Emergence -
A process-ontological approach

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An overview of this talk:

1. The origin

1.1   The beginning of everything: pure logical and physical possibility, not reality

1.2   Primary, minimal difference as the 'starting point' for structural development

1.3   The term 'pandynamis' as the name for a 'tendency toward reality' in the sense of a fixed but evolving structure

1.4   Nomological openness

2. Structural stratification

2.1   The concept of the ontological layer: mutually compatible bundles of types of systems, objects, processes, and states

2.2   The concept of internal differentiation (in German: 'Binnendifferenzierung')

2.3   Determinism as a level-specific restriction, not as an absolute set of rules

2.4   Downward compatibility of all layers, upward freedom for further internal differentiation

2.5   A possible stratification: (1) proto-physical, (2) quantum mechanical, (3) chemical/mechanical, (4) biochemical/biological, (5) symbolic/abstract

2.5   The upward transition problem from one layer to the next

3. The internal worlds of each level of emergence

3.1   What characterizes a type of object and process?

3.2   What is new at each level of emergence: its internal structure of conditions and thus both its qualities, i.e., its stock of possible states, and its information content

3.3   The different manifestations of energy, time, and space at different levels of emergence: materiality, forms of energy, uniqueness of states, separation of entities, spatial and temporal continuity, difference between latency and instance.

3.4   Is artificial intelligence an indication of the emergence of a new level of emergence? Maybe; we still don't know.

A new model
demands new concepts:

In the following I will explain the core concepts of a cosmological model, which assumes the structural openness of the cosmos. From this arises the meaning of the term 'emergence'.

These concepts are:

Essential terms of the emergence model developed here:

1. (Relatively encapsulated **entities**:) **fields**, **objects**, and **systems** (as functional object populations), and furthermore all state changes at these entities and individual processes between the entities.

2. The **structure of conditions** (instead of laws of nature)

3. The **layering of levels** of existence or emergence

4. The **typification** of the emergent layers

5. Different **spaces of possibilities**
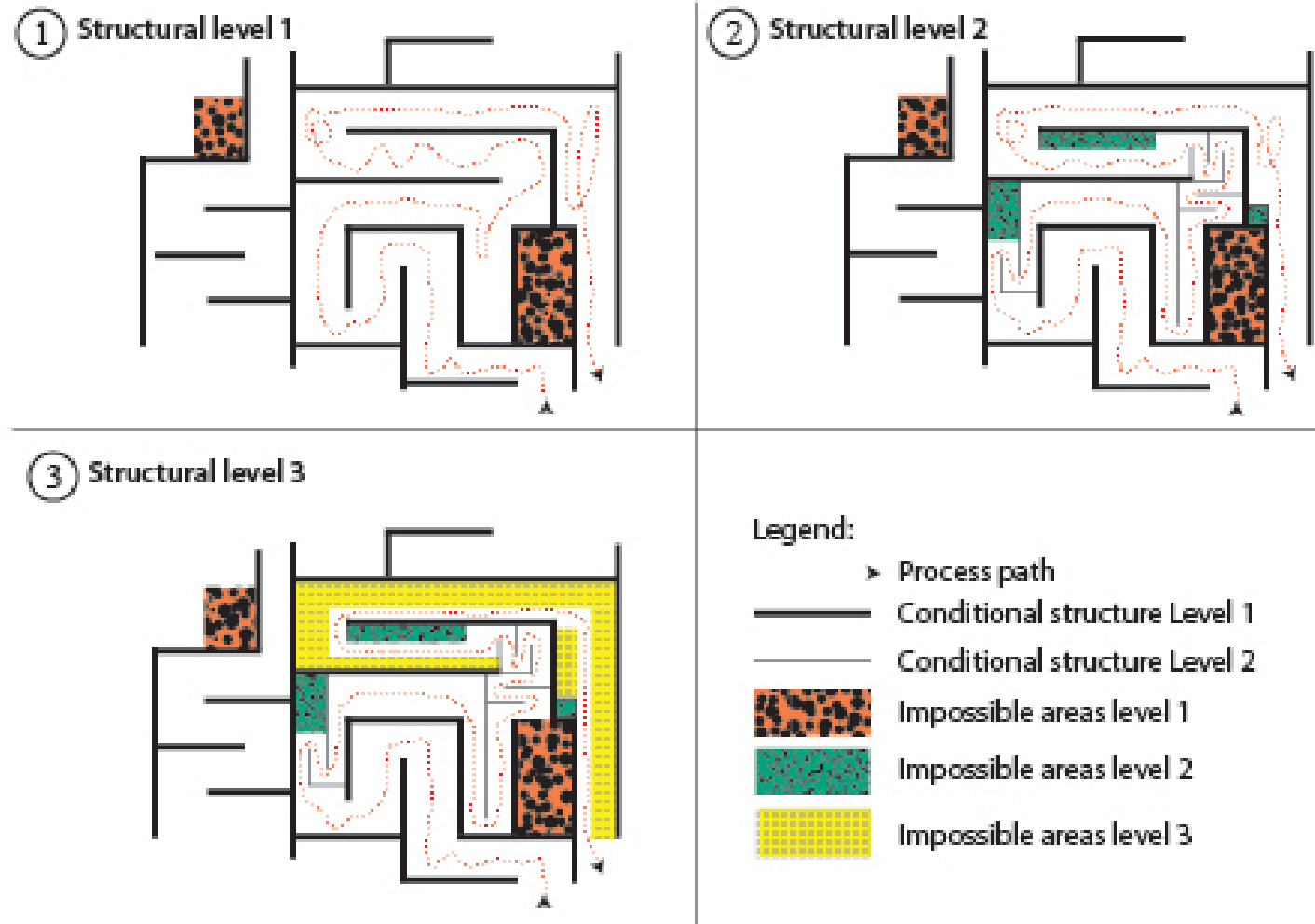
Example 1 of a conditional structure:

A widely known German board game as an example of an evolving structure of conditions

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Phase 1 Phase 2 Phase 3

Phase 4 Phase 5 Phase x (today) Phase y (future)
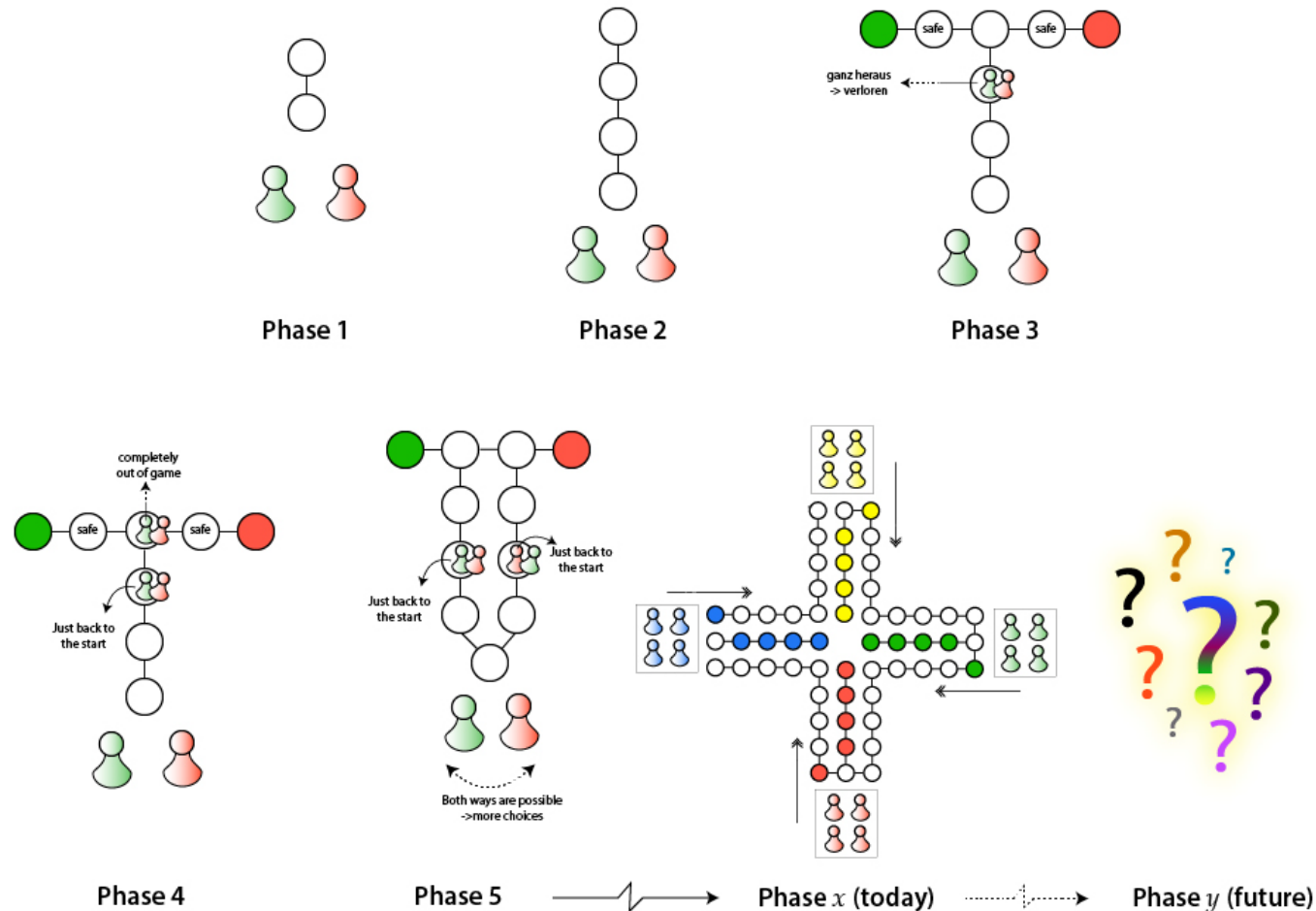
Example 2 of a conditional structure:

Structural development using the example of a labyrinth

① Structural level 1

② Structural level 2

③ Structural level 3

Legend:
- ➤ Process path
- —— Conditional structure Level 1
- — Conditional structure Level 2
- Impossible areas level 1
- Impossible areas level 2
- Impossible areas level 3

Emergence – The Becoming of the New

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The typification of layer elements:

Each emergent level is constituted by a variety of **entity, state, and process types** (for entities: as fields, objects, and systems).

Stabilization of emergent levels requires the elicitation of **compatible** entity, state, and process **types**. A stable **possibility space** is formed within the variance space.

(More on the concept of possibility space in a moment).

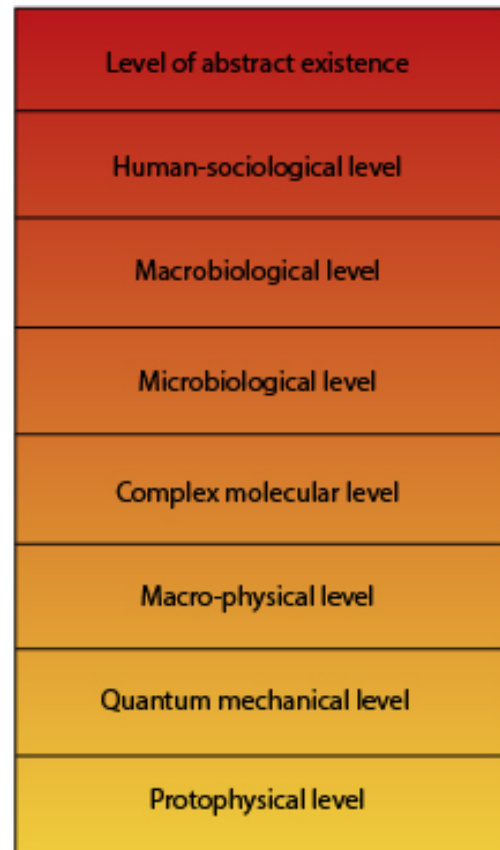# The level-stacked chain of events:

(Example:) "*Stepping on another person's foot*": Chronologically stacked individual events unfold (1) downwards to the root level and then (2) upwards again, changing with every level the coresponding event types.
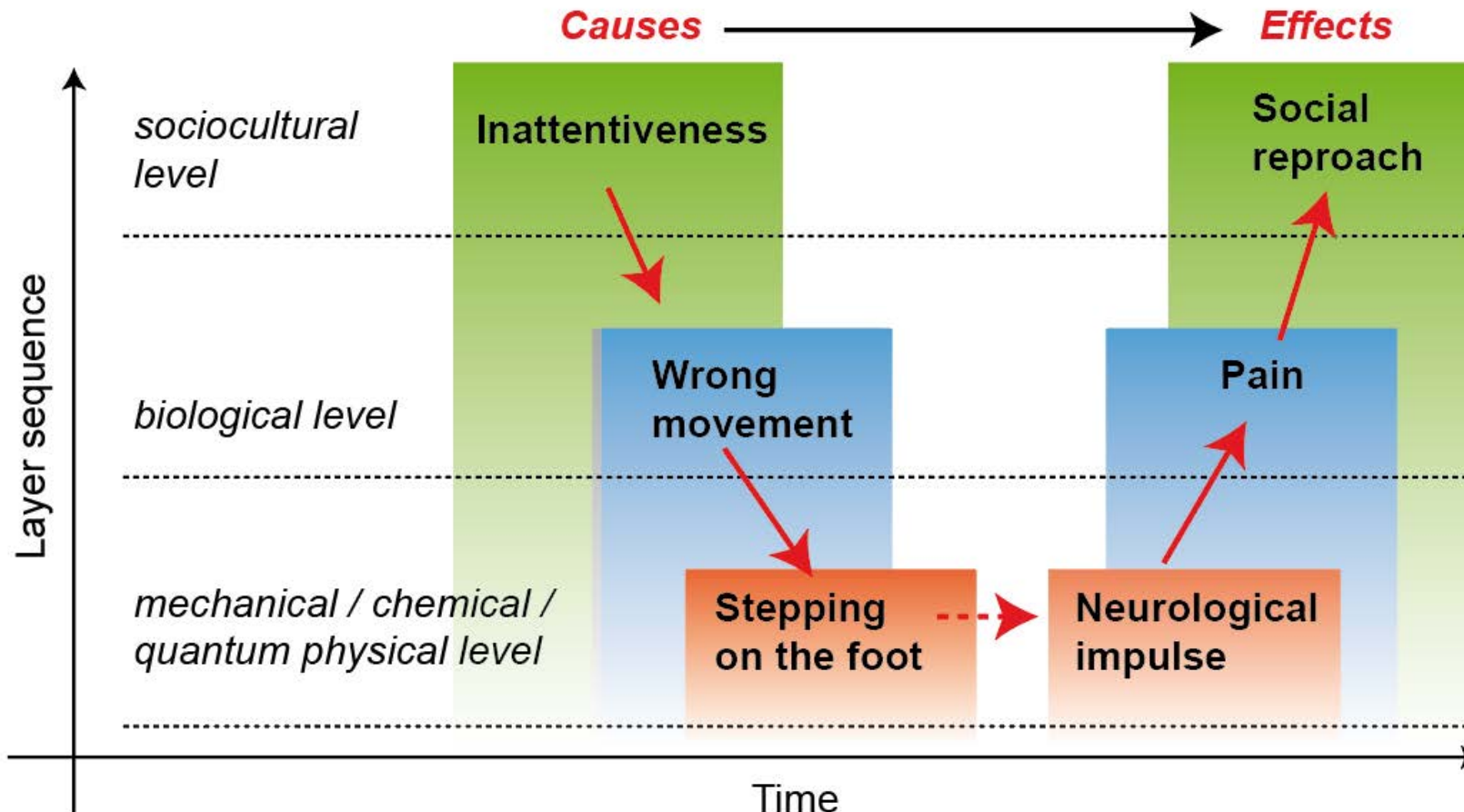
How are the levels of emergence related:

Two models of transition between emergent levels

Too rigid: Simple tier layering

Level of abstract existence
Human-sociological level
Macrobiological level
Microbiological level
Complex molecular level
Macro-physical level
Quantum mechanical level
Protophysical level

(no variety of types, no transitions)

Better: The spiral of development

Thick: stable steps;
Thin: unstable steps

Most stable, but not the most type-rich level in this stage of development

Increasing complexity over time

Variety of types

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