



con la partecipazione di **FEDERICO FAGGIN**

16 Aprile 2018

Aula I. Nievo Palazzo del Bo
Università di Padova



UNIVERSITÀ
DEGLI STUDI
DI PADOVA



DIPARTIMENTO DI PSICOLOGIA GENERALE

**Science
of Consciousness**

THE CONSCIOUSNESS ENIGMA

The mind-brain-reality relationship

PROF. ENRICO FACCO

Specialist in Anaesthesiology and Resuscitation

Specialist in Neurology

Senior Scholar - Studium Patavinum, University of Padova, Italy.

Centre for Clinical and Experimental Hypnosis, Torino, Italy.

Science of Consciousness Research Group

Department of Psychology - University of Padova (Italy)

<http://dpg.unipd.it/en/soc>



ISTITUTO
FRANCO GRANONE
CIICS centro italiano ipnosi
clinico sperimentale

THE BRAIN

- Consciousness, the unconscious, spirit and soul, and their enigmatic depths, constitute perhaps the most basic, greatest, and complex challenge to knowledge since the origin of humanity.
- The complexity of the psychic aspect is matched by that of the brain.
- It is the most complex organ in the body, and possibly in the physical universe.
 - It weighs 1200 – 1400 grams (~ 2 to 3% of body weight)
 - It consumes 20% of the whole body's oxygen and 25% of its glucose
- The brain is the human body's most metabolically active organ.

- Bewildering complexity:
 - Contains 100 billion neurones, each of which connects to other neurones through hundreds or thousands of synapses
 - Comparable to a giant electronic circuit with an immeasurable number of connections, grossly estimated to be not less than 100,000 billion.
- The extraordinary complexity of the brain mentioned above does not even take into account the glia – the cell system that supports the neurones (composed of various cell types such as astrocytes, oligodendrites and microglia).
 - The cells comprising the glia are far more numerous than neuronal cells.

- Until a few years ago, glia were considered to be just a metabolic support structure, a sort of neuronal glue and, as such, considered irrelevant in brain activity.
- In reality glia's role in cerebral physiology is anything but minor, particularly in:
 - synapse formation,
 - synapse growth and plasticity,
 - formation of myelin,
 - transmission of nerve impulses,
 - the immune functions of the nervous system.
- The brain is not, therefore, a static and rigid organ, neither functionally nor anatomically, since it is able to create new nerve fibres and new connections related to experiences, intentions, and life activities:

- Even the old dogma of a fixed number of neurones – which are gradually lost over time – has now been discarded after it was discovered that the brain contains stem cells.
- The close but still mysterious mind-brain relationship has, at its foundation, an extraordinary complexity, flexibility, and ability to transform both of its parts:
 - Just as the mind undergoes changes due to life experience, study, training, and pursued aspirations, so too, in tandem, does the brain, modifying its connections and circuits and the integration of different cerebral areas.
- Each of us is not just the epiphenomenon of our cerebral circuits_
 - Each of us is also the director and creator of our mind and brain
 - A lifetime transformation process between:
Evolution and increase in connectivity \leftrightarrow involution and neuronal pruning.

- We are equally responsible for the evolution/involution of others' mind-brain:
 - The most critical aspect is the developmental period.
- The relationship between environment and biological adaptation can no longer be viewed only in terms of random mutations and gene selection:
 - Environmental experience is able to alter epigenetic signals and regulate the genome, playing a fundamental role in cerebral reorganization or restructural processes.

MIND-BRAIN

- During the developmental period, there is a physiological pruning within the brain, which remodels it according to the requirements and experiences of life:
 - Adolescence is a critical and difficult developmental stage in the transition from infancy to adulthood, during which a progressive autonomy is acquired.
 - During this important phase, there are important modifications in both the function and structure of the brain, modulated by life experience in a fine-tuned dynamic balance between:
 - spontaneous biological evolution,
 - experiences and responses to stimuli, including greater uncertainty, sensitivity, susceptibility to anxiety, mood and personality disturbances, food issues, the development or manifestation of psychoses, and substance abuse.

THE BRAIN: EPIGENETIC ASPECTS

In short, an individual's early experiences determine his/her response to later experiences, and the later ones modify the effects of earlier experiences, of which the key socio-psychological, cultural, and epigenetic factors contribute to personal development, mental health or, instead, a deviation towards psychopathology.

A DEFINITION OF CONSCIOUSNESS

- The way in which consciousness emerges from the brain is still a mystery.
- To date we do not have a consistent and definitive idea of what consciousness is and what gives rise to it.
- It is possible that all its abilities and functions are as yet unknown.
- The concept itself of consciousness is still unclear, as is the correct way to study it.
- Debates within the neuroscience field contain profound philosophical, epistemological, and metaphysical implications.

Our normal waking consciousness, rational consciousness as we call it, is but one special type of consciousness, whilst all about it, parted from it by the filmiest of screens, there lie potential forms of consciousness entirely different.

WILLIAM JAMES

THE SCIENCE OF CONSCIOUSNESS

- The science of consciousness was born in the 1980s and therefore has not been definitively established:
 - Today there is a huge quantity of data available regarding the neurobiological aspects of consciousness:
 - Nonetheless these are only one part, albeit a very pertinent one, of a far more complex problem.
- The subject of consciousness does not lie exclusively in medicine and biology, but also involves psychology, physics, philosophy, and anthropology, with an increasing need for an interdisciplinary approach.

There are fundamental and as yet unresolved epistemological and metaphysical implications.

MAINSTREAM SCIENCE

- Science's prevalent metaphysical position is that of material monism.
- Materialism considers consciousness to be immaterial and therefore not real:
 - Consciousness as merely an epiphenomenon of cerebral circuits.
 - "Ghost in the machine" (Ryle, 1949).
 - The individual is viewed as a powerless host at the mercy of the cerebral machine.
- This position is baseless, even though consolidated in science:
 - The problem is essentially a metaphysical one.
 - It constitutes the basic core of the discussion on the establishment of a science of consciousness.

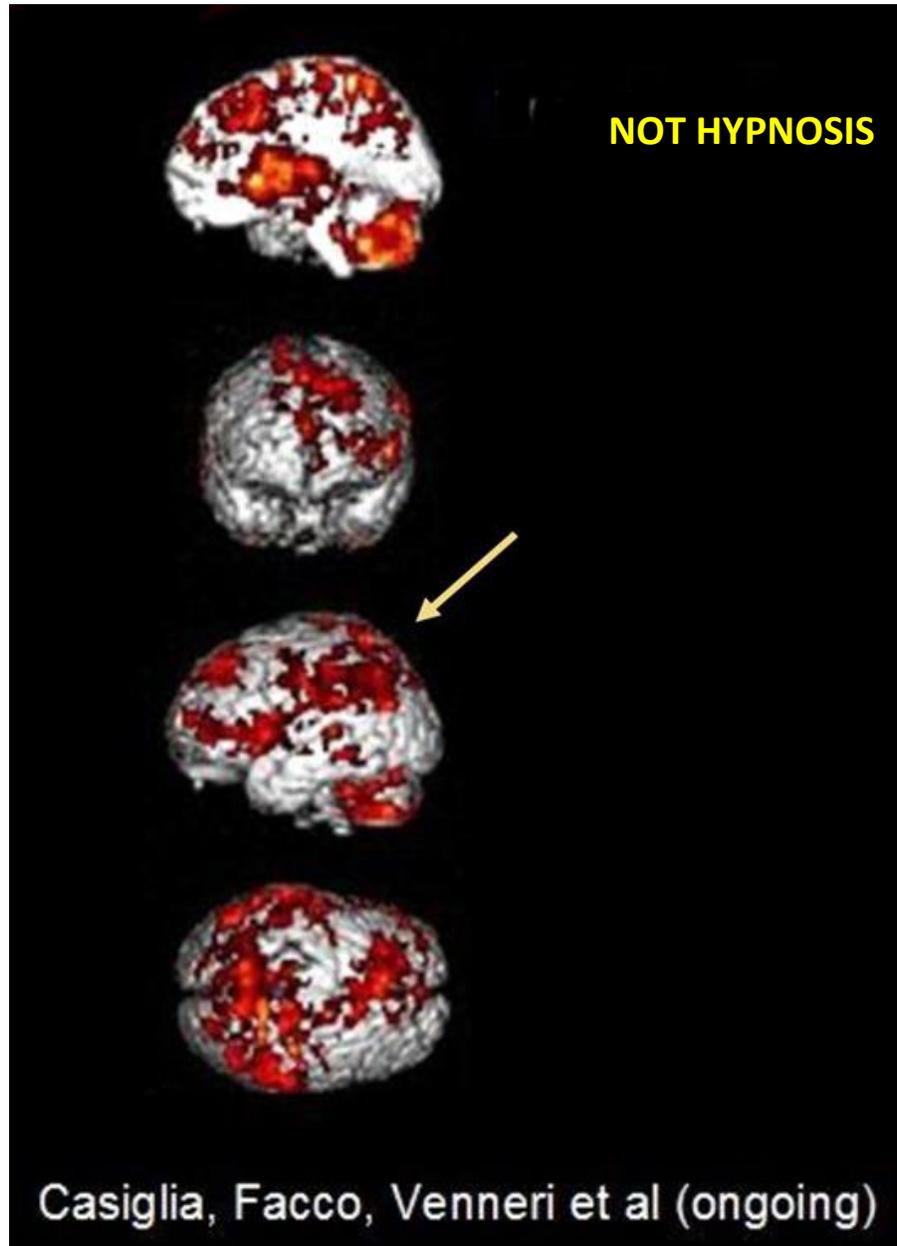
BRAIN-MIND

Fundamental axiom of neurology:

Every event of the mind corresponds to a specific NCC
(Neuronal Correlates of Consciousness)..

- The relationship is two-way and shows a correlation, but is not one of cause and effect:
 - Materialism's one-way fixed bottom-up hierarchy is axiomatic and baseless.
 - The logical error is the *a priori* assertion that the brain is the only reality.
- If the relationship is two-way, even thoughts and words are like neurotransmitters and able to activate cerebral circuits specifically designed to perform certain tasks:
 - The relationship is simultaneously two-way, bottom-up, and top-down.

HYPNOTIC ANALGESIA



THE ORIGINAL SIN OF GALILEAN SCIENCE

Galilean science did not arise from the free reflection on what and how to investigate, but from a political compromise with the Church and the Inquisition:

[The great Mystery of the Universe, including God and the soul]... **but such profound contemplations are the purview of a doctrine greater than ours (theology); we must be content with being less worthy, like the workers who, from the mines, extract and bring out the marble, from which able sculptors (theologians) create magnificent figures, previously hidden inside a rough and shapeless slab.**

Dialogues Concerning Two New Sciences, Day 3, Corollary III

THE RISE OF SCIENCE

DESCARTES

- Descartes, in trying to avoid an irreparable rift with academics and the Church, completely separated the soul (*res cogitans*) from physical reality (*res extensa*), assigning to each one a different ontology:
 - He saved the soul, making it immune to the mechanistic model.
 - But he arbitrarily separated the mind from the body, which are inseparable *in vivo*.
 - He (inadvertently?) opened the door to the Enlightenment and then from there to Positivism and Material Monism, which dominate science.

SCIENCE AND CONSCIOUSNESS

- Thus science did not stem from free philosophical reflection, but from a compromise with the Church and the Inquisition, in which the soul (consciousness) came under the exclusive domain of religion:
 - Physics has removed the observer from the observed phenomenon, in the false belief of the observer's impartiality.
 - Medicine has been pervaded by mechanistic axioms and by its mathematical apriorisms (Burrt, 2003):
 - La Mettrie publishes "Man a Machine" (1747).
 - Karl Vogt states: "*The brain secretes thought as the stomach secretes gastric juice, the liver bile, and the kidneys urine.*" (Superstition and Science, 1854).
 - Medicine concerned itself more and more with the *earthly machine* – the *body* – treating patients as if the psyche had no role whatsoever in either physiology or pathology.

- On the contrary, medicine was born and exists as a method of tending to patients' needs, and cannot be solely concerned with imposing mechanistic ideals onto their bodies.

Fascination with objectivity and denial of subjectivity.

- According to Chalmers (1999), there are two main problems with the study of consciousness:
 1. *Easy problem*
 2. *Hard problem*
- 1. **The easy problem** is “easy” because the study model is clear and the instruments are available: it is the traditional mechanistic paradigm of neuroscience.

- 2. The difficult problem** is the crucial one, that of **nature and the meaning of experiences – subjective experiences** – equally significant, but qualitatively different with respect to understanding only the cerebral mechanisms that underpin the psyche, and which cannot be investigated with a mechanistic paradigm.
- For example, the experience and meaning of pain cannot be reduced only to its mechanisms of transmission in the central nervous system.

If consciousness is scientifically defined as an emergent product of the brain and it is believed that experience has a physical origin in the brain's physiology, how and why this occurs is still unknown.

SCIENCE OF CONSCIOUSNESS

HISTORICAL AND EPISTEMOLOGICAL ASPECTS

- From the end of the 19th century consciousness and soul were discarded *a priori* and considered by positivist metaphysics to be a controversial and irrelevant subject.
- In dominant materialism, as practiced by totalitarian utopias at the beginning of the 20th century:
 - Soul = nothing more than a word, lacking any definable scientific value.
 - Consciousness = a subject of no interest to psychology.
 - Imagination = a quality of children, primitive peoples, and “inferior” races.

They are axiomatic and self-referential materialistic and rationalistic positions.

- Psychology was born at the end of the 19th century with Wundt's experimental psychology.
- Wundt supported a *double-faceted* psychology:
 1. Experimental psychology.
 2. *Völkerpsychologie* (≈ cultural psychology)
But he rejected the unconscious and criticised Freud's ideas as "mystical psychology".
- Later, *Völkerpsychologie* was abandoned → Behaviourism.
 - Consciousness and soul were relegated to oblivion until the end of the 20th century.

"Souls are no longer fashionable" (William James)

- The problem of soul and spirit has therefore been rejected *a priori* on axiomatic grounds, but it has remained alive, although unresolved, and is being reconsidered:

- The idea of a soul has been accepted by most of humanity throughout history, including the current era, and by most of current medical students (Martyn et al., 2013).
- It is a vague and poorly-defined concept, but in itself part of the psyche and, as such, independent of any religious creed or view.
- Likewise consciousness and the unconscious are still poorly-defined concepts, but still not rejected and must not be rejected.

The alternative is to apply double standards.

- It is necessary to critically reconsider categories, axioms, and mental processes that underpin consciousness, which make the world appear as it does and as we have codified it.
 - In accordance with Husserl, we must understand if “*not just modern physical naturalism, but also any objective philosophy*” are valid and qualifiable as “*transcendental naivety*” [Husserl (1959)*The Crisis of European Sciences and Transcendental Phenomenology*].
 - As Marcel Proust would say, “*the real problem today is not that of discovering new ground, but of having new eyes*”.

The fundamental problem

Is the consciousness-soul-spirit idea a cultural illusion of all humanity that has always existed?

or

Is it the gross error of a 20th century cultural elite, dazzled by materialism and the view of physical reality through a classical lens?

It is a fundamental question:

- The entire view of the world, the meaning of human and animal life, depend on it.
- To reach a solution, we need a critical review of the foundations of positivism and physicalism, the bases of the dominant scientific paradigm of the “hard” sciences and medicine:
 - The consequences of the wrong choice would be disastrous: a serious cultural – and maybe epigenetic - pruning.

In other words:

- If the physicalist rejection of consciousness, soul and spirit is a well-grounded evolution of scientific and philosophical thought, we should consistently abandon their study forever:
 - For consistency's sake, we should perhaps keep silent forever, to avoid meaningless pursuits...
- Otherwise the physicalist paradigm must be reassessed from the basics in order to find and correct its errors.

Tertium non datur (There is no third possibility).

- The mind-brain and inside world-outside world relationship brings up and challenges the apparently endless dispute between:

REALISM AND SUBJECTIVISM

OBJECTIVISM AND IDEALISM

MATERIALISM AND IMMATERIALISM

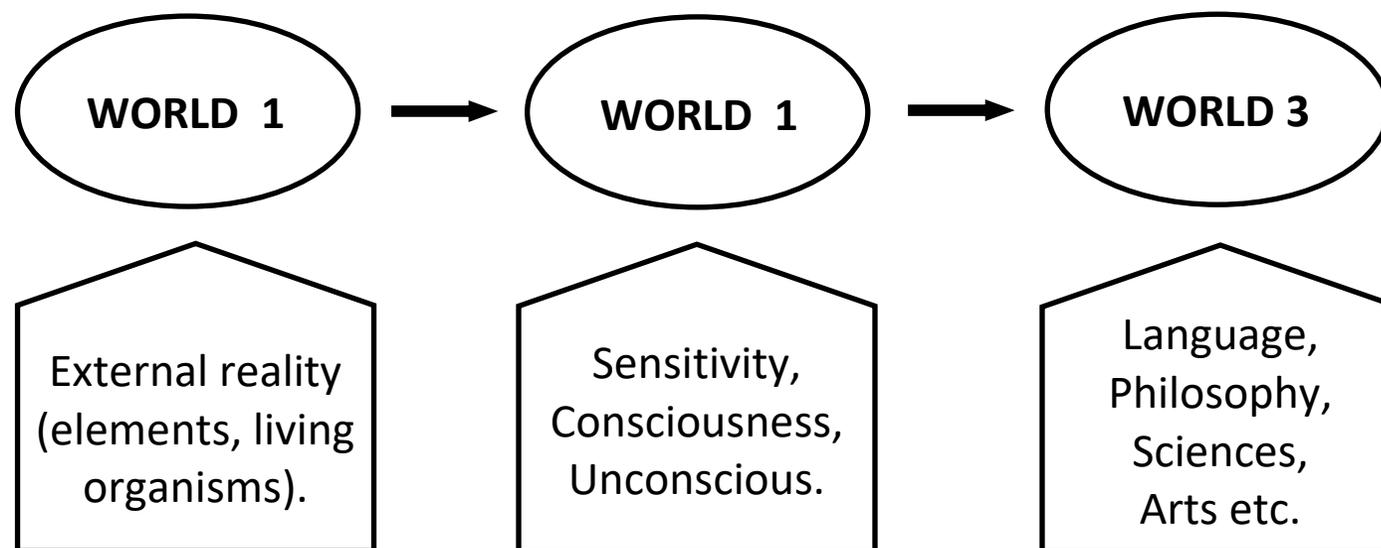
MONISM AND DUALISM

Perhaps the incompatibility is unfounded and hence potentially solvable, because every -ism is for the most part based on limited concepts, rigidly established categories and mental constructions.

- Reality can be classified into three worlds

(Popper & Eccles, 1981):

- The world of phenomena in themselves.
- The world of the mind.
- The world of products of the mind.



- In the study of consciousness there are various basic criticisms:
 - Consciousness is not a simple and monomorphic phenomenon → difficult to define
 - The term “consciousness” has many meanings, making it ambiguous and susceptible to misunderstandings.
 - The role of consciousness and intellect is persistently overestimated with respect to the unconscious (*Cogito ergo sum*).
 - Consciousness is observer and observed at the same time:
 - Risk of a short circuit.
 - Need to include introspection and first person perspective.

Consciousness is not just immaterial subjectivity without any concrete reality:

Everything that is perceived and known about the outside world is made from the “substance” of consciousness, and lives in and belongs to the world of the mind.

Features of Consciousness

Arousal
Awareness

Drawsiness
Excitation

Ego
Qualia
Self

Dream
Sleep
Wakefulness

Mental activities

Absorption
Action planning
Attention
Compassion
Conscience & ethics
Dissociation

Emotions
Empathy
Experience
Feelings
Imagination
Inner thought

Intention
Introspection
Judgement
Love
Language
Memory

Motivation
Perception
Reason

Neurological disorders

Akinetic mutism
Agnosia
Aphasia
Autoscopy

Coma
Delirium
Dementia
Epilepsy

Memory deficits
Minimal responsiveness
Neglect
Parkinson's disease

Psychosis
Stupor
Split brain
Vegetative state

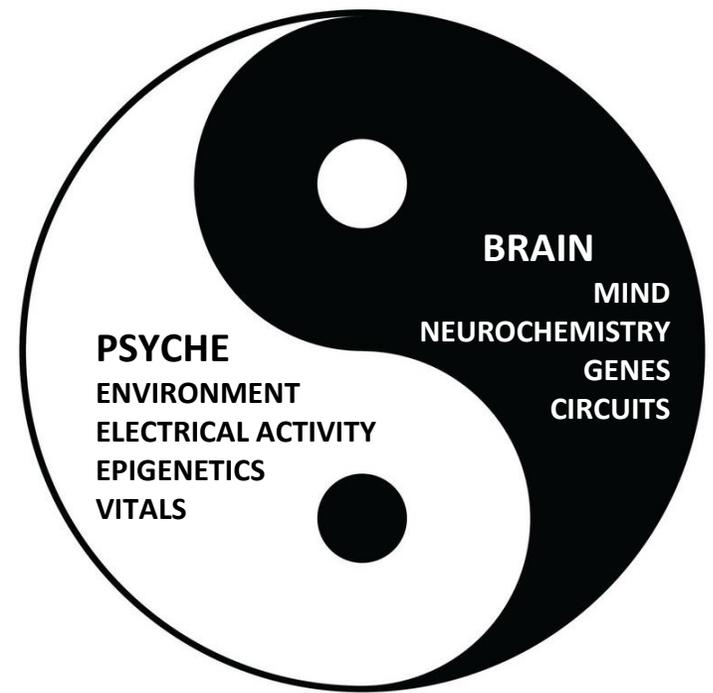
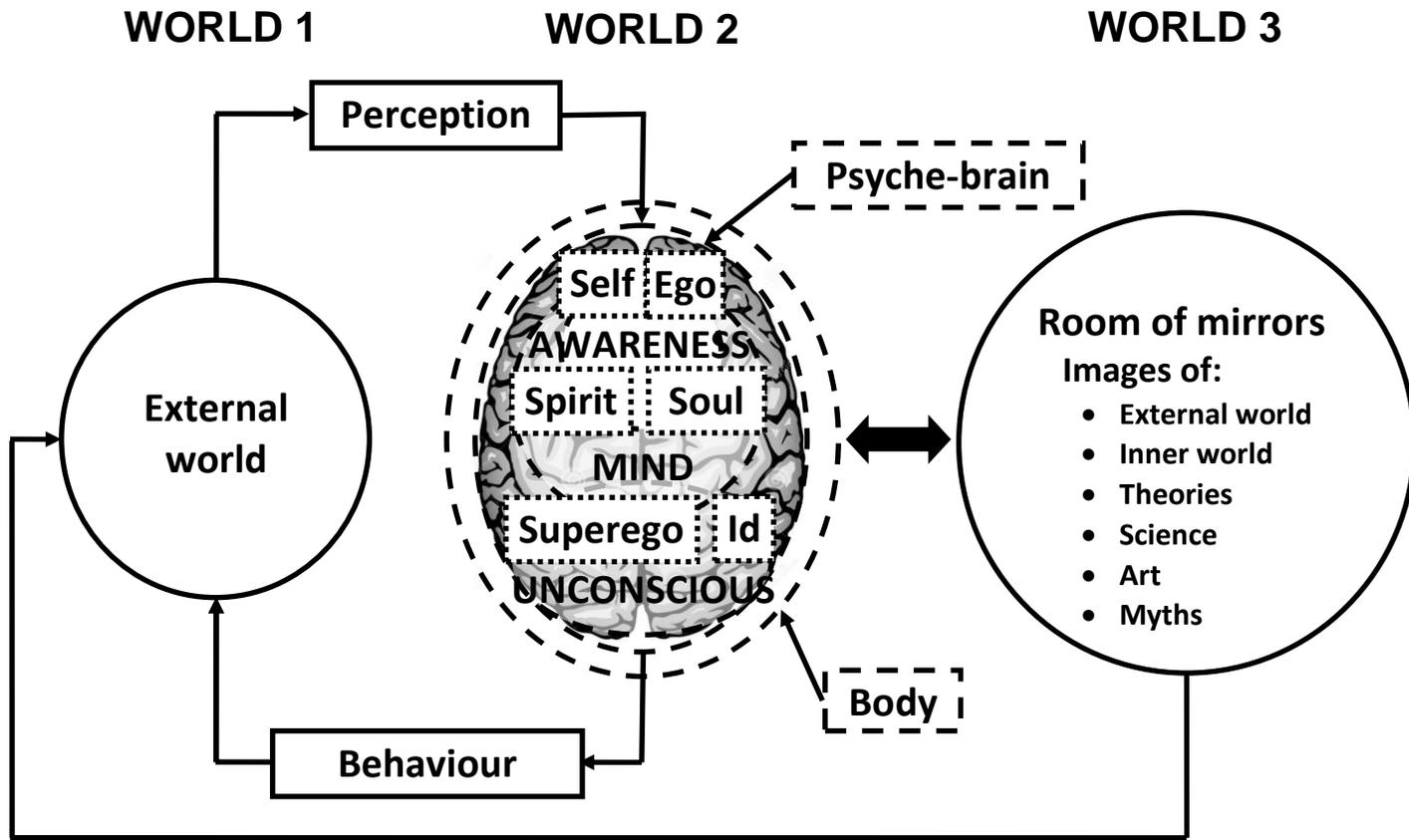
NOMEs

Depersonalization

Hypnosis

Mystical experiences

Synesthesia



SEMANTIC PROBLEMS

- Science belongs to the world of the mind, which is subjective and depends on:
 - Language.
 - The need for common protocols and the scientific community's social consensus.
- Strong similarities to the structure of a judiciary process – debate, verdict, and sentence – since ancient Greece (Severino, 1980; Lloyd & Sivin, 2002):
- *“Much of the philosophy of science in Greece therefore seems obsessed with courts... But a distinctive peculiarity of the Greeks was the need to win, against any opponent, even in matters of science, a game of zero sum where one's victory meant the other's defeat” (Lloyd, 2009).*

- Rhetoric, along with its fallacies, was already a serious worry for Plato and Aristotle because of its power to profoundly alter ἀπόδειξις (apódeixis, evidence, proof), which is necessary for the right knowledge.
- It is the best method we have, but it is not immune to egocentric presumptions and the imposition of personal ideas, errors, and abuses.

PHILOSOPHICAL IMPLICATIONS

- In previous centuries there has been a rift between science, religion, and philosophy (Russell, 1959):
 - Increasing inter-disciplinary communication problems.
 - Cultural barriers.
 - Prejudices.
- In science, philosophy, and religion an anthropocentric-ethnocentric-egocentric perspective has been inadvertently adopted:
 - What level of objectivity can be expected?
 - Objectivity never exceeds that of shared subjectivity.

- The human mind, with its conversational way of reasoning, is strongly inclined to substantialize and ontologize → study of universals and the immutable:
 - Inadvertant projection of concepts, mental categories, and beliefs onto reality.
 - Swap subjective phenomena for objective properties.

Phenomenal realism or naive realism.

Dogma of the Immaculate Conception.

- This notwithstanding that in the history of thought, a systemic censorship of belief in sensorial data was introduced, along with a rational thought strategy.
 - But the credibility problem also involves concepts and the logic itself.

METAPHYSICS AND SCIENCE

- Metaphysics has always been scorned since the Enlightenment.
- At the beginning of the 20th century logical positivism denounced the enslavement of Eastern culture to metaphysics, proposing to systematically free science from it.
 - However, every axiom and general principle is metaphysical in nature or has metaphysical implications.
 - E.g., the physicalist assumption that consciousness is only an epiphenomenon of cerebral circuits is axiomatic, metaphysical, and is likewise not demonstrable.

Positivism has brought the irruption of metaphysics and prejudice into science, considering as real only what is compatible with it.

(Popper, 1970)

LIMITS OF DUALISM AND MONISM

- The monism-dualism debate is directly implicated in the scientific debate on consciousness and the *difficult problem*.
 - Materialist monists and “hard” scientists → only acknowledge cerebral mechanisms.
 - Dualists → concentrate on individual experience.
 - The matter/function dichotomy cannot logically be deemed incompatible.
- Materialist monism rejects out of hand half the dualistic world without proof of its inexistence: thus it is a prejudicial choice.
 - Furthermore, in order to deny dualism, it has to implicitly admit its existence:
 - Materialists continue to argue in a dualistic sense.

“ To adopt what is confirmed is to adopt what is denied” (Zhuāngzǐ)

- Dualism is naively anthropocentric, because it considers transcendental reality to be simply something to which man is blind and deaf.

Are monism and dualism, and their apparent incompatibility, well-founded, or an alienated product of the non-contradiction principle?

PHYSICAL SELF-CONTRADICTION OF MATERIALISTIC MONISM

- Materialism is groundless even from a physical point of view:
 - It is still attached to 19th century physics: matter = primary manifestation of reality, characterized by mass, inertia, size.
 - For better consistency, it should take strictly into account all knowledge of physics, even future knowledge – in every case, partial models.
- Matter is not a primary manifestation of reality:

“Matter is not what it seems. Its most obvious property – variously labelled resistance to motion, inertia, or mass – can be interpreted more accurately in completely different terms. The mass of ordinary matter is the energy contained in its elementary parts, in themselves devoid of mass. Even space is not as it seems. What to our eyes looks like empty space reveals itself to our mind as a complex medium, swarming with spontaneous activity.

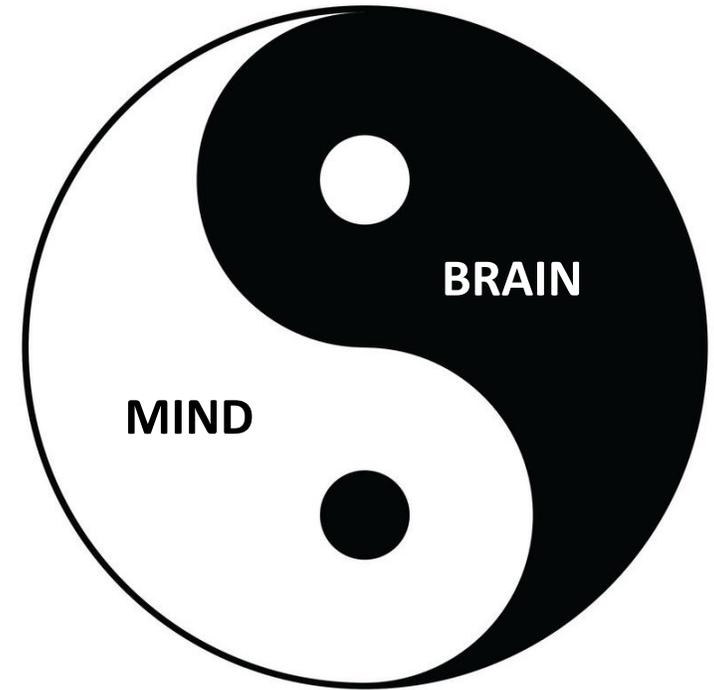
Wilczeck, 2009

**Matter
Space**

**Energy → Matter-Energy
Time → Space-Time**

Mind

Brain → Mind-Brain



DUALISM VS MONISM

- A common mistake: *a priori* metaphysical assumptions, on which reality is modelled:
 - The consequence of the tendency to substantialize and ontologize, i.e., apply names and concepts of things and qualities and superimpose them onto reality, is “*an illusion, which is totally inevitable*” (Kant, 1781)
 - Instead it's not just names, concepts, and labels:
 - Nature couldn't care less about man's clumsy attempts to classify its phenomena.
- Many philosophical and scientific philosophies were based on phenomenal realism, “**a modern heresy**”, which has pervaded science since its birth (Vaselli, 2013).

LIMITS OF CLASSICAL LOGIC

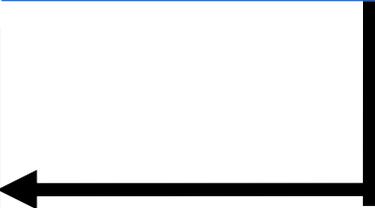
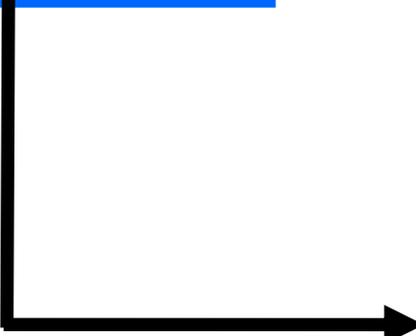
- Aristotle himself (*Metaphysics, 1005B, 1-5*) alerted us to the unquestioning use of axioms, the veracity of which must be continually checked by philosophers:
 - Avoid imposing beliefs and dogmas (even scientific ones) on reality.
- Posterity has transformed Aristotelian logic into dogmatic doctrine (Russell, 1959):
 - For centuries the principle of non-contradiction has been considered the ***Firmissimum omnium principiorum*** (*the most solid of principles*).
 - It separates reality in a rigidly binary way (true-false, 0-1).
 - It can only work when the essence of phenomena is well-known (not possible), otherwise the contradiction is only illusory.
- Classical logic includes paradoxes and unresolvable antinomies.
- Other logics have emerged:
 - Fuzzy logic: non-binary logic that allows all values between 0 and 1.
 - Dialetheism, paraconsistent logic:
 - Some, not all, contradictions are real.

CLASSICAL LOGIC
1 - TRUE 0 - FALSE

Syntactic factors:
liar paradox, etc.

Insufficient information
Inadequate approach
Psychological factors

DIALETHEISM	
1 - TRUE	0-1
1-0	0-FALSE



DUALISM VS MONISM

- Dialetheism is not new, but it was already adopted by pre-Socratic philosophers and Taoists up until Hegel (Priest, 2013):
 - Parmenides (*Peri Phýseos*, 8, 52-9): *“The opinion of mortals... they agree to give two names to two forms, thinking that uniting them is unnecessary: in this they are mistaken. They judge them opposite in their structures.”*
 - Heraclitus (fr. 11,12): *“All things are beautiful to a God. Rightfully so; but humans have considered some things just, others unjust. What is opposed comes together, and from discord (comes) beautiful harmony”*.
- Taoism describes reality as being incessantly dynamic, unseparated, in which every phenomenon is generated from its opposite and which in turn generates it:
 - Similar to the pre-Socratic stance.

It is time to carefully reconsider these non-dualistic paradigms for their wisdom and ability to understand reality in a pragmatic, valid, and non-dissociative way.

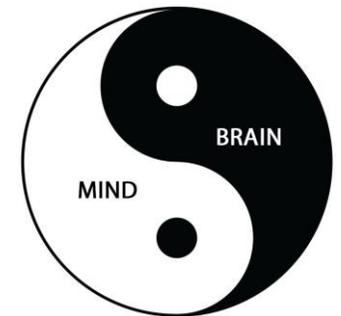
BEYOND DUALISM AND MONISM?

- Monism can include the entire dualist world. In accordance with Spinoza, mystics, and idealists:
 - Avoid arbitrarily separating reality into incompatible parts.
- THEORY:
 - It can tentatively be called Olomonism (OM)
 - To reconsider the apparently contradictory names, concepts, and labels of dualism as manifestations of one inseparable reality: the contradiction will then begin to dissolve.



ENERGY ↔ MATTER

MIND ↔ BRAIN

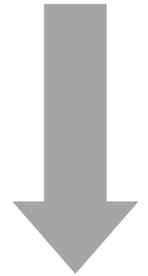


THEORIES OF CONSCIOUSNESS

- Theories of consciousness can be divided into various groups:
 1. Neurobiological theories.
 - Neurocorrelates of consciousness (NCC)
 2. Theories of information processing.
 3. Theories of social consciousness.
 4. Quantum theories.
 5. Theories of consciousness non-locality, of an apparently neo-animistic or pan-psychistic tone.

(Tressoldi et al. 2016; Facco et al. 2017)

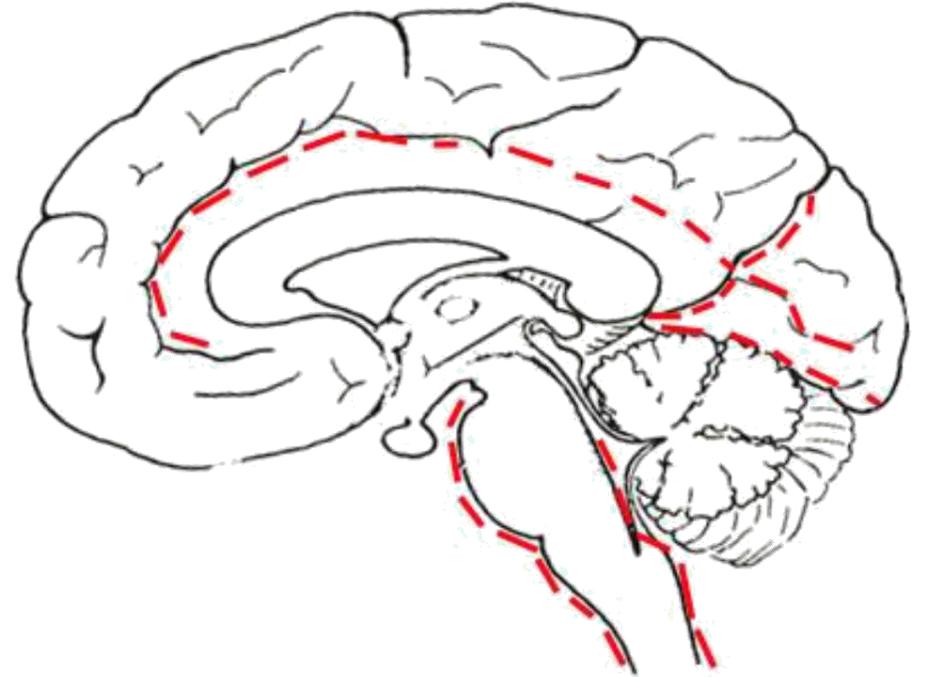
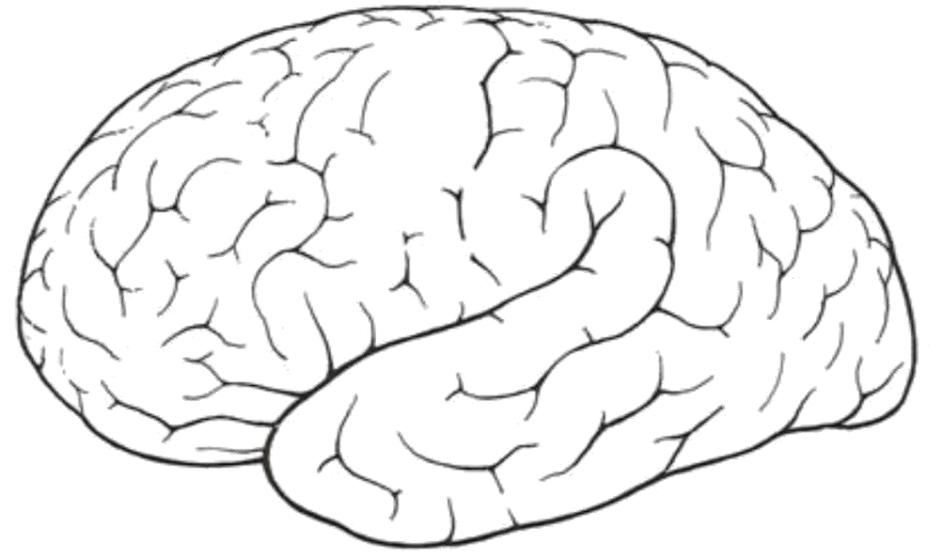
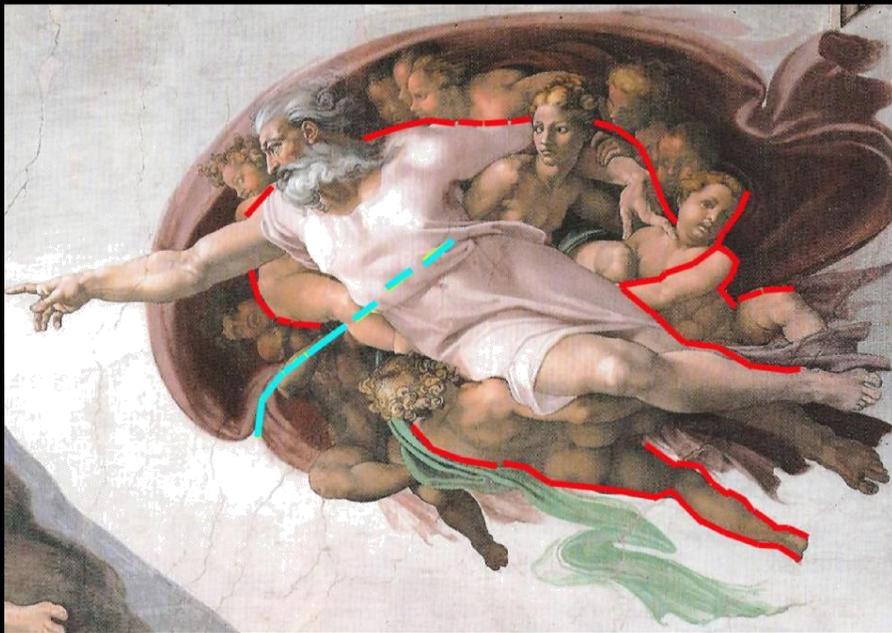
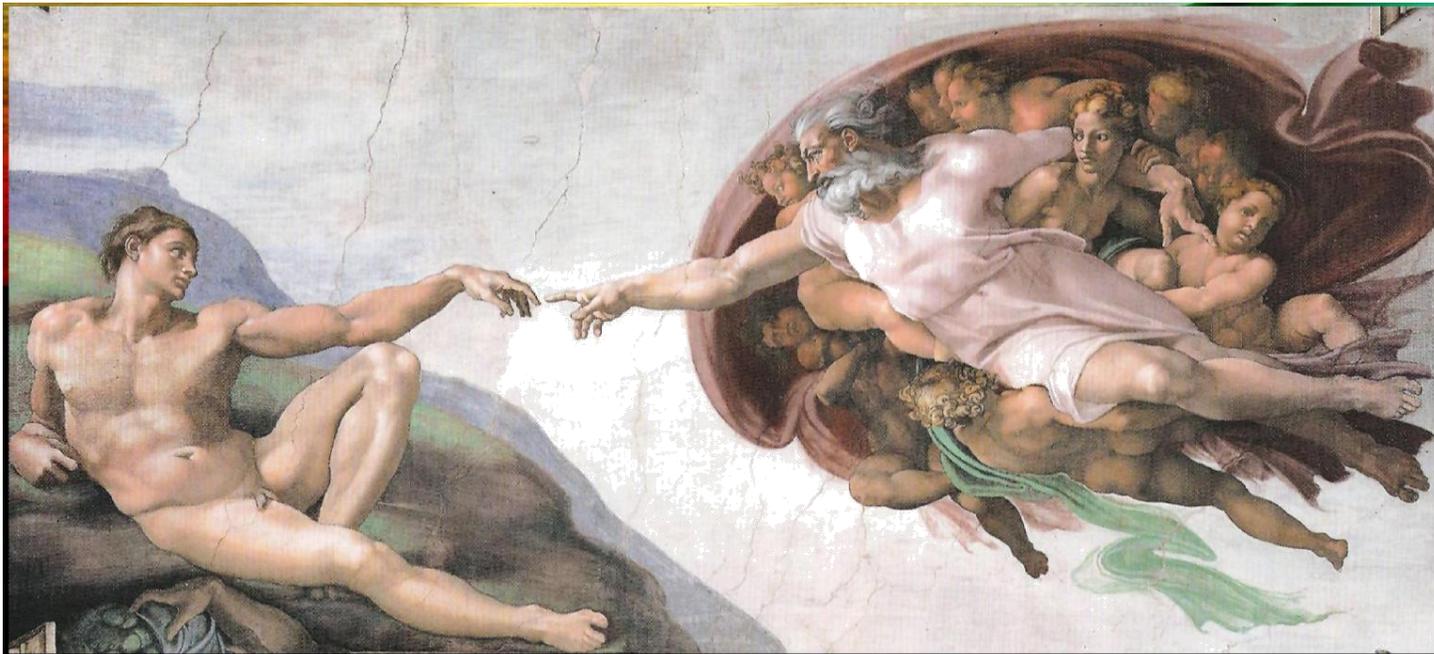
EASY PROBLEM



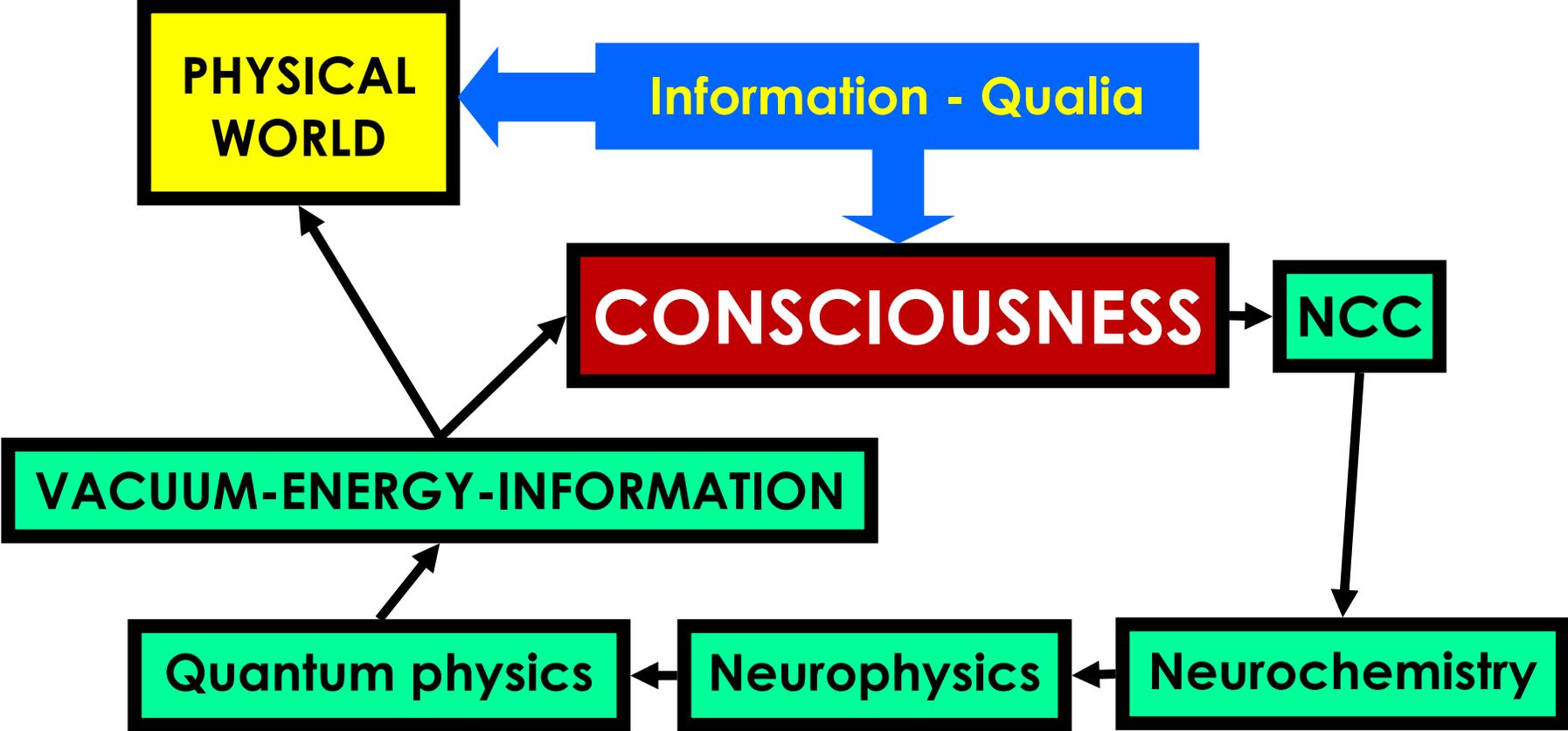
HARD PROBLEM

CONCLUSIONS

- How consciousness is formed is still a mystery.
- Consciousness is an emergent property of a composite:
 - Consciousness is intimately connected to the nervous system and therefore with the rest of the body:
 - This connection does not necessarily imply a cause-effect relationship:
 - Namely, that consciousness resides in the brain and is only an epiphenomenon of it.
- Consciousness cannot be reduced only to the brain's physical state.
 - Is consciousness non-locality possible?
- Reductionism is unable to explain the Hall of Mirrors:
 - It does not explain the nature and meaning of its contents (world of ideas, theories, culture, arts).
 - Qualia remain enigmatic.
 - Experience is, in the best of cases, only partially communicable.
 - Enigmatic in the absence of communication.



Pushing the reductionist approach to its extreme consequences, we return to the *unus mundus*:



SEVERINO

PARMENIDES, TAO

**The universe itself
Being – Unknowable
Vacuum-energy-information
Not 'things', but interconnected events**

**KANT
VEDIC TRADITION
MYSTICAL CURRENTS**

QUANTUM PHYSIC

**BUDDHISM
REALITY = EMPTINESS**

**BACKGROUND OF
THE APPEARANCE**

CONSCIOUSNESS=POSSIBILITY OF THE BEING'S APPEARANCE

**WORLD = CO-CREATION OF BEING AND OF CONSCIOUSNESS.
CONSCIOUSNESS IS CLOTHED IN THE QUALIA OF BEING.**

**WE KNOW NOTHING ABOUT EVERY THING, ... BUT OPINIONS
ARE DIFFERENT FOR EACH OF US [DK 68 B7] ... I KNOW THAT
I KNOW NOTHING [DK68B 304]**

DEMOCRITUS

*The only real journey... is having new eyes, to see the
universe through another's eyes, through the eyes of a
hundred others, to see the one hundred universes that
each one sees, that each one is.*

Marcel Proust