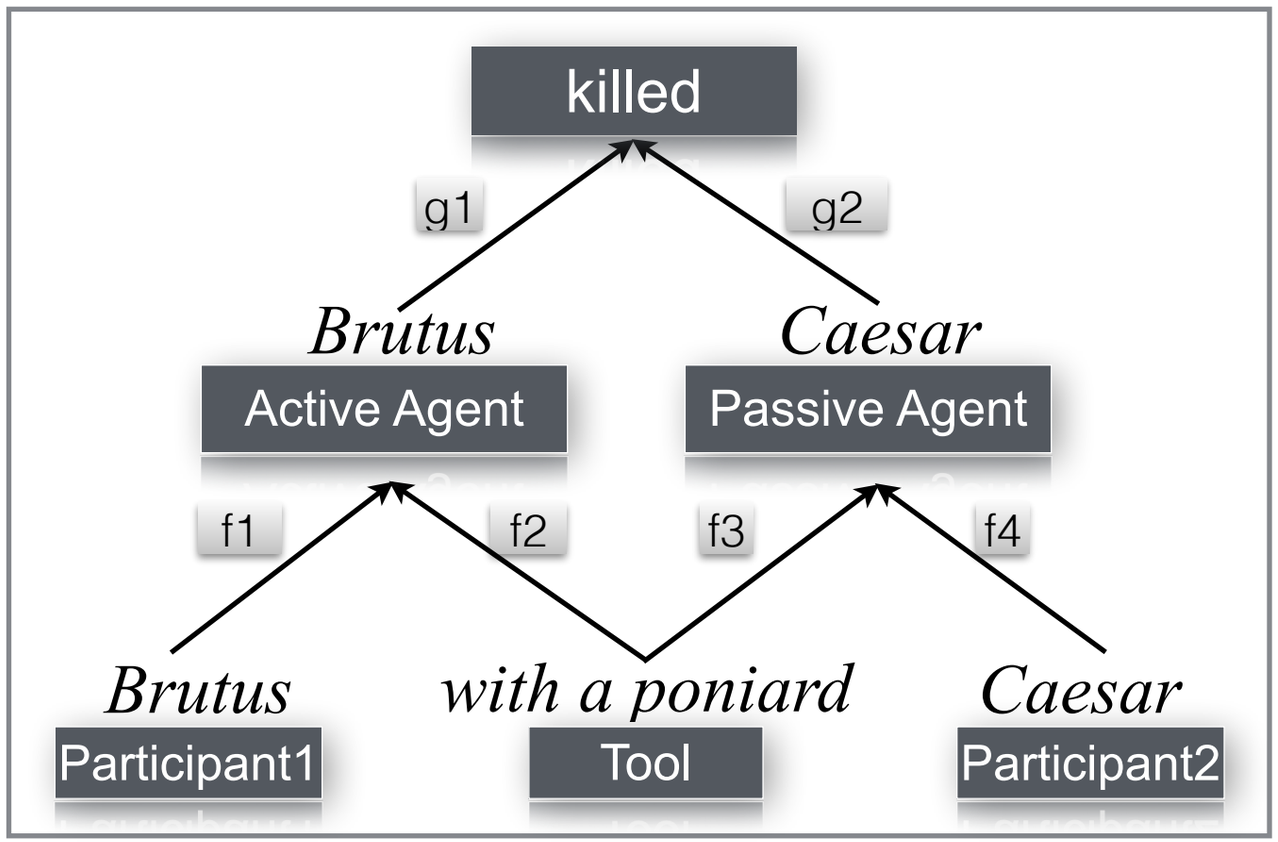
(b) **Roles** (roles are situations with a unique participant)

Participants in semantic situations are divided into *living beings* and *non-living figures*. Among the most important roles in which agents and non-living figures are well known in linguistics as “agents” (active actants) and patients (passive actants). From the viewpoint of time and space, roles are divided into (1) **static** (states) and (2) **dynamic** (processes and actions). The dynamic roles may be (2a) *active*, (2b) *median* or (2c) *passive*.

Note that the meaning of language utterances is aligned with more than one semantic relationship. Hence, participants in a given situation may play more than one role. This is an important theoretical shift as it is an alternative solution to "case theory" (Fillmore, Ch. 1968) which states that, paradoxically, each utterance has as many "core cases” as there are noun phrases in a sentence (Włodarczyk, A. 2008 and 2013: 21-40).

Ortho-information

The proper information contained in utterances has a non tree-like structure. Here is an example of a heterarchical relationship between units of an utterance represented as an abstract distributed net.



Note that this reflects the Message (linguistic interface) semantics of the utterance *"Brutus killed Caesar with a poniard"*.

Ortho-information in utterances

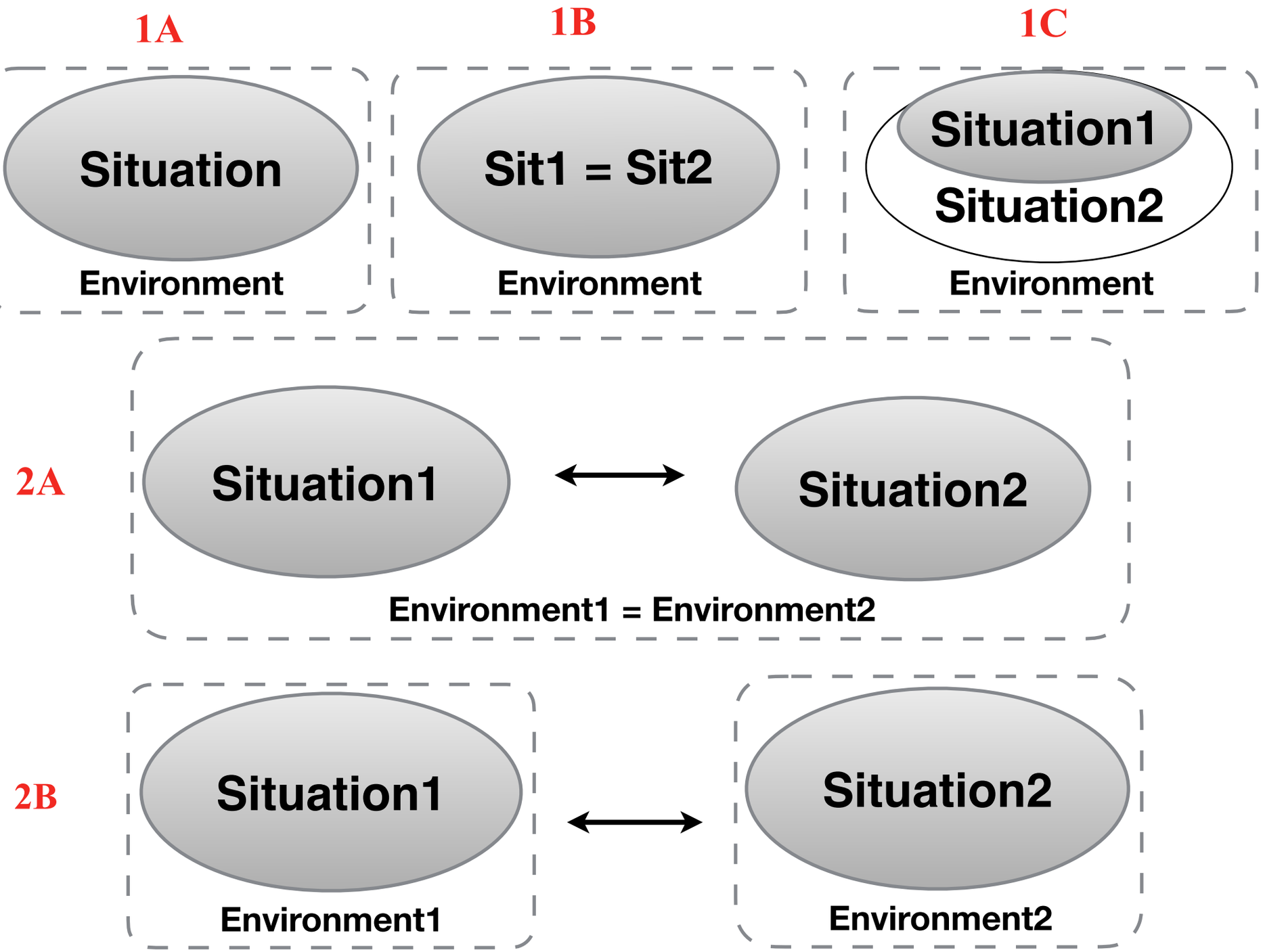
(Example of multi-role participants)

```
def trade(a1, a2, o1, o2) =
              transmit(a1,a2,o1,o2) | transmit(a2,a1,o2,o1)
def transmit(a1, a2, o1, o2) =
              (give(a1, o1) > o1 > goto(o1,a2))
def give(a1, o) = (a1 + " gives " + o)
def goto(o, a2) = (o + " goes to " + a2 )

def sell(a1, a2, o) = trade(a1, a2, o, "money")
def buy(a1, a2, o) = trade(a1, a2, "money", o)
```

```
sentence: "John trades (his) car for a camel with Peter."
trade("john","peter", "car", "camel")
OUTPUT:
"peter gives camel goes to john"
"john gives car goes to peter"

Sentence: "John buys a car from Peter."
buy("john","peter", "car")
OUTPUT:
"peter gives car goes to john"
"john gives money goes to peter"
```

```
Sentence: "Peter sells a car to John."
sell("peter","john", "car")
OUTPUT:
"peter gives car goes to john"
"john gives money goes to peter"
```

SITUATIONS as expressed in Simple Utterances



Planes of the Space of Information as Building Blocks of Utterances

1. The ***Enunciative*** Plane concerns centres of attention, while the ***Instantiative*** Plane concerns the filling of variables with the individuals.

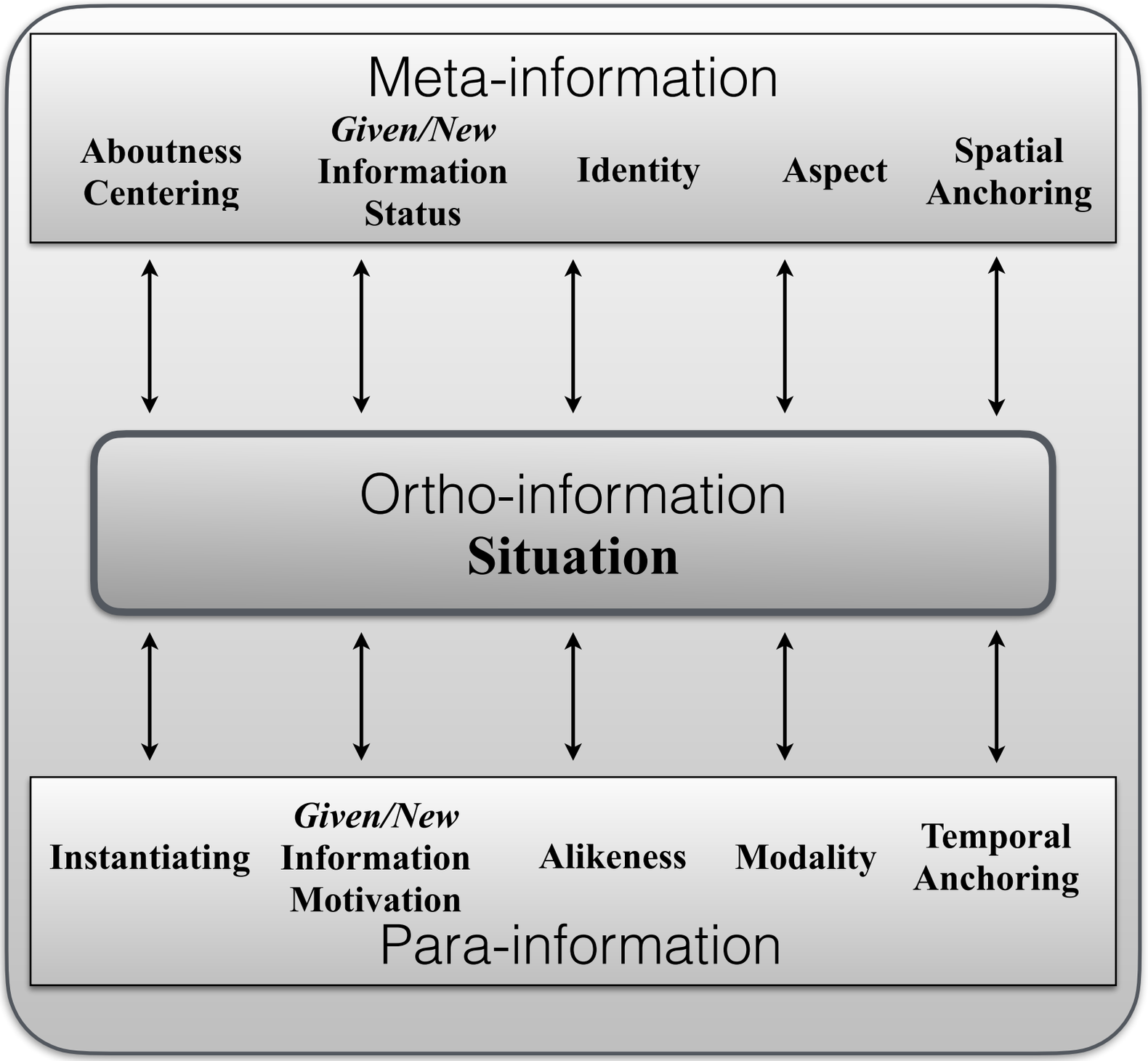
2. The ***Identificational*** Plane preserves *absolute identities* of the situation in question and of its participant(s), while the ***Comparative*** Plane establishes *relative identities* (alikeness) with respect to other situations.

Planes of the Space of Information as Building Blocks of Utterances

1. The ***Aspectual*** Plane determines the "way of being" of the situation in question or that of its participant(s), while the ***Modal*** Plane links the expressed *posed* situation to the tacit *preposed* one.

2. The ***Spatial*** Plane locates the situation in question within the space of its environment (world) while the ***Temporal*** Plane provides anchoring information which relates the time of the situation to that of the speech situation.

Planes within the Three Spaces of Information Structure in Natural Language Utterances



Sorts of Linguistic Information and Context Dependency in Natural Language Utterances

Meta-information

PERSPECTIVE
Shift

Ortho-information
Situation

PARTIALITY
Expand vs. Contract

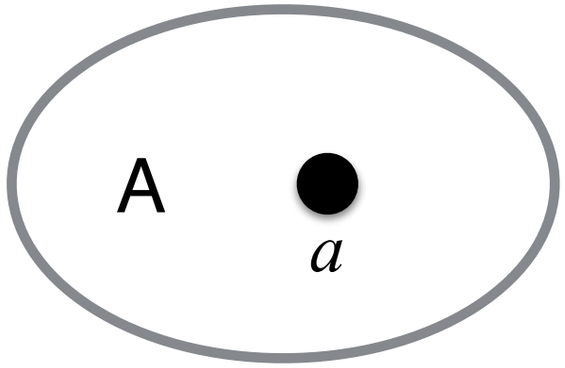
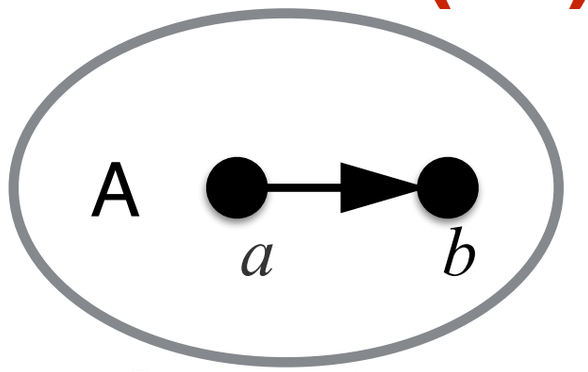
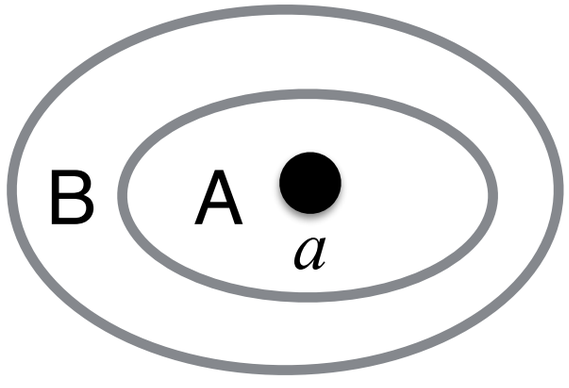
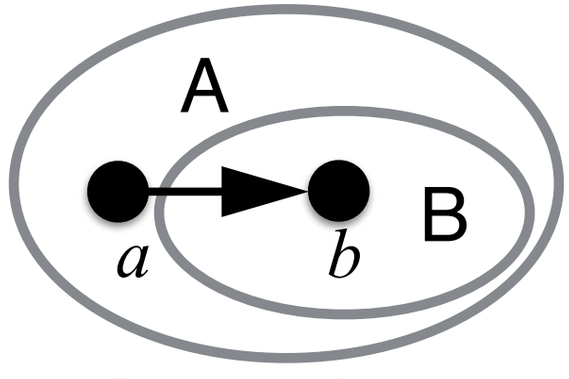
APPROXIMATION
Push vs. pop

Para-information

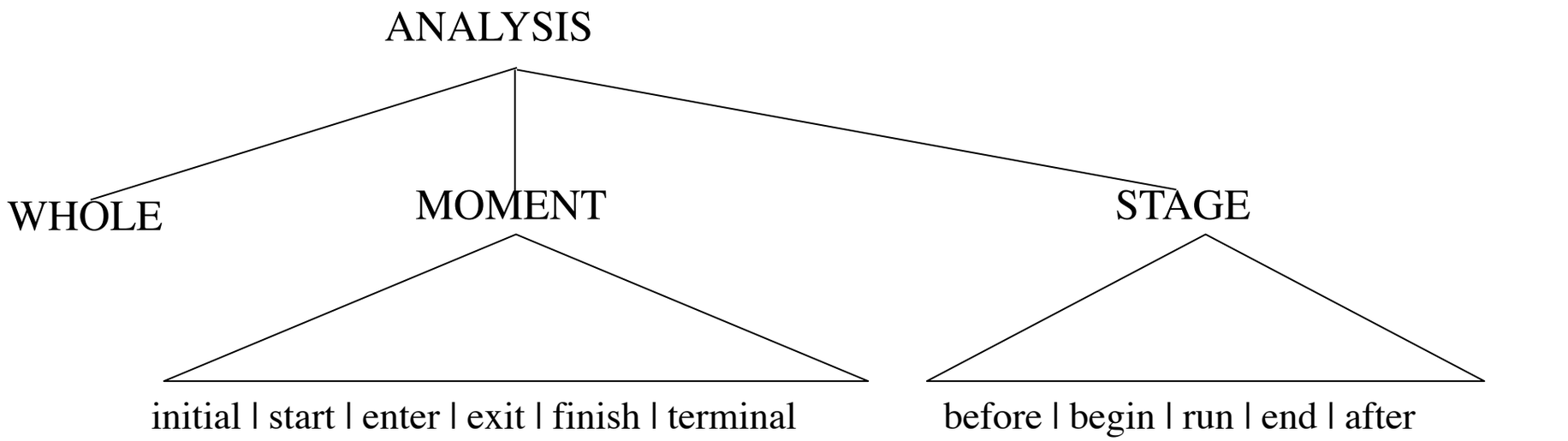
PERSPECTIVE
Shift

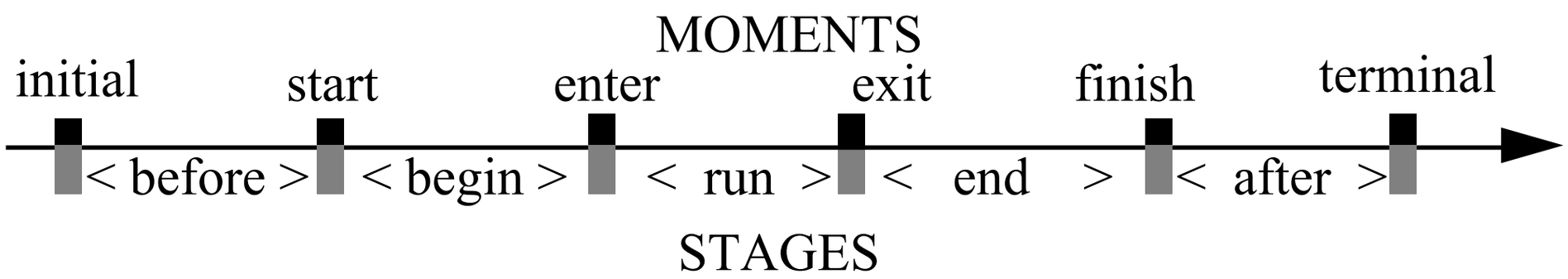
PARA-INFORMATION

Meta- and Para-information

	Identity	
complexity	***Absolute***	***Relative***
simple	ø *a* **wa**  ***Indication*** $a \in A \parallel a = a, sel\ a$	**also** *a* **(de) mo**  ***Comparison*** $\{a,b\} \in A \parallel a =_{\phi} b, sel\ a$
embedded	**just, precisely** *a* **koso**  ***Insistence*** $a \in A, A \subset B \parallel a = a, sel\ a$	**even** *a* **(de) sae/sura**  ***Concession*** $a,b \in A,\ a \notin B, B \subset A \parallel a =_{\phi} b, sel\ a$

ANALYSIS PARAMETERS OF SITUATIONS
for description of Aspect
INTERNAL VIEW

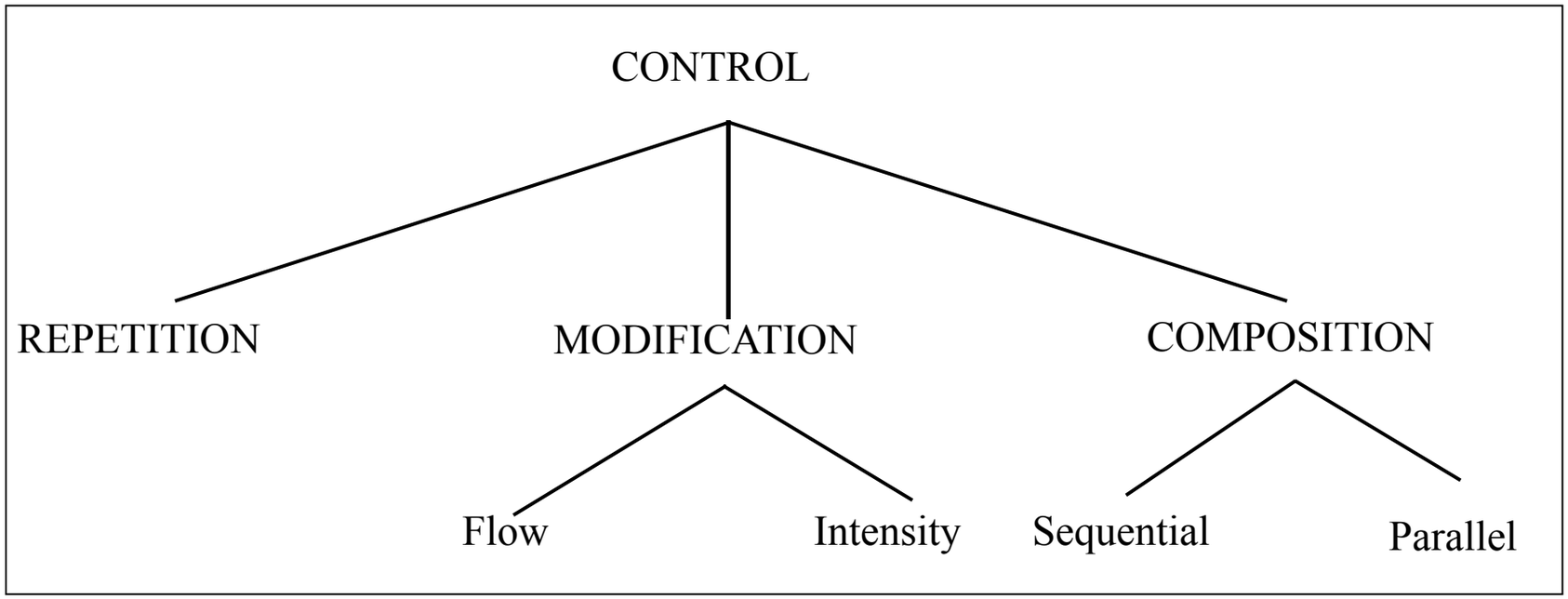




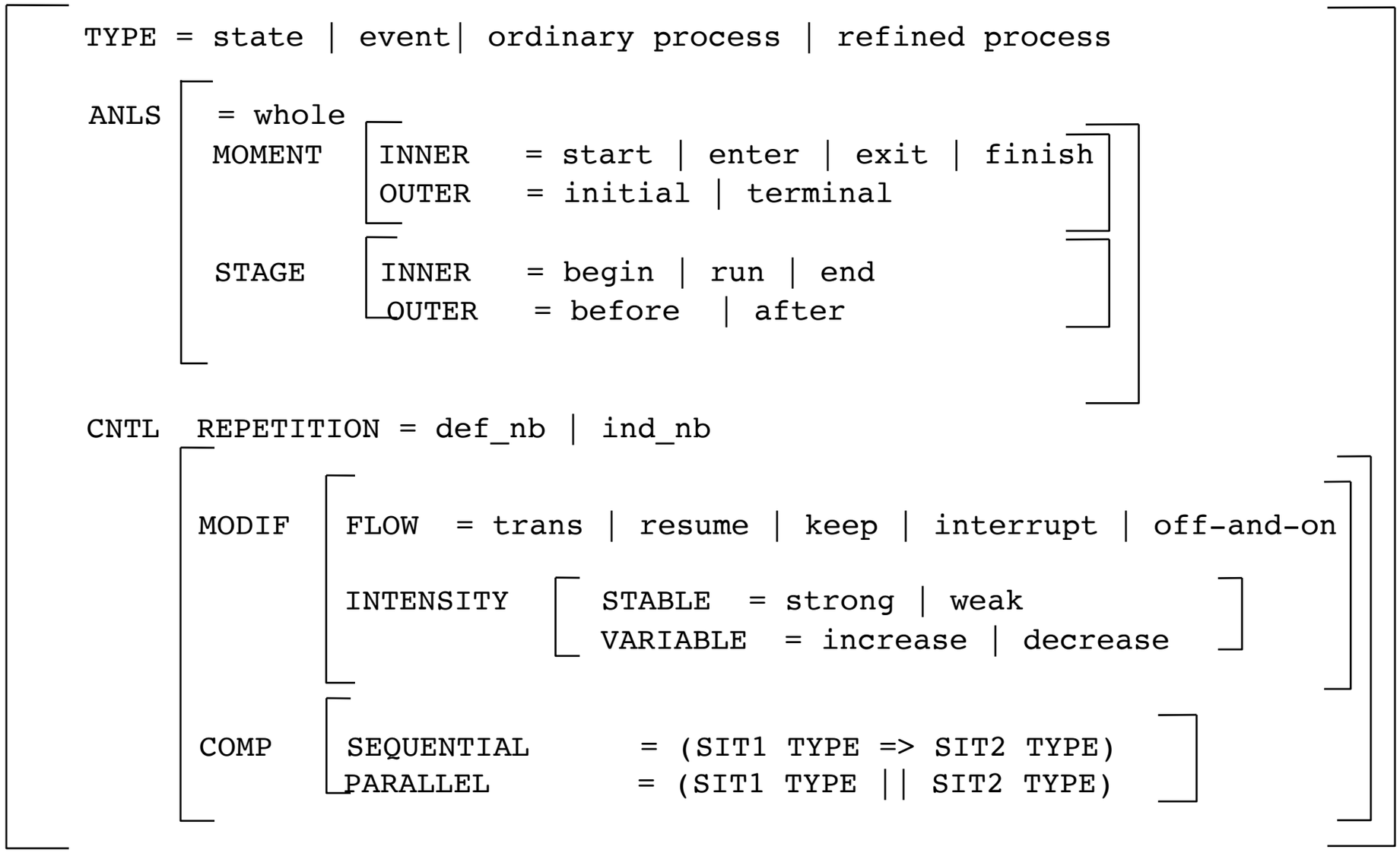
CONTROL PARAMETERS OF SITUATIONS

for description of Aspect

EXTERNAL VIEW



SEMANTIC FEATURE STRUCTURE COMPONENTS OF ASPECT



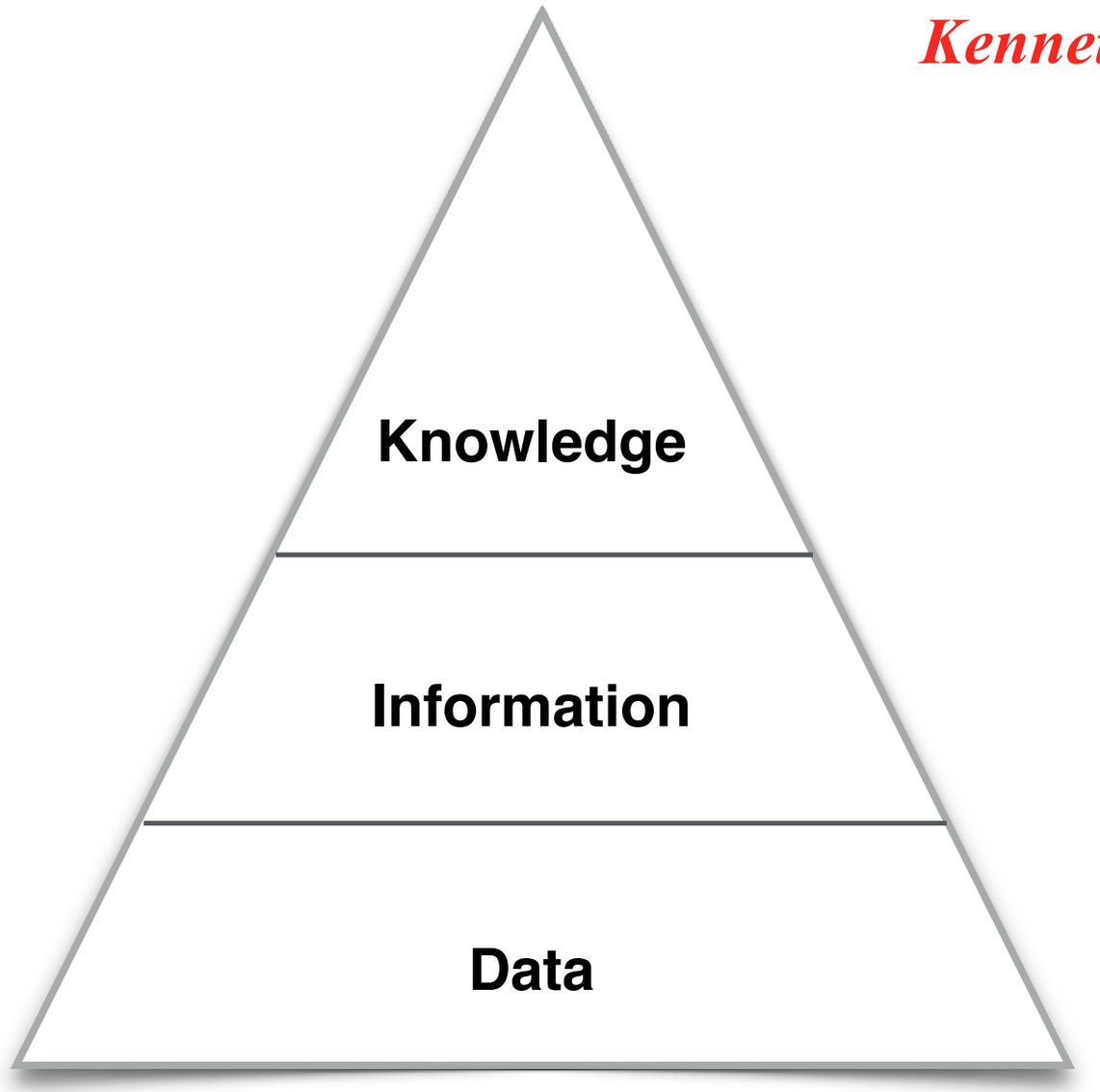
MODALITY marked as PARA-INFORMATION

	EPISTEMIC	DEONTIC	ALETHIC	CONATIVE
PREPOSED **Prediction** Implicature	***Premise***	***Cause***		***Objective***
	Sources: - hearsay - speculation - deduction	**Sanction:** - punishment - reward	**Origin:** - nature - experience **Means:** - order	
POSED **Predicted** Explicature	***Conclusion***	***Effect***		***Result***
	- certain - doubtful - ruled out	- obligation - permission	- necessity - possibility - contingency	

The DATA -INFORMATION-KNOWLEDGE (DIK) Hierarchy of Knowledge at Work

Knowledge Hierarchy DIK

Kenneth Boulding (1955)



"Typically information is defined in terms of data, knowledge in terms of information...".

Rowley, Jennifer (2007). "The wisdom hierarchy: representations of the DIKW hierarchy". *Journal of Information and Communication Science*. **33** (2): 163–180.

DIK and "Centralised Nervous Systems"

Code

Data output device →

information

Information synthesis →

Chunks of knowledge

Knowledge integration →

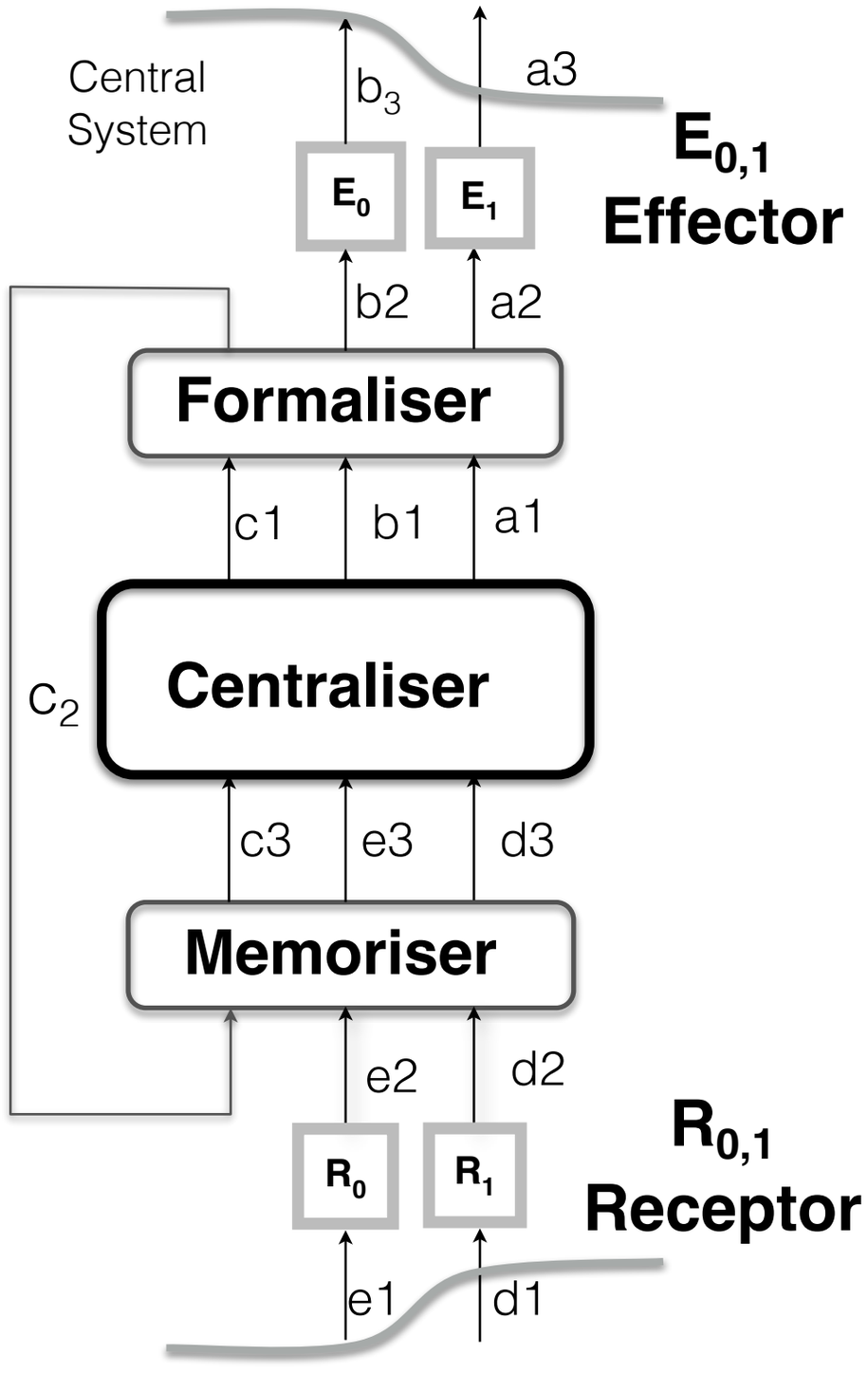
Chunks of knowledge

Information analysis →

information

Data input device →

Code



Greniewski Henryk (1965 & 1968)

The DIK Hierarchy at Work

COMPLEX GRANULE

intent
type
extent
token

Information Flow Logic
Jon Barwise & Jerry Seligman

intent
features
extent
object

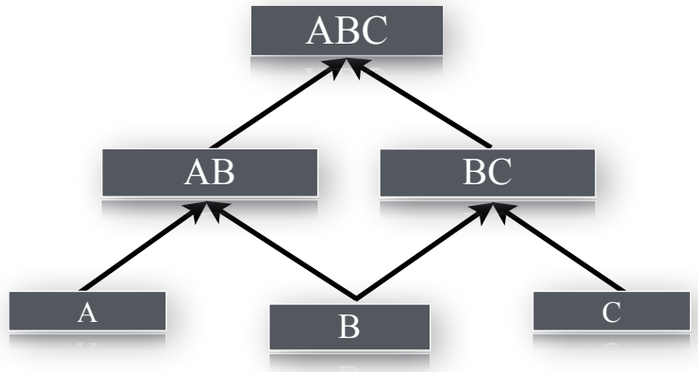
Formal Concept Analysis
Rudolf Wille

intent
atributes
extent
objects

Rough Set Theory
Zdzisław Pawlak

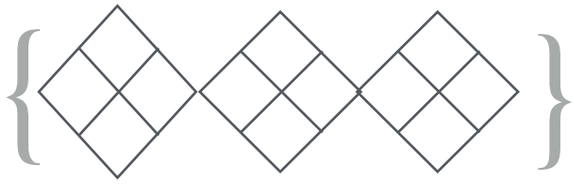
GRANULE

Integrating



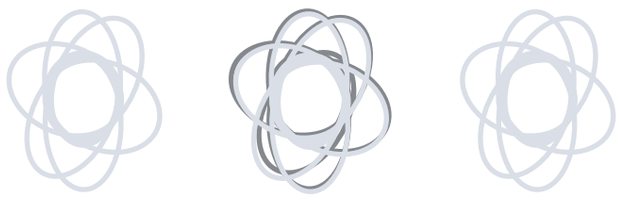
Complex Distributed Systems

Scaling



Binary Centralised Systems

Identifying



Multi-valued Systems

MACRO

Higher Layer Information Components

Encapsulation

FORMAL CONCEPT

Emergence

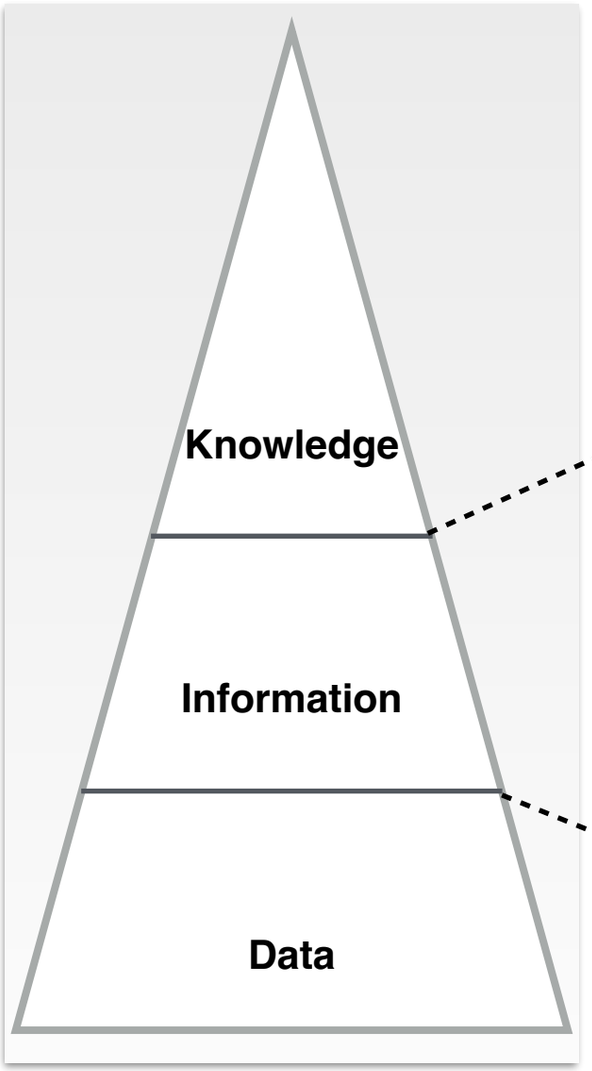
Lower Layer Information Components

MICRO

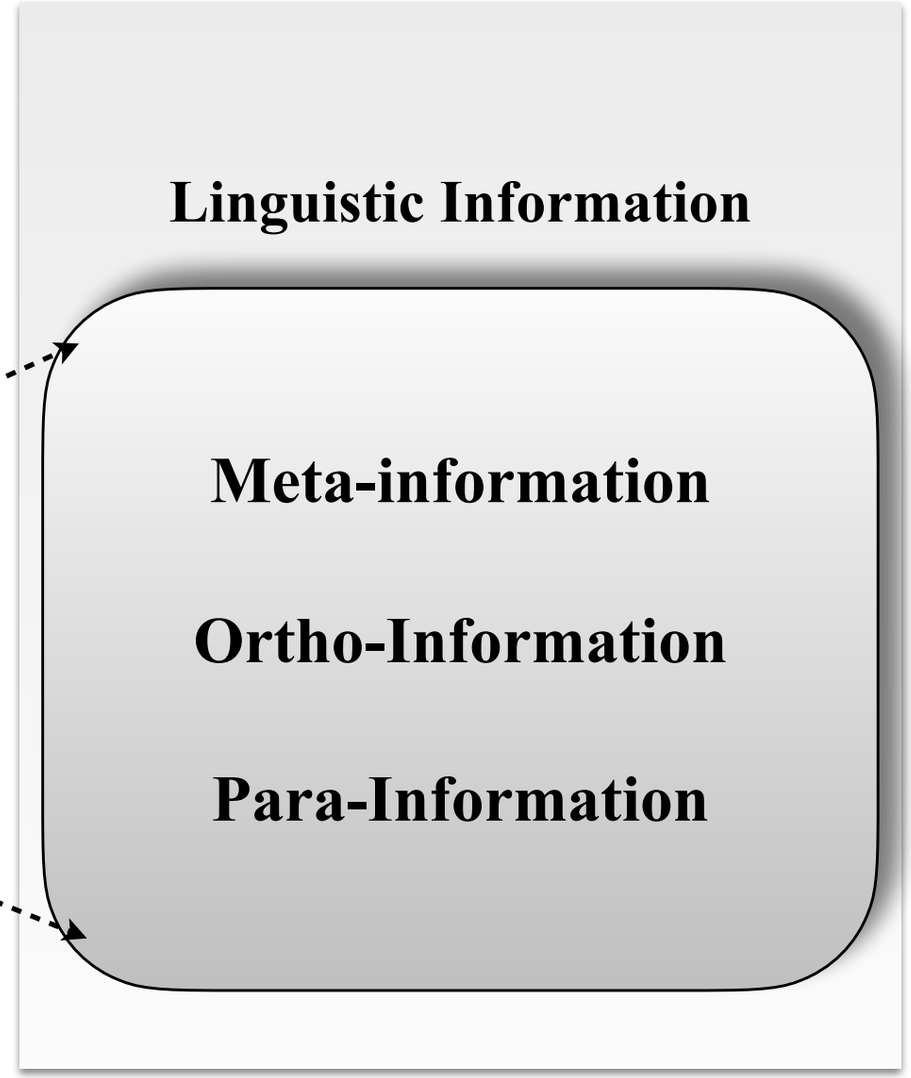
Source: A. W.

The Data-Information-Knowkedge HIERARCHY and Linguistic Information STRUCTURE within it

DIK Hierarchy



Information Structure Triad

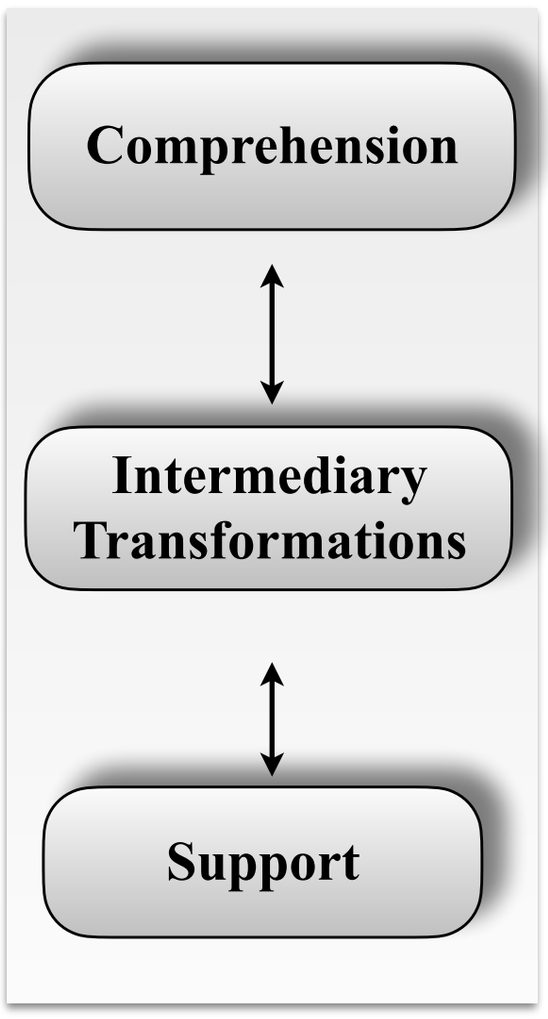


Knowledge Engineering

Conceptual Linguistics

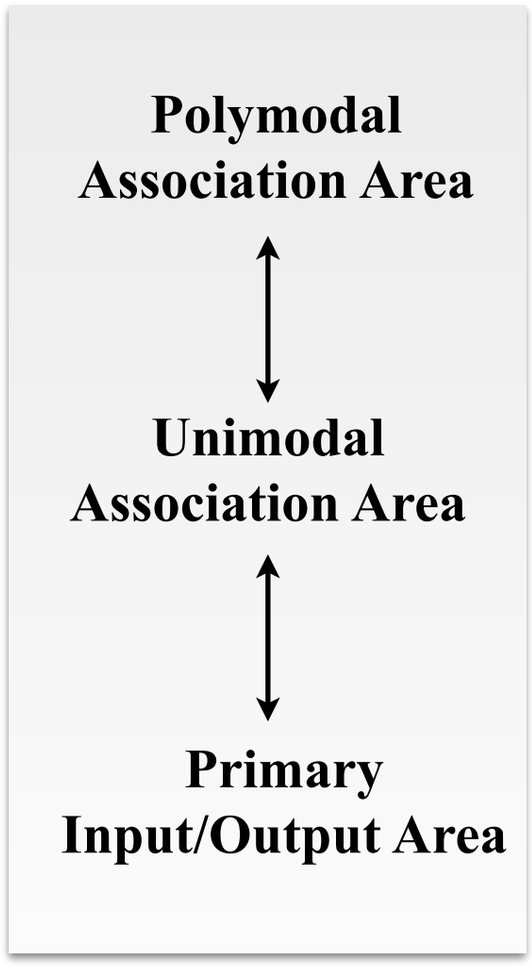
The DIK Hierarchy is universal

Qualitative Theory of Information



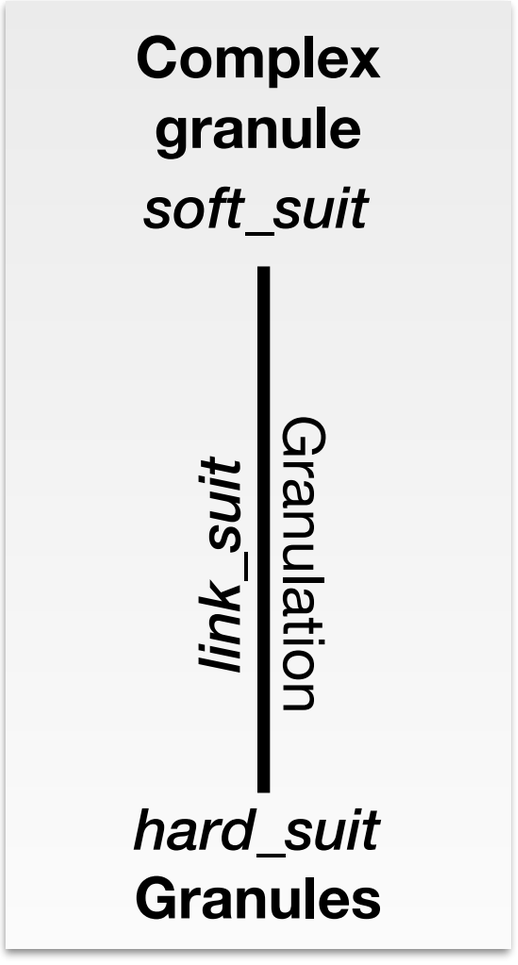
Cybernetics

Theory of Brain Cortex



NeuroScience

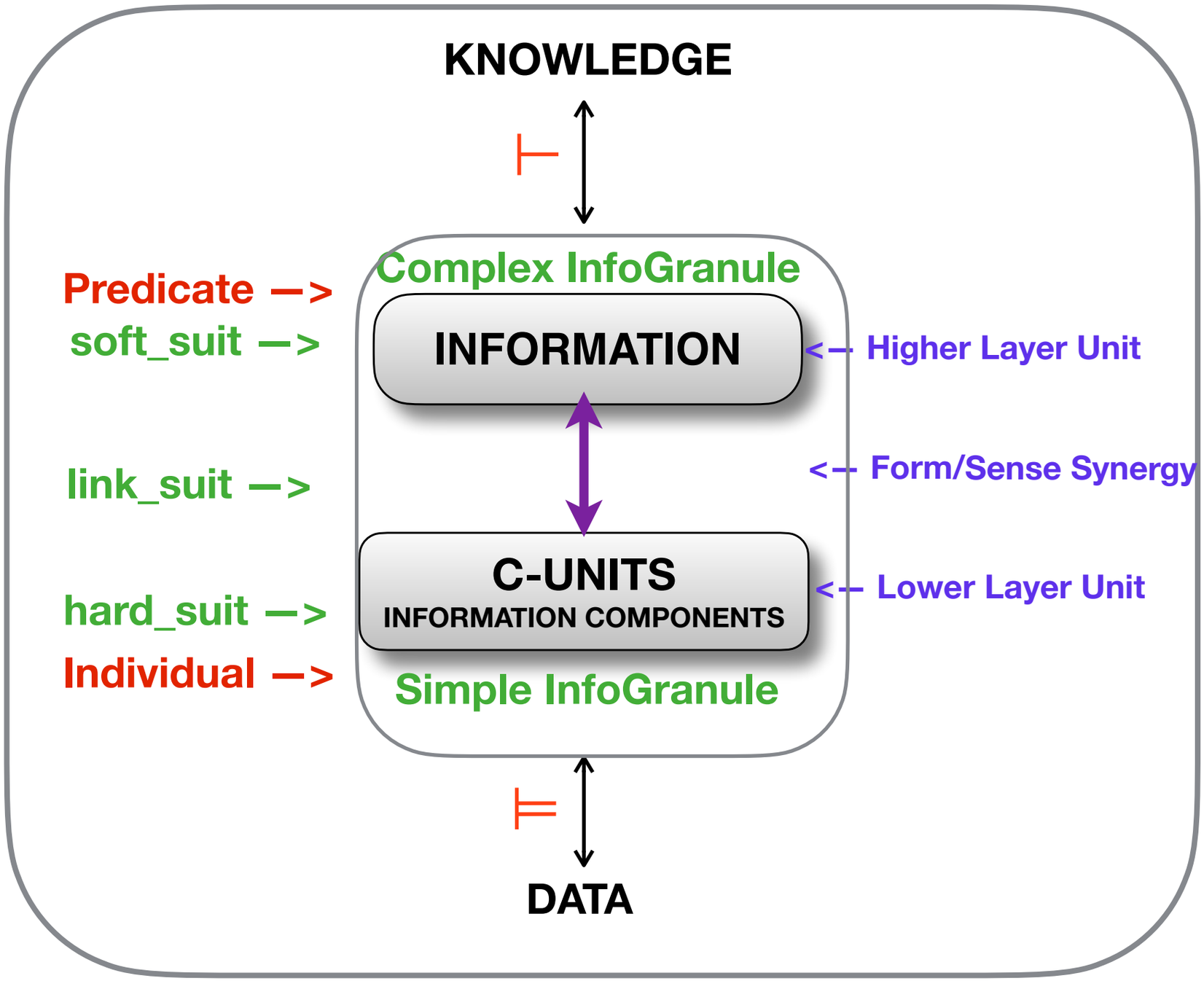
Granular Computing



Computer Science

The Data-Information-Knowledge (DIK) Hierarchy

Two-Layered Model of Information Formation

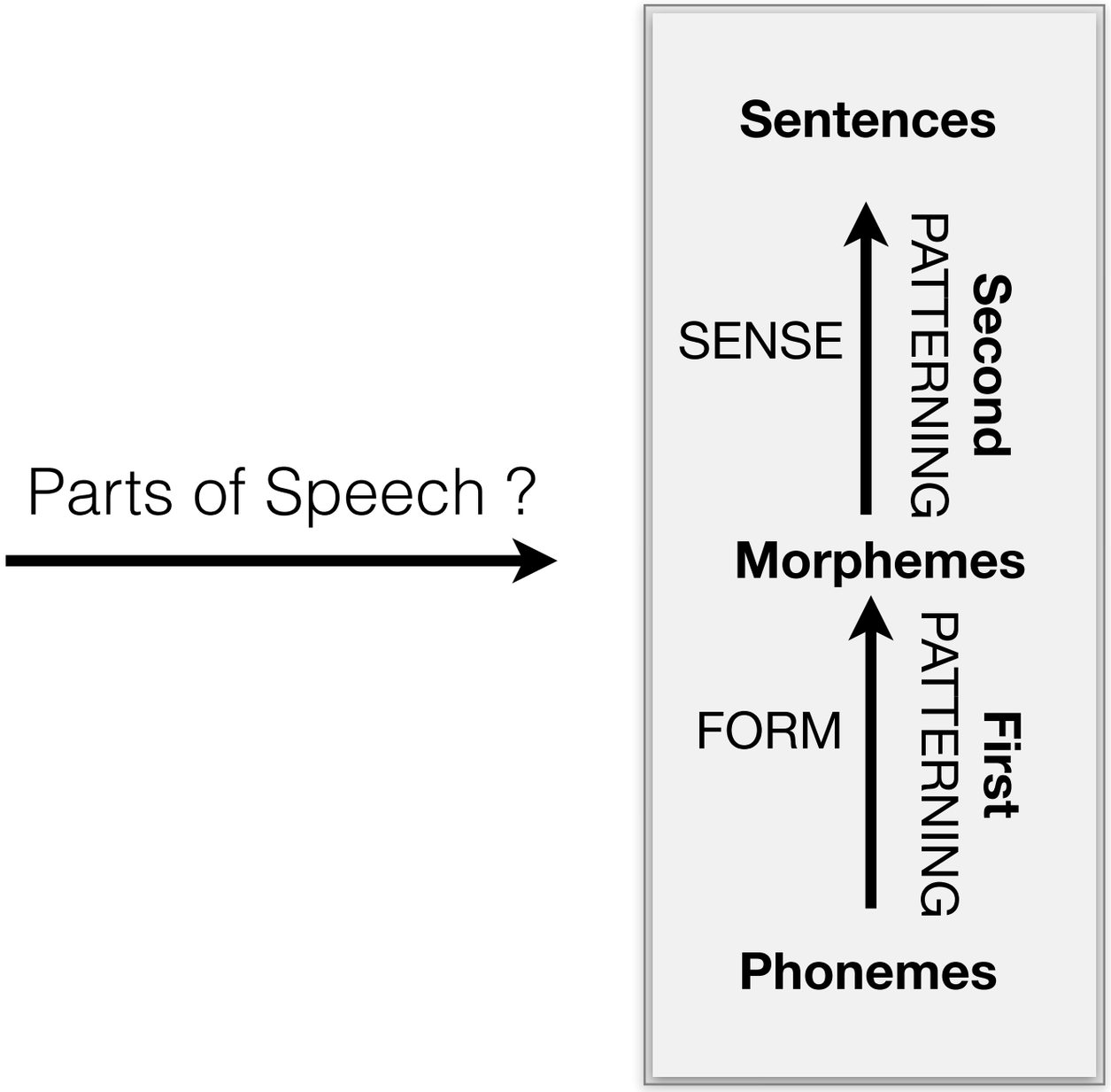


In red: *First Order Logic terms*

In green: *Granular Computing terms*

In violet: *Conceptual Linguistics terms*

DOUBLE PATTERNING of LANGUAGE UNITS



Structural Linguistics

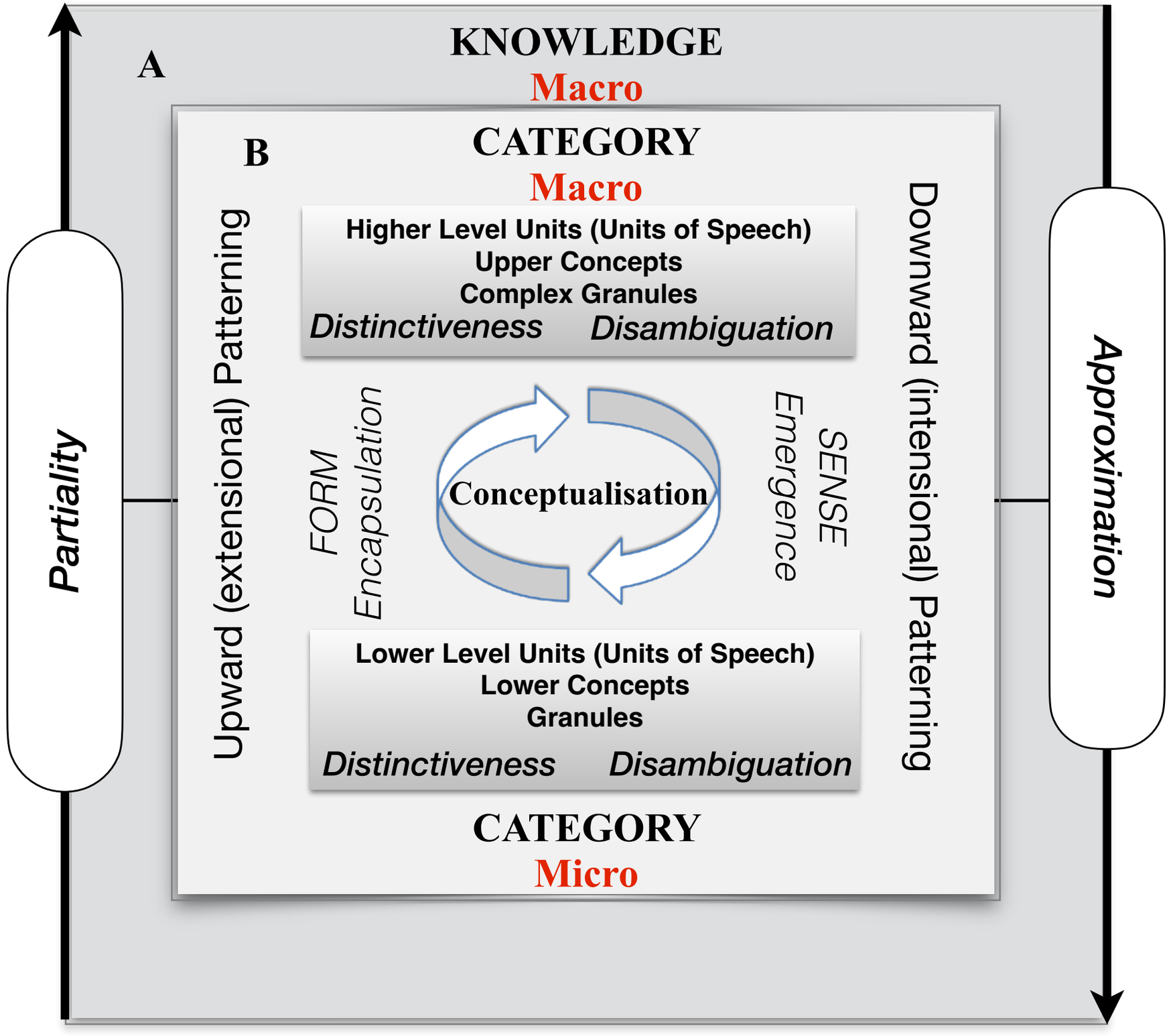
EMBEDDED CONCEPTUAL INFORMATION and PAIRWISE PATTERNING

A Generalised Hypothesis

The box B contains

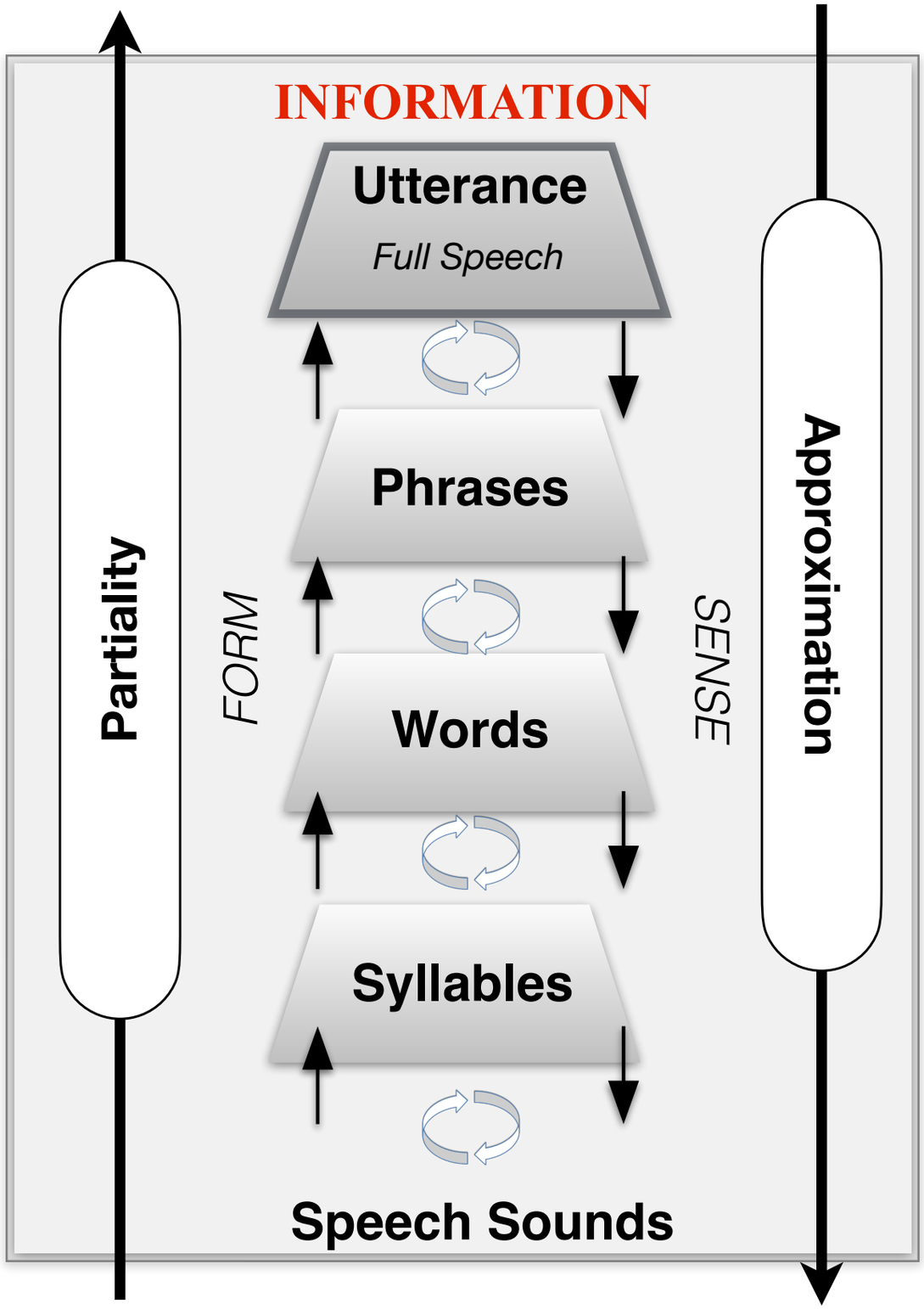
Information

for the box A



Partiality and approximation are context dependency operations

LANGUAGE PAIRWISE CONCEPTUAL PATTERNING

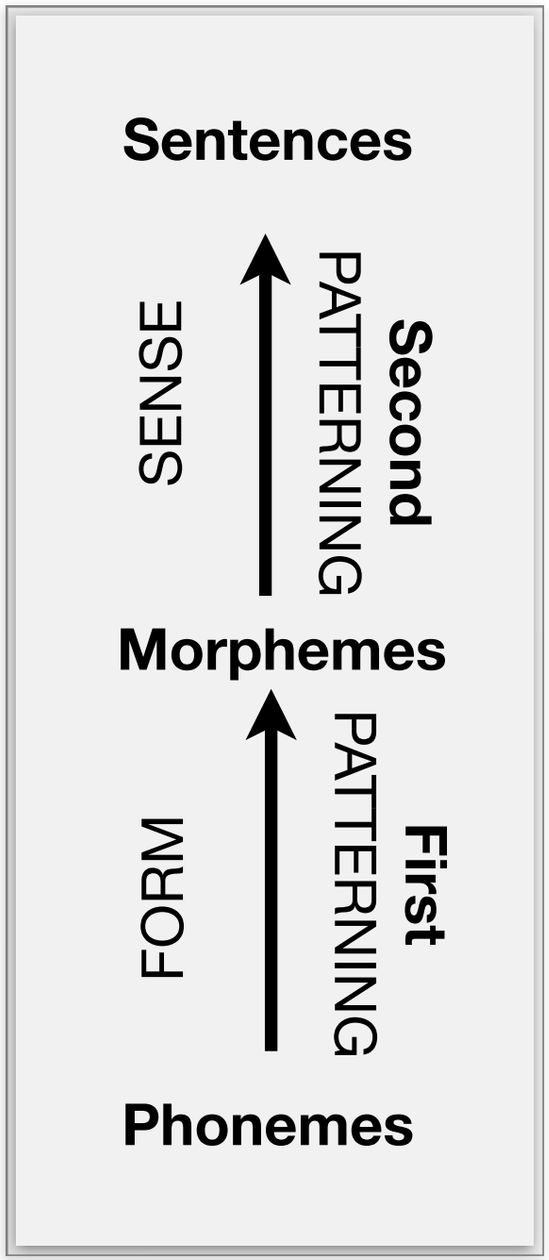


Source: André Włodarczyk

LANGUAGE UNITS PATTERNING

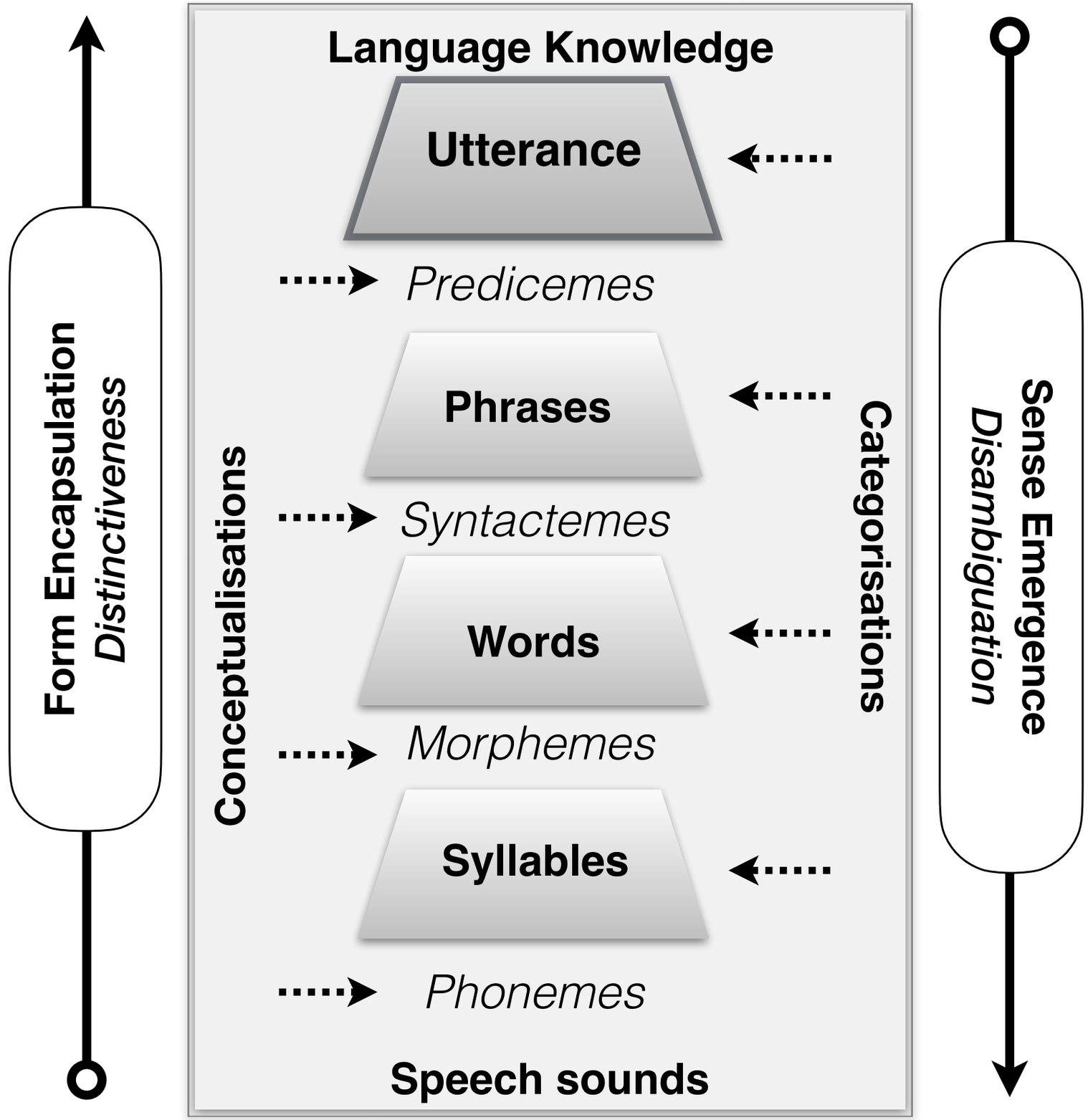
Structural Linguistics

DOUBLE PATTERNING



Conceptual Linguistics

MULTI-LAYERED FORM-SENSE PAIRWISE PATTERNING



Source: André Włodarczyk

What should Social Sciences be ?

Claude Lévi-Strauss: "*social sciences* will be **structural** sciences or will not be"

Jean Petitot: "*social sciences* will be **natural** sciences or will not be"

Let us interpret J. Petiot's wording**:** social sciences *will be*

a. ***transdisciplinary****,*
b. ***experimental*** *and*
c. ***mathematically tractable*** or *will not be*.

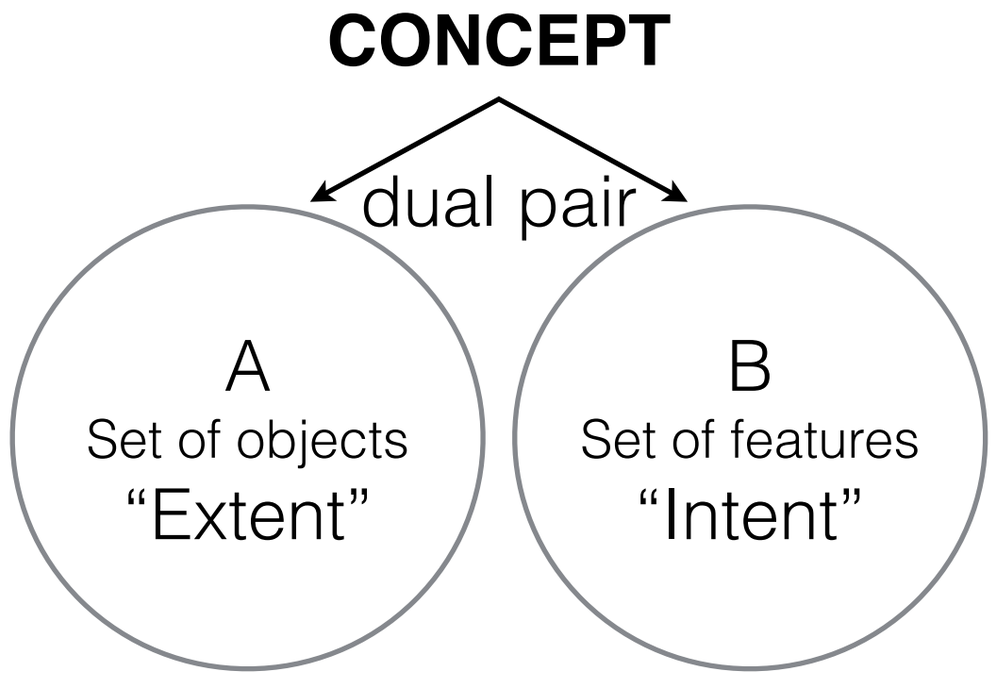
Thank you
for your Attention

FORMAL CONCEPT

Concepts and Utterances

That concepts **inform** (make sense) comes out of the activation/creation of **multi-dimensional** alignements between semiotic and non-semiotic categories (monoids).

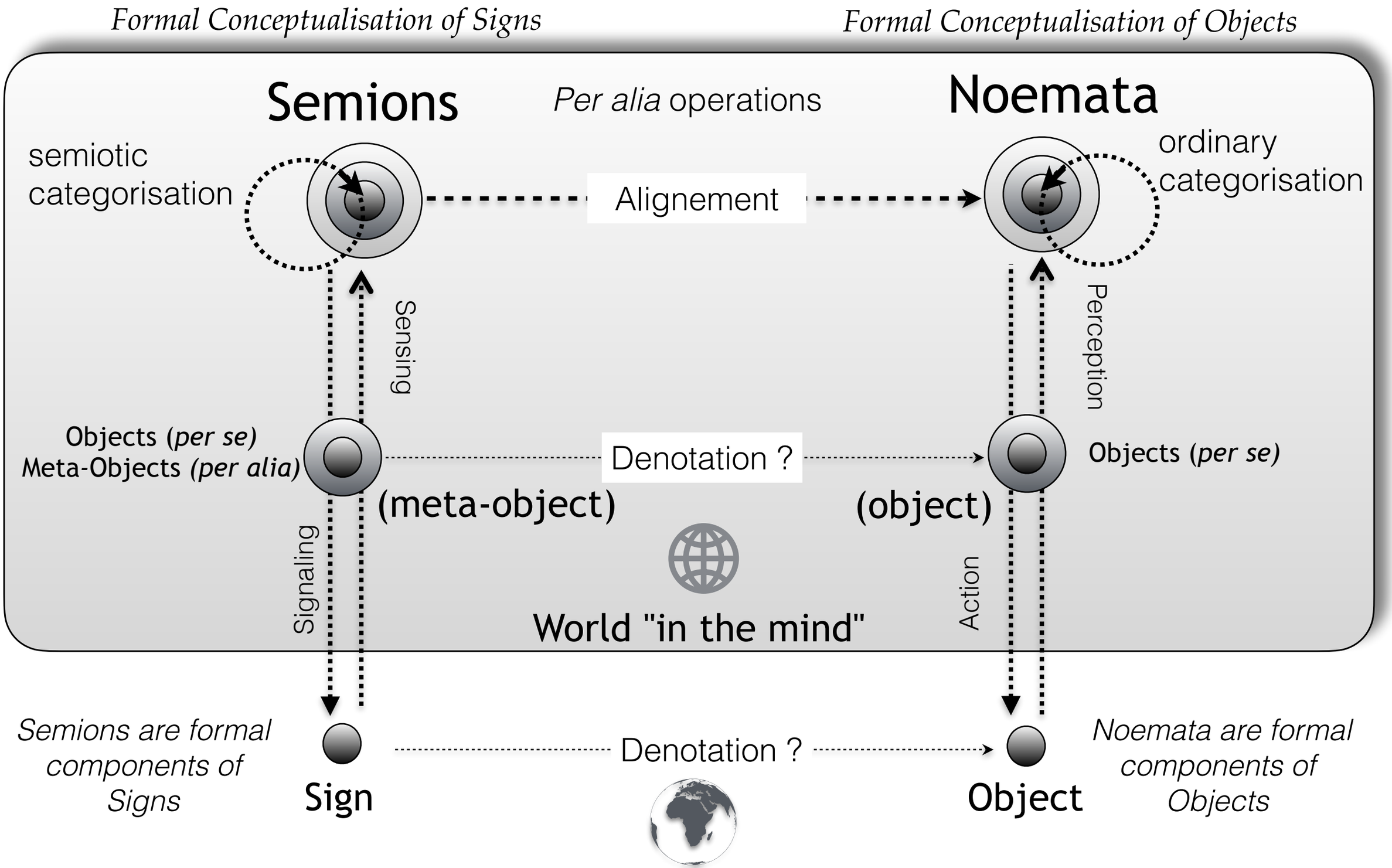
What are (Formal) Concepts ?



f(A) = B and g(B) = A

Galois Connection

Semiotic and Ordinary **Formal Concepts** as Core Components of Categories



Terminology

- The term „semion“ (from the Greek word σημεῖον = „sign”) seems to have been coined by S. K. Šaumjan (1916 - 2007).
- The term „noema“ (from νόημα = „thought” or „what is thought about”) has been coined by Edmund G. A. Husserl (1859 - 1938). It appeared in opposition to ὄνομα = „name” coined by Aristotle (384-322 BC).

Natural Language Processing

- Control System across Utterance Unit Layers -

Order of Major Tasks	Major Tasks	
	FORM Encapsulation	**SENSE Emergence**
1	use category construction **rules**	select utterance subject
2	match ready-made schemes	adjust the subject to the scheme
3 optional	use scheme recombination **rules**	change the subject or emphasise it