Ontological dependences between classes:

Their expression in the ILC

Claudio Gnoli

Ibersid 2026. Current developments in ILC, Zaragoza & online, 1 Oct 2026

Phenomenon-based classification (Gnoli et al. 2024)

- Lists phenomena (stars, plants, games...) instead of disciplines
- Is it essentialist ? (Thellefsen 2025)
- It depends on what you mean (Gnoli 2026)
- “under-theorized ontological foundation” (Dewi et al. 2026)
- So let us provide it...

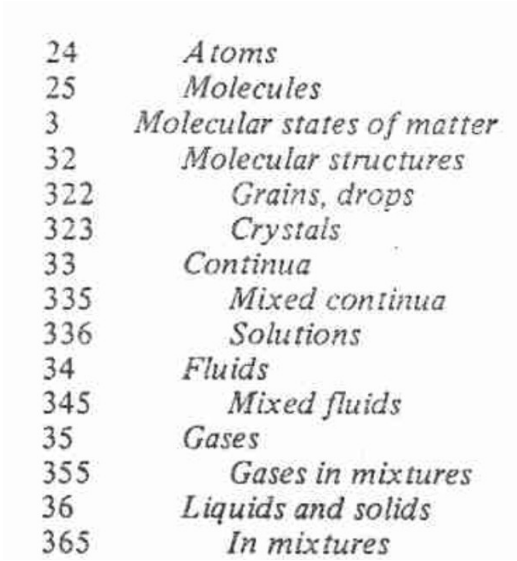
Integrative levels (Needham; Feibleman; CRG)

- Broad classes of phenomena
- emerged from integration of simpler phenomena
- giving rise to novel properties

- e.g.
  molecules → bulk matter
  ~~*cold, liquid*~~ *cold, liquid*

Integrative levels as main classes

- atoms
- molecules
- bulk matter
- cells
- organisms
- agency
- ...



24	*Atoms*
25	*Molecules*
3	*Molecular states of matter*
32	*Molecular structures*
322	*Grains, drops*
323	*Crystals*
33	*Continua*
335	*Mixed continua*
336	*Solutions*
34	*Fluids*
345	*Mixed fluids*
35	*Gases*
355	*Gases in mixtures*
36	*Liquids and solids*
365	*In mixtures*

Integrative levels as subclasses

- agency
  - reflexes
  - hereditary coordinations
  - fixed action patterns
  - behavioural sequences
  - life habits

Wikimedia CC-BY-SA Per Harald Olsen

  - **Also subclasses of rocks, of language, of polities**

Many subclasses are not levels (Hjørland 2026)

- **animals**
  - sponges
  - flatworms
  - molluscs
  - arthropods
  - chordates

Wikimedia CC-BY B. Picton & public domain

Molluscs are not made of flatworms…
So what is their relationship?

(Generic) ontological dependence

- **A class cannot exist without prior existence of another class:**

  bulk matter ← molecules
  languages ← organisms

  - **constitutive** sculpture ← wood
  - **efficient** rivers ← rain
  - **formal** plants ← genes

Evolutionary processes

- Variation
- Replication (formal dependence,
  through memories: genetic, neural, linguistic)
- Selection (efficient dependence)

Phenomena as 4-dimensional *perdurants* (things/processes)
Classes of phenomena evolve in time.

Genealogical dependence

A formal dependence between classes of phenomena in an evolutionary lineage

- flatworms <~~ (ancestor)
- molluscs <~~ (ancestor)

ILC assumes that all classes of phenomena have originated from other classes

Monism vs. pluralism

classificatory monism vs. pluralism (Hjørland)

metaphysical monism: one world, with
ontological pluralism: levels have emergent properties (Hartmann)

- emergentism monism (Peacocke 2014)

Wikimedia CC-BY-SA Navywalrus

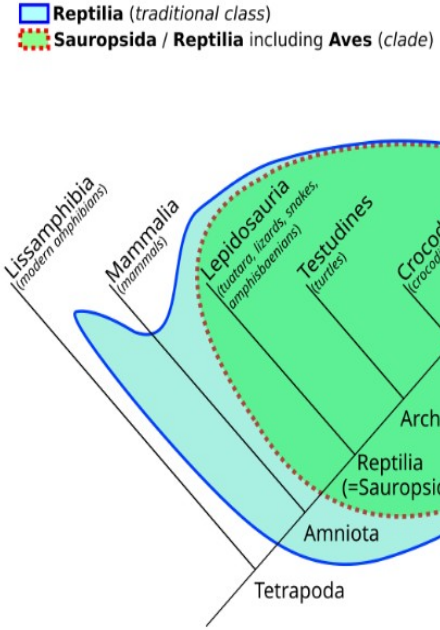
Genealogical classifications

(1) group phenomena that are similar
a newborn squid is grouped with squids

(2) group phenomena that have a common origin
a new squid variety is grouped with squids

1 and 2 sometimes conflict, *e.g. birds & crocodiles.*

1 may be replaced by 2 as knowledge progresses:
bats and sparrows get separated (non-essentialism)



Genealogical classifications

- (3) place new types according to their degree of difference:

  new class or

  new superclass or even

  new integrative level

Integrative levels are top classes originated from previous levels by constitutive + formal dependence

Order within arrays

- **animals**
  - sponges
  - flatworms
  - molluscs
  - arthropods
  - chordates

- **(4) a class is listed after pre-existing same-rank classes**
  (Ranganathan's "later-in-time", "later-in-evolution")

Order of integrative levels and subclasses

f molecules

k biopolymers ← *f*

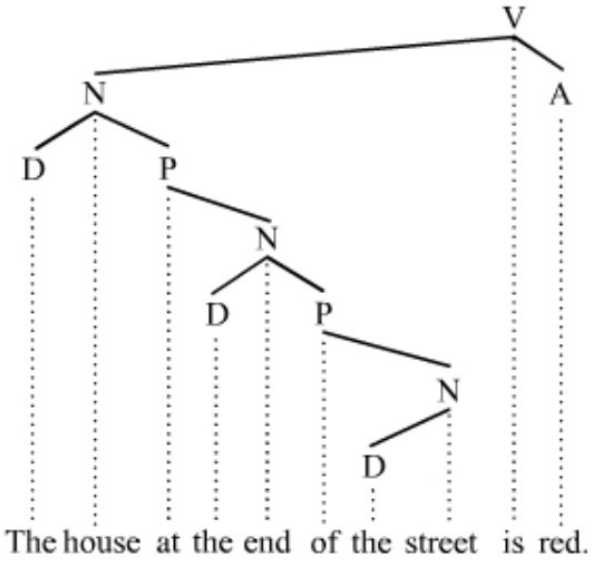
l cells ← *k*

…

q languages

qo words

qp phrases ← *qo*



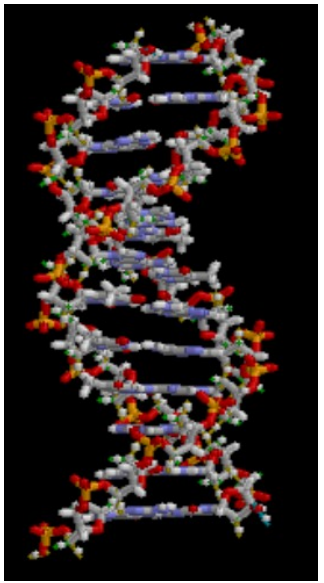
(4a) Specification

"After" does not mean "immediately after":

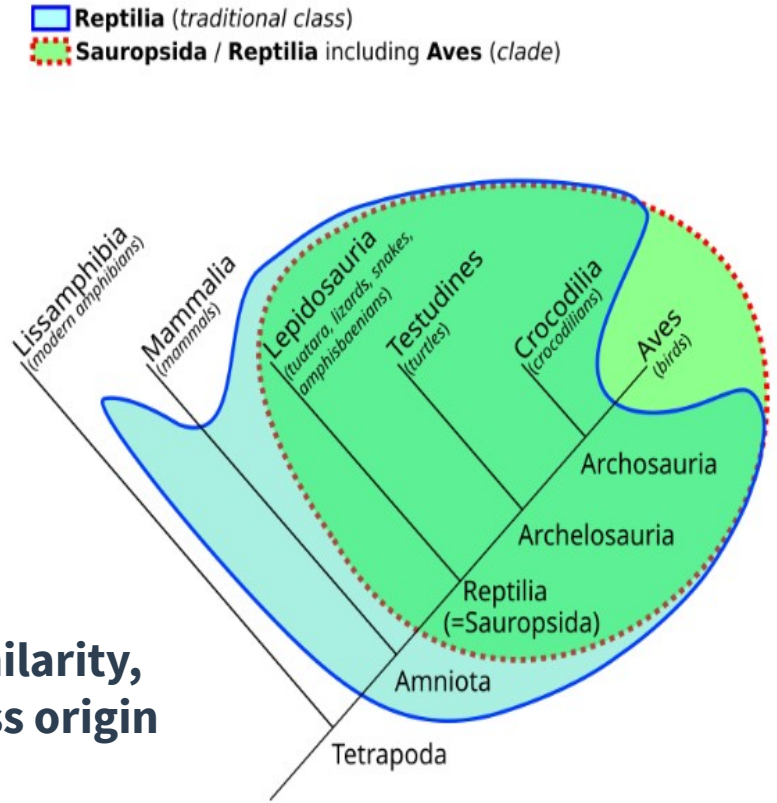
…

f molecules
g bulk matter ← *f*
h celestial objects ← *g*
i rocks ← *gssu*
j landforms ← *i*
k biopolymers ← *f*
l cells ← *k*

…



Origin trees hide similarity, and vice versa (Hull 1988)



ILC schedules privilege similarity,
”←” cross references express origin

(4b) Specification

Principle 4 only olds in same-rank arrays

j **landforms**
jw **islands**
jwt **atolls** ← ***mqdc***
…
m **organisms**
mqdc **anthozoa**

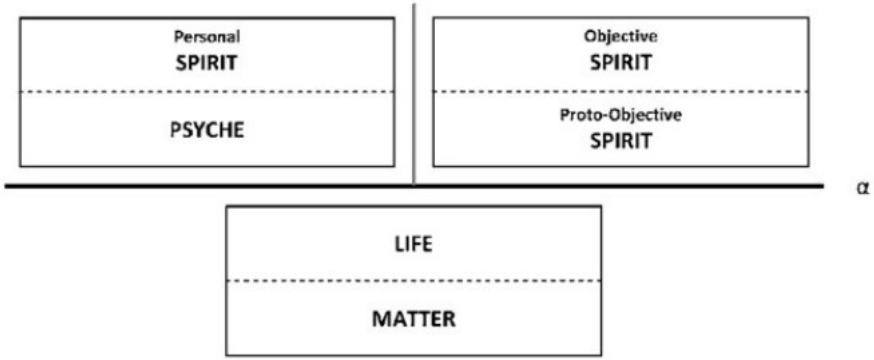
Informational strata

Triggered by new kinds of memory (Jacob 1976)

a-c	**information**	
d-j	**matter**	
k-n	**life**	(genetic memories)
o-p	**mind**	(neural memories)
q-y	**culture**	(linguistic memories)

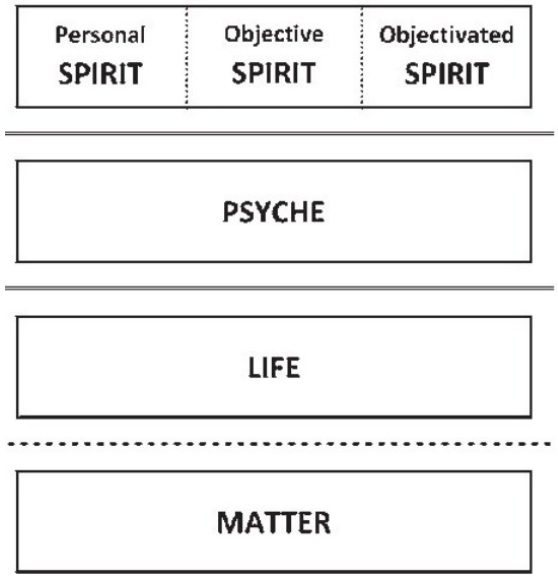
a.k.a. “spirit”, “society”

culture ← mind



Caption

Figure 5.5: Roberto Poli's architecture of levels of reality.



Figure

Caption

Figure ▒.▒: Nicolai Hartmann's architecture of levels of reality.[4]

This figure was uploaded by Michael Kleineberg

Content may be subject to copyright.

First appearance of minds largely precedes culture; e.g. octopuses, eagles have mind though not being social

Integrative levels of culture

- **culture**
  - "sociofacts"
  - "artifacts"
  - "mentefacts"

…But in which order?

Wikimedia public domain

Integrative levels of culture

In the evolution of *Homo*
technology precedes organized civil society

Classes of artifacts are products
rather than enterprises (their agents)

Wikim.CC0 Thirunavukkarasye-Raveendran

Integrative levels of culture

r **raw materials**; primary commodities
s **goods**; finished products; sec. commodities } "artifacts"
t **services**; consumption; tertiary sector

u **social groups**; civil society; institutions } "sociofacts"
v **organizations**; legal entities; owners

w **customs**; uses; habits; lore; tradition; rituals
x **creative arts**; aesthetic expressions } "mentefacts"
y **scholarship**; science; teachings; tenets

Conclusions

- Principles for genealogic classification needs formalization
- Main principles are (1) similarity and (2) common origin
- Origin implies constitutive + formal dependence
- A class is listed after same-rank classes on which it depends
- ILC schedules get more consistent with principles
- Some open questions: “raw materials”, order of mentefacts

Gracias por su atención !

ilc@iskoi.org