

Philosophical Implications of Artificial Intelligence and Quantum Physics

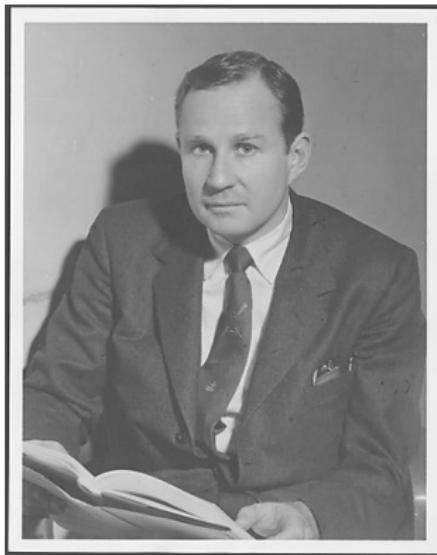
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Manifest Image and Scientific Image

Why the world we perceive and the reality described by QM differ so drastically?

Manifest Image and Scientific Image



We assign *meaning* to the quantum phenomena by theory and experiment.

Wilfrid Sellars

Where Manifest Image and Scientific Image Meet



Niels Bohr

The use of classical concepts in
is indispensable for understanding
quantum phenomena.



Niels Bohr



Immanuel Kant

Quantum Physics and *Realism*

Realism

Physical things have definite properties even when nobody measures them.

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Realism

Physical things have definite properties even when nobody measures them.

Non-realism

Quantum properties don't exist in a definite way until they're measured.

$QP \rightleftharpoons Realism$ and $QP \rightleftharpoons \neg Realism$

Quantum Physics and *Determinism*

Determinism

Future states of a system are fully determined by its current state and the laws of physics.

Quantum Physics and *Determinism*

Determinism

Future states of a system are fully determined by its current state and the laws of physics.

Indeterminism

Quantum outcomes are fundamentally probabilistic; even with complete knowledge of the wavefunction, only probabilities of results can be predicted.

$QP \Leftrightarrow \text{Determinism}$ and $QP \Leftrightarrow \neg\text{Determinism}$

The Problem of *Free Will*

Determinism $\implies \neg$ *Free Will*

The Problem of *Free Will*

Determinism $\implies \neg$ *Free Will*

and

\neg *Determinism* $\not\implies$ *Free Will*

Zeno's Paradox

Zeno of Elea (c. 490-430 BC)

Before a moving object can reach a goal, it must reach the halfway point. Before it can reach that halfway point, it must reach the quarter-way point. And before that, the eighth-way point, and so on ad infinitum. Therefore, motion is impossible.

What Is Intelligence? What Does It Mean to *Think*?

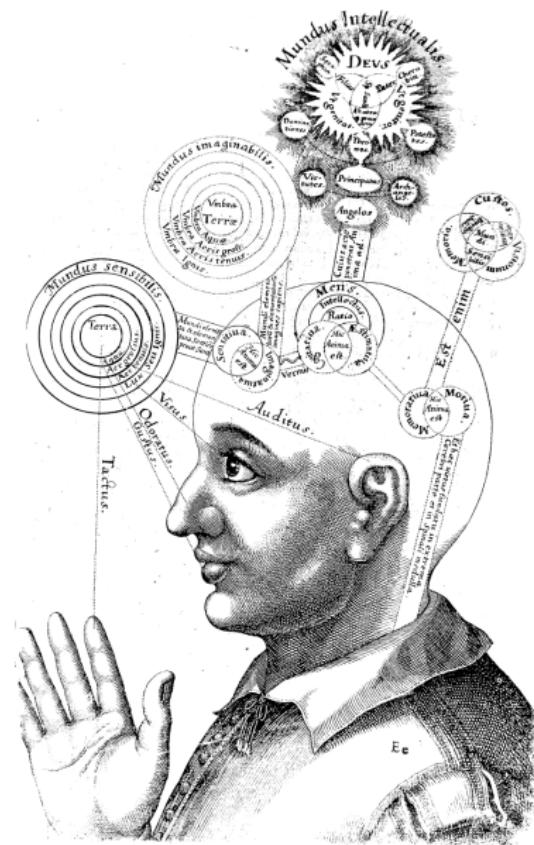
- ▶ How do we define it?

What Is Intelligence? What Does It Mean to *Think*?

- ▶ How do we define it?
- ▶ What is the role of consciousness?

What Is Intelligence? What Does It Mean to *Think*?

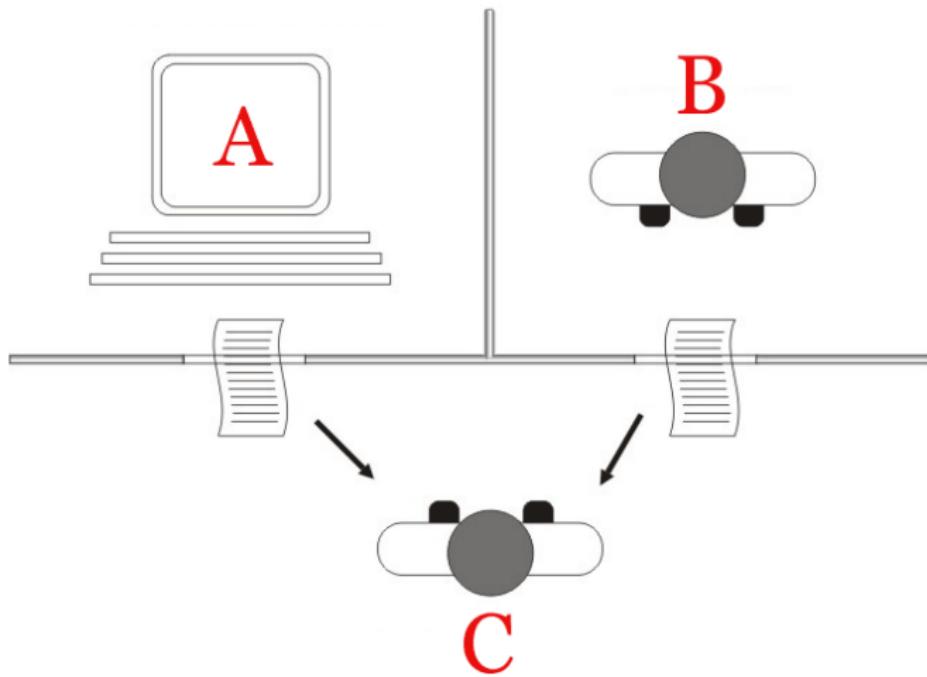
- ▶ How do we define it?
- ▶ What is the role of consciousness?
- ▶ How do we test for it?



Can Machines Think?



This is Thinking:



Thinking and Quantum Physics

- ▶ Do human brains *use* quantum phenomena?

Thinking and Quantum Physics

- ▶ Do human brains *use* quantum phenomena?
- ▶ Is it required?

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- ▶ Do human brains *use* quantum phenomena?
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A. Turing, 1950

I believe that in about fifty years' time it will be possible to programme computers, with a storage capacity of about 10^9 , to make them play the imitation game [...].

Bibliography

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