

A
CYBERNETICS
MATHEMATICS
DESIGN

'Draft' PAPER

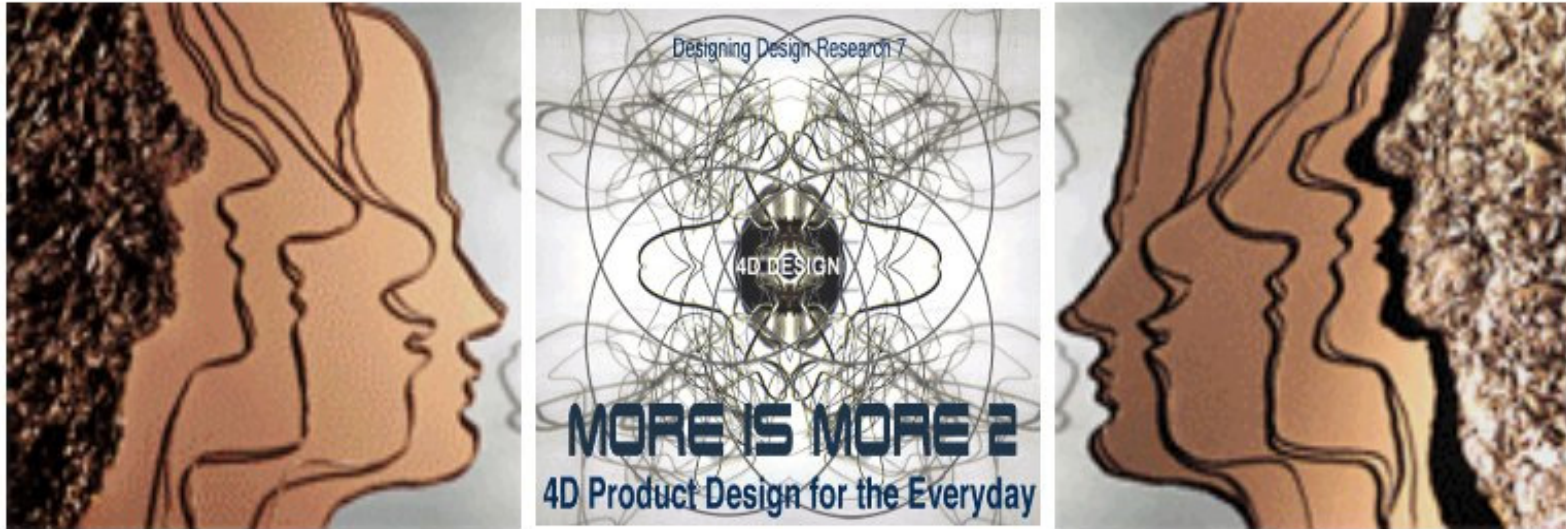
- **'Li' and the Artificial: 'Designing' the Future through 4D Design.**

by Alec Robertson
& Delai Men

2010

A Video  Abstract

Designing Design Research 7:



Venue: *DANA CENTRE*, Science Museum, Queen's Gate, South Kensington, London, SW7, UK.
Tuesday 6th May 2008.

*A Design Research
Event endorsed
by the*



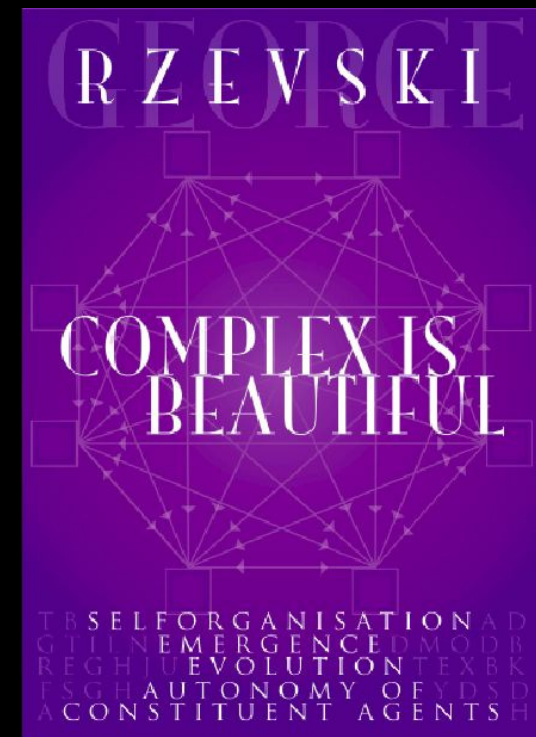
**CHARTERED
SOCIETY OF
DESIGNERS**

*Click on **SQUARE** above for Multimedia Proceedings,
or the **Video** icon at top for a 10 minute Video Abstract of this Design Research Event.*

- **Complex Systems Science (CSS).**
- **4D design**
- **C2 Cybernetics**
- **Applied Performance**
- **Li' (礼)**

Science of Complex Systems....

- A system is complex if it consists of autonomous units (Actors, Players, Agents) each pursuing own goal in a strong interaction with each other
- The interaction can be competitive, cooperative or a combination of the two
- Goals of individual players may or may not be disclosed to other players.



Professor George Rzeski, Magenta Corp. (2006)

3D design ...

The 3D World is predictable (deterministic = 3D)

- based on the “grand design”
- any uncertainty is due to our inability to understand it
- the future is given
- Aristotle, Kant, Newton, Einstein

Deterministic 3D forms of artefact of today, which are for example:

Static e.g. Conventional cars, aircraft, engines

Linear e.g. Conventional automated production lines

Dedicated e.g. Conventional non-robotic tools

Active but not interactive e.g. A clock

based upon presentation by George Rzveski at “More is More”, Magenta Corp. (2005)

4D design and complexity...

The 4D world is inherently unpredictable (complex = 4D)

- evolves with time due to autocatalytic properties of some of its elements
- evolution is irreversible and leads to an increase in complexity
- the future is under perpetual construction
- Buddha, Maxwell, Darwin, Popper, Prigogine

Complexity is a prerequisite for 4D form in artefacts with, for example:

Adaptation (complex system adapt to any external or internal unexpected change that disrupts its operation for better or worse)...

Resilience (complex systems are resilient to changes that represent a threat to their survival, eg, misuse, breakdowns)...

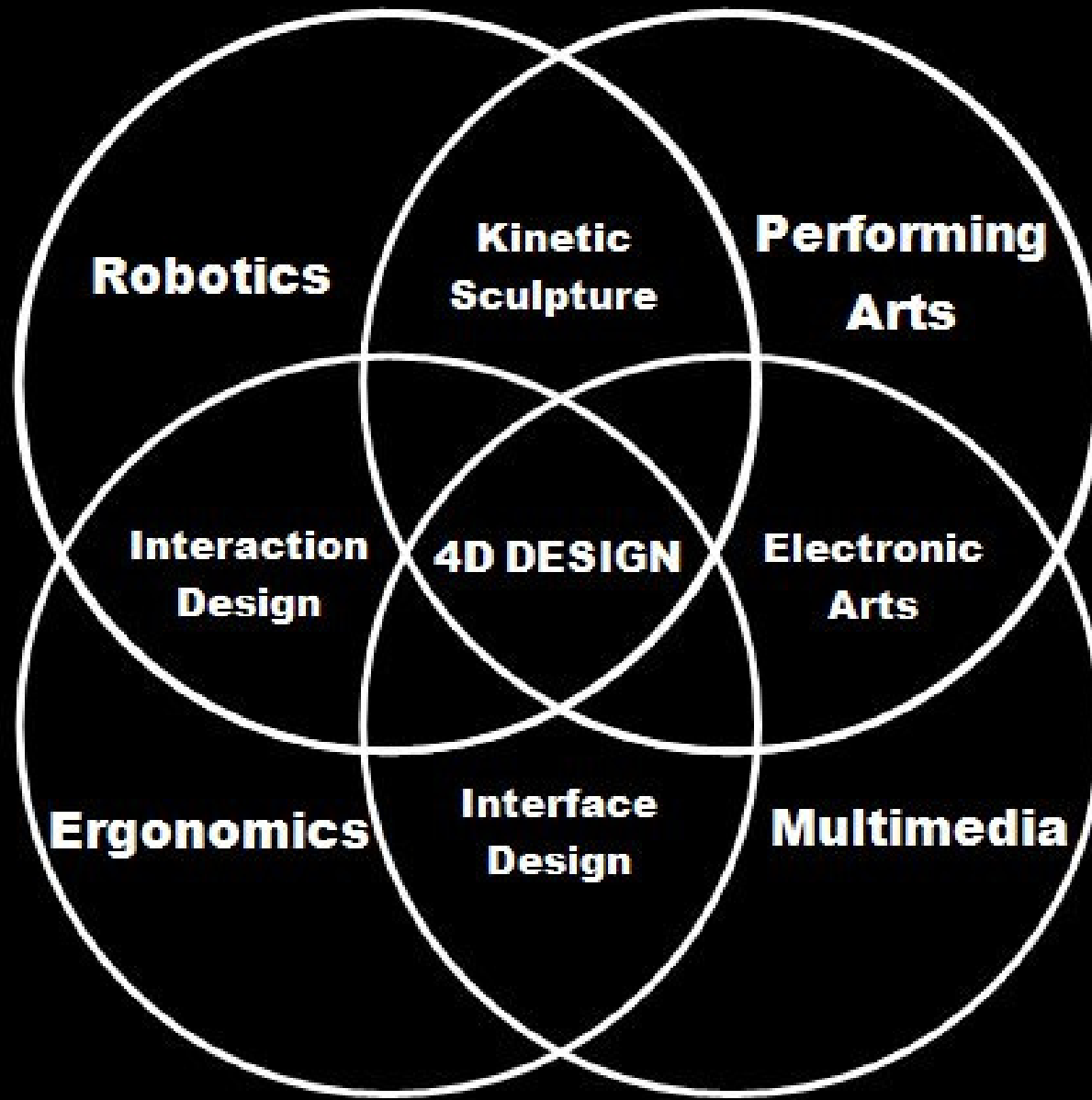
based upon presentation by George Rzveski at "More is More", Magenta Corp. (2005)

4D Design....

“The dynamic form resulting from ...

*the design of the behaviour of artefacts and
people in relation to each other
and their environment.”*

*Alec Robertson
4D Dynamics Conference 1995*



4D Design : expands art&design ‘*design*’?

2D DESIGN

Graphic Design
Illustration
Printmaking
Film
Video
TV
Textile Prints.

3D DESIGN

Metalsmith design
Furniture Design
Structured Textiles
Fashion Design
Jewellery design
Industrial Design (3D)
Packaging Design
Ceramics
Glass
Architecture (3D)
Interior Design (3D)

4D DESIGN

Interaction Design
Multimedia Design
Animatronics
Service Design
Corporate Identity Design
Industrial Design (4D).
Cultural Engineering.
Information Design.
Event Design
Architecture (4D)
Interior Design (4D)
Product Opera.

Alec Robertson @ 4D Dynamics Conference 1995

Examples...

*Real 4D products have 'dynamic' form in real or **actual space** and can be:*

- dynamic lighting in a discotheque
- Sony AIBO dog with 'personality',
- 'smart' clothing
- responsive solar panels on buildings etc

Alec Robertson. (1995

Examples...

*Virtual 4D products have 'dynamic' form in **cyber-space** and can be:*

- computer games
- internet chat rooms
- etc.

Alec Robertson. (1995)

Examples...

Real 4D services have 'dynamic' form in real or actual space and can be:

- and the way food is served in restaurants
eg. McDonalds vs The Ritz.
- through to 'customer care' systems in hotels,
eg. a motel vs a Hilton

Alec Robertson. (1995)

Cybernetics.....

C1.....First order cybernetics
the cybernetics of observed systems

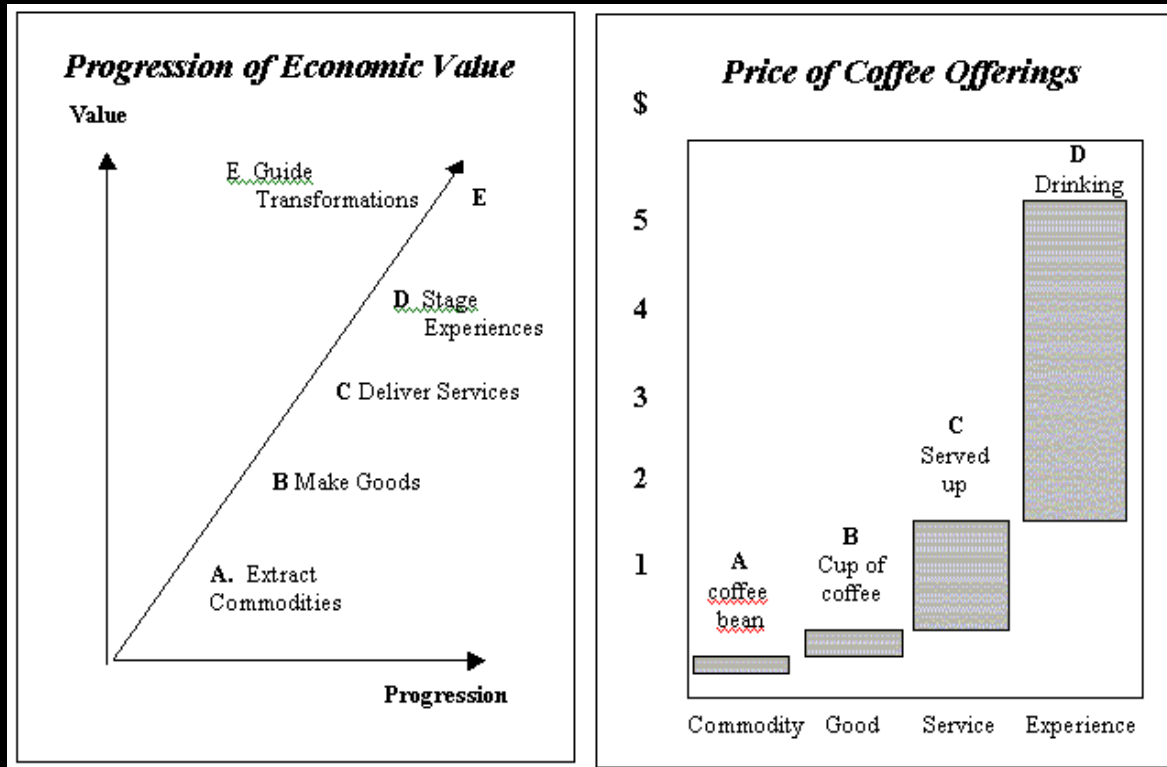
C2.....Second order cybernetics
the cybernetics of observing systems

Heinz von Foerster in book "Cybernetics of Cybernetics"

"the observer is touched and touches "

Ranulph Glanville at "Cybernetic Serendipity Redux." Sept 2008

.....or applied performance arts?



4D value

In this example, we see the value of the raw material (**A. coffee bean**) provided, and the 3D artefacts used (**B. cups** etc.).

This is followed by the delivery of the service of **making** (C.) though to the complex dynamics within the experience of drinking in a social setting (D) , and what I refer to as 'applied performing arts' -

Diagram in Robertson (2001) from Pine & Gilmore's book The Experience Economy (1999).



**SNAKE
ROBOT**



**SPIDERCRAWL
-ROBOT**



**HAND
ROBOT**

“礼”

𡇗 禮 禮 禮 禮 禮

Li' (礼) denotes and embodies the entire spectrum of interaction with humans, nature, and material objects. Many patterns in nature, such as growth rings in trees, flows of water and drifting clouds as physical elements inter-act in 'complex' ways over time, and visually show a moment of 'Li'.

the recycled guide to nature's secret patterns

LI

DYNAMIC FORM IN NATURE



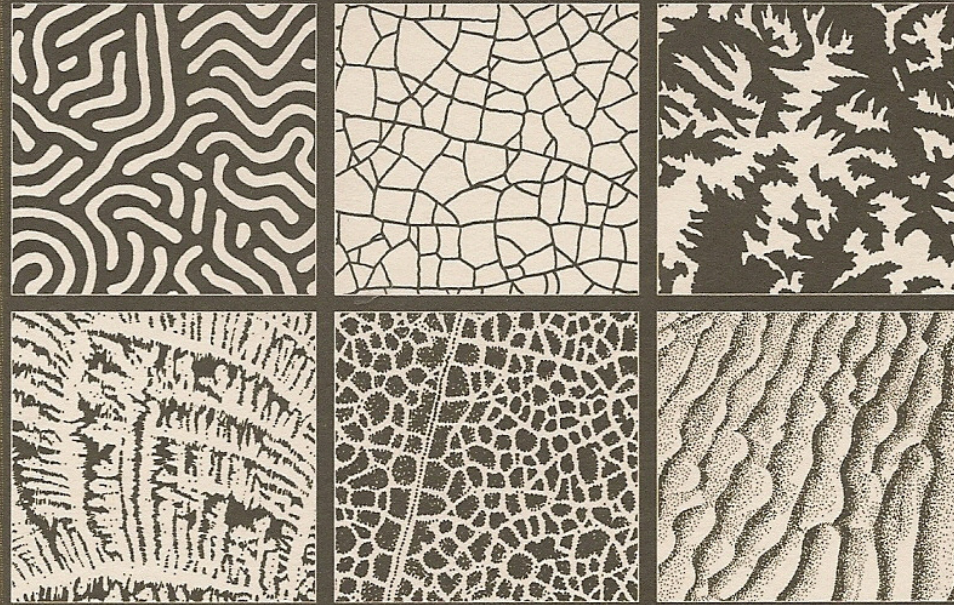
David Wade



easy!l the totall! utter!l best Li boeK_eyor

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Why does Nature use the same special patterns over and over again?
What are the main families of natural design? How are they formed?
Did the ancient Chinese really study this subtle and elegant subject?

In this beautiful book, illustrated by David Wade, a new perception
of organic pattern, 'Li', is presented for the first time in the West.
Essential reading for designers, artists, philosophers and natural scientists.

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Confucian classic text

“*lij*”, Book of Rites

Etiquette: “respect”, “abidance”,
“moderation”, “self-discipline”,

Ci Hai

..... *A challenge for SCHOLARSHIP :*

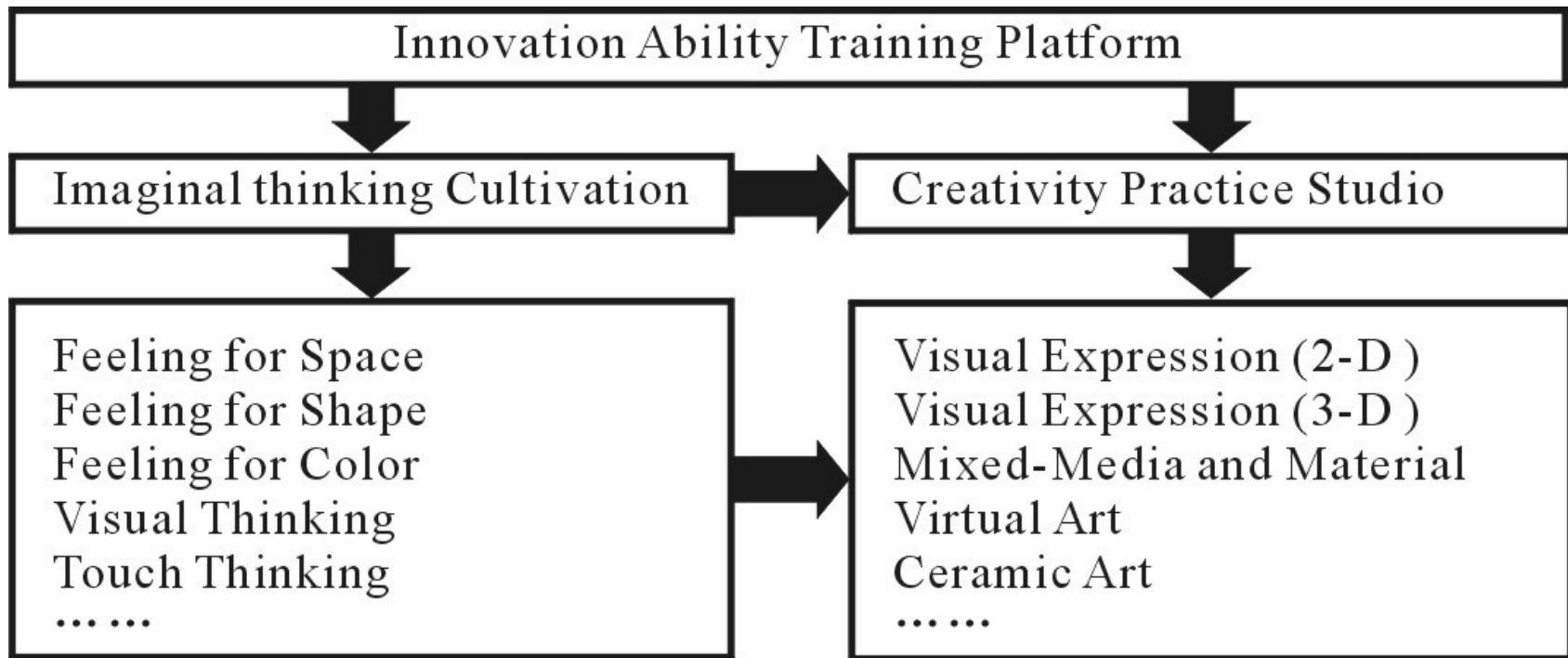
....what does the ancient Chinese definition
of scholarship offer?

qin 琴, qi 棋, shu 書, and hua 畫.

“Musical Instruments,
Board Games,
Calligraphy,
and Painting”

reason, creation, expression and dexterity.

South China University of
Technology , Guangzhou, China.



‘innovation consciousness’



- 'service design'
- 'user centred design'
- 'universal design'
- 'user experience design'

A challenge for DESIGNING:

...to consider the relationships between
elements as 'the design'..

.... and to enable 'adaptation'
that gives rise to metamorphosis.

*Alec Robertson
at KINETICA MUSEUM
14 October 2008*

Designing the future....

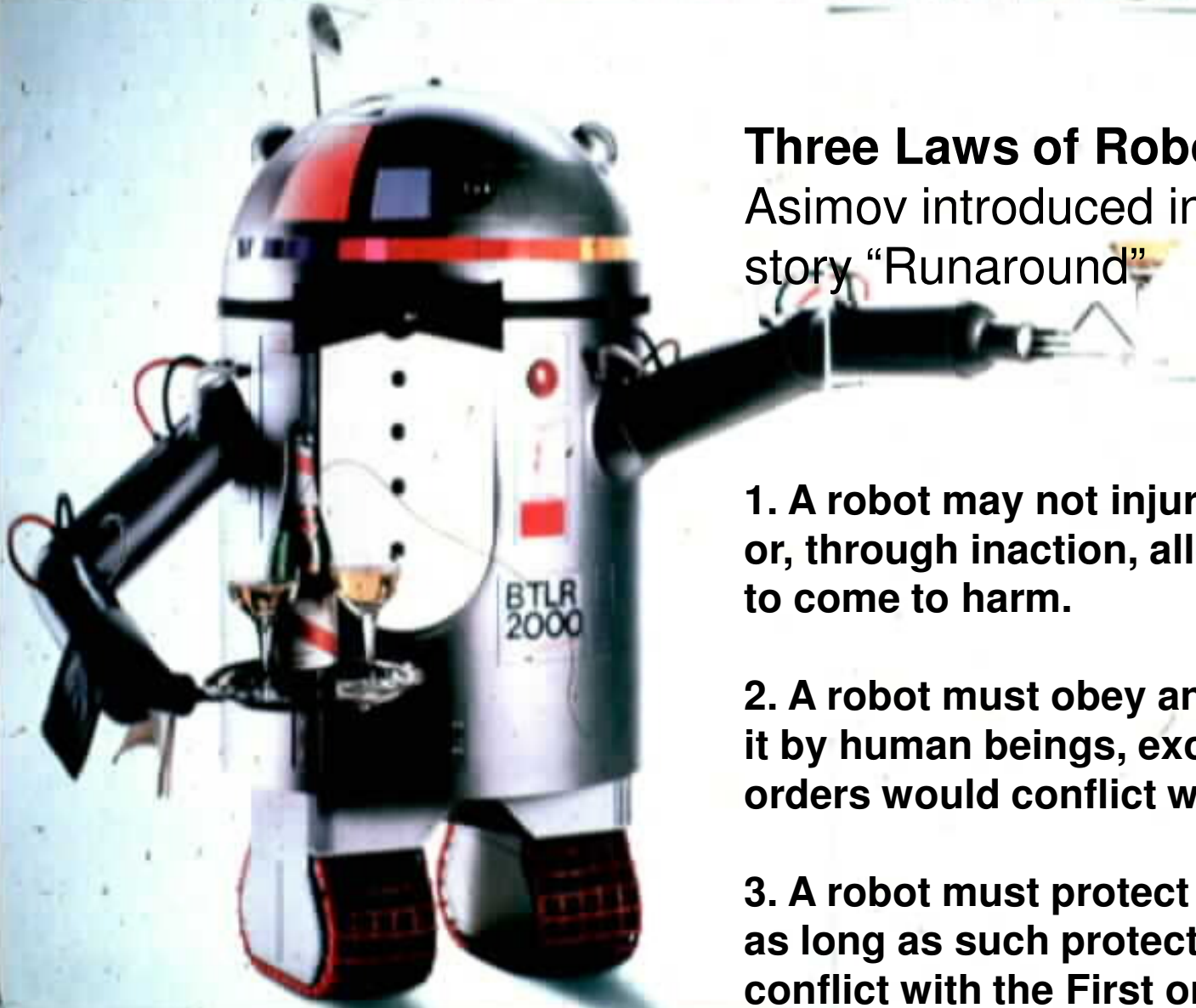
asynchronous polysensorial performative

semiosis *habitus* reciprocity

emergence *adaptation*

Conversational spatialisation ?

ONE GIANT LEAP FOR MACHINEKIND.



Three Laws of Robotics by Isaac Asimov introduced in his 1942 short story "Runaround"

- 1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.**
- 2. A robot must obey any orders given to it by human beings, except where such orders would conflict with the First Law.**
- 3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.**

Li' may well be important to embody in artificial systems as 'machines' become more and more intelligent and autonomous

‘challenge norms’

