

# Emergent information. A Unified Theory of Information framework

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# Contents

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## 1 Approaches to a Science of Information

1.1 Capurro's trilemma

1.2 Capurro's trilemma resolved

1.3 Accounts of information

## 2 A unified theory (UTI) as backbone of a Science of Information

2.1 Emergent information

2.2 Example: Understanding "Artificial Intelligence" (AI)

## 3 Science of Information and its place in the edifice of science(s)

# 1 Approaches to a Science of Information

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1.1 Capurro's trilemma

1.2 Capurro's trilemma resolved

1.3 Accounts of information

## 1.1 Capurro's trilemma

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	<b>information terms</b>	<b>discussion</b>
<b>synonymy (reduction)</b>	one and the <b>same</b> meaning	false <b>unification</b> attempt (identity)
<b>analogy (projection)</b>	<b>similar</b> meanings	failed <b>unification</b> attempt (identity): what is the standard of comparison?
<b>equivocity (disjunction)</b>	<b>disparate</b> meanings	surrender to <b>diversification</b> (in-/ difference): Babel

## 1.2 Capurro's trilemma resolved

	<b>information terms</b>	<b>discussion</b>
<b>synonymy (reduction)</b>	one and the <b>same</b> meaning	false <b>unification</b> attempt (identity)
<b>analogy (projection)</b>	<b>similar</b> meanings	failed <b>unification</b> attempt (identity): what is the standard of comparison?
<b>equivocity (disjunction)</b>	<b>disparate</b> meanings	surrender to <b>diversification</b> (in-/ difference): Babel
<b>specification hierarchy (integration)</b>	<b>historically-logically connected</b> meanings: reproducing evolutionary steps (emergence)	<b>unity-through-diversity</b> attempt (identity and difference): never-ending process of defining and refining

## 1.3 Accounts of information

	<b>handling...</b>	<b>understanding...</b>	<b>studying information</b>
<b>synonymy (reduction)</b>	<b>objectivism</b>	<b>materialism</b>	<b>externalism</b>
	object of action	material object	third-person study object
<b>analogy (projection), equivocity (disjunction)</b>	<b>subjectivism</b>	<b>idealism</b>	<b>internalism</b>
	subjective action	immaterial action (monistic, dualist)	interpretative action (first-person study)
<b>specification hierarchy (integration)</b>	<b>subject-object dialectics</b>	<b>emergentist materialism</b>	<b>perspective shifting</b>
	subjective/objective	agency/relations	outside/inside

## 2 A unified theory (UTI) as backbone of a Science of Information

	<b>handling...</b>	<b>understanding...</b>	<b>studying information</b>
<b>synonymy (reduction)</b>	objectivism	materialism	externalism
	object of action	material object	third-person study object
<b>analogy (projection), equivocity (disjunction)</b>	subjectivism	idealism	internalism
	subjective action	immaterial action (monistic, dualist)	interpretative action (first-person study)
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	subjective/objective	agency/relations	outside/inside

## 2 A unified theory (UTI) as backbone of a Science of Information

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### **The historical-logical account of information:**

- the meaning of the concept of information has to comprehend both what different manifestations have in **common** and what is **unique** to each of them;
- historical manifestations of information **descend** from earlier manifestations but do **not derive** from them logically;
- each understanding of a **particular** manifestation enriches and extends the **universal** concept.



## 2 A unified theory (UTI) as backbone of a Science of Information

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### 2.1 Emergent information

2.1.1 Cognition – communication – co-operation

2.1.2 Physical, biotic, social information

### 2.2 Example: understanding "Artificial Intelligence" (AI)

2.2.1 Identity of "man"/society and machine

2.2.2 In-/Difference of "man"/society and machine

2.2.3 Identity and difference of "man"/society and machine

## 2.1 Emergent information

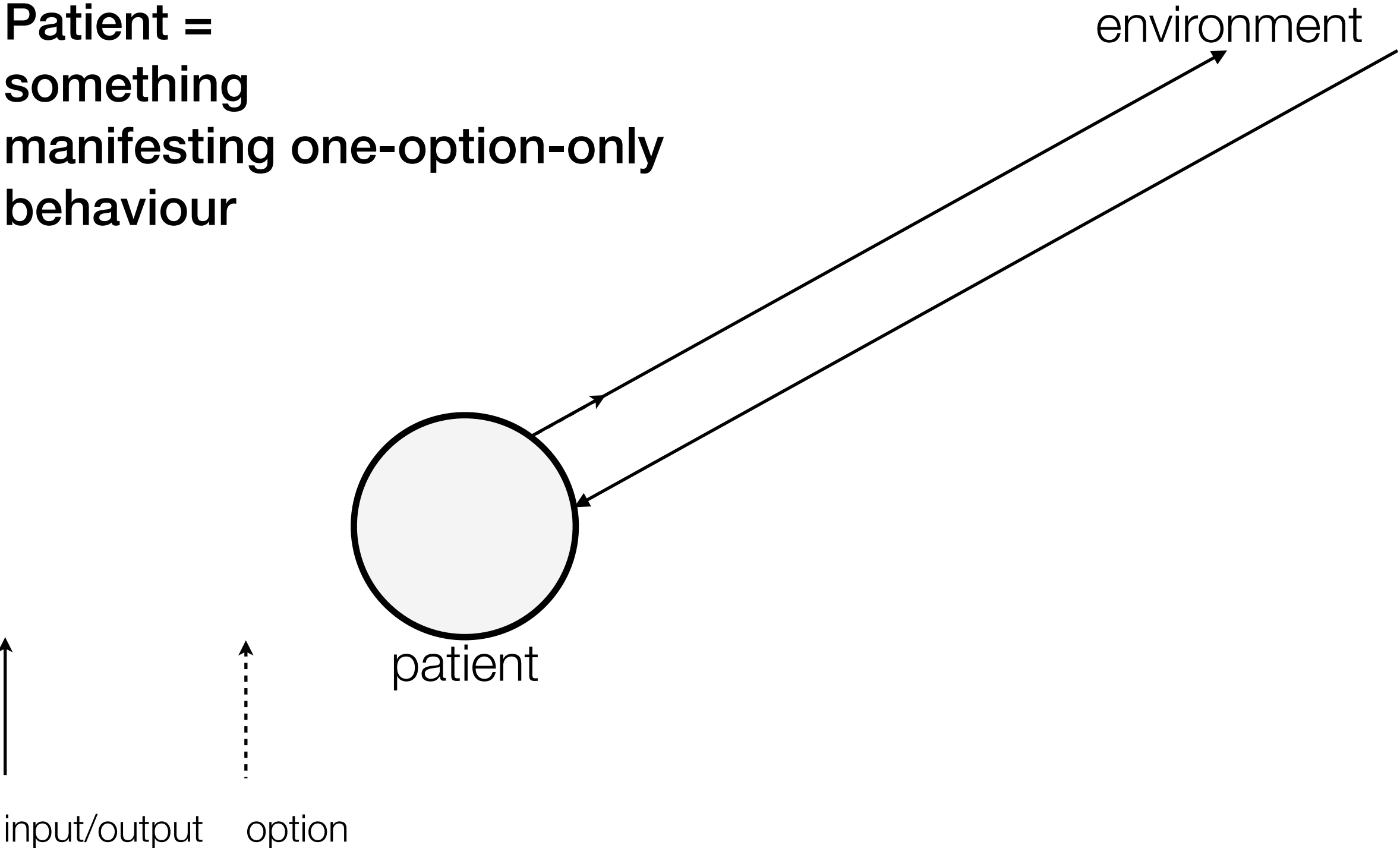
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**Information co-extends with self-organisation.**

# 2.1 Emergent information

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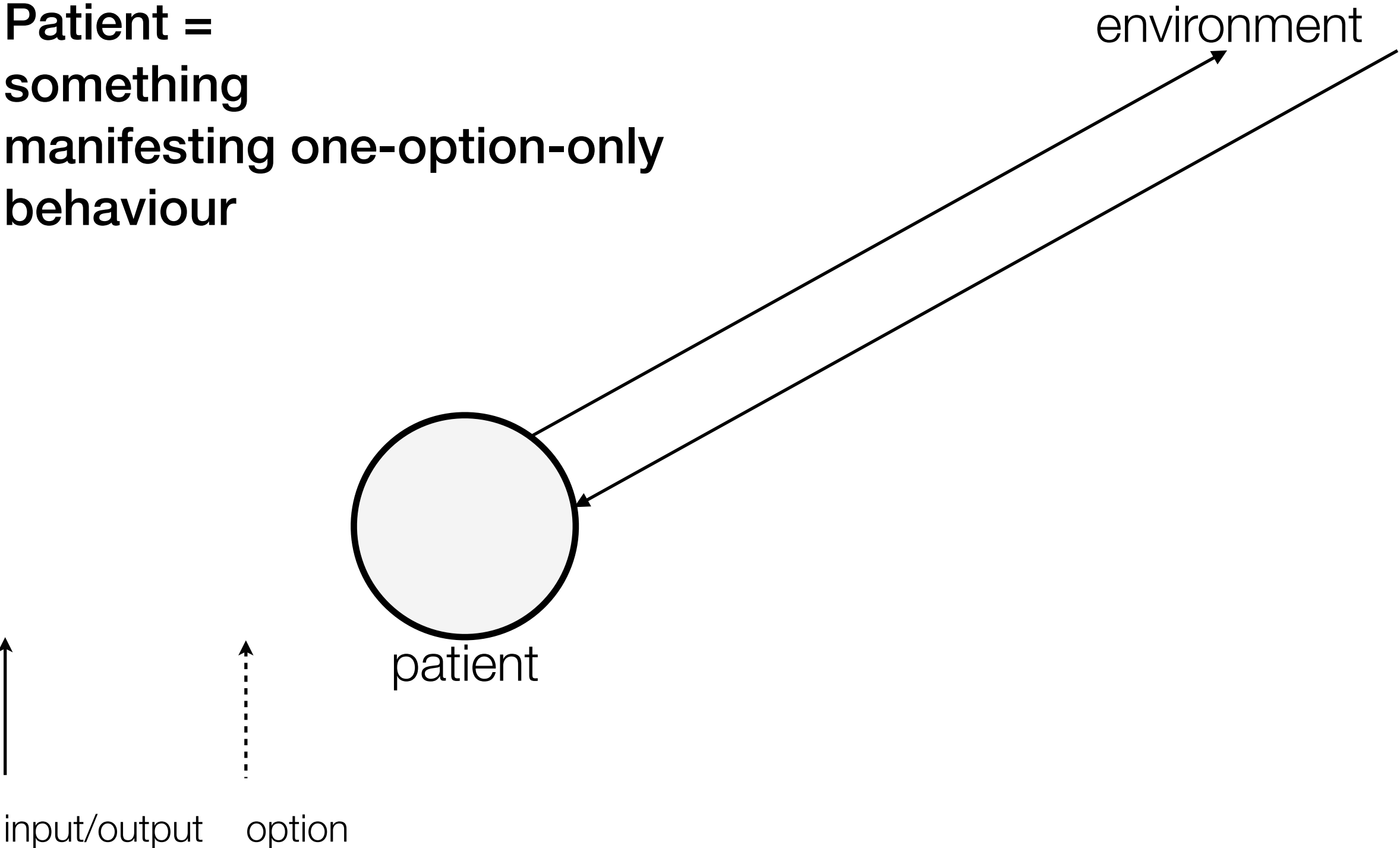
**Patient =  
something  
manifesting one-option-only  
behaviour**



# 2.1 Emergent information

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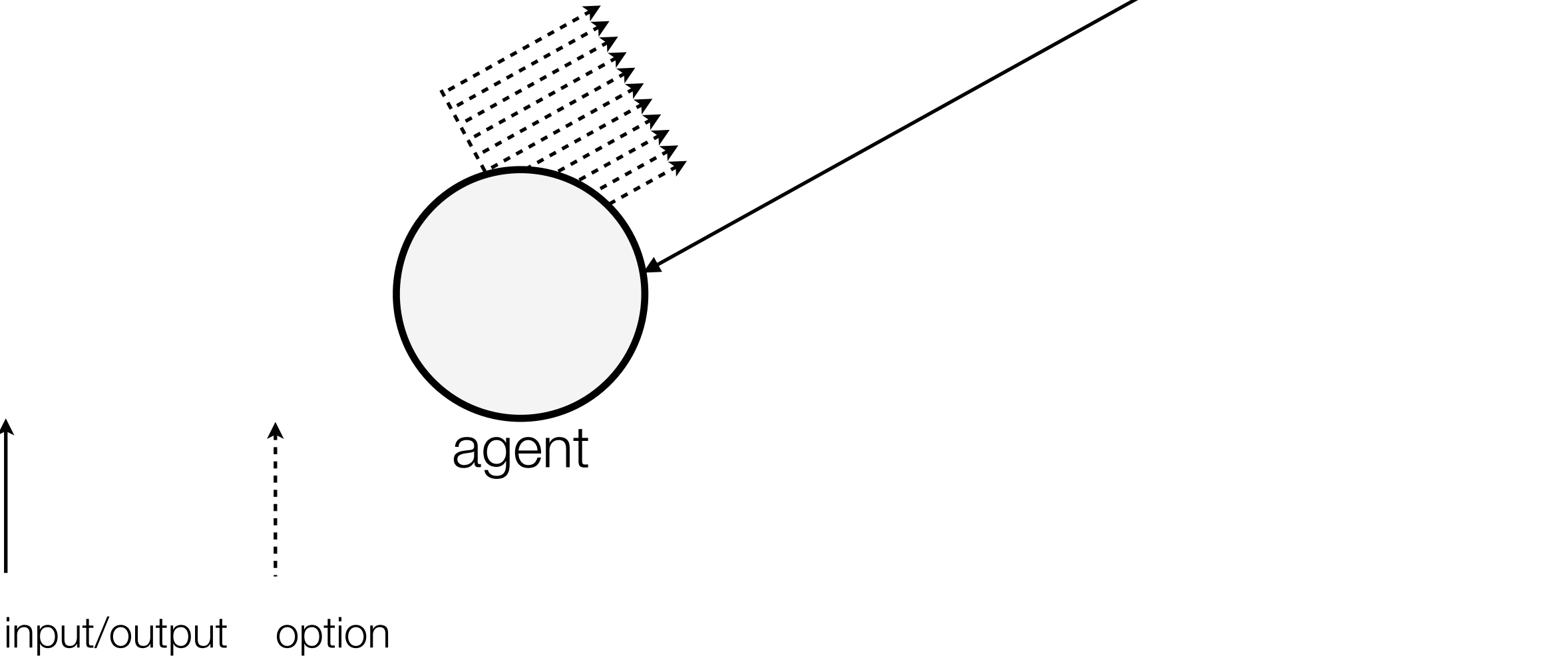
**Patient =  
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# 2.1 Emergent information

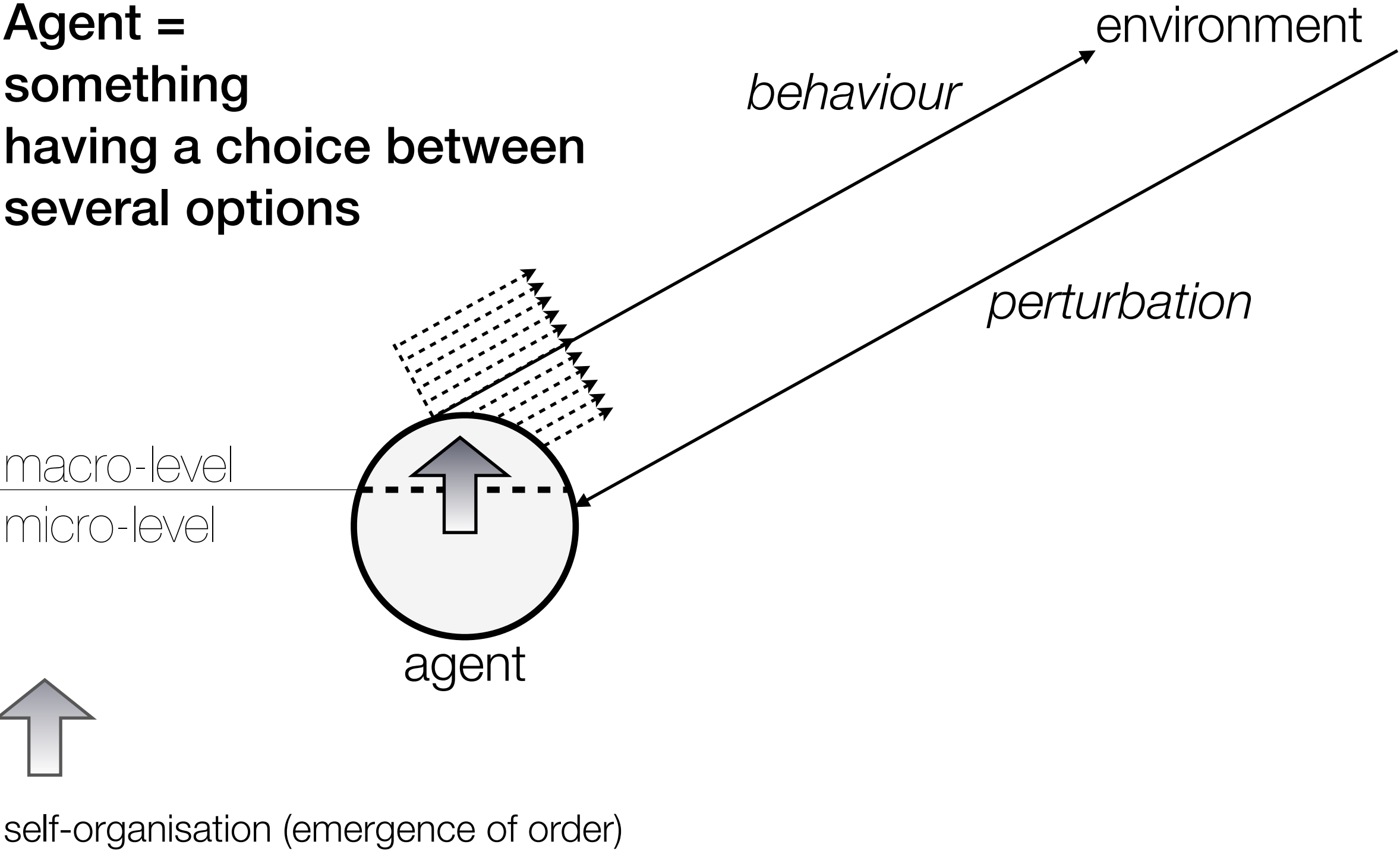
**Agent =  
something  
having a choice between  
several options**

environment



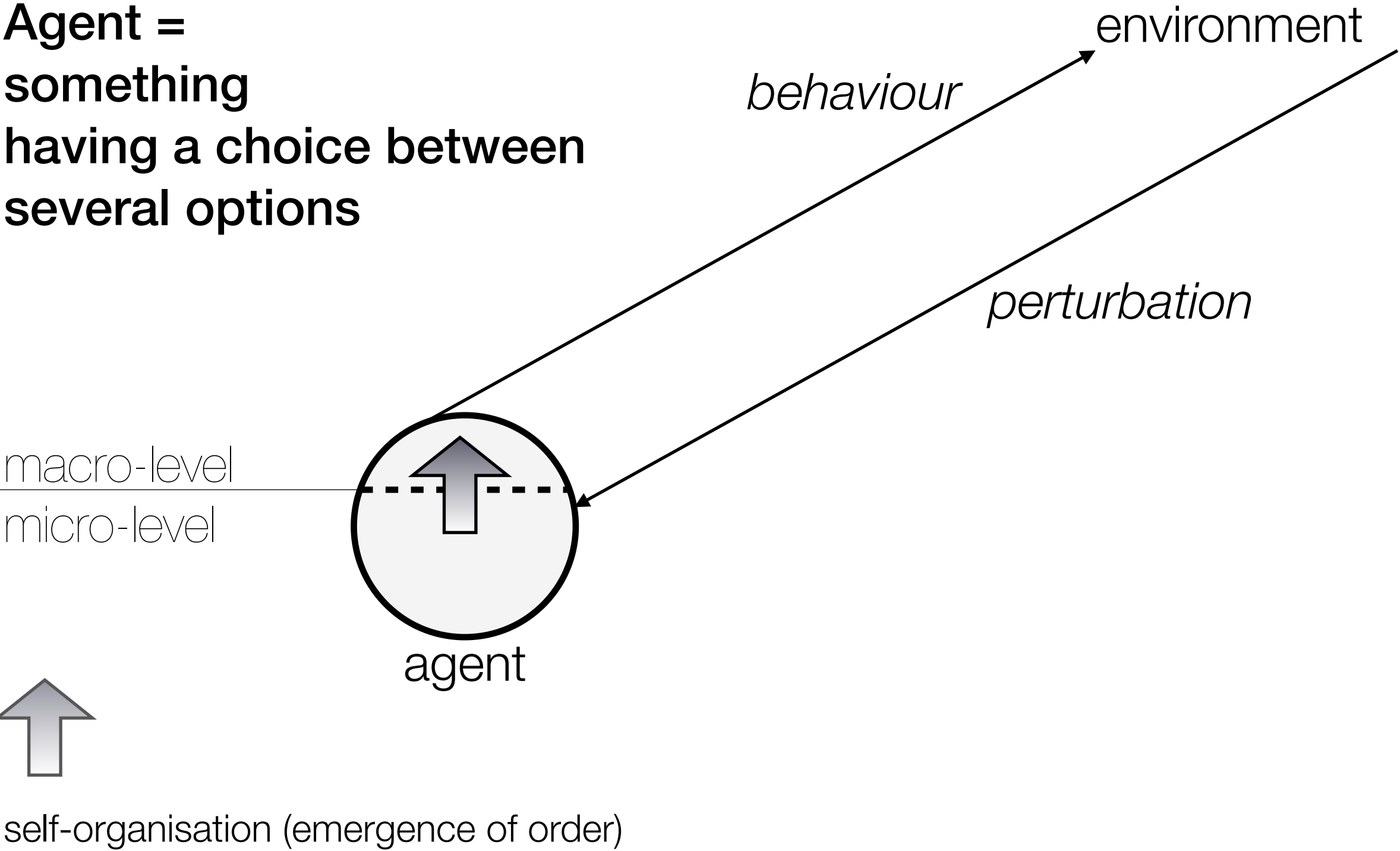
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something  
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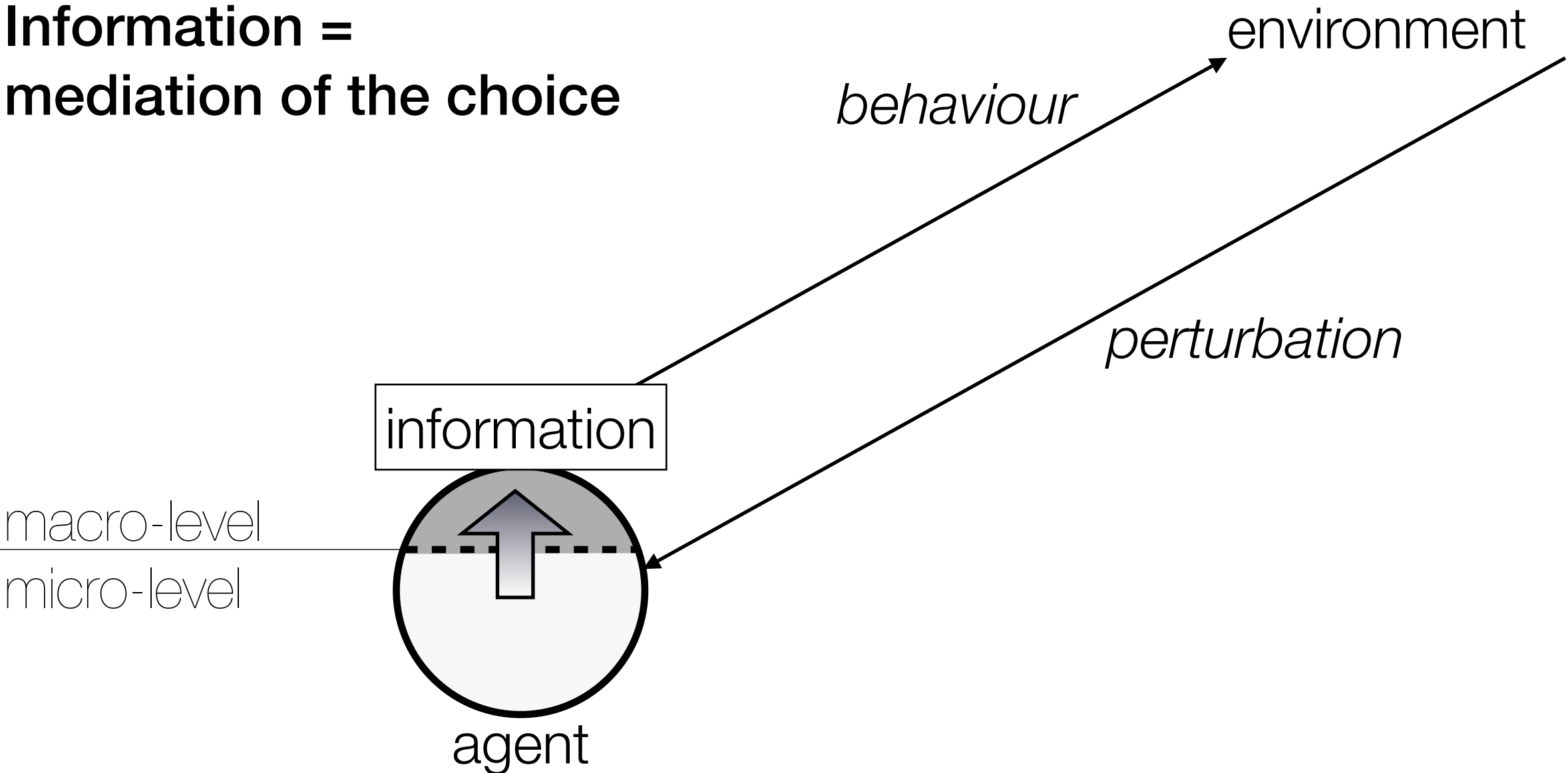
# 2.1 Emergent information

**Agent =  
something  
having a choice between  
several options**



# 2.1 Emergent information

**Information =  
mediation of the choice**

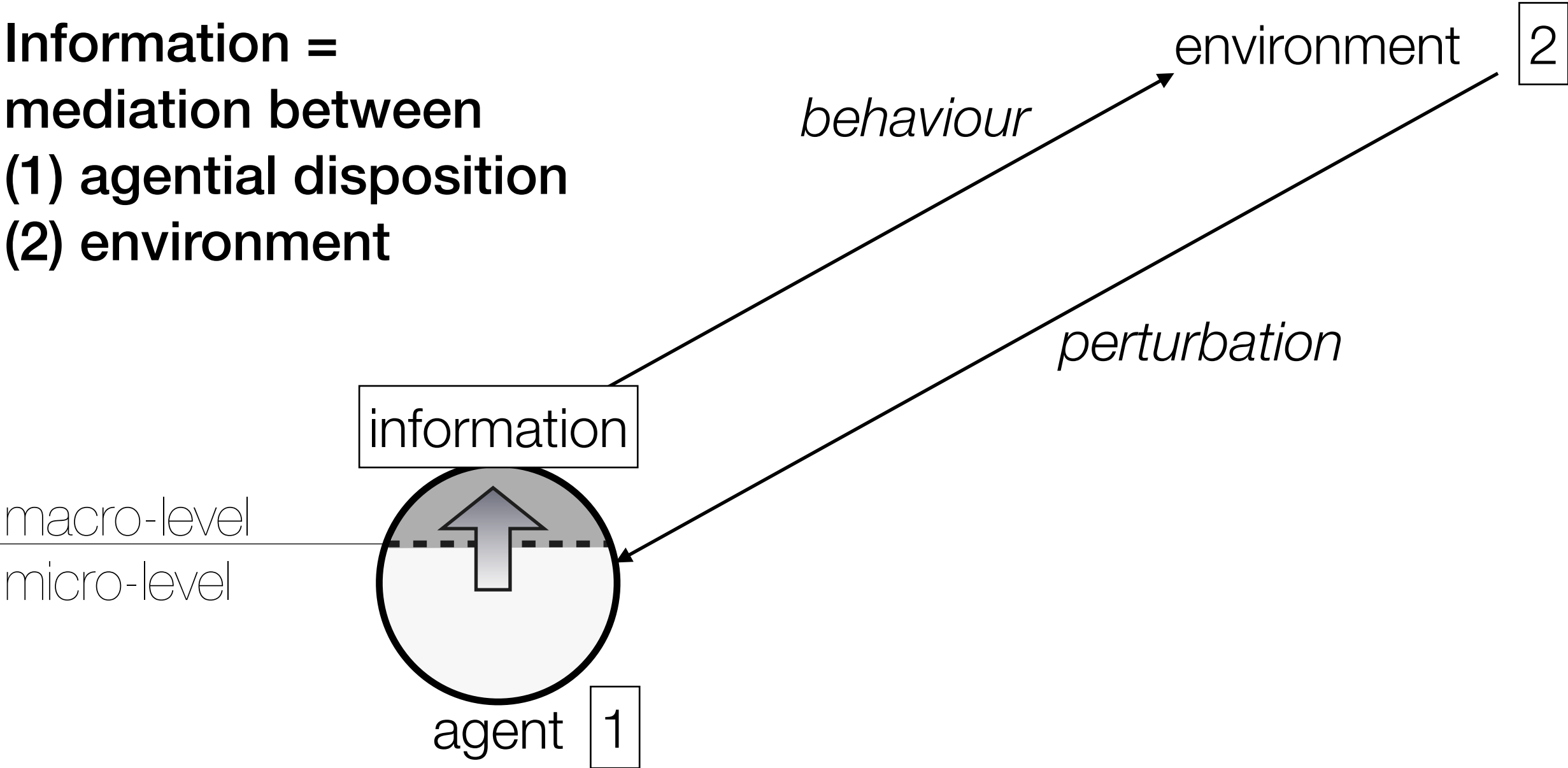


self-organised order = generated/utilised information (mediator)



# 2.1 Emergent information

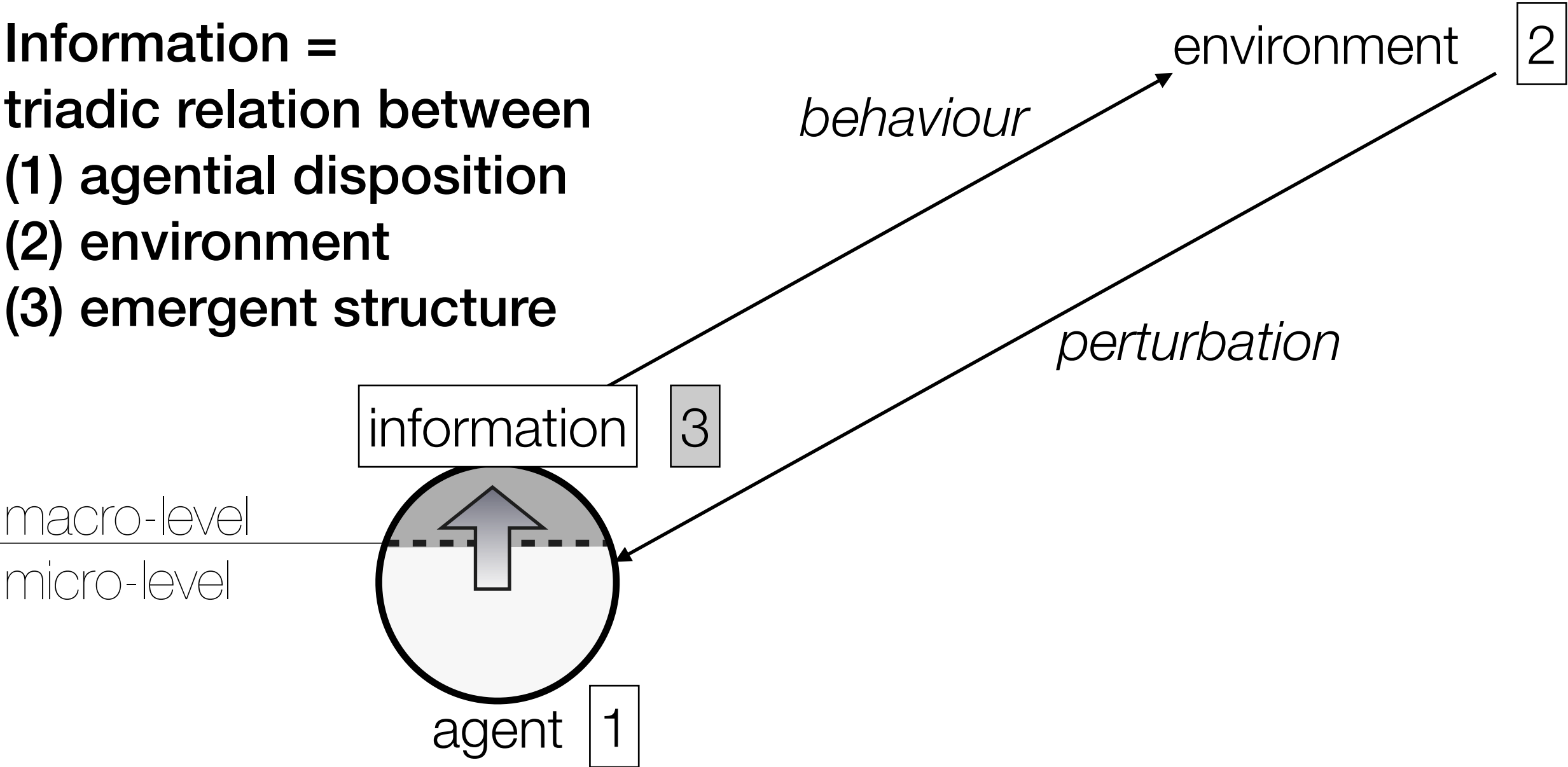
**Information =  
mediation between  
(1) agential disposition  
(2) environment**



self-organised order = generated/utilised information (mediator)

# 2.1 Emergent information

**Information =**  
**triadic relation between**  
**(1) agential disposition**  
**(2) environment**  
**(3) emergent structure**



self-organised order = generated/utilised information (mediator)

## 2.1 Emergent information

**Information =**

**process in which**

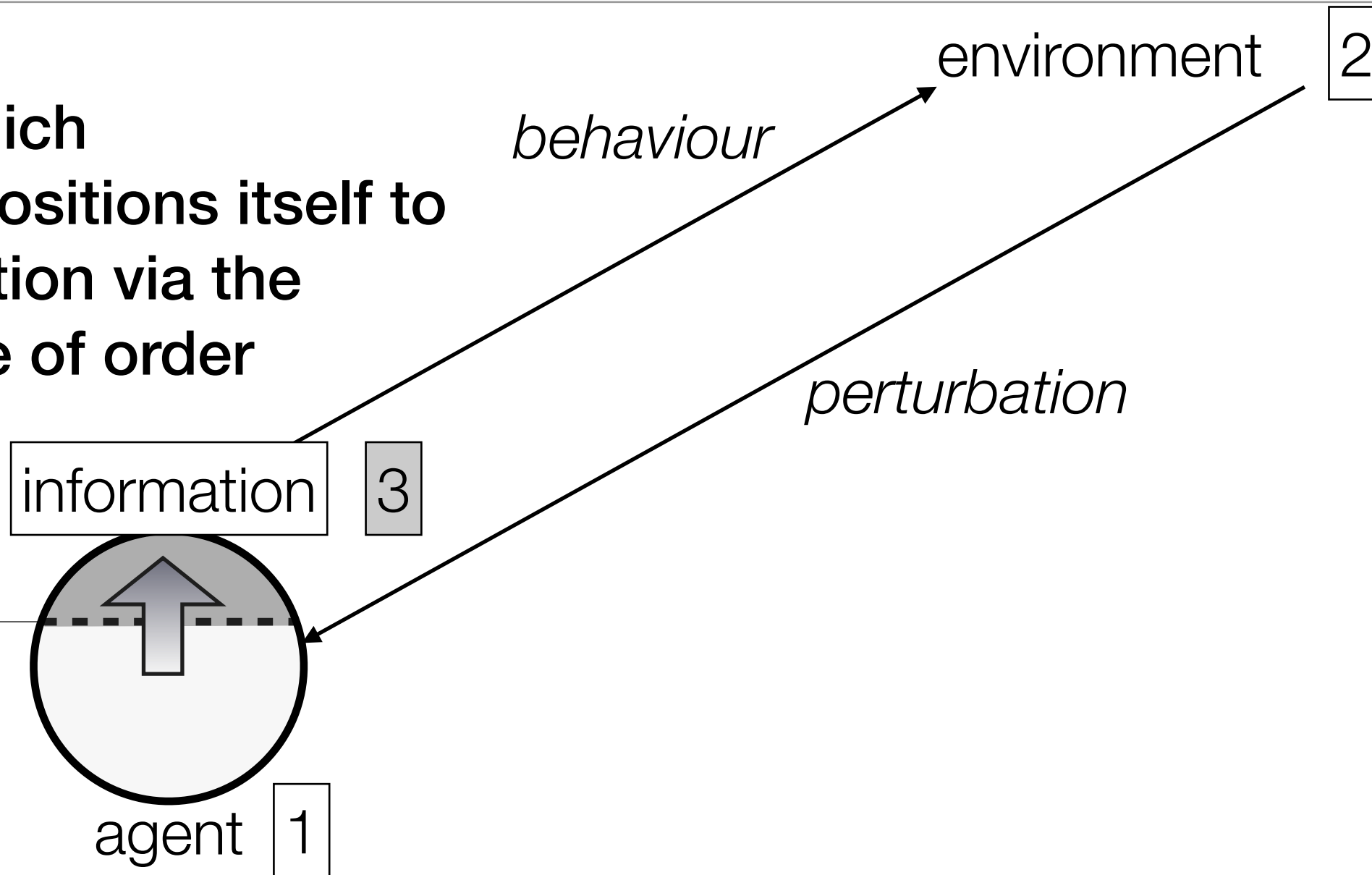
**(1) an agent positions itself to**

**(2) a perturbation via the**

**(3) emergence of order**

macro-level

micro-level



self-organised order = generated/utilised information (mediator)

## 2.1.1 Cognition – communication – co-operation

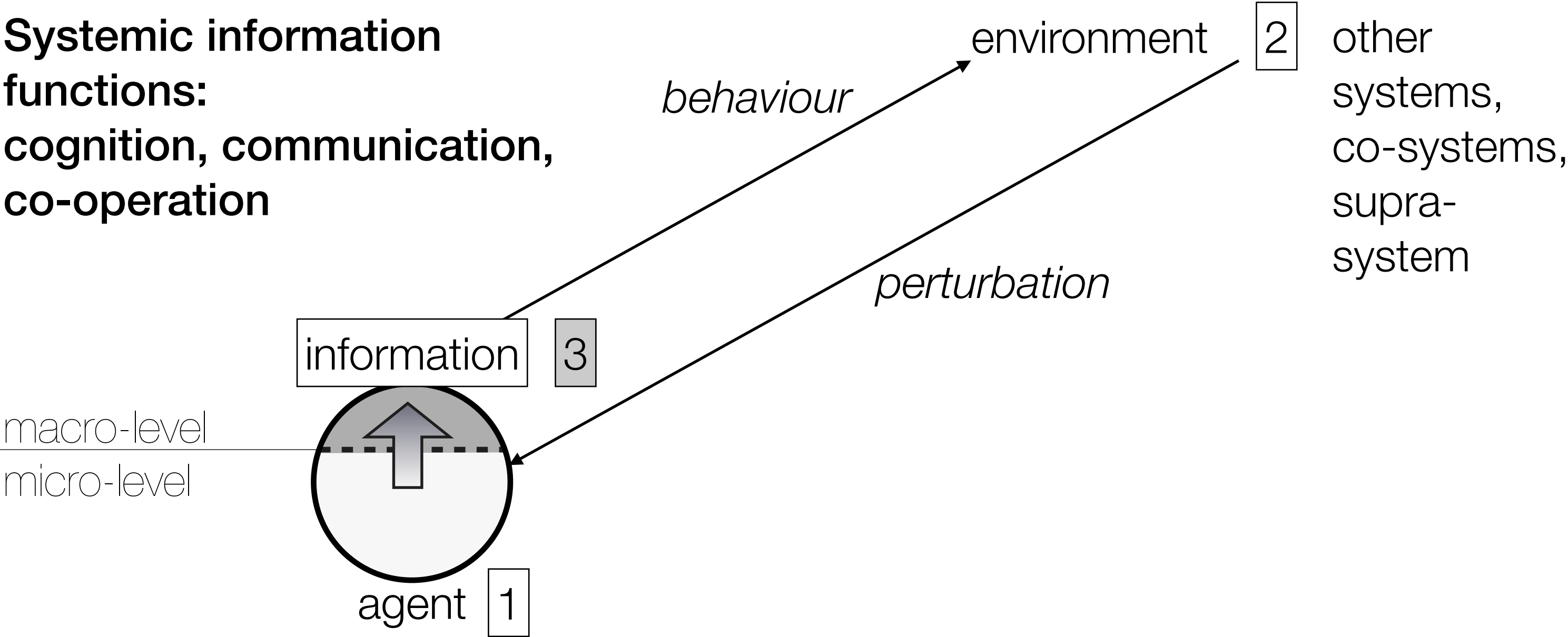
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### **The Triple-C Model of information:**

Information appears across the nested intra-, inter- and suprasystemic functions from **cognition** over **communication** to **co-operation**.

# 2.1.1 Cognition – communication – co-operation

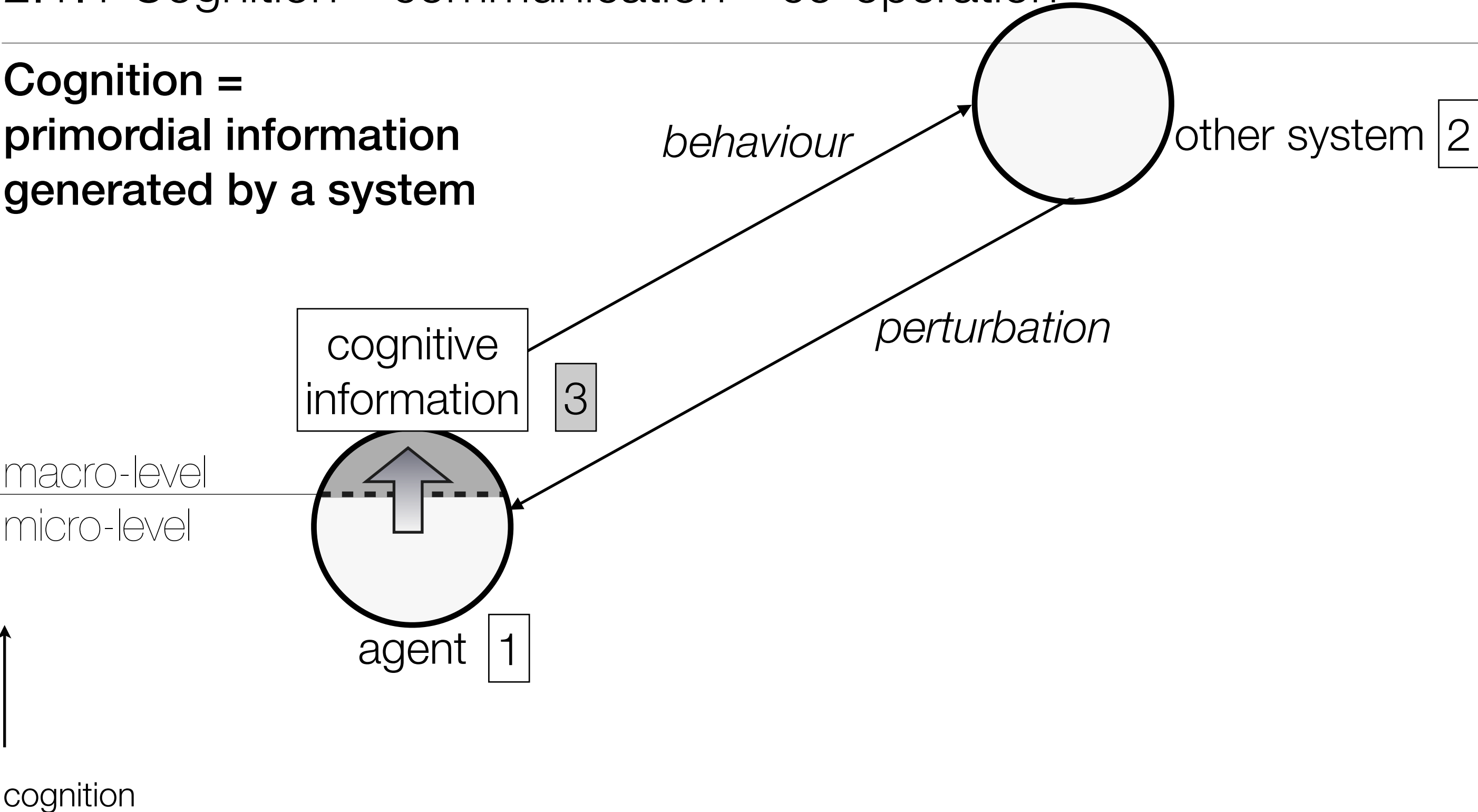
**Systemic information functions:**  
**cognition, communication, co-operation**



self-organised order = generated/utilised information (mediator)

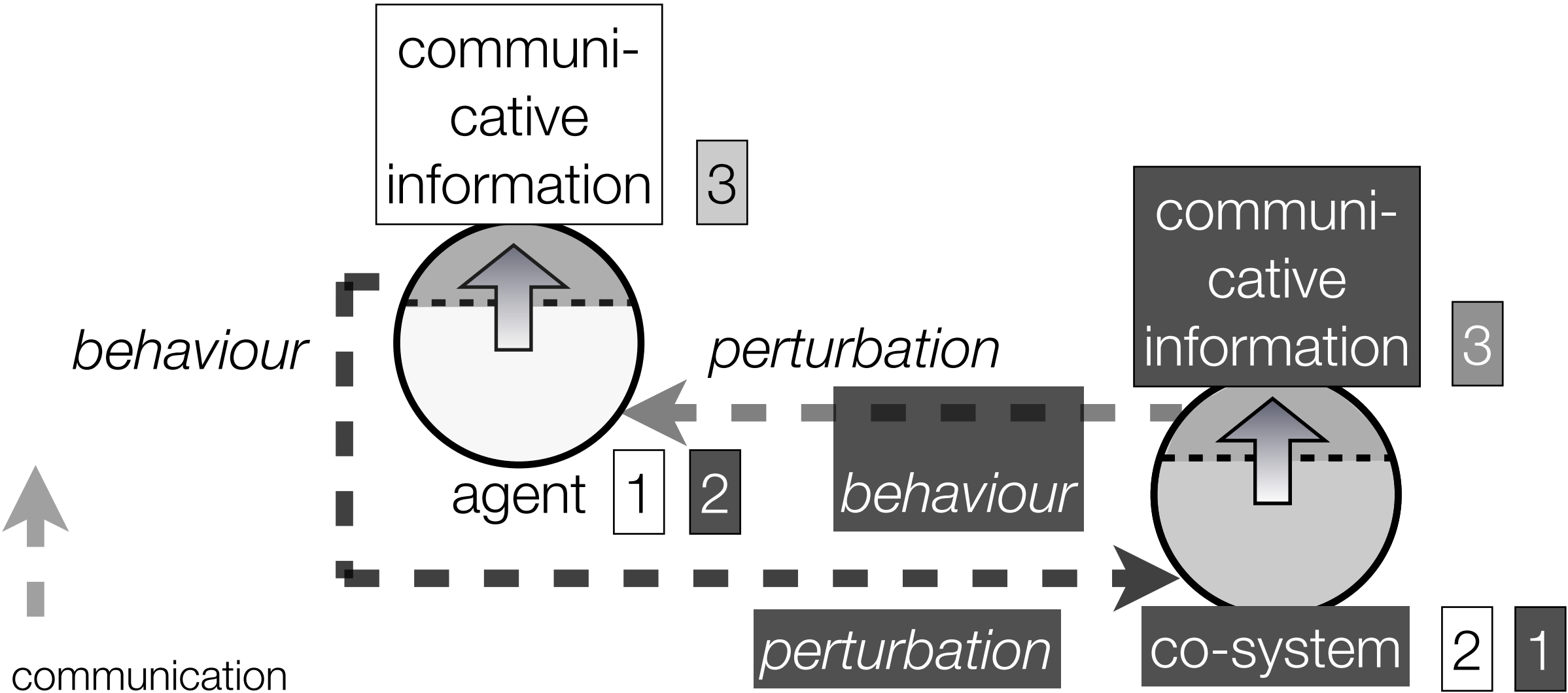
# 2.1.1 Cognition – communication – co-operation

**Cognition =  
primordial information  
generated by a system**



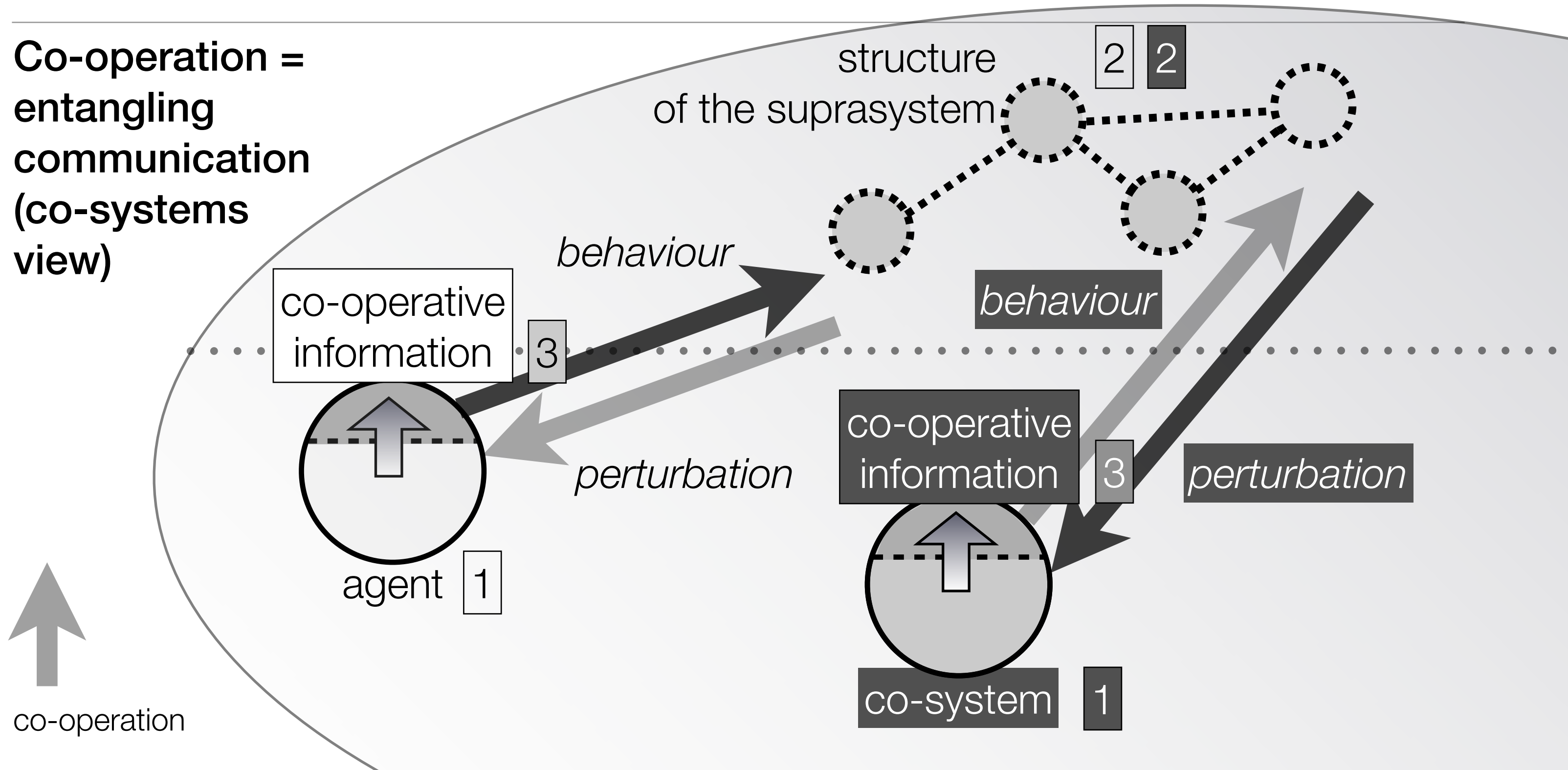
# 2.1.1 Cognition – communication – co-operation

**Communication =  
coupling of cognitions of co-systems**



## 2.1.1 Cognition – communication – co-operation

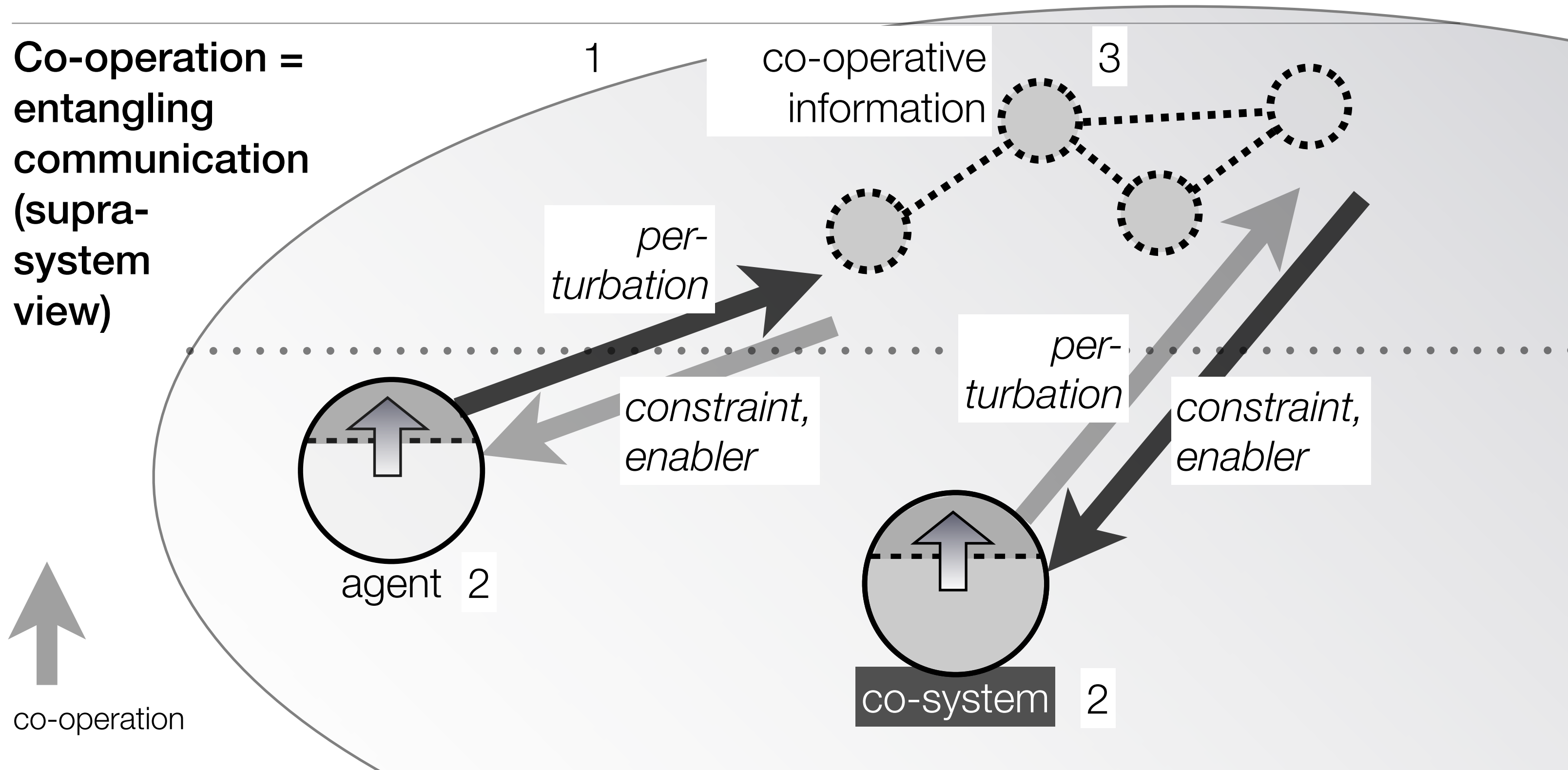
**Co-operation =  
entangling  
communication  
(co-systems  
view)**





## 2.1.1 Cognition – communication – co-operation

**Co-operation =  
entangling  
communication  
(supra-  
system  
view)**



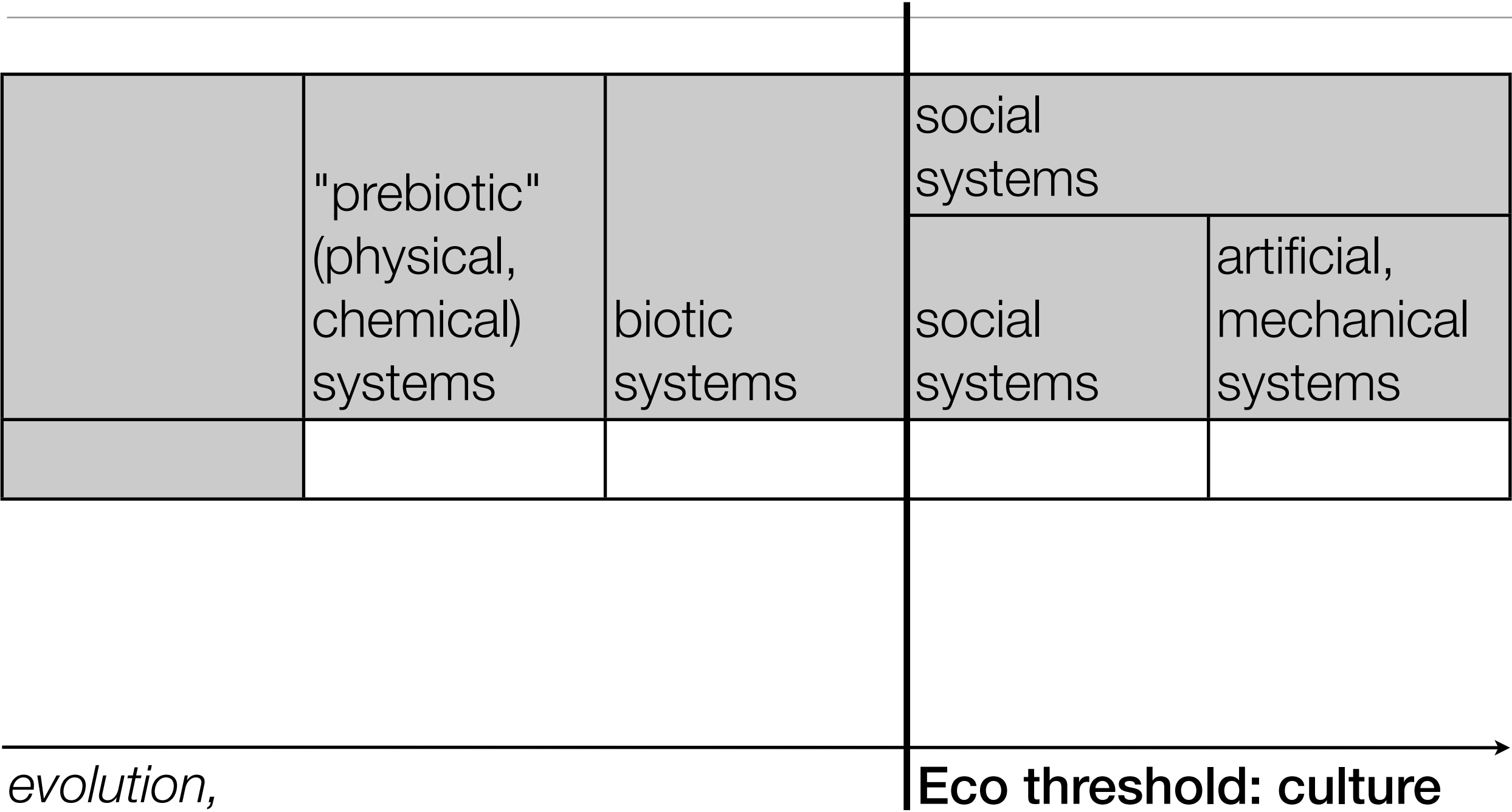
## 2.1.2 Physical, biotic and social information

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### **The Multi-Stage Model of information:**

Information manifests itself along the evolutionary chain of differentiated system categories **from physical over biotic to social systems.**

# 2.1.2 Physical, biotic and social information



# 2.1.2 Physical, biotic and social information

	"prebiotic" (physical, chemical) systems	biotic systems	social systems	
			social systems	artificial, mechanical systems
semiotics	no	no	<b>yes</b>	no

*evolution,  
increase in complexity*

**Eco threshold: culture**

# 2.1.2 Physical, biotic and social information

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		biotic systems	social systems	artificial, mechanical systems
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*evolution, increase in complexity*

**Fuchs-Kittowski threshold: life** →

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biosemiotics	no	<b>yes</b>	<b>yes</b>	no

*evolution,  
increase in complexity*

**Fuchs-Kittowski threshold: life**



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*evolution,  
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**Hofkirchner threshold: self-organisation**



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semiotics	no	no	<b>yes</b>	no
biosemiotics	no	<b>yes</b>	<b>yes</b>	no
complexity	<b>yes</b>	<b>yes</b>	<b>yes</b>	no

*evolution,  
increase in complexity*

**Hofkirchner threshold: self-organisation** →



## 2.2 Example: understanding "Artificial Intelligence" (AI)

	"prebiotic" (physical, chemical) systems	biotic systems	social systems	artificial, mechanical systems
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*evolution,  
increase in complexity*

**Hofkirchner threshold: self-organisation**



## 2.2 Example: understanding "Artificial Intelligence" (AI)

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### "Man"/society and machine:

The relationship of "man"/society and the machine is modelled

- either on the basis of the **identity** (reductionism, projectionism)
- or the **in-/difference** (disjunctionism),
- or **identity and difference** (integrationism),

of their levels of complexity.

## 2.2.1 Identity of "man"/society and machine

<b>"Man"/society-machine models</b>			
<b>conflation</b>	<b>monism:</b> "man"/society and mechanism are deemed identical inasmuch as they share the same level of complexity	<b>reduction</b>	<b>technomorphism:</b> the level of complexity of "man"/society is assumed to be as low as that of a mechanism
		<b>projection</b>	<b>anthropomorphism:</b> the level of complexity of a mechanism is assumed to be as high as that of "man"/society

## 2.2.1.1 Identity by reduction: "man"/society is a machine – stepwise dehumanisation

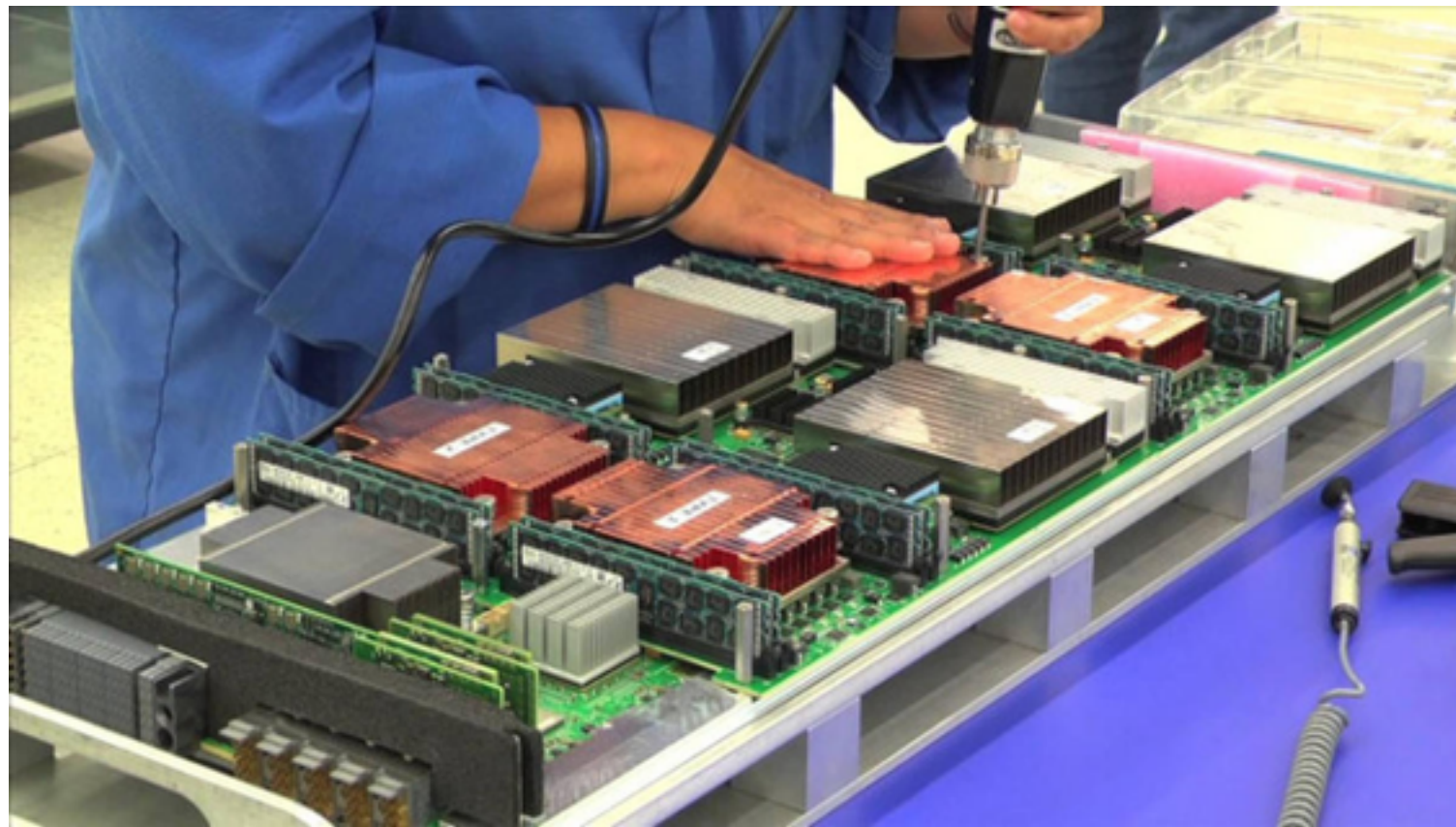
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- (1) Society is reduced to the **individual actor** – a fallacy of *horizontal reduction* of complexity (from the macro- to the micro-level of a system);
- (2) The individual actor is reduced to its **body**, a social being to a living being, to a biotic system – a fallacy of *biologism* (a *vertical* reduction from social complexity on a higher evolutionary level to biotic complexity on a lower evolutionary level);
- (3) The human body is reduced to its **physical substrate** – a fallacy of *physicalism* (reduction from biotic to physical complexity);
- (4) The physical substrate of the human body is reduced to a **mechanism** – a fallacy of *strict determinism* (reduction from the complexity of self-organising systems capable of emergent properties to the zero-complexity level of hetero-organised entities devoid of emergence).

## 2.2.1.1 Identity by reduction: "man"/society is a machine – stepwise dehumanisation

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**Examples:** Materialism in education of computer and cognitive scientists ("If I can model it with engineering or natural science methods, I understand it")



## 2.2.1.2 Identity by projection: any machine is like "man"/society – stepwise animation

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- (1) The essential features of the **social system** are projected onto the level of the individual actor;
- (2) The essential features of the **individual actor** as a social being are projected onto the human body as biotic system;
- (3) The essential features of the **human body** are projected onto its physical substrate;
- (4) The essential features of the **physical substrate** of the human body are projected onto any mechanism, be it natural or artificial.



## 2.2.1.2 Identity by projection: any machine is like "man"/society – stepwise animation

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**Examples:** Info-Computationalism ("The universe is a natural computer")\*, panpsychism and animism ("The universe is ensouled"), Gaia hypothesis ("The planet is a living organism")\*\*



## 2.2.2 In-/Difference of "man"/society and machine

	<b>"Man"/society-machine models</b>	
<b>disjunction</b>	<b>dualism:</b> "man"/society and mechanisms are deemed independent entities of different or same complexity	<b>human exceptionalism:</b> "man"/society is assumed to be of an unequalled complexity level
		<b>technological exceptionalism:</b> a mechanism of an unequalled complexity level is assumed feasible
		<b>"man"/society-machine egalitarianism:</b> "man"/society and mechanisms are assumed to interact on the basis of equalised complexity levels



## 2.2.2.1 Difference by human exceptionalism: "man"/society uniqueness

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**Examples:** Idealism in theological positions, humanities ("Humans are sentient – robots are corpses")\*



## 2.2.2.2 Difference by technological exceptionalism: machine uniqueness

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**Examples:** Technophilia in Trans- and Posthumanism ("Technology will outperform more and more human functions"), Singularitarianism



## 2.2.2.3 Indifference by "man"/society-machine egalitarianism: equality of humans and technology

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**Examples:** Flat ontologies in Actor-Network-Theory ("actants")\*, Sociomaterialism ("intra-action")\*\*

### ACTOR-NETWORK THEORY



Matter feels,  
converses, suffers,  
desires, yearns and  
remembers

Karen Barad



SCHOOL OF BUSINESS AND SOCIAL SCIENCES  
AARHUS UNIVERSITY

GROUP 28-29  
ACTOR-NETWORK THEORY

1 DECEMBER 2015  
2

WWW.STOREMYPIC.COM

## 2.2.3 Identity and difference of "man"/society and machine

	<b>"Man"/society-machine models</b>	
<b>integration</b>	<b>dialectic:</b> mechanisms are deemed to take part in raising the complexity of "man"/society, while as such those are of zero complexity	<b>techno-social systemism:</b> techno-social systems are assumed to emerge from social systems as soon as mechanisms are functionalised for the increase of social complexity in order to solve problems the complexity of which would otherwise overpower the system

## 2.2.3 Identity and difference of "man"/society and machine

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**Examples:** Tools for conviviality\*



### 3 Science of Information and its place in the edifice of science(s)

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#### **Systems thinking and the informational perspective reconceptualise the edifice of science(s):**

Anything can be framed, modelled and designed

– in a **systemic** way, that is, as a **system** (or in the context of the dynamics or the architecture of systems), and, since self-organising systems are information-generating systems,

– in an **informational** way, that is, as an **informational agent** (or in the context of the dynamics or the architecture of informational agents), as well; each according to their **evolutionary stage**.

↑ general  
↓ specific

# philosophy

*com-  
plexity:  
system  
– infor-  
mation*

**formal  
sciences:  
logics,  
mathe-  
matics**

**real-world sciences**

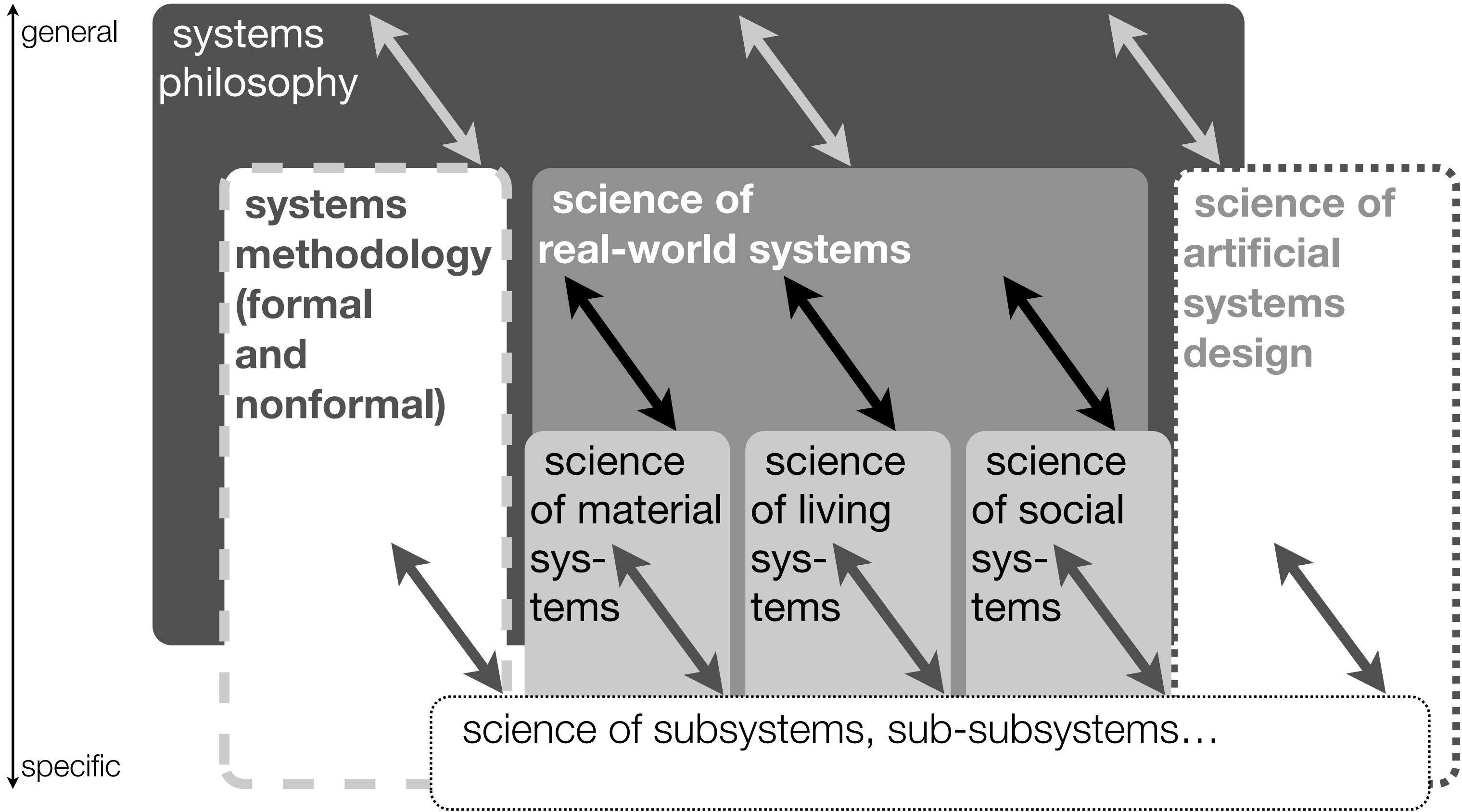
natural sciences  
(physics, chemistry,  
biology...)

social &  
human  
sciences  
(socio-  
logy...)

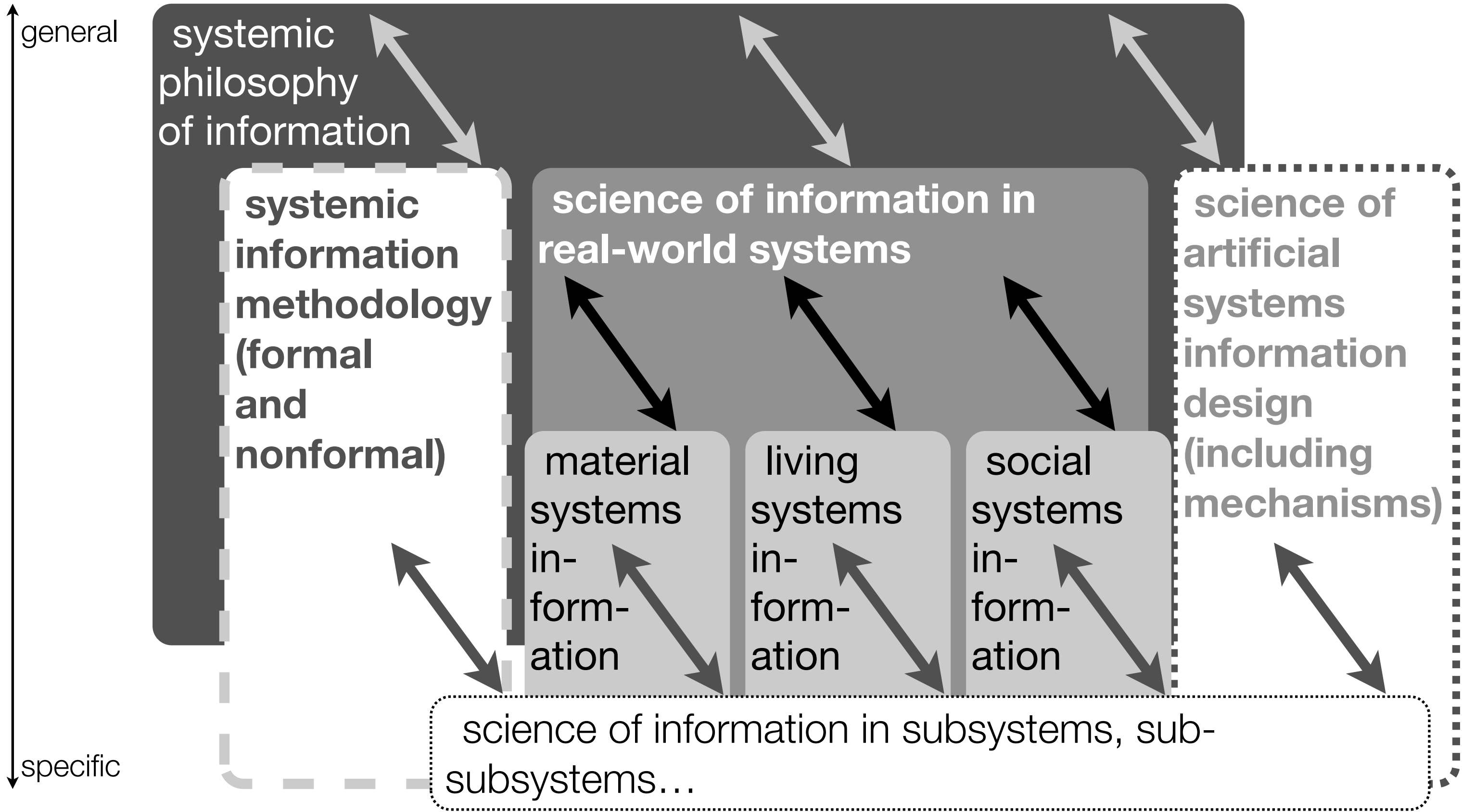
**applied  
sciences:  
engineering  
(computer  
science...),  
manage-  
ment, arts**

subdisciplines...









### 3 Science of Information and its place in the edifice of science(s)

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On the basis of **UTI** (systemic informationism), **Science of Information** can **cross diverse disciplines** and **transcend them upwards to metalevels for unification** in order to flesh out the theoretical specification hierarchy of empirical information manifestations:

- the disciplinary borders can become **permeable** and
- the lower and higher levels can enter a **bottom-up and top-down loop** so as to be open to adopting changing findings and insights when attempting a consistent picture of the whole.

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Thank you.