Biological Organisation as the True Foundation of Reality

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Conventional Physics

- Current physics views *matter* as primary
- Deals happily with information, but rejects meaning
- It has its problems, e.g. quantum mechanics is a statistical theory, saying nothing about individual events
- Plus all-pervasive confusion: 'If you think you understand quantum mechanics, you don't understand quantum mechanics' (Feynman)
- And physics is having a hard time at present matching theory and experiment
- Might this be because something is missing from the regular world view? Might physics be suffering as a result?

The alternative

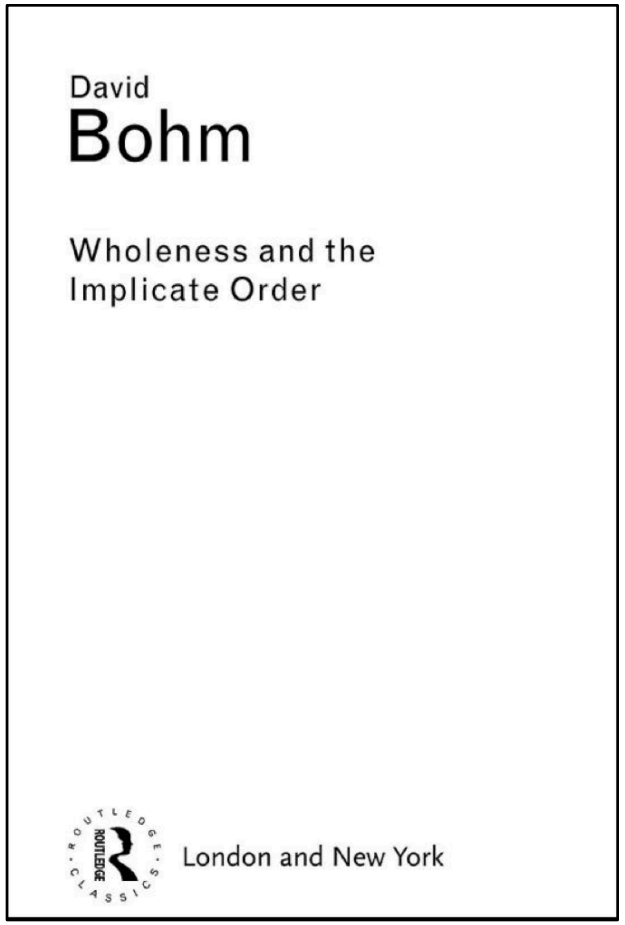
- Main thesis of this talk: meaning is as fundamental as matter; the two are entangled
- As Peirce wrote in the 19th century: 'all this universe is perfused with signs'
- His theory of signs (semiotics) does now have a place in biology (in the discipline of *biosemiotics*, which studies the role that signs play in biology)
- But it has not yet crept into regular physics, where signs and meaning are viewed as irrelevant

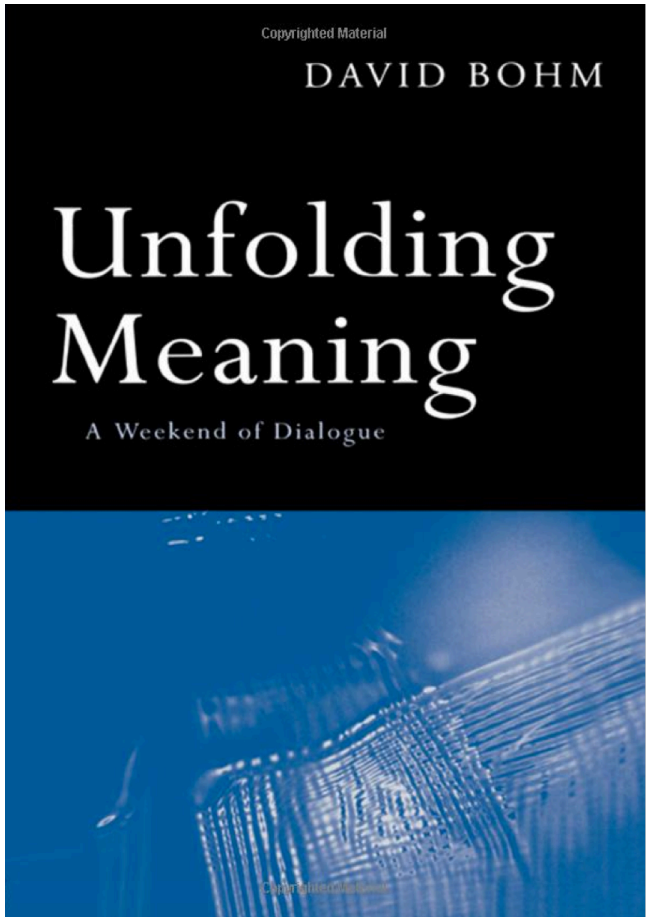
What are Signs?

- Signs are entities that relate to corresponding *objects*, through the mediation of *interpretants*: signs (e.g. realised through biomolecules having particular significance) direct the activities of biological systems

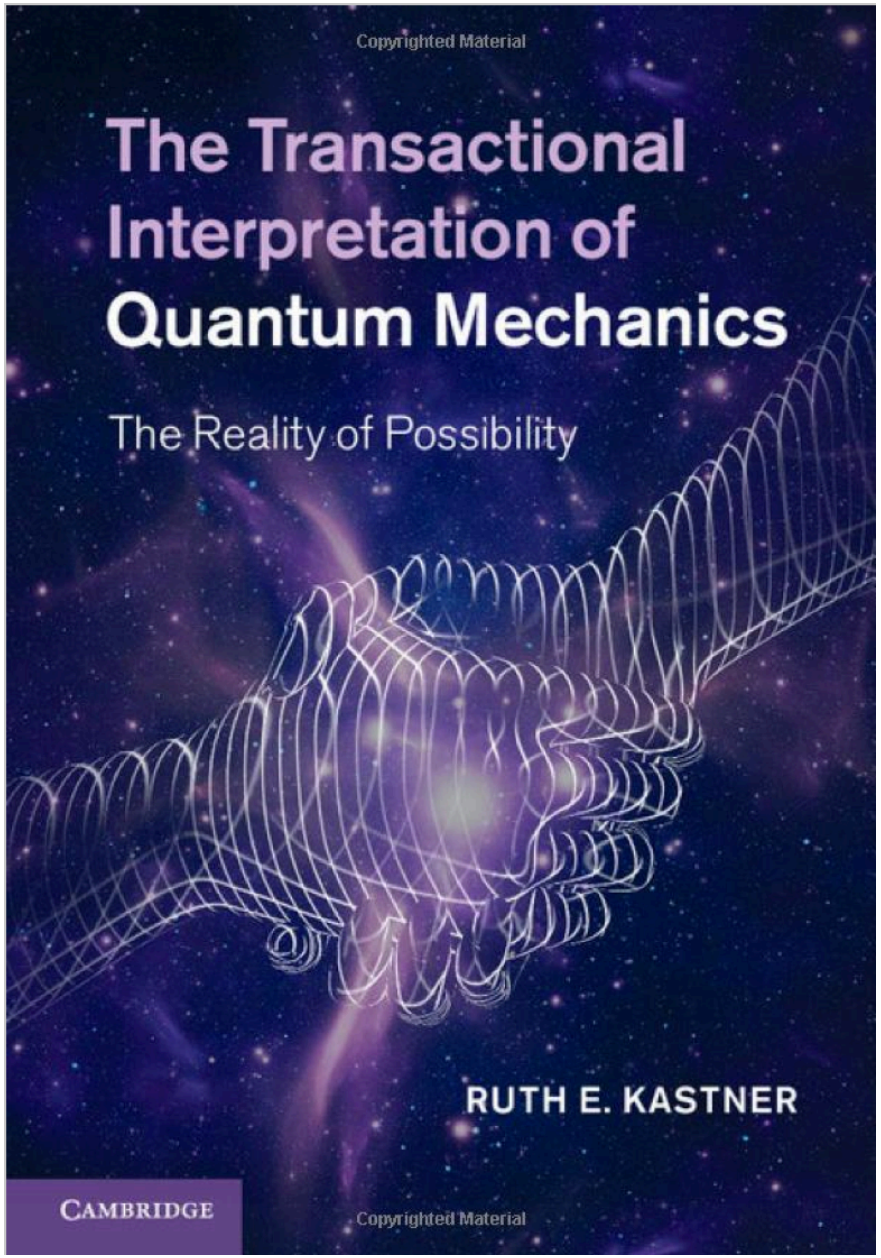
- While nothing in physics corresponds to biosemiotics, a number of people have made relevant proposals. The following slides indicate books having such concerns.

Books by David Bohm

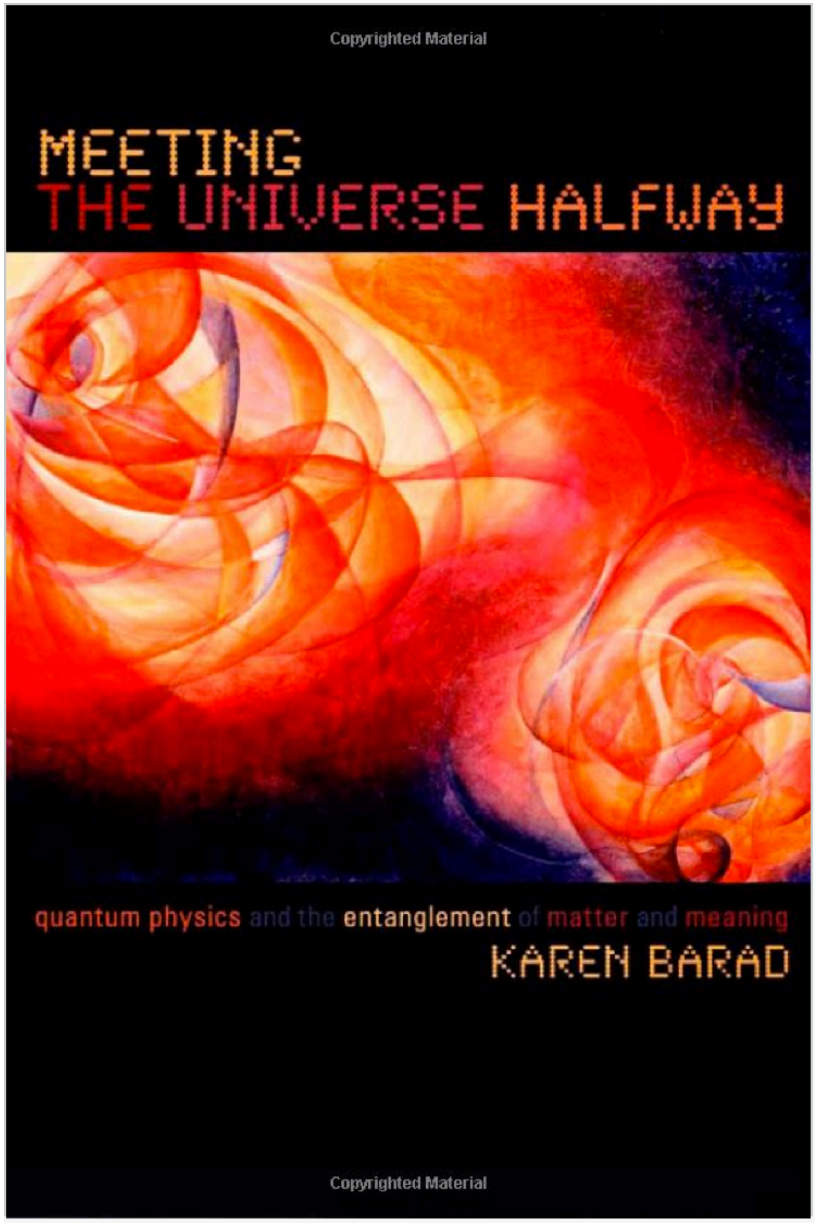




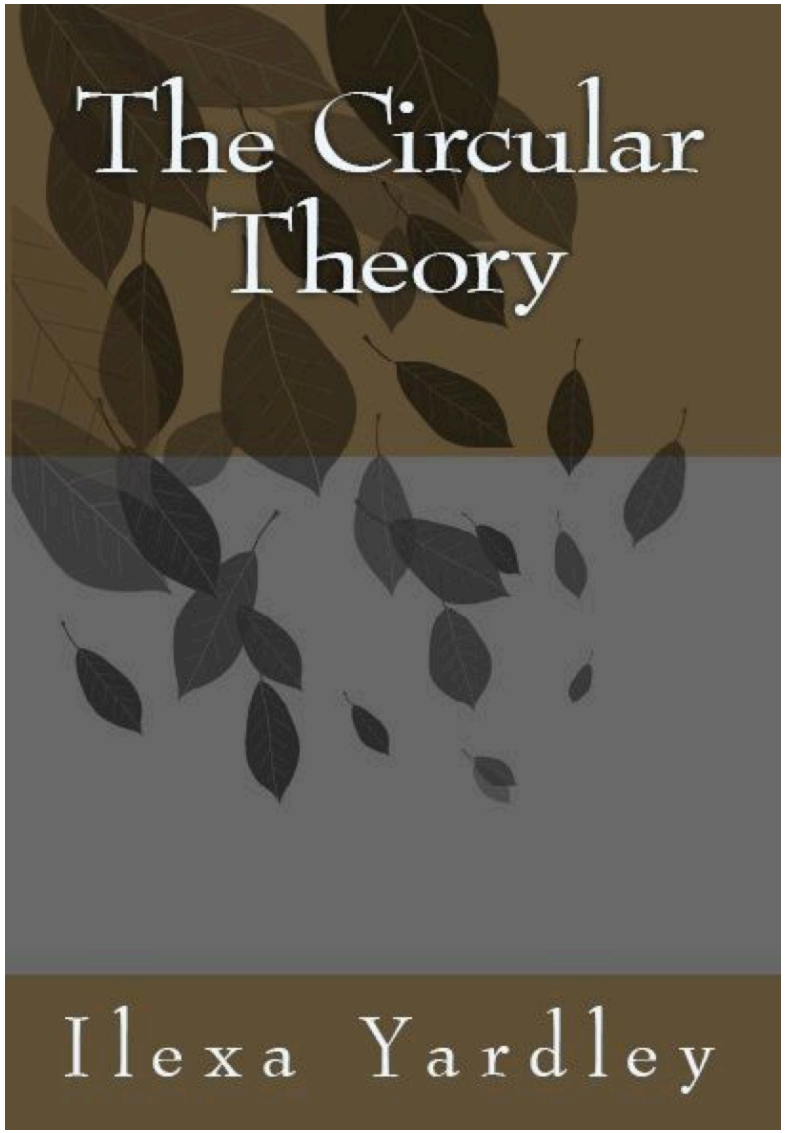
Introducing *soma-significance*:
"Soma (which is physical) and significance (which is mental) are not in any sense separately existent, but rather are two aspects of one overall reality"



"This book will explore the view that quantum theory is describing a world of possibility that lies beneath, or beyond, our ordinary, experienced world of reality"



"Matter and meaning are not separate elements. They are inextricably fused together, and no event, no matter how energetic, can tear them asunder"



Yardley: “Somewhere between mind and matter is an expression which we normally call symbol. We do not have to locate this symbol. We know it exists because it expresses itself as number systems, word systems, picture systems.”

“From ideas, symbols. From symbols, mind. We invented symbols so we could have some way of articulating the hidden reality we know as mind. There can be no mind without idea, no idea without symbol, no symbol without reality. So, here, is a unified whole (mind, matter, symbol).”

Cosmos and History: The Journal of Natural and Social Philosophy, vol. 10, no. 1, 2014

http://philpapers.org/rec/HANCBI-3

COMPLEXITY BIOLOGY-BASED INFORMATION STRUCTURES CAN EXPLAIN SUBJECTIVITY, OBJECTIVE REDUCTION OF WAVE PACKETS, AND NON-COMPUTABILITY

Alex Hankey

'Self-organized criticality' in complexity biology places system loci of control at critical instabilities, physical properties of which, including information properties, are presented.

The key issue

- The picture to be presented hypothesises fundamental reality to be similar to life, and the question to be addressed is how familiar life mechanisms can be translated to this new domain, without involving chemistry.
- Unfortunately biological systems are much less ‘tidy’ than the ones typically studied in physics (though physics is catching up), so the picture will not be that straightforward!

Matter according to Barad

"Matter is not a thing, but a doing, a congealing of agency; it is morphologically active, responsive, generative, and articulate".

What does this mean? Worded more simply: matter takes form, and creates and manipulates that form, with the assistance of symbolic mechanisms.

Agency and intra-action

Agency is an abstraction, a notional *cause*, like the wind, a magnetic field, or a resonance, featuring in an explanation. Abstract *agencies* can be used to model concrete *phenomena*.

Re 'congealing of agencies': agencies can come together in the production of a phenomenon. *Intra-action* is a term used by Barad to refer to the mutual influences involved in this production.

But the congealing is more complicated than it may seem to be at first sight …

Separation

Here is a subtle issue. The adjoining shape might be usefully modelled either as two blobs or one. If as two, than what exactly are the components that are interacting? Answer: their identities become well-defined only if they are completely separated from each other.

Barad's describes the situation thus, using it to explain miscellaneous quantum paradoxes:
"Individuals do not preexist their interactions; rather, individuals emerge through and as part of their entangled intra-relating."

Entanglement of physical and mental

- Matter can compute
- This in itself implies that the *physical and mental are intimately connected*

Computational matter

'Computational matter' as such is familiar:

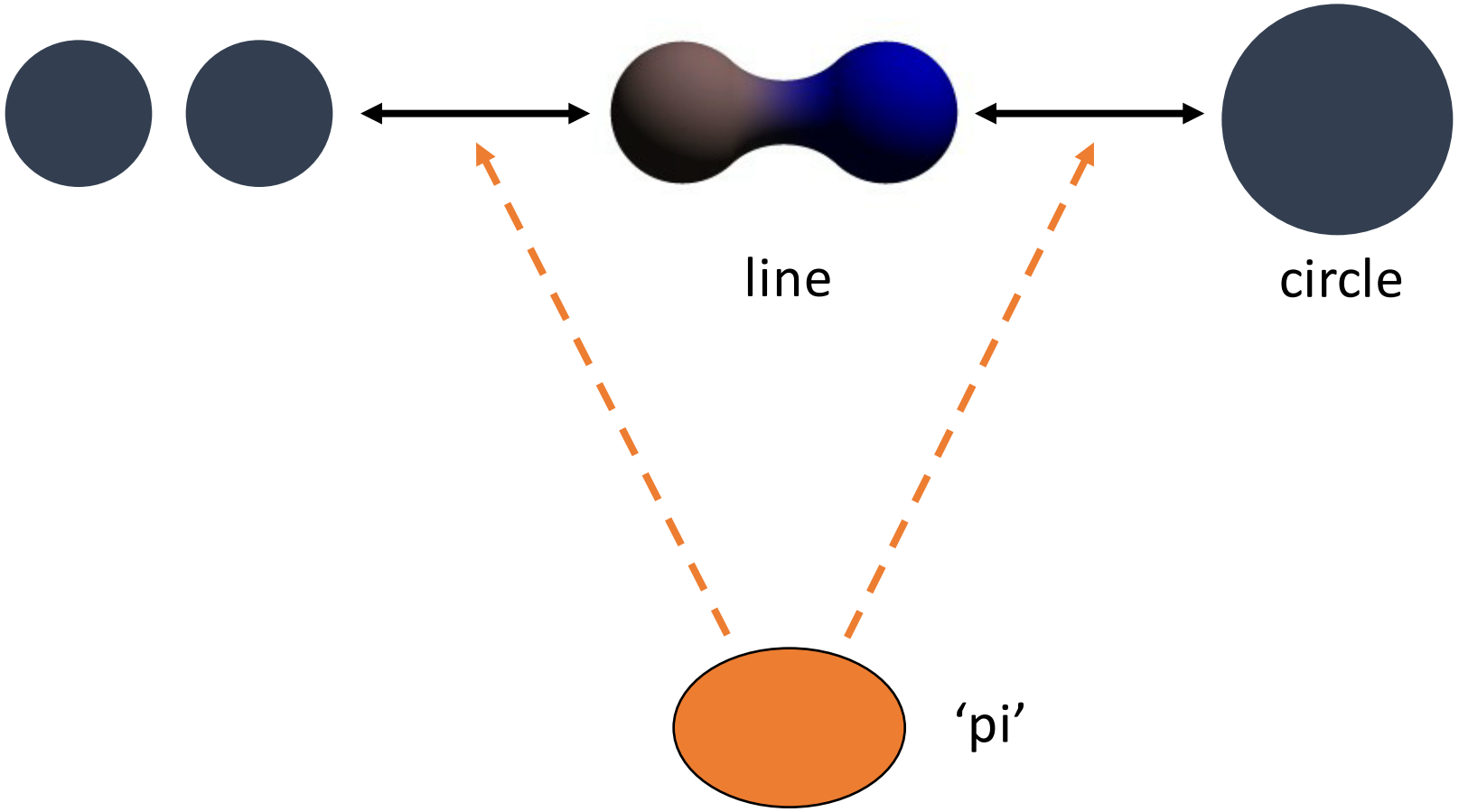
- The 'analytical engine' of Babbage and Lovelace
- Turing machine
- The brain (uses network mechanics, not Turing)

So matter being entangled with computing isn't an issue. Meaning is trickier, thus: meaning is related to difference: different computations, different outcome

Only certain computations 'work', and biology selects these

Biological systems use 'good ideas' (algorithms): **this is what turns physics into biology**

Physics of system manipulation



Oppositional dynamics

Yardley: “Any idea is connected to a counter-idea (an opposite), or else the idea cannot exist”.

Compare “this is not a pipe” (Magritte)

The real pipe and the image of the pipe are different things, but they are connected (one can be a proxy for the other).

When we notice something, the one thing becomes two (the external thing, and the copy in my mind).

More illustrations

Situation 1: consider pairs A↔a, B↔b, C↔c

and time sequence A, B, C

this implies time sequence a b c

(interpretation: old dynamics ABC *instructs new*, abc; 'gets it over hurdles')

Situation 2, **replication**: as with DNA, if X and Y are pairs, X can make repeated copies of Y, assisted by assembly mechanism Z ('pi').

Example: pairing of a thing with its name leads to replication of name for thing

Role of ideas

Yardley again: “From ideas, symbols. From symbols, mind. We invented symbols (and they invented us) so we could have some way of articulating the hidden reality we know as mind. There can be no mind without idea, no idea without symbol, no symbol without reality. So, here, is a unified whole (mind, matter, symbol).”

An idea is an entity (e.g. computer code or neural network) that, like a hologram, magically achieves visible results. Like a resonance, it is there but isn’t quite a thing, more a ‘doing’.

Most ideas (generative mechanisms) fail to replicate, but key ideas survive and influence what happens.

Process and system

Yardley: “an entity is always part of a process, a process always part of a system, which is always part of an entity, process and system, ad infinitum”

This indicates the overall organisation of the complex situation described here

A system is a ‘piece of magic’ that can run a particular domain

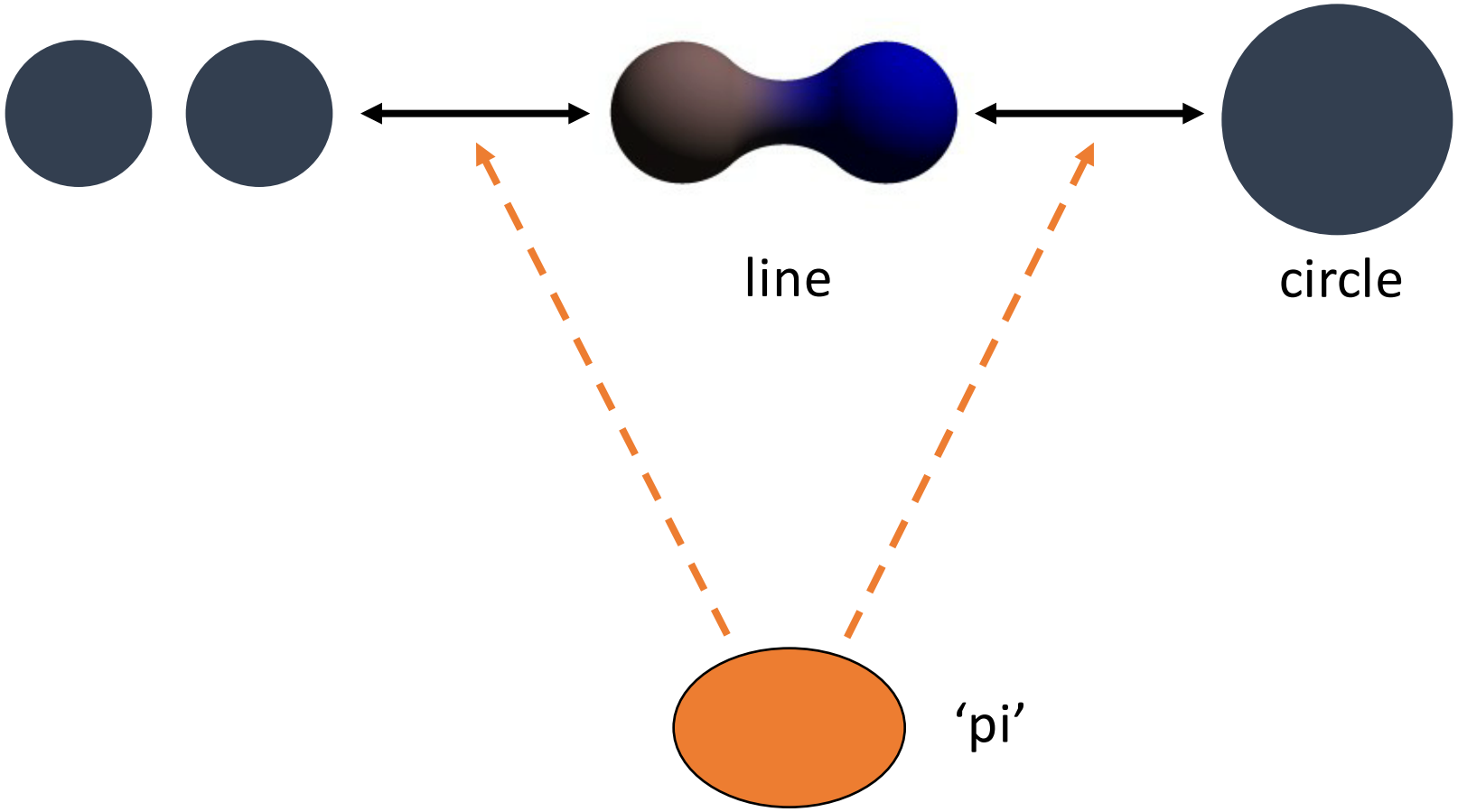
Systems *evolve* through working at border of domain, thus extending it by annexing other systems

Complicated picture, but logical, and broadly speaking fits structural aspects of linguistic activity

Space, time and mathematics

- Mechanisms relevant to ‘spatiality’ and ‘temporality’ can lead to emergence of space-time (Barad and Kastner): e.g. spatiality develops into concrete space in the same way that a sense of balance develops into the skill of balance
- Matthew Watkins in his ‘Secrets of Creation’ trilogy discusses indications, based on the way primes appear in physical contexts, of mathematics having a physical basis
- Interpretation here: *mathematical facts* imply *physical processes* that give rise to corresponding *mathematical thoughts* in the mind of the mathematician, hence *mathematical intuition*

The basis of everything(?)



Concluding comments

C P Snow spoke of 2 cultures: sciences and humanities.

Just as non-scientists don't engage with the 2nd law, scientists don't typically engage with thinking of a more descriptive character such as that discussed here.

Biology shows that a synthesis is possible. Physics needs to accept that a similar perspective is needed there and not presume that quantitative is the final word; *connections* are equally significant.

At the moment we see only the top of an iceberg; we can expect the future to develop the scientific aspect (e.g. involving parallels with critical phenomena, AI and A-life). It may well confound mainstream ideologies by revealing new potentialities of nature.

Acknowledgements

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THE END