

a humane trilogy

Emoção Art.ficial 5.0
Autonomia Cibernética

ITAÚ Cultural
July 2010

paul pangaro, ph.d.
cyberneticlifestyles.com

“In the beginning

“In the beginning was the interaction.”



2006
interaction

[emoção art.ficial 3.0]
interface cibernética

PORTUGUÊS

ENGLISH VERSION

emergência!

apresentação

trabalhos

simpósio

serviços

[emoção art.ficial 4.0]
bienal internacional de arte e tecnologia

2008
emergence

emergência!

Cérebro

Caos

Haeckel

Game

Generativo

ALife

Autoria

EA1.0

EA2.0

Formigas

Cibernética

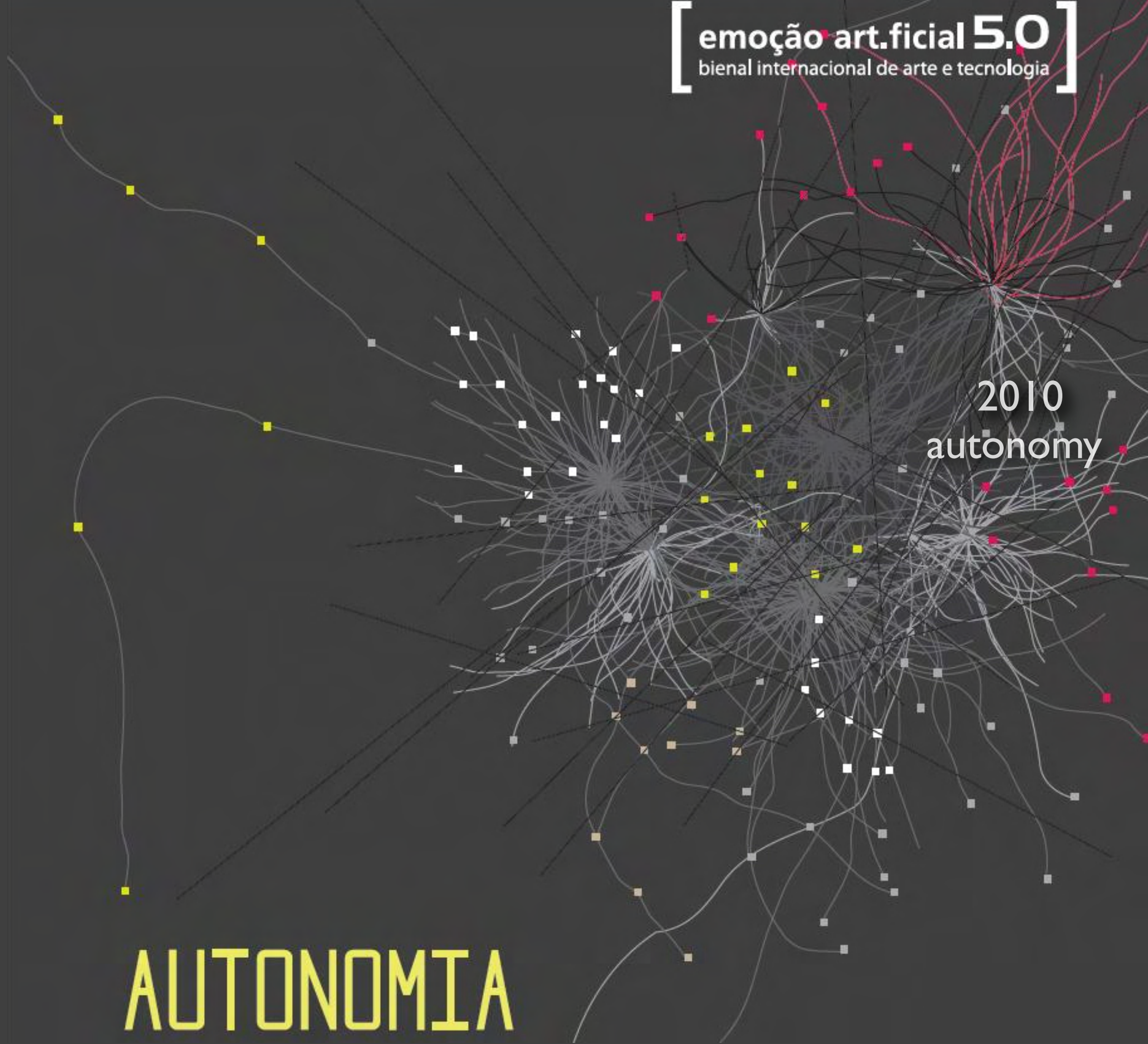
Cibercultura

english version

[emoção art.ficial 5.0]
bienal internacional de arte e tecnologia

2010
autonomy

AUTONOMIA

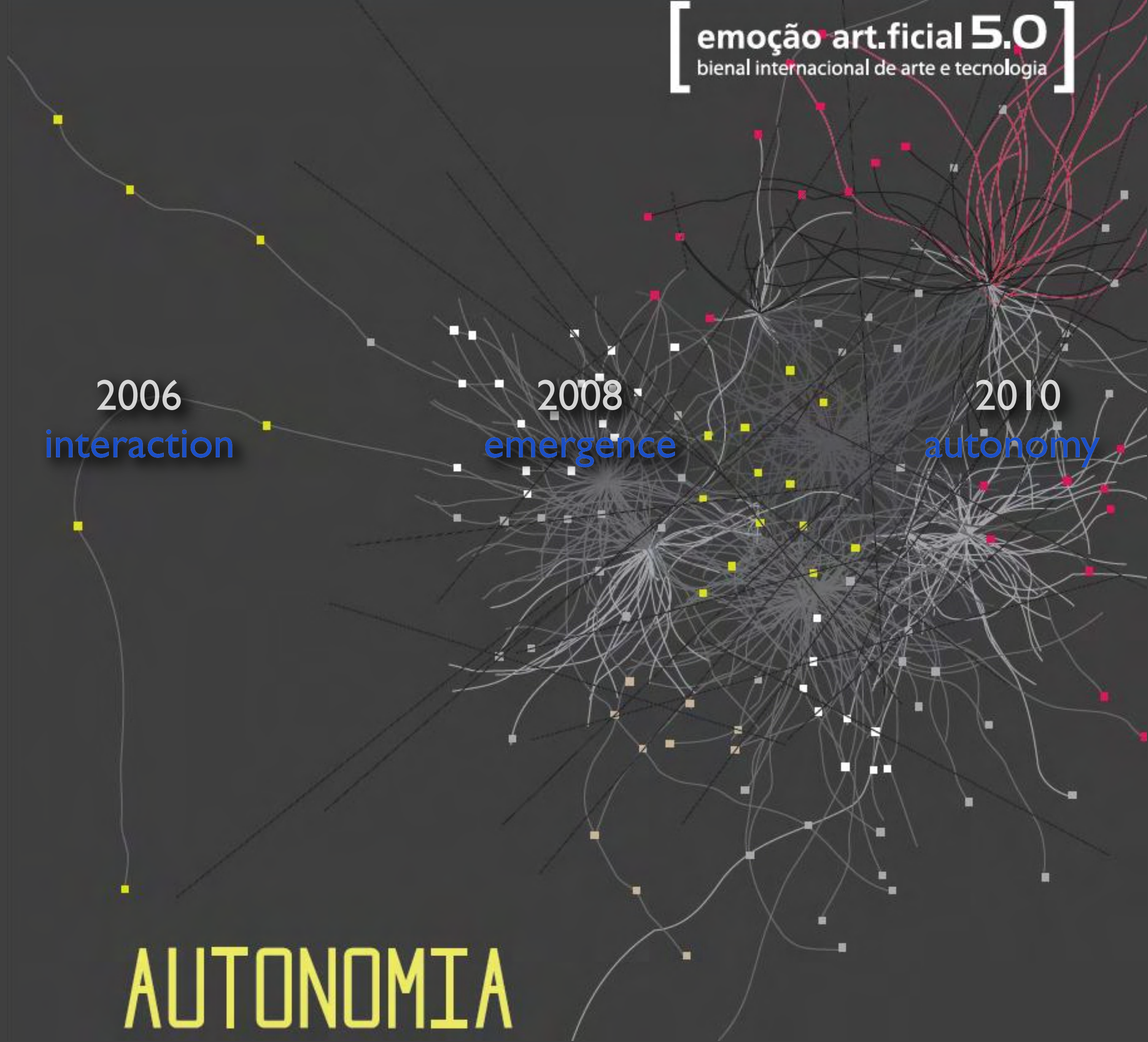


2006
interaction

2008
emergence

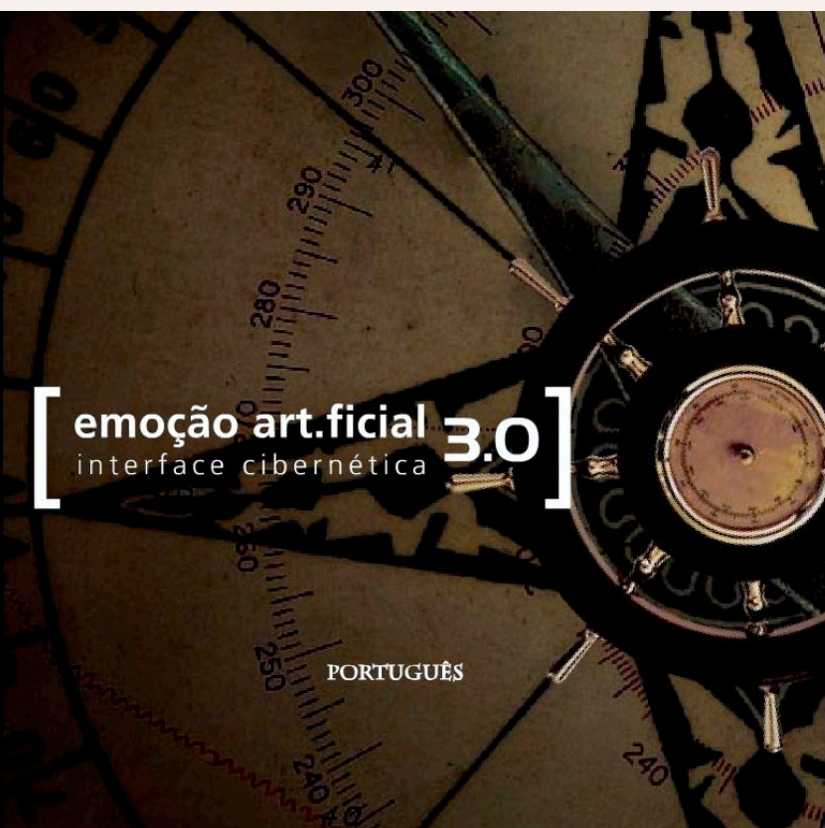
2010
autonomy

AUTONOMIA



Itaulab trilogy

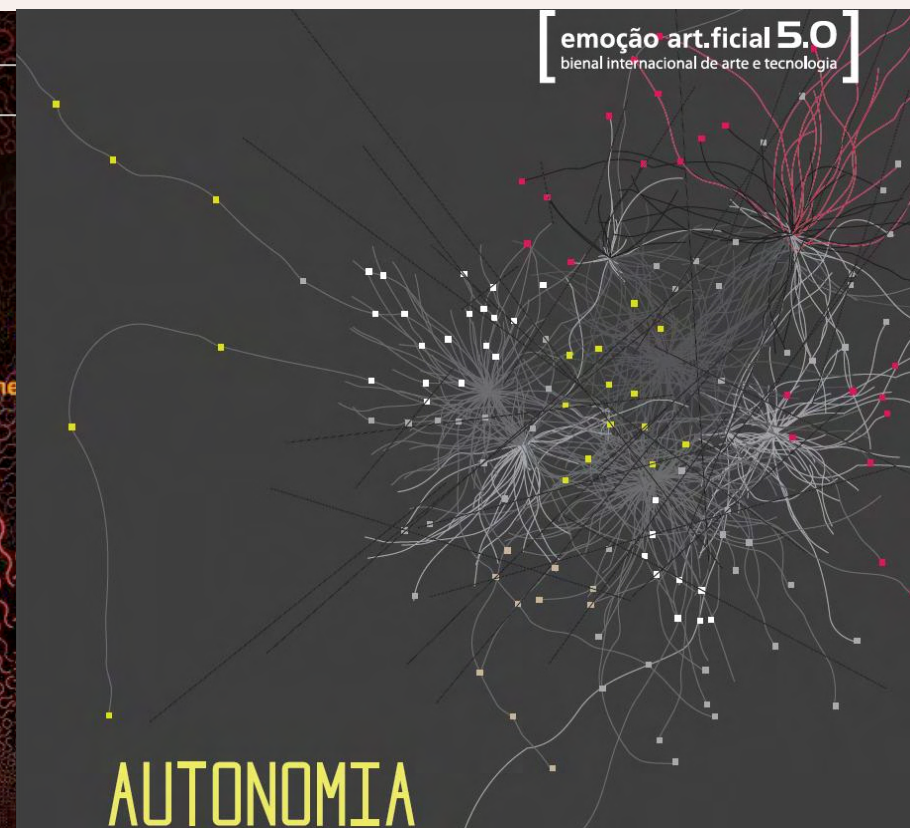
interaction



emergence

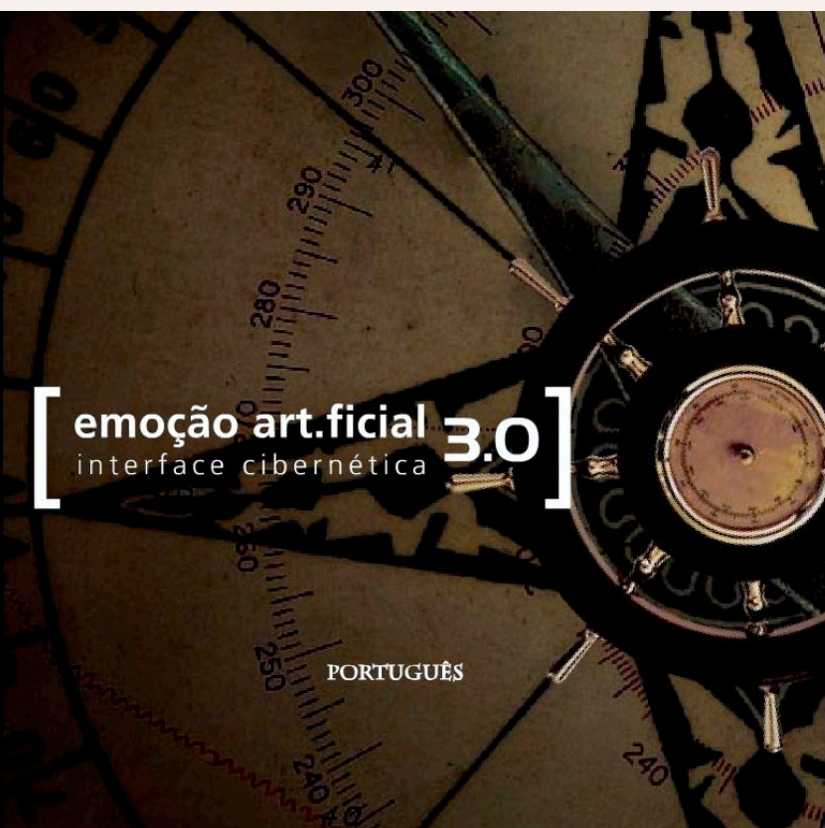


autonomy



cybernetic trilogy

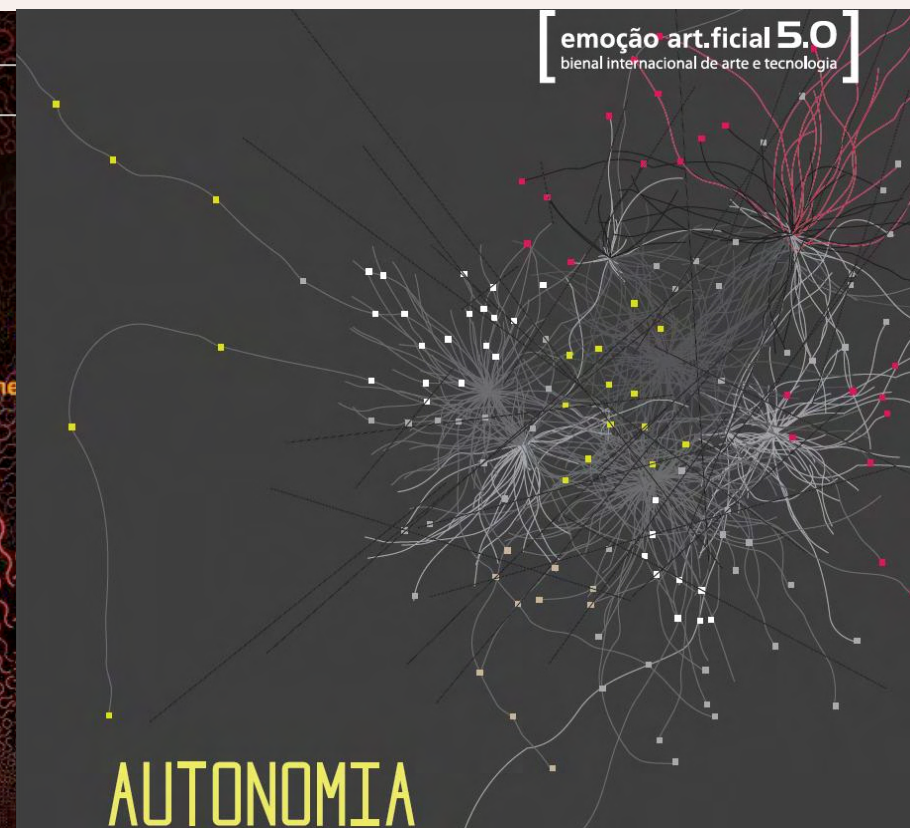
interaction



emergence

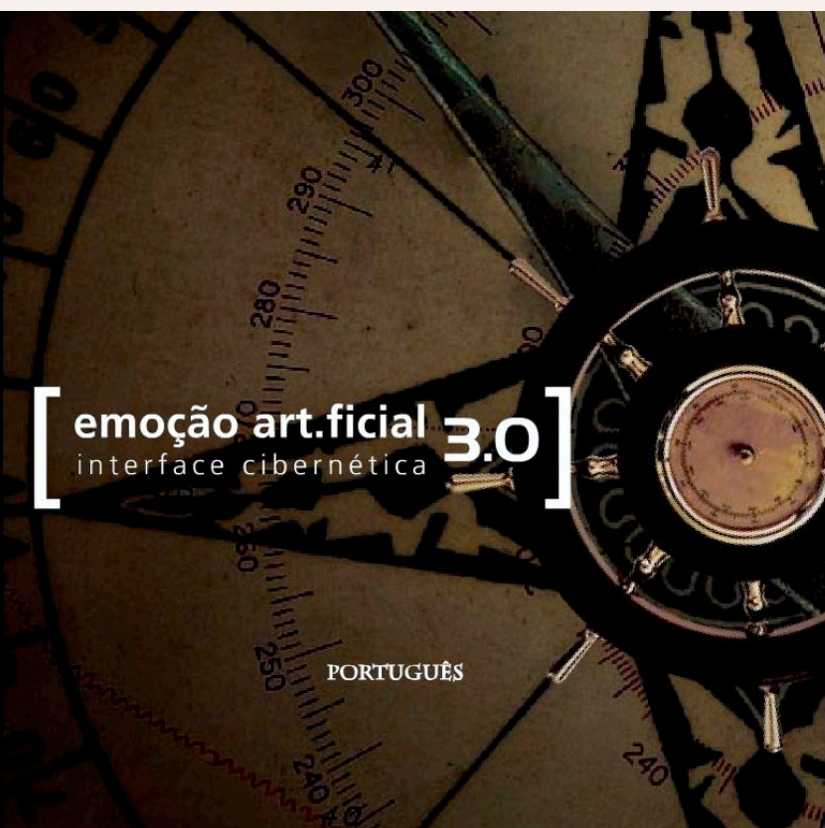


autonomy



frameworks

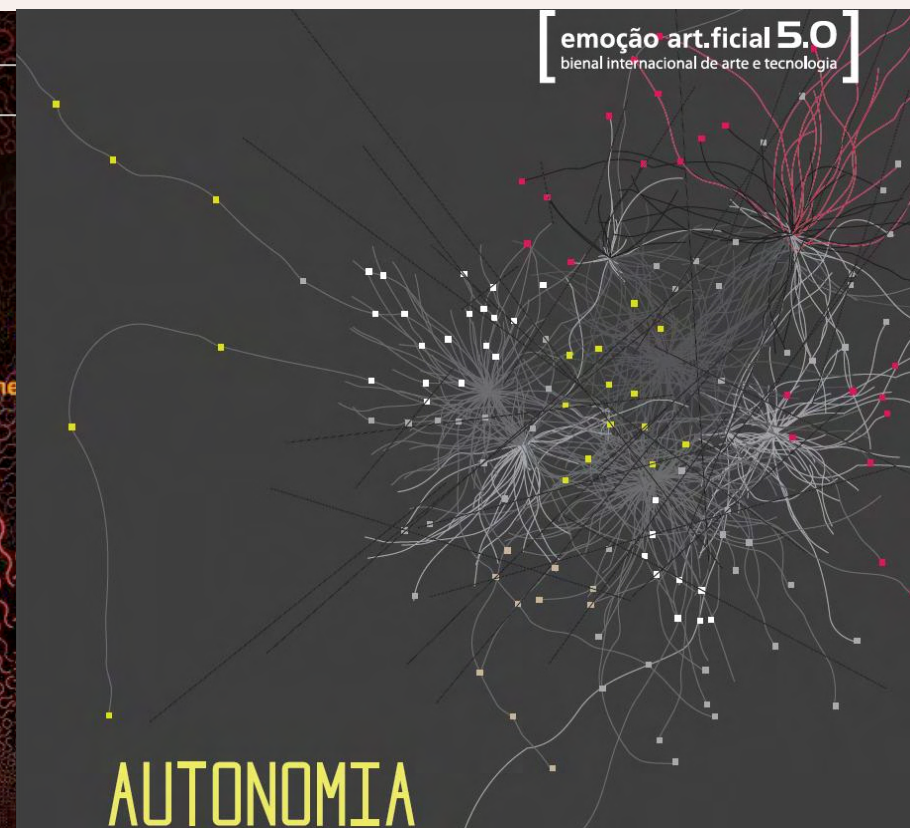
interaction



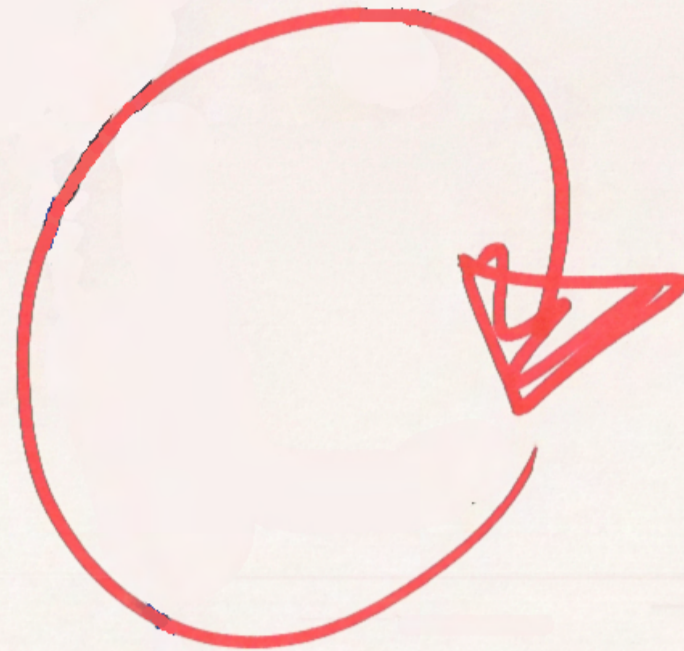
emergence



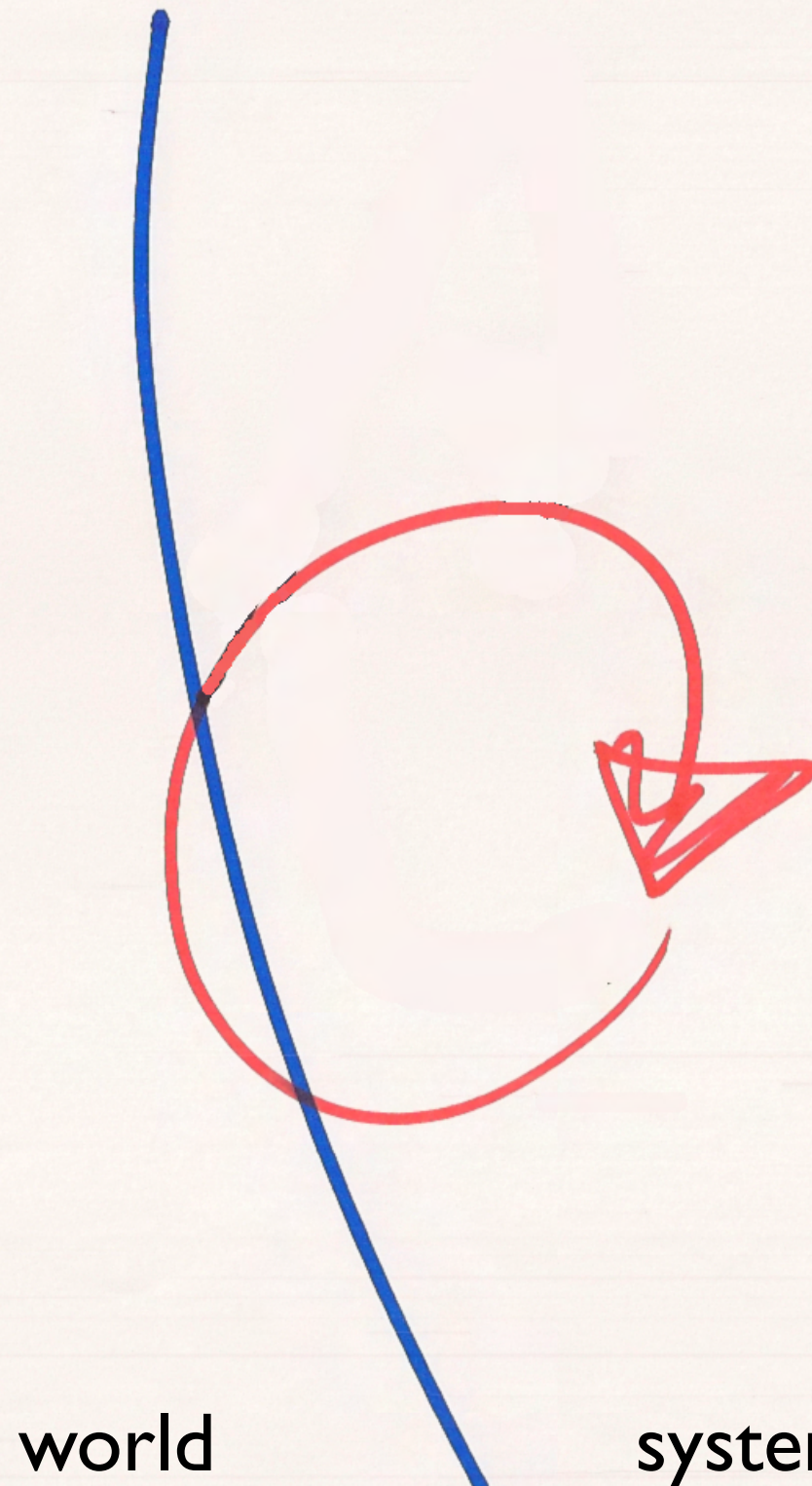
autonomy



interaction



interaction

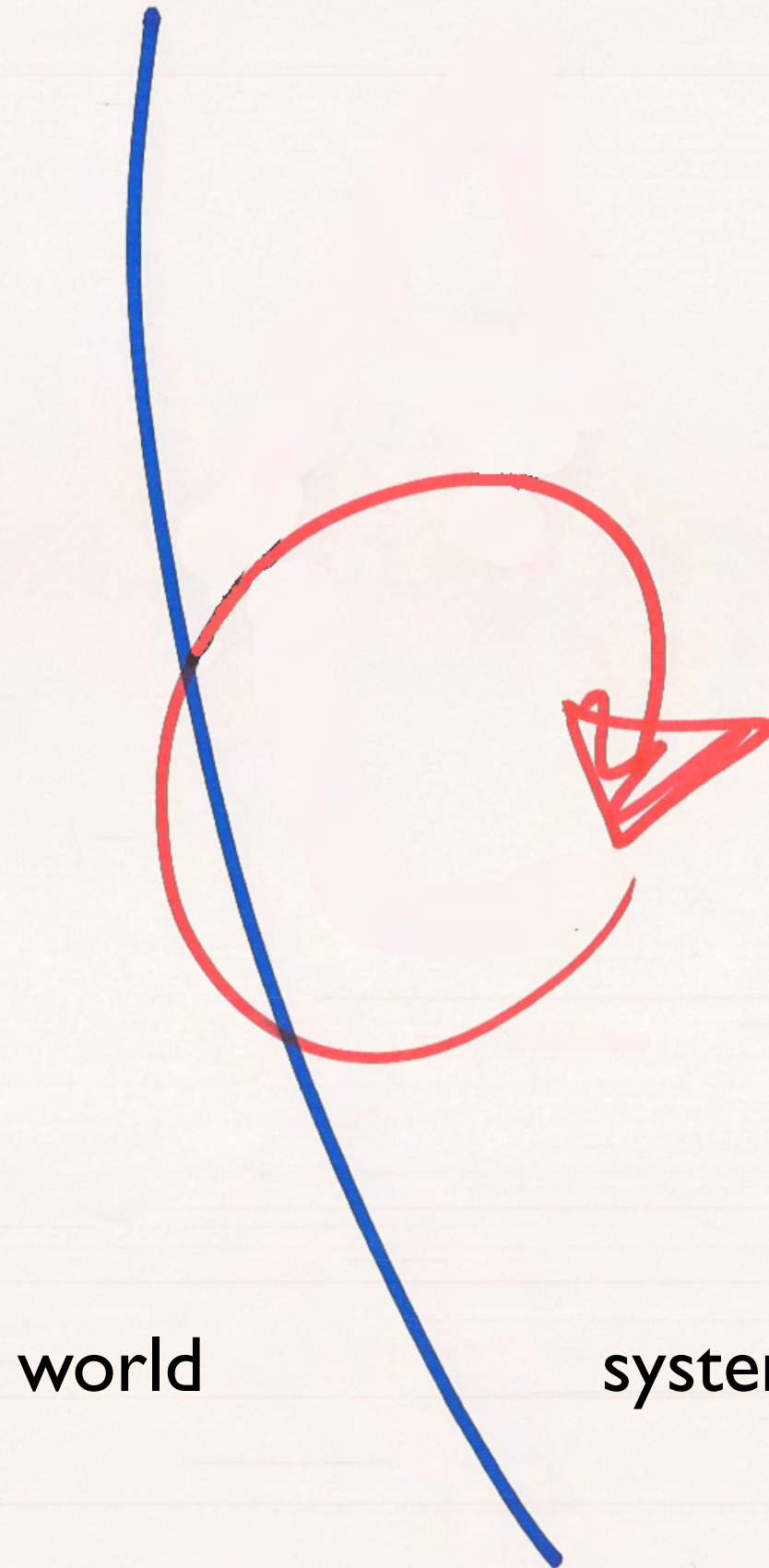


world

system

the blue line separates
the system from the world.

interaction

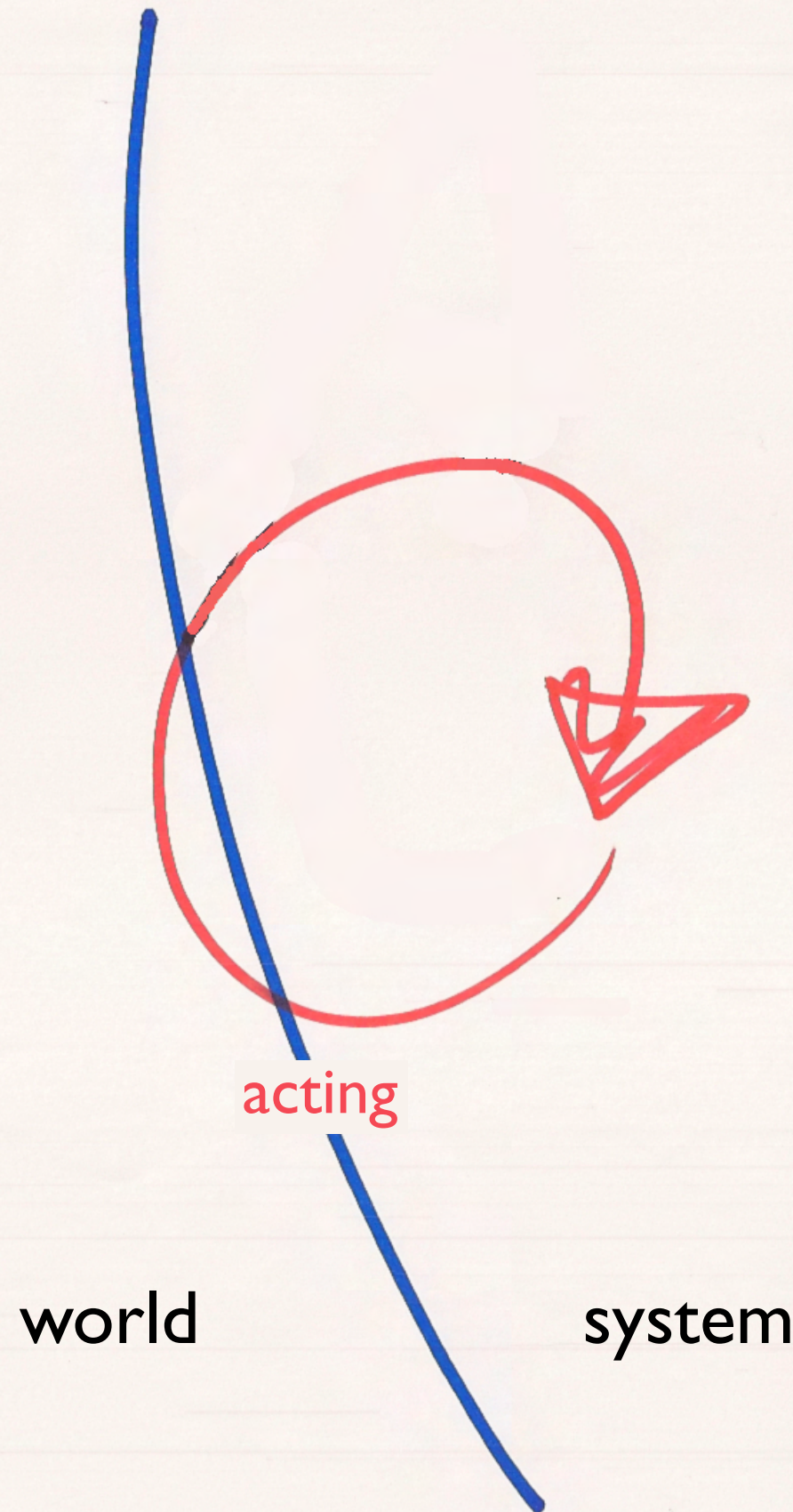


world

system

the red loop
represents interaction
with the world.

interaction

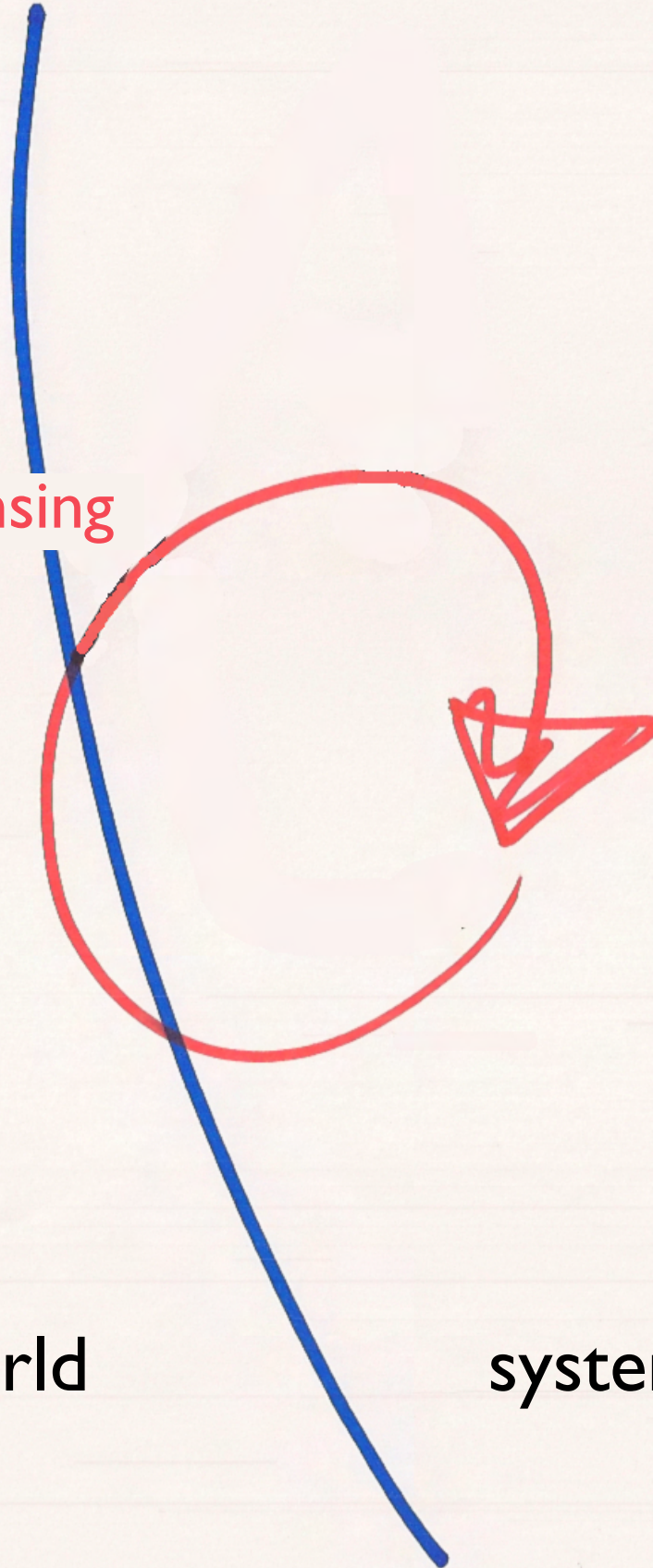


interaction

sensing

world

system

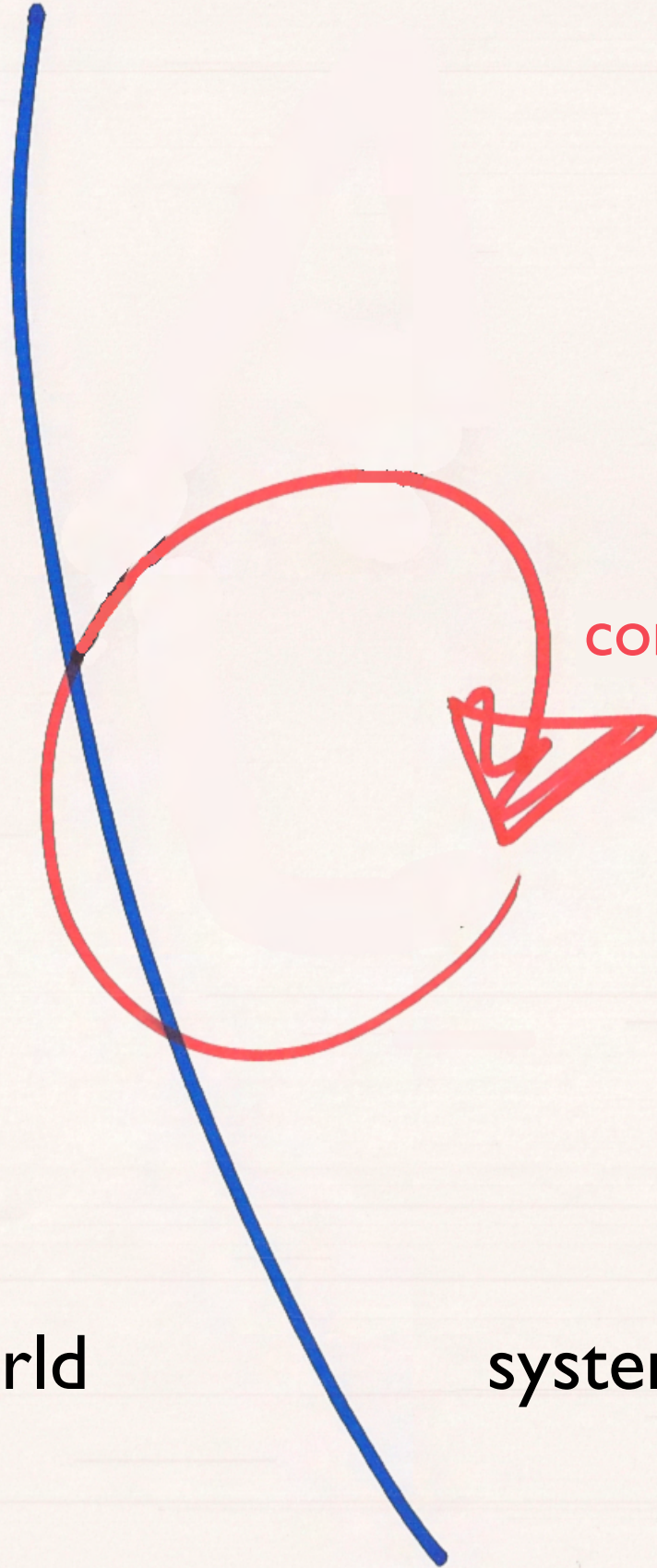


interaction

comparing

world

system



interaction

technological system—
maintaining room temperature

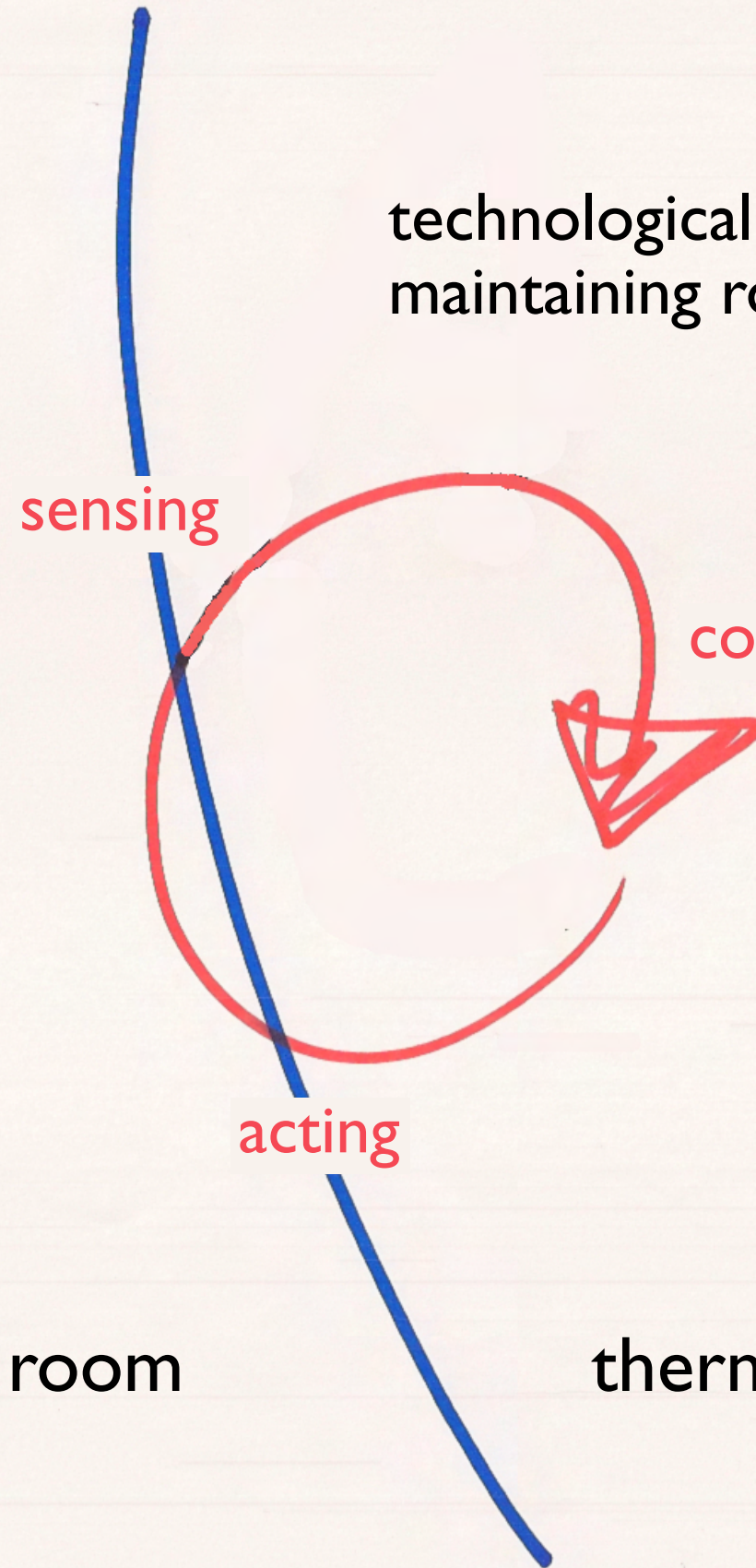
sensing

comparing

acting

room

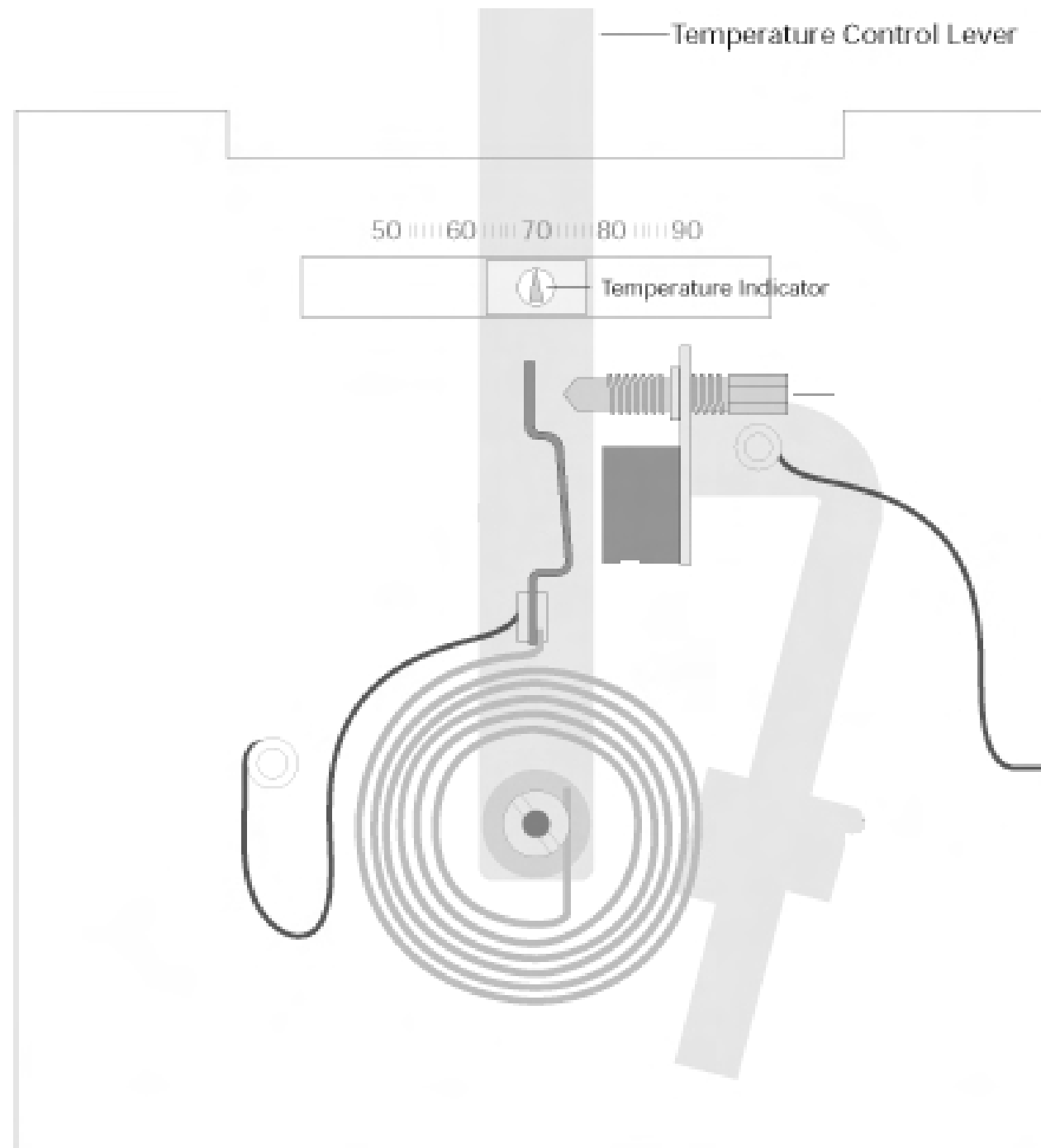
thermostat



first-order cybernetic system

technological system—
maintaining room temperature

thermostat
device



interaction

biological system—
maintaining body temperature

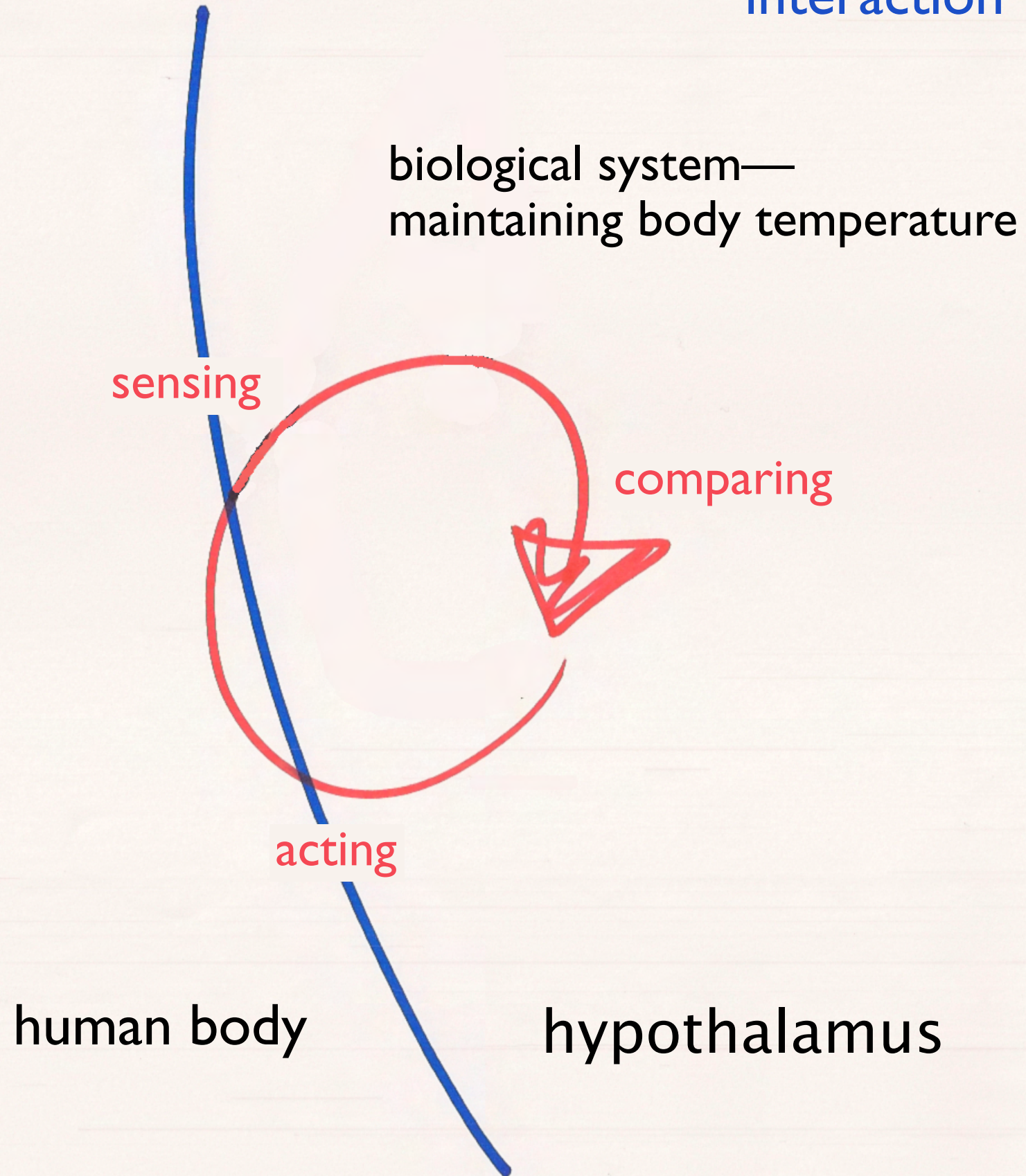
sensing

comparing

acting

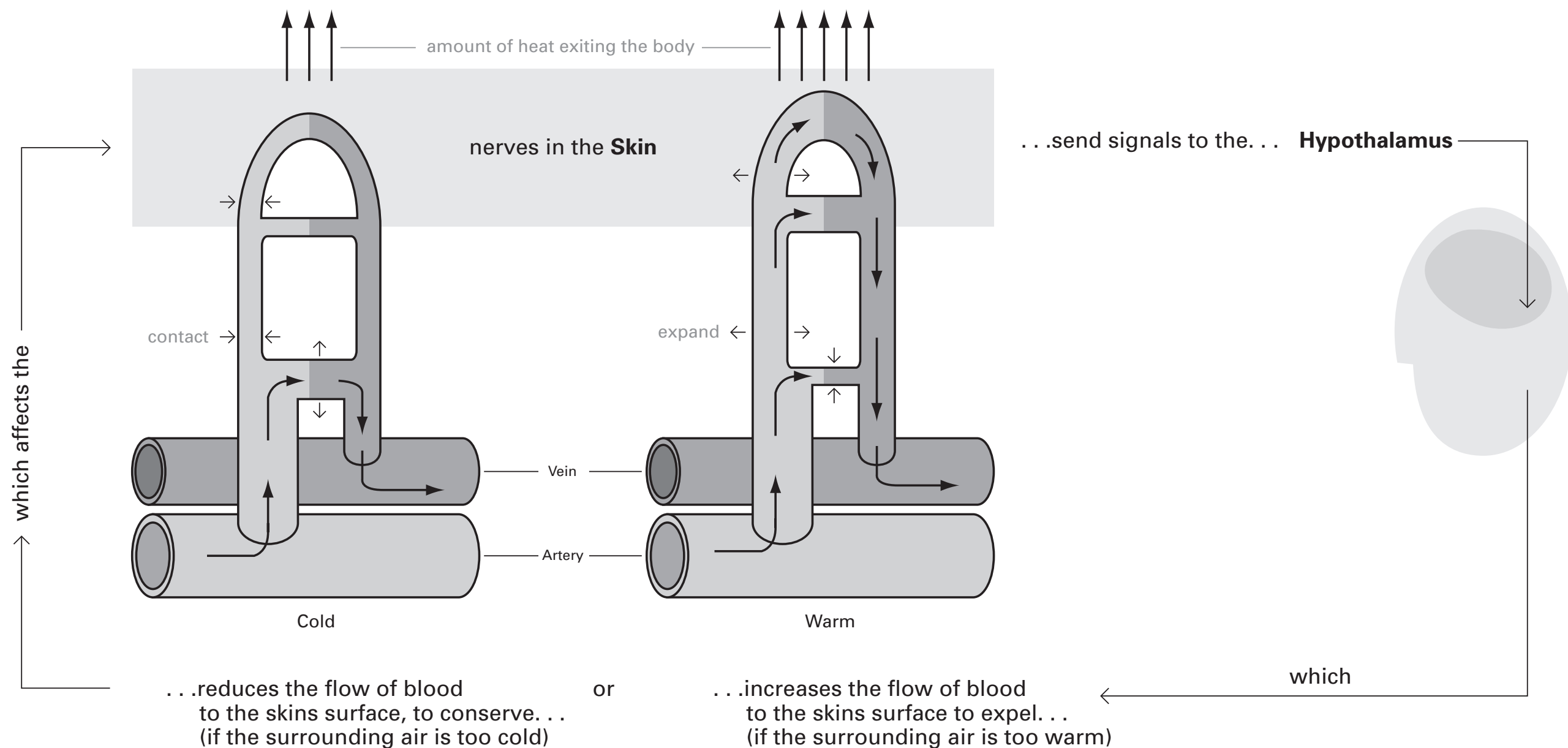
human body

hypothalamus



first-order cybernetic system

biological system—
maintaining body temperature



[emoção art.ficial 3.0] interface cibernética

APRESENTAÇÃO · PROGRAMAÇÃO · SIMPÓSIO · PESQUISA SITE

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apresentação

programação

participantes

cobertura



Messa di Voce (2003)

A instalação se vale de um sofisticado software de reconhecimento de voz para transformar cada nuance vocal em gráficos complexos e expressivos.

Golan Levin

Artista performático, desenvolve sistemas para a criação e manipulação simultânea de imagem e som.

Zachary Lieberman

Administra cursos de multimídia na Parsons School of Design.

[ver todas as obras](#)



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Evolving Sonic Environments (2006)

Vários dispositivos se comunicam por meio de ondas ultra-sônicas. Elas atingem vibrações que atuam na fronteira da audição humana, mas podem ser vistas em um telão graças a um sistema de visualização de dados.

Usman Haque

Leciona na escola de arquitetura de Bartlett, Londres.

Robert Davis

Artista e professor do departamento de psicologia da Universidade de Goldsmiths, Londres.

[ver todas as obras](#)



[emoção art.ficial 3.0] interface cibernética

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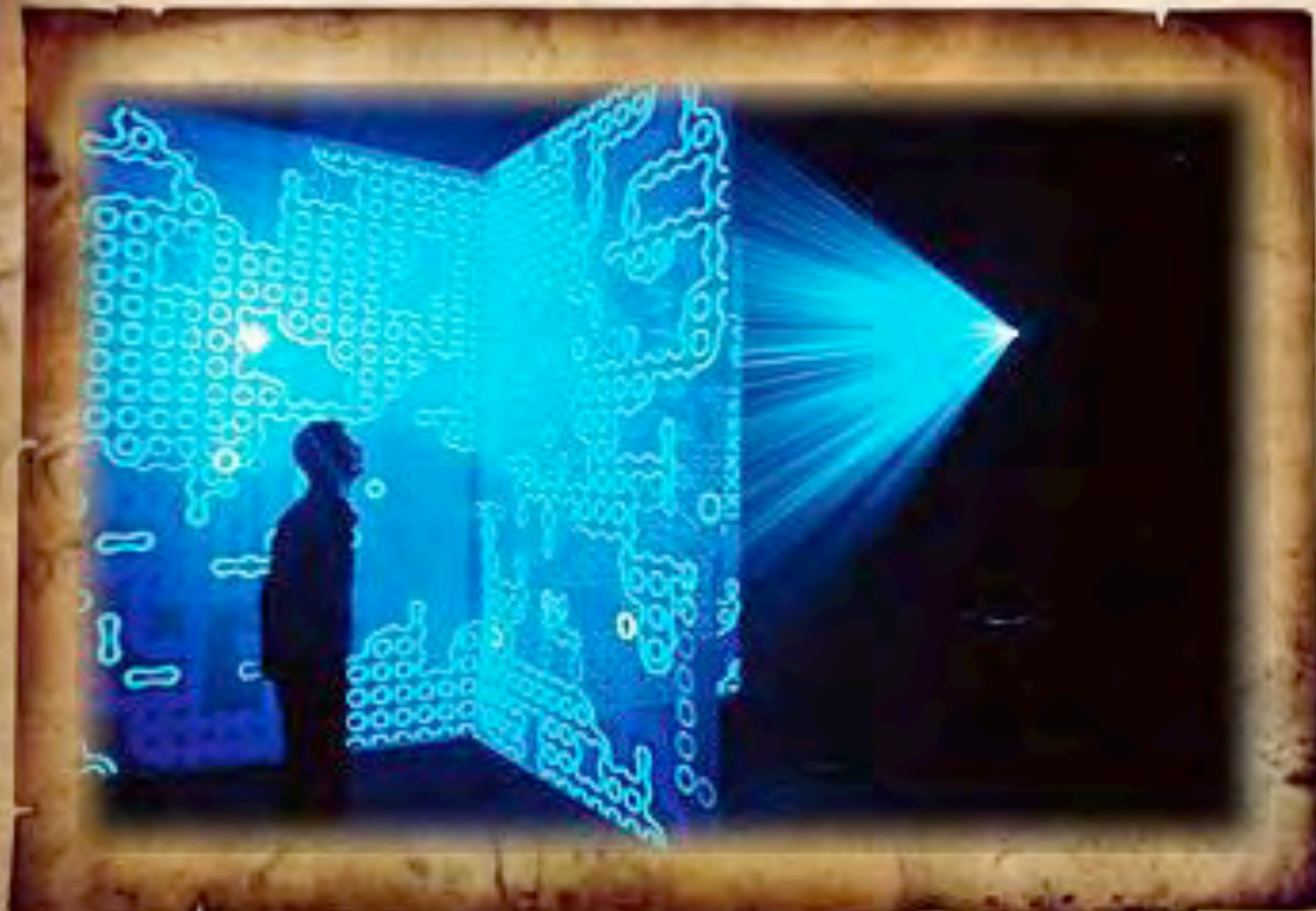
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Eden (2000)

Instalação evolucionária de vida artificial que forma um ecossistema. Os agentes são autômatos celulares que interagem entre si e com o ambiente.

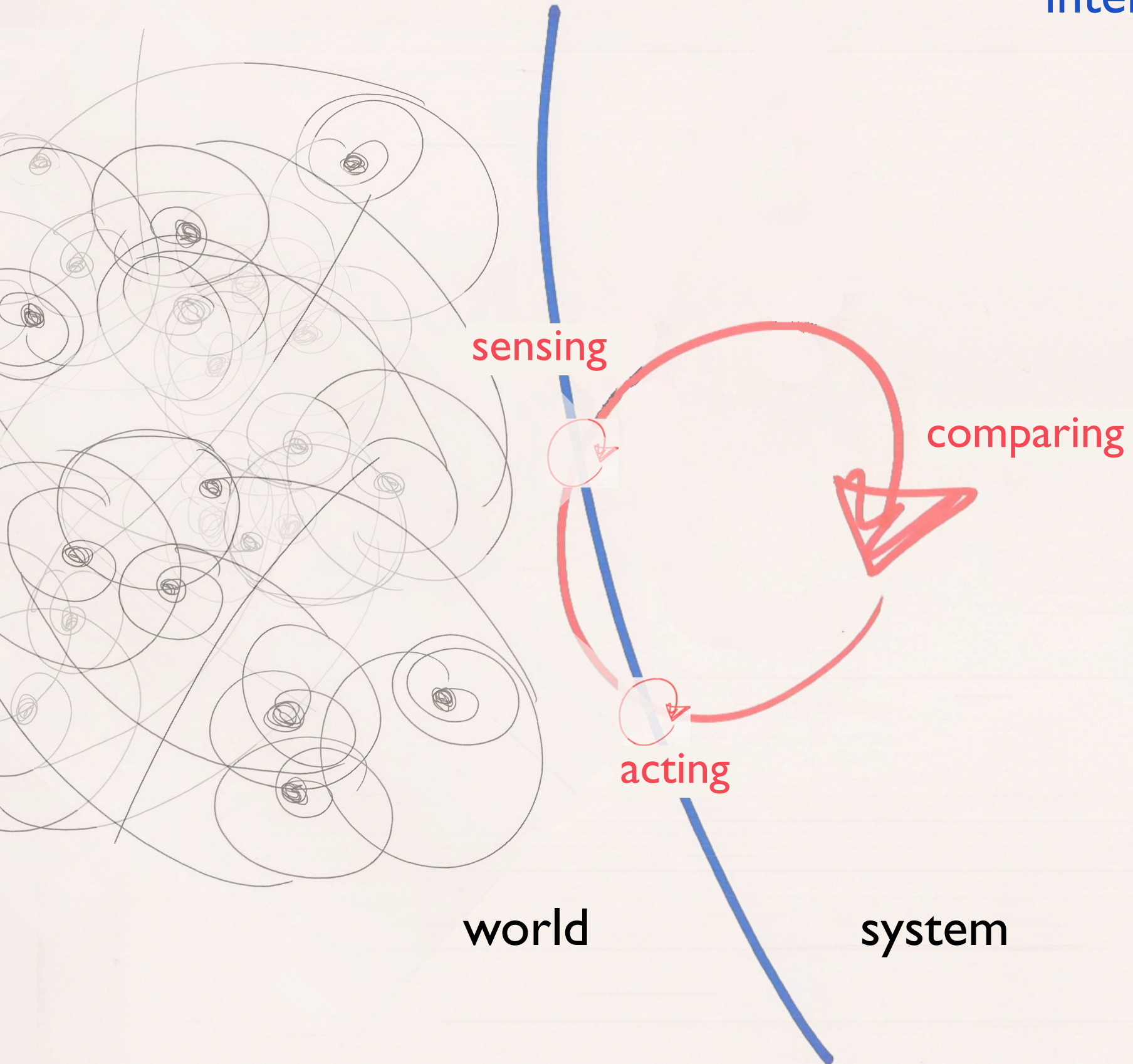
Jon McCormack

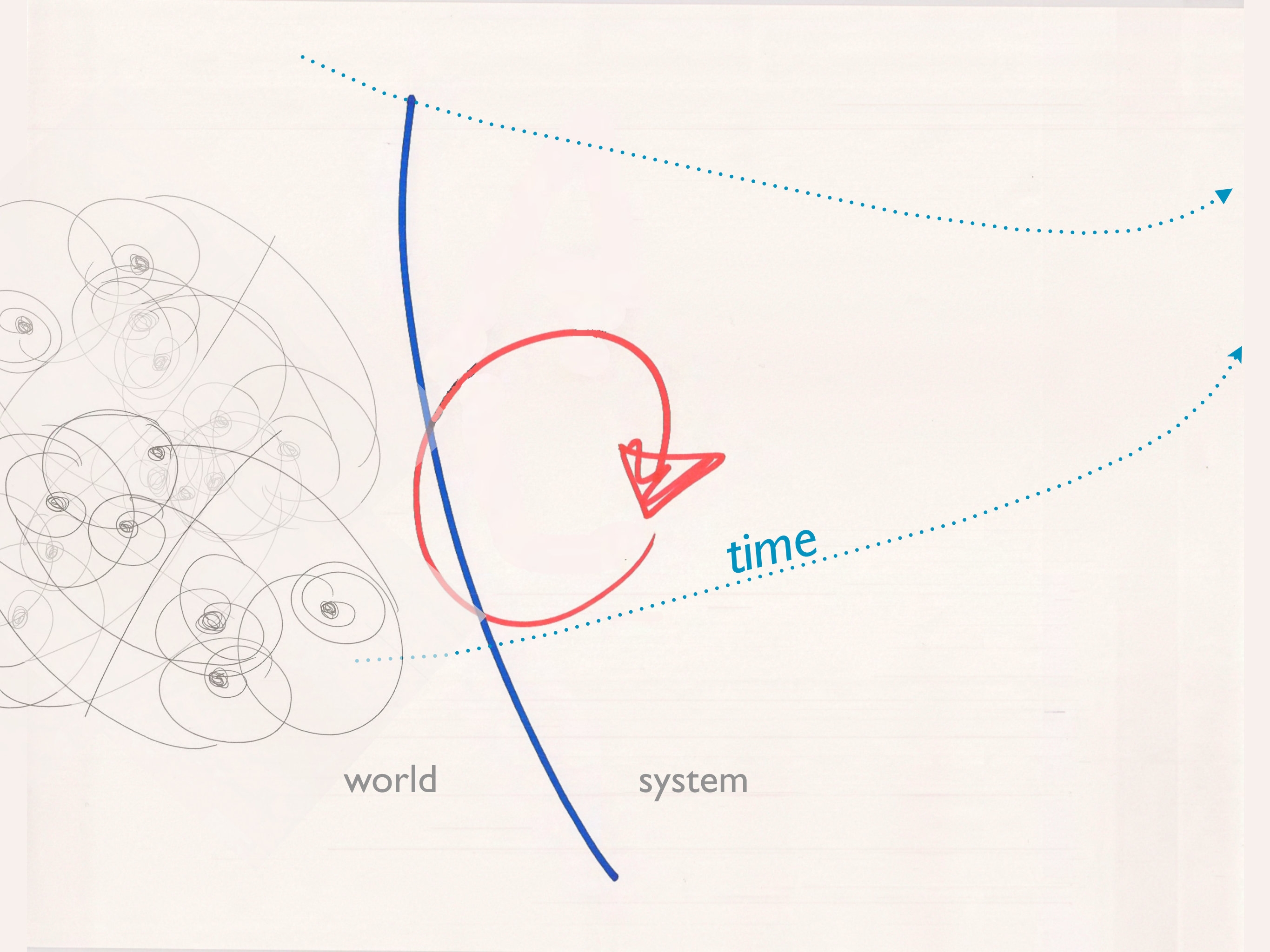
Artista australiano. É professor sênior de ciência da computação e co-diretor do Centro de Mídia Arte Eletrônica na Universidade de Monash, em Melbourne.

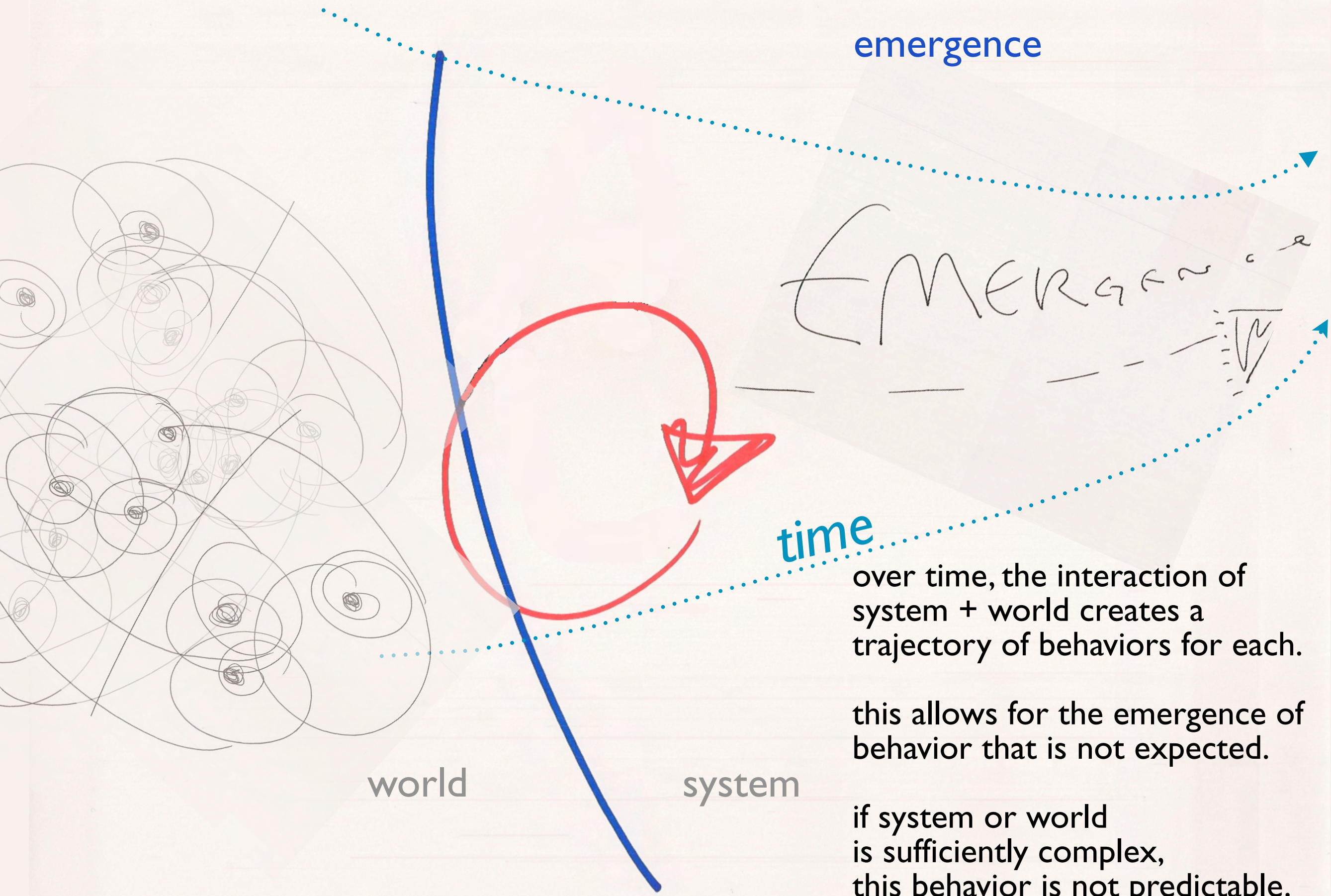
[ver todas as obras](#)



interaction







emergence

time

world

system

over time, the interaction of
system + world creates a
trajectory of behaviors for each.

this allows for the emergence of
behavior that is not expected.

if system or world
is sufficiently complex,
this behavior is not predictable.

emergência!

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emoção art.ficial 4.0
bienal internacional de arte e tecnologia

apresentação

Emoção Art.ficial 4.0 – Emergência!

No cotidiano, associamos a palavra emergência a hospitais e ambulâncias. Mas ela traz também outros significados menos óbvios, como realidades complexas surgindo da aplicação de regras simples. O cérebro, o formigueiro, as cidades e os softwares livres são exemplos de emergência sob este ponto de vista não convencional.

A quarta edição da Bienal Emoção Art.ficial, entre 2 de julho e 14 de setembro, reflete sobre a emergência no campo da arte cibernética. A exposição apresenta obras constituídas por elementos reais ou virtuais que, ao interagirem entre si, originam resultados complexos não previstos pelo artista. A construção de tais obras apresenta, dessa maneira, características emergentes que expandem os conceitos tradicionais de criação e autoria.

Além da exposição, será realizado o Simpósio Emoção Art.ficial 4.0, entre 2 e 5 de julho e com transmissão ao vivo pela internet, que tratará sobre o conceito de emergência. ON_OFF, espetáculos em live images, e performances de improvisação em dança completam a programação



emergência!

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trabalhos

The Bacterial Orchestra

Ultra-Nature

I/VOID/O

Performative Ecologies

Roots

Canções Submersas

Bachelor – The Dual Body

Reler

The Mutations of the White Doe

Bacterias Argentinas

PixFlow #2

Tumbling Dream Chambers

RAP3 – Robotic Action Painter

Mikado_Xplosion

youTAG

Spore

The Bacterial Orchestra, de Martin Lübcke e Olle Cornéer (Suécia, 2006)

Uma orquestra formada por *células auditivas* que se comportam como um organismo. Da interação entre elas resulta uma espécie de microfonia que, trabalhada por um software especial, possibilita evoluções sonoras que aludem a diferentes momentos históricos da música, que vão de Mozart a acid house.

Martin Lübcke é consultor na área de programação em computadores e doutor em física teórica. É também integrante da banda Máfã.

Olle Cornéer é DJ, produtor na área de música eletrônica e integrante de projetos como Dibaba (representado pelas gravadoras Gigolo Records e Plong!) e Dada Life (Breastfed, Pickadoll). Também escreve artigos sobre música para a mídia especializada.



emergência!

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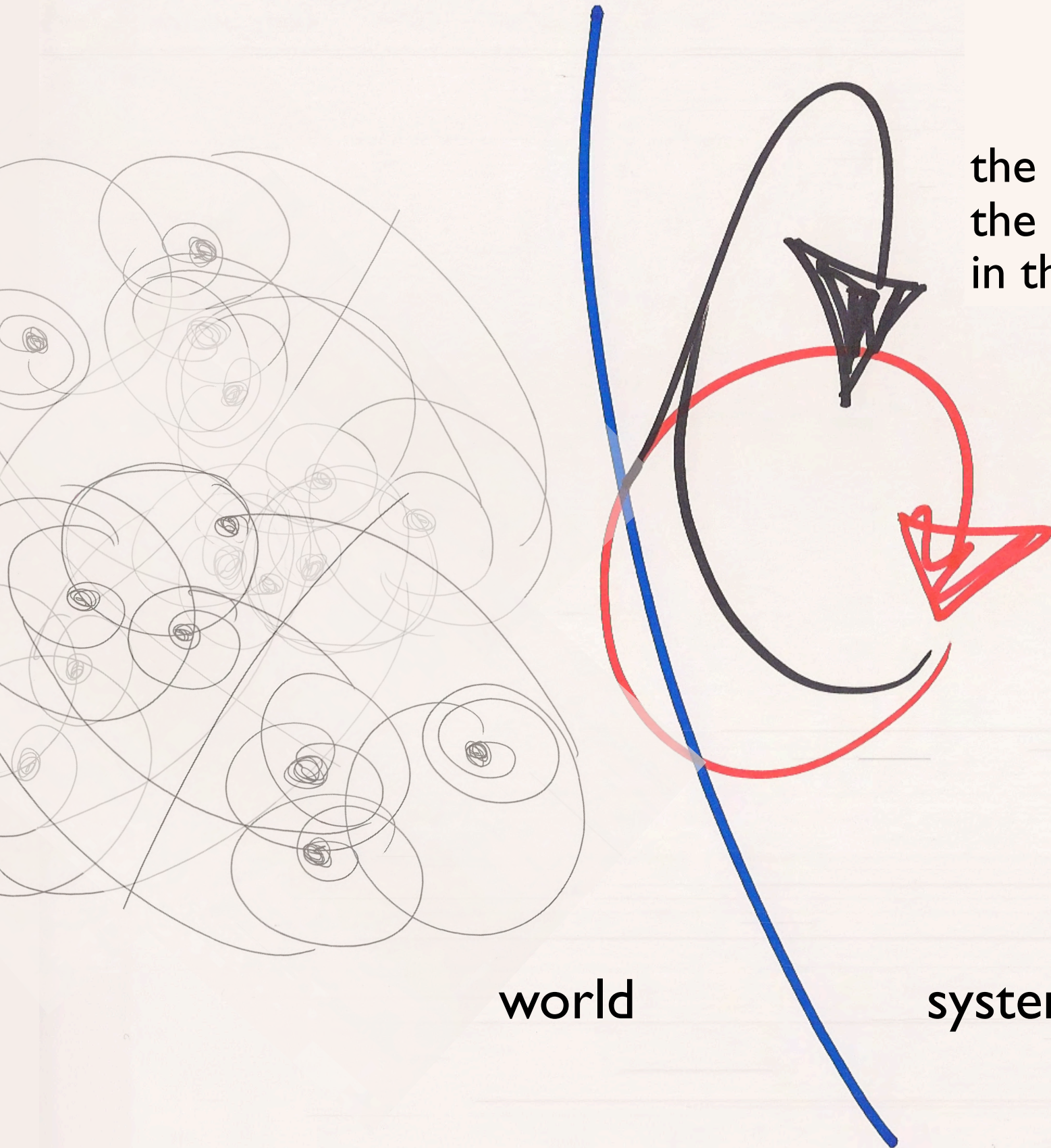
Spore

Performative Ecologies, de Ruairi Glynn (Irlandês, 2007)

Uma comunidade de quatro robôs orienta-se por meio de um software de reconhecimento de padrões faciais. A obra examina o potencial interativo (e não apenas responsivo) de elementos robóticos ao se engajar em formas de comunicação performativas e não-verbais com o público.

Ruairi Glynn é membro do Interactive Architecture na Bartlett School of Architecture, em Londres, grupo coordenado pelos professores Stephen Gage e Ranulph Glanville. É também "associate lecture" em design interativo na Central Saint Martins.





the black loop represents
the system's action + the action's result
in the world.

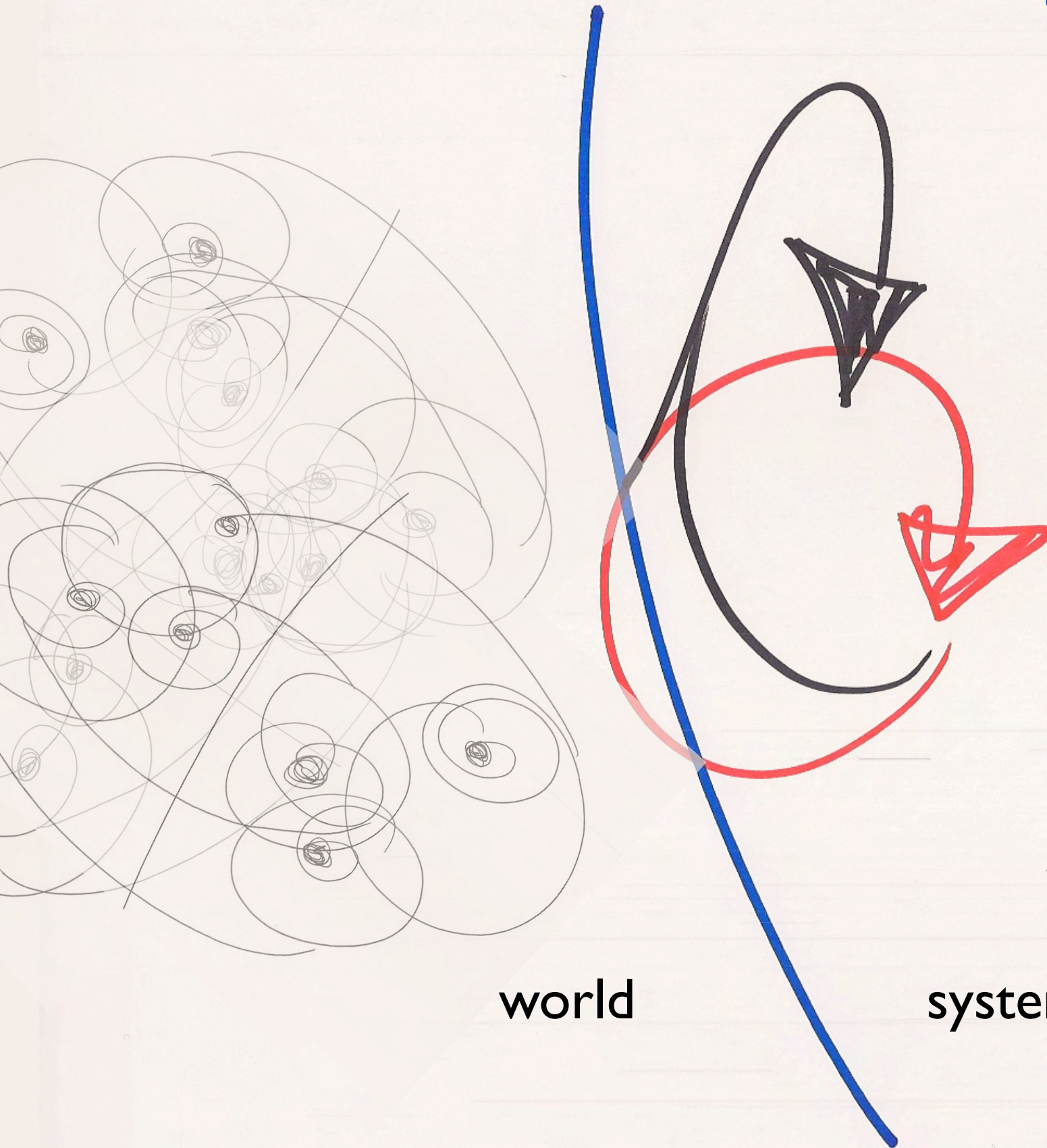
outcomes are assessed.

the black loop can change
the goal of the red loop
to something else.

world

system

autonomy



if a system learns from its interaction,
it can repeat successful behaviors.

if it repeats success,
it operates independently of time.

if it operates independently of time,
it becomes “autonomous”.

“auto” = self

“nomos” = law

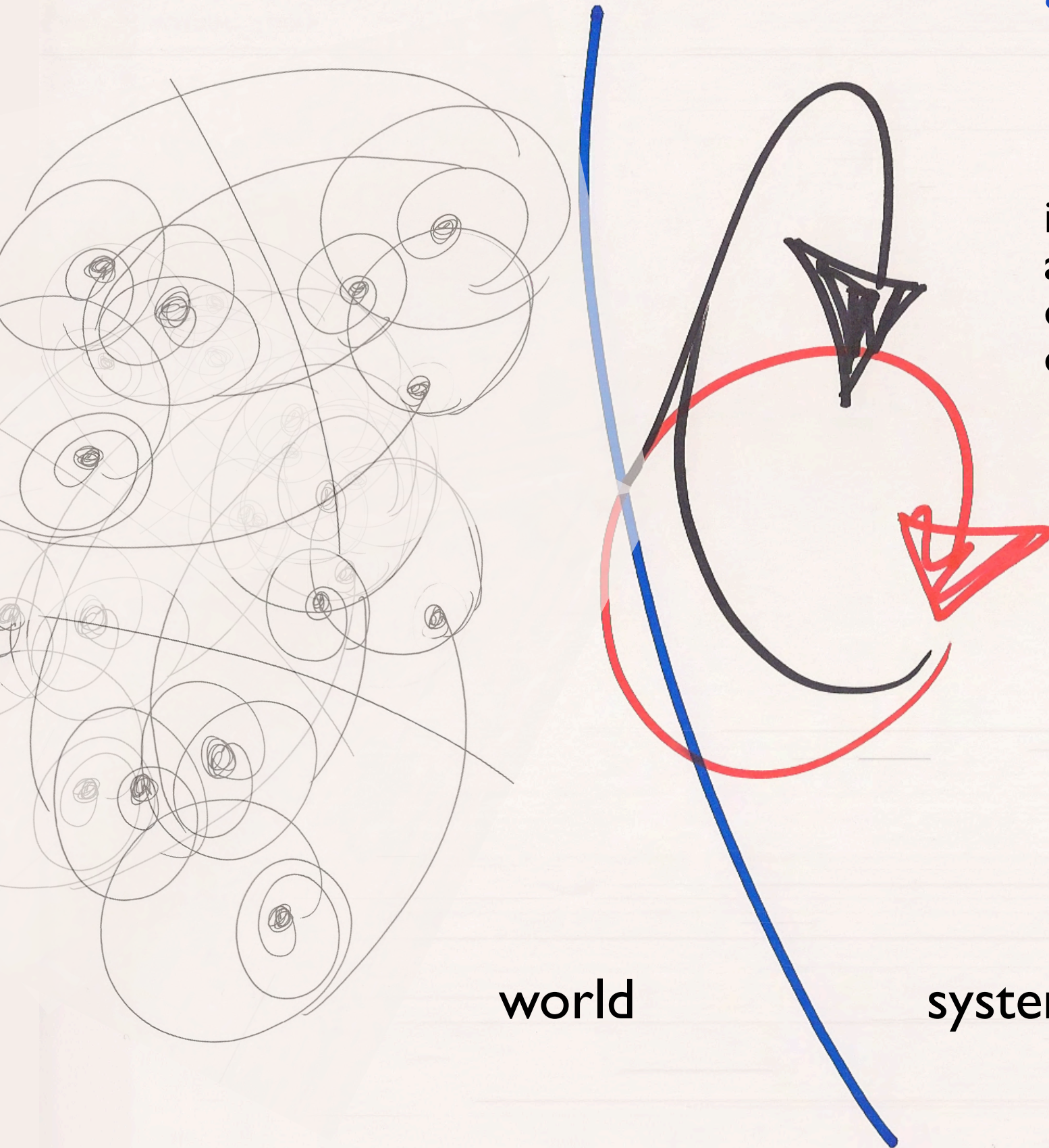
an autonomous system sets its own laws.

world

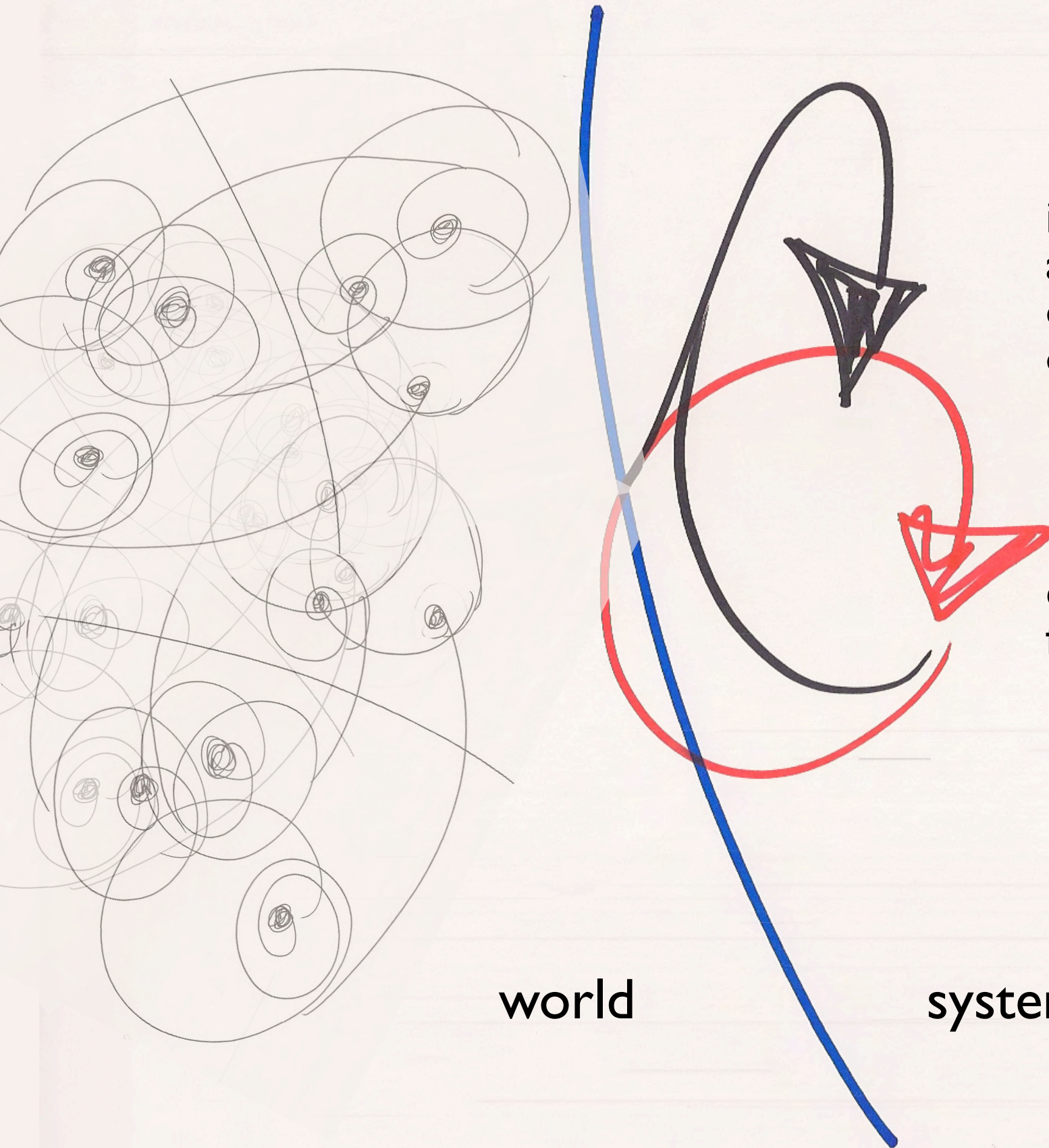
system

autonomy

in a changing world,
a system must continue to learn
or it may fail to survive
or succeed in its goals.



interaction | autonomy

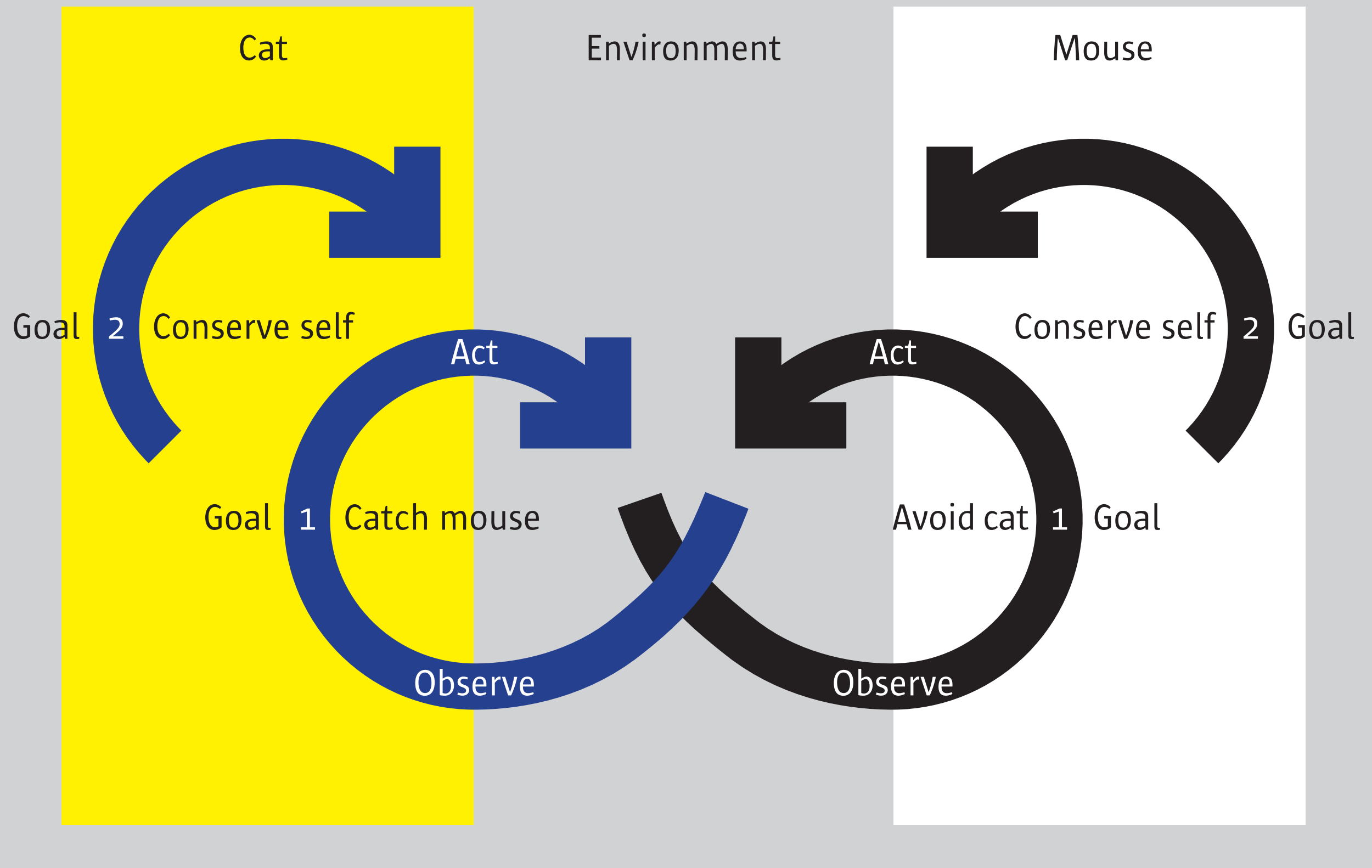


in a changing world,
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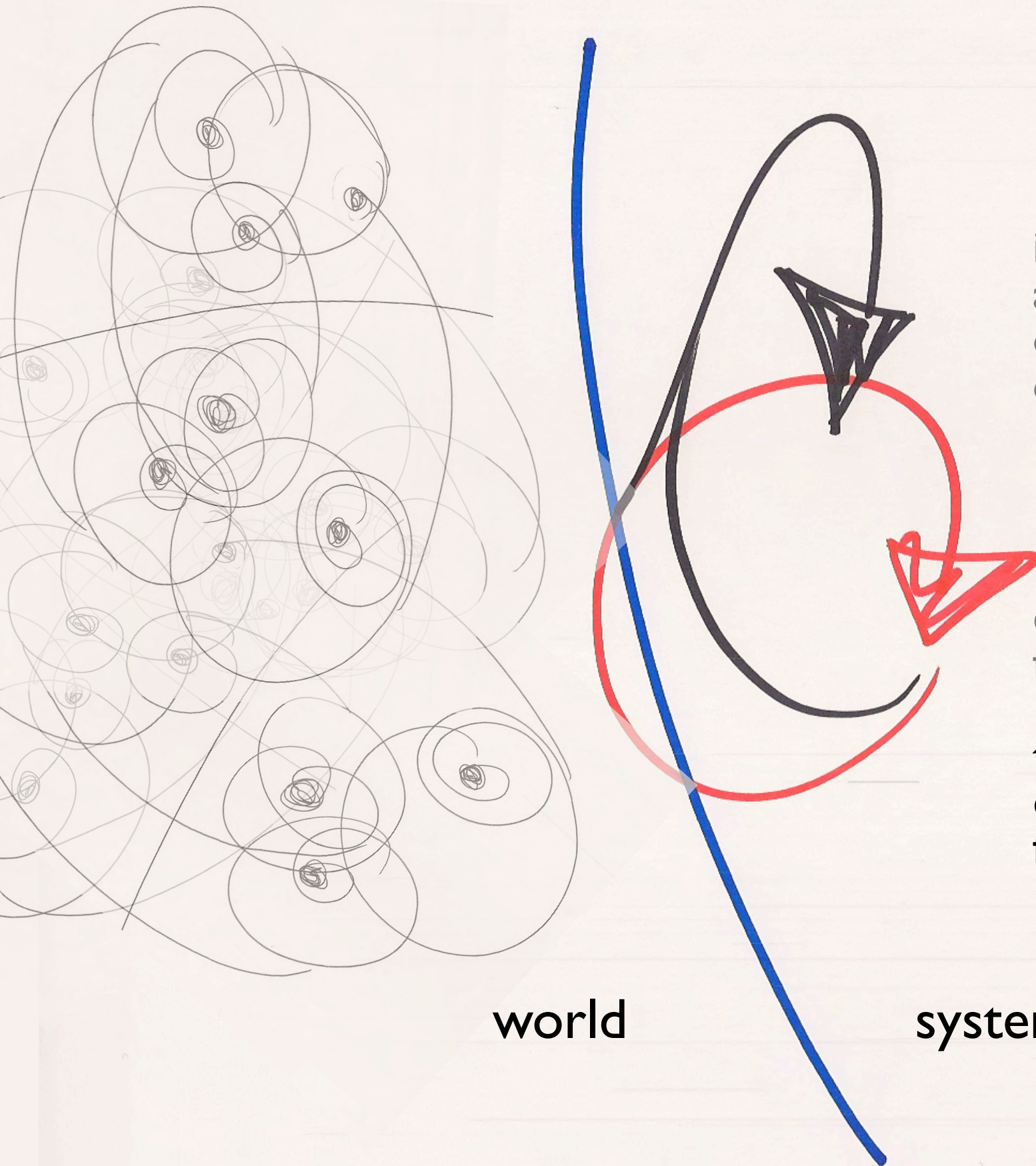
continued interaction is necessary
for the system to continue to learn.

world

system



interaction | autonomy



world

system

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continued interaction is necessary
for the system to continue to learn.

thus, autonomy requires dependence—
dependence on the same world
from which it maintains its autonomy.

interaction | autonomy

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world

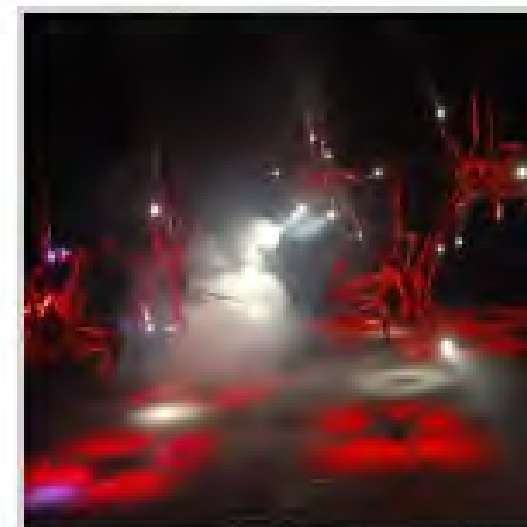
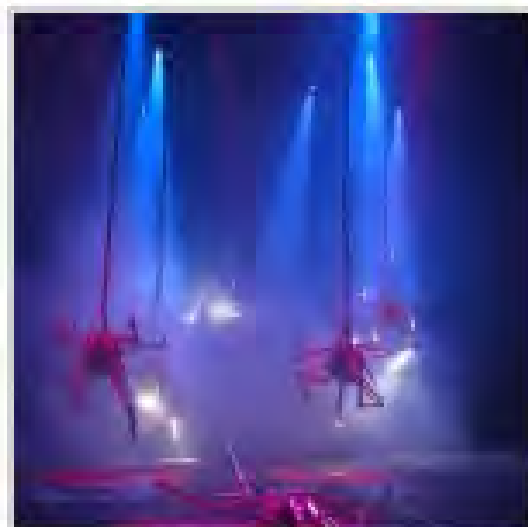
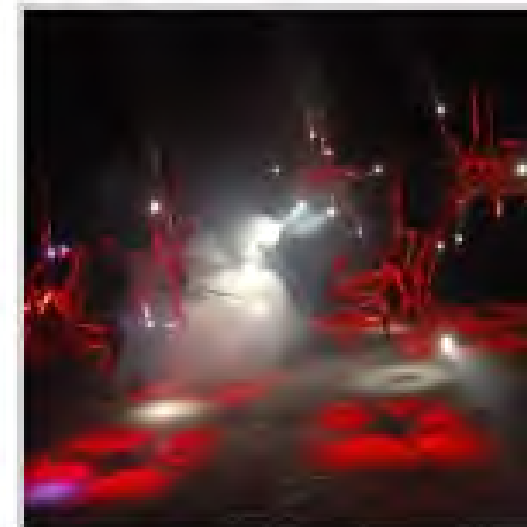
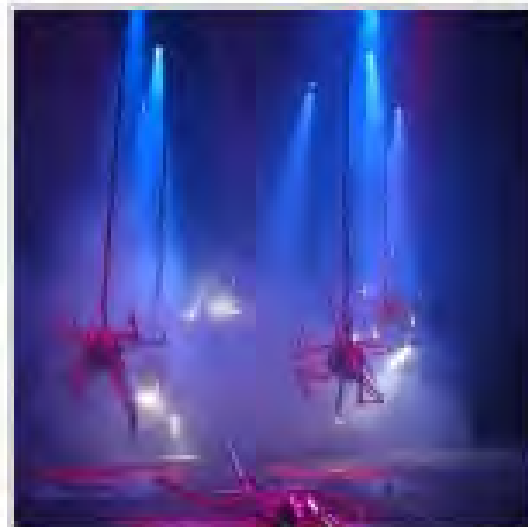
system

paradox of autonomy

Hysterical Machines

by Bill Vorn (Canada, 2006)

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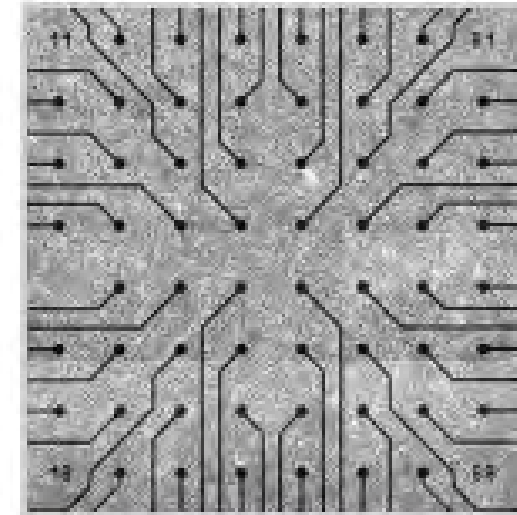
Five arthropod robots make organic but twitchy movements: an unexpected behavior, since it is realized by machines which, supposedly, should be merely functional. This work aims to evoke the spectator's empathy for the robotic entities, which in fact are more than a handful of metallic structures.

Bill Vorn has been dedicated to robotic art since 1992. A professor at Concordia University, Canada, where he teaches electronic art, he is in charge of the research laboratory for robotic art creation (Alab) at Hexagram Institute, also in Canada.

Silent Barrage

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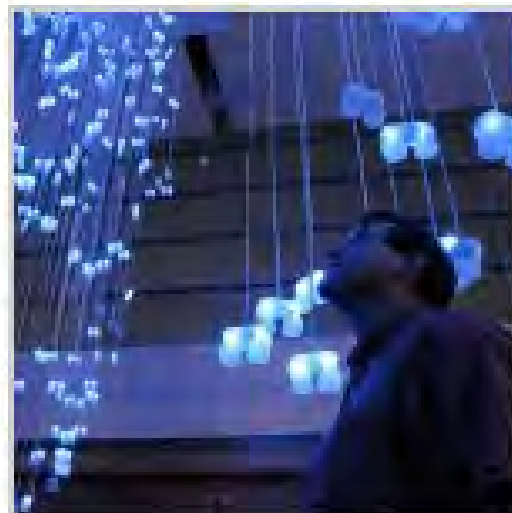
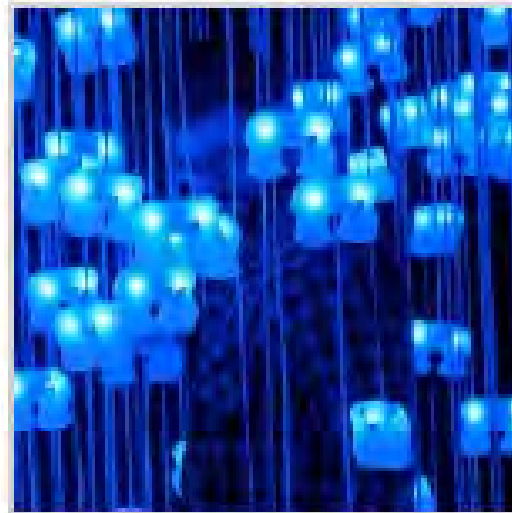
by SymbioticA (Australia - United States, 2008–2009)



Robots move vertically along various columns, leaving traces that are actually the representation of the firings of neurons cultivated in a glass recipient located thousands of kilometers away. Parallel to this, sensors located around the installation capture the movements of the public, which, in turn, also move the robots about.

The collective **SymbioticA** is made up of artists Guy Ben-Ary and Philip Gamblen, composer Brett Murray, engineers Peter Gee, Nathan Scott and Stephen Bobic, as well as Dr. Steve Potter, a neuroscientist with the laboratory of neuroengineering at Georgia Tech, Atlanta, United States. Installed at the School of Human Anatomy and Biology of the University of Western Australia, the group blends art with science, encouraging critical thinking on the ethical and cultural questions involved in the manipulation of life.

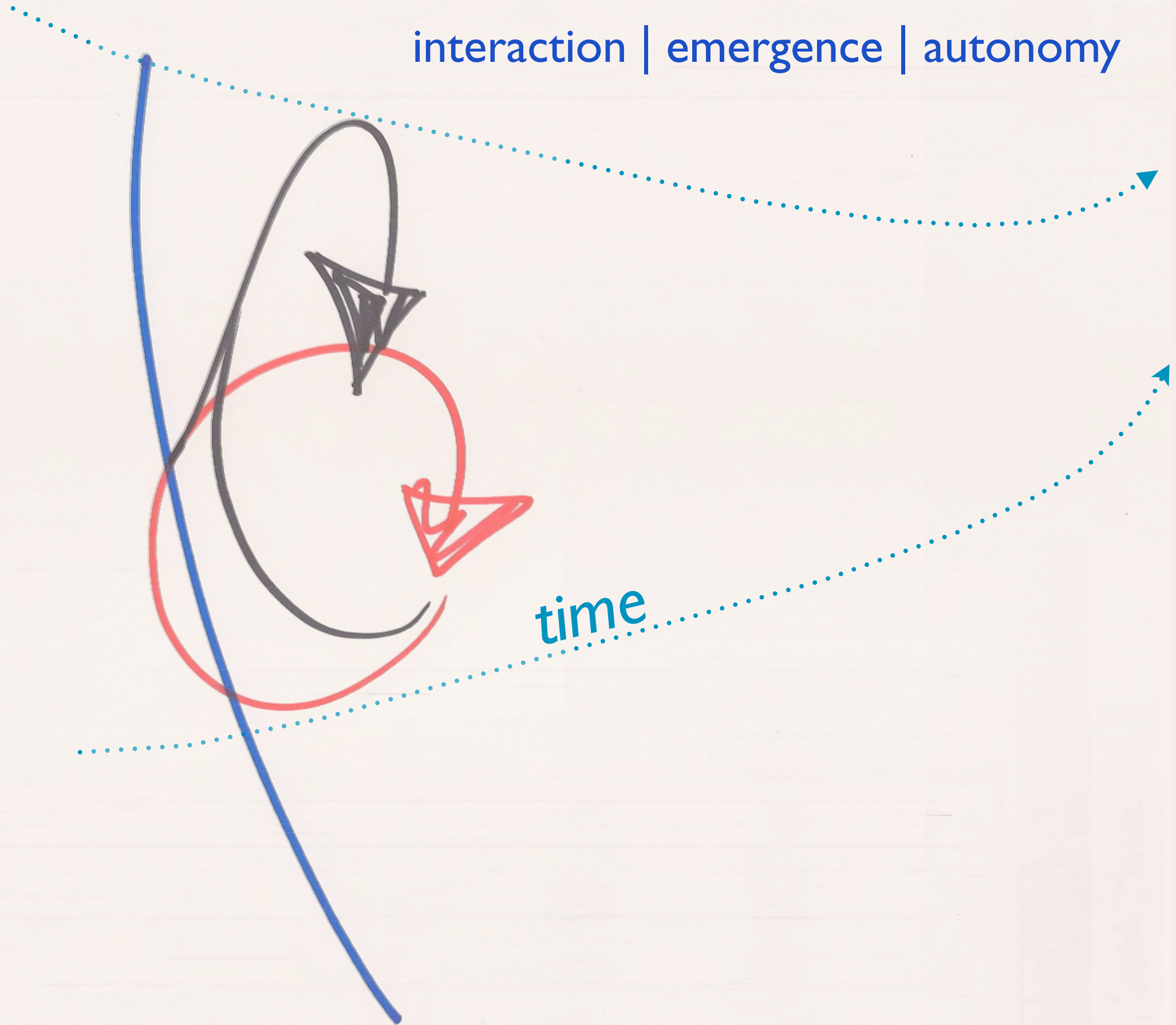
by **Adam Brown and Andrew H. Fagg** (United States, 2006)



A network of sensors is linked to about one thousand devices that sing like living beings. Each one of these "lifeforms," called a "bion," communicates with the others and reacts to the presence of the spectators. The installation's title refers to a primordial biological energy unit, identified as "orgone" by scientist Wilhelm Reich.

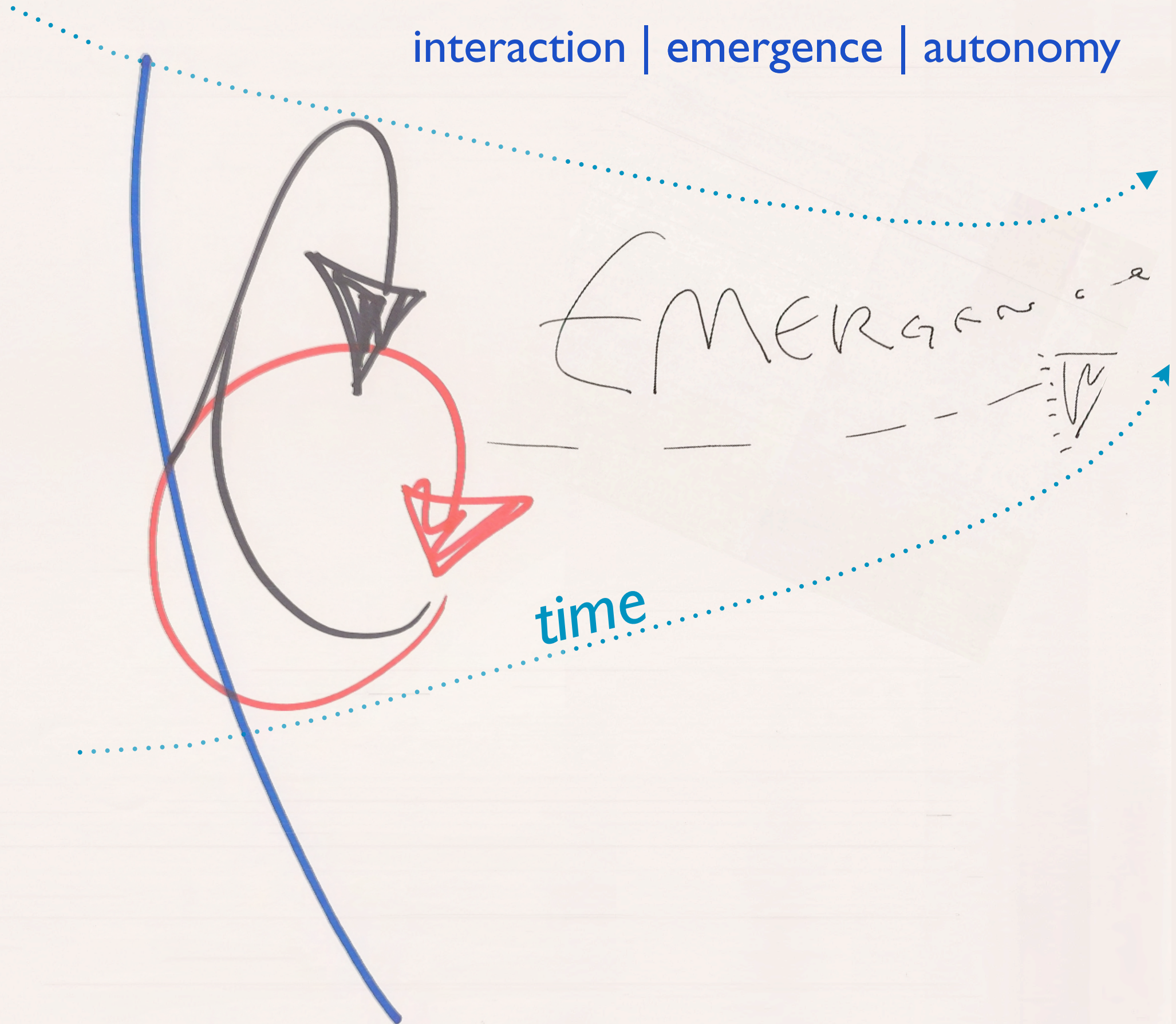
Artist **Adam Brown** works on the border between science, technology and art. He is interested, more specifically, by the relations between humans and synthetic life forms. **Andrew H. Fagg** is a doctor of computer science and works as an associate professor of bioengineering at the University of Oklahoma, United States.

interaction | emergence | autonomy



time

interaction | emergence | autonomy



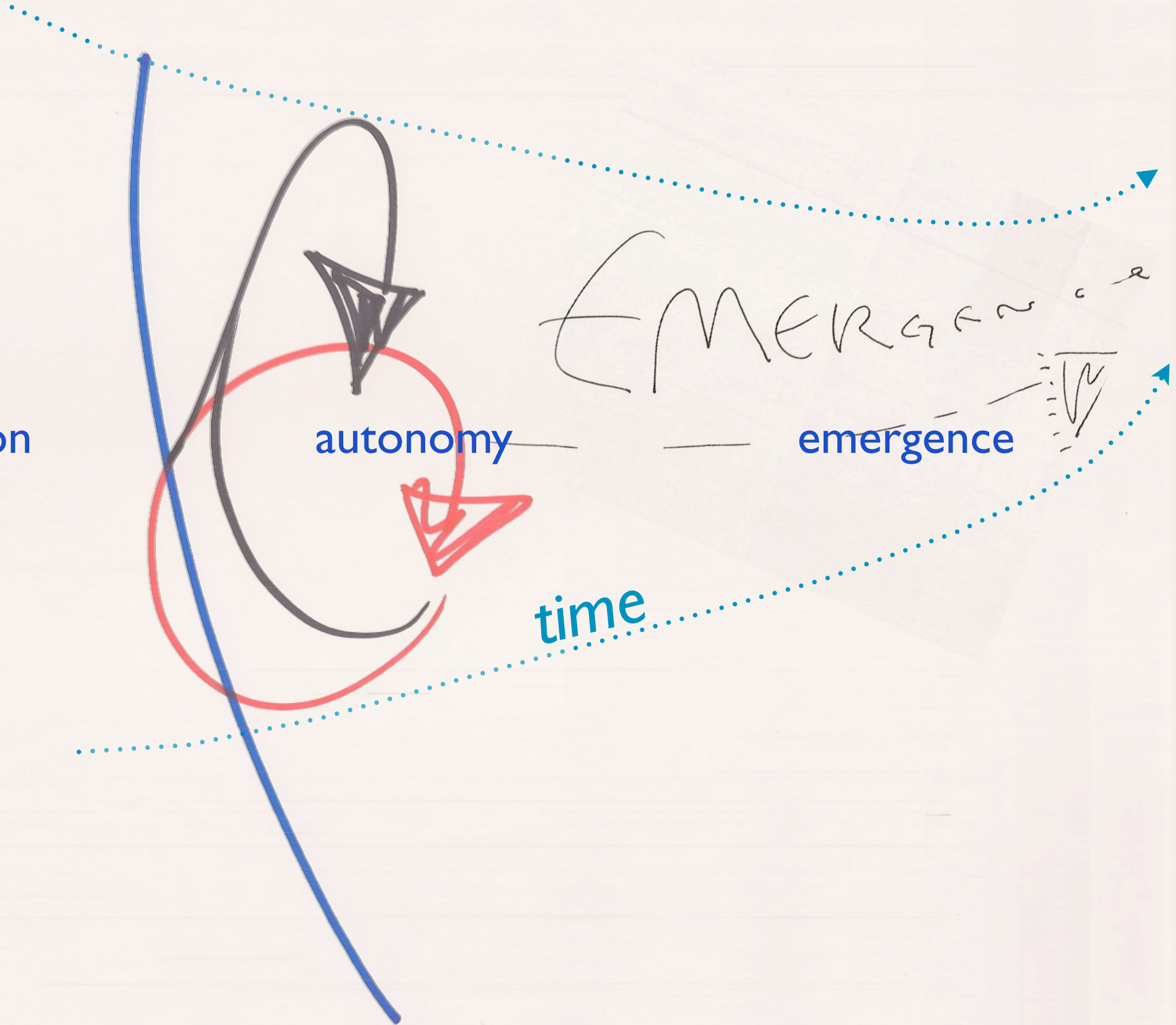
interaction

autonomy

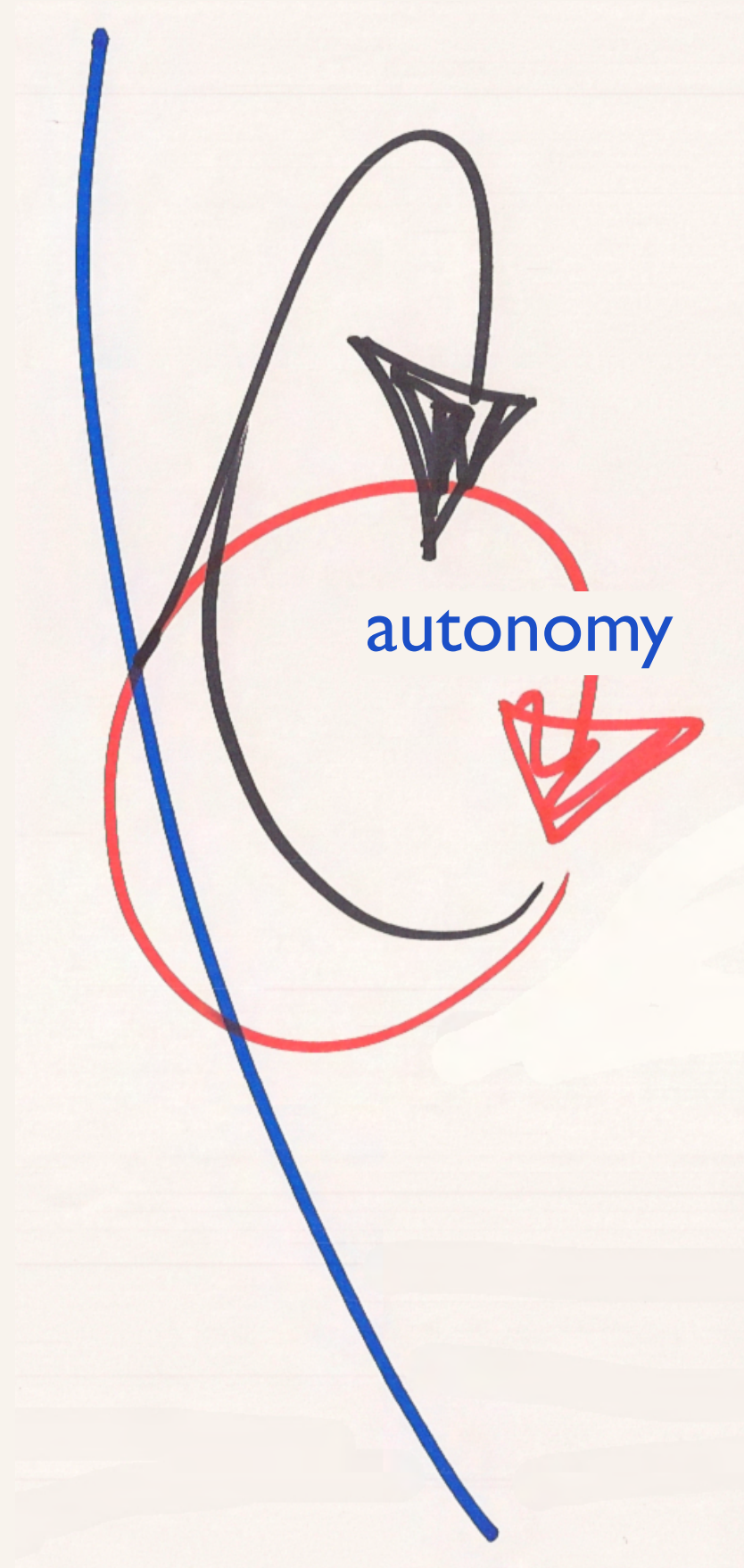
time

emergence

EMERGENCE

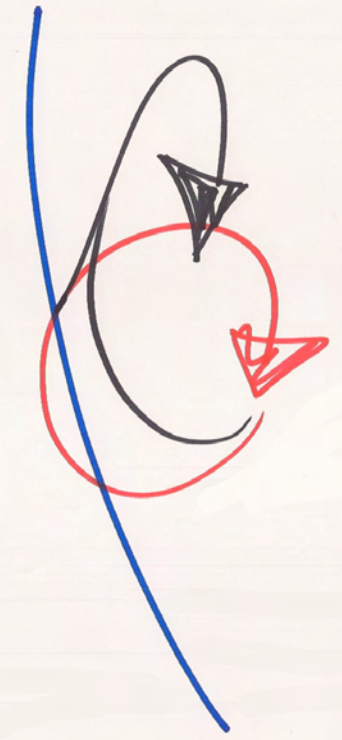


interaction



autonomy

emergence



interaction

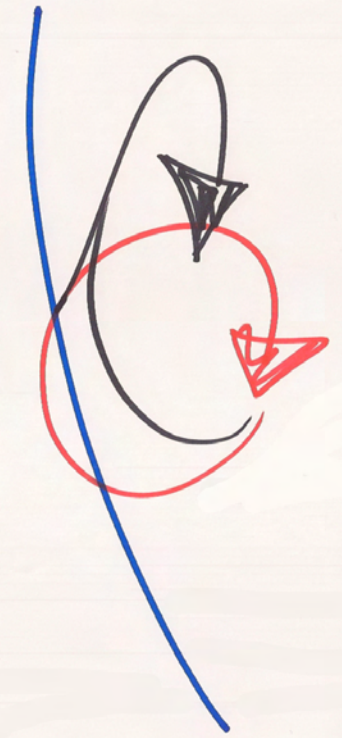
autonomy

emergence

interaction

emergence

autonomy



frameworks

interaction

emergence

autonomy



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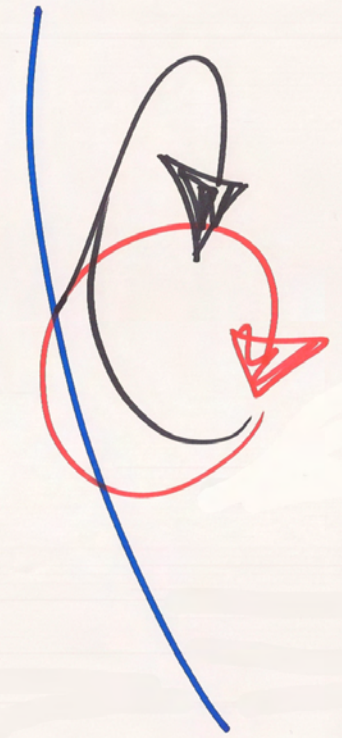
interaction



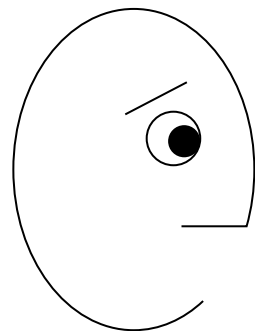
conversation

emergence

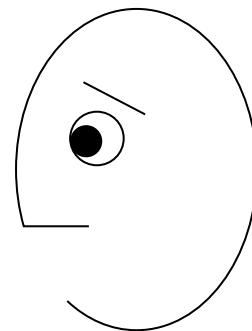
autonomy



what is conversation?

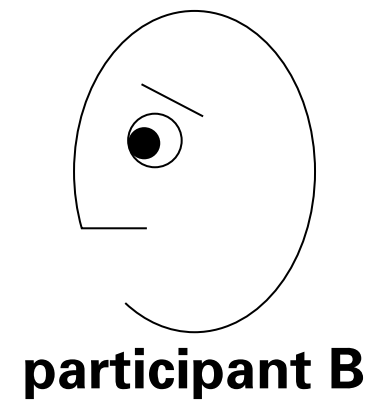
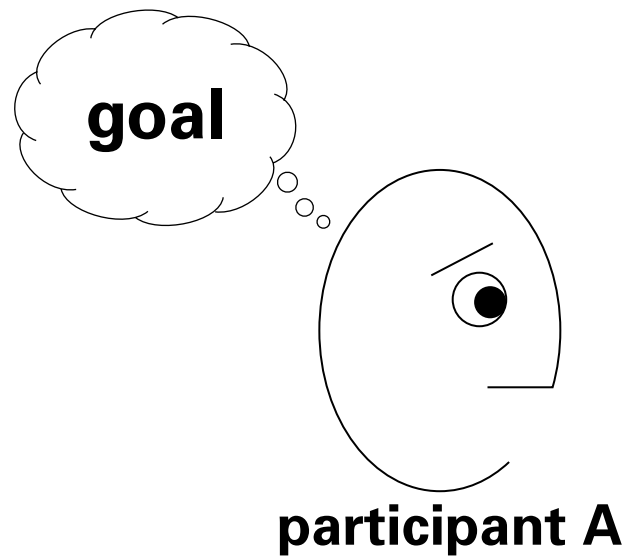


participant A

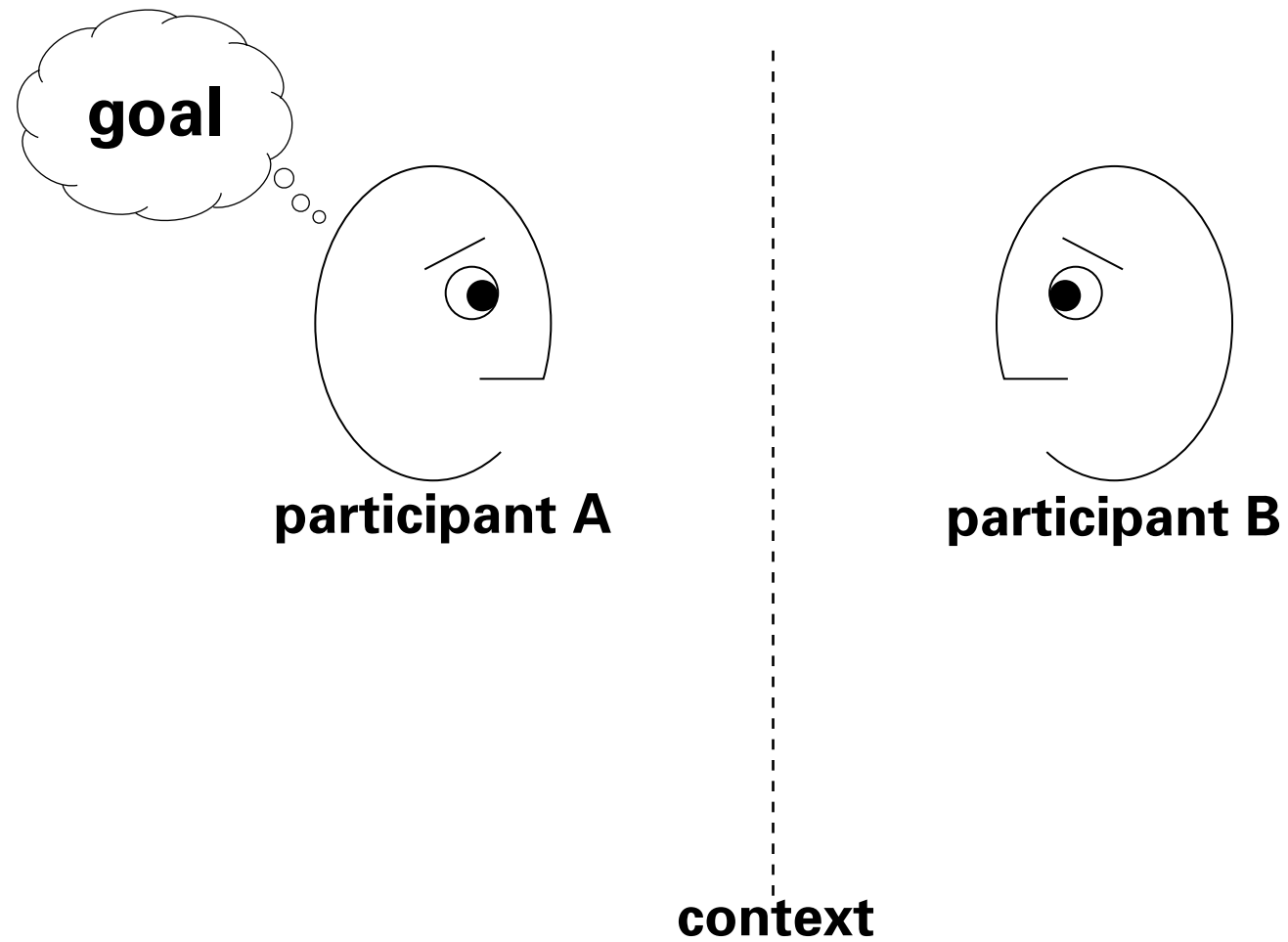


participant B

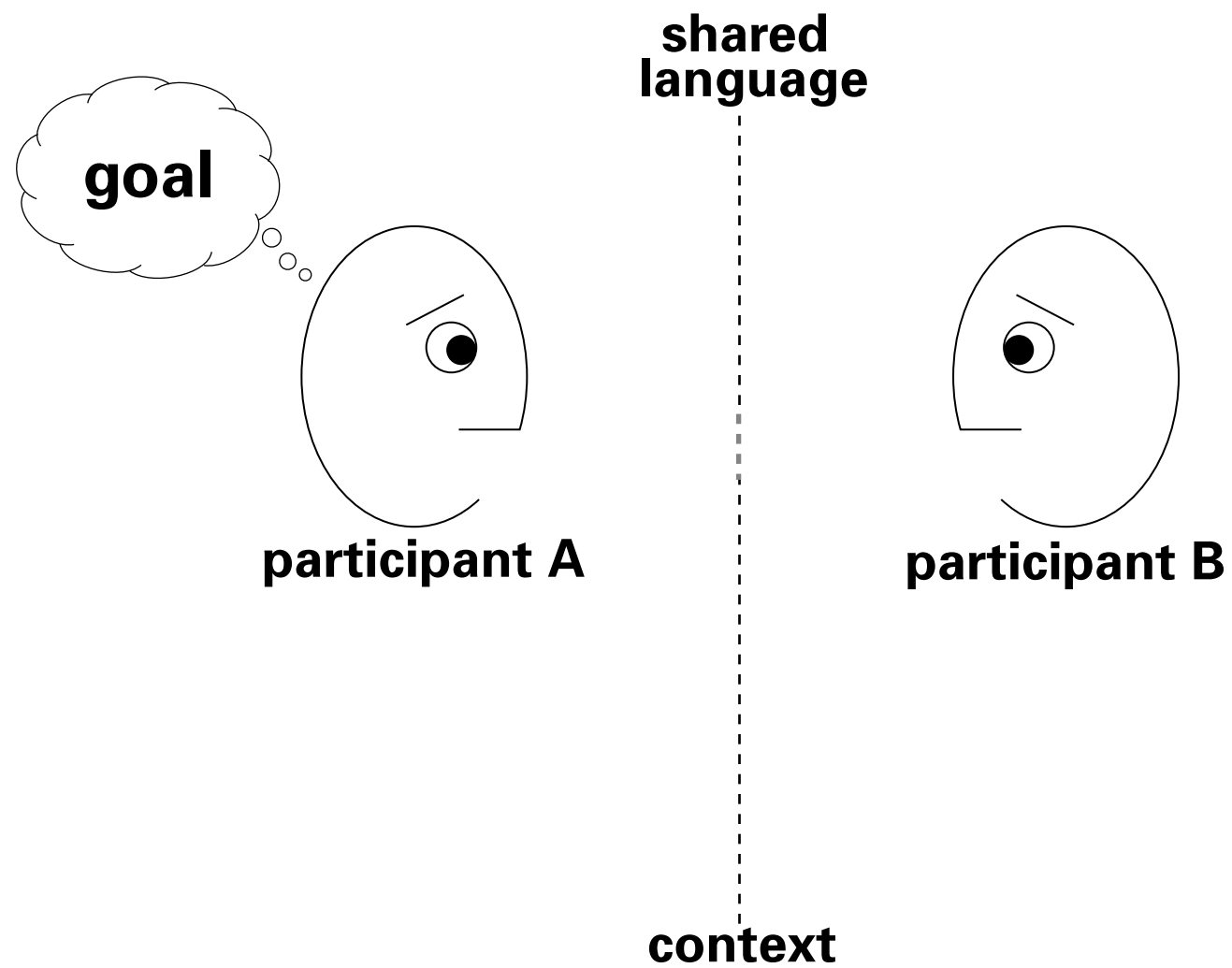
a participant has a goal



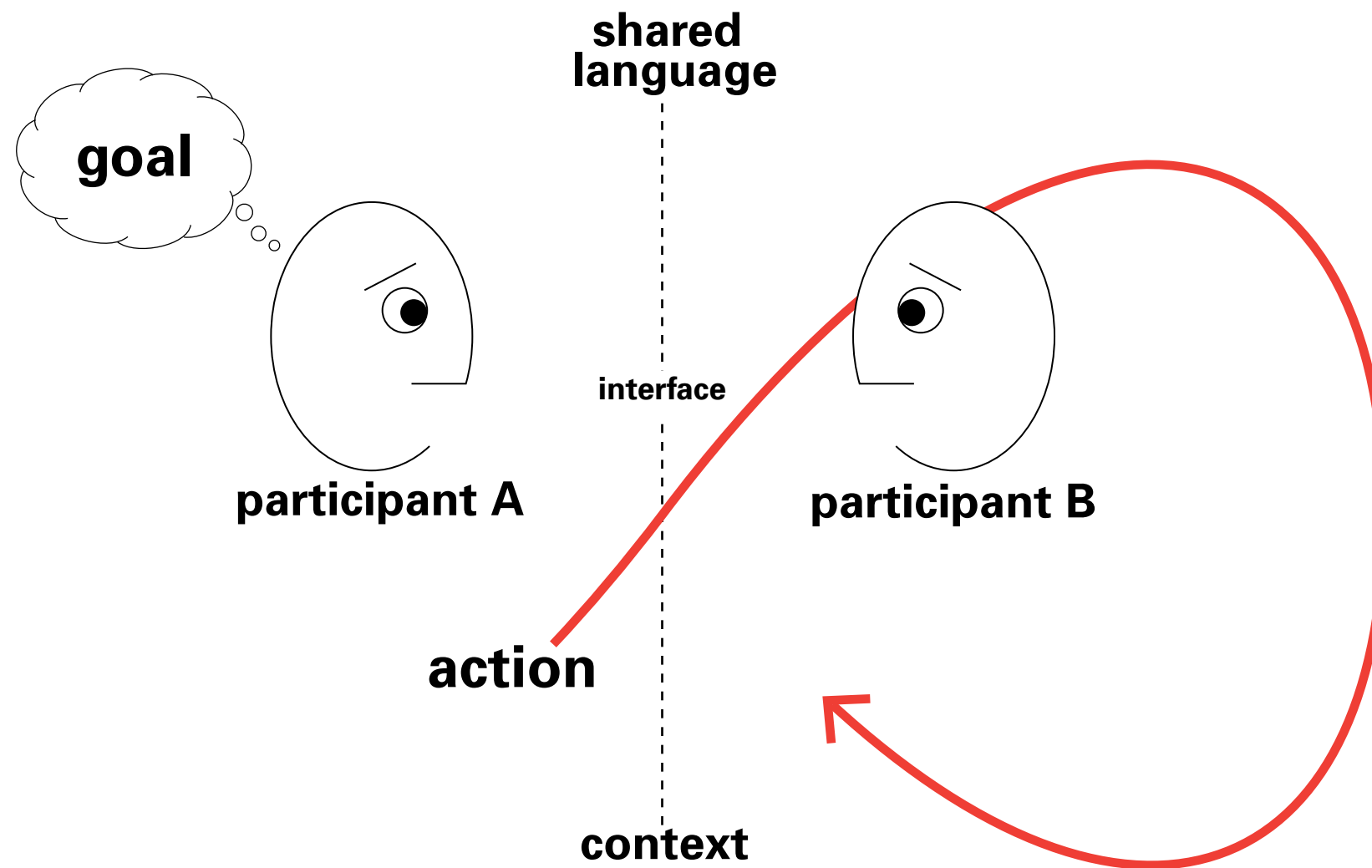
chooses a context



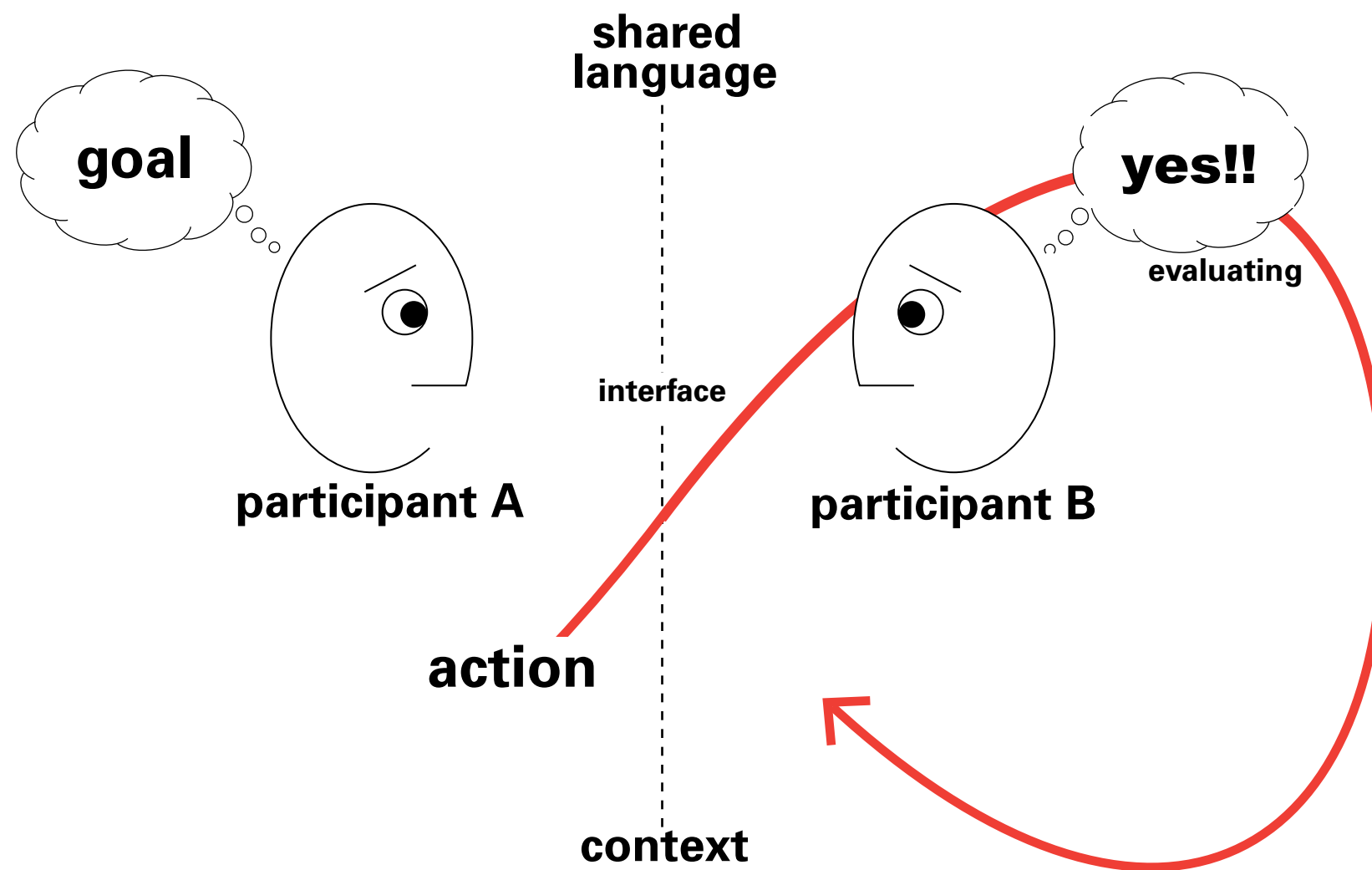
chooses a language



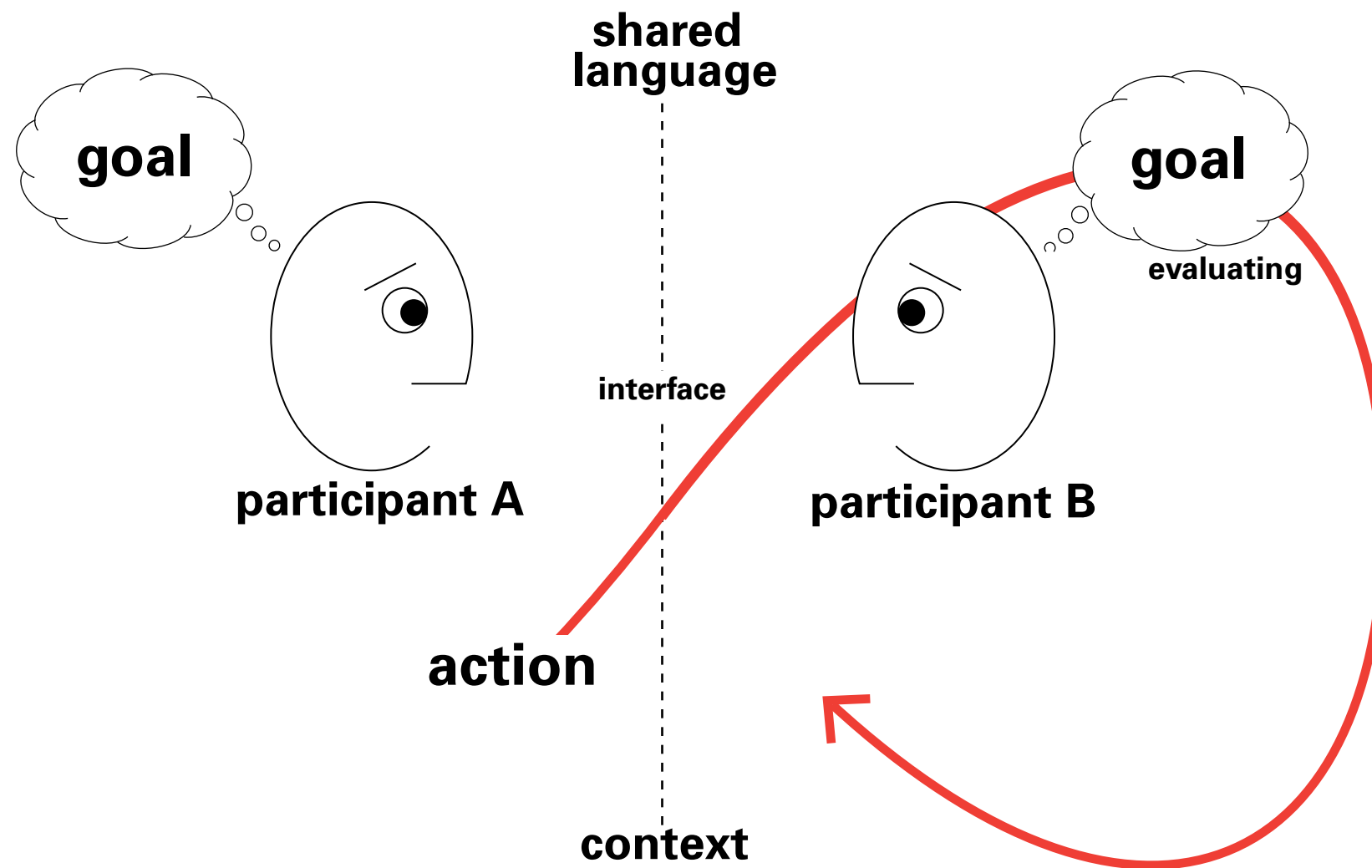
begins an exchange



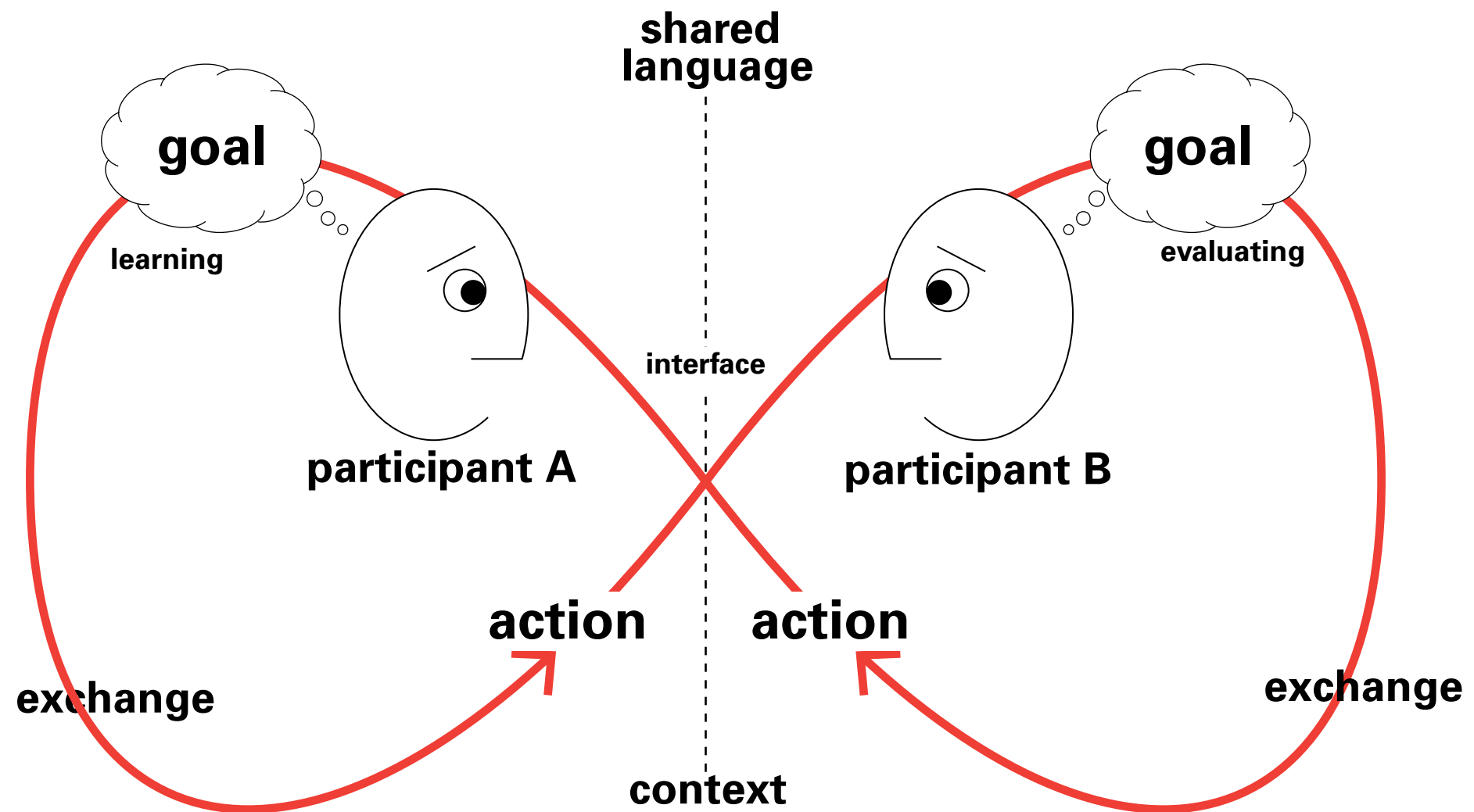
evokes a reaction...



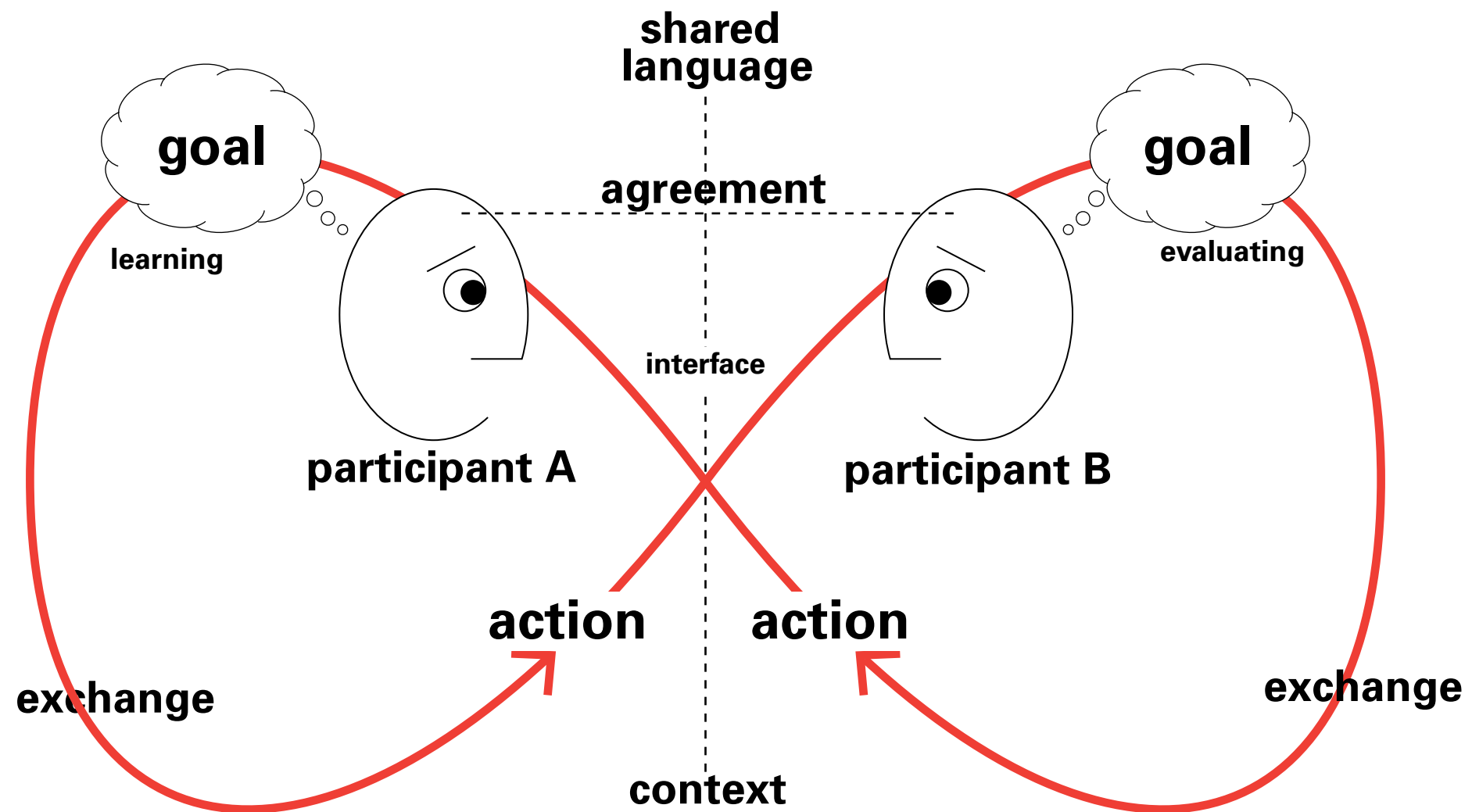
evokes a reaction...



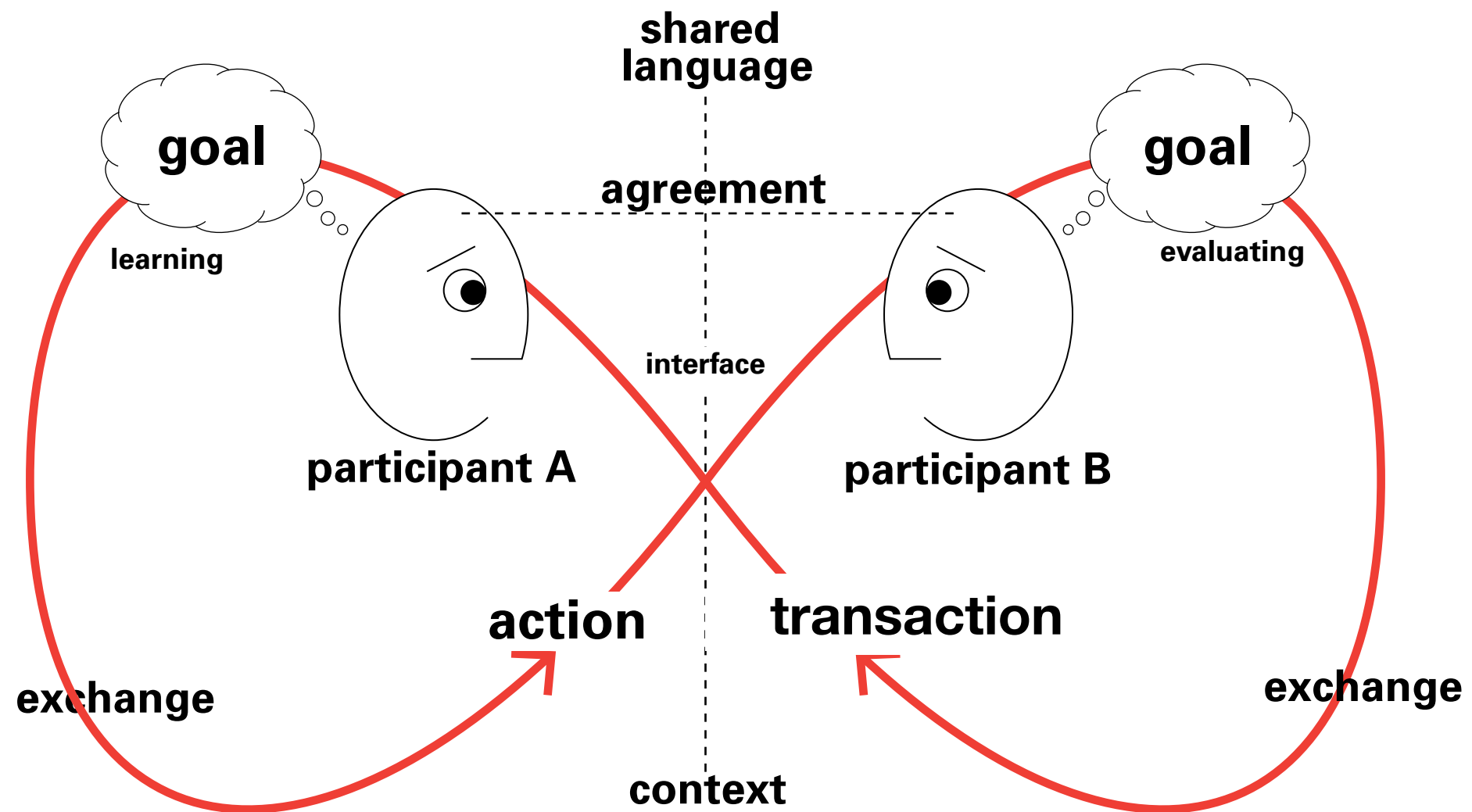
...that evokes a reaction



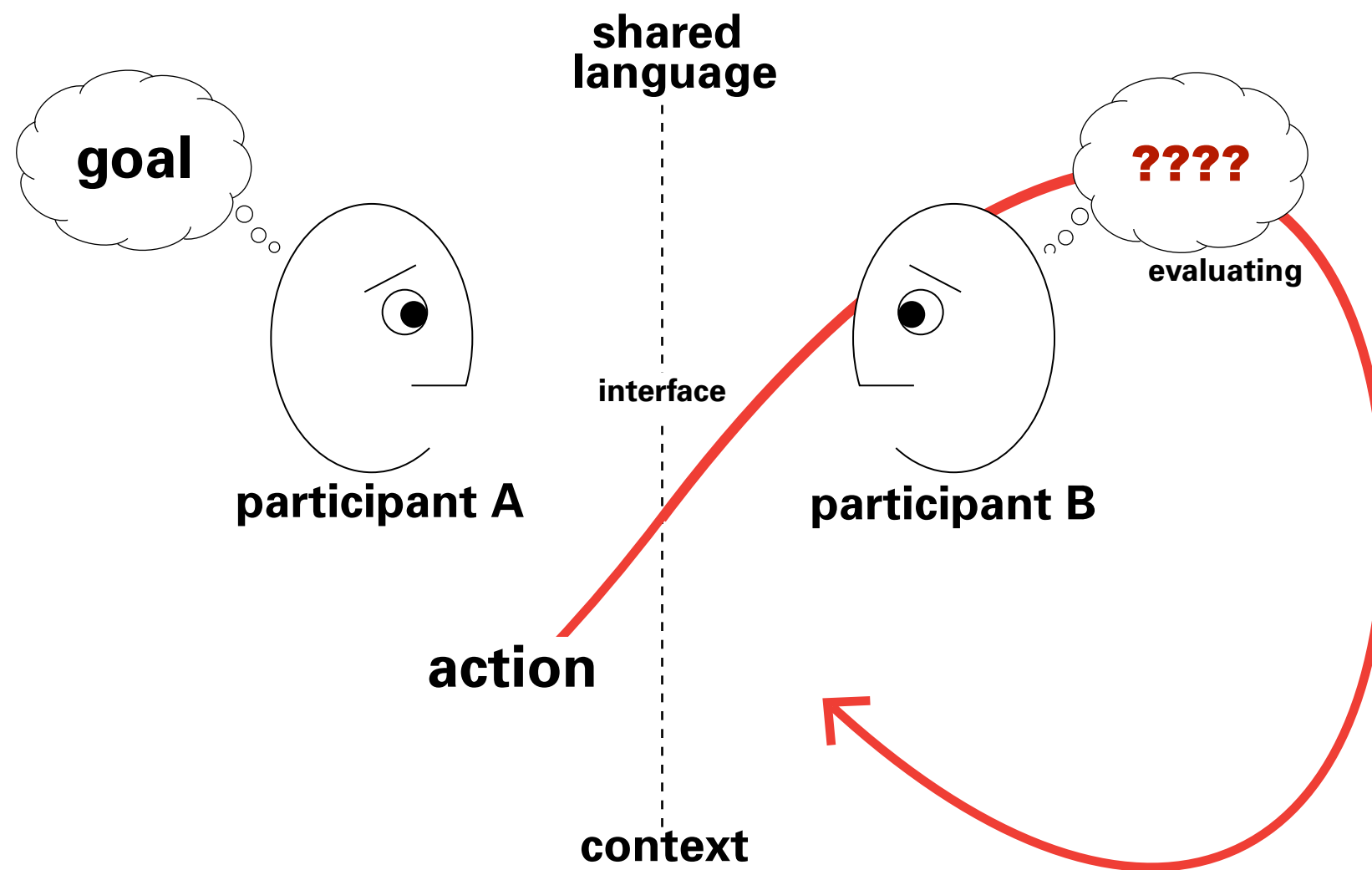
agreement may be reached

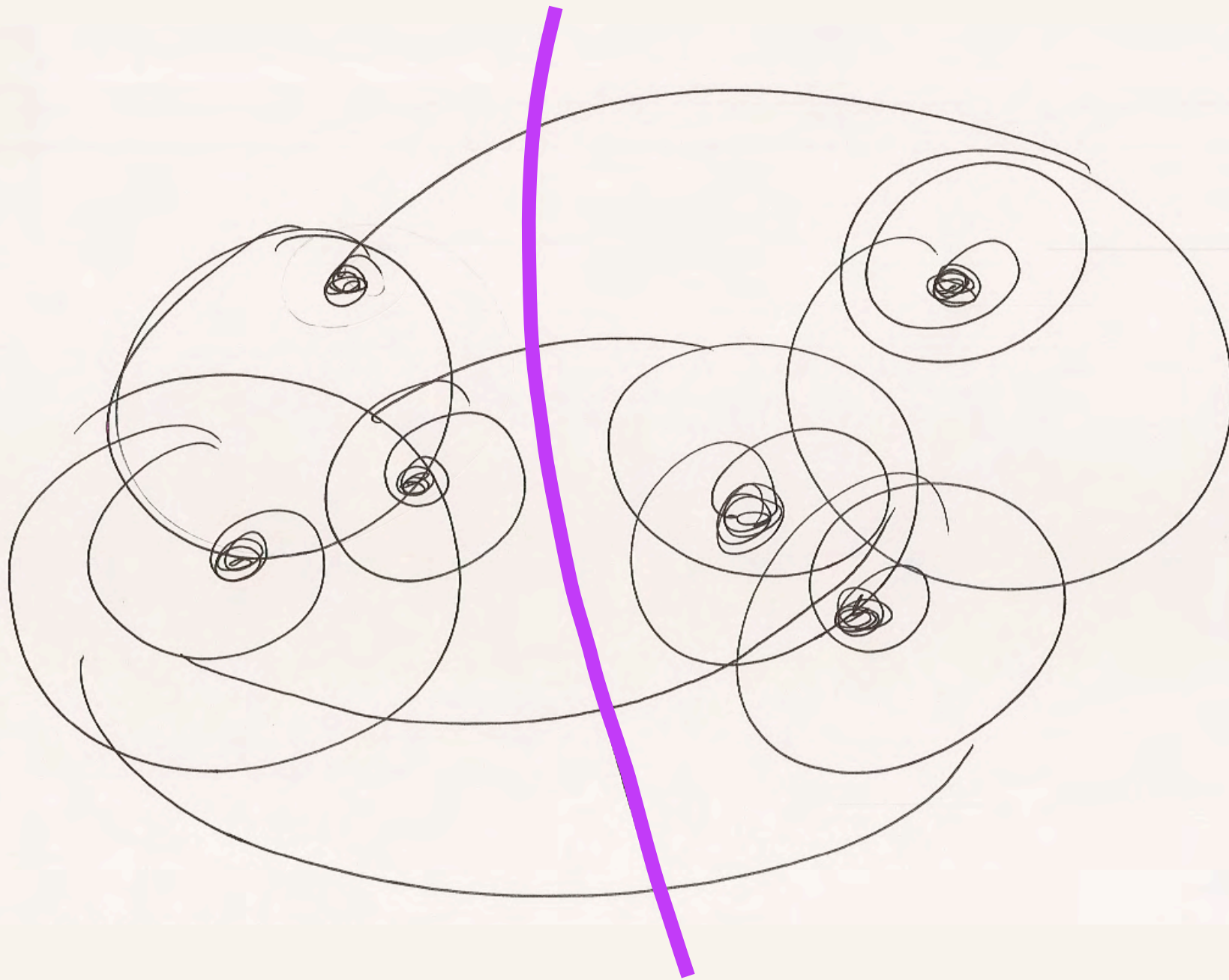


a transaction may occur



shall I respond?

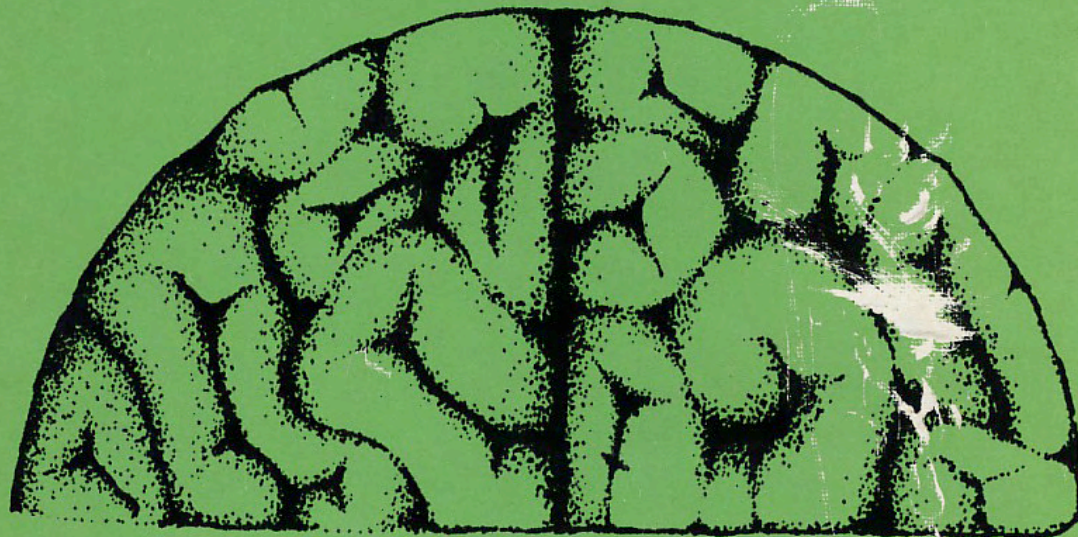




- participants = conversational range or variety
- more variety = more capacity to evolve
- more capacity to evolve = more choices
- more choices = more possible agreements
- agreements = cultural and social change

GORDON PASK

CONVERSATION, COGNITION AND LEARNING



A CYBERNETIC THEORY-
AND METHODOLOGY

ELSEVIER

GORDON PASK

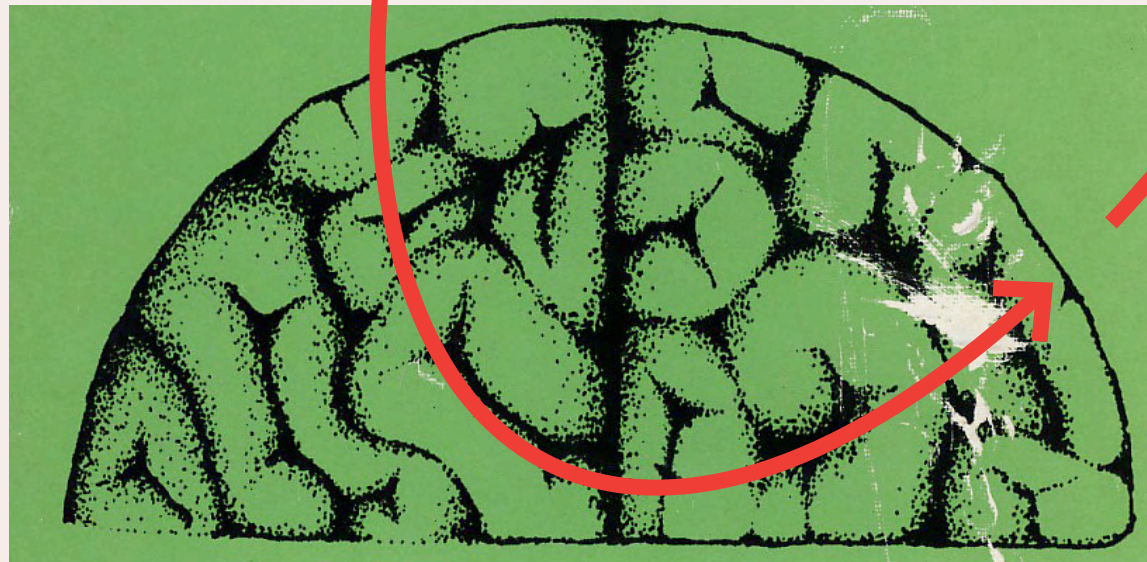
CONVERSATION THEORY



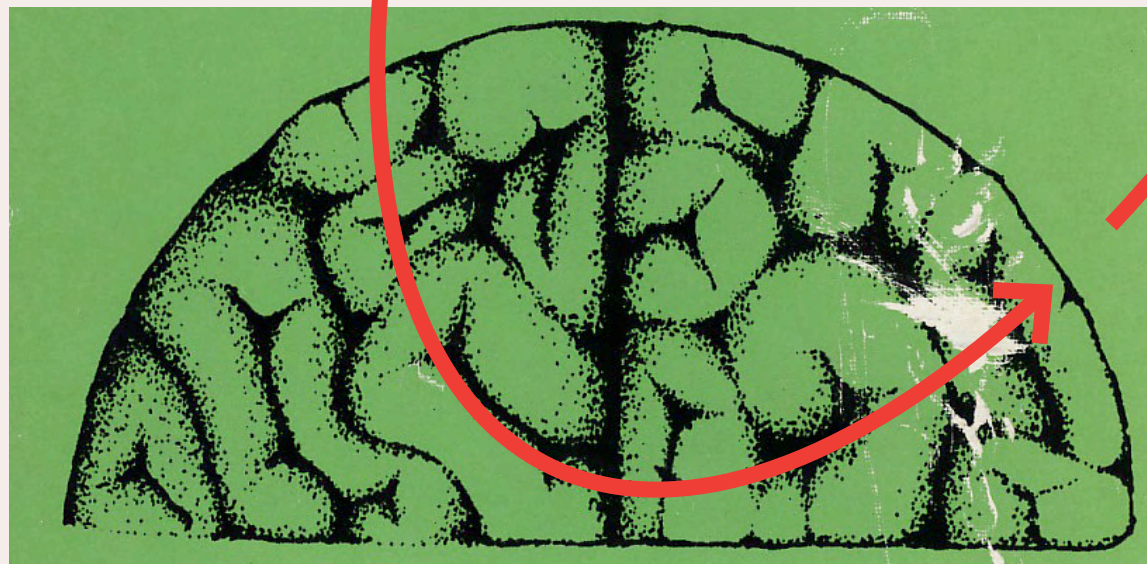
APPLICATIONS IN EDUCATION
AND EPISTEMOLOGY

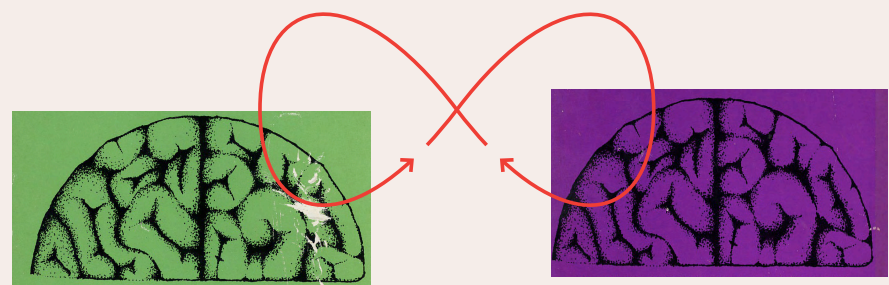
ELSEVIER

consciousness is conserved



consciousness = shared awareness

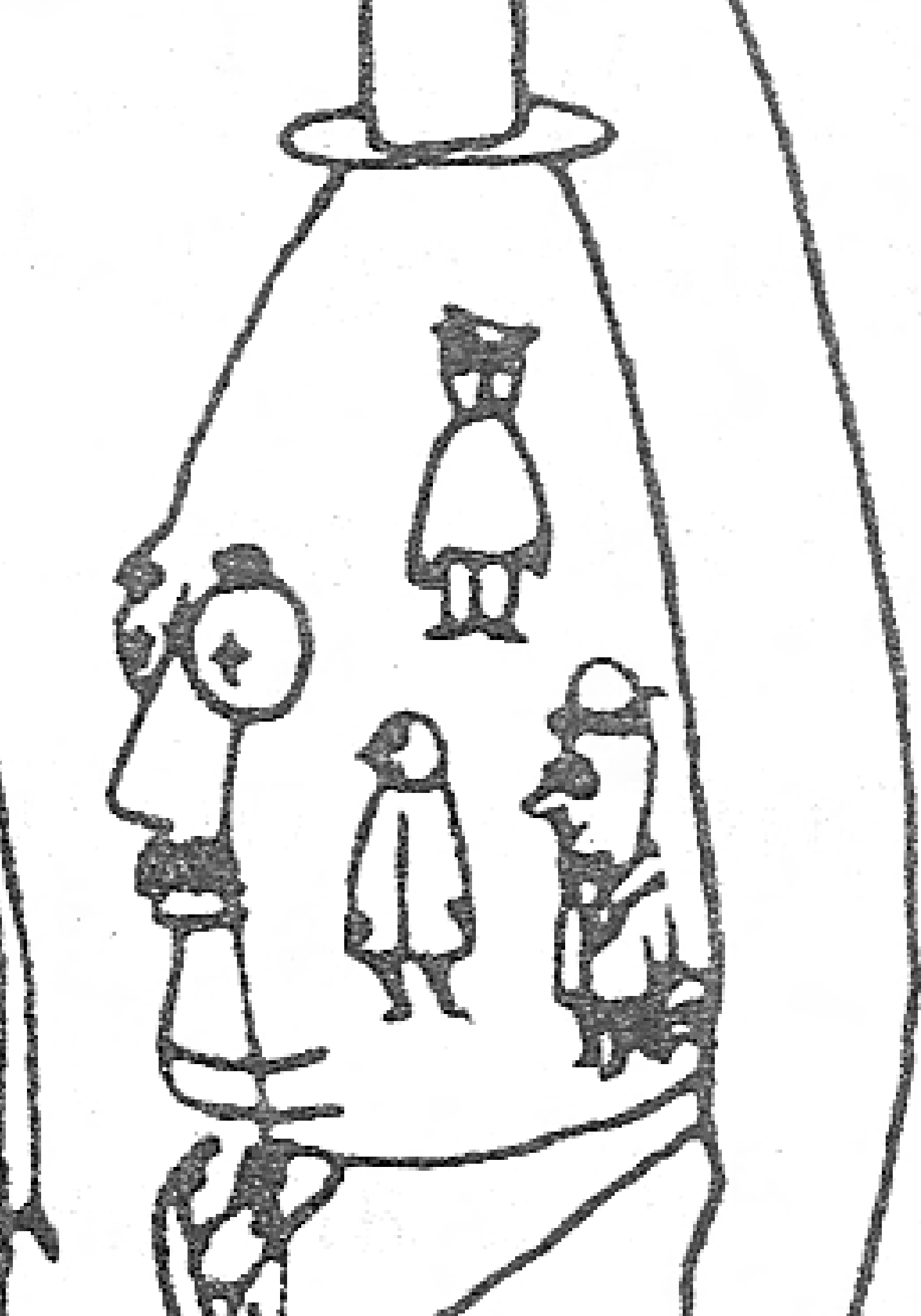


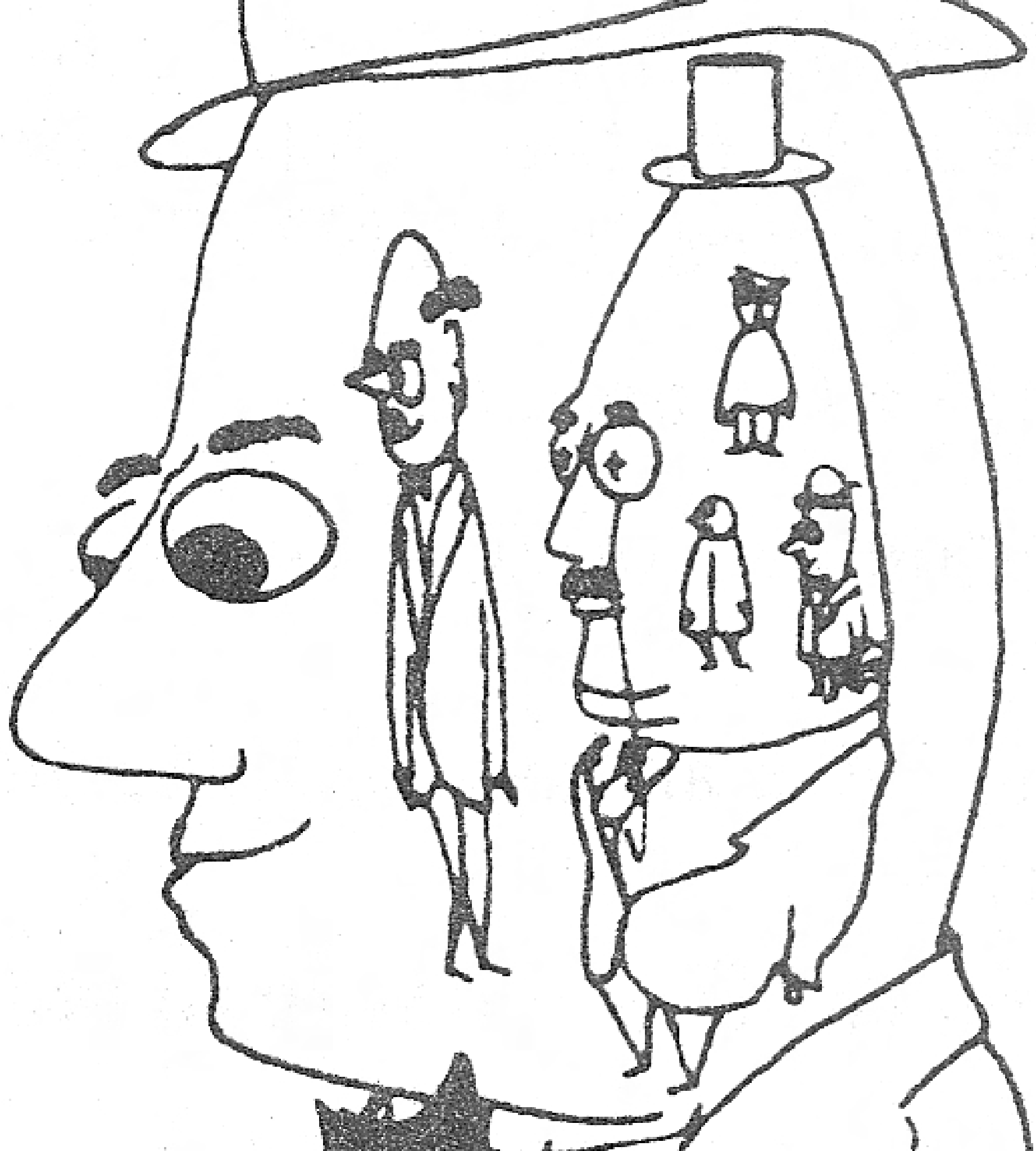




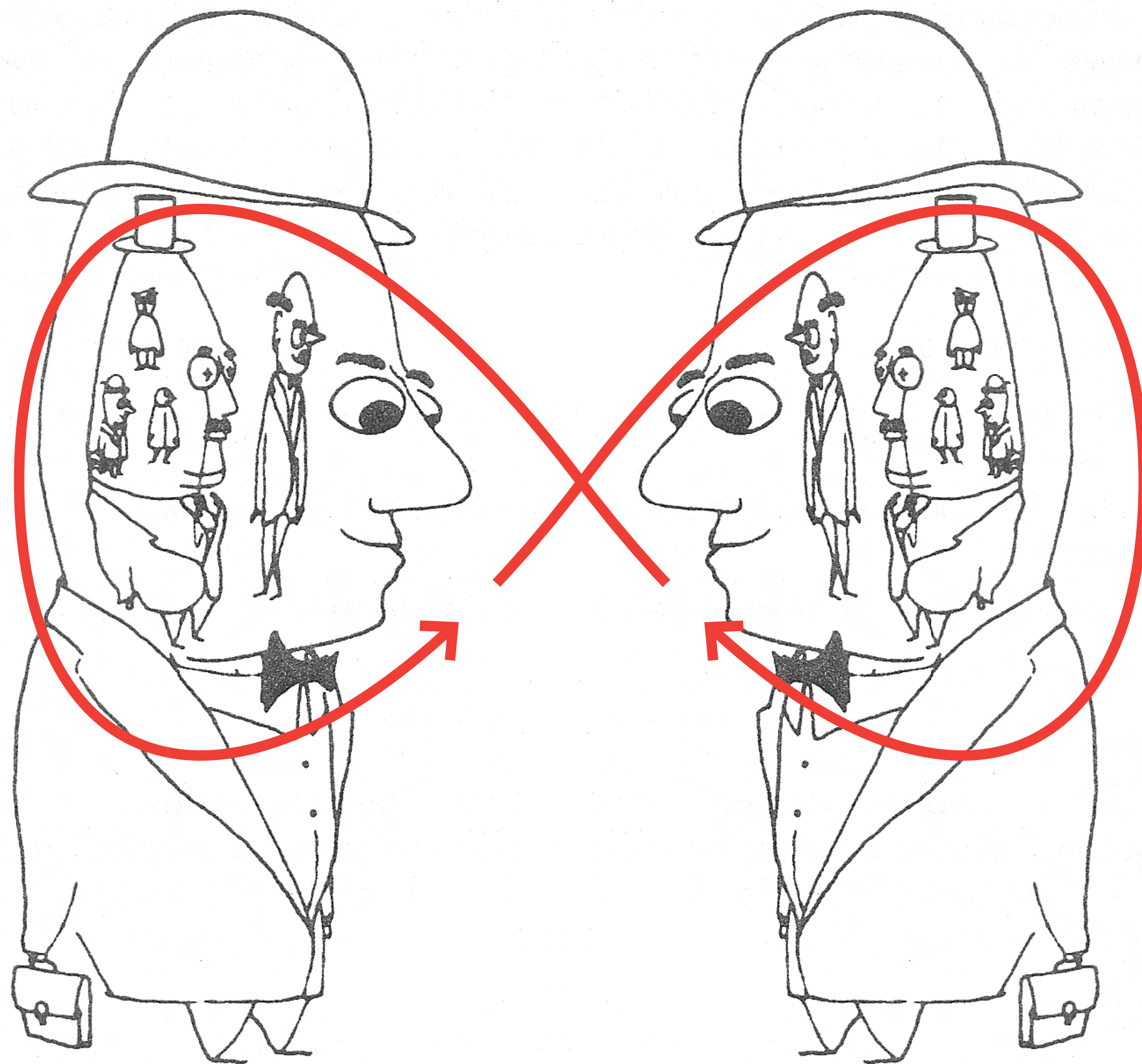












— original drawing by Gordon Pask

frameworks

interaction



conversation



consciousness

emergence

autonomy



frameworks

interaction

emergence

autonomy



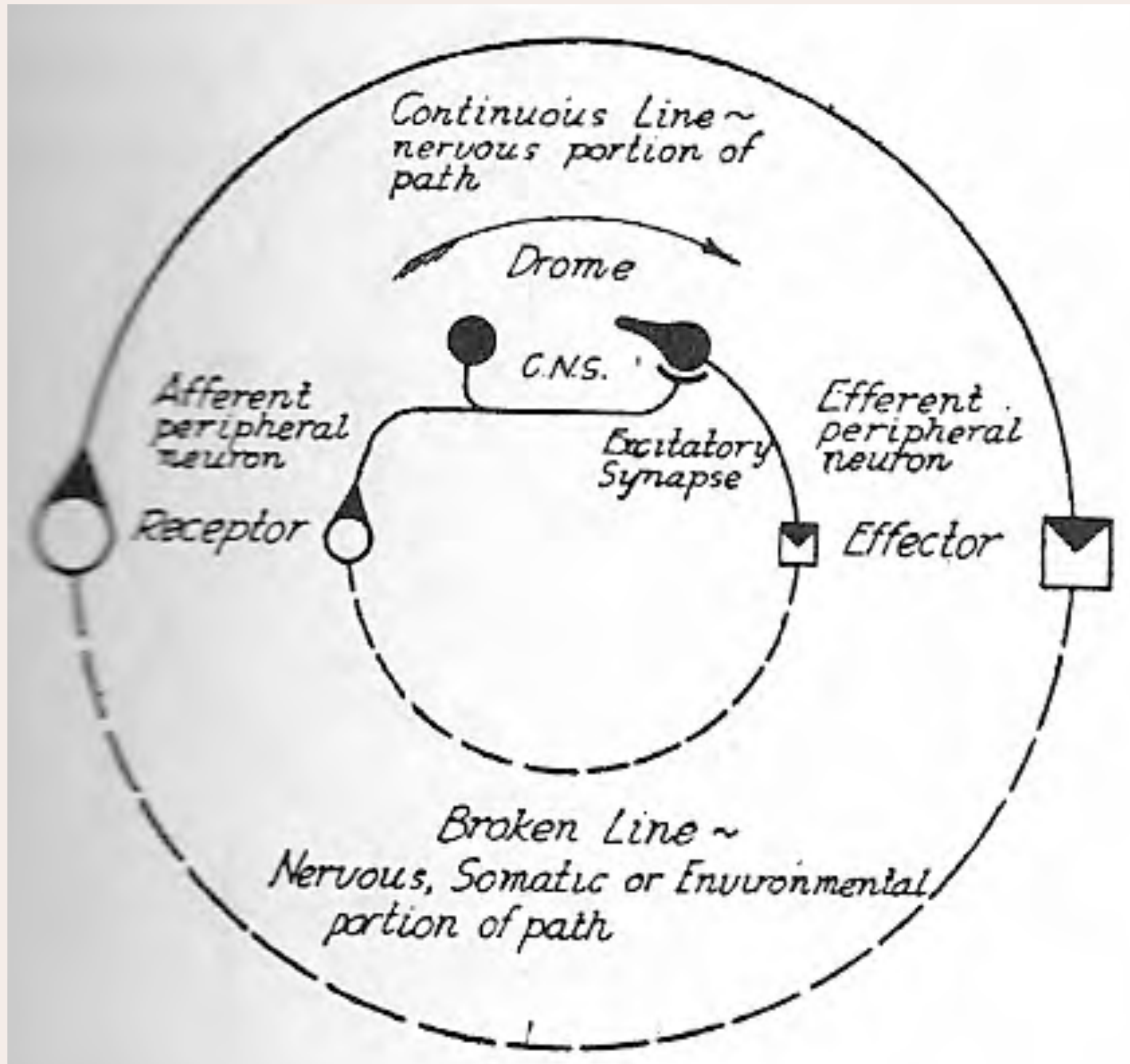
entailments



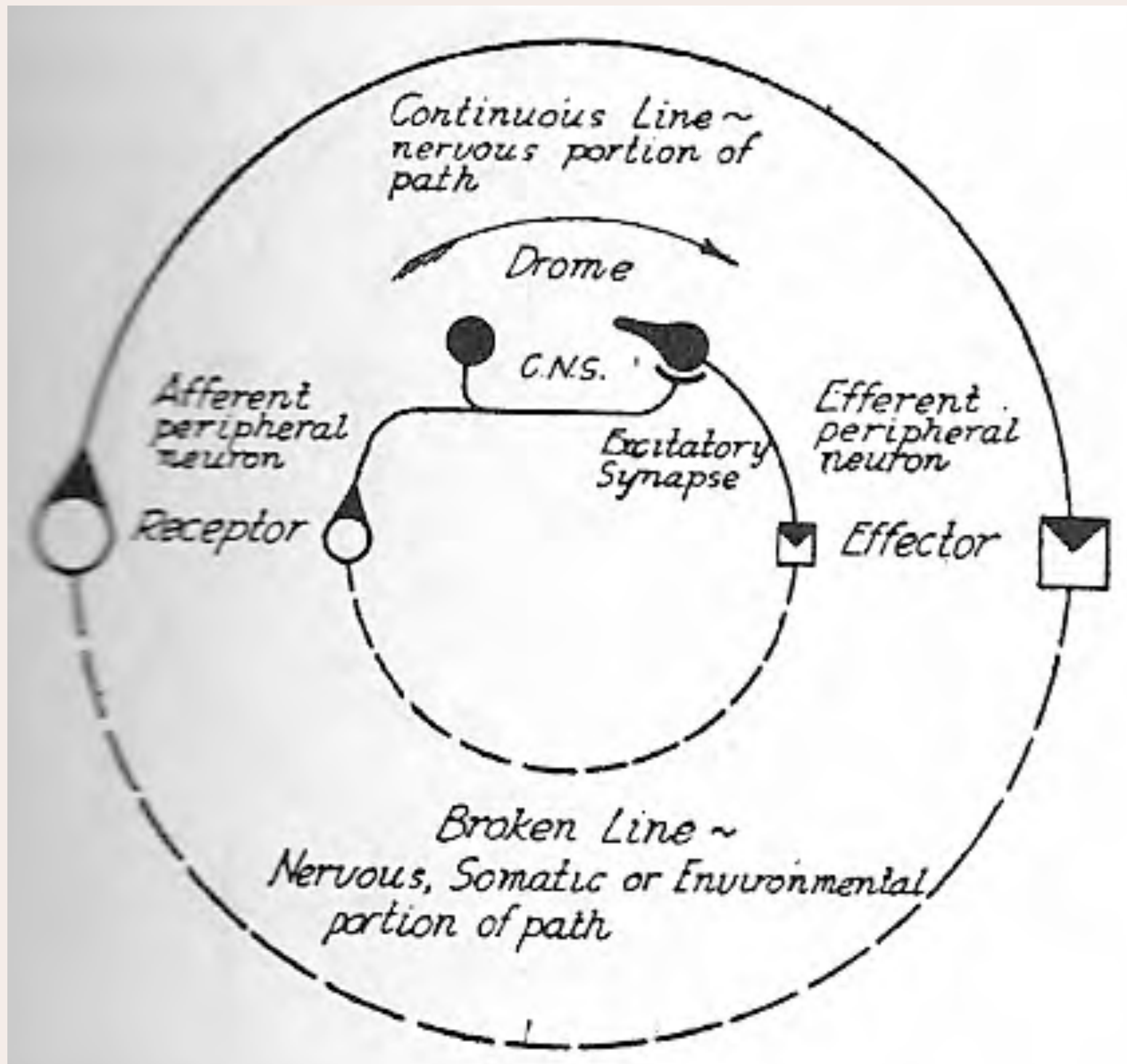
behavior of an “Eigen function”

[illegible]

organization of the nervous system



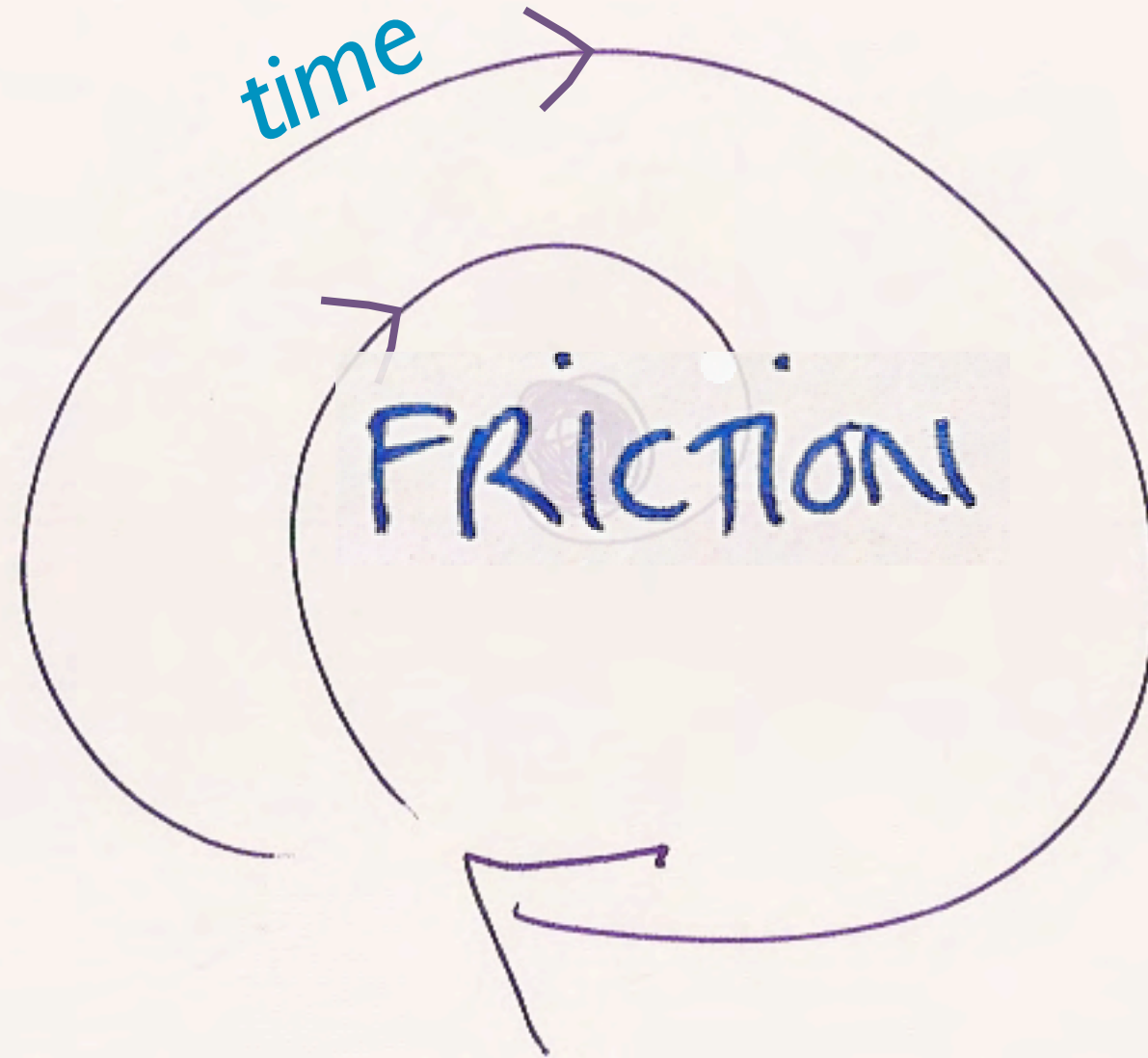
reverberating circular signals

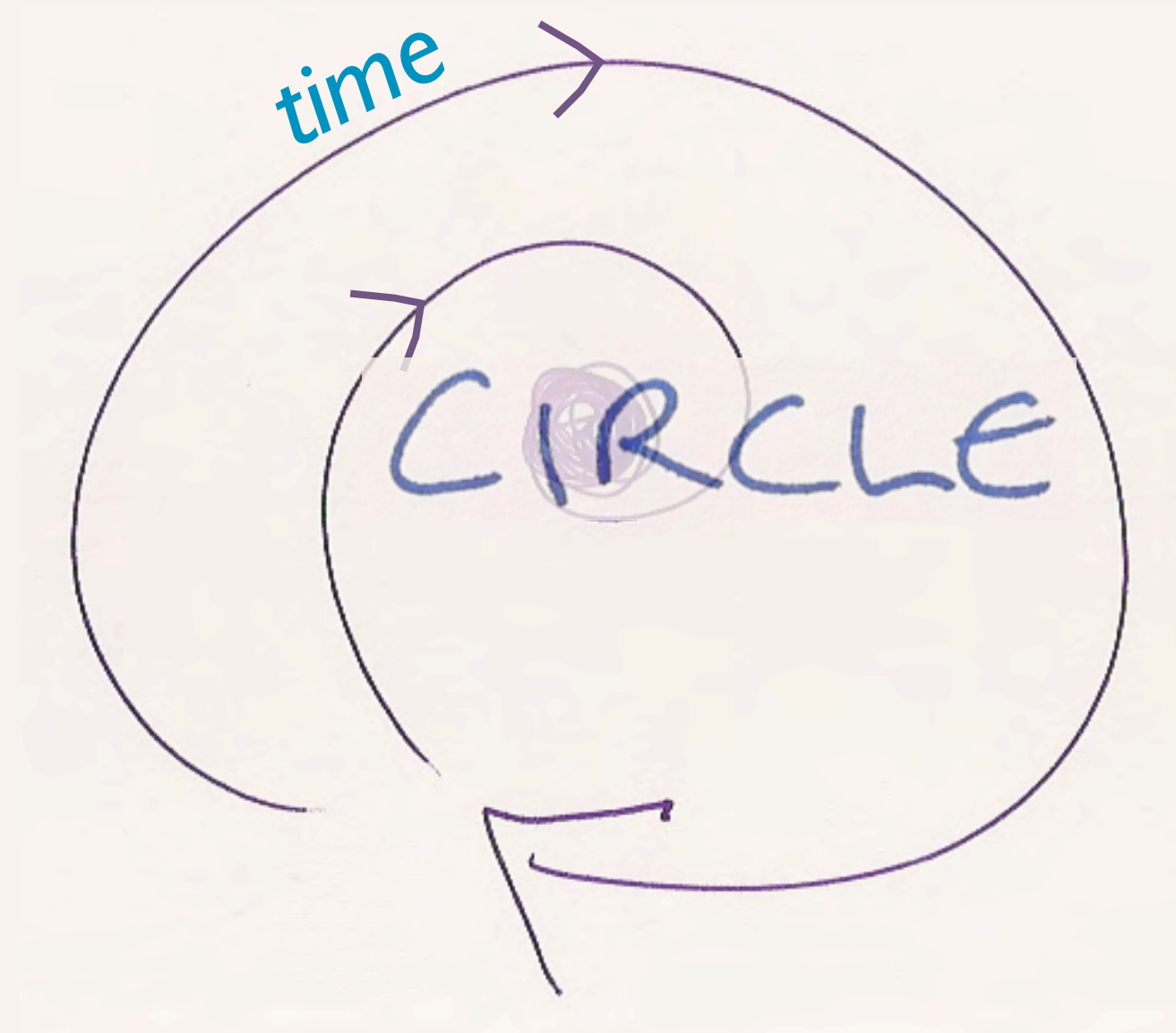


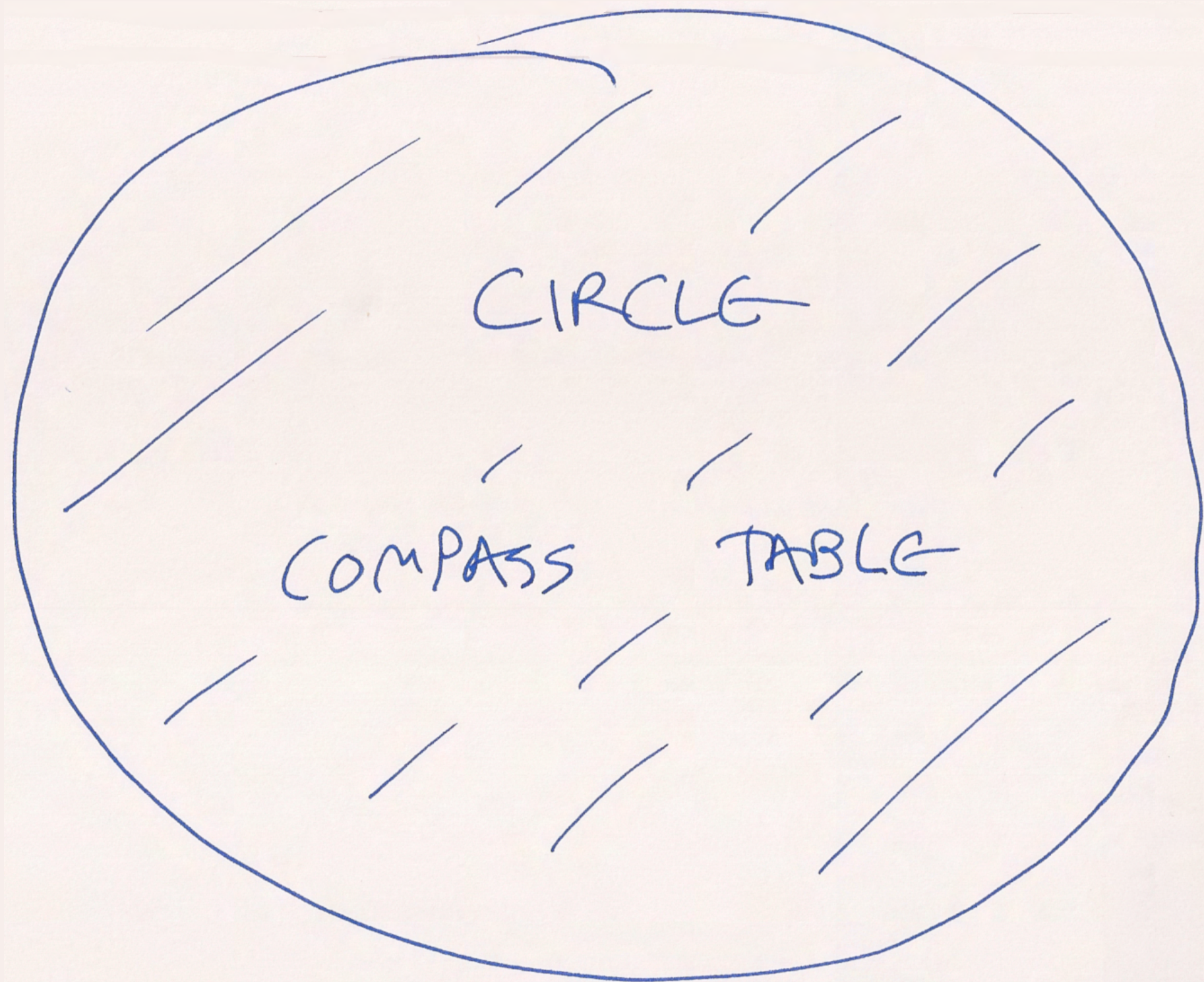
“strange attractor”











YOU SAY -

CYLINDER

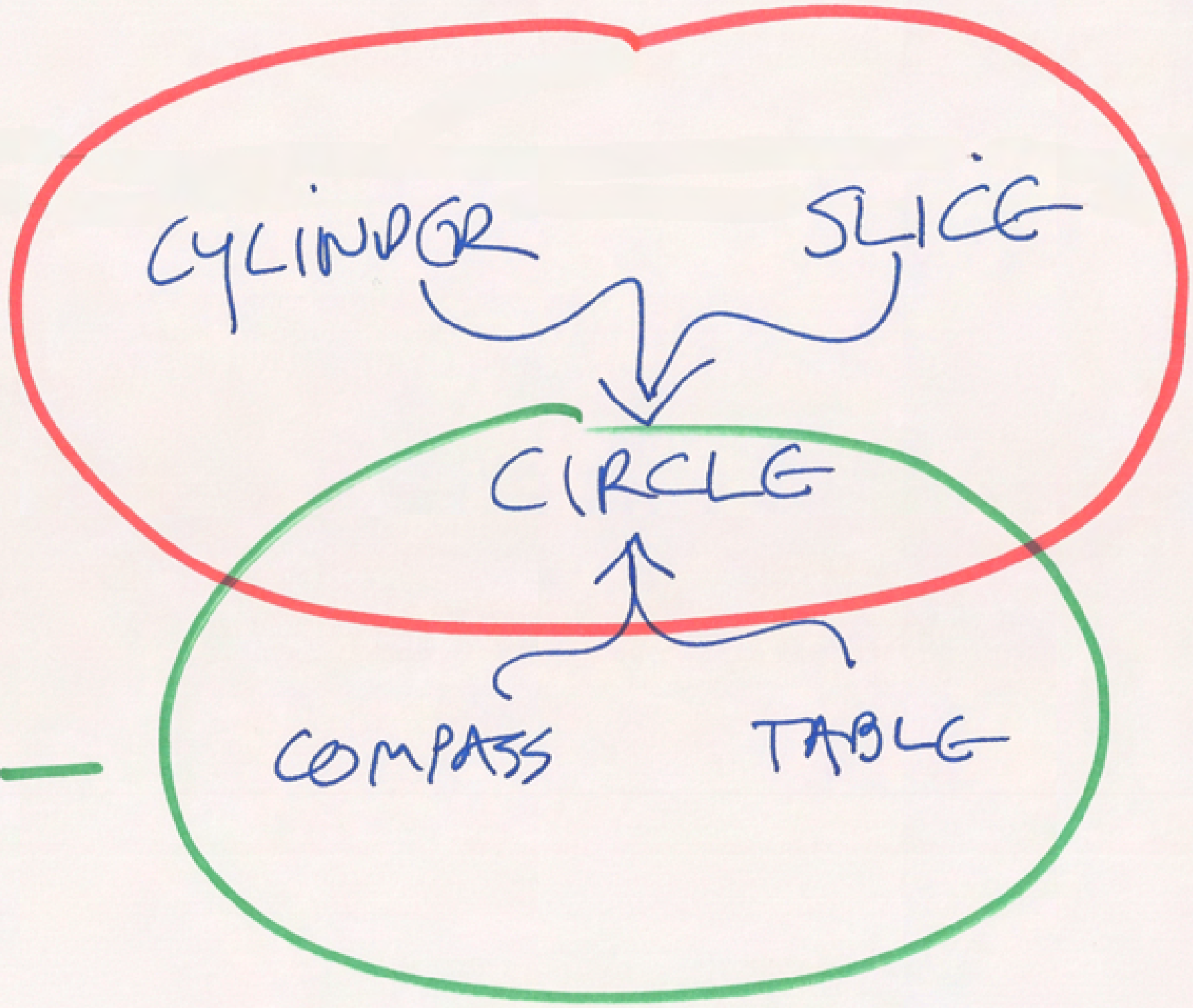
SLICE

CIRCLE

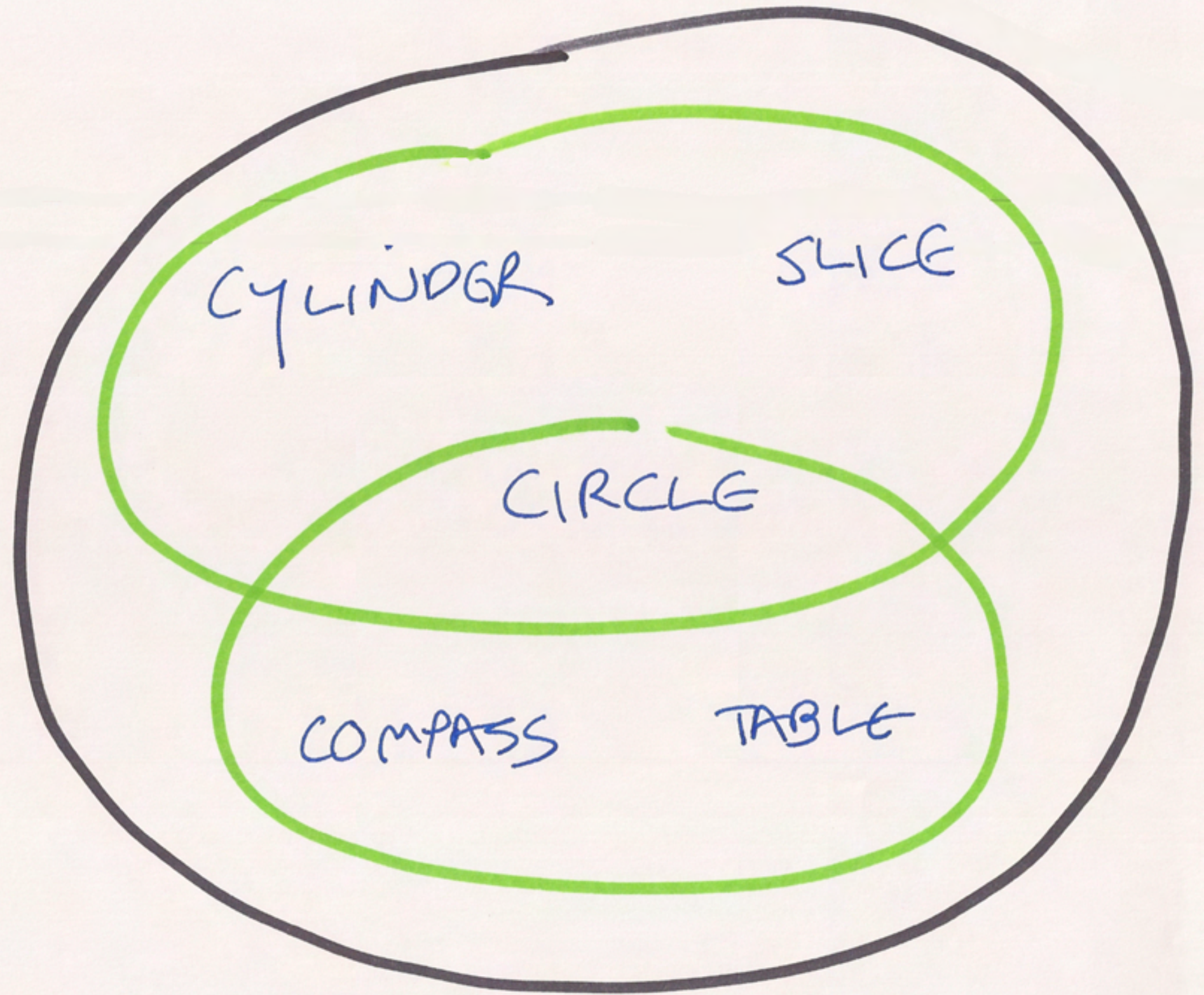
I SAY -

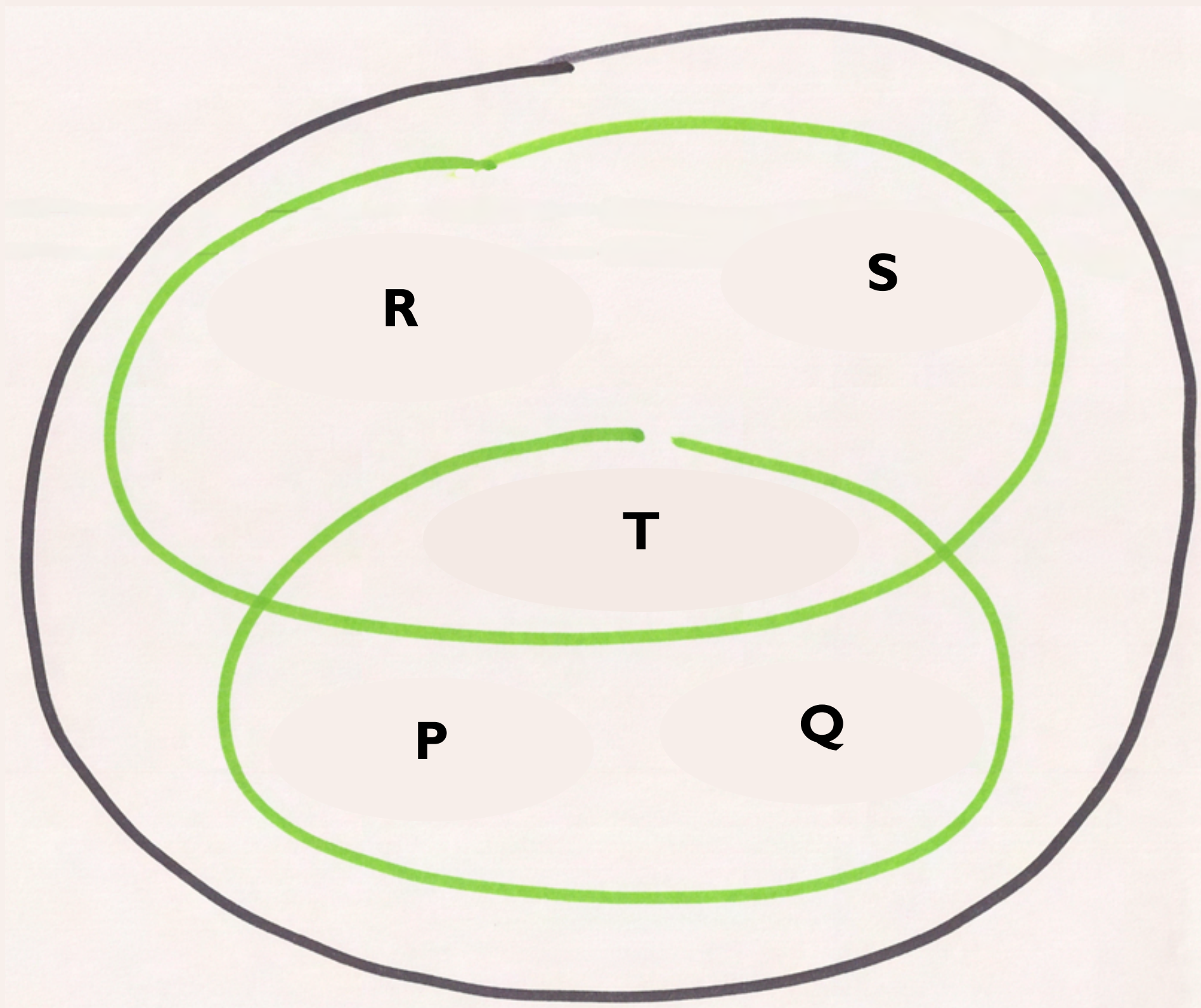
COMPASS

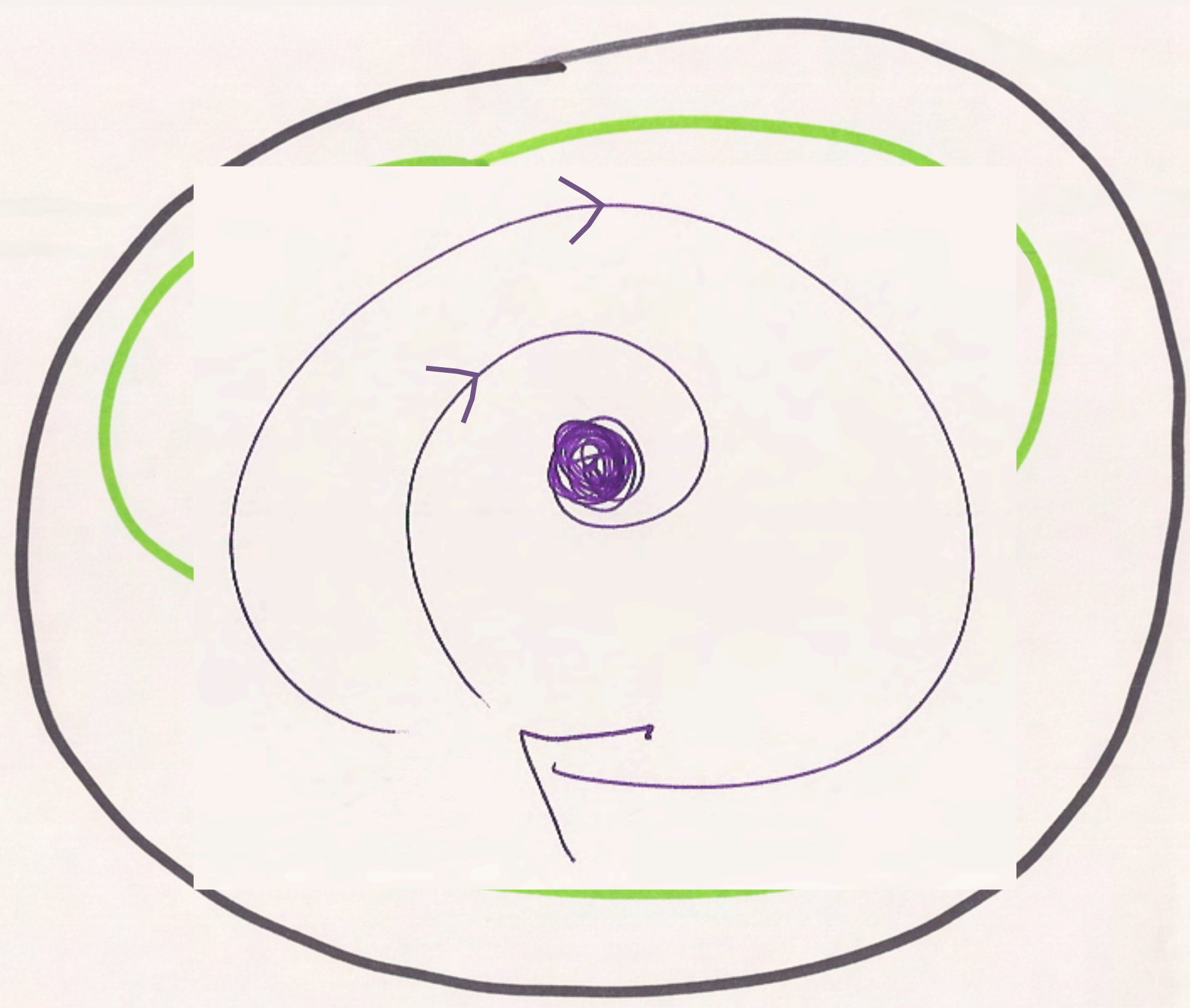
TABLE

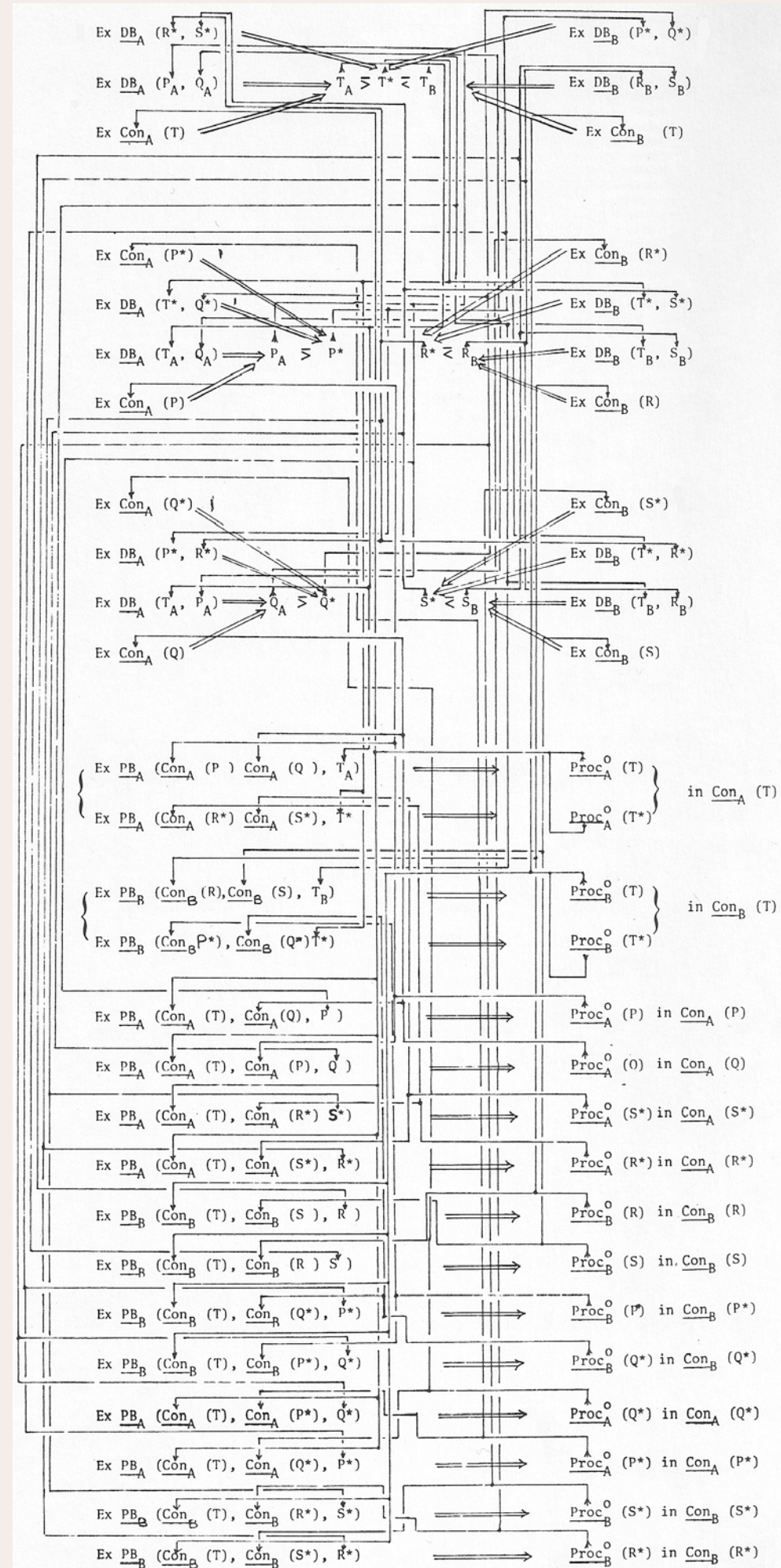


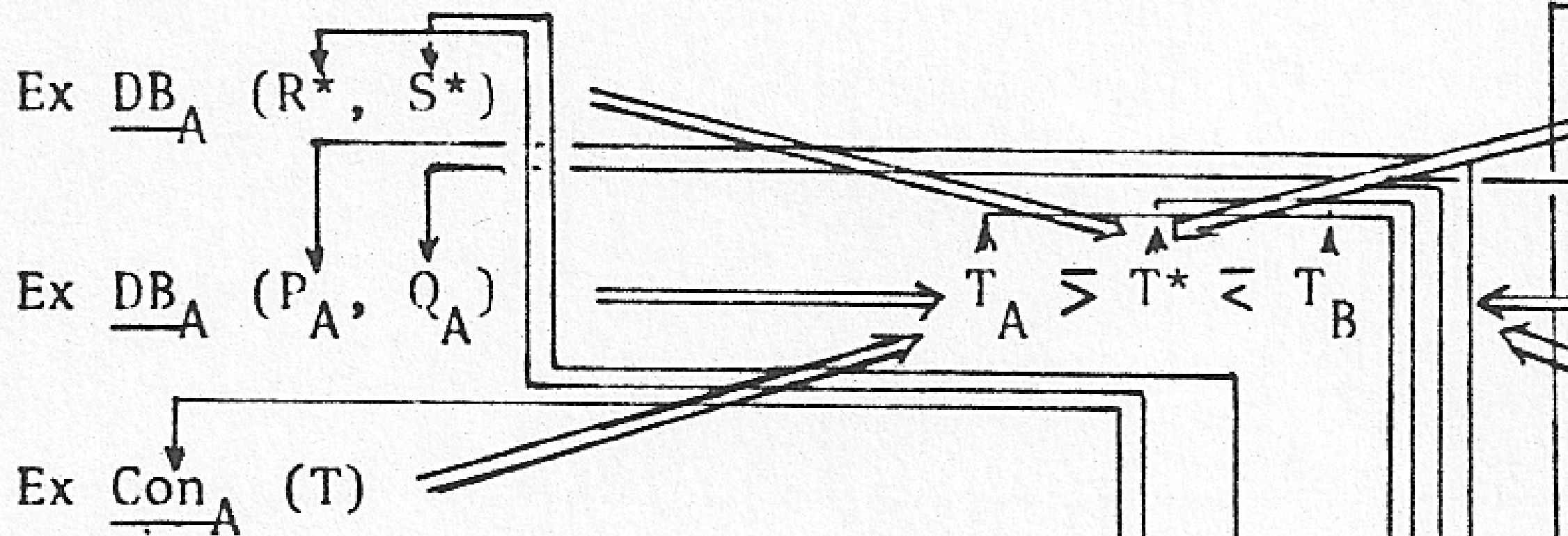
WE SAY -

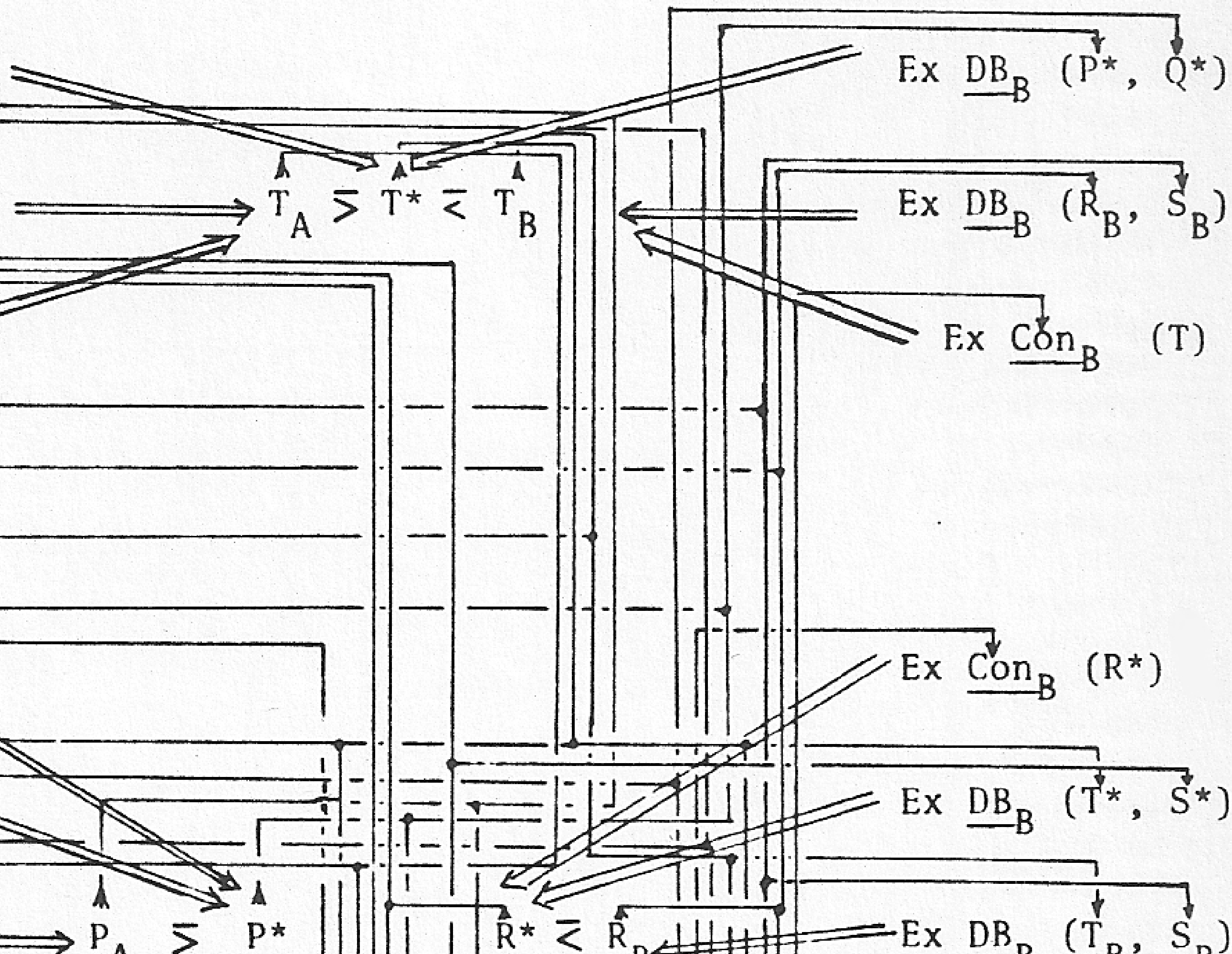


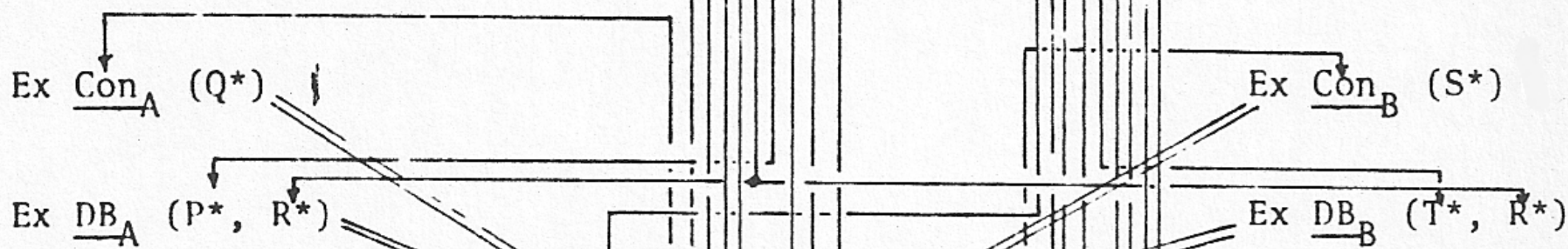
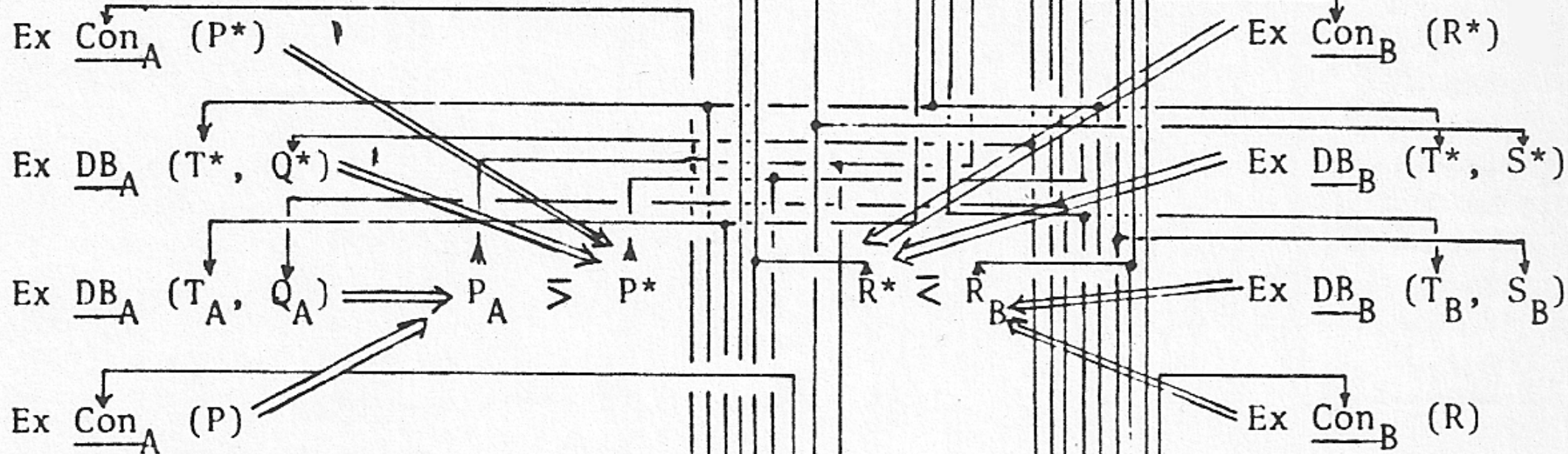
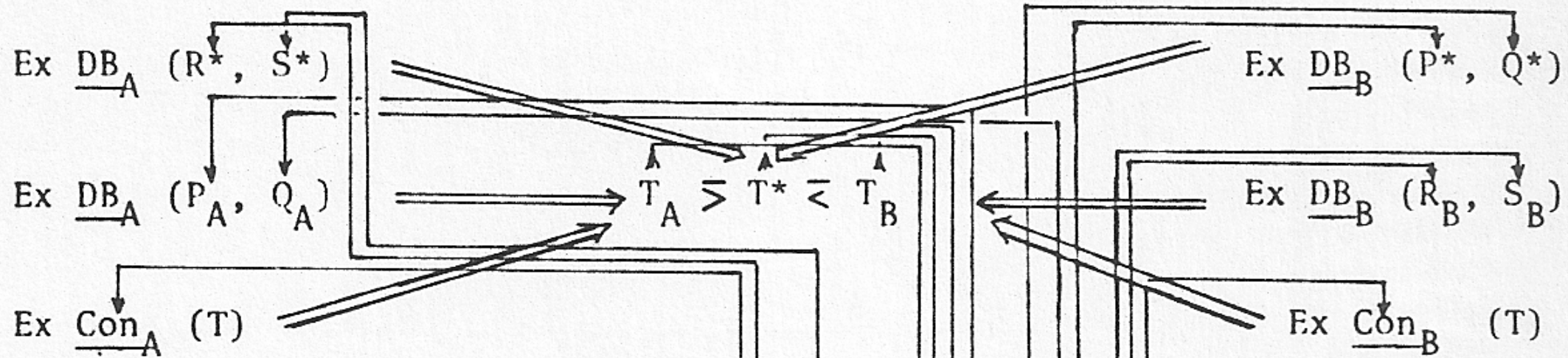












Ex \underline{PB}_A (\underline{Con}_A (T), \underline{Con}_A (Q), $\overset{\downarrow}{P}$)

Ex \underline{PB}_A (\underline{Con}_A (T), \underline{Con}_A (P), $\overset{\downarrow}{Q}$)

Ex \underline{PB}_A (\underline{Con}_A (T), \underline{Con}_A (R*), $\overset{\downarrow}{S^*}$)

Ex \underline{PB}_A (\underline{Con}_A (T), \underline{Con}_A (S*), $\overset{\downarrow}{R^*}$)

Ex \underline{PB}_B (\underline{Con}_B (T), \underline{Con}_B (S), $\overset{\downarrow}{R}$)

Ex \underline{PB}_B (\underline{Con}_B (T), \underline{Con}_B (R), $\overset{\downarrow}{S}$)

Ex \underline{PB}_B (\underline{Con}_B (T), \underline{Con}_B (Q*), $\overset{\downarrow}{P^*}$)

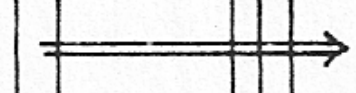
Ex \underline{PB}_B (\underline{Con}_B (T), \underline{Con}_B (P*), $\overset{\downarrow}{Q^*}$)

Ex \underline{PB}_A (\underline{Con}_A (T), \underline{Con}_A (P*), $\overset{\downarrow}{Q^*}$)

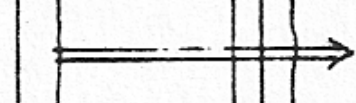
Ex \underline{PB}_A (\underline{Con}_A (T), \underline{Con}_A (Q*), $\overset{\downarrow}{P^*}$)

Ex \underline{PB}_B (\underline{Con}_B (T), \underline{Con}_B (R*), $\overset{\downarrow}{S^*}$)

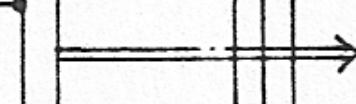
Ex \underline{PB}_B (\underline{Con}_B (T), \underline{Con}_B (S*), $\overset{\downarrow}{R^*}$)



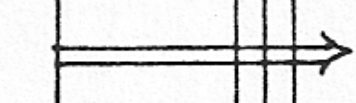
$\overset{\uparrow}{Proc}_A^O$ (P) in \underline{Con}_A (P)



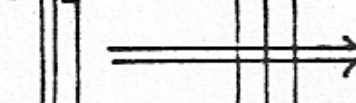
$\overset{\uparrow}{Proc}_A^O$ (Q) in \underline{Con}_A (Q)



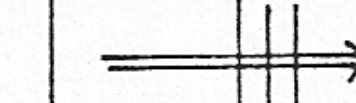
$\overset{\uparrow}{Proc}_A^O$ (S*) in \underline{Con}_A (S*)



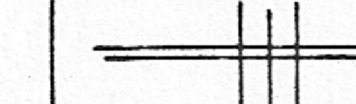
$\overset{\uparrow}{Proc}_A^O$ (R*) in \underline{Con}_A (R*)



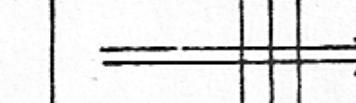
$\overset{\uparrow}{Proc}_B^O$ (R) in \underline{Con}_B (R)



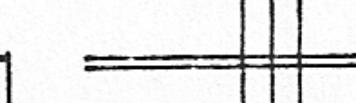
$\overset{\uparrow}{Proc}_B^O$ (S) in \underline{Con}_B (S)



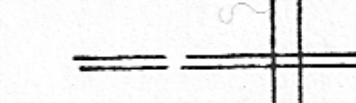
$\overset{\uparrow}{Proc}_B^O$ (P*) in \underline{Con}_B (P*)



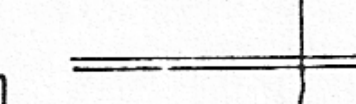
$\overset{\uparrow}{Proc}_B^O$ (Q*) in \underline{Con}_B (Q*)



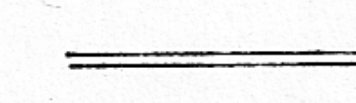
$\overset{\uparrow}{Proc}_A^O$ (Q*) in \underline{Con}_A (Q*)



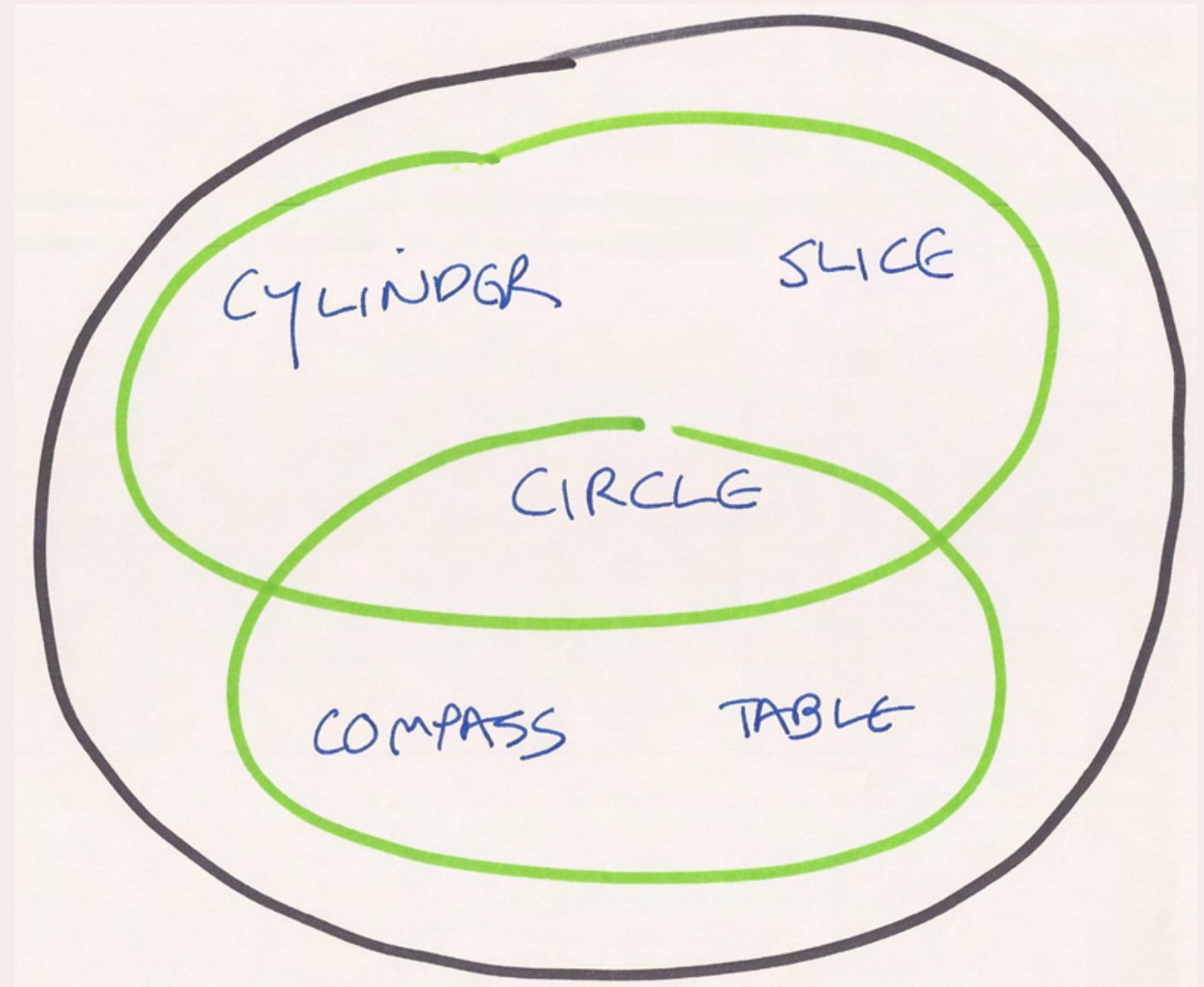
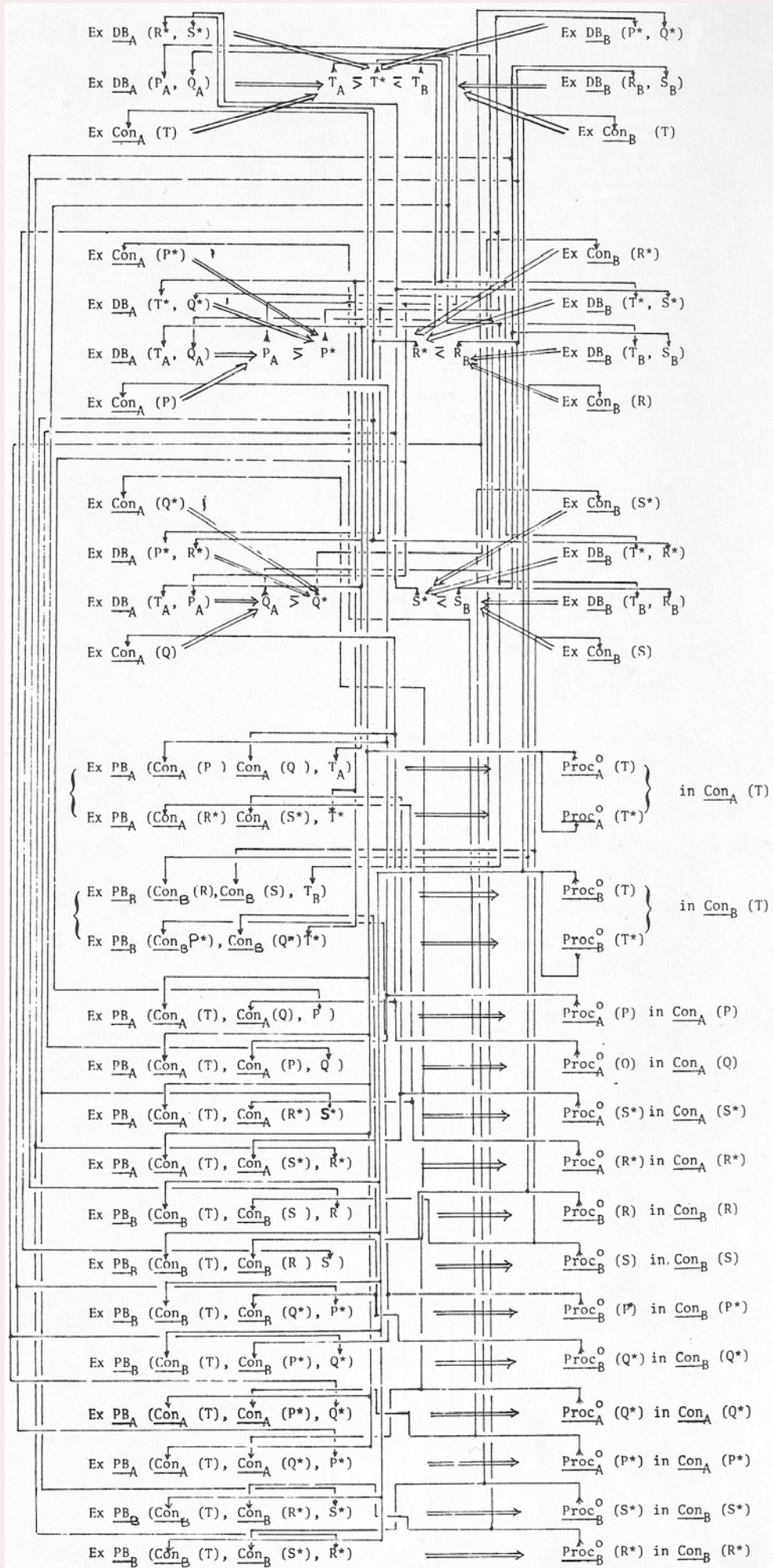
$\overset{\uparrow}{Proc}_A^O$ (P*) in \underline{Con}_A (P*)

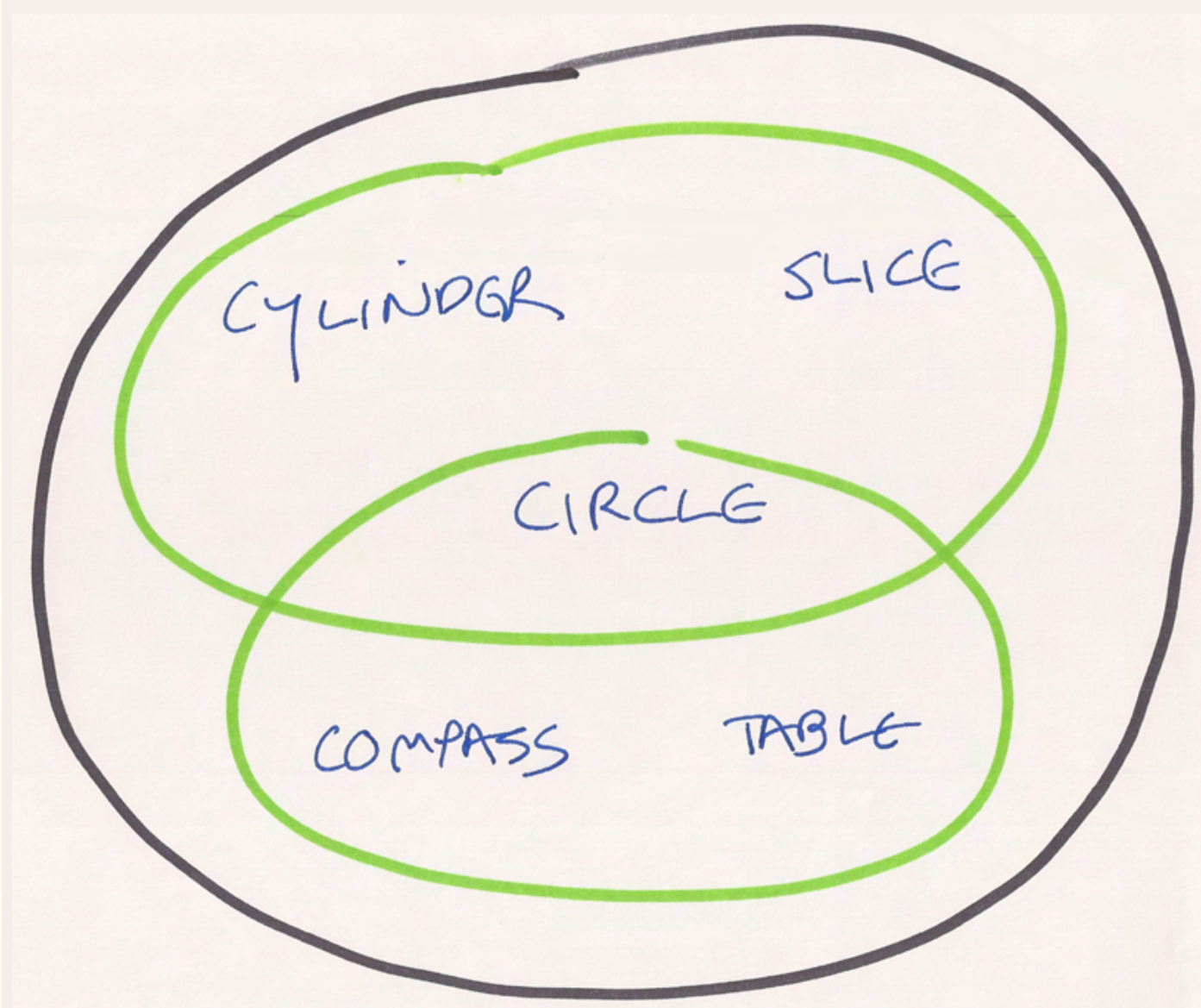
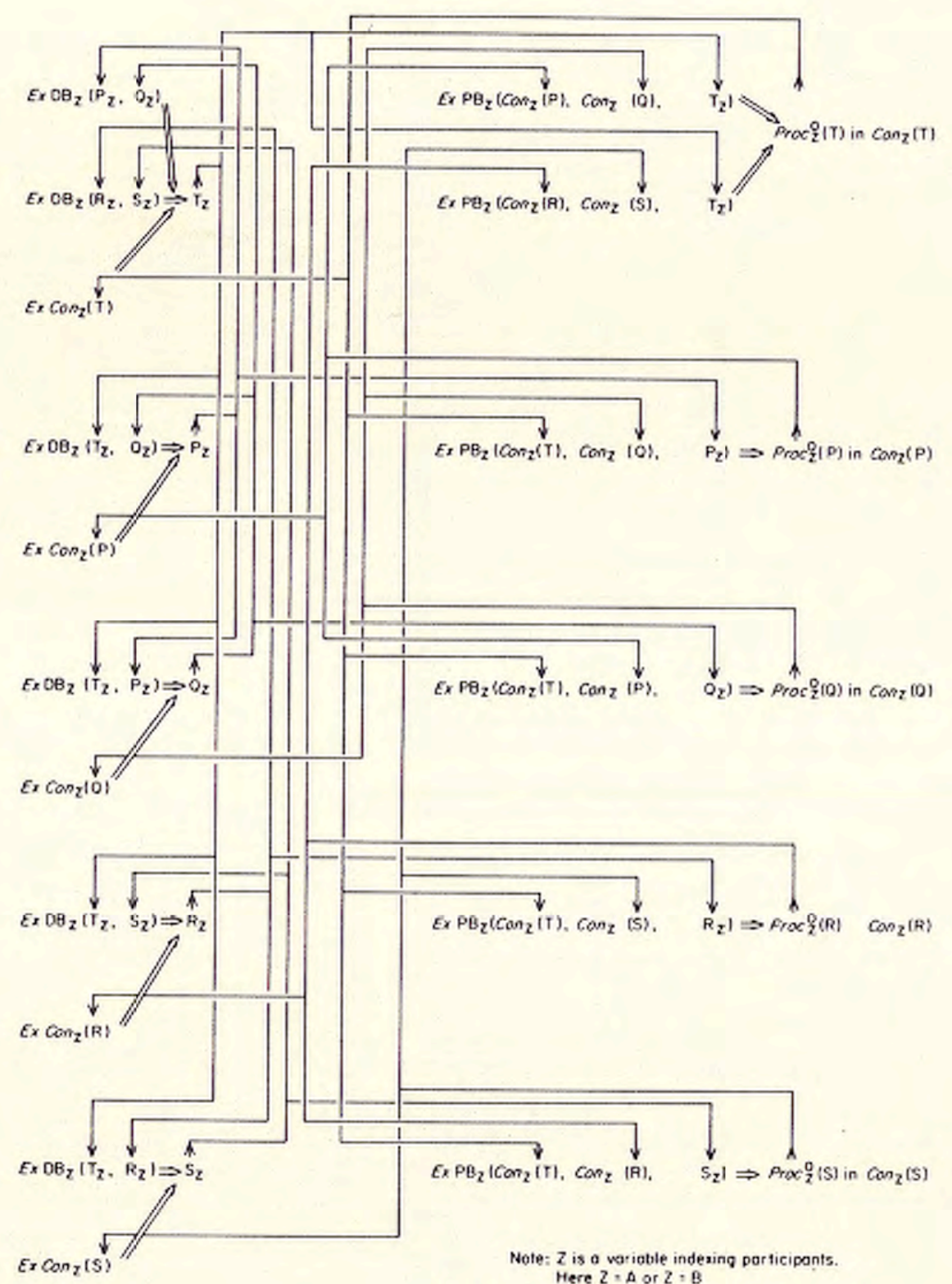


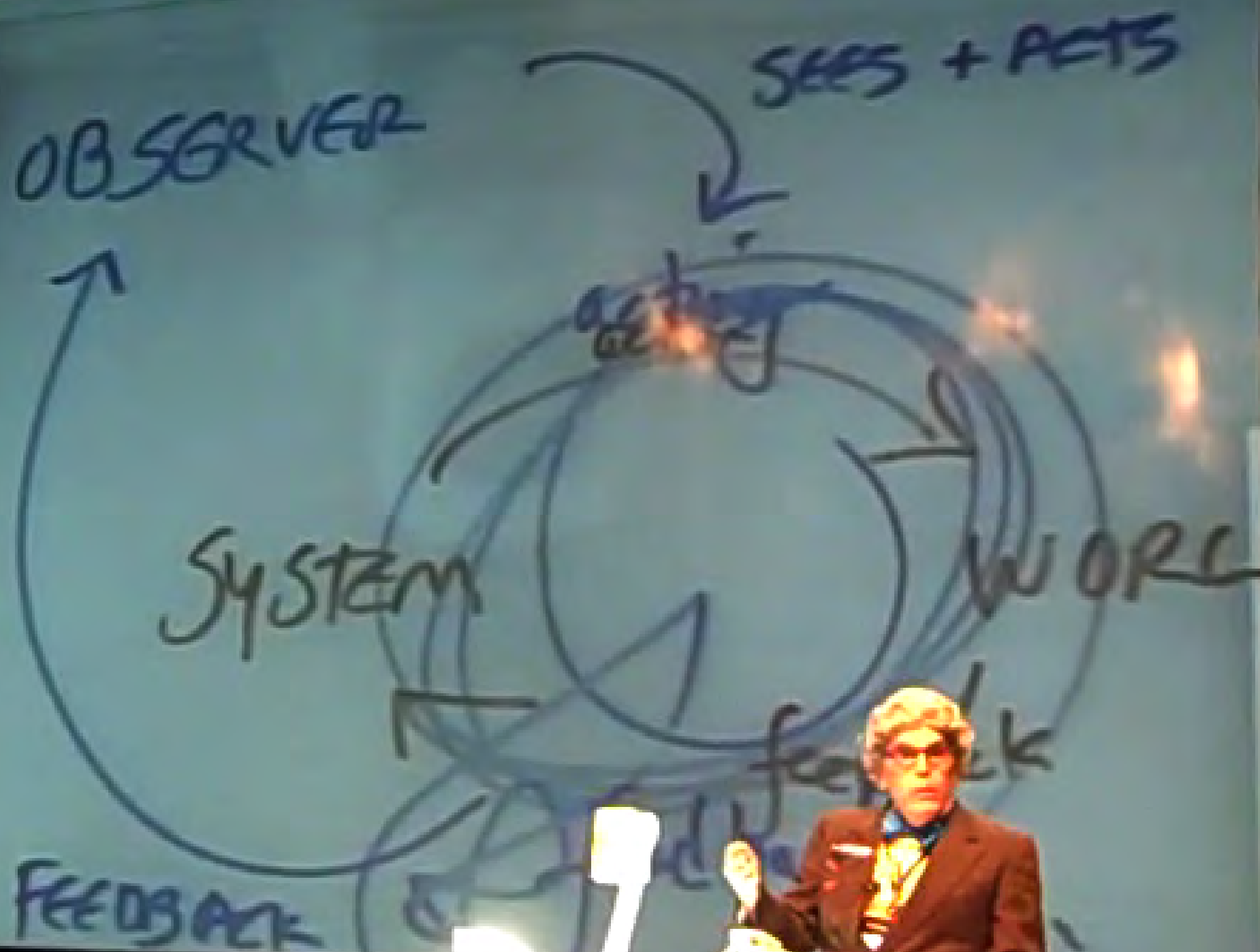
$\overset{\uparrow}{Proc}_B^O$ (S*) in \underline{Con}_B (S*)



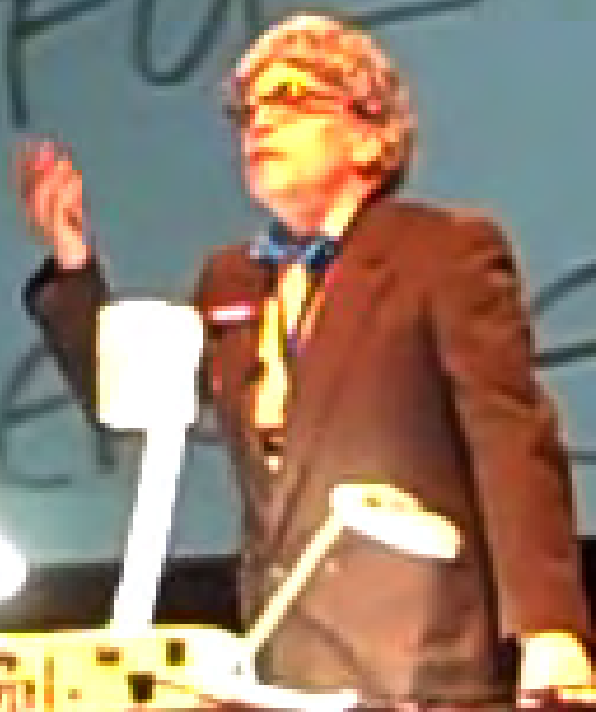
$\overset{\uparrow}{Proc}_B^O$ (R*) in \underline{Con}_B (R*)







Dr. Dineen
MEANINGFUL
EMERGENCE



frameworks

interaction

emergence

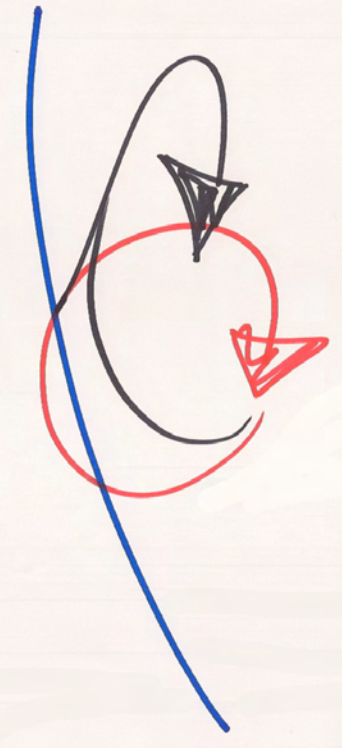
autonomy



entailments



meaning



frameworks

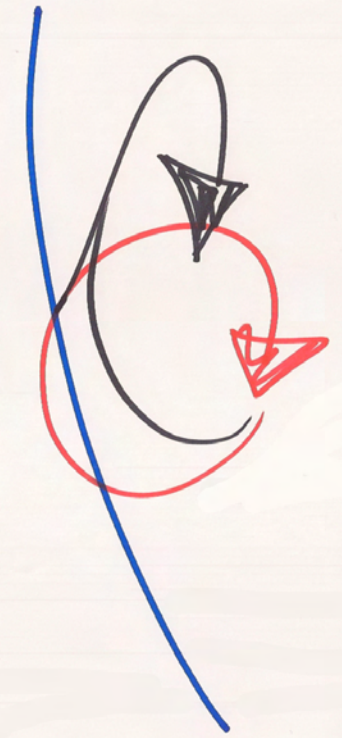
interaction

emergence

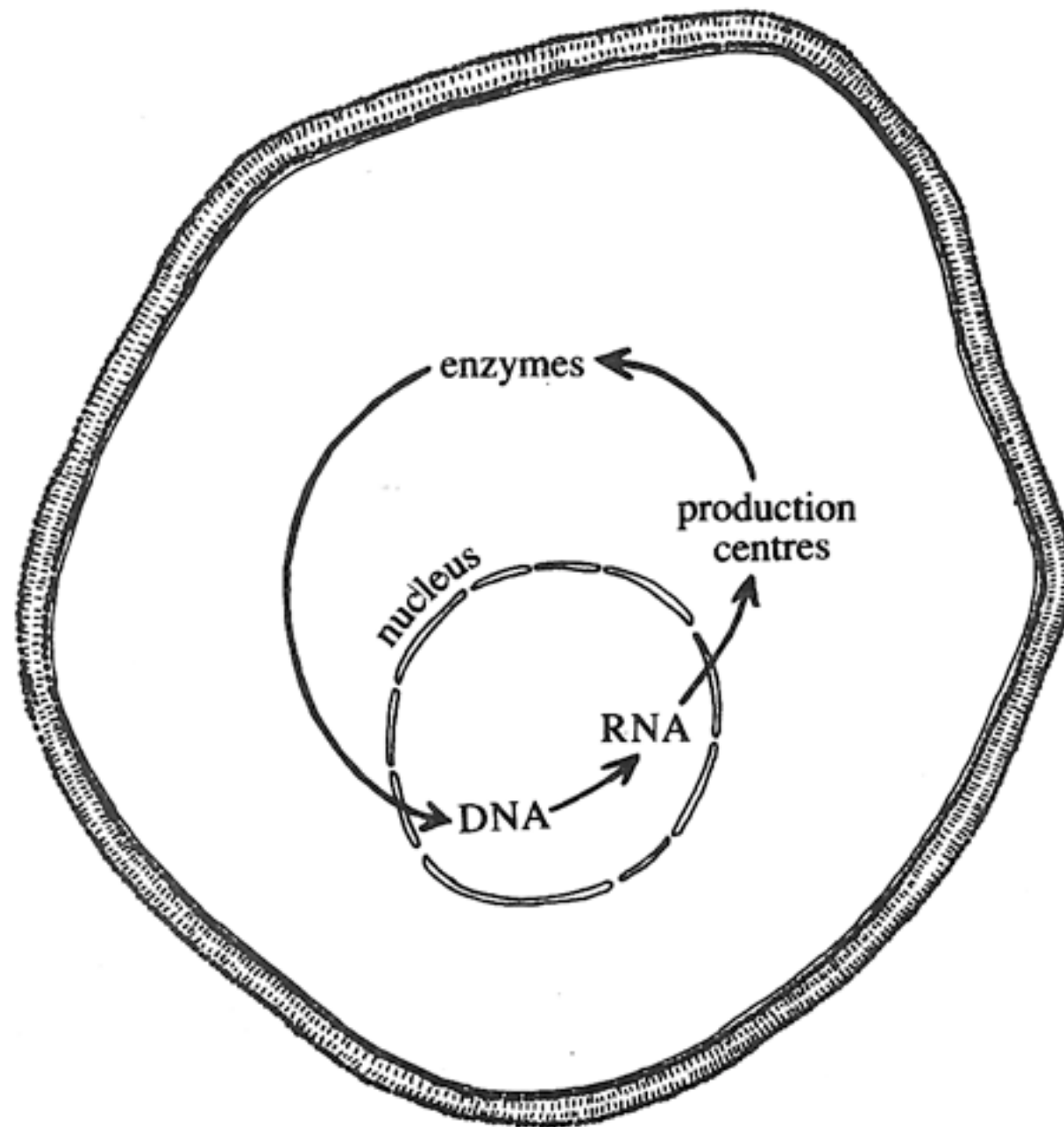
autonomy



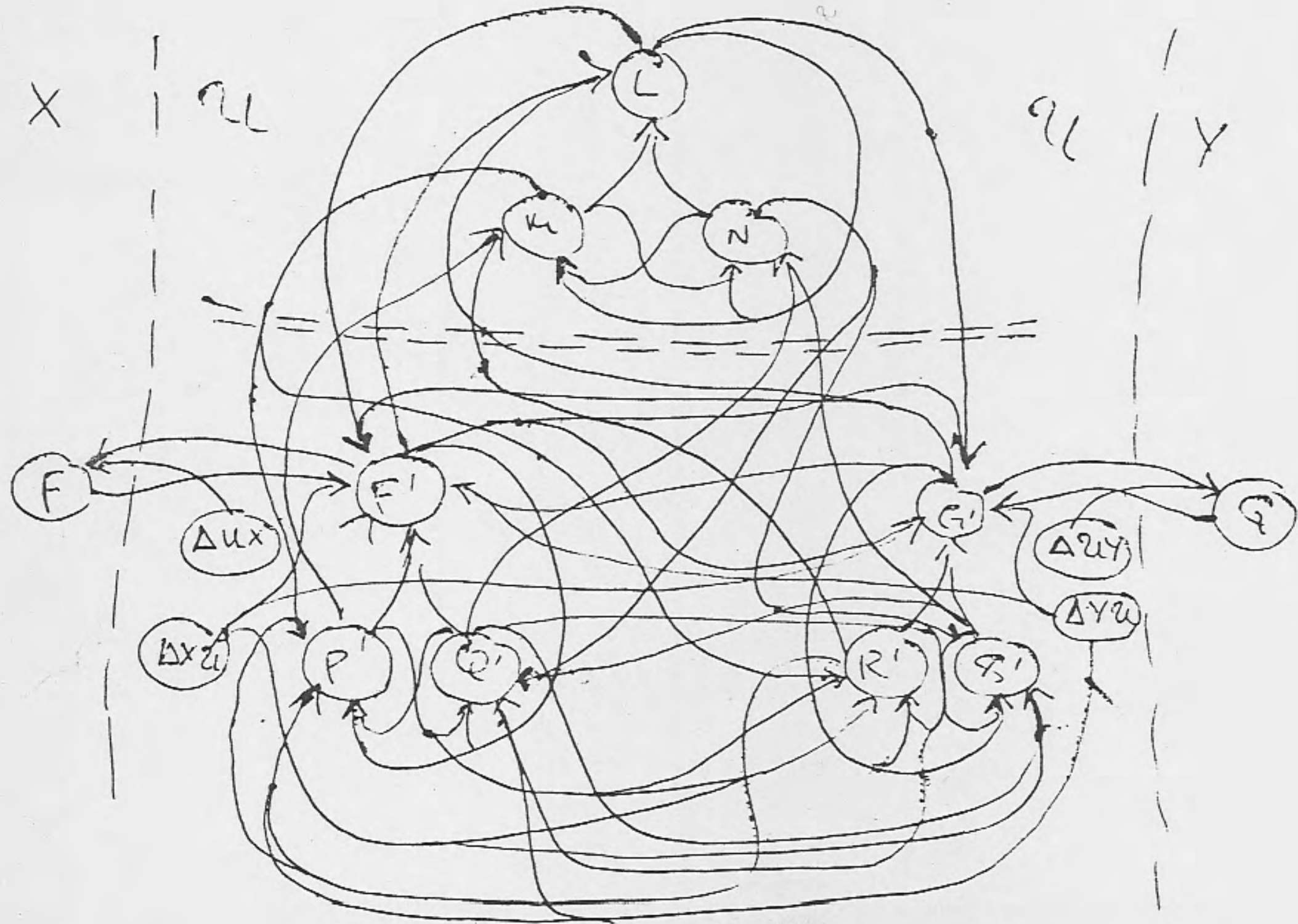
autopoiesis



biological view of autopoiesis

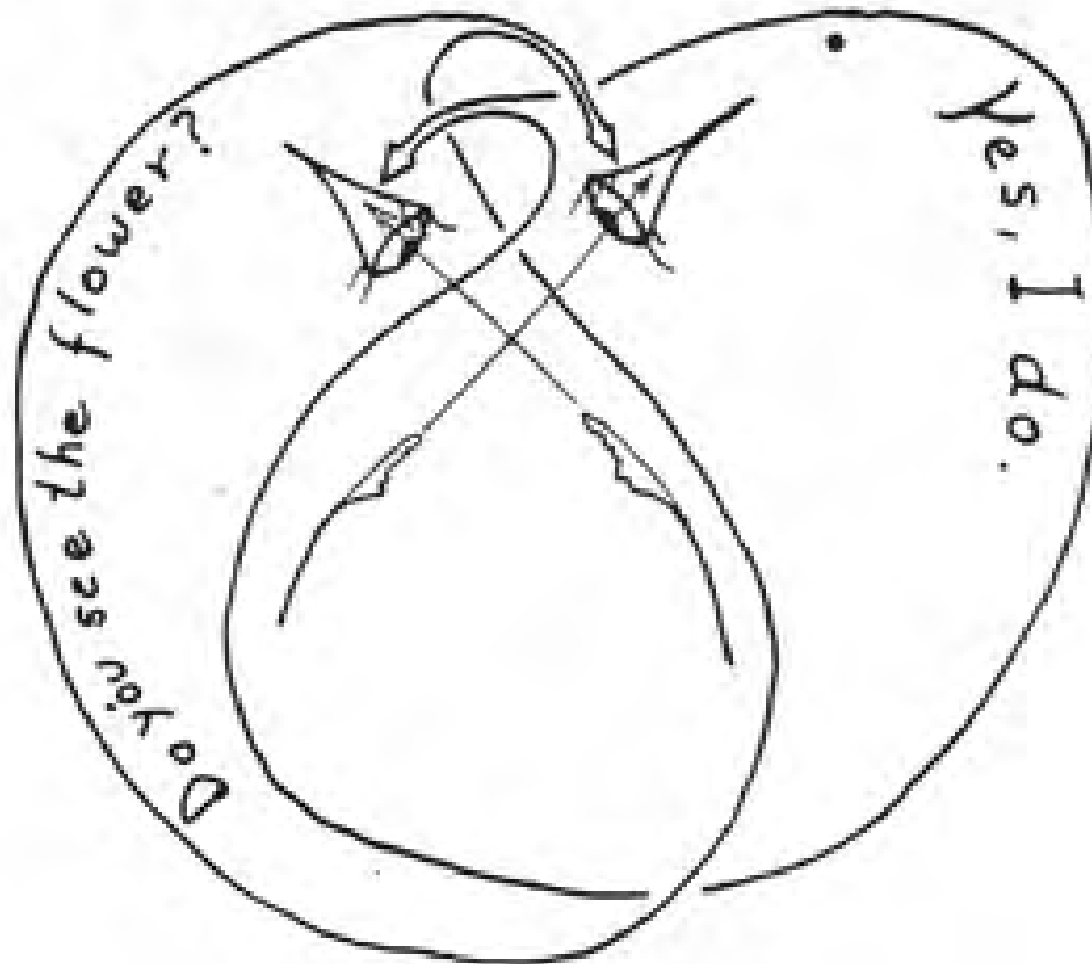


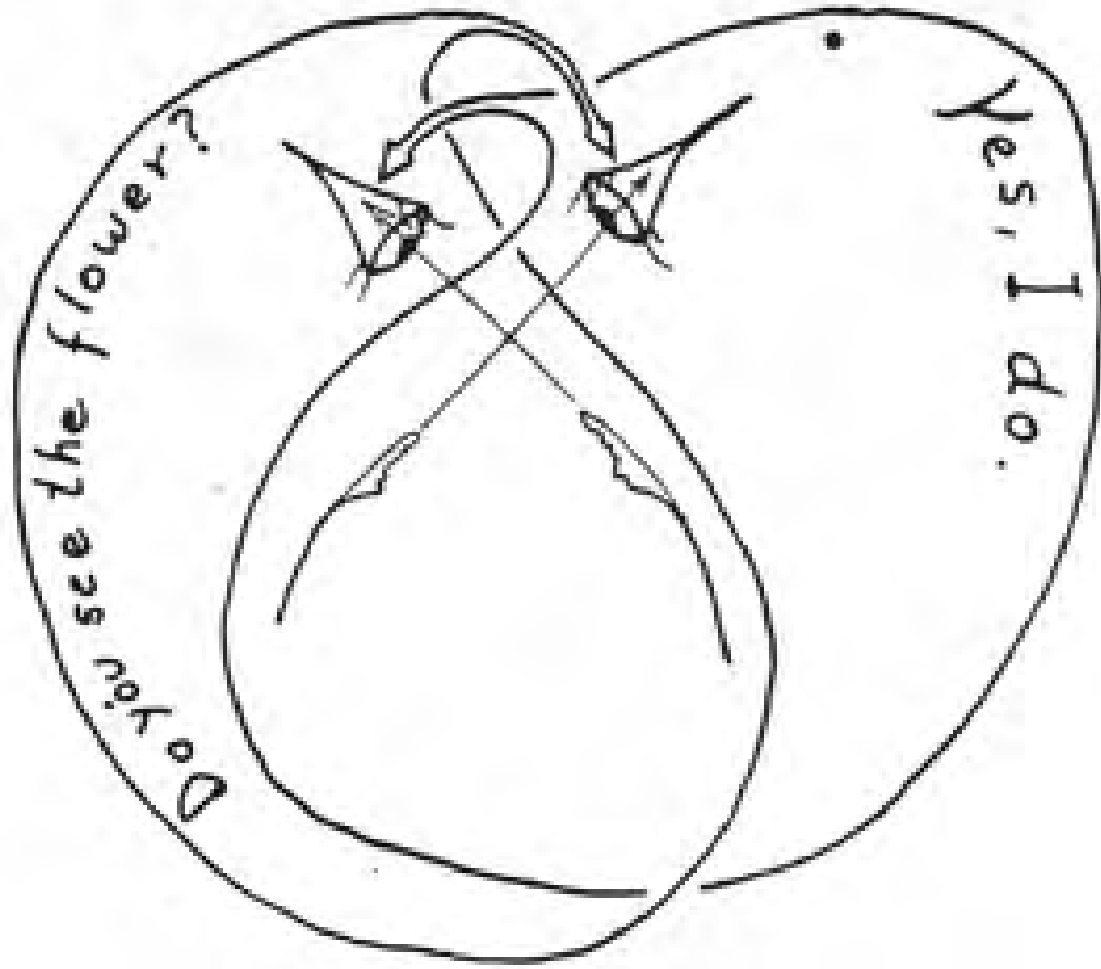
cognitive view of autopoiesis



— original drawing by Gordon Pask

social view of autopoiesis





— original drawing by Humbert Maturana

frameworks

interaction

emergence

autonomy



autopoiesis



being human

frameworks

interaction

emergence

autonomy

frameworks

interaction



conversation

emergence



entailments

autonomy



autopoiesis

frameworks

interaction



conversation



consciousness

emergence



entailments



meaning

autonomy



autopoiesis



being human



interaction

conversation

consciousness

emergence

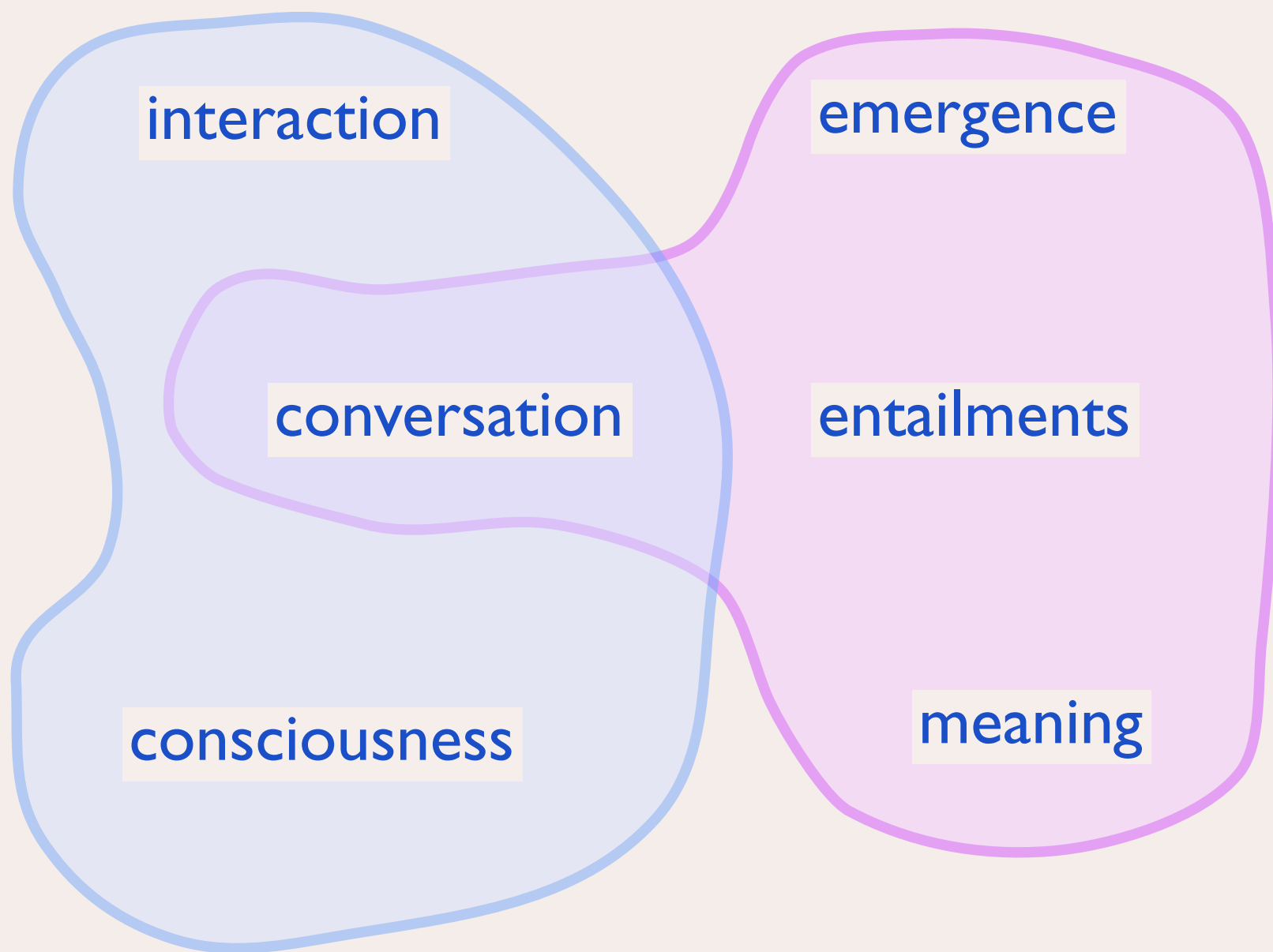
entailments

meaning

autonomy

autopoiesis

being human



interaction

conversation

consciousness

emergence

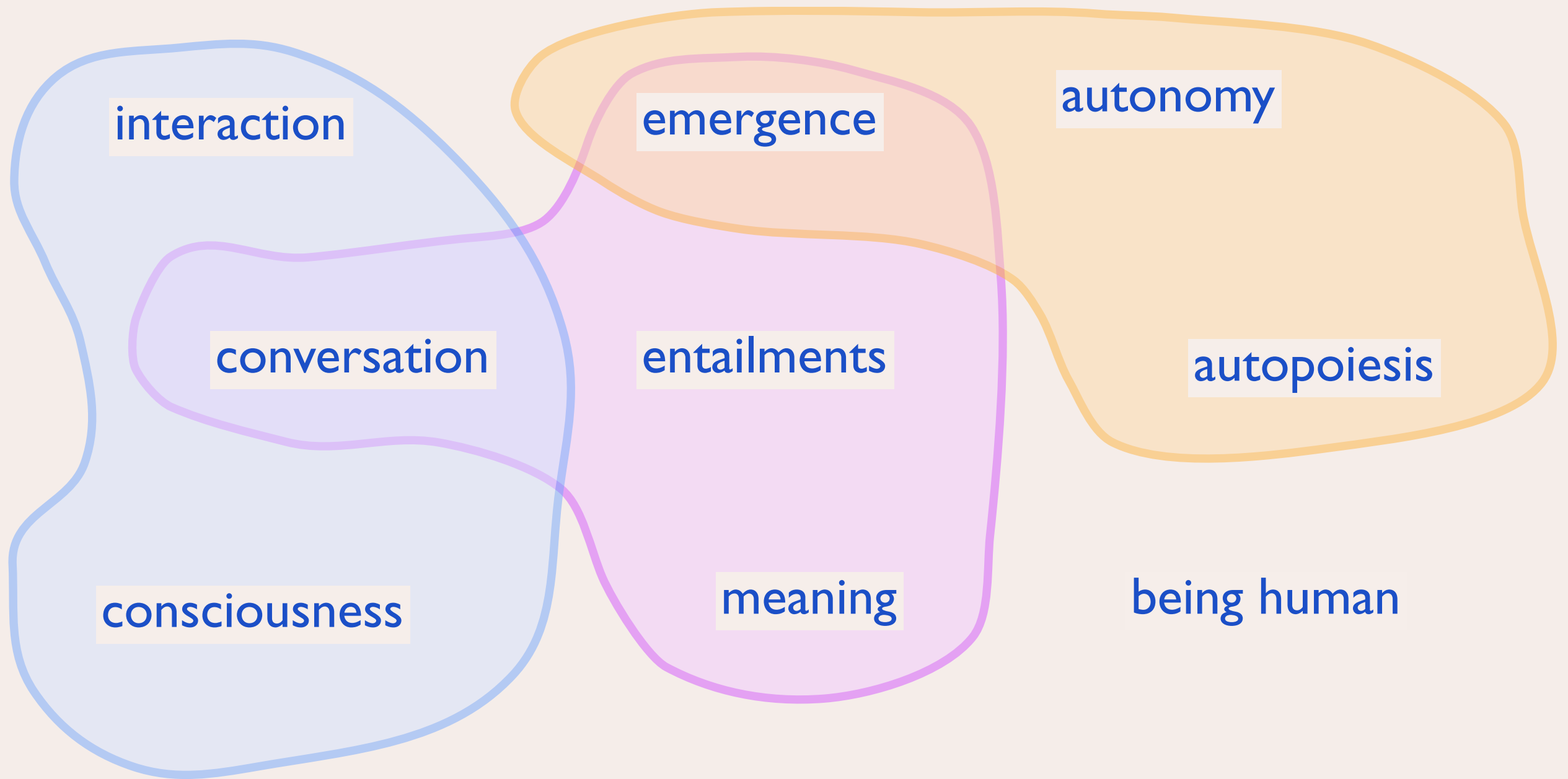
entailments

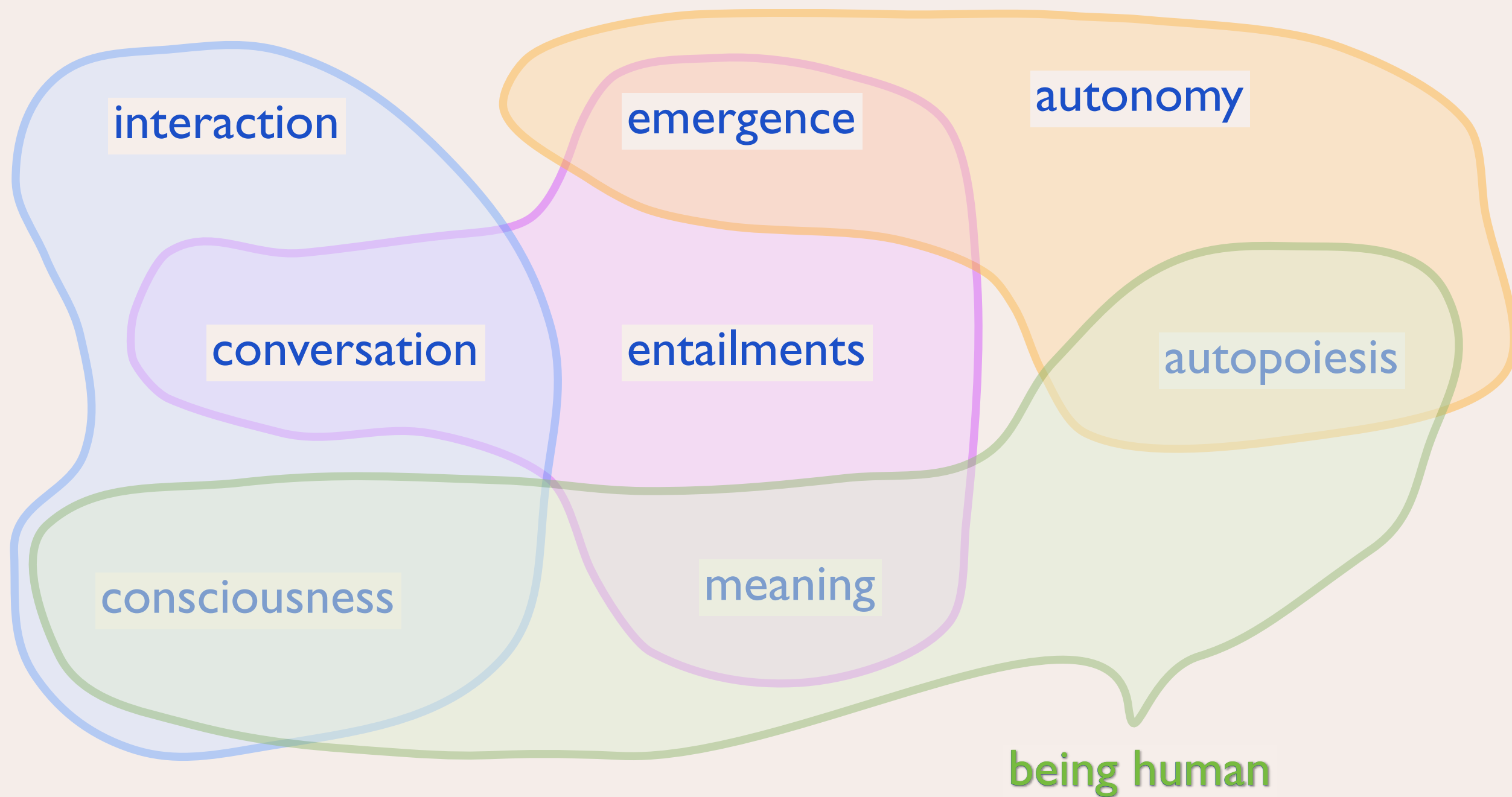
meaning

autonomy

autopoiesis

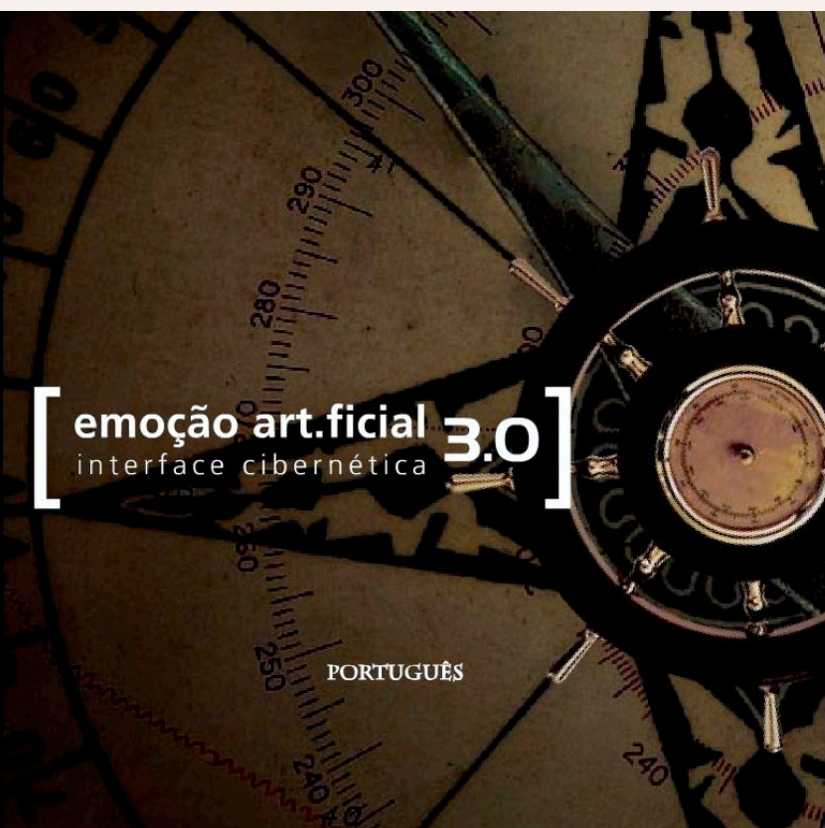
being human





Itaulab trilogy

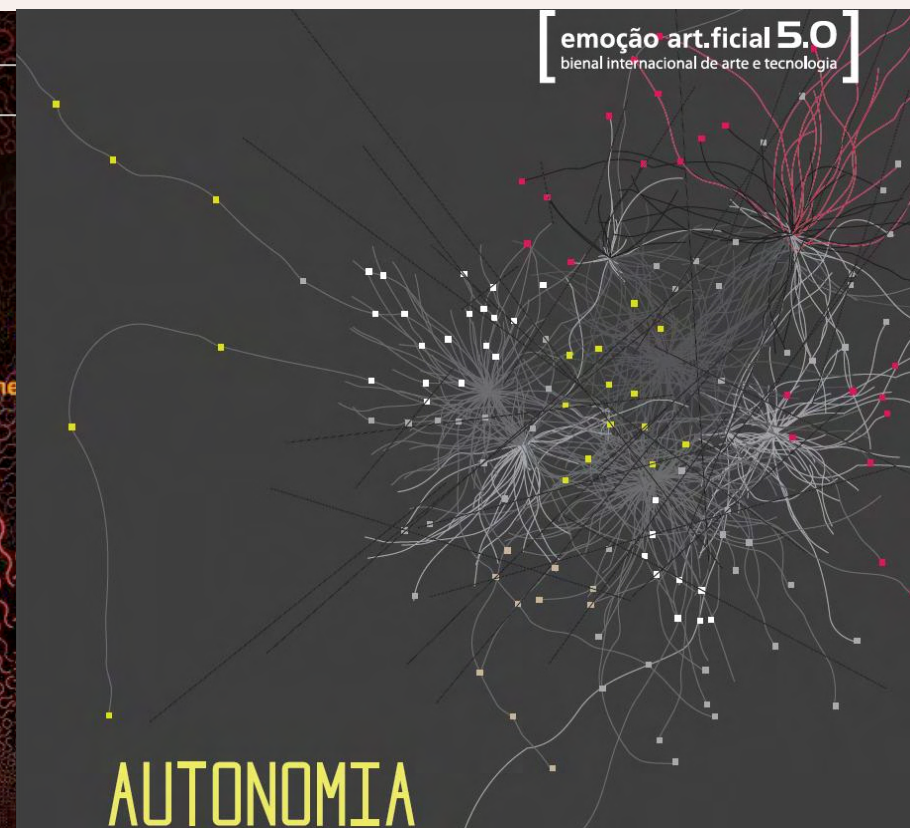
interaction



emergence



autonomy



interaction

autonomy

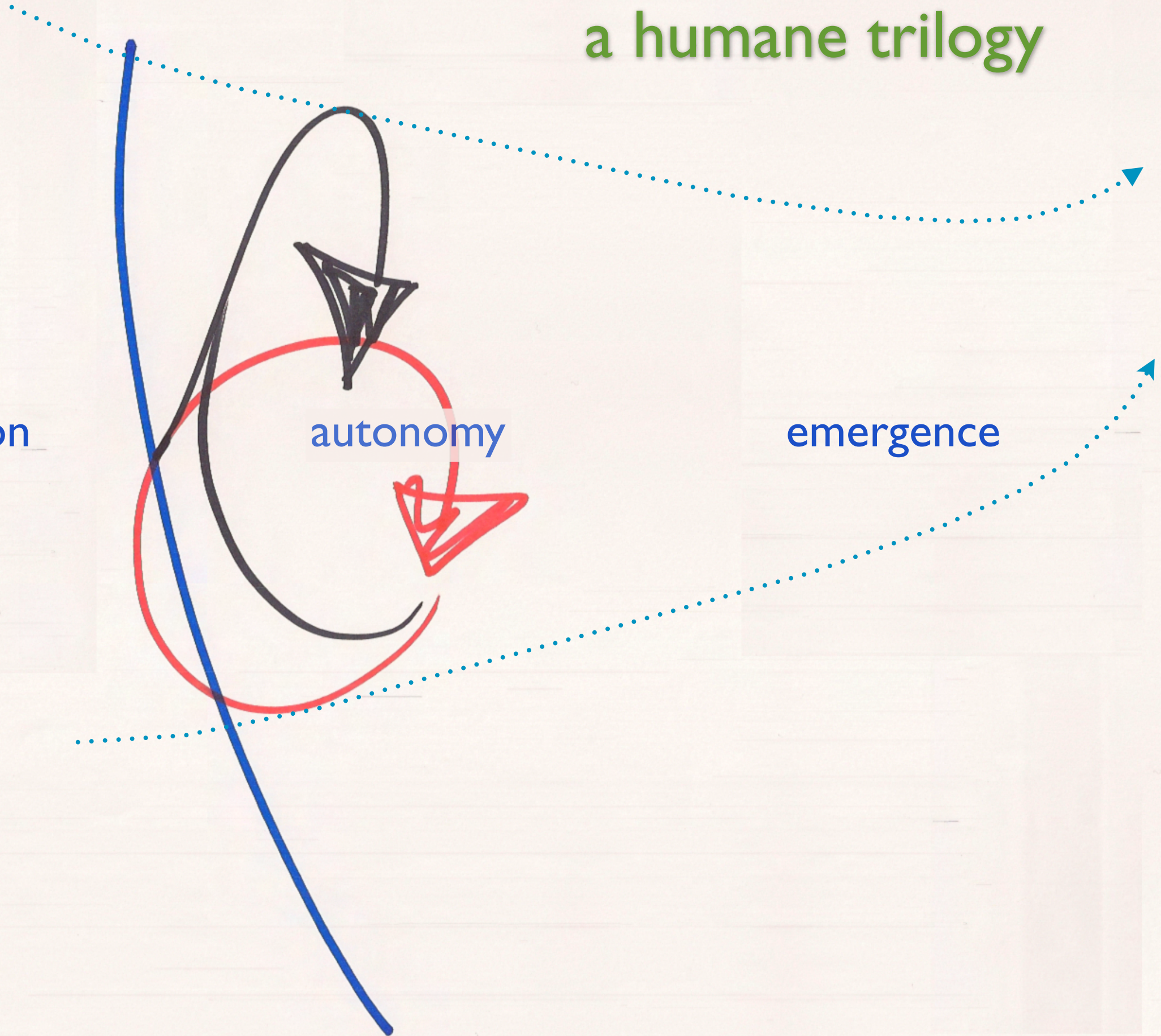
emergence

a humane trilogy

interaction

autonomy

emergence



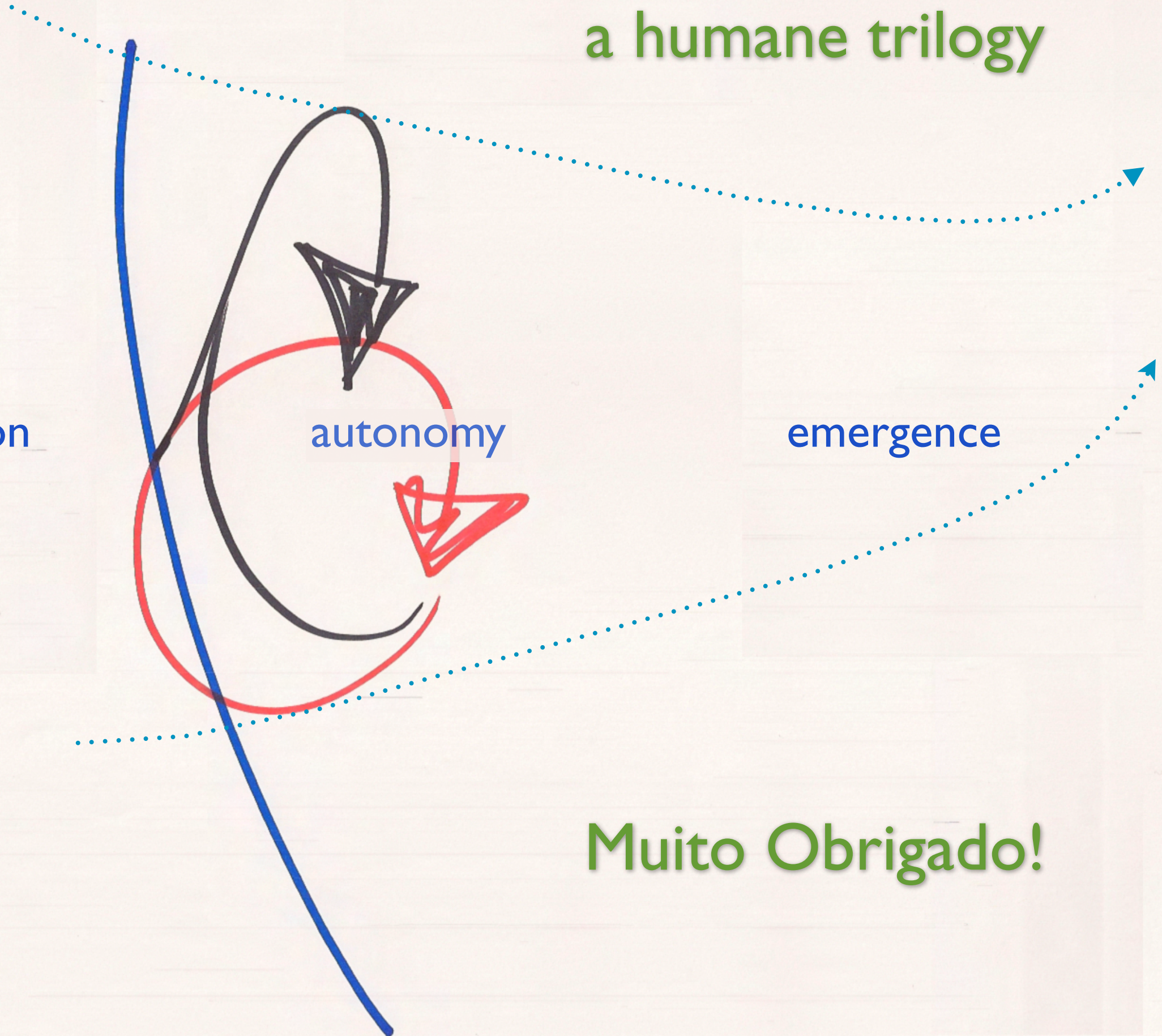
a humane trilogy

interaction

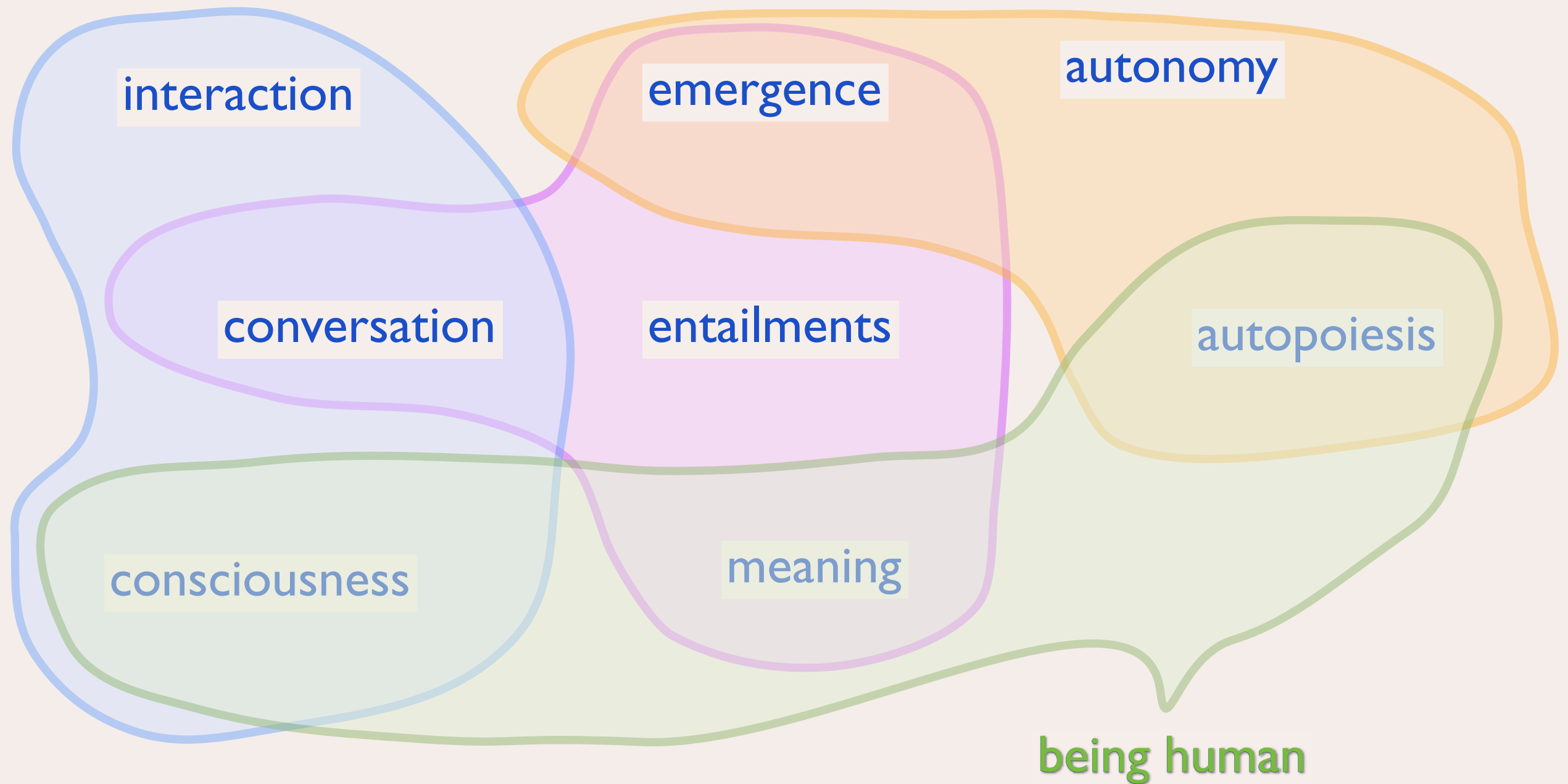
autonomy

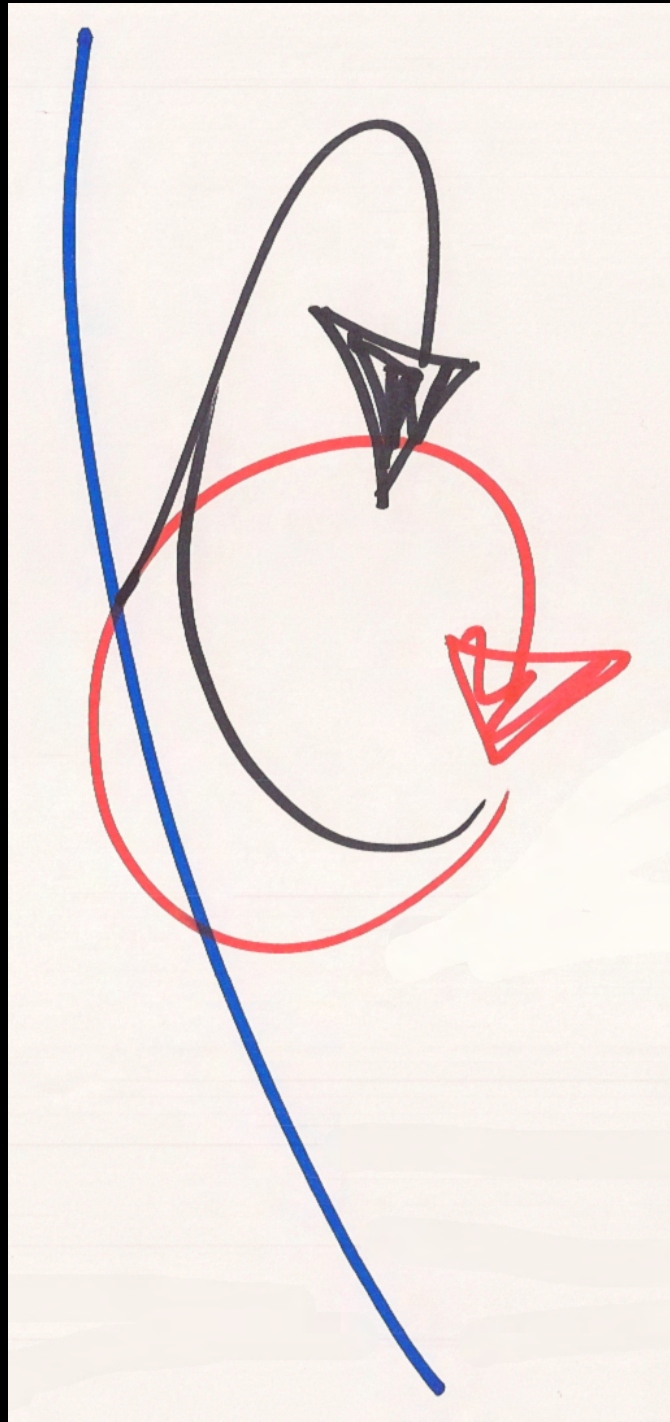
emergence

Muito Obrigado!



questions & answers





a humane trilogy

my thanks to

marcos cuzziol

guilherme kujawski

all the staff of Itaulab and Itaú Cultural

peter cariani

patricia clough

cj maupin

in appreciation of

heinz von forester

humberto maturana

gordon pask

paul pangaro

pan@pangaro.com