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## Information and Mind

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## ***Information and Mind – Introduction***

It is tempting to suppose that some concept of *information* could serve eventually to unify mind, matter, and meaning in a single theory. (Dennett and Haugeland, 1987, emphasis in the original)



## *Information and Mind – Introduction (cont.)*

The concept of information, properly understood, is fully sufficient to do away with popular dualistic schemes invoking spiritual substances distinct from anything in physics. This is Aristotle redivivus, the concept of matter and *form* united in every object of this world, body and soul, where the latter is nothing but the formal aspect of the former. The very term “information” clearly demonstrates its Aristotelian origin in its linguistic root.  
(Braitenberg, 2008, my emphasis)

## *Information and Mind – Introduction (cont.)*

...there is for every molecule an infinite number of differences between its location and the locations in which it might have been. Of this infinitude, we select a very limited number, which become information. In fact, what we mean by information – the elementary unit of information – is a difference which makes a difference.  
(Bateson, 1972)

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## *Information and Mind – Summary*

Physical information = material form

Intentional information = mental content, semantic information,  
meaning and significance

(“Intentional”: technical term, intentional information is “about  
something”)

Intentional information is best considered *encoded* in physical  
information, being decoded in use

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## *Information and Mind – Sections*

Physical information

Intentionality and the mind

Intentional information

Conclusion

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## *Information and Mind – Physical information*

Physical information = material form = structure/shape, but also all other material qualities, such as mass, electrical resistance, etc.

Bateson's "differences."

Due to the application of Shannon's (1948) concept to physics.

No meaning/semantic/intentional aspect or component.

Physical information, like matter and energy, is conserved, because physical processes are lawful, and so the state of affairs at one time can be deduced given the state of affairs at another time.

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## *Information and Mind – Physical information (cont.)*

Every physical entity *encodes* the outcomes of all of its potential interactions, the decoding key in each case being the context (that with which it interacts).

Example: genes are items of physical information encoded in DNA sequences, the decoding key being the biological context.

Context both enables and constrains potential interactions.  
(Sect. end)

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## ***Information and Mind – Intentionality and the mind***

Intentionality = “aboutness”

Brentano (1924): intentionality is “the ineliminable mark of the mental”

My explanation: the concept of mind implies modelling, and intentionality is the relationship between model and object.

But mentality  $\neq$  passive representation – minds act to achieve goals – they have purpose – a mind is a model user.

(In fact no model is passive, every one *uses* physical information to yield intentional information.)

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## *Information and Mind – Intentionality and the mind (cont.)*

So what is a model?

Dennett (1987): an intentional system is one whose behaviour can be successfully predicted by attributing intentionality to it.

Instrumentalism: valid in this context (evolutionary emergence).

“Intentional systems” = models/modellers,  
therefore a model is that which is usefully treated as such.

(I view perception as an intentional attribute, along with beliefs, desires, etc.)

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## ***Information and Mind – Intentionality and the mind (cont.)***

What is use?

Just as all minds, and only minds, model, so all minds, and only minds, use. It would be circular to define use instrumentally, either directly, or indirectly via modelling, but circular definitions can be *useful*.

More work required!

The use of physical information to construct models is generally but not necessarily unconscious.

The content of consciousness is a stream of intentional information. (Sect. end)

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## ***Information and Mind – Intentional information***

Light reflects off the surface of an apple and in doing so is changed, so that the material form of the reflected light carries clues about the material form of the apple.

The reflected light strikes the retina, causing neural/mental activity (see next slide), and, eventually, a subjective impression of “an apple.”

The intentional information *about* the apple is *encoded* in the light that enters the eye, and in consequent neural activity, where the decoding key is the neural/mental context, the mind/brain as a whole.

Similarly (but much more complexly) intentional information about intentional information is encoded in the light that is entering your eyes  
now.

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## *Information and Mind – Intentional information (cont.)*

“Intentional information” encompasses all mental content, meaning and significance.

Mental content is encoded in neural activity, while meaning and/or significance can be encountered anywhere, depending upon the decoding key – the mind/brain – concerned.

Intentional information is subjective: inherently uncertain, due to the “referential gap” – identification of the object necessarily involves a leap of faith.

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## *Information and Mind – Conclusion*

Intentional information is always encoded in physical information, being decoded in use. While in clear form in the mind of the user, it remains encoded in the brain.

Purpose motivates decoding and influences interpretation.

This might be viewed as a generalisation of Wittgenstein's (1972) later concept of meaning as use in a given context (“language game”).

(Unlike his earlier “picture” theory of meaning (1961) it acknowledges the relevance of purpose and context.)

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