**My mind is not the universe: the map is not the territory**

Note for Chinese speakers: 建议您首先阅读本文内的中文部分

**Abstract**

In order to describe my findings/conclusions systematically, a new semantic system (i.e., a new language) has to be intentionally defined by the present article. Humans are limited in what they know by the technical limitation of their cortical language network. A reality is a situation model (SM). For example, the conventionally-called “physical reality” around my conventionally-called “physical body” is actually a “geometric” SM of my brain. The universe is an autonomous objective parallel computing automaton which evolves by itself automatically/unintentionally – wave-particle duality and Heisenberg’s uncertainty principle can be explained under this “first-order” SM of my brain. Each elementary particle (as a building block of the universe) is an autonomous mathematical entity *itself (i.e., a thing in itself)*. If we are happy to accept randomness, it is obviously possible that all *other* worlds in the many-worlds interpretation do not exist objectively. The conventionally-called “space” does not exist objectively. “Time” and “matter” are not physical. Consciousness is the subjective-form (aka quale) of the mathematical models (of the objective universe) which are intracorporeally/subjectively used by the control logic of a Turing machine’s program objectively-fatedly. A Turing machine’s consciousness or deliberate decisions/choices should not be able to actually/objectively change/control/drive the (autonomous or objectively-fated) world line of any elementary particle within *this* world. Besides the Schrodinger equation (or its real-world counterpart) which is a valid/correct/factual causality of the universe, every other causality (of the universe) is either invalid/incorrect/counterfactual or can be proved by deductive inference based on the Schrodinger equation only. If the “loop quantum gravity” theory is correct, time/space does not actually/objectively exist in the objective-evolution of the objective-reality, or in other words, we should not use the subjective/mental concept of “time”, “state” or “space” to describe/imagine the objective-evolution of the universe.

**Keywords:** Conway's Game of Life; causality; consciousness; free will; determinism; fatalism

**Abbreviations**

1O: first-order

2O: second-order

BB: building block

MM: mathematical model

SM: situation model

TM: Turing machine

Just like other animals, humans are limited in what they know by the structure of their nervous systems and by the structure of their languages [5]. More specifically, humans are limited in what they know by the technical limitation of their *cortical language networks* *[6][7]*.

In order to describe my findings/conclusions systematically, a new semantic system (i.e., a new language) has to be intentionally defined by the present article.

The worldview common reductionists are using, is not completely objective. This study discusses the nature of universe, consciousness and causality in depth, based on a new, completely objective worldview which views the universe as a state machine of elementary particles. No one has had such a formal discussion before in depth based on such a completely objective worldview.

"If, in some cataclysm, all of scientific knowledge were to be destroyed, and only one sentence passed on to the next generation of creatures, what statement would contain the most information in the fewest words? I believe it is the atomic hypothesis that all things are made of atoms — little particles that move around in perpetual motion, attracting each other when they are a little distance apart, but repelling upon being squeezed into one another. In that one sentence, you will see, there is an enormous amount of information about the world, if just a little imagination and thinking are applied. [100]" – Richard Feynman.

**Intracorporeal/subjective/subjective-reality/consciousness vs. Extracorporeal/objective/objective-reality/universe**

I can pretend/imagine that I am *something else* – I can imagine the existence of another “me”. With such an imagination, I feel as if that I am not alone – I feel as if that there are two clones of “me” now. By this imagination, I duplicate myself *mentally*.

When I pretend/imagine that I am something else, this imagination *means* the existence of something other than my mind. But this imagination is not a *proof* ofthe existence of anything other than my mind – I have no way to *prove* the existence of anything other than my mind. This is the position of solipsism.

When I think from the position of solipsism, I stop *pretending/imagining* that I am something else – I stop *imagining* the existence of something other than my mind.

I write the present article, to record/track/organize/evaluate my own thoughts.

In everyday life, actually I imagine/postulate every other person as another “me”, or as a variant of “me”. In this case, I imagine/postulate the existence of something other than my mind – I imagine/postulate the existence of *two* separated clones of my own mind. In other words, I imagine/postulate the existence of another clone of my mind – which is something other than my (own) mind.

When I think from the position of solipsism, I stop imagining/postulating another person as another “me”. In this case, I stop imagining/postulating the existence of something other than my mind – I stop imagining/postulating the existence of *two* separated clones of my own mind. In other words, I stop imagining/postulating the existence of another clone of my mind – which is something other than my (own) mind.

It is logically impossible for my mind to actually know, whether my mind’s clones actually exist or not. In other words, it is logically impossible for my mind to actually know, whether the position of solipsism is correct or not.

Every animal brain is a biological neural network [78][82]. Some (recurrent) neural networks are Turing machines (TMs) [1] [2]. For example, the human brain is a TM [3]. Some neural networks are universal Turing machines [4].

In the semantics of the present article, a *situation* means a system of related subjects/objects whose states are evolving.

In the semantics of the present article, the term “subjective” means that “my brain does a cognitive task, only based on the (sensory) data/information itself should be able to get/process, while my brain manages to unlearn the (sensory) data/information only another TM should be able to get/process”, while the term “objective” means that “my brain does a cognitive task, only based on the (sensory) data/information another TM should be able to get/process, while my brain manages to unlearn the (sensory) data/information only itself should be able to get/process”.

So, the term “subjective” in the present article means “*completely* subjective” in natural language; the term “objective” in the present article means “*completely* objective” in natural language.

When my brain is being (completely) objective, my brain only imagines/postulates *one potential spatiotemporal outcome* *(i.e., one situation-option)* under the context of spacetime. (“No man ever steps in the same river twice, for it's not the same river and he's not the same man.” – Heraclitus.) Let us call *this single potential spatiotemporal outcome (i.e., this single situation-option)* the objective-fate. The objective-fate is objectively-fated. In the semantics of the present article, “objectively-fated” means “completely objectively controlled/driven/caused/decided/chosen/stated/programmed (by something)”, and "not objectively free/flexible/active”. This is my brain’s own (subjective) belief regarding the objective-state-evolution of an *objective-reality [106][14][15] (aka objectivity, third-person objective reality [16][17], thing in itself [18], real world, or outer/extracorporeal/public situation/reality/world).* My brain imagines/postulates that the objective-state-evolution of the objective-reality is objectively-fated/passive. My brain imagines/postulates that every physical-object (e.g., my brain itself) is objectively-fated/passive – my brain imagines/postulates one potential spatiotemporal outcome of every physical-object's upcoming action under the context of spacetime. The objective-state-evolution of an objective-reality can be described by the phrase “matter in motion as a whole [105]” – if we imagine that matter actually/objectively exists within this objective-reality. “Heaven and Earth are ruthless and treat the myriad creatures as straw dogs. [74]” – Lao Tzu.

When my brain is being (completely) subjective, my brain (subjectively) imagines/postulates two or more potential-outcomes/situation-options. My brain imagines/postulates that the objective-state-evolution of the objective-reality is free/flexible/active, not objectively-fated/passive. My brain imagines/postulates that at least one physical-object (e.g., my brain itself) is free/flexible/active – my brain imagines/postulates two or more potential-outcomes/situation-options of this physical-object's upcoming action.

For example, when I reach a T-junction, the road ahead me has two branches under the context of space. Subjectively, my upcoming spatial movement has *two potential branches (i.e., two situation-options)* under the context of space – my trajectory has *two potential spatial branches (i.e., two spatial situation-options)* under the context of space. Actually/objectively, my upcoming spatiotemporal movement only has *one potential branch (i.e., one situation-option)* under the context of spacetime – my body’s world tube only has *one potential spatiotemporal branch (i.e., one spatiotemporal situation-option)* under the context of spacetime.

When my brain is being (completely) subjective, my brain is being treated (by my brain) as a subject which is free/flexible/active. When my brain is being (completely) objective, my brain is being treated (by my brain) as an object (i.e., a physical-object) which is objectively-fated/passive, not a subject which is free/flexible/active.

When my brain is being (completely) objective, my brain manages to imagine/simulate what the objective-reality should look like from another TM’s viewpoint.

When my brain imagines about the data/information which another TM should be able to get/process, my brain has to explain the data/information being processed by my brain as a *subjective-reality [12] (subjectivity, (private) subjective consciousness [13], subjective cognitions/mind, inner/intracorporeal/private situation/reality/world, personal take [103], or “Cartesian theater” [97])* – the data/information being processed by my brain comes from an objective-reality where my brain is actually/objectively located. (Obviously, my brain is not actually/objectively located in my brain’s subjective-reality.) In some sense, my brain’s subjective-reality represents/models/simulates my brain’s objective-reality at some degree. Obviously, it is logically possible that my brain’s objective-reality does not look like my brain’s subjective-reality, although my brain sometimes imagines that its objective-reality looks the same as its subjective-reality – when my brain (incorrectly/counterfactually) imagines its subjective-reality as its objective-reality.

The term “universe” or “Brahman” refers to a single objective-reality shared by all humans – this objective-reality exists outside of our subjective-reality/mind [106].

Actually/objectively, the (spatiotemporal) objective-state-evolution of the universe/objective-reality only has *one potential-outcome/situation-option (i.e., the objective-fate)* under the context of spacetime. In my mind/subjective-reality, the objective-state-evolution of the universe/objective-reality is (subjectively) imagined/postulated/represented/modeled/simulated/mentally-visualized to have two or more potential-outcomes/situation-options, only because that my mind/subjective-reality cannot reliably forecast which potential-outcome/situation-option will be realized by the objective-state-evolution of the universe/objective-reality.

When my brain is being (completely) subjective, my brain only (incorrectly/counterfactually) explains the data/information being processed by my brain as an objective-reality.

When my brain is being (completely) objective, my brain can (incorrectly/counterfactually) explain the data/information being processed by my brain as an objective-reality, and my brain can also explain the data/information being processed by my brain as a subjective-reality. My brain prefers to explain the data/information being processed by my brain as a subjective-reality.

A physical-object (in the universe) or a pattern (in a Game of Life system) is a dynamic-physical-system.

A dynamic-physical-system has a spatial scope, and its state evolves objectively as time goes on. When we focus on the objective-state-evolution of a dynamic-physical-system over/across *time*, we view this dynamic-physical-system as a physical-event/physics-experiment. When we focus on the *spatial* scope of a physical-event/physics-experiment, we view this physical-event/physics-experiment as a dynamic-physical-system. So, actually a dynamic-physical-system equals to a physical-event/physics-experiment.

When my brain is being (completely) objective, my brain views itself as a dynamic-physical-system.

When my brain is making a decision/choice while my brain being (completely) objective, my brain considers its own decision/choosing process. Findings in [102] “help explain the critical contribution of the hippocampus to value-based decision-making, providing a mechanism by which knowledge of relationships in the world can be incorporated into reward predictions for guiding decisions”.

Before an out-of-body experience, my brain could not be (completely) objective.

In human adult who can be (completely) objective (e.g., Dr. John Ding-E Young), usually an out-of-body experience is reported (e.g., see http://blog.sina.com.cn/s/blog\_13814c5aa0102zugf.html ).

When my brain is being objective, my brain manages to view/imagine itself only from the (imagined/simulated) viewpoint of another TM,only based on the data/information the other TMshould be able to get/process, while my brain manages to unlearn the data/information only itself should be able to get/process– my brain’s neural network is capable to represent this sentence *compositionally [98][99]*. Let us call this viewpoint the *objective-perspective (aka third-person perspective [29], distanced perspective [58] or God’s eye view [30] [31] [15]).* When my brain views/imagines *something else (e.g., another TM)*, my brain uses the objective-perspective.

When my brain is being subjective, my brain manages to view/imagine itself only from the viewpoint of itself,only based on the data/information itselfshould be able to get/process, while my brain manages to unlearn the data/information only another TM should be able to get/process– my brain’s neural network is capable to represent this sentence *compositionally [98][99]*. Let us call this viewpoint the *subjective-perspective (aka first-person perspective [28] or immersed perspective [58]).* When my brain views/imagines itself, my brain uses either the subjective-perspective or the objective-perspective.

So, when I am being *objective*, I pretend/imagine that I am *something else (i.e., another TM) –* I imagine the existence of something other than my mind. When I am being *subjective*, I do not need to pretend/imagine that I am something else – I do not need to imagine the existence of something other than my mind.

When my brain uses the objective-perspective, my brain needs to imagine/postulate/suppose the dual existence of both its extracorporeal objective-reality/universe and its intracorporeal subjective-reality/consciousness. My brain can treat its intracorporeal subjective-reality as its extracorporeal objective-reality/universe – my brain needs to imagine/postulate/suppose that my brain has access to another undisclosed intracorporeal subjective-reality/consciousness besides *the so-called “extracorporeal objective-reality/universe” (which is actually my brain’s intracorporeal subjective-reality/consciousness).* Alternatively, my brain can treat *its intracorporeal subjective-reality/consciousness (i.e., the so-called “extracorporeal objective-reality/universe”)* as my brain’s intracorporeal subjective-reality/consciousness – my brain needs to figure out what the actual extracorporeal objective-reality/universe is.

(My brain’s intracorporeal subjective-reality is actually/objectively some (sensory) data/information being got/processed (by my brain) in my brain’s objective-reality.)

(When my brain infers from “we don't have transparent access to the objective/extracorporeal reality” to “we do have transparent access to a subjective/intracorporeal reality” (see https://twitter.com/keithfrankish/status/1429087347145125895), the so-called “objective/extracorporeal reality” refers to my brain's objective-reality/universe, while the so-called “subjective/intracorporeal reality” refers to my brain’s subjective-reality/consciousness. Then, when my brain imagining the so-called “subjective/intracorporeal reality”, my brain’s precondition is that the so-called “subjective/intracorporeal reality” actually/objectively exists – my brain can label its *“transparent reality” (i.e., the reality my brain has transparent access to)* as either its “subjective/intracorporeal reality” or its “objective/extracorporeal reality”; when my brain imagining the so-called “objective/extracorporeal reality”, my brain's precondition is that the so-called “objective/extracorporeal reality” actually/objectively exists – my brain can label its “transparent reality” as either its “objective/extracorporeal reality” or its “subjective/intracorporeal reality”. When my brain is imagining/postulating/supposing the dual existence of both its “subjective/intracorporeal reality” and its “objective/extracorporeal reality”, it is easier for my brain to label its “transparent reality” as its “subjective/intracorporeal reality” (i.e., its consciousness), comparing to label its “transparent reality” as its “objective/extracorporeal reality” (i.e., its universe). My brain’s visual hallucination appears in my brain’s “transparent reality”, which means that my brain’s “transparent reality” is actually/objectively my brain's “subjective/intracorporeal reality”, not my brain’s “objective/extracorporeal reality”. My brain’s entire “transparent reality” is actually/objectively a visual hallucination of my brain.)

(When my brain uses the objective-perspective, my brain can imagine/postulate/suppose its “transparent reality” to be its “objective/extracorporeal reality”, while imagining/postulating/supposing that my brain has transparent access to another undisclosed “subjective/intracorporeal reality” (besides its “transparent reality”). Alternatively, my brain can imagine/postulate/suppose its “transparent reality” to be its “subjective/intracorporeal reality”.)

When my brain uses the subjective-perspective, my brain does not need to imagine/postulate/suppose the dual existence of both its extracorporeal objective-reality/universe and its intracorporeal subjective-reality/consciousness. My brain treats its intracorporeal subjective-reality/consciousness as its extracorporeal objective-reality/universe, without imagining/postulating/supposing that my brain has access to another undisclosed intracorporeal subjective-reality/consciousness besides *the so-called “extracorporeal objective-reality/universe” (which is actually my brain’s intracorporeal subjective-reality/consciousness).* In other words, my brain only imagines/postulates/supposes the sole existence of its *extracorporeal objective-reality/universe* – but this so-called *“extracorporeal objective-reality/universe”* is actually my brain’s intracorporeal subjective-reality/consciousness.

(When my brain uses the subjective-perspective, my brain imagines/postulates/supposes its “transparent reality” to be its “objective/extracorporeal reality”, without imagining/postulating/supposing that my brain has transparent access to any other reality (besides its “transparent reality”).)

Can elementary particles talk/bark/think/decide/choose? It looks like that a single elementary particle cannot talk/bark/think/decide/choose. It looks like that a group of elementary particles (e.g., a human; a dog; a computer) can talk/bark/think/decide/choose. However, what a group of elementary particles can do, is exactly the sum of what each single elementary particle (within the group) can do. So, it looks like that a single elementary particle can participate in the talking/barking/thinking/deciding/choosing of a group of elementary particles, although it looks like that, this single elementary particle is not aware of that by itself. It looks like that this group of elementary particles can be aware of that by itself, but *my brain (being another group of elementary particles, or even being the same group of elementary particles)* has no way to actually/objectively know *that (whether this group of elementary particles is actually aware of that by itself),* only based on the data/information my brain should be able to get/process *from its objective-perspective*.

Let us call a state machine’s transition function the *first-order (1O) function* or simply *1O-function.* The 1O-function can be stochastic. The “actual future” of a state machine refers to its state transition.

If a TM within a state machine believes that the state machine *will* be objectively-fated by a 1O-function, the TM should agree that every physical-event/physics-experiment (which happens within the state machine) will be objectively-fated by the 1O-function, not objectively free/flexible/active.

“A physical theory should clearly and forthrightly address two fundamental questions: what there is, and *what it does*. The answer to the first question is provided by the *ontology* of the theory, and the answer to the second by its *dynamics*. The ontology should have a sharp mathematical description, and the dynamics should be implemented by precise equations describing how the ontology will, or might, evolve. [92]” (Apparently, this comment only applies to a physical theory which describes a dynamic-physical-system. Dramatically, it is logically possible that a physical theory might describe a static physical-system – it is logically possible that a physical-system can be *static.* It is logically possible that a physical-system does not *do* anything. Or in other words, it does not make sense to describe *“what it does”*.) The 1O-function describes the *dynamics* of a state machine.

"All things are numbers. [75]" – Pythagoras.

A Game of Life system, a Rule 110 cellular automaton, a two-dimensional/three-dimensional Primordial Particle System [39][40] or the universe is a state machine.

A TM's decision/choice which can *only* be explained based on the stochasticity of the 1O-function, is not a deliberate decision/choice. An animal brain's decision/choice which can *only* be explained based on the reaction of mirror neurons, is not a deliberate decision/choice.

In the semantics of the present article, unless explicitly stated otherwise, the term “decision” means a *deliberate* decision, and the term “choice” means a *deliberate* choice.

The 1O-function of every Game of Life system is as below [52]:



where



The 1O-function of a stochastic cellular automaton (which is a variation of Game of Life) is as below:



where



Let’s call this 1O-function the stochastic-McKenzie-function. Let’s call this stochastic cellular automaton the Stochastic Game of Life, and call the original Game of Life the Nonstochastic Game of Life. A Nonstochastic Game of Life system is actually a special case of the Stochastic Game of Life system.

Let us call a cell in a Nonstochastic/Stochastic Game of Life system, a cell in a Rule 110 cellular automaton, an elementary particle in the universe or a particle in a two-dimensional/three-dimensional Primordial Particle System the building block (BB). In the semantics of the present article, a BB’s “state” includes its position.

In the Standard Model of particle physics, BBs are the simplest possible objects that can be shifted, rotated and boosted [35]. A pure quantum state corresponds directly to (objective) reality [36]. “Ever since the fundamental paper of Wigner on the irreducible representations of the Poincaré group, it has been a (perhaps implicit) deﬁnition in physics that an BB ‘is’ an irreducible representation of the group, G, of ‘symmetries of nature.’ [37]” “Particles are at a very minimum described by irreducible representations of the Poincaré group [38].”

In case that a state machine is *a collection of BBs (i.e., a tremendous cloud of BBs)*, its state transition refers to the objective-state-evolution of all BBs; its state transition is a parallel computation to *calculate* the new state of every BB based on the preceding state of all BBs, using the 1O-function only. Let us call such a state machine the *1O-parallel-computing-automaton*, and call its state transition the *1O-parallel-computation*. The 1O-parallel-computation/objective-state-evolution of a 1O-parallel-computing-automaton refers to the objective-state-evolution of all its BBs.

BBs are mutually exclusive subsets of a 1O-parallel-computing-automaton.

A macroscopic situation within a 1O-parallel-computing-automaton, is actually/objectively a series/set of sequential/adjacent microscopic situations at the BB level.

Within a 1O-parallel-computing-automaton, the set of BBs included by a dynamic-physical-system (e.g., a glider pattern) might change over time.

Two dynamic-physical-systems might exchange BBs. For example, two dynamic-physical-systems might exchange force-carrier BBs which are “bosons”.

In the context of Newton's second law, an external force (e.g., gravity) which is applied to a dynamic-physical-system (within a 1O-parallel-computing-automaton) is fictionally supposed to be the cause of the objective-state-evolution of this dynamic-physical-system. (If we suppose that the external force is nonfictional, there is no way for this dynamic-physical-system to actually/objectively void/avoid the external force at this moment.) The actual cause of the objective-state-evolution of this dynamic-physical-system is the 1O-function (of the 1O-parallel-computing-automaton), not the external force. The external force does not actually/objectively exist. The actual cause of the objective-state-evolution of this dynamic-physical-system falls *inside* the spatial scope of this dynamic-physical-system.

It seems like that a force-carrier BB carries force. However, a force-carrier BB does not actually/objectively carry force.

The single potential-outcome/situation-option/objective-fate of the objective-state-evolution of a Nonstochastic/Stochastic Game of Life system is objectively-fated. Or in other words, the objective-fate of every pattern (within this system) is the single potential-outcome/situation-option of the objective-state-evolution of this system; the objective-state-evolution of every pattern follows its objective-fate.

More generally, the single potential-outcome/situation-option/objective-fate of the objective-state-evolution of a 1O-parallel-computing-automaton is objectively-fated by its 1O-function.

The 1O-function of every Rule 110 cellular automaton is as below (https://en.wikipedia.org/wiki/Elementary\_cellular\_automaton):

**N110d=(C+R+C\*R+L\*C\*R)%2**

The 1O-function of every two-dimensional Primordial Particle System is as below [39]:



“The motion of a mechanical object, even a human-sized object, should be governed by the rules of quantum mechanics.” [93]

It is possible that Schrodinger equation is the 1O-function of the universe. For readers who do not agree with that, let us *suppose* that I just discovered the actual 1O-function of the universe, and let us call it U-function.

For any 1O-parallel-computing-automaton, if its 1O-function happens to be the U-function, let's call it the U-system. For example, the universe is a U-system.

In a cellular automaton, the position of a BB does not change over time. In a U-system or a two-dimensional/three-dimensional Primordial Particle System, the position of a BB changes over time. So, a U-system or a two-dimensional/three-dimensional Primordial Particle System is not a cellular automaton.

If the universe (as a U-system) actually/objectively exists, it is logically possible that myself is actually/objectively a philosophical zombie (which is a subset of this U-system).

If my mind actually/objectively exists, it is logically possible that the universe (as a U-system) is actually/objectively a hallucination (which is a subset of my mind).

It is logically possible that my mind is the only thing which actually/objectively exists – the universe (as a U-system) does not actually/objectively exist. It is also logically possible that the universe (as a U-system) is the only thing which actually/objectively exists – I am actually/objectively a philosophical zombie.

It is also logically possible that both my mind and the universe (as a U-system) are two different things which both actually/objectively exist. In this context, the universe (as a U-system) actually/objectively exists, and I am not a philosophical zombie – I need to map *the context of my mind* with *the context of the U-system*.

It is logically possible that any person (including myself) is *actually/objectively* a hallucination (which is a subset of my mind) *or* a philosophical zombie (which is a subset of a U-system) – it is logically impossible for a person (including myself) to be both a hallucination (which is a subset of my mind) *and* a philosophical zombie (which is a subset of a U-system) at the same time *actually/objectively*.

When thinking (completely) objectively, a person’s experience is so different that she feels like that she has an alternate personality – a new dedicated alternate personality (aka the true self [25]) which uses the objective-perspective. It is a dissociative/meditation experience, or more specifically, a kind of out-of-body experience [65][64]. When she uses the objective-perspective to observe herself, she accurately treats herself as an ordinary/plain/nonsignificant physical-object in a physics-experiment/dynamic-physical-system/U-system – her objective-fate is the single potential-outcome/situation-option of the objective-state-evolution of this physics-experiment/dynamic-physical-system/U-system. When she uses the objective-perspective to observe herself, it feels like observing herself from somewhere outside of the physics-experiment/dynamic-physical-system/U-system where she lives, and it feels like observing herself from the extracorporeal space, and it feels like observing her virtual doppelganger by using a virtual reality system [58]; it feels like that she is a character in a finished script/story/book/simulation, and she is observing this character from the viewpoint of an audience (of this script/story/book/simulation) – her objective-fate is like this script/story/book/simulation. The said script/story/book/simulation only has one potential-outcome/situation-option. A character in the said script/story/book/simulation might (subjectively) imagine two or more potential-outcomes/situation-options for the objective-state-evolution of the said script/story/book/simulation. The said script/story/book/simulation described the objective-state-evolution of each BB of the U-system – a TM’s decision/choice/thought/action is actually/objectively controlled/driven/caused/decided/chosen/stated/programmed by the objective-state-evolution of the BBs within the TM. Actually/objectively, a TM’s decision/choice/thought/action is not free/flexible/active. “A TM’s decision/choice/thought/action controls/drives/causes/decides/chooses/programs/branches the objective-state-evolution of some BBs of the TM’s 1O-parallel-computing-automaton” is an incorrect/counterfactual causality.

A human brain uses a subjective/intracorporeal mathematical model (MM) to represent/forecast the objective-state-evolution of the extracorporealobjective-reality, to make a decision/choice in the objective-reality subjectively/intracorporeally. From the objective-perspective, the said human brain’s subjective/intracorporeal representation/forecast/decision/choice is objectively-fated, so it does not actually/objectively control/drive/cause/decide/choose/program/branch the objective-state-evolution of any BB (of the objective-reality). Although in the said human brain’s subjective/intracorporeal MM, its decision/choice controls/drives/causes/decides/chooses/programs/branches the objective-state-evolution of some BBs (of the objective-reality) – this subjective/intracorporeal causality is actually counterfactual/fictional.

A TM’s objective-reality is actually/objectively the TM’s extracorporeal situation.

Apparently, a TM’s MM (of its objective-reality) is not its objective-reality. “The map is not the territory [5].”

For a TM (within a 1O-parallel-computing-automton), the 1O-parallel-computing-automaton is the TM’s objective-reality, not the TM’s subjective-reality. Actual/objective BBs (of the 1O-parallel-computing-automaton) are mutually exclusive subsets of the TM’s objective-reality, not subsets of the TM’s subjective-reality. The TM has no way to locate any actual/objective BB within its subjective-reality, because there is no actual/objective BB in its subjective-reality. There is no actual/objective atom/molecule in the TM’s subjective-reality; there is no actual/objective *matter* in the TM’s subjective-reality (i.e., actual/objective *matter* is not in the TM’s subjective-reality).

When I mentally visualizing the objective-reality as a physics-experiment/dynamic-physical-system, this is a dissociative/meditation experience. The objective-state-evolution of each BB within my brain, is part of the objective-state-evolution of this physics-experiment/dynamic-physical-system. Let us name this experience the physics-experience.

The objective-state-evolution of the objective-reality is actually the objective-state-evolution of a physics-experiment/dynamic-physical-system – the objective-reality is actually a physics-experiment/dynamic-physical-system. The single potential-outcome/situation-option of the objective-state-evolution of this physics-experiment/dynamic-physical-system is objectively-fated. Any cognition of *a TM (e.g., a human brain)*, is an outcome of the objective-state-evolution of this physics-experiment/dynamic-physical-system.

Every decision/choice actually made by a TM’s program, is objectively-fated by the 1O-function, or in other words, is actually/objectively controlled/driven/caused/decided/chosen/programmed by the objective-state-evolution of the 1O-parallel-computing-automaton. So, objectively (i.e., only based on the data/information another TM should be able to get/process), the TM is incapable/powerless to make any decision/choice differently. The objective-state-evolution of the 1O-parallel-computing-automaton, is not actually/objectively controlled/driven/caused/decided/chosen/programmed/branched by any decision/choice actually made by the TM’s program. Any decision/choice actually made by the TM’s program, does not actually/objectively control/drive/cause/decide/choose/program/branch the objective-state-evolution of any BB (of the 1O-parallel-computing-automaton). (This is more obvious, in case that the 1O-parallel-computing-automaton is a Nonstochastic/Stochastic Game of Life system.)

More generally, the objective-state-evolution of a TM’s intracorporeal subjective-reality, is actually/objectively controlled/driven/caused/decided/chosen/stated/programmed by the objective-state-evolution of the TM’s 1O-parallel-computing-automaton/objective-reality; the objective-state-evolution of the TM’s 1O-parallel-computing-automaton/objective-reality, is not actually/objectively controlled/driven/caused/decided/chosen/programmed/branched by the objective-state-evolution of the TM’s intracorporeal subjective-reality.

Unfortunately, the control logic of the human brain’s program counterfactually/incorrectly/*insanely* postulates/models/represents/simulates that the objective-state-evolution of a U-system is *not* objectively-fated (i.e., “the objective-state-evolution of the U-system is actually/objectively controlled/driven/caused/decided/chosen/programmed/branched by the decision/choice of a TM inside the U-system”), when it confuses its intracorporeal subjective-reality/subjectivity with the extracorporeal objective-reality/objectivity. Obviously, when two programs both counterfactually/incorrectly/insanely postulates/models/represents/simulates that the objective-state-evolution of a U-system is not objectively-fated, either program will not think the other program to be counterfactual/invalid/incorrect/insane. Dramatically, both programs will think the third program – who is not counterfactual/invalid/incorrect/insane – to be counterfactual/invalid/incorrect/insane.

When the control logic of a TM's program will be insane/sane, is objectively-fated by the 1O-function.

Logically speaking, “time” is a TM’s intracorporeal phenomenon only. The TM imagines/postulates that “time” also applies to *the objective-reality (which is a mathematical entity/structure)*, but obviously the TM has no way to prove that. Even if “time” actually applies to the objective-reality, the TM has no way to directly access the “time” in the objective-reality – the TM only has directly access to the “time” in its intracorporeal representation/model of the objective-reality. After the TM discovered the 1O-function of the objective-reality, the TM might be able to imagine/postulate a variable in the 1O-function to be the “time” of the objective-reality – but it does not prove that the objective-reality *actually* has “time”.

The control logic of a TM’s program organizes/sorts its intracorporeal constructions/representations/memories/information/data of physical-eventsby time and space, but this fact does not prove that the actual physical-events actually/objectively happen *in the same time sequence* in *the objective-reality (i.e., a mathematical entity/structure)*. It is logically possible that *all the so-called "future" physical-events (to the control logic of a TM’s program) have actually/objectively happened in the objective-reality already (i.e., all the so-called “future” physical-events are constructed/established/fixed in the objective-reality already)*, although the TM’s program does not have access to their intracorporeal constructions/representations/memories/information/data yet – perhaps due to some unknown reason/factor which can be imagined/postulated as a kind of mathematical distance within *the objective-reality (i.e., a mathematical entity/structure)*.

Let us do a thought experiment. Let us suppose that a TM within a Nonstochastic Game of Life system has a subjective perception of time and space. If we reverse the objective-state-evolution of this Nonstochastic Game of Life system (to play it backward), the TM’s intracorporeal representation/construction of its objective-reality remains the same, so the TM should have the same subjective perception of time and space – the TM should not notice that the actual/objective direction of the time flow of its objective-reality is reversed, comparing to the perceived/subjective direction of the time flow in its intracorporeal representation (of its objective-reality). (For example, the TM should not notice that a glider (pattern) is moving backward. To the TM, the glider is still moving forward – the glider is still moving forward in its intracorporeal representation (of its objective-reality). Although we (humans) can see that the glider is actually/objectively moving backward now. A TM always feels like that the time flow of its objective-reality has the same direction as the time flow in its intracorporeal representation (of its objective-reality) – even if we reverse the direction of the objective-state-evolution of its objective-reality. In this sense, to a TM, the actual direction of the time flow of its objective-reality does not matter – the TM will never know the actual direction of the time flow of its objective-reality.) In this case, the so-called “future” physical-events (to the control logic of the TM’s program) actually/objectively happened in its objective-reality already, while the so-called “past” physical-events (to the control logic of the TM’s program) will happen in its objective-reality in the actual/objective future. The intracorporeal constructions/representations/memories/information/data of the so-called “past” physical-events (to the control logic of the TM’s program) are accessible to the TM’s program already, although the actual physical-events have not actually/objectively happened in its objective-reality yet. The TM does not have intracorporeal constructions/representations/memories/information/data of the so-called “future” physical-events (to the control logic of the TM’s program) yet, although the actual physical-events have actually/objectively happened in its objective-reality already. The actual physical-events actually/objectively happen in a *reversed* order in the objective-reality, comparing to the order of their representations in the TM’s subjective perception (of the objective-reality).

The subjective/mental concept of “time” and “state” depend on each other – a “state” is something like a snapshot (of the objectively evolving objective-reality) at a specific moment in time. If time does not actually/objectively exist (in the objective-evolution of the objective-reality (i.e., a *static* mathematical entity/structure)), the concept of “state” does not make sense anymore in this context.

(BTW, in the technical area of “loop quantum gravity”, space, time, particles and fields get fused into a single (mathematical) entity/structure: a quantum field that does not live in space or time [90]. In other words, the objective-evolution of the quantum field (i.e., the objective-reality) cannot be actually/objectively divided by time or space – the objective-evolution of the quantum field is actually/objectively indivisible (by time or space). If the “loop quantum gravity” theory is correct, time/space does not actually/objectively exist in the objective-evolution of the objective-reality. The fundamental equations of the “loop quantum gravity” theory have no explicit space or time *variables* [90] – the fundamental equations describe the objective-evolution of the objective-reality. If the “loop quantum gravity” theory is correct, the fundamental equations are the U-function. In this case, we should not imagine that a U-system occupies a space and changing its state to evolve over time – we should not use the subjective/mental concept of “time”, “state” or “space” to describe/imagine the objective-evolution of a U-system. In this case, a U-system can be viewed as a special state machine. Let us call such a special state machine the time-irrelevant-state-machine (i.e., a quantum field as a single mathematical entity/structure). We can imagine the time-irrelevant-state-machine (as a single mathematical entity/structure) to be something objectively dynamic – it evolves objectively. But in this case, its objective-evolution is not *over* time – the time-irrelevant-state-machine does not evolve *over* time. The time-irrelevant-state-machine objectively evolves *over* another variable (other than time) – the time-irrelevant-state-machine is dynamic *over* the other variable. Then, the U-function describes its objective-evolution over the other variable. The objective-evolution of the time-irrelevant-state-machine does not involve the subjective/mental concept/variable of “time”, but involves the other subjective/mental concept/variable instead. The subjective/mental concept/variable “time” is modeled/simulated/represented by a TM (within the time-irrelevant-state-machine) in its subjective/intracorporeal MM (which models/simulates/represents the objective-reality), while the other subjective/mental concept/variable is not modeled/simulated/represented in this MM. So, the other subjective/mental concept/variable is hidden to the TM in this sense. Alternatively, we can imagine the time-irrelevant-state-machine (as a single mathematical entity/structure) to be something objectively static – it does not objectively evolve over any variable. In this case, the U-function does not describe a dynamic objective-evolution, but describes a static mathematical relationship. But then we should not imagine the time-irrelevant-state-machine as a “special state machine” anymore – we can call it the static-quantum-field instead. There is no way to divide the *ontology* of the static-quantum-field from its *dynamics*. Or in other words, the static-quantum-field does not have its *dynamics* – because it is a *static* physical-system.)

“Although deductive inference is easy to test or model, the results of this type of inference never increase the semantic information above what is already stated in the premises.” (See http://penta.ufrgs.br/edu/telelab/3/deductiv.htm). Because, “human reasoners tend to maintain the semantic information in the premises [84]”.

In natural language, the statements “the thing ‘A’ should already state the semantic information of the thing ‘B’”, “based on the thing ‘A’ only, we should be able to prove the thing ‘B’ by deductive inference” and “the thing ‘B’ is completely objectively controlled/driven/caused/decided/chosen/stated/programmed by the thing ‘A’” have exactly the same meaning.

I know some causalities (e.g., [87]) in social science, humanity, psychology, biology, chemistry and physics.

In theory, besides the 1O-function, we should be able to prove every other valid causality only based on the 1O-function by deductive inference. In other words, the 1O-function should already state the semantic information of all other valid causalities; the 1O-function completely controls/drives every other valid causality. If we are unable to prove a causality only based on the 1O-function by deductive inference, it means that this causality is invalid/incorrect. This is the position of reductionism.

A TM only has access to the data/information of past physical-events – the TM will never have access to the data/information of any future physical-event. So, the TM has no way to actually know whether there will be any future physical-event in the future. The TM even has no way to actually know whether the *future* actually/objectively exists or not.

Based on the data/information of past physical-events, if the TM has enough confidence on a causality (e.g., the 1O-function), it means that the TM has enough confidence on the idea that all future physical-events will be controlled/driven/caused/decided/chosen/stated/programmed by this causality. (For example, if the TM has enough confidence on the 1O-function, it means that the TM has enough confidence on the idea that all future physical-events will be objectively-fated by the 1O-function.) But the TM has no way to actually know whether the future physical-events are actually/objectively controlled/driven/caused/decided/chosen/stated/programed by this causality or not.

TM imagines that “time always lapses”. TM cannot imagine that “time does not lapse”. Even if TM imagines that everything is “paused”, it does not mean that “time does not lapse”, but only means that “everything does not change *over time*”.

TM imagines *time* to be continuous – it will not stop at some point. TM imagines the objective-state-evolution of its 1O-parallel-computing-automaton to be continuous too – it will not stop at some point.

TM imagines its 1O-parallel-computing-automaton to be eternal – it will still exist in the future. TM imagines its causalities to be eternal too – it will still work in the future. TM imagines the future to be an extension/generalization of the past: the past is extended/generalized (to the future), based on its causalities.

A TM can extend/generalize the past (to the future), based on the 1O-function *only*. Alternatively, a TM can extend/generalize the past (to the future), based on its causalities (*not only* the 1O-function).

If the TM has enough confidence on the 1O-function, it will have less confidence on another causality, if this causality cannot be deductively inferenced from the 1O-function only. The TM might think this causality to be invalid/incorrect.

So, if the TM has enough confidence on the 1O-function, it will have enough confidence on the future extended/generalized based on the 1O-function *only*. It will have less confidence on the future extended/generalized based on its causalities (*not only* the 1O-function). The TM might think the latter future to be invalid/incorrect, while thinking the former future to be valid/correct, if they conflict with each other.

For a 1O-parallel-computing-automaton, if a subset of all its BBs constructs a temporarily-isolated-system during a time frame, during this time frame, this temporarily-isolated-system (as a smaller 1O-parallel-computing-automaton) still uses the original 1O-parallel-computing-automaton's 1O-function.

So, any temporarily-isolated-system within the universe is a U-system.

Let us suppose that there are only three BBs in a U-system, and suppose that the initial state of the collection of BBs is as below:

|  |  |
| --- | --- |
| Sequential number of the BB | State of the BB |
| Position of the BB | Other states of the BB |
| x | y | z | Type of the BB | Other state of the BB |
| 0 | 0 | 0 | 110 | 0 | 0 |
| 1 | 3.4 | -5.87 | 9 | 6 | 1 |
| 2 | 2 | 75 | -64.3 | 4 | 0 |

Table 1

At the next moment, let us suppose that the state of the collection of BBs changed to below:

|  |  |
| --- | --- |
| Sequential number of the BB | State of the BB |
| Position of the BB | Other states of the BB |
| x | y | z | Type of the BB | Other state of the BB |
| 0 | 98 | -35.4 | 8.43 | 0 | 1 |
| 1 | 2567 | -765.4 | -243 | 6 | 1 |
| 2 | -334.2 | 24.2 | 894.3 | 4 | 0 |

Table 2

In table 1 and table 2, a BB’s position includes three numbers (e.g., “0, 0, 110” for the first BB in table 1). However, it’s possible that the position of a BB (in every U-system) actually includes four or more numbers – it depends on the 1O-function.

Only based on the data/information a human brain should be able to get/process, usually a U-system is more complicated than a Nonstochastic/Stochastic Game of Life system. So, situations/conclusions for 1O-parallel-computing-automatons are less obvious in the context of a U-system (than in the context of a Nonstochastic/Stochastic Game of Life system). So, if it is difficult to imagine a situation/conclusion in the context of a U-system, readers can try to imagine this situation/conclusion in the context of a Nonstochastic/Stochastic Game of Life system first.

It is (obviously) unreasonable/incorrect/counterfactual to assume/postulate that one is capable of disrupting the 1O-function in order to choose another flavor of ice cream – readers can try to imagine this situation/conclusion in the context of a Nonstochastic/Stochastic Game of Life system first.

Every animal brain is actually a pure physical machine/device constructed by *a fuzzy set of BBs (i.e., a tremendous cloud of BBs)*. So, natural intelligence displayed by an animal brain, is actually artificial intelligence demonstrated by a machine.

When I am in my lucid-dream, my existence is somehow created/constructed by my brain. Every object in my lucid-dream, is created/constructed by my brain. In my lucid-dream, I focus on the situation I encounter. I am aware of that, the situation (I encounter) is created/constructed by my brain, and the environment is created/constructed by my brain.

After I wake up from my lucid-dream, my environment and I are still created/constructed by my brain, based on the data/information collected by my nervous system. My environment and I are not real. They are only representations/simulations/models. My current environment has higher degree of realness than the situation in my lucid-dream. (Unfortunately, I have no way to prove this belief/postulation – it is logically possible that my current environment has lower degree of realness than the situation in my lucid-dream. This is illustrated by the story that “Zhuang Zhou dreams of being a butterfly”.) It is logically possible that I can wake up again from my current environment, to see another environment which has higher degree of realness than my current environment – like the story of the popular film “Inception”. However, it is logically impossible for my brain to wake up to directly see the objective-reality where my brain is actually/objectively living in.

I feel like that I am located inside my body, and I focus on the situation my body encounters. However, both my current environment and my body are created/constructed by my brain – both my current environment and my body are actually *in* my mind. The conventionally-called “physical reality” (around my conventionally-called “physical body”) which I feel like that I am living in right now, is actually a *virtual* situation/reality/world which is created/constructed by my brain.

Anything being “predetermined” is “objectively-fated”. In case that the 1O-function of a 1O-parallel-computing-automaton is nonstochastic, anything being “objectively-fated” in this 1O-parallel-computing-automaton is “predetermined”. In case that the 1O-function of a 1O-parallel-computing-automaton is stochastic, anything being “objectively-fated” in this 1O-parallel-computing-automaton is not “predetermined” – “objectively-fated” is less rigid than “predetermined” in the context of such a 1O-parallel-computing-automaton.

When a TM is using a causality to explain something, the causality is mentally visualized as a situation which is being perceived by the TM.

In my mind, when I mentally visualizing any other causality (except 1O-function), it disturbs my mental visualization of 1O-function. So, when I mentally visualizing 1O-function, I intentionally avoid to mentally visualize any other causality. My mental visualization of the BBs (which are following 1O-function) looks like tremendous floating clouds, with each BB being like a minute liquid droplet (in a cloud) – this is a dissociative/meditation experience. These BBs include the BBs of my brain. Let us name this experience the nirvana-experience, just for convenience. During the nirvana-experience, I can prevent other causalities from disturbing the causality of 1O-function. As a dissociative/meditation experience, the nirvana-experience is deeper than the physics-experience; the context of the physics-experience is richer than the context of the nirvana-experience.

Dramatically, the nirvana-experience actually discloses the objective/extracorporeal situation in the objective-reality. In contrast, what my brain experiences in my everyday life (which is much richer comparing to the context of the nirvana-experience), actually does not disclose the objective/extracorporeal situation in the objective-reality, but reflects a subjective/intracorporeal situation which is generated/created/constructed/invented by my brain itself (e.g., the phase precession in the human hippocampus and entorhinal cortex [85]).

The worldview which is being used by common reductionists, is not (completely) objective.

When a person thinks objectively, she emotionlessly/aimlessly treats a physical-object (e.g., her brain) as a fuzzy set of BBs – she does not consider the function/usage/value/meaning of this physical-object. In other words, she intentionally avoids using any other causality (except the 1O-function) in her mental visualization of the situation/task/problem she is focusing on – she mentally visualizes the situation/task/problem to be some BBs which are following 1O-function.

The state of each BB refreshes automatically/unintentionally at every moment. At every moment, the state of every BB is completely objectively-fated by the 1O-function and the state of all BBs at the preceding moment. In other words, the 1O-function and the state of all BBs at a moment should already state the semantic information of the state of all BBs at the next moment. So, the 1O-function and the initial state of all BBs should already state the semantic information of the state of all BBs at every moment. So, the 1O-function and the initial state of all BBs should already state the semantic information of the world lines of all BBs; the 1O-function and the initial state of all BBs should already state the semantic information of the 1O-parallel-computation of the 1O-parallel-computing-automaton. In other words, the world lines of all BBs are completely objectively-fated.

In natural language, the statements “the objective-state-evolution of every BB is completely objectively-fated by the 1O-function and the initial state of the 1O-parallel-computing-automaton” and “the objective-state-evolution of every BB of a 1O-parallel-computing-automaton is completely self-controlled/self-driven/self-caused/self-decided/self-chosen/self-programmed, and we found that the objective-state-evolution of every BB always follow a mathematical equation – the 1O-function” have exactly the same meaning; the terms “completely self-controlled/self-driven/self-caused/self-decided/self-chosen/self-programmed” and “automatic/unintentional (from the viewpoint of another TM)” have exactly the same meaning.

In the semantics of the present article, the term “autonomous” means “completely self-controlled/self-driven/self-caused/self-decided/self-chosen/self-programmed”.

So, the objective-state-evolution of every BB is completely autonomous. So, the world line of every BB is completely autonomous. In this sense, the objective-state-evolution/objective-fate of each BB is completely independent to each other – the objective-state-evolution/objective-fate of one BB does not actually/objectively control/drive/cause/decide/choose/branch the objective-state-evolution/objective-fate of any other BB. (It was recently found (by TMs within a U-system) that it is possible to formulate quantum mechanics without any reference to “a global time or *causal* structure” [95].) The objective-state-evolution/objective-fate of a dynamic-physical-system is exactly the sum of the objective-state-evolution/objective-fate of each BB of this dynamic-physical-system.

If it is difficult to imagine that the objective-state-evolution of every BB is completely objectively-fated, readers can mentally substitute the statement “the objective-state-evolution of every BB is completely objectively-fated” with the statement “the objective-state-evolution of every BB is completely autonomous”.

The 1O-function can be used to *forecast* a BB’s objective-state-evolution. As the transition function of the objective-state-evolution of a 1O-parallel-computing-automaton, the 1O-function itself is just a plain mathematical equation – obviously it does not provide any actual/objective/physical power/force to control/drive/cause/decide/choose a BB’s objective-state-evolution. A TM within the 1O-parallel-computing-automaton has no way to know where the actual/objective/physical power/force (to control/drive/cause/decide/choose the objective-state-evolution of a BB) comes from. So, the TM can safely imagine that the objective-state-evolution of every BB is completely autonomous. In other words, the TM can safely imagine that the objective-state-evolution of every BB does not depend on any external power/force. (When we imagine that Newton’s first law applies to a moving BB, we are used to imagine that this BB can change its position (as time goes on) without any external power/force.) Alternatively, the TM can fictionally imagine that the 1O-function magically provides actual/objective/physical power/force to control/drive/cause/decide/choose a BB’s objective-state-evolution – the TM knows that this imagination is fictional. (In the same sense, we can fictionally imagine that Newton’s first law magically provides actual/objective/physical power/force to change a moving BB’s position (as time goes on); a TM within a Nonstochastic Game of Life system can fictionally imagine that the rules of the system magically provide actual/objective/physical power/force to move a glider pattern across space (as time goes on), while we know that the host computer (of the Nonstochastic Game of Life system) provides actual/objective/physical power/force to move the glider pattern across space (as time goes on).)

During an out-of-body experience [65][64], a person feels like that she is located outside of her body. Then, the person can view herself from a vivid objective-perspective(like *actually* viewing herself from the viewpoint of another TM), and can discover the true relationship between herself and her environment (i.e., the universe): as a fuzzy set of BBs which are completely objectively controlled/driven by 1O-function, every physical-object (e.g., her brain) is an *ordinary/plain/nonsignificant* fuzzy subset of its environment (i.e., the universe), in the same sense that a jigsaw piece is an *ordinary/plain/nonsignificant* subset of a jigsaw puzzle.

The experimenter of a quantum physics experiment can be viewed as a physical-object in a larger quantum physics experiment (which includes the experimenter’s physical body).

In the universe, every physical process (e.g., a moving clock; a human brain is making a decision; a conversation between two humans; the objective-state-evolution of the whole universe) can be viewed as a quantum physics experiment. In a quantum physics experiment, the rotation speed of a clock hand, the decision made by a human brain, or the speech made by a human, is completely objectively-fated by 1O-function.

Completely objectively-fated by 1O-function, the objective-state-evolution of the universe can be viewed as an ongoing large-scale quantum physics experiment in space, which was started from the Big Bang singularity 13.8 billion years ago. Every physical process is part of this quantum physics experiment. A TM (e.g., a human brain) might counterfactually postulate that itself has the ability/freedom to actually/objectively change/control/drive the objective-state-evolution of this quantum physics experiment, but no physical-object is capable to actually/objectively change/control/drive the objective-state-evolution of this quantum physics experiment, because each physical-object itself (as a fuzzy set of BBs) is actually an *ordinary/plain/nonsignificant* fuzzy subset of this quantum physics experiment – no physical-object has the ability/freedom to actually/objectively change/control/drive the objective-state-evolution of this quantum physics experiment. So, the objective-state-evolution of this quantum physics experiment is objectively-fated – the single potential-outcome/situation-option of this quantum physics experiment is objectively-fated. Sometimes we know the single potential-outcome/situation-option at some degree beforehand. For example, we know that tomorrow is not the end of the world, although we are not sure about it.

The world line of every BB is decided by 1O-function. The world tube of every physical-object is decided by the world lines of all its BBs. A physical-object doesn’t have the ability/freedom to actually/objectively control/drive/change the world line of any BB. (Or in other words, the world line of every BB is completely autonomous.) Each physical-object’s physical activity is objectively controlled/driven by the (autonomous or objectively-fated) world lines of all its BBs, like a puppet. (But a TM might counterfactually postulate that it can objectively control/drive its own physical activity at some degree.) It’s possible that every physical-object (e.g., my brain) is a philosophical zombie.

In this sense, any two physical-objects actually/objectively have nothing to do with each other – their physical activities actually/objectively have nothing to do with each other. One physical-object does not actually/objectively control/drive another physical-object. One physical-object’s physical activity does not actually/objectively control/drive the physical activity of another physical-object.

In the same sense, a physical-object’s physical activity during a time period actually/objectively has nothing to do with this physical-object’s physical activity during another time period – a physical-object’s physical activities during two different time periods actually/objectively have nothing to do with each other.

During a rat’s vicarious trial and error [76], the future is mentally visualized/evaluated by mental time travel [76] [77]. The rat mentally visualizes/evaluates a number of potential/mental/intracorporeal path-options in its hippocampus, to choose one path from them – at most one of these path-options has the chance to actually happen objectively in the real world.

Subjectively (i.e., only based on the data/information the rat’s brain should be able to get/process), there are two or more path-options (for the rat’s brain to choose) in the rat’s intracorporeal subjective-reality/subjectivity. However, actually/objectively (i.e., only based on the data/information another TM (e.g., a human brain) should be able to get/process), there is only one path-option (for the rat’s brain to choose) in the rat’s extracorporeal objective-reality/objectivity. Apparently, the rat’s brain is unaware of the difference between its intracorporeal subjective-reality and its extracorporeal objective-reality (i.e., the rat’s brain does not imagine/postulate the existence of an extracorporeal objective-reality underneath/behind its intracorporeal subjective-reality; the rat’s brain treats its intracorporeal subjective-reality as its extracorporeal objective-reality), so we should not say that the rat’s brain is insane, if the rat’s brain believes that there are two or more path-options for the rat’s brain to choose in the extracorporeal objective-reality. If a human brain (who is fully aware of the difference between the intracorporeal subjective-reality and the extracorporeal objective-reality; who imagines/postulates the existence of an extracorporeal objective-reality underneath/behind its intracorporeal subjective-reality) also believes that there are two or more path-options for the rat’s brain to choose in the extracorporeal objective-reality, we should say that this human brain is insane.

The rat’s brain is objectively-fated to choose the chosen path, but the rat's brain has no way to know its own decision beforehand. So, the rat’s brain counterfactually feels like that itself has the ability/freedom to actually/objectively choose any of them – the rat’s brain counterfactually feels like that itself has freedom to move in the space (over time). The rat's brain is not aware of that, during its own choosing process, every BB involved, is objectively controlled/driven by 1O-function – actually the rat’s brain does not have the freedom to choose the chosen path (freely). In this sense, we can say that the choice is made by the 1O-function, not by the rat’s brain. Objectively (i.e., only based on the data/information another TM should be able to get/process), the rat’s brain is incapable/powerless to make the choice differently. Although the rat’s brain *subjectively (i.e., only based on the data/information the rat’s brain should be able to get/process)* feels like that it is capable to make the choice differently.

When exhaustively mentally considering/visualizing the objective-state-evolution of every BB in the spacetime, the rat's body can move in the space (over time) *without* freedom. (The overall visualization (of all BBs) looks like tremendous floating clouds, fireworks or spindrifts.) The rat's body does not have freedom to move in the spacetime – the rat’s body cannot revisit the same point (with the same space/time coordinates) again in the spacetime. The rat's body can revisit the same point (with the same space coordinates) in the space, but it cannot revisit the same point (with the same time coordinate) in the time – it cannot revisit a moment in the past (by time travel). In this sense, the rat’s body has less “freedom” along the time dimension, comparing to the “freedom” it has along the space dimensions.

A three-dimensional space is visualized (by the rat’s visual cortex) in the mind; time is not visualized in the mind. When the rat's brain does not exhaustively mentally consider/visualize the objective-state-evolution of every BB in the spacetime, it feels like that the rat's body has freedom in a three-dimensional space. When the rat's brain exhaustively mentally considers/visualizes the objective-state-evolution of every BB in the spacetime, it knows that the rat's body has no freedom in the four-dimensional spacetime, which means that the rat’s body has no freedom in the three-dimensional space (when exhaustively mentally considers/visualizes the objective-state-evolution of every BB in the spacetime). If this four-dimensional spacetime is visualized (by the rat’s visual cortex) to be a four-dimensional space (which uses the fourth space dimension to represent time) in the mind, the rat's brain will know that the rat's body has no freedom in this four-dimensional space.

A decision made by a human brain (for example, to say something to someone) by evaluating a number of potential/mental/intracorporeal situation-options (upon her/his (objectively-fated) *personal goal/aim/task (i.e., the (objectively-fated) problem she/he wants to solve)*), has the same nature as the decision made by the rat’s brain in the vicarious trial and error – each situation-option for the human brain is like a potential/mental/intracorporeal path-option for the rat’s brain.

(More generally, within a 1O-parallel-computing-automaton, a decision made by *a TM (e.g., a TM [44] within a Nonstochastic Game of Life system; an AlphaGo clone who is playing a board game Go in a U-system; a robot who is playing a (robot) football game in a U-system)* by evaluating a number of potential/mental/intracorporeal situation-options, has the same nature as the decision made by the rat’s brain in the vicarious trial and error. If a human brain (who is fully aware of the difference between the TM’s intracorporeal subjective-reality/subjectivity and the TM’s extracorporeal objective-reality/objectivity/1O-parallel-computing-automaton) believes that there are two or more situation-options for the TM to choose in the TM’s extracorporeal objective-reality/objectivity/1O-parallel-computing-automaton, we should say that this human brain is insane.)

Each situation-option is mentally visualized by the human brain. (A TM’s *path-option*s (regarding paths across the space) are also the TM’s *situation-option*s – each *path-option* is a *situation-option*.) (For the human brain, these situation-options are potential/mental/intracorporeal branches of the objective-state-evolution of the objective-reality. The human brain mentally visualizes these branches (of the objective-state-evolution of the objective-reality) automatically/unintentionally.) At most one of these situation-options/branches has the chance to actually happen objectively in the objective-reality. According to the mapping between the objective-reality and the human brain’s mind, this chosen situation-option/branch is objectively-fated (by the 1O-function) to be actually/objectively chosen by the objective-state-evolution of the objective-reality, but the human brain has no way to know which situation-option/branch will be chosen in advance. (The control logic of the program of a TM (e.g., a human brain) might counterfactually/incorrectly believe that every situation-option/branch has a nonzero Bayesian probability to happen objectively in the objective-reality.) When a human brain imagines/visualizes every human brain’s situation-options/branches to be path-options (regarding paths across the space), all these imagined/visualized path-options form an unexplored maze (i.e., an unexplored topological structure) in space. The future imagined/visualized by a human brain, is like an unexplored maze (in space) for the brain. The actual maze is built on demand in real time by the human brain, just like a mole digs an (underground) tunnel system on demand in real time.

For example, when I text someone, the potential/mental/intracorporeal sentences/messages we are going to text each other, form an unexplored maze (in space) for my brain, and form another (different) unexplored maze (in space) for the other person’s brain. (Another example, when I play chess with someone, the potential/mental/intracorporeal moves we are going to make, form an unexplored maze (in space) for my brain, and form another (different) unexplored maze (in space) for the other person’s brain.) Our brains build the actual maze on demand in real time, just like two moles dig a tunnel system together – shift work. My brain evaluates my imagined/visualized maze by mental time travel – my brain’s actual path through my maze is objectively-fated by 1O-function.

BTW, instead of (automatically/unintentionally) mentally visualizing two or more *potential/mental/intracorporeal* branches of the objective-state-evolution of the objective-reality, my brain can (automatically/unintentionally) mentally visualize only one *actual/objective/extracorporeal* branch of the objective-state-evolution of the objective-reality – this is a dissociative/meditation experience.

Apparently, what is objectively-fated to happen, should actually/objectively happen. So, what actually/objectively happens, is objectively-fated to happen. Before it actually/objectively happens, it can’t be mentally considered/visualized/evaluated by a TM through its mental time travel. It is paradoxical for the TM to mentally consider/visualize it beforehand through mental time travel, simply because that the TM has no way to get/process the required information beforehand. For example, the TM’s pending decision is a required information – it doesn’t mean that the TM’s pending decision is objectively free. The TM’s pending decision is (subjectively) free, only based on the data/information the TM itself should be able to get/process. The TM’s pending decision is not (objectively) free, only based on the data/information another TM should be able to get/process.

For example, when a mole is digging a tunnel system, it can’t decide where to dig, before it finished a mental time travel through its mentally imagined/visualized tunnel system. During the mental time travel, it can’t visualize the pending decision (on where to dig) – it hasn’t decided where to dig yet. The pending decision is (subjectively) free, but not (objectively) free.

**SM/reality**

Situation models (SMs) [8][9] are complex mental representations that can simulate the situation described in a text [10]. A SM is a mentally perceived *situation*. A SM is a situation modeled/represented/simulated by data/information – a SM does not include actual/objective matter. A SM might include *visual mental images [62][63]* – a situation or a SM is a mentally visualized information/knowledge. Being a simulation/representation, a SM is a computational model.

A SM of a TM is actually/objectively an intracorporeal spatiotemporal physical construction (inside this TM).

A TM’s SM is the TM’s intracorporeal/subjective simulation/representation/MM of the objective-reality, which is reconstructed/generated from the data/information being got/processed by the TM.

A SM might simulate anything. For example, a human brain can have a SM which includes *all* the natural numbers – let's call this SM the natural-numbers-SM. This human brain simulates/models/represents/imagines all the natural numbers in the natural-numbers-SM – this human brain doesn’t literally store all the natural numbers.

When a human is not reading a text, I believe that a “background” SM is simulated (by her objective/physical brain) to represent her current situation in the objective-reality, and this SM is somehow narrated by her cortical language network, like an internal monologue. Then, when she is reading a text, her objective brain has to simulate two SMs for her, one of them is the “background” SM. Her brain can somehow use text to describe either SM respectively.

My brain somehow uses the text of the present article to describe its “background” SM.

Each SM simulated by a human’s objective brain, is a reality for her; every reality for her, is a SM simulated by her objective brain. A reality is a mentally perceived *situation*.

As a TM, the author of the present article postulates that every TM has both an objective-reality (which exists objectively) and a SM (or two or more SMs) at the same time, and this TM itself lives/exists in its objective-reality objectively, not in its SM, although this TM’s program counterfactually feels like that it “lives/exists/*presents*” in its SM “objectively”, because it counterfactually defines/imagines/narrates its SM to be its objective-reality (this is a pareidolia); every TM’s SM is produced by its objective-reality objectively.

Human believes that one SM can be more real than another SM. A SM’s realness-degree determines the realness-degree of its elements/components; a SM’s elements/components have the same degree of realness.

Some terms are conventionally used in natural language, to compare the realness-degrees of two SMs.

For example, the following terms are conventionally used when referring to a SM with higher degree of realness: “physical”, “objective” (aka “third-person objective [11]”), “extracorporeal”, “outer”, “actual”, “real”, “true”, “real-world”, “valid”, “correct”, “factual”, “sane”, and “nonfictional”. Let us add the term “first-order (1O)” to the list for convenience.

For example, the following terms are conventionally used when referring to a SM with lower degree of realness: “mental”, “subjective” (aka “first-person subjective [11]”), “intracorporeal”, “inner”, “imagined”, “supposed”, “postulated”, “visualized”, “narrated”, “invalid”, “incorrect”, “counterfactual”, “insane”, “fictional”, “illusive”, “delusive”, “fake” and “pareidolic”. Let us add a term “second-order (2O)” to the list for convenience.

Comparing to a SM with higher degree of realness, a SM with lower degree of realness is imagined/counterfactual/pareidolic/illusive/delusive/fake.

Every reality for a human, is a situation simulated by her objective brain as a SM. So, none of these realities actually exists in the way it is simulated as (i.e., none of these realities actually exists in the way it is simulated to be). In this sense, none of these realities is 1O/actual; all these realities are 2O/imagined. “To be is to be perceived.”

Being simulated by my objective brain as a SM, the (shared) objective-reality is the thing in itself [18] which does not depend on the existence of my objective brain. My perception/imagination/postulation/knowledge/description/narration/visualization of the objective-reality is only based on the data/information I should be able to get/process, if I am not myself, but another TM.

Let us call a TM’s SM of the objective-reality the TM’s objective-reality-SM.

When I watch a virtual reality through glasses, I see a virtual world behind the glasses, but actually there is no such a virtual world behind the glasses – the virtual world is actually a SM of my brain.

Similarly, when I watch the “physical reality” around my “physical body”, the “physical reality” I see is actually a virtual situation/reality/world – this virtual situation/reality/world is actually a SM of my brain. (This virtual situation/reality/world is actually my brain’s quale of the objective-reality. My brain does not have access to what the actual objective-reality looks like – before BBs (e.g., photons) from the objective-reality being processed by my eye/brain. For example, my brain does not have access to what an actual/objective human eye/body looks like. The actual/objective human eye/body is in the objective-reality.) Let us call this SM the 2O-geometric-SM.

I feel like that the 2O-geometric-SM is around my “physical body” – I feel like that the 2O-geometric-SM includes my “physical body”. Apparently, being an element/component of the 2O-geometric-SM, the “physical body” I feel, is actually a virtual body, like an avatar. This virtual body is actually my brain’s quale of my actual/objective body.

A TM’s 2O-geometric-SM is the TM’s *cognitive map of “space” [59]* (if we postulate that the conventionally-called “space” exists objectively). The 2O-geometric-SM not only includes the space inside the TM’s visual field, but also includes the space outside of the TM’s visual field.

A TM’s 2O-geometric-SM is actually the TM’s mentally visualized representation of all its current potential/mental/intracorporeal path-options in the context of a conventionally-called “space” – the 2O-geometric-SM or the conventionally-called “space” represents/visualizes all the potential/mental/intracorporeal path-options.

The human brain's 2O-geometric-SM is implemented/modeled by phase precession in the human hippocampus and entorhinal cortex [85] – the phase precession is the objective-form of the 2O-geometric-SM.

A TM’s 2O-geometric-SM is actually the TM’s intracorporeal/subjective representation of the objective-reality. (When a TM is lucid-dreaming, the TM’s 2O-geometric-SM is still the TM’s intracorporeal/subjective representation of the objective-reality.) But the 2O-geometric-SM is narrated as the objective-reality by the TM’s internal monologue in natural language – the 2O-geometric-SM is treated as the objective-reality by the control logic of the TM’s program. (When a TM is lucid-dreaming, the TM knows that, logically speaking, the TM’s 2O-geometric-SM is not the objective-reality.)

The 2O-geometric-SM is not the objective-reality. Under this context, a flower I see (which is located in front of my eyes, inside my 2O-geometric-SM), is not *the actual/objective flower (which is in the objective-reality)*, but my brain’s subjective/intracorporeal perception of the actual/objective flower.

*If* the 2O-geometric-SM is the objective-reality, under this context, when I see a flower in front of my eyes, my brain’s subjective/intracorporeal perception of the flower, should be located *somewhere inside my brain (i.e., not in front of my eyes) –* the flower (which is actually my brain’s subjective/intracorporeal perception) should be located *somewhere inside my brain (i.e., not in front of my eyes)*.

Only if a projector (which is connected to my brain) is mounted on my head, the projector is able to project my brain’s subjective/intracorporeal perception (of the flower) onto a screen in front of my eyes, for my mental image of the flower to be displayed on this screen, for my eyes to see. But where is the actual/objective flower (which is not my brain’s subjective/intracorporeal perception) then?

There is not *a small person sitting inside my brain to watch my brain's subjective/intracorporeal perception of the flower (aka “Cartesian theater” [97])*. Even if there is a small person sitting inside my brain, this small person is not me.

I am not sitting inside a big brain, to watch the big brain's subjective/intracorporeal perception of the flower. Even if I am sitting inside a big brain, this big brain is not my brain.

**1O-parallel-computing-automaton**

Objectively-fated by the 1O-function, the 1O-parallel-computation is aimless, not goal-directed/task-oriented/solution-oriented.

If the position of every BB (of the universe) does not change over time, and/or if the positions of all BBs (of the universe) are in the same two-dimensional Euclidean space (i.e., the space of the universe only has two dimensions), it will be easier for a human brain to mentally consider/visualize the universe as a state machine.

Within a 1O-parallel-computing-automaton, when a TM is mentally considering/visualizing the 1O-function/1O-parallel-computation, the TM has to exhaustively mentally consider/visualize the objective-state-evolution of every BB in the spacetime

When we mentally model/imagine/visualize something, we have to use an imagined viewpoint/observer located somewhere outside of its model/representation/visualization. (Our (mental) model/imagination/visualization is actually a SM simulated by our objective brains.)

For example, when my brain mentally models/imagines/visualizes something which is outside of my brain, my brain can use an imagined viewpoint/observer located somewhere inside my brain. When my brain mentally models/imagines/visualizes itself, my brain has to use an imagined viewpoint/observer located somewhere outside of my brain.

When I am using a viewpoint located outside of a system/SM, it implicitly means that I have some knowledge about this system/SM.

Regarding a 1O-parallel-computing-automaton, let us call an external observer who is located somewhere outside of the 1O-parallel-computing-automaton its 1O-external-observer.

The objective-state-evolution of a 1O-parallel-computing-automaton happens once, and only happens once.

We can imagine that a 1O-external-observer can press a “pause” button to pause/freeze the objective-state-evolution of a 1O-parallel-computing-automaton at any specific moment – the state (e.g., position) of every BB freezes at this moment. We can imagine that the 1O-external-observer can then press a “play” button to resume/continue the objective-state-evolution of this 1O-parallel-computing-automaton. The pause/freeze should not change the objective-state-evolution of the 1O-parallel-computing-automaton. So, any TM within the 1O-parallel-computing-automaton has no way to detect the pause/freeze. It’s like pause a film and then resume it – it should not change the plot of the film.

We can imagine that a 1O-external-observer will be able to observe a 1O-parallel-computing-automaton's future state in the future. Strictly speaking, such an imagination should be a prerequisite for a mental time travel into the future. Please note that, such an imagination assumes that the 1O-parallel-computing-automaton's future state only has one potential-outcome/situation-option (which is completely fated by the 1O-function and the initial state of the 1O-parallel-computing-automaton).

We can imagine that a 1O-external-observer can restore the state of a 1O-parallel-computing-automaton to an earlier state in the history, and then restart the objective-state-evolution of the 1O-parallel-computing-automaton from that state. (Strictly speaking, such an imagination should be a prerequisite for a mental time travel into the past.) However, a TM within this 1O-parallel-computing-automaton has no way to make a different *deliberate* decision/choice in the second run of the objective-state-evolution, even though the 1O-function is stochastic. If the 1O-function is stochastic, the TM might be able to make a different *nondeliberate* decision/choice in the second run of the objective-state-evolution.

At any specific moment, the state of all BBs is a natural continuation of the state of all BBs at the preceding moment (right before the specific moment). The state change of all BBs between these two moments, is completely objectively-fated by the 1O-function: it is not objectively free/flexible; it is not objectively controlled/driven/caused/decided/chosen/branched by any set of BBs.

In a 1O-parallel-computing-automaton, every coincidence is objectively-fated to happen by the 1O-function. For example, if I throw a dice twice but get the same number, it is objectively-fated to happen by the 1O-function of the universe.

Let us suppose that a 1O-external-observer has unlimited computational power and knows the real-time state of every BB inside a 1O-parallel-computing-automaton, without measuring it. Let us call such a 1O-external-observer the 1O-omniscient-external-observer. So, no agent can have more knowledge than the 1O-omniscient-external-observer regarding anything inside this 1O-parallel-computing-automaton. Apparently, a 1O-omniscient-external-observer can reliably forecast a TM’s pending decision/choice.

When we trying to forecast/retrodict something within a 1O-parallel-computing-automaton, it means that we believe that we have recognized some *causalities (aka patterns)* of the objective-state-evolution of the 1O-parallel-computing-automaton.

For example, when a human observes the objective-state-evolution of a Nonstochastic Game of Life system on a computer screen, in case that she does not know the 1O-function of this 1O-parallel-computing-automaton, she can recognize some causalities of the objective-state-evolution. For example, "a glider pattern travels across space, until it is blocked by another pattern" or “a Gosper glider gun generates/launches gliders” – either *causality (aka pattern)* is actually a physical-law (of this 1O-parallel-computing-automaton) which can be proved by deductive inference based on the 1O-function only. *If the human only recognized these two causalities (i.e., if she has not recognized the 1O-function)*, she is short of knowledge (regarding the system). The short of knowledge means uncertainty (about the system). Based on the uncertainty (about the system), she might have *fluke mind* regarding the objective-state-evolution of the system. For example, she might think of that, when a TM in the system is generating a new pattern (in the system), the TM might be able to generate this new pattern at a location which can avoid the shooting of any Gosper glider gun (actually, if the TM itself also recognized these two causalities, the TM itself might try its best to generate the new pattern at a location which can avoid the shooting) – *she counterfactually/incorrectly feels like that the TM might be able to actually/objectively change the objective-state-evolution of the system (i.e., she counterfactually/incorrectly feels like that the TM has some degree of freedom)*. Because she does not know that the TM’s own objective-state-evolution is objectively-fated by the 1O-function – she is short of this knowledge. She will be *desperated*, after she knows the 1O-function – she knows that the TM has no freedom at all. If the TM itself knows the 1O-function, the TM itself will be *desperated* too – the TM knows that itself has no freedom at all. In this case, the TM knows that, both the Gosper glider gun and itself are actually parts of the same (distributed) pattern. Or in other words, the Gosper glider gun is actually part of the TM, or the TM is actually part of the Gosper glider gun, although the Gosper glider gun might shoot the TM; the Gosper glider gun is not a pattern separated from the TM, although the Gosper glider gun is seemingly/superficially “separated” from the TM by *space* – the Gosper glider gun is not actually/objectively separated from the TM in the *spacetime*.

If the actual 1O-function of a 1O-parallel-computing-automaton is nonstochastic, a BB’s objective-state-evolution is predetermined by the 1O-function.

If the actual 1O-function of a 1O-parallel-computing-automaton is stochastic, a BB’s objective-state-evolution is not literally predetermined by the 1O-function – a 1O-omniscient-external-observer can't accurately *forecast* a BB's state using the stochastic 1O-function. However, in the present article, I do not want to postulate that the BB has the ability/freedom to subjectively choose its own state from the set of possible states which are literally allowed by the stochastic 1O-function – I do not want to postulate that a BB has any sort of subjective freedom. Instead, I’d rather postulate that the BB’s only state is objectively chosen by the stochastic 1O-function (in case that the 1O-parallel-computing-automaton is a computer simulation, the BB’s only state is actually chosen by the computer program) from the set of possible states which are literally allowed by the stochastic 1O-function – it explains why any other state (which is also literally allowed by the stochastic 1O-function) is actually impossible in the real world. Then, I can postulate that a BB's state is *actually* predetermined by the stochastic 1O-function*,* although a BB's state is not literally predetermined by the stochastic 1O-function.

Let us say that the *state* of a BB carries 1O-information or 1O-data, and say that the state *change* of a BB carries 2O-information or 2O-data.

In a 1O-parallel-computing-automaton, the 1O-parallel-computation calculates 1O-information, which gives rise to 2O-information.

When we humans observe a 2O-information being propagated/processed, let us say that the 2O-information is being 2O-propagated/2O-processed. Being part of the 1O-parallel-computation, the 2O-propagation or 2O-processing is not something different from the 1O-parallel-computation.

Humans postulate that BBs are the only medium for the 2O-propagation/2O-processing of 2O-information – information which cannot be represented by the state change of BBs, is not a 2O-information, and has no way to be 2O-propagated/2O-processed. (“To be is to be perceived.”)

For example, when humans observe a TM [44] processing data/information in a Nonstochastic Game of Life system (on a computer screen), the data/information is 2O-information, which is being 2O-processed. A BB switches its state between live and dead over time. Such a state change carries 2O-information.

Another example, visual information from a retina to the brain, is carried by electric currents through optic nerves. An electric current is a stream of charged particles. In the state of a BB in a charged particle, the position information changes over time. The change of a BB’s position carries 2O-information. This 2O-information will be 2O-processed by the BBs in the brain. The objective-state-evolution of all BBs inside the brain, is objectively-fated by the 1O-function, and is *seemingly (i.e., subjectively)* controlled/driven by the 2O-information. Output information from a vertebrate brain to the spinal cord, is also carried by electric currents.

The phase precession in the human hippocampus and entorhinal cortex objectively represents/forecasts the human body's situation within an environment [85].

A TM should be using an intracorporeal MM to represent/forecast its situation within an environment. (For example, the phase precession in the human hippocampus and entorhinal cortex [85] is the objective-form of this intracorporeal MM in the objective-reality. Being a simulation/representation, a SM is an intracorporeal MM.) The present article postulates that the TM is subjectively experiencing the subjective-form (aka quale) of this intracorporeal MM. But apparently, there is no way to actually/objectively prove/verify this postulation.

In the semantics of the present article, a TM’s (subjective) MM is a structuralized 2O-information (which is being 2O-processed) for representing/forecasting. In the objective-reality, the objective-form of the said (subjective) MM is *the 2O-information (e.g., the phase precession in the human hippocampus and entorhinal cortex [85]).* As the 2O-information, the objective-form of the said MM can be objectively detected by a physical device (other than the said TM itself). In case that the said TM is a human brain, *another TM (e.g., the experimenter in [85])* can use its own *theory of mind module [53][54][55][56]* to mentally map the objectively detected 2O-information with the subjective narration of the former TM (about the said MM), or in other words, to mentally visualize them “side by side” to compare them. (However, when the latter TM is mentally visualizing the subjective narration of the former TM (about the said MM), what the latter TM mentally visualizing/perceiving, is actually its own *subjective-form (aka quale)* of the said MM, not the former TM’s *subjective-form* of the said MM – the latter TM mentally interprets/decodes/visualizes the former TM’s narration (in natural language) into the latter TM’s own subjective-form of the said MM. Actually, the latter TM is always subjectively experiencing its own quale – the latter TM has no way to subjectively experience the former TM’s quale.) Then, the latter TM feels *as if* that the former TM can subjectively experience the said MM, although the latter TM cannot logically prove that. (However, under this scenario, it is the latter TM itself who is actually subjectively experiencing the said MM.) The former TM can talk about its subjective experience (about the said MM) in natural language, but this (objective) fact is not enough to prove that the former TM can actually subjectively experience the said MM. For example, I am typing/writing the present article, but this (objective) fact is not enough to prove that my brain can actually subjectively experience the SM which is being described by the present article.

A human brain can describe the subjective-form of its MM in natural language, but there is no way to objectively detect the subjective-form of this MM (by a physical device other than this human brain itself). So, actually there is no way to prove the objective existence of the subjective-form of this MM – it is possible that the subjective-form of this MM does not actually exist. In other words, it is possible that the human brain is a philosophical zombie.

Being a TM’s subjective experience, the nature of the “subjective-form” (aka “quale”) of a MM cannot be defined by natural language *directly –* it’s logically possible that no *TM (e.g., the human brain)* actually has access to its “quale”.

I claim that I have access to *my “quale” (e.g., my “quale” of pain)*. If you claim that you have access to your “quale” too, how do you know that my “quale” has the same nature as your “quale”? – you have no way to actually know that. You only have access to your own “quale”; you have no access to my “quale”. (For example, when we talking about the term “pain”, you are actually mentally/subjectively experiencing your own “quale” of your own pain – you have no way to actually mentally/subjectively experience my “quale” of my pain.) It’s also possible that both of us don’t actually have access to the “quale” – either of us can talk about “quale” without actually having access to it.

If both you and me have access to the “quale” at the same time, and if your "quale” and my “quale” are the same in nature, you can get what I mean by the term “quale”, based on your subjective experience of your own “quale” – you get what I mean correctly in this case.

If both you and me have access to the “quale” at the same time, and if your "quale” and my “quale” are different in nature, you can get what I mean by the term “quale”, based on your subjective experience of your own “quale”. But in this case, you get what I mean incorrectly.

If I do not have access to my “quale” (i.e., I am a philosophical zombie), you can still get what I mean by the term “quale”, based on your subjective experience of your own “quale”. But in this case, you get what I mean incorrectly – I actually mean nothing by the term “quale”.

If both of us do not have access to the “quale” (i.e., we are both philosophical zombies), another person (who has “quale”) still feels like that you get what I mean by the term “quale”, based on her/his subjective experience of her/his own “quale”. In this case, you get what I mean correctly – I actually mean nothing by the term “quale”.

Your brain knows an apple’s *actual appearance (i.e., quale)* in your brain’s subjective-reality. But your brain has no way to know this apple’s *actual appearance (i.e., quale)* in my brain’s subjective-reality – it is logically possible that *my brain does not have access to its “quale” (i.e., my brain is a philosophical zombie)*. In case that my brain is a philosophical zombie, my brain can still describe this apple’s appearance in natural language. Because neural networks can represent words and phrases compositionally [98][99].

If we imagine a BB as a billiard ball which has a state, a 1O-external-observer knows this state, but an internal TM has no way to detect this state directly – this explains Heisenberg’s uncertainty principle. (The 1O-external-observer can model/postulate/imagine the BB as a particle.) The internal TM can only detect the BB’s state *change* through 2O-processing. The internal TM can either model/postulate/imagine the BB’s state *change* as the state *change* of a wave, or model/postulate/imagine the BB’s state *change* as the state *change* of a particle – this explains the wave-particle duality.

A BB whose state *change* does not propagate to any other BB, exists from the viewpoint of an 1O-external-observer, but does not exist from the viewpoint of any internal TM.

In case that a 2O-processing produces a (subjective) MM through 2O-processing 2O-information, this MM depends on the state *change* of BBs, not depends on the *state* of BBs. So, a 2O-processing can only know the state *change* of BBs, not the *state* of BBs.

In theory, Heisenberg’s uncertainty principal applies to every 1O-parallel-computing-automaton. For example, no human has figured out an algorithm for a TM in a Nonstochastic Game of Life system to measure the state of a BB without uncertainty yet.

Inside a 1O-parallel-computation, we humans can subjectively recognize/identify a fuzzy set of BBs which is 2O-processing some 2O-information, if we can subjectively recognize/identify/decode the 2O-information (from the state change of these BBs), and if we can subjectively model/recognize/identify the function of the 2O-processing (by analyzing the state change of these BBs). Based on our (subjective) MM of the function of the 2O-processing, we subjectively define these BBs to be *a subjective-object (i.e., a dynamic-physical-system)* of the 1O-parallel-computing-automaton. This subjective-object is subjectively represented by our MM of the function of the 2O-processing – this subjective-object is subjectively modeled to be a (non-linear) processor of 2O-information. In case that our MM (of the 2O-information processor) is a fitted/accurate model of the 1O-function, we cannot use this MM to subjectively model a counterfactual situation (which is different from the actual situation within the 1O-parallel-computation). In case that our MM is not a fitted/accurate model of the 1O-function, this MM loses some details of the 1O-parallel-computation, that’s why we can use this MM to subjectively model a counterfactual situation (which can’t actually happen in the 1O-parallel-computing-automaton). We might counterfactually/wishfully believe/postulate that this counterfactual situation can actually happen in this 1O-parallel-computing-automaton, so that we can blame this subjective-object for preventing this counterfactual situation from actually happening (i.e., in case this subjective-object is a Gosper glider gun, we can blame it for shooting another pattern). (But apparently, this counterfactual situation can only happen in a different 1O-parallel-computing-automaton which has a different 1O-function or initial state.) Upon receiving the blame (as a 2O-information), the subjective-object might be able to subjectively forecast what the blamers will do, and make decisions/actions based on its forecast. Its forecast/decision/action is actually carried out by the 1O-function.

From the objective-perspective, every subjective-object is a set of BBs.

Physical-objects (in a U-system), two-dimensional patterns (in a Nonstochastic/Stochastic Game of Life system), one-dimensional patterns (in a Rule 110 cellular automaton), two-dimensional structures (in a two-dimensional Primordial Particle System [39]) and three-dimensional structures (in a three-dimensional Primordial Particle System [40]) are all subjective-objects. A TM is a subjective-object.

The term “consciousness” has two meanings. Firstly, it refers to a TM’s subjective cognition or (private) subjective-reality. The subjective-form of a MM of the TM is part of the TM’s subjective-reality – the TM’s subjective-reality is the sum of the MMs of the TM. Secondly, when a TM suspects the presence of the subjective-reality in a subjective-object, we can say that this TM has subjective clues for the *objective-consciousness* of the subjective-object; the subjective-object can be this TM itself.

Each TM’s subjective-reality is completely modeled/represented/simulated by the TM’s intracorporeal BBs.

A TM’s subjective-reality is actually/objectively the TM’s intracorporeal situation.

In case that the actual 1O-function of a 1O-parallel-computing-automaton is stochastic, even if I postulate that each BB has the ability/freedom to subjectively choose its own state from a set of possible states which are literally allowed by the stochastic 1O-function, it doesn’t mean that a subjective-object (which includes two BBs) has an overall ability/freedom to choose the states of the two BBs together – I don’t want to further postulate that one BB’s subjective choice can be influenced by another BB. So, when we are considering a subjective-object which includes two BBs, each BB can only subjectively choose its own state by itself independently. In this scenario, the two BBs have two separate subjectivities/abilities/freedoms, the two subjectivities/abilities/freedoms can’t join into one single subjectivity/ability/freedom (of the subjective-object). The state of the subjective-object is not chosen by the two BBs together, but chosen by each BB independently. The statement “both BBs have freedoms” doesn’t mean that the said subjective-object has freedom – the said subjective-object doesn’t have the freedom to subjectively leverage the freedoms of the two BBs. (For example, a TM (e.g., a brain) doesn’t have the freedom to subjectively leverage the freedom of the BBs within the TM.) We feel like that the said subjective-object has freedom, but the freedom is only the sum of the freedoms of the two BBs. The two BBs actually act independently – they don’t cooperate with each other. But we feel like that, the two BBs (of a subjective-object) cooperate with each other to act together (as a subjective-object).

**2O-SM/subjective-reality vs. 1O-SM**

As a TM, a human brain can somehow use natural language to describe itself as a physical symbol system [60] in text – each symbol (of the physical symbol system) maps to a term/phrase in natural language. The text 2O-propagates to another TM, to be 2O-processed by the latter TM. The latter TM as a physical symbol system is meaningfully changed by the 2O-processing.

The relationships among the symbols are determined by the objective construction of the TM – every symbol is anchored by the entire relationship network of all symbols. In a physical symbol system, no symbol is independent/standalone. So, when a TM uses human language, the meaning of every term/phrase depends/relies on the meanings of all other terms/phrases. When two TMs are communicating using human language, for each term/phrase, either TM has *an intracorporeal symbol (e.g., a neural underpinning)* to represent it. (For each TM, the subjective relationship between any two subjective symbols (in the TM’s subjective-reality), is completely modeled/represented/simulated/implemented by the physical interactions between the two intracorporeal symbols (in the objective-reality).) The two TMs' intracorporeal symbol networks have different (spatiotemporal) topological structures in *spacetime*, so actually we should never say that the two TMs have the same understanding for that term/phrase. Actually, each TM is sealed by its own unique physical symbol system – each TM can only experience the context of its own unique physical symbol system. Each TM can only experience the meaning of the human language, based on its own unique understanding/viewpoint – each TM is limited/restrained by its own unique understanding of the human language. For example, each reader actually has a different/unique understanding about the meaning of every term/phrase (e.g., "meaning", “situation”, “model”, “reality”, “subjective”, “objective”, “fated” or “the ghost in the machine [23]”) used in the present article, even if the readers are using the same English dictionary. No matter what a text means to a TM subjectively, when the 1O-parallel-computing-automaton refreshes automatically/unintentionally at every moment, the TM is objectively-fated (by the 1O-function and the state of the 1O-parallel-computing-automaton at the preceding moment, or by the 1O-function and the initial state of the 1O-parallel-computing-automaton) to output the text which the TM is objectively-fated to output – the objective-fate is objectively-fated by the 1O-function. (For example, in the objective-reality, my brain is objectively-fated to type/write the present article as what it is objectively-fated to be, no matter what the text of the present article means to my brain subjectively. So, the present article is actually typed/written by the 1O-parallel-computing-automaton automatically/unintentionally, although it superficially looks like that the present article is typed/written by my brain intentionally.)

Every TM’s program as an entire computational/mathematical model of the objective-reality is not fitted/accurate. Every TM’s program is a physical symbol system which roughly models/represents/simulates the objective-reality. The physical symbol system is a symbolization/oversimplification/stereotype of the objective-reality. The symbols are being used by a SM of the TM. Let us call this SM the TM’s 2O-SM. The TM’s 2O-SM as an oversimplified rough computational/mathematical model of the objective-reality is not fitted/accurate. The TM’s 2O-SM is like a pseudocode which represents/models the objective-reality. A TM's 2O-SM is the TM's Bayesian model of the objective-reality. A TM’s 2O-SM is the TM’s mental representation of all its current potential/mental/intracorporeal *situation-option*s – the 2O-SM represents all the potential/mental/intracorporeal *situation-option*s. A TM’s 2O-SM is a representation of the 2O-information being 2O-processed by the TM.

“We found that after training, recurrent units can develop into clusters that are functionally specialized for different cognitive processes, and we introduce a simple yet effective measure to quantify relationships between single-unit neural representations of tasks. Learning often gives rise to compositionality of task representations, a critical feature for cognitive flexibility, whereby one task can be performed by recombining instructions for other tasks. [98]” This explains how a TM’s 2O-SM is objectively formed/emerged in the objective-reality. In the objective-reality, a causality is objectively implemented/enabled by one or more clusters.

A subjective-object is a symbol being used by a TM’s 2O-SM – a subjective-object in the objective-reality, is represented by a symbol in the TM’s 2O-SM. Due to the 1O-parallel-computation, a subjective-object keeps changing/evolving, which means that a subjective-object becomes a new subjective-object at every moment, but the TM's 2O-SM keeps using the same subjective/intracorporeal MM to model it, and keeps using the same symbol (e.g., “the ship of Theseus”) to represent it. This MM/symbol is a stereotype.

The *objective-reality* is a symbol being used by a TM’s 2O-SM.

A TM’s 2O-SM not only can represent/model/simulate the actual objective-reality where the TM objectively lives in, but also can represent/model/simulate/imagine some other objective-realities which are different from the actual objective-reality where the TM objectively lives in.

When I am reading/watching a finished script/story/book/simulation, I forecast an upcoming plot, and I feel *as if* that the forecasted situation *will* actually happen. But apparently, if actually the forecasted situation won’t happen (in the script/story/book/simulation), the forecasted situation is predetermined (by the script/story/book/simulation) to not happen – but I have no way to know that in advance (unless I am actually reading/watching the same script/story/book/simulation for the second time).

A forecast made by a TM's 2O-SM (automatically/unintentionally) is probability-based/inaccurate/unreliable – a forecasted situation has the highest Bayesian probability to happen, according to the current knowledge of the TM’s 2O-SM. This forecasted situation is the TM’s mental representation of the future, based on the TM’s current knowledge. Let us call this forecasted situation the TM’s subjective-fate. (The TM’s subjective-fate is a trend (like an inertia) which is subjectively identified by the 2O-SM. The objective-state-evolution of the objective-reality does not need to follow this subjectively forecasted trend.) Based on the TM’s Bayesian model, the TM’s 2O-SM has an estimation of the Bayesian probability for the forecasted situation (to happen). Based on its current knowledge/estimation, the TM’s 2O-SM feels *as if* that the forecasted situation *will* actually happen. (But apparently, it’s always possible that the forecasted situation won’t actually happen in the objective-reality. It’s possible that the forecasted situation is objectively-fated to *not* happen in the objective-reality. But the TM has no way to know *that (i.e., the objective-fate)* in advance, so the TM’s 2O-SM still only has an estimation of the Bayesian probability for the forecasted situation – the forecasted situation is not the objective-fate. So, the TM’s 2O-SM still automatically/unintentionally uses the estimation of the Bayesian probability for the forecasted situation, even if the TM literally knows that everything (which actually happens in the objective-reality) follows the objective-fate – this knowledge (i.e., literally knowing that everything follows the objective-fate) might objectively-fatedly subtly disturb/change the estimated Bayesian probability for the forecasted situation. If we imagine that the TM somehow knows the objective-fate in advance, such a knowledge will void the estimation of the Bayesian probability for the forecasted situation – but the TM has no way to actually have such a knowledge.) Based on such a forecast, a decision is automatically/unintentionally made by the TM's 2O-SM according to the TM’s preference. This decision is objectively-fated to be made by the TM in the objective-reality – but in the objective-reality the TM has no way to know its own decision in advance.

Let us call a TM’s SM of the 1O-parallel-computation the TM’s 1O-SM. A TM’s mental visualization of its 1O-SM is the nirvana-experience.

Let us call a TM’s SM of the time-irrelevant-state-machine the TM’s 0.9O-SM. Let us call a TM’s SM of the static-quantum-field the TM’s 0.8O-SM.

A TM's 2O-SM reflects intracorporeal situation/subjective-reality (inside the TM), while a TM's 1O-SM reflects extracorporeal situation/objective-reality (outside the TM).

In a TM’s 1O-SM, the objective-state-evolution of the objective-reality is simulated to have *one* potential-outcome/situation-option. In a TM’s 2O-SM, the objective-state-evolution of the objective-reality is (incorrectly/counterfactually) simulated to have two or more potential-outcomes/situation-options.

A TM’s 1O-SM is a SM which includes/models/simulates the TM itself objectively. A TM’s 2O-SM is a SM which includes/models/simulates the TM itself subjectively. The realness-degree of the 2O-SM is lower than the 1O-SM. If the 1O-SM is a factual/valid/correct/real/true/accurate/straight MM of the objective-reality, the 2O-SM is a counterfactual/invalid/incorrect/fake/distorted/pareidolic/illusive/delusive MM of the objective-reality.

The 1O-SM is a symbol being used by a TM’s 2O-SM.

When a TM is being subjective, it uses its 2O-SM. When a TM is being objective, it uses its 1O-SM.

According to a TM's 2O-SM, subjective-objects are located inside the TM’s seemingly “extracorporeal/objective” 2O-geometric-SM/2O-SM. The TM has a quale of such a subjective-object. The TM has a quale of the 2O-geometric-SM/2O-SM. The TM has direct access to the appearance of such a subjective-object (in the context of the TM’s 2O-geometric-SM/2O-SM).

However, actual subjective-objects are located inside the TM's extracorporeal/objective objective-reality, not located inside the TM's intracorporeal/subjective 2O-geometric-SM/2O-SM. The TM does not have a quale of such an actual subjective-object. The TM does not have a quale of the objective-reality. The TM does not have direct access to the appearance of such an actual subjective-object (in the context of the objective-reality). (For example, my brain does not know an actual/objective apple’s appearance in the context of the objective-reality.) Such an actual subjective-object (in the context of the objective-reality) is only *an abstract concept (i.e., a thing in itself)* to the TM.

A TM’s 1O-SM works like a bridge/relay between the “thing in itself” (i.e., the objective-reality) and the TM’s 2O-geometric-SM/2O-SM. The TM’s 1O-SM represents/models/simulates the “thing in itself” *closer* than the TM’s 2O-geometric-SM/2O-SM. The TM’s 1O-SM is not the “thing in itself”. The TM’s 1O-SM is a mental visualization of the “thing in itself”. This mental visualization is generated/constructed/invented/designed/imagined (by the TM) based on the components/elements of the TM’s 2O-geometric-SM/2O-SM – this mental visualization is not something brand new. This mental visualization is old wine in new bottles.

A TM can explain/forecast the objective-state-evolution of the objective-reality, based on the context of its 2O-SM, or based on the context of its 1O-SM. Based on the context of its 1O-SM, the objective-state-evolution/objective-fate of the objective-reality, is objectively-fated by the 1O-function.

When the control logic of a TM’s program is using the 2O-SM, the situation described/defined by the TM’s 2O-geometric-SM is treated (by the control logic of the TM’s program) as extracorporeal situation/objective-reality (outside the TM). When the control logic of a TM’s program is using the 1O-SM, the situation described/defined by the TM’s 2O-geometric-SM is treated (by the control logic of the TM’s program) as intracorporeal situation/subjective-reality (inside the TM).

When a TM compares its 2O-SM with its 1O-SM, the TM will know that its 2O-SM is invalid/incorrect/counterfactual/fictional/problematic, while its 1O-SM is valid/correct/factual/nonfictional/problemless. If a TM wants to keep its 1O-SM intact, the TM should clearly divide its 1O-SM from its 2O-SM.

In a TM’s 1O-SM, the 1O-function is postulated to be the only order which controls/drives the objective-state-evolution of the 1O-parallel-computing-automaton/objective-reality. The TM’s 1O-SM is the TM's fitted/accurate computational/mathematical model of the objective-reality. So, a forecast made by a TM's 1O-SM is accurate/reliable, not probability-based. The TM’s 1O-SM only represents/models/simulates the actual objective-reality where the TM objectively lives in. The objective-state-evolution of the 1O-SM matches the objective-state-evolution of the objective-reality; the objective-state-evolution of the 1O-SM syncs with the objective-state-evolution of the objective-reality. Physical-laws are based on the context of the 1O-SM.

When two people are talking with each other in natural language, the meaning of a person’s words is based on the context of the person’s 2O-SM. The context of the person’s 2O-SMmight distract the person’s brain from the context of her/his 1O-SM, or in other words, might distract the person’s brain from her/his nirvana-experience.

When a 1O-parallel-computation is being observed by a 1O-external-observer (for example, when the 1O-parallel-computation of a Nonstochastic/Stochastic Game of Life system is being observed by a human), it’s possible that the 1O-external-observer can have a 1O-SM which represents/models/simulates the 1O-parallel-computation. Besides, the 1O-external-observer can have another 1O-SM which represents/models/simulates the objective-reality where the 1O-external-observer itself objectively lives in. So, the 1O-external-observer can have more than one 1O-SMs.

The 1O-SM is used by a TM’s subjective cognition to represent the objective-reality. The subjective cognition of *a TM (e.g., a neural network)* is created/fated by the objective-reality, but the subjective cognition of the TM has no way to access the actual objective-reality. The TM can at most create a mental model to represent the objective-reality. For example, in an experiment, when the experimenter changes the task for a monkey [83], the experimenter knows for sure that the monkey’s task is actually/objectively changed by the objective-reality. The monkey might be aware of that its task has been changed by the objective-reality, but the monkey has no way to know for sure whether its task has been actually/objectively changed by the objective-reality or not. The experimenter can actually/objectively distinguish the monkey brain’s objective-reality from the monkey brain’s subjective cognition. But the monkey brain has no way to actually/objectively distinguish its objective-reality from its subjective cognition. The subjective cognition of the monkey brain has no way to access the actual objective-reality. The subjective cognition of the monkey brain always accesses to a mix which represents the objective-reality and its subjective cognition at the same time. Within this mix, the monkey brain needs to subjectively distinguish/model the objective-reality from its subjective cognition. The monkey brain’s dynamic task-belief is a model of the objective-reality. The monkey brain’s dynamic task-belief reflects the objective-state-evolution of the monkey’s objective-reality. More generally, the situation of every TM in a 1O-parallel-computing-automaton, has the same nature as the situation of the monkey brain in the experiment. For example, at this moment, my brain does not know what is my current *objective* task. So, my brain can only do a *subjective* task (which is subjectively identified by my brain itself). More generally, the objective existence of the objective-reality is only a TM’s subjective postulation/cognition – the TM has no way to know whether the objective-reality actually/objectively exist or not. Dramatically, a TM’s subjective cognition actually has no influence/control on the objective-reality – the TM’s subjective cognition is created/fated by the objective-reality.

A common human’s theory of mind postulates a spatial unity of self and body, an observer that resides in one’s body and is the subject of one’s subjective conscious experience [24]. This postulated situation is the 2O-SM. Let us call the observer in the 2O-SM the intracorporeal-observer (aka the false self [25]). The relationship between the intracorporeal-observer and one’s body is like “the ghost in the machine [23]”.

Human brain has the ability to imagine/simulate the cognitions/mind of another person. Based on this ability, a human brain can imagine/simulate an imaginary companion (aka imaginary friend), and can further identify/postulate this imaginary companion to be an observer of one's subjective conscious experience (like an alternate personality). Let us call this observer the extracorporeal-observer (aka the true self [25]).

Actually, the human brain perceives/imagines itself to be the extracorporeal-observer. The extracorporeal-observer is different from an ordinary alternate personality, because the extracorporeal-observer can be experienced (by the brain with *visual mental imagery [62][63]*, as a kind of out-of-body experience [65][64], which is like observing one’s virtual doppelganger by using a virtual reality system [58], or like *actually* observing the brain’s body from the viewpoint of another TM) to be located in extracorporeal space.

The extracorporeal-observer is like a 1O-external-observer.

Dramatically, this human brain can further nominate the extracorporeal-observer to be the sole observer of one’s subjective conscious experience. (In this case, this human brain can also imagine/postulate the existence of the intracorporeal-observer at the same time. Then, the intracorporeal-observer is imagined/postulated to have its ownsubjective conscious experience – besides the extracorporeal-observer's subjective conscious experience. In other words, this human brain imagines/postulates the dual existence of both the extracorporeal-observer's subjective conscious experience and the intracorporeal-observer's subjective conscious experience.) This postulated situation is the 1O-SM. The extracorporeal-observer has no influence/control on the objective-state-evolution of the 1O-SM.

The relationship between the extracorporeal-observer and one’s body is like “the ghost *out* of the machine”.

The intracorporeal-observer is the center of the 2O-SM. The 1O-SM is allocentric. The extracorporeal-observer is not the center of the 1O-SM.

The 2O-SM is defined/imagined/narrated by the TM to be its objective-reality; the intracorporeal-observer is defined/imagined/narrated by the TM to be a subjective-object. This is the TM’s pareidolia. In this pareidolia, the observational reference frame of the intracorporeal-observer is used. The viewpoint of the intracorporeal-observer (who is located in the TM’s intracorporeal space, and who has the same knowledge/ignorance as the TM currently has) is defined to be the TM’s subjective-perspective. The clause “from a TM’s subjective-perspective” means that “from the viewpoint of the TM itself – based on the current knowledge/ignorance of the TM itself”. When a TM uses the subjective-perspective, actually it is using the 2O-SM.

From the TM’s subjective-perspective, the intracorporeal-observer observes how the intracorporeal-observer works as the center in the 2O-SM. The TM’s pending action is modeled/represented/simulated as something outside of the 2O-state-evolution of the 2O-SM like an external force, not as an internal element/component within the 2O-state-evolution of the 2O-SM. (The 2O-state-evolution is the TM’s program’s subjective/imagined/forecasted/supposed/narrated state evolution of the TM’s objective-reality.) The TM’s pending decision is intentionally excluded from the TM’s intracorporeally simulated 2O-state-evolution of the 2O-SM, when the TM is forecasting a 2O-baseline (of the 2O-state-evolution of the 2O-SM) which does not include the consequence of the TM’s pending decision, so that the TM can make the pending decision based on this 2O-baseline.

The 1O-SM is defined/imagined/narrated by the TM to be its objective-reality; this is the TM’s pareidolia. In this pareidolia, the observational reference frame of the extracorporeal-observer is used. The viewpoint of the extracorporeal-observer (who is located in the TM’s extracorporeal space, and whose knowledge is not limited by the knowledge the TM currently have) is defined to be the TM’s objective-perspective. The clause “from a TM’s objective-perspective” means that “from the viewpoint of a 1O-omniscient-external-observer – only based on the data/information a 1O-omniscient-external-observer should be able to get/process”. When a TM uses the objective-perspective, it is either using the 1O-SM, or using a SM which is an obscure mixture of the 1O-SM and the 2O-SM (let’s call it the 1.5O-SM).

From the objective-perspective of the extracorporeal-observer, when a MM is being intracorporeally used by a TM within its 2O-processing, from the subjective-perspective of the TM, the content of the MM is being “subjectively experienced” by the TM.

Using the semantics of natural language, “a TM uses a MM (from the objective-perspective of the extracorporeal-observer)” is described as “a TM subjectively experiences a MM (from the TM’s own subjective-perspective)”.

A TM’s 1O-SM describes/narrates/models/represents/simulates the objective-state-evolution of the 1O-parallel-computing-automaton actually/objectively (i.e., from the objective-perspective of the extracorporeal-observer). A TM’s 2O-SM describes/narrates/models/represents/simulates the objective-state-evolution of the 1O-parallel-computing-automaton fictionally/subjectively (i.e., from the subjective-perspective of the intracorporeal-observer).

The situation described by the 1O-SM is significantly different from the situation described by the 2O-SM. So, when the 1O-SM borrows a symbol from the 2O-SM, the meaning of the symbol might be significantly different under the context of the 1O-SM.

For a symbol, let us call its original meaning (under the context of the 2O-SM) the 2O-meaning, and call its meaning under the context of the 1O-SM the 1O-meaning. A symbol’s 2O-meaning is the meaning from the subjective-perspective. A symbol’s 1O-meaning is the meaning from the objective-perspective.

For the symbols “action”, “active”, “agree”, “assume”, "avoid", “bad”, “believe”, “categorize”, “category”, "cause", “chance”, “change”, “choose”, “contain”, “control”, “create”, “decide”, “decision”, “determine”, “disappoint”, “disappointment”, “disprove”, “divide”, “do”, “drive”, “effect”, “evaluate”, “fate”, “fated”, “find”, “flexible”, "follow", “forecast”, "free", "freedom", “good”, “happen”, “have”, “imagine”, “impossible”, “influence”, “know”, “make”, “nonstochastic”, “object”, “plan”, “possible”, “postulate”, “postulation”, “prove”, “random”, “reaction”, “regret”, “relationship”, “state”, “stochastic”, “subject”, “suppose”, “supposition”, “truly”, “type”, “unavoidable”, and “use”, let us add a prefix "2O-" to the symbol when referring to its 2O-meaning, and add a prefix "1O-" to the symbol when referring to its 1O-meaning. For example, for the symbol “avoid”, let us use the term “2O-avoid” when referring to its 2O-meaning, and use the term “1O-avoid” when referring to its 1O-meaning.

The objective-fate is the 1O-fate; a TM's subjective-fate is the TM’s 2O-fate.

The future situation which is being represented/simulated/modeled/forecasted by a TM’s 2O-SM, is the 2O-fate; the future situation which is being represented/simulated/modeled/forecasted by a TM’s 1O-SM/1O-function, is the 1O-fate.

What will actually/objectively happen in the real world, is 1O-fated to happen – the 1O-fate is 1O-fated to happen. What is being forecasted to happen by a TM, is not 1O-fated to happen – the TM’s 2O-fate is not 1O-fated to happen. However, a human brain counterfactually feels like that its 2O-fate is 1O-fated to happen. Because, when the human brain is mentally visualizing the future, the 2O-fate is mentally visualized by the human brain (as episodic future thinking).

For example, if I have a dentist appointment next week, whether I will show in the appointment, is 1O-fated, but the appointment is not 1O-fated to happen, although I counterfactually feel like that the appointment is 1O-fated to happen. Apparently, the dentist might cancel the appointment.

Completely 1O-fated by its initial state and the 1O-function, a 1O-parallel-computing-automaton is not 1O-free/1O-flexible/1O-active. Then, being a fuzzy subset of a 1O-parallel-computing-automaton, a subjective-object is not 1O-free/1O-flexible/1O-active. Even if a subjective-object knows the *actual* 1O-function, the subjective-object has no way to 1O-change/1O-control/1O-drive the state of any BB to break the *actual* 1O-function – a subjective-object has no way to 1O-change/1O-control/1O-drive the 1O-parallel-computing-automaton/1O-parallel-computation. (In case that the actual 1O-function is stochastic, the subjective-object has no way to 1O-change/1O-control/1O-drive the state of any BB to make it different from the only state 1O-chosen by the stochastic 1O-function from the set of possible states which are literally allowed by the stochastic 1O-function.) So, a subjective-object has no way to 1O-change/1O-control/1O-drive/1O-decide/1O-choose the action of itself.

“From my objective-perspective, what should I do?” No matter what you “should” do, you have to do what you are 1O-fated (by the 1O-function) to do. What you will do is completely 1O-fated by the 1O-function, but it cannot be reliably forecasted in advance – due to technical limitations.

Human brain can (subjectively) imagine a past/present/future state of a 1O-parallel-computing-automaton which breaks the 1O-function of this 1O-parallel-computing-automaton, even though there is no way to (actually/objectively) realize this state in this 1O-parallel-computing-automaton. A human brain’s (subjective) imagination regarding the future state of the universe, does not (actually/objectively) change the objective-state-evolution of the universe.

By hacking the computer program which simulates a Nonstochastic/Stochastic Game of Life system, a 1O-external-observer is capable to 1O-change the state of a BB within the system to *break* the 1O-function.

If a 1O-external-observer knows the *actual* 1O-function of a 1O-parallel-computing-automaton, and is capable to 1O-change the state of a BB to *break* the *actual* 1O-function, let us call such a 1O-external-observer the 1O-breaker of the 1O-parallel-computing-automaton. Only a 1O-breaker is capable to (actually/objectively) 1O-change/1O-control/1O-drive/branch the objective-state-evolution of the 1O-parallel-computing-automaton – no subjective-object within the 1O-parallel-computing-automaton is capable to (actually/objectively) 1O-change/1O-control/1O-drive/branch the objective-state-evolution of the 1O-parallel-computing-automaton. The 1O-change breaks the 1O-fate – the 1O-change is 1O-free/1O-flexible and not 1O-fated/predetermined.

By default, the objective-state-evolution of a 1O-parallel-computing-automaton only has one potential-outcome/situation-option.

Iff there is an (actual) 1O-breaker for a 1O-parallel-computing-automaton, the objective-state-evolution of the 1O-parallel-computing-automaton has two or more potential-outcomes/situation-options which depend on the pending action of the 1O-breaker. In this case, if a script/story/book/simulation describes the objective-state-evolution of each BB of the 1O-parallel-computing-automaton, the potential-outcome of this script/story/book/simulation will be determined by the pending action of the 1O-breaker – this script/story/book/simulation is unfinished.

The extracorporeal-observer is not a 1O-breaker.

Regarding the change of the state of a BB (by a subjective-object), the change over time fated by the 1O-function, is a 2O-change. Regarding the control/drive of the state of a BB (by a subjective-object), the control/drive which follows the 1O-function, is a 2O-control/2O-drive or a “*seeming (i.e., subjective)* control/drive”.

The 2O-change/2O-control/2O-drive follows the 1O-fate – the 2O-change/2O-control/2O-drive is 1O-fated.

Regarding the change/control/drive of the state of a BB, on the basis of the 2O-change/2O-control/2O-drive, any extra change/control/drive introduced by a 1O-breaker, is a 1O-change/1O-control/1O-drive.

A subjective-object has no way to 1O-change/1O-control/1O-drive the state of a BB – only a 1O-breaker can do that for the BB. The said subjective-object can be the said BB itself.

A TM has no way to 1O-change/1O-control/1O-drive its own pending decision/choice – only a 1O-breaker can do that for the TM.

It’s easy for a human brain’s program to simulate/imagine/mentally-visualize how a TM’s program is objectively-fatedly/passively executed (following the objective-state-evolution of a 1O-parallel-computing-automaton), but it’s hard for a human brain’s program to simulate/imagine/mentally-visualize how the human brain’s program itself is objectively-fatedly/passively executed, because the human brain’s program has to use the human brain’s program itself to simulate/imagine/mentally-visualize how the human brain’s program itself is objectively-fatedly/passively executed. In the semantics of natural language, by default, the control logic of a human brain’s program is (incorrectly/counterfactually) simulated/imagined/mentally-visualized as a 1O-breaker (who is capable to (actually/objectively) 1O-change/1O-control/1O-drive/branch the objective-state-evolution of the 1O-parallel-computing-automaton), while the control logic of a TM's program is not simulated/imagined/mentally-visualized as a 1O-breaker. That’s why we human brains have subjective clues for the objective-consciousness of a human brain’s program, while we human brains do not have subjective clues for the objective-consciousness of a TM’s program, although a human brain is also a TM.

When a TM forecasts what a subjective-object (let us call it A) (e.g., the TM itself) will act upon another subjective-object (let us call it B), if the TM figures out two or more 2O-possible actions for A to act, the TM counterfactually feels like that each 2O-possible action has the 1O-chance to happen in the objective-reality. (These 2O-possible actions are actually potential/mental/intracorporeal situation-options – at most one of these potential/mental/intracorporeal situation-options has the 1O-chance to happen in the objective-reality.) If the TM treats B itself as a temporarily-isolated-system, the TM can treat both A and the TM itself as 1O-external-observers of the temporarily-isolated-system. Under this setting, the temporarily-isolated-system, A and the TM are subsets of a larger 1O-parallel-computing-automaton which is 1O-controlled/1O-driven by the same 1O-function. Within the larger 1O-parallel-computing-automaton, A has no way to 1O-change/1O-control/1O-drive the state of any BB within B to break the 1O-function. So, as an 1O-external-observer of the temporarily-isolated-system, A has no way to 1O-control/1O-drive/1O-cause/1O-decide/1O-choose/branch/1O-change the state of any BB within B to break *the 1O-function of the temporarily-isolated-system (which is the same as the 1O-function of the larger 1O-parallel-computing-automaton)*. So, A is not a 1O-breaker of the temporarily-isolated-system – B’s activity actually has nothing to do with A’s action. (A and B might exchange some force-carrier BBs which do not actually/objectively carry force.) But the TM counterfactually feels like that A is a 1O-breaker of the temporarily-isolated-system, because the TM counterfactually feels like that each 2O-possible action (of A) has the 1O-chance to happen in the larger 1O-parallel-computing-automaton. But actually, 1O-fated by the 1O-function, without the help from an actual 1O-breaker of the larger 1O-parallel-computing-automaton, at most one of the 2O-possible actions (of A) has the 1O-chance to happen in the larger 1O-parallel-computing-automaton. (In case that the actual 1O-function is stochastic, in the chosen action (of A), the state of each BB (of A) is 1O-chosen by the stochastic 1O-function from the set of possible states which are literally allowed by the stochastic 1O-function. So, in case that a second 2O-possible action (of A) is also literally allowed by the stochastic 1O-function, at least the state of one BB (of A) in the second 2O-possible action (of A) should be different from the state 1O-chosen by the stochastic 1O-function from the set of possible states which are literally allowed by the stochastic 1O-function – this is impossible.) Actually, the TM is 1O-fated to figure out those 2O-possible actions (of A), and A is 1O-fated to choose the chosen action. Actually, the chosen action is chosen by the 1O-function (of the larger 1O-parallel-computing-automaton), not by A; the 2O-possible actions are figured out by the 1O-function (of the larger 1O-parallel-computing-automaton), not by the TM.

It's possible that a 1O-parallel-computing-automaton's 1O-function does not apply to all BBs equally. In this case, I can give each BB a serial number, so that 1O-function can include this serial number, to handle each BB differently, based on its serial number. To say the least, 1O-function can simply exhaustively define the state of every BB at every moment – let's call such a 1O-function the exhaustive-1O-function. Then, no matter how weird a BB behaves (comparing to other “normal” BBs), this weird behavior still follows the exhaustive-1O-function. For example, even psychokinesis can follow the exhaustive-1O-function – “it looks like that the person makes a chair floating in the air without physical interaction; actually, the position information in the states of the BBs of the chair was 1O-fated to evolve to that location (in the air) during that time period, following the exhaustive-1O-function.”

After a TM in a 1O-parallel-computing-automaton 2O-found the 1O-function of the 1O-parallel-computing-automaton to be 2O-stochastic (e.g., to be the stochastic-McKenzie-function or the Schrodinger equation), only based on the data/information the TM should be able to get/process, logically speaking, it’s always possible that the TM’s 1O-parallel-computing-automaton is a 1O-nonstochastic 1O-parallel-computing-automaton which actually uses an undisclosed 1O-nonstochastic 1O-function (instead of the stochastic 1O-function 2O-found by the TM, e.g., the stochastic-McKenzie-function or the Schrodinger equation). (A TM is capable to make a 2O-truly 2O-random/2O-stochastic decision which can’t be forecasted by any TM within this 1O-parallel-computing-automaton, but “2O-truly 2O-random/2O-stochastic” does not necessarily mean “1O-free”.) After recording the state of all BBs in this 1O-parallel-computing-automaton during a time frame, a 1O-external-observer can disclose a 1O-nonstochastic 1O-function for this time frame – this 1O-nonstochastic 1O-function exhaustively defines the state of every BB at every moment. Let us call this 1O-nonstochastic 1O-function the postmortem-1O-function. (Except the actual designer of this 1O-parallel-computing-automaton (if this 1O-parallel-computing-automaton was intentionally designed by a designer), any other 1O-external-observer has no way to know whether the postmortem-1O-function is the *actual* 1O-function (which was set by the designer) or not.) Then, based on the postmortem-1O-function, this 1O-external-observer can view this 1O-parallel-computing-automaton as a 1O-nonstochastic 1O-parallel-computing-automaton (during this time frame). (This 1O-external-observer can say that quantum effects are *predetermined* by this postmortem-1O-function 1O-nonstochastically.) A TM in this 1O-parallel-computing-automaton can record the state of some BBs of this 1O-parallel-computing-automaton during this time frame. Then, based on this record, this TM can disclose part of the 1O-nonstochastic exhaustive-1O-function/postmortem-1O-function for this time frame – this TM has no way to know whether this (part) 1O-function is the *actual* 1O-function (which was set by the designer) or not.

If it is difficult to accept a conclusion (of the present article) which involves a 1O-stochastic 1O-function, readers can mentally substitute the 1O-stochastic 1O-function (in the context of the conclusion) with the (1O-nonstochastic) exhaustive-1O-function/postmortem-1O-function instead.

Since the Nonstochastic Game of Life is a special case of the Stochastic Game of Life, in case that a TM is actually in a Nonstochastic Game of Life system, the TM has no way to empirically 2O-prove that it is not in a Stochastic Game of Life system. More generally, a TM who is actually in a 1O-nonstochastic 1O-parallel-computing-automaton has no way to empirically 2O-prove that it is not in a 1O-stochastic 1O-parallel-computing-automaton.

Humans’ concept of cause is constructed from experience (e.g. [47]). “Correct” theory of causality can be learned from relatively little evidence, often becoming entrenched before specific causal models are learned [48]. “Hume shows that experience does not tell us much. Of two events, A and B, we say that A causes B when the two always occur together, that is, are constantly conjoined. Whenever we find A, we also find B, and we have a certainty that this conjunction will continue to happen. Once we realize that ‘A must bring about B’ is tantamount merely to ‘Due to their constant conjunction, we are psychologically certain that B will follow A’, then we are left with a very weak notion of necessity. This tenuous grasp on causal efficacy helps give rise to the Problem of Induction–that we are not reasonably justified in making any inductive inference about the world.” [68]

Every (subjective/intracorporeal) causality (e.g., a causality between two subjective-objects; a causality between two physical-events) is a relationship/MM. Every belief is a causality.

A causality is a pattern recognized/learnt (by a TM) from a time series of physical-eventsthrough machine learning (i.e., pattern recognition).

Except the 1O-function, let us call all other causalities regarding a 1O-parallel-computing-automaton the 2O-causalities. For example, every causality in social science or humanity/psychology/biology/chemistry is a 2O-causality.

The future situation which is being represented/simulated/modeled/forecasted by a TM’s 2O-SM/2O-causalities, is the 2O-fate.

Statements like “a subjective-object pushes/accelerates/launches/controls/drives/generates another subjective-object” or “a physical-event causes/controls/drives/decides/chooses another physical-event to happen” are 2O-causalities. For example, “a decision of my brain causes/controls/drives/decides my finger to move/accelerate/launch”, "my finger's push/control/drive makes/causes a stationary billiard ball to move/accelerate/launch – a force from my finger acts on the stationary billiard ball to push/accelerate/launch/control/drive it", “a wind’s push/control/drive makes/causes a stationary sail to move/accelerate/launch – a force from the wind acts on the stationary sail to push/accelerate/launch/control/drive it”, “a decision of my brain causes a stationary billiard ball to be launched by the push of my finger”, “a decision of wind/God causes a stationary sail to be launched by the push of the wind”, "the analgesic reduces my pain" or “a Gosper glider gun generates/launches gliders”.

After my finger follows a decision of my brain to press the button of a device to collide two high-energy photons, the two photons should disappear, and a pair of electron-positron should appear [86]. The statement “the objective-state-evolution of one of these four BBs causes/controls/drives/decides/chooses/branches the objective-state-evolution of another BB” or “one of these four BBs controls/drives another BB” is a 2O-causality.

The 1O-function is an *objective* pattern of the 1O-parallel-computing-automaton.

The 1O-function is valid/correct/factual.

If a 2O-causality can be proved by deductive inference based on the 1O-function only, it is valid/correct/factual. Otherwise, it is invalid/incorrect/counterfactual.

The 1O-parallel-computation of the 1O-parallel-computing-automaton follows the 1O-function. If the 1O-prallel-computation also follows a 2O-causality, this fact proves this 2O-causality by deductive inference based on the 1O-function only – this fact proves that this 2O-causality is valid/correct/factual. So, the 1O-parallel-computation does follow any invalid/incorrect/counterfactual 2O-causality.

However, when a TM’s program uses an invalid/incorrect/counterfactual 2O-causality, this invalid/incorrect/counterfactual 2O-causality does not look invalid/incorrect/counterfactual. Every TM’s program is using its 2O-causalities (in its control logic) to forecast the 1O-parallel-computation of the 1O-parallel-computing-automaton, no matter these 2O-causalities are valid/correct/factual or not.

A TM can *reliably* forecast the pending decision of another TM (within a 1O-parallel-computing-automaton), based on the 1O-function (of the 1O-parallel-computing-automaton) only, or based on the (former) TM’s valid/correct/factual 2O-causalities only. The former TM and the latter TM can be the same TM.

A TM can *unreliably* forecast the pending decision of another TM (within a 1O-parallel-computing-automaton), based on the (former) TM’s invalid/incorrect/counterfactual 2O-causalities. The former TM and the latter TM can be the same TM.

Besides the 1O-function, every other physical-law is a 2O-causality. The mathematical relation (of the objective-evolution of the state of BBs) reflected by every other physical-law (besides the 1O-function), should have been expressed by the 1O-function already. Otherwise, it means that the 1O-function need to be revised to cover this mathematical relation.

Only based on the 1O-function, we should be able to prove every other physical-law by deductive inference – every other physical-law should be valid/correct/factual. In other words, the semantic information of every other physical-law is already stated in the 1O-function. In this sense, once I know the 1O-function, every other physical-law (e.g., the laws of thermodynamics) is redundant.

Actually, the semantic information of all the objective-state-evolution of a 1O-parallel-computing-automaton is already stated in the initial state and the 1O-function of the 1O-parallel-computing-automaton.

The physical interaction (if we suppose that the physical interaction is nonfictional) among any number of subjective-objects, is 1O-fated by the 1O-function. A TM itself is a subjective-object. When a TM’s program uses its 2O-causalities (in its control logic) to forecast the 1O-parallel-computation of the 1O-parallel-computing-automaton, if one of these 2O-causalities cannot be proved by deductive inference based on the 1O-function only, this 2O-causality is invalid/incorrect/counterfactual. In this case, this 2O-causality does not accurately treat the subjective-objects as ordinary/plain/nonsignificant subjects/objects in a physics-experiment/dynamic-physical-system.

When a TM learns a new causality/pattern (through machine learning) based on its findings (from experiments/observations), the TM is using inductive inference. Logically speaking, findings from experiments/observations can only increase a TM’s confidence on a specific causality/pattern, but will never be sufficient to prove this causality/pattern. Within a 1O-parallel-computing-automaton, a TM can only learn the 1O-function (of this 1O-parallel-computing-automaton) by inductive inference. If the TM has enough confidence on the 1O-function, the TM should agree that, only based on the 1O-function, the TM should be able to prove every other *valid/correct/factual* causality/pattern by deductive inference. In this sense, besides the 1O-function, every other *valid/correct/factual* causality/pattern is redundant – the semantic information of every other *valid/correct/factual* causality/pattern is already stated in the 1O-function. In this sense, every other *valid/correct/factual* causality/pattern is a customized/localized/temporary/approximate/downgraded shortcut/simulation/MM/substitution/counterpart of the 1O-function. To this TM, before it proves a 2O-causality (based on the 1O-function) by deductive inference, this 2O-causality is less reliable than the 1O-function – this 2O-causality might be invalid/incorrect/counterfactual. Within this TM’s program, the 2O-causalities cooperate/compete with each other, to construct a reality/situation/SM – the 2O-SM; this TM’s program uses the 2O-causalities/2O-SM to forecast future situations – such a forecast is less reliable than a forecast based on the 1O-function/1O-SM. (The 1O-function/1O-SM describes/narrates/represents the intrinsic control logic of a 1O-parallel-computing-automaton. A TM’s 2O-causalities/2O-SM do not describe/narrate/represent the intrinsic control logic of a 1O-parallel-computing-automaton, but describe/narrate/represent the intrinsic control logic of this TM's program. "My mind is the universe and vice versa. [108]" – Lu Jiuyuan.)

When a TM or a 1O-omniscient-external-observer only uses the 1O-function to make a forecast/retrodiction, the forecast/retrodiction should turn out to be valid/correct/factual – the forecast/retrodiction does not need to be certain.

When a TM uses a set of 2O-causalities to make a forecast/retrodiction, if every 2O-causality can be proved based on the 1O-function by deductive inference, the forecast/retrodiction should have the same level of correctness as the forecast/retrodiction made by a 1O-omniscient-external-observer only using the 1O-function – the TM’s forecast/retrodiction should turn out to be valid/correct/factual. So, if the TM’s forecast/retrodiction turns out to be invalid/incorrect/counterfactual, it means that at least one of these 2O-causalities cannot be proved based on the 1O-function by deductive inference – at least one of these 2O-causalities is invalid/incorrect/counterfactual.

David Hume thought that “we are ignorant of the powers that operate between objects”. [67] The 1O-function represents/models “the powers that operate between objects” in a 1O-parallel-computing-automaton.

In a TM’s 2O-SM, each 2O-causality is postulated to be an order which controls/drives the objective-state-evolution of the 1O-parallel-computing-automaton/objective-reality.

My brain’s mental visualization of the objective-state-evolution of the 1O-SM looks like floating clouds, fireworks or spindrifts. When I am observing the objective-state-evolution of floating clouds, fireworks or spindrifts, I do not try to identify 2O-causalities from it, so I do not perceive/see 2O-causalities in it. The 2O-causalities (I am perceiving) distract me from the actual objective-state-evolution. The 2O-causalities (I am perceiving) deform the objective-reality into the 2O-SM.

An animal’s 2O-causalities work as causalities in its brain, due to the objective/physical construction of its brain.

For example, in Ivan Pavlov’s experiment, a dog learnt to salivate whenever the bell rings. The actual relationship between the bell and the food is a coincidence – the dog learnt the coincidence.

There are 500+ million dogs in the world today. Each dog lives in a unique environment, watching/hearing a unique series of physical-events happening around it in its everyday life. Each physical-event is 1O-fated by the 1O-function. If one dog happens to see food after bell for many times, it will learn to salivate whenever the bell rings. This dog does not need to be in Ivan Pavlov’s experiment – it is possible that this dog sees food after bell just by coincidence.

Being part of the 1O-fated objective-state-evolution of the universe, the series of physical-events which objectively happened in Ivan Pavlov’s experiment (e.g., bell rings; food being served), actually also happened by coincidence – although Ivan Pavlov did not think so. For example, during the experiment, the series of physical-events which objectively happened in Ivan Pavlov’s brain (which decided Ivan Pavlov’s cognitions/mind/forecasts/decisions/actions), actually happened by coincidence.

Every subjective-object is 1O-controlled/1O-driven by the 1O-function. Every physical-event is 1O-fated by the 1O-function. So, the 1O-function is the only actual/objective relationship between any two subjective-objects/physical-events – any two subjective-objects/physical-events do not have any other actual/objective relationship. Actually, any other relationship (between any two subjective-objects/physical-events) is just a coincidence.

(Some relationships between two subjective-objects/physical-events (e.g., one subjective-object statically *supports* another subjective-object; causal launching) are included in visual perception, which are derived from automatic/unintentional visual processing – these relationships are hardwired in human brain [79]. Being a fuzzy set of BBs, every subjective-object is actually/objectively *suspending* in space on its own – no subjective-object is actually/objectively *supported* byany other subjective-object. For example, my body is not actually/objectively *supported* by the earth. If I can say that my body is supported by the earth, I can also say that the earth is supported by my body – both my body and the earth are actually/objectively *suspending* in space on its own. (If the general theory of relativity is correct, both my body and the earth are in a curved spacetime caused by the uneven distribution of mass.) The 2O-causality “subjective-object A statically supports subjective-object B”, “subjective-object A pushes/accelerates/launches/controls/drives subjective-object B” or “a force from subjective-object A acts on subjective-object B to push/accelerate/launch/control/drive subjective-object B” is actually counterfactual – like Aristotelian/Newtonian physics.)

The coincidences experienced by a TM during its life time, is decided by the 1O-function and the physical construction of its local environment. Living in its ecological niche, if the TM constructs a Bayesian model based on the coincidences it experienced, the TM can use this Bayesian model to unreliably forecast/retrodict future/past coincidences, and the TM has a relatively high chance to make good (but unreliable) forecasts/retrodictions, as long as the TM remains living in the same ecological niche. But the TM has no way to 1O-change/1O-control/1O-drive its own future/1O-fate using its own (unreliable) forecasts. Apparently, in order to illustrate this theory, we can design such a TM in a Nonstochastic Game of Life system.

To a dog, the causality between the bell and the food is a 2O-causality. This 2O-causality works as a causality in the dog’s brain, due to the new neural connections built in the dog’s brain during the (machine) learning. More generally, in an animal brain, all its 2O-causalities work in the same way – they have objective constructions, and their work is carried out by their objective constructions. Or in other words, every 2O-causality has its neural substrate/underpinning. For example, the pictures of the actress Halle Berry and the letter string “Halle Berry” are somehow connected by a single unit in the right anterior hippocampus [50], which means that this single unit works as a 2O-causality between the letter string “Halle Berry” and her pictures. Similar multimodal neurons also exist in artificial neural networks [51].

Some 2O-causalities (e.g., classical conditioning) are not fitted MMs of the objective-reality.

For example, in Ivan Pavlov's experiment of classical conditioning, food will be served after bell rings, the relationship (between food and bell) learned by the dog is not a fitted MM of the objective-reality – it's not always true everywhere in the objective-reality. (Bayesian models for reinforcement learning have been very successful [70][71][72].)

For the same reason, it's always possible that the conclusion of an inductive argument is not a fitted MM of the objective-reality.

If any MM used by a TM's 2O-SM is not a fitted MM of the objective-reality, the TM's 2O-SM as a whole is not a fitted MM of the objective-reality.

A 2O-causality is a roughly estimated MM (which might be oversimplified or not fitted) to represent/model the 1O-parallel-computation; the 1O-function is the actual MM of the 1O-parallel-computation. A 2O-causality is like a pseudocode which represents/models the 1O-parallel-computation.

2O-causalities are the causalities used by a human brain’s program. A 2O-causality (used by a human brain’s program) is based on the context of the human brain’s 2O-SM. Each 2O-causality is a pareidolia constructed by the 1O-parallel-computation. In case a 2O-causality is a pair of 2O-cause and 2O-effect, both the 2O-cause and the 2O-effect are symbols being used by the 2O-SM; the 2O-relationship between the 2O-cause and the 2O-effect is also a symbol being used by the 2O-SM.

Apparently, the human brain has neural underpinnings to abstractly represent a pair of 2O-cause situation and 2O-effect situation, and to abstractly represent the 2O-relationship between the 2O-cause situation and the 2O-effect situation. (The 2O-cause situation and the 2O-effect situation are different in time or space. They happen at different times, and/or happen at different locations. They cannot happen at the same location, at the same time.) Or in other words, the human brain has a neural underpinning to abstractly represent a 2O-causality. The neural underpinning of the abstracted 2O-cause situation maps to the 2O-cause symbol; the neural underpinning of the abstracted 2O-effect situation maps to the 2O-effect symbol; the neural underpinning of the abstracted 2O-relationship maps to the 2O-relationship symbol.

When a human brain mentally visualizes a situation, the human brain might mentally visualize its 2O-effect situation or/and its 2O-cause situation automatically/unintentionally, that's why the human brain incorrectly/counterfactually intracorporeally/subjectively feels like that a 2O-cause situation 2O-causes/2O-controls/2O-drives/2O-decides/2O-chooses a 2O-effect situation.

It was recently found (by human brains within a U-system) that it is possible to formulate quantum mechanics without any reference to “a global time or causal structure” [95].

In a 1O-parallel-computing-automaton, the initial state and the 1O-function are the only 1O-causesof the 1O-parallel-computation – the initial state and the 1O-function *1O-control/1O-drive/1O-cause/1O-decide/1O-choose/1O-state/1O-program* the 1O-parallel-computation. The so-called *“1O-control/1O-drive/1O-cause/1O-decide/1O-choose/1O-state/1O-program”* is not an *illusion of control* [73]. The 1O-function is not a pareidolia.

In the objective-reality, no subjective-object has 1O-control over any subjective-object – a subjective-object even has no 1O-control over itself. (Or in other words, the objective-state-evolution of every BB is completely autonomous.) This is obvious from the viewpoint of a 1O-omniscient-external-observer. A subjective-object (let us call it A) might have *2O-control* over a subjective-object (let us call it B). So, the so-called *“2O-control”* (for example, a mouse's brain 2O-controls its body, and a manmade device 2O-controls the mouse's brain, and a human brain (i.e., the experimenter) 2O-controls the manmade device [80][81] – the human brain 2O-controls the mouse's body) is actually a generalized *illusion of control* – this generalized *illusion of control* is actually a TM’s Bayesian model of the two subjective-objects (as the 2O-subject and the 2O-object respectively), and is actually the TM’s automatically/unintentionally imagined/postulated/fictionalized Bayesian probability of the relationship (regarding controlling/driving) between the two subjective-objects. Based on this Bayesian probability, the TM's Bayesian model might be able to make good (but unreliable) forecasts/retrodictions in the objective-reality. The TM’s automatically/unintentionally imagined/postulated/fictionalized Bayesian probability of the relationship (regarding controlling/driving) between the two subjective-objects is actually a 2O-causality of the TM. A causality (of the TM) is actually a tiny SM (of the TM). Actually, in the objective-reality, the two subjective-objects have no relationship (regarding controlling/driving) – the actual probability of the relationship (regarding controlling/driving) between the two subjective-objects is *0*. The two subjective-objects actually/objectively have nothing to do with each other – B’s activity actually/objectively has nothing to do with A’s action. Each subjective-object even has no 1O-control over itself. In the TM’s Bayesian model, A (as the 2O-subject) has a nonzero Bayesian *probability* to 2O-control/2O-drive B (as the 2O-object). So, logically speaking, B (as the 2O-subject) has exactly the samenonzero Bayesian probability to 2O-control/2O-drive A (as the 2O-object). (For example, a mouse's brain has a nonzero Bayesian probability to 2O-control its body, while the mouse's body has the same nonzero Bayesian probability to 2O-control its brain; a manmade device has a nonzero Bayesian probability to 2O-control the mouse's brain [80][81], while the mouse's brain has the same nonzero Bayesian probability to 2O-control the manmade device; a human brain (i.e., the experimenter) has a nonzero Bayesian probability to 2O-control the manmade device, while the manmade device has the same nonzero Bayesian probability to 2O-control the human brain. So, the human brain has a nonzero Bayesian probability to 2O-control the mouse's body, while the mouse's body has the same nonzero Bayesian probability to 2O-control the human brain.)

In order to solve real-world tasks/problems, the design/program of a TM systematically highlights/emphasizes the factors which are more important for these tasks/problems (comparing to the rest factors), at the cost of systematically underestimates/ignores the rest factors. The rest factors look less important to the TM, just because that they are systematically underestimated/ignored by the design/program of the TM. For example, when a TM is forecasting subjective-object B’s trajectory, the TM focuses on its subjective cognition that subjective-object A has a nonzero Bayesian probability to control/drive B (in the TM’s Bayesian model), while the TM systematically underestimates/ignores the nonzero Bayesian probability for B to control/drive A (in the TM’s Bayesian model), because the nonzero Bayesian probability for B to control/drive A falls out of the scope of the current task/problem (i.e., forecasting B’s trajectory). Another example, when a TM is planning what itself should do (in order to solve a problem), it focuses on what itself can do (i.e., its potential/mental/intracorporeal action/behavior options (to solve the problem)), while systematically underestimates *the reaction of its environment (i.e., the potential/mental/intracorporeal reaction/behavior options of its environment (to prevent the problem from being solved)).*

In the objective-reality, a subjective-object has no 1O-control over itself; in a TM’s Bayesian model, the subjective-object (as the 2O-subject) has a nonzero Bayesian *probability* to 2O-control/2O-drive itself (as the 2O-object) – the subjective-object can be the TM itself. The 2O-SM symbol “2O-object” has a counterpart in the 1O-SM – a subjective-object. But the 2O-SM symbol “2O-subject” has no counterpart in the 1O-SM. The 2O-SM symbol “2O-subject” is being created out of nothing – the 2O-SM symbol “2O-subject” is fictionally invented. The 2O-SM symbol “ego” refers to the (nonexistent) 2O-subject of an 2O-object. For example, I feel like that my brain *itself (as the 2O-subject)* is 2O-controlling/2O-driving *my brain (as the 2O-object)*. Actually, every subjective-object is only a *2O-object*, not a *2O-subject* – a 2O-object (e.g., my brain) doesn’t have a 2O-subject. Although we humans feel as if that there is a virtual 2O-subject (like an invisible homunculus) sitting inside the physical boundary of each 2O-object, 2O-controlling/2O-driving the 2O-object (like a human player controls/drives her/his avatar in a multiplayer computer game (e.g., Minecraft)) – this feeling is only a postulation of common human’s theory of mind. (When I watch a subjective-object, I see a virtual 2O-subject inside its physical boundary, but actually there is no such a virtual 2O-subject inside its physical boundary – such a virtual 2O-subject is actually a symbol of my 2O-SM. Such a virtual 2O-subject is mentally visualized by my 2O-SM.) Apparently, we won’t find a 2O-subject inside a 2O-object if we open/break the 2O-object. For example, in a brain surgery, we won’t find something called “ego” inside the brain – we won’t find the aforementioned invisible homunculus inside the brain.

(Analogously, if I break another human player’s avatar in Minecraft, I won’t see the human player’s body inside the avatar, and I won’t see *a receiver (which can receive control signals from the human player)* inside the avatar. So, if I am a non-player character in Minecraft, I will not find crucial evidence to assure me that “each character (including myself) in Minecraft is actually remotely controlled/driven by an ‘alien’ who is located outside of the Minecraft world”. Even if Mojang Studios (the developer of Minecraft) adds a receiver inside the avatar of a human player, this receiver is actually fake – this receiver is not used to receive control signals from a human player. An avatar in Minecraft is not a physical mecha which is physically controlled/driven by a human player directly. A physical mecha has the same degree of realness as its physical controller/driver – a physical mecha and its physical controller/driver are in the same reality/SM. An avatar in Minecraft has a lower degree of realness than its human player – an avatar and its human player are in two different realities/SMs. For a human player, Minecraft provides/constructs/simulates/visualizes/narrates a new SM which is a variation of her/his 2O-geometric-SM – her/his avatar is in the new SM. For a human player, her/his brain provides/constructs/simulates/visualizes/narrates her/his original 2O-geometric-SM.)

(Analogously, when I am in my lucid-dream, I will not find crucial evidence to assure me that “each person (including myself) in my lucid-dream is actually remotely controlled/driven by a human player who is located outside of my lucid-dream. Even if I find a receiver inside the brain of a person in my lucid-dream, this receiver is actually fake – this receiver is not used to receive control signals from a human player. A person in my lucid-dream is not a physical mecha which is physically controlled/driven by a human player directly. A person in my lucid-dream has a lower degree of realness than her/his human player – a person (in my lucid-dream) and her/his human player are in two different realities/SMs.)

(Analogously, right now, I will not find crucial evidence to assure me that “each person (including myself) is actually remotely controlled/driven by an ‘alien’ who is located outside of the universe” – I will not find *a receiver (which is used to receive control signals from the “alien”)* inside the brain of any person. A person is not a physical mecha which is physically controlled/driven by an “alien” directly. A person has a lower degree of realness than her/his “alien” – a person and her/his “alien” are in two different realities/SMs.)

Actually, the 2O-subject or “ego” doesn't exist – the 2O-subject or “ego” doesn't have 1O-control over the 2O-object/subjective-object. The relationship between the 2O-subject or “ego” and the 2O-object/subjective-object is like “the ghost in the machine [23]” – let us call this kind of “ghost” the 2O-subject-ghost.

In the 2O-SM, the 2O-subject-ghost is (incorrectly/counterfactually) simulated/imagined/mentally-visualized to be a 1O-breaker; the 2O-subject-ghost is (incorrectly/counterfactually) simulated/imagined/mentally-visualized to be the 2O-cause of the objective-state-evolution of the BBs of a 2O-object/subjective-object; the 2O-subject-ghost is (incorrectly/counterfactually) simulated/imagined/mentally-visualized to be free/flexible/active, not 1O-fated/passive. Actually/objectively (i.e., in the 1O-SM), the 1O-function is the 1O-cause of the objective-state-evolution of the BBs of a 2O-object/subjective-object.

The objective-state-evolution of any BB does not include the contribution from a 1O-breaker/2O-subject-ghost, although it (incorrectly/counterfactually) feels like that the contribution from a 1O-breaker/2O-subject-ghost is included.

Subjectively (i.e., from the subjective-perspective of the intracorporeal-observer), the control logic of a TM’s program (incorrectly/counterfactually) treats the TM’s program as a 1O-breaker/2O-subject-ghost.

Objectively (i.e., from the objective-perspective of the extracorporeal-observer), the control logic of a TM’s program does not treat the TM’s program as a 1O-breaker/2O-subject-ghost.

When my brain models an entity or process as making a choice in order to achieve a goal (i.e., when my brain uses agential thinking) [101], my brain is imagining/postulating the existence of a 2O-subject-ghost for this entity/process.

Any decision/choice of the 2O-subject-ghost of a 2O-object/subjective-object, is actually controlled/driven/caused/decided/chosen by the objective-state-evolution of the BBs within the 2O-object/subjective-object, not actually controlled/driven/caused/decided/chosen/branched by the 2O-subject-ghost.

The objective-state-evolution of any BB within a 2O-object/subjective-object, is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by any decision/choice of the 2O-subject-ghost of the 2O-object/subjective-object.

More generally, the objective-state-evolution of any intracorporeal/extracorporeal BB, is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by any decision/choice of the 2O-subject-ghost of the 2O-object/subjective-object. In this sense, to the 2O-subject-ghost of the 2O-object/subjective-object, actually there is no difference between an intracorporeal BB and an extracorporeal BB.

The 2O-subject-ghost of a 2O-object/subjective-object is imagined/simulated (by the human brain) to be a decision maker (for the 2O-object/subjective-object) who is capable to make a decision freely (for the 2O-object/subjective-object) – this decision is imagined/simulated (by the human brain) to control/drive/cause/decide/choose/branch the objective-state-evolution of the BBs of the 2O-object/subjective-object.

Machines/2O-objects/subjective-objects actually controlled/driven/decided by the 1O-function in the objective-reality, is treated as 2O-subject-ghosts controlled/driven/decided by the 2O-causalities in the 2O-SM.

Both the intracorporeal-observer and the extracorporeal-observer are 2O-subject-ghosts. But actually, the extracorporeal-observer is like “the ghost *out* of the machine”, not “the ghost *in* the machine”. Being the intracorporeal-observer/extracorporeal-observer, we are 2O-subject-ghosts – we do not actually/objectively exist in the context of my 1O-SM. We exist in the context of my 2O-SM as 2O-subject/2O-cause symbols – we exist inside my brain as intracorporeal spatiotemporal physical constructions/representations/memories/information/data. (According to my 2O-SM, subjective-objects/2O-subject-ghosts/2O-objects are located inside my seemingly “extracorporeal/objective” 2O-geometric-SM/2O-SM. My brain has a quale of such a subjective-object/2O-subject-ghost/2O-object. My brain has direct access to the appearance of such a subjective-object/2O-subject-ghost/2O-object (in the context of my 2O-geometric-SM/2O-SM).) We do not exist in my extracorporeal situation/objective-reality. (Actual subjective-objects/2O-objects are located inside my extracorporeal/objective objective-reality, not located inside my intracorporeal/subjective 2O-geometric-SM/2O-SM. My brain does not have a quale of such an actual subjective-object/2O-object. My brain does not have direct access to the appearance of such an actual subjective-object/2O-object (in the context of the objective-reality).) In the context of my 2O-SM, the 2O-SM itself is an (imagined) problem/game about *the 2O-subject-ghosts (which are 2O-cause symbols within the context of this problem/game)*. (Each 2O-subject-ghost/2O-cause has a neural underpinning in my brain – each 2O-subject-ghost/2O-cause is represented by a neural underpinning. Each 2O-subject-ghost/2O-cause in my mind reflects such a neural underpinning (in my brain). Each subjective-object in *my 1O-SM (as an intracorporeal/subjective simulation/representation/MM of the objective-reality)* maps to a 2O-subject-ghost in *my 2O-SM (as another intracorporeal/subjective simulation/representation/MM of the objective-reality)*.)

The context/definition/configuration/settings of this problem/game, and the intracorporeal physical 2O-process to solve/play this problem/game, are both 1O-fated by the 1O-function. Every vertebrate brain is “designed” (by Darwinian natural selection) to solve/play such a problem/game – every vertebrate brain physically constructs such a problem/game intracorporeally. However, a vertebrate brain cannot directly observe the *actual move (i.e., actual physical activities)* of any vertebrate brain in such a game – the actual move of a vertebrate brain is hidden behind its face. A 1O-external-observer can directly observe it. A vertebrate brain can only directly observe the actual move of *the physical body of a vertebrate*. *The physical body of a vertebrate* works as a *vehicle (i.e., mecha)* to carry its brain. *The physical body of a vertebrate* is not a player of such a game – its brain is a player of such a game. A vertebrate brain can directly observe its own problem/game (constructed by itself intracorporeally), but cannot directly observe another vertebrate brain’s problem/game (constructed by the latter brain intracorporeally) – a 1O-external-observer can directly observe both.

A vertebrate brain is actually a 2O-object within its extracorporeal situation/objective-reality, although the control logic of the vertebrate brain's program (incorrectly/counterfactually) feels/imagines/postulates/simulates itself to be *a 2O-subject-ghost* within its own intracorporeal 2O-SM/problem/game – *a 2O-subject-ghost* is not treated the same way as a 2O-object (by the control logic of the vertebrate brain’s program). Within the vertebrate brain’s intracorporeal 2O-SM/problem/game, *a 2O-subject-ghost (as the 2O-cause symbol)* is imagined/postulated/simulated (by the 2O-causality used by the control logic of the vertebrate brain's program) to have a supernatural/magical freedom/power to control/drive/cause/decide/choose/branch the objective-state-evolution of *its own 2O-object (as the 2O-effect symbol),* to make its own 2O-object to do something other than what it actually does, while *a 2O-object (as a 2O-effect symbol)* is not imagined/postulated/simulated to have such a power. (A subjective-object’s 2O-subject-ghost is imagined/postulated/simulated to have the supernatural/magical freedom/power to control/drive/cause/decide/choose/branch the objective-state-evolution of this subjective-object itself – a TM’s 2O-subject-ghost is imagined/postulated/simulated to have the supernatural/magical freedom/power to choose the chosen option (freely) in this TM’s own decision/choice. Some human brains imagine/postulate that such a freedom/power is supernaturally/magically endorsed by *the stochasticity of the 1O-function (i.e., quantum randomness)*. But obviously, the stochasticity of the 1O-function helps a TM to make a *random* (nondeliberate) decision/choice, not a *free* (deliberate)decision/choice. The stochasticity of the 1O-function introduces random noises into a TM’s deliberate decision/choice – such random noises cannot make the TM’s deliberate decision/choice *free*. Readers can think of this in the context of a *Stochastic* Game of Life system.) For example, after I broke a glass accidently, the control logic of my brain's program imagines/postulates/simulates that the 2O-subject-ghost of my brain has a supernatural/magical freedom/power to control/drive/cause/decide/choose/branch the objective-state-evolution of its own 2O-object, to make its own 2O-object to do something other than breaking the glass earlier. Obviously, the control logic of my brain's program is cheating itself. (Actually/objectively, the objective-state-evolution of the vertebrate brain’s own 2O-object is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by the 2O-subject-ghost – the 2O-subject-ghost does not actually/objectively exist. In other words, the vertebrate brain *“itself” (as the 2O-subject)* does not actually/objectively exist – Theseus’ ship *“itself” (as the 2O-subject)* does not actually/objectively exist. Alternatively, in a sense, a 2O-subject-ghost (e.g., Theseus’ ship “itself” as the 2O-subject-ghost) dies and resurrects at every moment.) Both using the aforementioned 2O-causality, two vertebrate brains might agree with each other that they have such a power. A vertebrate brain is extracorporeally/actually/objectively a 2O-object whose control logic intracorporeally/subjectively imagines/postulates/simulates themselves as 2O-subject-ghosts (instead of 2O-objects) – a vertebrate brain is a 2O-object whose control logic does not imagine/postulate/simulate themselves as 2O-objects.

When a TM (e.g., an animist’s brain) is using its 2O-SM, its internal monologue narrates (in natural language) that all 2O-subject-ghosts are living/animated/alive/present, and are living/present at the present moment (in time) – that’s why the TM feels like that. However, no 2O-subject-ghost actually/objectively exists – only the *machines* (i.e., the subjective-objects/2O-objects) actually/objectively exist.

Due to the 1O-parallel-computation, a subjective-object keeps changing/evolving, but a TM's 2O-SM keeps using the same 2O-subject-ghost to represent the subjective-object.

A flock of starlings seems to have a “life of its own” distinct from the microscopic process (i.e., physical interactions among individual birds), even though there is no mystery that the flock is in fact constituted by the birds [91] – the “life of its own” is actually a 2O-subject-ghost.

Analogously, a subjective-object (e.g., a starling; a billiard ball; a puppet; a cloud; the ship of Theseus; an atom; a pair of entangled particles; a BB; the universe; a flock of starlings; a glider pattern) seems to have a “life of its own” distinct from the microscopic process (i.e., physical interactions among BBs), even though there is no mystery that the subjective-object is in fact constituted by the BBs – the “life of its own” is actually a 2O-subject-ghost.

The 2O-subject-ghost (of a subjective-object) does not add anything to the objective-state-evolution of any BB (of this subjective-object). The objective-state-evolution of a subjective-object is exactly the sum of the objective-state-evolution of each BB of this subjective-object – the objective-state-evolution of the *whole* has nothing more than the sum of the objective-state-evolution of the *parts*. The *whole* is like a puppet whose objective-state-evolution is completely controlled/driven by the objective-state-evolution of the *parts*. The 2O-subject-ghost represents the *whole*.

The objective state of each BB evolves on its own independently/autonomously/unintentionally/automatically. Which specific subjective-object/2O-subject-ghost a BB "belongs" to, should not have any actual/objective impact/effect on the BB's objective-state-evolution – a BB should not do anything *special* for the subjective-object/2O-subject-ghost it "belongs" to. (Well, an individual bird might “intentionally” do something “special” for the flock it “belongs” to. But obviously, each BB of this bird has no intention. In this sense, the objective-state-evolution of this bird is actually/objectively unintentional/automatic – this bird actually/objectively unintentionally/automatically does something *seemingly* special for the flock it “belongs” to.) A BB's objective-state-evolution is standalone, which is independent of any subjective-object/2O-subject-ghost it "belongs" to – a BB does not actually/objectively *belong* to any subjective-object/2O-subject-ghost.

My brain manages to unlearn the 2O-subject-ghost of a flock/subjective-object, in the nirvana-experience. Obviously, unlearning the 2O-subject-ghost of a subjective-object, is much harder than unlearning the 2O-subject-ghost of a flock.

In the semantics of natural language, when a subjective-object is being the grammatical agent, by default, it implicitly refers to the 2O-subject-ghost of this subjective-object, although the 2O-subject-ghost does not actually exist in the objective-reality. Using the semantics of natural language, by default, the internal monologue (of the human brain) is painting a fictional/incorrect/counterfactual picture – the 2O-SM. (That’s why I have to intentionally define *a new semantic system (i.e., a new language)* in the present article.)

For example, in the sentence “she is making a decision”, the grammatical agent “she” does not refer to her neural network (as a subjective-object), but (implicitly) refers to the 2O-subject-ghost of her neural network. Actually, the decision is being made by the objective-state-evolution of the 1O-parallel-computing-automaton, not by the 2O-subject-ghost of her neural network, although her neural network (as a subjective-object) claims that the decision is being made by the 2O-subject-ghost of her neural network – my neural network understands the meaning of this (counterfactual/incorrect/fictional) claim.

In other words, by default, the semantics of the natural language fictionally/incorrectly/counterfactually assumes/imagines that each TM is being controlled/driven by its 2O-subject-ghost – this assumption/imagination is actually a 2O-causality. Based on this fictional/incorrect/counterfactual assumption/imagination, by default, the semantics of the natural language further fictionally/incorrectly/counterfactually assumes/imagines that these 2O-subject-ghosts are playing a multiplayer game (with each other) as players – actually this assumption/imagination is also a 2O-causality. Let us call this assumed/imagined multiplayer game the 2O-subject-ghost-game. (BTW, the context of the 2O-SM is much richer than the context of the 1O-SM. If the context of the 1O-SM is like a desert or a physics-experiment/dynamic-physical-system, the context of the 2O-SM is like a Disneyland/lucid-dream for the fictional/imagined 2O-subject-ghosts to play a multiplayer game.) The statement “the TMs’ 2O-subject-ghosts are playing a multiplayer game” implies that “I am automatically/unintentionally solving a problem which is being represented by a multiplayer game which is being played by the TMs’ 2O-subject-ghosts – I am automatically/unintentionally using my 2O-causalities (about the 2O-subject-ghosts) to solve an (imagined) problem about *the 2O-subject-ghosts (which are 2O-cause symbols within the context of this problem)*.” The programs of vertebrate brains (as TMs) can cooperate with each other to solve such an imagined problem together, based on the context of such an imagined multiplayer game – the program of every vertebrate brain innately imagines this problem/game by “design”. In a sense, this imagined multiplayer game is “designed” by Darwinian natural selection – the program of every vertebrate brain is “designed” to play this imagined multiplayer game automatically/unintentionally using *its 2O-causalites (about the subjectively/intracorporeally modeled/simulated/represented 2O-subject-ghosts/symbols).* Its 2O-causalities define/set a subjective/intracorporeal relationship/situation among the subjective/intracorporeal 2O-subject-ghosts/symbols.

The control logic of a TM’s program actually handles the 2O-subject-ghosts/2O-causes – a 2O-subject-ghost is a 2O-cause symbol within the context of the problem being solved by the TM’s program. For example, when the control logic of a TM’s program concerns about a BB, actually the control logic is handling the 2O-subject-ghost of this BB.

In a problem being solved by a TM’s program, the TM’s program uses a 2O-subject-ghost to represent each subjective-object – the context of this problem is the 2O-SM. If the TM uses a 2O-subject-ghost to represent each BB, it becomes a new problem – the context of the new problem is the 1O-SM.

The control logic of the program of a TM (e.g., a human brain) might counterfactually/incorrectly believe that every potential/mental/intracorporeal situation-option has a nonzero Bayesian probability to happen objectively in the objective-reality. That’s why the TM’s program might (automatically/unintentionally) try to identify a 2O-subject-ghost who has the maximum Bayesian probability to be responsible for the happening (or *not* happening) of a situation-option – this 2O-subject-ghost is subjectively identified (by the TM’s program) to be the 2O-cause of the happening (or *not* happening) of this situation-option.

In the present article, I do not prove the existence of myself to myself, like *what René Descartes did (i.e., “I think, therefore I am”)*. In contrast, I proved to myself that *myself (as a 2O-subject-ghost)* does not actually/objectively exist in the objective-reality – the existence of *myself (as a 2O-subject-ghost)* is actually/objectively my physical brain’s subjective/intracorporeal imagination/supposition/postulation/simulation. The human brain uses a neural underpinning (this neural underpinning should be able to physically interact with *the phase precession in the human hippocampus and entorhinal cortex [85] (i.e., the objective-form of the human brain’s 2O-geometric-SM)*) to represent *myself (as a 2O-subject-ghost)* intracorporeally, and then the human brain claims that “I exist” in natural language – the human brain uses another neural underpinning to intracorporeally represent the meaning of the term “exist”. When the human brain says the sentence “I exist”, the term “I” in this sentence actually/objectively refers to a neural underpinning in this human brain. So, if the human brain is actually a philosophical zombie (who does not have access to any quale), it will still *honestly* claim that “I exist” or “I think, therefore I am”, because it has all the required neural underpinnings to make such claims. In other words, if Descartes was a philosophical zombie, he would still *honestly* write down the famous sentence “I think, therefore I am”.

In the context of my 2O-SM, every person (including myself) is a 2O-subject-ghost (which is a subset of my mind). In the objective-reality, every person (including myself) is actually/objectively a philosophical zombie (which is a subset of the objective-reality).

In a TM’s 2O-SM, a subjective-object (as the 2O-object) is 2O-controlled/2O-driven by itself (as the 2O-subject) – this statement reflects a postulation of common human’s theory of mind.

In a TM’s 1O-SM, a subjective-object is not 1O-controlled/1O-driven by *itself (as the so-called “2O-subject”)*, but only 1O-controlled/1O-driven by the 1O-function and the initial state of the 1O-parallel-computing-automaton.

In a TM’s 2O-SM, a TM (as the 2O-object) is 2O-controlled/2O-driven by its goal/aim/task (as the 2O-subject) – this statement reflects a postulation of common human’s theory of mind.

In a TM’s 1O-SM, a TM is not 1O-controlled/1O-driven by *its goal/aim/task (as the so-called “2O-subject”)*, but only 1O-controlled/1O-driven by the 1O-function and the initial state of the 1O-parallel-computing-automaton.

In a 2O-causality, the 2O-cause situation *2O-causes/2O-controls/2O-drives/2O-decides/2O-chooses* the 2O-effect situation. However, both the 2O-cause situation and the 2O-effect situation are actually only 1O-fated by the initial state and the 1O-function of the 1O-parallel-computing-automaton. (Or in other words, the objective-state-evolution of every BB is completely autonomous.) This is obvious from the viewpoint of a 1O-omniscient-external-observer. The physical process to establish the 2O-cause situation is 1O-fated by the 1O-function. This physical process does not include the contribution from a 1O-breaker/2O-subject-ghost, although it (incorrectly/counterfactually) feels like that the contribution from a 1O-breaker/2O-subject-ghost is included. The initial state and the 1O-function of the 1O-parallel-computing-automaton give birth to both the 2O-cause situation and the 2O-effect situation. So, the 2O-cause situation and the 2O-effect situation are like siblings – the 2O-cause situation does not give birth to the 2O-effect situation. The 2O-cause situation happens earlier than the 2O-effect situation, but it does not mean that the 2O-cause situation gives birth to the 2O-effect situation. The (actual) 1O-cause of the 2O-effect situation is not the 2O-cause situation, but the initial state and the 1O-function of the 1O-parallel-computing-automaton – *the 2O-cause situation has no 1O-control over the 2O-effect situation*. Every situation is only caused by the initial state and the 1O-function of the 1O-parallel-computing-automaton, not caused by any other situation. The 2O-cause situation even has no 1O-control over itself. So, the 2O-cause situation is incorrectly/counterfactually/fictionally identified/imagined/fictionalized to be the 2O-cause of the 2O-effect situation – the 2O-causality is fictionally invented. (1O-fated by the 1O-function and the initial state of the 1O-parallel-computing-automaton, the TM automatically/unintentionally uses the fictionally invented 2O-causality. The statement “the TM (automatically/unintentionally) uses the (fictionally invented) 2O-causality” itself is my brain’s fictionally invented 2O-causality. The existence of the TM/2O-causality is my brain’s fictionally invented 2O-causality – the TM/2O-causality does not actually/objectively exist. The TM/2O-causality only exists in my 2O-SM – they do not exist in my 1O-SM.) So, the so-called *“2O-causes/2O-controls/2O-drives/2O-decides/2O-chooses”* (in the statement “the 2O-cause situation *2O-causes/2O-controls/2O-drives/2O-decides/2O-chooses* the 2O-effect situation”) is actually a generalized *illusion of control*. This generalized *illusion of control* is actually a TM’s Bayesian model of the 2O-cause (as a 2O-SM symbol) and the 2O-effect (as another 2O-SM symbol), and is actually the TM’s automatically/unintentionally imagined/postulated/fictionalized Bayesian probability of the causal relationship between the 2O-cause situation and the 2O-effect situation – this Bayesian probability is narrated by natural language in the TM’s internal monologue. This Bayesian probability defines a control logic of the TM’s program – this Bayesian probability works as part of the TM’s program. The control logic of the TM’s program relies on this Bayesian probability. Based on this Bayesian probability, the TM's Bayesian model might be able to make good (but unreliable) forecasts/retrodictions in the objective-reality. An (objective) situation in the objective-reality, is represented by a 2O-SM symbol in the TM’s 2O-SM. Actually, in the objective-reality, the 2O-cause situation and the 2O-effect situation have no causal relationship – the actual probability of the causal relationship between the 2O-cause situation and the 2O-effect situation is *0*.

(For example, a dog sees food after bell just by coincidence – the bell and the food have no causal relationship. More generally, actually, in every 2O-causality, the 2O-cause situation happens before the 2O-effect situation just by coincidence. But a TM’s program does not treat the coincidence as a coincidence, instead, the TM’s program treats the coincidence as the evidence/proof/clue of a causality. Because the TM learns from the coincidence by machine learning – the TM’s program is created/adjusted through machine learning. Through machine learning (i.e., pattern recognition), the TM recognizes a causality/pattern from the coincidence, and then the TM will use this recognized causality/pattern in its future cognitive tasks, as if that the coincidence is not a coincidence – the TM is 1O-fated by the 1O-function to do this. 1O-fated by the 1O-function, the TM has to learn from the coincidence automatically/unintentionally, and has to use the causality/pattern (learnt from the coincidence) in its future cognitive tasks automatically/unintentionally. The causality/pattern (learnt from the coincidence) might work well in the TM’s future cognitive tasks – that’s why the causality/pattern looks plausible to the TM.)

(If a 1O-breaker can actually make a 2O-cause situation to disappear in a 1O-parallel-computing-automaton (by hacking the 1O-parallel-computing-automaton), and if the 2O-causality can be deductively inferenced from the 1O-function only, the 2O-effect situation should disappear in the hacked 1O-parallel-computing-automaton. But it does not necessarily mean that the 2O-cause situation *actually* causes the 2O-effect situation. For example, when my finger pushes a stationary billiard ball, the billiard ball moves. Analogously, when a wind pushes a stationary sail, the sail moves. If a 1O-breaker can *actually remove a wind’s push (e.g., by actually removing some air molecules (from the wind) before these air molecules contacts/touches the sail)* from the U-system (by hacking the U-system), the stationary sail should not move. Analogously, if a 1O-breaker can *actually remove my finger’s push (e.g., by actually removing my finger before it contacts/touches the billiard ball)* from the U-system (by hacking the U-system), the stationary billiard ball should not move. (When a human brain mentally visualizes this thought experiment, this human brain will learn a 2O-causality from this thought experiment. In this 2O-causality, the objective-state-evolution of the wind/finger is the 2O-cause situation, while the objective-state-evolution of the sail or the billiard ball is the 2O-effect situation. Within the context of this 2O-causality, it subjectively feels like that the wind/finger is more free/flexible/active than the sail or the billiard ball. But the wind/finger/sail or the billiard ball is just a set of BBs. 1O-controlled/1O-driven by the 1O-function, no BB is actually/objectively more/less free/flexible/active than any other BB, no matter it is in a wind/finger/sail, a billiard ball, a Gosper glider gun, or a pattern being shot by a Gosper glider gun. “Neither the flag nor the wind is moving, but it is the heart of the benevolent that is moving. [109]” – Hui-neng.) But this thought experiment does not necessarily mean that my finger’s push *actually* causes the movement of the billiard ball. “My finger does not push the stationary billiard ball” – this is a mental/intracorporeal situation-option which cannot be actually chosen by *my brain (which is not a 1O-breaker*) in the objective-reality, because my finger actually pushes the stationary billiard ball in the objective-reality. Although my brain knows that my finger’s push 2O-causes the stationary billiard ball to move, my brain actually has no way to prevent my finger from pushing the stationary billiard ball in the objective-reality, because my finger actually pushes the stationary billiard ball in the objective-reality. Although my brain can learn a 2O-causality from this thought experiment, my brain actually has no way to prevent my finger from pushing another stationary billiard ball in the objective-reality in the future, if my finger will actually push another stationary billiard ball in the objective-reality in the future. *My brain’s (intracorporeal) learning (or more generally, anything happened inside my brain physically)* will not prevent any physical-event from happening in the objective-reality (extracorporeally), because *my brain’s (intracorporeal) learning (or more generally, anything happened inside my brain physically)* is 1O-fated in the objective-reality. Every physical-event is 1O-fated in the objective-reality, no matter it happens inside my brain, or outside of my brain. My brain knows this, because my brain not only mentally visualizes/simulates the situation-options, but also mentally visualizes/simulates my brain’s intracorporeal physical process which visualizes/simulates the situation-options – my brain mentally visualizes/simulates how itself physically works in the objective-reality. My brain's program mentally visualizes/simulates how itself physically executes in the objective-reality.)

The 2O-cause situation and the 2O-effect situation actually/objectively have nothing to do with each other – the 2O-effect situation actually/objectively has nothing to do with the 2O-cause situation. In the TM’s Bayesian model, the causal relationship between the 2O-cause (symbol) and the 2O-effect (symbol) is represented by a number between 0 and 1 – a number to represent the Bayesian probability. The 2O-cause (symbol) has a nonzero Bayesian *probability* to 2O-cause/2O-control/2O-drive/2O-decide/2O-choose the 2O-effect (symbol) – *the 2O-cause (symbol) has 2O-control over the 2O-effect (symbol)*. So, logically speaking, the 2O-effect (symbol) has exactly the *same* nonzero Bayesian probability to 2O-cause/2O-control/2O-drive/2O-decide/2O-choose the 2O-cause (symbol). The 2O-cause situation happens earlier than the 2O-effect situation, that’s why the 2O-cause situation is labeled to be the “cause” in natural language.

When a TM postulates that a physical-event 2O-causes another physical-event, it draws a virtual arrow from the former physical-event to the latter physical-event in its mind. When the TM thinks of many physical-events, the TM draws many virtual arrows in its mind. Most virtual arrows are in the same direction – this direction is postulated by the TM to be the direction of *time*. Based on this direction, a 2O-cause situation is defined by the TM to be a physical-event which happened *earlier* than a 2O-effect situation. The TM uses this direction when planning its own work. For example, when a TM has a goal/aim situation to achieve, the TM tries to figure out a prerequisite situation of the goal/aim situation (actually, the prerequisite situation is mentally visualized by the TM automatically/unintentionally), and then tries to make the prerequisite situation to happen. (For example, a person tries to take on the socks first, before taking on the shoes. Another example, a person tries to buy a lottery, in order to win the lottery. Another example, a child tries to send a letter to Santa Claus, in order to get a present from Santa Claus.) But apparently, it does not mean that the prerequisite situation (of the goal/aim situation) can 2O-cause the goal/aim situation to happen.

If physical-event "A" happens earlier than physical-event "B", it does not mean that the happening of "A" contributes to the happening of "B", because both "A" and "B" are 1O-fated to happen. So, the virtual arrow from "A" to "B" (in a TM’s mind) is actually meaningless/fictional/counterfactual.

In the context that every physical-event/state in the future is 1O-fated, we can imagine a 1O-parallel-computation/1O-parallel-computing-automaton (e.g., a U-system) to be a single magical crystal ball which *already* contains a finished script/story/book/simulation about every physical-event/state/subjective-object in the future.

In the context that every physical-event/state is 1O-fated, the meaning of time, state or space is different – time, state or space is only intracorporeally used by a TM to subjectively/mentally define one essentially/actually/objectively indivisible evolving objective-reality as two or more adjacent evolving physical-events/states/subjective-objects (e.g., the TM itself and the TM’s environment). Objectively, the objective-evolution of an objective-reality (e.g., a Nonstochastic/Stochastic Game of Life system) is essentially/actually indivisible – the objective-reality is essentially/actually a single physical-event/subjective-object. But a TM subjectively/mentally/counterfactually/fictionally/virtually divides it into physical-events, states or subjective-objects in the TM’s intracorporeal MM of the objective-reality, which gives rise to the subjective/mental concept of time, state and space. (An AlphaGo clone subjectively/mentally/counterfactually/fictionally/virtually divides *it (i.e., the objective-evolution of the objective-reality)* into movements (of a board game Go) in the AlphaGo clone’s intracorporeal MM of the objective-reality. A TM is an observer, who can partition whatever it wants, by the control logic of its program. The partition of the objective-reality which is directly 2O-controlled/2O-driven by the control logic of a TM’s program, is treated (by the control logic of the TM’s program) as the TM itself; the rest of the objective-reality, is treated (by the control logic of the TM’s program) as the TM’s environment.) The TM failed to further divide a BB – that’s why the TM calls it the BB (of the objective-reality). Actually, only when a TM has a subjective/mental concept of separated/divided physical-events/states/subjective-objects, the TM can have a subjective/mental concept of time/state/space based on this subjective/mental division. In other words, the mental ability to understand the concept of time/state/space, is based on the mental ability to divide an (objectively indivisible) objective-reality into two or more physical-events/states/subjective-objects. (When I claim that the objective-reality is “indivisible”, actually I am using a single 2O-subject-ghost to represent the whole objective-reality.) The subjective/mental concept of time, state and space maps to something within the context/scope of a subjective/intracorporeal MM (of the TM). The subjective/mental concept of time, state and space is used (by the TM) to subjectively/intracorporeally model the objective-evolution of the objective-reality, but the TM has no way to know whether time/state/space actually/objectively exists in the objective-evolution of the objective-reality or not, because the TM does not have direct access to the objective-evolution of the objective-reality – the TM only has direct access to its own subjective/intracorporeal MM (of the objective-evolution of the objective-reality). Similarly, an AlphaGo clone subjectively/intracorporeally models the objective-evolution of *its objective-reality (i.e., the universe)* to be an evolving Go board, but the AlphaGo clone has no way to know whether the objective-evolution of its objective-reality is actually an evolving Go board or not – we humans know that the objective-evolution of the universe is not an evolving Go board.

A TM can use a single 2O-subject-ghost to represent the whole objective-reality. Alternatively, a TM can use a 2O-subject-ghost to represent each BB/subjective-object. Actually, every BB is a subjective-object; the whole objective-reality is a subjective-object. Anyway, when the TM is making a forecast, the TM needs to use a 2O-subject-ghost to represent each subjective-object. In other words, the control logic of the TM’s program actually concerns about the subjective-objects – the control logic of the TM’s program can deal with any subjective-object. However, when the TM’s program is making a forecast, usually some of its 2O-causalities (in its control logic) does not accurately treat the subjective-objects as ordinary/plain/nonsignificant subjects/objects in a physics-experiment/dynamic-physical-system.

When a TM is considering a 2O-causality, it believes that the 2O-cause situation *should* happen before the 2O-effect situation, which is fictional – "the 2O-cause situation 2O-causes/2O-controls/2O-drives/2O-decides/2O-chooses the 2O-effect situation" is a fictional/counterfactual belief. In this sense, when considering the 2O-cause situation and the 2O-effect situation in the spacetime, the TM casually/fictionally mentally considers/visualizes the time factor/dimension, without exhaustively mentally considering/visualizing the objective-state-evolution of every BB in the spacetime. Actually, retrocausality or backwards causation is possible.

For each specific 2O-relationship (e.g., the 2O-relationship between a TM's own activity and the global warming), two TMs might assign different Bayesian probabilities to it (in their Bayesian models respectively). That’s why the two TMs’ behaviors might be significantly different under the same scenario/setting.

The Bayesian probability (of a 2O-relationship) assigned by a TM’s Bayesian model is relatively stable over time – a TM’s Bayesian model is relatively stable over time. So, a TM can use theory of mind to estimate the Bayesian probability (of a 2O-relationship) assigned by another TM’s Bayesian model, based on the latter TM’s past behavior, and then the former TM can use the estimated Bayesian probability to roughly forecast the latter TM’s future behavior under a specific scenario/setting.

In this case, the former TM’s estimated Bayesian probability is 1O-fated; the former TM’s rough forecast is 1O-fated; the latter TM’s future behavior is 1O-fated. So, the gap between the former TM’s rough forecast and the latter TM’s future behavior is 1O-fated. The former TM and the latter TM can be the same TM [57].

In a TM’s Bayesian model, a subjective-object (as the 2O-subject) has a nonzero Bayesian probability to *2O-control/2O-drive* another subjective-object (as the 2O-object), which means that the objective-state-evolution of the former subjective-object (as the 2O-cause situation) has a nonzero Bayesian probability to 2O-cause/2O-control/2O-drive/2O-decide/2O-choose/branch the objective-state-evolution of the latter subjective-object (as the 2O-effect situation) – this is actually a special form of the 2O-causality.

The objective-state-evolution of the 1O-parallel-computing-automaton is completely 1O-fated by the 1O-function. But when a TM uses its Bayesian model, the TM counterfactually feels like that the objective-state-evolution of the 1O-parallel-computing-automaton is controlled/driven by the TM’s 2O-causalities – the TM counterfactually postulates that the objective-state-evolution of the 1O-parallel-computing-automaton is controlled/driven by the TM’s 2O-causalities.

No matter what 2O-causalities a TM’s program 2O-uses, it will not 1O-change the 1O-parallel-computation. (Similarly, no matter what 2O-causalities a 1O-external-observer uses, it won’t 1O-change the 1O-parallel-computation.) In contrast, the 1O-parallel-computation 1O-determines the 2O-causalities 2O-used by a TM’s program. (But the 1O-parallel-computation does not 1O-determine the 2O-causalities 2O-used by a 1O-external-observer.)

A TM automatically/unintentionally explains a decision based on the semantic information of a set of cherry-picked 2O-causalities. The TM can always explain any decision (e.g., the decision to cherry pick a 2O-causality) based on the semantic information of the 1O-function and the initial state of the 1O-parallel-computing-automaton – the semantic information of all decisions of the TM is already stated in the 1O-function and the initial state of the 1O-parallel-computing-automaton. The semantic information of the outcome of the cherry-picking of 2O-causalities (i.e., which 2O-causalities will be cherry-picked) is already stated in the 1O-function and the initial state of the 1O-parallel-computing-automaton. In case that the TM is an animal brain, the single potential-outcome of the cherry-picking (of 2O-causalities) depends on the neural underpinning of all 2O-causalities in the brain.

If two 1O-external-observers both know the state of every BB of a 1O-parallel-computing-automaton since the initial state till now, each of them can give a reason/cause on why a specific physical-event (e.g., a mistake made by a TM) happened, based on her/his own set of 2O-causalities. The two reasons/causes can be different. No matter what reason/cause the said TM or a 1O-external-observer gives, the reason/cause has no influence on the fact that the specific physical-event happened. Both reasons/causes are not the actual reason/cause for the specific physical-event to happen. The actual reason/cause for the specific physical-event to happen, is the 1O-function and the initial state of the 1O-parallel-computing-automaton – the specific physical-event was 1O-fated to happen. No matter what reason/cause the said TM or a 1O-external-observer gives, no subjective-object in the 1O-parallel-computing-automaton could prevent the reason/cause from actually happening – only a 1O-breaker could prevent the reason/cause from actually happening. No matter what reason/cause the said TM or a 1O-external-observer gives, it will not change the future objective-state-evolution of the 1O-parallel-computing-automaton – the future objective-state-evolution of the 1O-parallel-computing-automaton was 1O-fated by the 1O-function and the initial state. The reason/cause given by the said TM, is also 1O-fated by the 1O-function and the initial state. The said TM and the two 1O-external-observers can forecast what will happen in the 1O-parallel-computing-automaton, based on their respective set of 2O-causalities. No matter what forecast each of them made, it will not change the future objective-state-evolution of the 1O-parallel-computing-automaton. The forecast made by the said TM, is 1O-fated by the 1O-function and the initial state.

A TM’s program can use some 2O-causalities to forecast the future of the objective-reality it lives in. It is possible that the forecasted future situation can only happen in a different objective-reality.

On a specific task of relational reasoning, a human brain's 2O-SM cannot use its 2O-causalities to archive better performance than an artificial neural network [61]. In other words, in relational reasoning, a human brain is less reliable than this artificial neural network.

More generally, a TM’s 2O-SM uses 2O-causalities to unreliably model/reason (about) the objective-reality and/or unreliably forecast/guess/foresee/reason (about) the future of the objective-reality.

The statement “TMs postulate/imagine/model/suppose that 2O-causalities are used/postulated/imagined/modeled/supposed by the control logic of each TM’s program” is a 2O-causality used/postulated/imagined/modeled/supposed by the control logic of each TM’s program. The statement “2O-causalities are only endorsed by each other” is a 2O-causality which is only endorsed by other 2O-causalities.

A human brain's cortical language network implements/enables/supports all its 2O-causalities.

In a 1O-parallel-computing-automaton, for each subjective-object, its objective-state-evolution is a time series. The 1O-parallel-computation of each time series (as time goes on) follows the 1O-function objectively. The objective *MM* (aka *mathematical relation*)between any two states on the same time series, is the 1O-function. The objective MM between a state on one time series, and another state on another time series, is the 1O-function. The objective MM between the 1O-parallel-computation of one time series, and the 1O-parallel-computation of another time series, is the 1O-function.

Except the 1O-function which is an objective MM followed by the 1O-parallel-computation of every time series, any other MM between the 1O-parallel-computation of one time series and the 1O-parallel-computation of another time series, is not an objective MM followed by these two 1O-parallel-computations, but only a (subjective) 2O-causality which these two 1O-parallel-computations are modeled/imagined/postulated/supposed to follow, modeled/imagined/postulated/supposed by the control logic of a TM’s program. (A 2O-causality is not an objective MM. Except the 1O-function, every other causality used by the control logic of the TM’s program, is a 2O-causality. In this sense, every 2O-causality is a self-hypnosis; the TM is being hypnotized by every 2O-causality. Only based on the data/information a TM should be able to get/process, its 2O-causalities should be empirical. A TM’s all 2O-causalities as a holistic knowledge of this TM, is decision-oriented.) In this 1O-parallel-computing-automaton, the control logic of the TM’s program is emerged, due to the 1O-parallel-computation of the third time series (which follows the 1O-function objectively). In our 2O-SM, it looks like that the 1O-parallel-computation of the third time series uses the 2O-causality between the 1O-parallel-computations of other two time series, and thus the third time series is imagined/defined to be a TM who uses this 2O-causality in the control logic of its program. Or in other words, any third time series which looks like using a 2O-causality between the 1O-parallel-computations of another two time series, is imagined/defined to be a TM who uses this 2O-causality to forecast the 1O-parallel-computation of the second time series based on the 1O-parallel-computation of the first time series. In this sense, if a third time series always happens to be a relay in between another two time series, this third time series is imagined/defined to be a TM who uses a 2O-causality to forecast the 1O-parallel-computation of the second time series based on the 1O-parallel-computation of the first time series. If this third time series always happens to be a relay in between another two time series, it is due to the 1O-function and the specific local construction of the 1O-parallel-computing-automaton. So, a TM is a specific local construction in the 1O-parallel-computing-automaton which always happens to be a relay in between another two time series, due to the specific construction of the 1O-parallel-computing-automaton. Under this specific construction of the 1O-parallel-computing-automaton, the TM does not have 1O-freedom.

For example, in a Nonstochastic Game of Life system, a NOT-gate [69] reverses the input. The input and output are two time series. In the 2O-SM, the third time series is imagined/defined to be a conventionally-called “NOT-gate”; the third time series is imagined/defined to be a TM which can reverse the input; the objective-state-evolution of the input/output time series reflects a 2O-causality/2O-relationship which is labeled by the symbol “NOT”. The symbol “NOT” represents the 2O-causality/2O-relationship between the imagined input/2O-cause and the imagined output/2O-effect. Actually, in the 1O-SM, besides the 1O-function, the input time series and the output time series have nothing to do with each other – the objective-state-evolution of the output time series is *not caused* by the objective-state-evolution of the input time series. In the 2O-SM, it is counterfactually imagined that the objective-state-evolution of the output time series is *caused* by the objective-state-evolution of the input time series – the imagined 2O-causality/2O-relationship between the input time series and the output time series is counterfactual/pareidolic/illusive/delusive/fake. Actually, the imagined 2O-information carried by the input time series, is *imagined* to be 2O-processed by the NOT-gate, into the imagined 2O-information carried by the output time series – the 2O-information and its 2O-procesing are totally a mental imagination/visualization/pareidolia/illusion/delusion. The 2O-information doesn’t actually *move* from the input time series to the output time series, but in our 2O-SM, we feel as if that the 2O-information moves/2O-propagates from the input time series to the output time series – this feeling itself is a 2O-causality. If we hack this Nonstochastic Game of Life system to totally remove the input time series and/or the NOT-gate without affecting the objective-state-evolution of any other BB, the output time series should remain the same, which means that the output time series actually has nothing to do with the input time series and/or the NOT-gate. (In this case, the 1O-function of this Nonstochastic Game of Life system needs to be hacked accordingly.) In the 2O-SM, the NOT-gate is imagined/defined to use the 2O-causality/symbol/2O-relationship “NOT” to forecast the output time series based on the input time series; the 2O-causality/symbol/2O-relationship between the input and output is “NOT”. However, in the 1O-SM, the *actual* causality/relationship between the input and output is only the 1O-function, not the 2O-causality/symbol “NOT”. There shouldn’t be any actual “NOT” in the context of our 1O-SM; The symbol “NOT” should be meaningless in the context of our 1O-SM.

A TM’s 2O-SM is the SM of its subjective-reality.

Every TM’s 2O-SM/subjective-reality is completely 1O-fated by the TM’s objective-state-evolution. In other words, every TM’s objective-state-evolution should already state the semantic information of the TM’s 2O-SM/subjective-reality. The initial state and the 1O-function of the 1O-parallel-computing-automaton should already state the semantic information of every TM’s objective-state-evolution. So, the initial state and the 1O-function of the 1O-parallel-computing-automaton should already state the semantic information of every TM’s 2O-SM/subjective-reality.

Logically speaking, if we can replace every BB in a TM (e.g., an animal brain) one by one, without change/influence the state of any BB in this TM, this TM’s subjective-reality should remain intact.

A TM’s perception/imagination/postulation/knowledge/description/narration/visualization of its own subjective-reality is only based on the data/information the TM should be able to get/process.

The relationship between a TM’s subjective-reality and the TM (as a subjective-object) is like “the ghost in the machine [23]” – let us call this kind of “ghost” the subjective-reality-ghost.

When a TM observes a subjective-object (e.g., the TM itself) talking about its subjective-reality in human language, this observation can’t prove that the subjective-object has subjective-reality; when a TM postulates/believes that a subjective-object (e.g., the TM itself) has subjective-reality, this postulation/belief can’t prove that the subjective-object has subjective-reality.

A TM has no way to know whether another thing/subjective-object actually has subjective-reality or not. A TM won't have a valid/correct/factual *algorithm* to judge whether a thing/subjective-object (e.g., the TM itself) has subjective-reality or not.

A TM can only experience its own subjective-reality – a TM can’t experience the subjective-reality of any other thing/subjective-object. So, it’s logically possible that my brain is the only thing/subjective-object which has subjective-reality, while no other thing/subjective-object has subjective-reality – this is the position of solipsism.

The “extreme” positions that the subjective-reality of a TM plays no causal role (‘epiphenomenalism’) or that any cognitive/behavioural activity can in principle be carried out without the subjective-reality (‘conscious inessentialism’) are counterintuitive but hard to 2O-disprove [45] – there is no valid evidence to 2O-disprove that yet. These “extreme” positions claim that the subjective-reality of a TM has no function [46] – this claim is valid/correct/factual. A TM (e.g., my brain) is completely objectively controlled/driven by the 1O-function, no matter the TM has subjective-reality or not.

The statement “when a (subjective) MM is being used by a TM within its 2O-processing, the content of the MM is being ‘subjectively experienced’ by the TM; the subjective-reality is actually the intracorporeal use of a MM by a TM within its 2O-processing” is a 2O-causality used by my brain in the present article.

A TM’s subjective-reality is the TM’s subjective MM of an objective mathematical entity/structure (i.e., the TM’s 1O-parallel-computing-automaton). So, the subjective MM has no way to change the objective-state-evolution of the subjective MM itself. The subjective MM is 2O; the objective mathematical entity/structure is 1O. So, the subjective MM is not part of the objective mathematical entity/structure. For example, the subjective MM is not part of the TM’s objective construction (in the TM’s 1O-parallel-computing-automaton). So, the subjective MM has no way to change the 1O-parallel-computation of the TM’s 1O-parallel-computing-automaton. So, there is no way for another TM to 2O-prove the objective existence of the said TM’s subjective MM (i.e., the said TM’s subjective-reality).

For example, let us suppose that there are only three BBs in a 1O-parallel-computing-automaton, and let us postulate/imagine that a BB has a MM/subjective-reality/SM which is a geometric model of a (Euclidean) triangle with these three BBs as its vertexes. As a subjective MM, this Euclidean triangle has no way to change the objective-state-evolution of the Euclidean triangle itself, and has no way to change the 1O-parallel-computation of the 1O-parallel-computing-automaton.

Only based on the data/information a TM should be able to get/process, the 1O-function of its 1O-parallel-computing-automaton should be empirical. The 1O-function as a knowledge of a TM, is not decision-oriented.

“BBs are the only medium for the 2O-propagation of 2O-information; 2O-information 2O-propagates from one subjective-object (as output) to another subjective-object (as input), and causes 2O-processing in the latter subjective-object; 2O-information is 2O-processed within the latter subjective-object” is only a (subjective) 2O-causality. BBs, 2O-information, 2O-propagation/2O-processing and subjective-objects are modeled/imagined/postulated/supposed to follow this 2O-causality. Actually, in 1O-parallel-computation, 1O-information does not propagate from one BB (as output) to another BB (as input); the state change of one BB (over a time period) has nothing to do with the state change of any other BB (over the same time period); the state change of each BB is independent. The 2O-propagation/2O-processing is actually caused by the 1O-parallel-computation, not caused by the 2O-information (as input). 2O-information and its 2O-propagation/2O-processing are subjective only; 2O-information and its 2O-propagation/2O-processing are actually a subjective pareidolia/MM of human brain. In case that the 1O-parallel-computing-automaton is a Nonstochastic/Stochastic Game of Life system, this conclusion will be easier to understand for human brains.

For example, when my retina captures a photon from a star, by 2O-processing 2O-data/2O-information, my brain produces a (subjective) MM of the star. Actually, my MM is caused by the 1O-parallel-computation of the BBs in my brain (which is a subjective-object), not caused by the (sensory) 2O-data/2O-information being got/taken/received from any other subjective-object. If “God” somehow hacks the universe to totally remove the photon without affecting the objective-state-evolution of any other BB, my brain will still produce the same MM. (In this case, 1O-function needs to be hacked accordingly.) More generally, if “God” somehow hacks the universe to remove every BB outside of my brain without affecting the objective-state-evolution of any BB within my brain, my brain will still produce the same MM. So, as a subjective-object, my brain has no way to 2O-prove/2O-disprove the existence of any other subjective-object.

We human brains can observe a TM 2O-processing 2O-information in a Nonstochastic/Stochastic Game of Life system. When we are observing this TM, this TM acts as if that it has a subjective MM. So, we can postulate that this TM has a subjective MM. Actually, the existence of the subjective MM is a 2O-causality used by human brains.

Similarly, I can observe a human brain 2O-processing 2O-information in the universe. When I am observing this human brain, this human brain acts as if that it has a subjective MM. So, I can postulate that this human brain has a subjective MM. Actually, the existence of the subjective MM is a 2O-causality used by my brain. This human brain can be my own brain.

Similarly, in a Nonstochastic/Stochastic Game of Life system, a TM can observe another TM 2O-processing 2O-information. When the former TM observing the latter TM, the latter TM acts as if that it has a subjective MM. So, the former TM postulates that the latter TM has a subjective MM. Actually, the existence of the subjective MM is a 2O-causality used by the former TM. The two TMs can be the same TM.

Only based on the data/information a 1O-omniscient-external-observer (who is located outside of a *finite* 1O-parallel-computing-automaton) should be able to get/process, this 1O-omniscient-external-observer is capable to reliably forecast a finite time 1O-parallel-computation based on the 1O-function; this 1O-omniscient-external-observer should say that the 1O-parallel-computation is forecastably-1O-fated – the 1O-omniscient-external-observer can use a generalized algorithm to reliably forecast the 1O-fate of the 1O-parallel-computing-automaton/1O-parallel-computation*.* For example, when a reader reading the present article inside the universe, this 1O-omniscient-external-observer should say that the (actual) 1O-effect of reading the present article (by this reader) is forecastably-1O-fated.

Let us suppose that a TM’s program within the 1O-parallel-computing-automaton is capable to use a general algorithm to reliably forecast the 1O-parallel-computation. Then, we can suppose that there is another TM in the 1O-parallel-computing-automaton. Every possible program-input pair can be given to the latter TM’s program, while the former TM’s program should be able to use the general algorithm to forecast whether the latter TM’s program will finish running, or continue to run forever. Under this setting, the general algorithm can solve the halting problem for all possible program-input pairs. However, such a general algorithm cannot exist [34], which means that our first supposition is counterfactual. So, according to computability theory, it is impossible for a TM’s program (within the 1O-parallel-computing-automaton) to use a general algorithm to reliably forecast the 1O-parallel-computation; the TM’s program should say that the 1O-parallel-computation is unforecastably-1O-fated – it is impossible for the TM’s program to use a general algorithm to reliably forecast the 1O-fate of the 1O-parallel-computing-automaton/1O-parallel-computation. (So, the TM’s program itself is not a general algorithm to reliably forecast the 1O-fate – the TM’s program has no way to use itself as a general algorithm to *always* reliably forecast the 1O-fate. The TM’s program itself will know the 1O-fate after it happens.)

For example, if a TM’s program in a Nonstochastic/Stochastic Game of Life system discovered the 1O-function of the system, the TM’s program should say that the 1O-parallel-computation is unforecastably-1O-fated.

Another example, when a reader reading the present article inside the universe, this reader should say that the (actual) 1O-effect of reading the present article (by this reader) is unforecastably-1O-fated.

If a TM’s program can use a general algorithm to reliably forecast the 1O-parallel-computation, the TM’s program can make a decision based on this algorithm/forecast, and can explain this decision based on this algorithm/forecast (e.g., “Based on a general algorithm, I reliably forecasted that I would choose this option, that’s why I choose this option.”). But in fact, it is impossible for a TM’s program to use a general algorithm to reliably forecast the 1O-parallel-computation. So, it is impossible for a TM’s program to make a decision based on such a reliable forecast. That’s why every TM’s program has to use its 2O-causalities/2O-SM to *explain* its own decision.

For example, a TM’s program might say that “I can't reliably forecast the option (which I will choose) based on a general algorithm. So, I have to choose the option based on a 2O-causality*.*”. In this case, a 1O-omniscient-external-observer should be able to reliably forecast which 2O-causality will be mentally chosen by this TM’s program to explain its decision. But the TM’s program itself is unable to reliably forecast which 2O-causality will be mentally chosen by itself to explain its decision, before the 2O-causality is actually mentally chosen by the TM’s program. Mentally choosing a 2O-causality to explain its decision, is actually the second decision for the TM’s program to make. The 2O-causality which is mentally chosen by the TM’s program to explain its first decision, is not the 1O-cause for the TM’s program to make the first decision, but only a 2O-cause for the TM’s program to make the first decision. The TM’s both decisions are actually made by the 1O-function, not by *the TM’s program “itself” (as the 2O-subject-ghost/subjective-reality-ghost)* – this is obvious from the viewpoint of a 1O-omniscient-external-observer. So, either decision does not change the objective-state-evolution of the objective-reality. In this sense, which 2O-causality is mentally chosen by the TM’s program to explain its first decision, does not actually matter. In other words, the 2O-cause for the TM’s program to make the first decision, does not actually matter – either decision does not actually matter.

If a human brain can accept that a 1O-parallel-computation is forecastably-1O-fated/unforecastably-1O-fated in case that the complexity of the 1O-parallel-computing-automaton is relatively *low* (e.g., a U-system which includes a cerebral organoid; a Nonstochastic/Stochastic Game of Life system which includes a simple TM), logically speaking, this human brain should also accept that a 1O-parallel-computation is forecastably-1O-fated/unforecastably-1O-fated in case that the complexity of the 1O-parallel-computing-automaton is relatively *high* (e.g., a U-system which includes one human brain; the universe).

When a TM’s program uses the 2O-SM to compute, it has a much lower computational complexity than using the 1O-SM to compute.

When the complexity of a 1O-parallel-computing-automaton is relatively high, a human brain tends to switch to use the 2O-SM (instead of the 1O-SM/1.5O-SM) to model the 1O-parallel-computing-automaton – I agree that this tendency is annoying.

Only based on the data/information a 1O-external-observer should be able to get/process, the universe evolves like following a finished script/story/book/simulation which described the objective-state-evolution of every BB. I am following this script/story/book/simulation in real time. No one in the 1O-parallel-computing-automaton has read/watched this script/story/book/simulation beforehand.

When my brain is reading/watching this script/story/book/simulation, 2O-causalities are automatically/unintentionally emerged/created based on the past plots in this script/story/book/simulation, to be used to unreliably forecast/guess/foresee/reason the upcoming plot in this script/story/book/simulation. Postulating/perceiving/imagining itself to be the protagonist in this script/story/book/simulation, my brain automatically/unintentionally 2O-makes 2O-decisions based on the unreliable forecast/guess (of the 2O-SM), to 2O-control/2O-drive the protagonist in this script/story/book/simulation.

The objective-state-evolution of the plots of this script/story/book/simulation (which cannot be reliably forecasted by the objective/physical construction of my brain based on the past plots) is represented/simulated/modeled by the 1O-SM of my brain.

The 2O-SM uses 2O-causalities; the 1O-SM uses 1O-function. The 2O-SM is decision-oriented; the 1O-SM is not decision-oriented. The 2O-SM is a pareidolia constructed by the 1O-parallel-computation; the 1O-SM is not a pareidolia.

Using a single mathematical function (i.e., the 1O-function), the 1O-SM is a coherence theory of truth, or in other words, the 1O-SM is not self-contradictory.

As a MM, a 2O-causality might be contradictory to another 2O-causality. Using a set of 2O-causalities, usually a TM’s 2O-SM is not a coherence theory of truth, or in other words, usually a TM’s 2O-SM is self-contradictory.

For a TM, its 1O-SM is a belief system; its 2O-SM is another belief system.

A TM plans its pending action, based on its conceptualized (aka modeled/abstracted/summarized/imagined/narrated) union (aka collection) of 2O-categories of situations to model/represent an uncertain future state of its 2O-SM. For example, “I will catch the last bus tonight” and “I will miss it” are a union of two 2O-categories. Each 2O-category roughly summarizes uncountable actual situations. Uncountable actual situations are subjectively/mentally divided into a limited number of 2O-categories. Each 2O-category is a potential/mental/intracorporeal situation-option/branch. Each 2O-category is actually a *large-scale-SM* regarding an overall future situation for the TM; each large-scale-SM is a symbol being used by the 2O-SM.

When a TM forecasts the future based on the 2O-categories of situations and the TM’s 2O-causalities, its forecast is actually unreliable. For example, when a TM imagines/forecasts/guesses “what would happen if I disappear?”, the TM might imagine a number of potential/mental/intracorporeal situation-options. What will actually happen if the TM disappears, only depends on the actual state of the 1O-parallel-computing-automaton at the moment the TM disappears. A 1O-external-observer can only reliably forecast it by actually simulating it. Actually, when a 1O-external-observer simulates it, the 1O-external-observer needs to precisely know when the TM disappears, and how the TM disappears. It might make a big difference if the TM disappears at a slightly different time, or disappears at a slightly different way – butterfly effect. (Actually, if I can somehow objectively move my finger in a slightly different way (comparing to the way my finger actually moves) like what a 1O-breaker can do, it might make a big difference to the objective-state-evolution of the universe.) So, from the viewpoint of the TM, what will actually happen if the TM disappears, at some degree depends on when the TM disappears, and at some degree also depends on how the TM disappears. But the TM is incapable to imagine/forecast/guess the future at this level of precision (based on the 2O-categories of situations, and based on the TM’s 2O-causalities) – both the 2O-categories (of situations) and the 2O-causalities are actually too rough to make a precise/reliable forecast.

From the viewpoint of the TM, based on its current knowledge/ignorance, each 2O-category has the 2O-freedom to happen in the future. Being the 1O-parallel-computation, the actual future is 1O-fated; the objective-state-evolution of the TM’s 1O-SM is 1O-fated. But being part of the 1O-parallel-computation, the 2O-processing of the TM’s program is incapable to forecast which 2O-category will actually happen in the future, so it has to use a union of two or more 2O-categories together as a MM to model/represent a future situation. So, a union of 2O-categories of situations of its 2O-SM (in the future) is used to handle the uncertainty in the TM’s forecast of an uncertain future state of its 2O-SM.

When a TM’s program uses its 2O-SM to unreliably forecast/guess/foresee/reason the future, among the union of all the unreliably forecasted/guessed 2O-categories of future situations, if the TM’s program wishes a specific 2O-category (i.e., a 2O-good 2O-category) to happen, it searches through its 2O-causalities, until it finds a rough 2O-cause (which is a 2O-category of situation) for that specific 2O-category in a 2O-causality (which is a pair of rough 2O-cause and rough 2O-effect), and then the TM’s program tries to 2O-make the rough 2O-cause to happen, while being unsure about the (actual) *1O-effect* of its own (actual) *1O-action (aka objective-state-evolution)* before the 1O-effect (actually) 1O-happens, and also being unsure about the 1O-effect of its *other possible 2O-actions (which won’t 1O-happen in the TM’s 1O-parallel-computing-automaton)*. (For example, right now, a human is unsure about the 1O-effect of a glass of wine she is going to drink, but she will know that later. She is unsure about what she would be doing right now – if she didn’t drink too much wine last night.) During this process, 2O-information is being 2O-processed by the TM’s program. According to computability theory, only based on the data/information the TM’s program should be able to get/process, the TM’s program itself should say that this process is unforecastably-1O-fated. Only based on the data/information a 1O-external-observer should be able to get/process, the 1O-external-observer should say that this process is forecastably-1O-fated. After this process, if that specific 2O-category actually happens, it means that the specific 2O-category is 1O-fated to happen. In the context of the TM’s 2O-SM, the TM’s program successfully 2O-made the specific 2O-category to happen. In the context of the TM’s 1O-SM, the TM’s program did not 1O-make the specific 2O-category to happen, because the specific 2O-category had no way to 1O-avoid happening from the beginning, although the TM’s program was unaware of this fact.

Similarly, if a TM’s program somehow wishes to 2O-avoid a specific 2O-category (i.e., a 2O-bad 2O-category) to happen, and if this specific 2O-category actually does not happen, it means that this specific 2O-category is 1O-fated to not happen. In the context of the TM’s 2O-SM, the TM’s program successfully 2O-avoided the specific 2O-category. In the context of the TM’s 1O-SM, the TM’s program did not 1O-avoid the specific 2O-category, because the specific 2O-category had no way to actually happen from the beginning, although the TM’s program was unaware of this fact.

The situation “a TM’s program can actually 1O-do something other than what it actually 1O-does” is 2O-possible but 1O-impossible. This situation is counterfactual. A TM’s program can actually 1O-do something other than what it actually 1O-does, but only under a *particular* condition, and the *particular* condition is – *if* the TM’s program can actually 1O-do something other than what it actually 1O-does. This particular condition is counterfactual. A TM’s program doesn’t 2O-know what itself will actually 1O-do in advance. So, when it 2O-plans for the future, it 2O-imagines/2O-evaluates two or more possible 2O-actions of itself. Without the help from an actual 1O-breaker (of the 1O-parallel-computing-automaton), at most one of these possible 2O-actions (of itself) is not counterfactual (i.e., other possible 2O-actions can only happen in some different 1O-parallel-computing-automatons), which means that the TM’s program (counterfactually) 2O-supposes/2O-imagines (beforehand) that it can actually 1O-do something other than what itself actually 1O-does in the 1O-parallel-computing-automaton. Then, following the 1O-function of the 1O-parallel-computing-automaton, the TM’s program is 1O-fated to 2O-choose/2O-decide to 1O-do the 1O-fated action. We 2O-believe/2O-imagine that the TM’s program 2O-chooses/2O-decides to 1O-do something. After the TM’s program actually 1O-does what it actually 1O-does, based on this knowledge, the TM’s program 2O-knows *which* 2O-action (of itself) is not counterfactual, and the TM’s program should 2O-agree that it can’t actually 1O-do anything other than what it actually 1O-does, unless the TM was in a different 1O-parallel-computing-automaton which has a different 1O-function or initial state.

In the context of a TM’s 2O-SM, every TM's program can 2O-choose/2O-decide to do something based on its 2O-forecast. It looks as if that the actual designer of each TM's program (if a TM’s program was intentionally designed by a designer) 2O-assumes that the TM’s program can 2O-choose/2O-decide to do something based on its 2O-forecast. When we are using our 2O-SM, it looks as if that every TM 2O-believes/2O-imagines that a TM’s program can 2O-choose/2O-decide to do something based on its 2O-forecast. (For example, within a Nonstochastic Game of Life system, although a TM’s program can’t *actually* choose/decide to do anything, we human brains can (counterfactually) 2O-believe/2O-imagine that, the TM’s program can 2O-choose/2O-decide to do something based on its 2O-forecast. We can accurately simulate/2O-forecast the TM's 1O-action/objective-state-evolution based on its program and its input. Another example, when some robots are playing a (robot) football game in a U-system, although a robot's executable program can't actually *choose/decide* to do anything, we human brains can (counterfactually) 2O-believe/2O-imagine that, the robot's executable program can 2O-choose/2O-decide to do something based on its 2O-forecast. We can reliably simulate/2O-forecast the robot's 1O-action/objective-state-evolution based on its executable program and its input.) In the context of the 2O-SM, in order for the “choosing/deciding” to be “*actual*”, the “choosing/deciding” shouldn't be 1O-fated; the so-called “2O-choosing/2O-deciding” as a concept is only a mental imagination/visualization/pareidolia of *a TM’s 2O-SM (e.g., the 2O-SM of the designer)*. In a 1O-fated 1O-parallel-computing-automaton, there is no subject which is qualified to actually *choose/decide* to 1O-do anything. The “1O-fated 2O-choosing/2O-deciding” is not the *actual* “choosing/deciding”. There shouldn’t be any actual “choosing/deciding” in the context of our 1O-SM; the symbol “choosing/deciding” should be meaningless in the context of our 1O-SM.

During the 1O-parallel-computation of a 1O-parallel-computing-automaton, at any given time, every BB must have a *state* (i.e., a set of objective/physical quantities, such as position and momentum), and only has *one* state;a BB cannot have two or more different states at the same time. That’s why physicists bother to measure the state of a BB. Neither Heisenberg’s uncertainty principle nor many-worlds interpretation implies that a BB has two or more different states at a given moment (in this world among the many worlds).

When we say that a BB has *one* state at a given moment, it means that the BB does not have any other state at this moment. At this moment, among infinite number of all possible states, this BB only have one of them. This BB cannot have two or more states at this moment. According to Heisenberg’s uncertainty principle, a TM (e.g., the brain of a physicist) inside the 1O-parallel-computing-automaton cannot measure the state of this BB without uncertainty – it does not mean that this BB actually/objectively has two or more states at this moment.

At every moment, the *one* state a BB has, is 1O-fated by the 1O-function and the initial state of the 1O-parallel-computing-automaton. Any subjective-object (e.g., the BB itself) does not have the ability/freedom to subjectively choose whichstate the BB should have (from infinite number of all possible states) – every BB within the subjective-object is 1O-controlled/1O-driven by the 1O-function too.

If we suppose that a BB is capable to 1O-do something other than what it actually 1O-does, and if we also suppose that this BB actually 1O-does something other than what it actually 1O-does, then actually this BB is still 1O-doing what it actually 1O-does, as long as we don’t 2O-suppose that this BB is 1O-doing two different things (i.e., 1O-having two different states) at the same time. Even if we 2O-suppose that this BB is actually 1O-doing two different things at the same time, actually this BB is still 1O-doing what it actually 1O-does. The situation “a BB can actually 1O-do something other than what it actually 1O-does” is paradoxical/counterfactual. A BB can actually 1O-do something other than what it actually 1O-does, but only under a *particular* condition, and the *particular* condition is – *if* the BB can actually 1O-do something other than what it actually 1O-does. This particular condition is counterfactual. We don’t 2O-know what a BB will actually 1O-do in advance. So, when we 2O-plan for the future, we 2O-imagine/2O-evaluate two or more possible 2O-actions of the BB. Without the help from an actual 1O-breaker (of the 1O-parallel-computing-automaton), at most one of these possible 2O-actions (of the BB) is not counterfactual, which means that we (counterfactually) 2O-suppose/2O-imagine (beforehand) that the BB can actually 1O-do something other than what it actually 1O-does in the 1O-parallel-computing-automaton. Then, following the 1O-function of the 1O-parallel-computing-automaton, the BB is 1O-fated to 2O-choose/2O-decide to 1O-do the 1O-fated action. We 2O-believe/2O-imagine that the BB, the subjective-object/TM which 2O-contains the BB, the 1O-function, or the 1O-parallel-computing-automaton 2O-chooses/2O-decides to 1O-do something. After the BB actually 1O-does what it actually 1O-does, based on this knowledge, we 2O-know *which* 2O-action (of the BB) is not counterfactual, and we should 2O-agree that the BB can’t actually 1O-do anything other than what it actually 1O-does, unless the BB was in a different 1O-parallel-computing-automaton which has a different 1O-function or initial state.

So, every BB is incapable/powerless to 1O-do anything other than what it actually 1O-does (in the 1O-parallel-computation), and is incapable/powerless to 1O-have any state other than what it actually 1O-has (in the 1O-parallel-computation).

So, every subjective-object (in a 1O-parallel-computing-automaton) is incapable/powerless to 1O-do anything other than what it actually 1O-does (in the 1O-parallel-computation). This is the view of fatalism [27]. When I am using this view, it feels like that I am in a finished-script/finished-story/finished-book/finished-simulation/lucid-dream, and I have no way to change the objective-state-evolution of this finished-script/finished-story/finished-book/finished-simulation/lucid-dream – this is a dissociative/meditation experience.

When we say that (inside a 1O-parallel-computing-automaton) a TM’s program can 2O-avoid a specific 2O-category (of situations), it means that this specific 2O-category is supposed to be avoidable, from the TM’s subjective-perspective. This supposition is counterfactual.

What a TM’s program 2O-does, actually is not 1O-done by the TM’s program itself.

The 2O-SM 2O-postulates that a TM’s 2O-action (i.e., the 2O-action of every BB inside the TM) is 2O-driven/2O-controlled/2O-caused/2O-decided/2O-chosen/branched by the TM’s program, the 2O-decision of the TM’s program, or the TM’s 2O-SM. The TM’s program, the 2O-decision of the TM’s program, or the TM’s 2O-SM is only a 2O-cause of the TM’s 2O-action; it’s only a 2O-causality – this 2O-causality is only a postulation of common human’s theory of mind. (In a 2O-SM, *the TM’s program,* *the 2O-decision of the TM’s program or the TM’s 2O-SM (as the 2O-cause symbol)* has a nonzero Bayesian probability to 2O-cause the TM’s 2O-action (as the 2O-effect symbol) to 2O-change. But actually, in the objective-reality, *the TM’s program, the 2O-decision of the TM’s program or the TM’s 2O-SM (as the 2O-cause situation)* and the TM’s 2O-action (as the 2O-effect situation) have no causal relationship.) Started from the initial state of the 1O-parallel-computing-automaton, the 1O-action/objective-state-evolution of every BB within the TM is only 1O-fated/1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/1O-stated by the 1O-function. So, the 1O-action/objective-state-evolution of every BB within the TM is 1O-unavoidable. So, the specific 2O-category (of situations) is 1O-unavoidable. Similarly, when we are reading the finished script/story/book of a documentary film about a football game, we know that any upcoming plot in this script/story/book is 1O-unavoidable, although a character in this script/story/book does not 2O-know that. (The 1O-action/objective-state-evolution of any BB within a TM is only 1O-fated by the 1O-function, not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by the TM’s program, the 2O-decision of the TM’s program, nor the TM’s 2O-SM. (Or in other words, the objective-state-evolution of every BB is completely autonomous.) So, when a TM is approaching another TM, whether they will have a physical contact, is only 1O-fated by the 1O-function, not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by any TM’s program, the 2O-decision of any TM’s program, nor any TM’s 2O-SM.)

For example, in a Nostochastic Game of Life system, when a Gosper glider gun is shooting another subjective-object, the 1O-action/objective-state-evolution of any BB within the two subjective-objects is only 1O-fated by the 1O-function, not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by any subjective-object. The 1O-action/objective-state-evolution of any BB within the latter subjective-object, is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by any BB within the Gosper glider gun. It looks like that a force from the Gosper glider gun acts on the latter subjective-object to change the latter subjective-object's behavior.

Another example, after my finger follows a decision of my brain to press the button of a device to collide two high-energy photons, the two photons should disappear, and a pair of electron-positron should appear [86]. The 1O-action/objective-state-evolution of any of these four BBs is only 1O-fated by the 1O-function, not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by my brain’s program, the 2O-decision of my brain’s program, nor my brain’s 2O-SM. The 1O-action/objective-state-evolution of one of these four BBs, is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by the 1O-action/objective-state-evolution of any other BB. One of these four BBs is not 1O-controlled/1O-driven by any other BB.

Another example, in the universe, when my finger follows a decision of my brain to push/accelerate/launch/control/drive a stationary billiard ball (i.e., when a force from my finger acts on the stationary billiard ball to push/accelerate/launch/control/drive it), the 1O-action/objective-state-evolution of any BB within the finger/ball is only 1O-fated by the 1O-function, not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by my brain’s program, the 2O-decision of my brain’s program, nor my brain’s 2O-SM. The 1O-action/objective-state-evolution of any BB within the ball, is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by any BB within my finger. Any BB within the ball, is not 1O-controlled/1O-driven by any BB within my finger.

(Analogously, when a wind pushes/accelerates/launches/controls/drives a stationary sail (i.e., when a force from a wind acts on the stationary sail to push/accelerate/launch/control/drive it), the 1O-action/objective-state-evolution of any BB within the wind/sail is only 1O-fated by the 1O-function, not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by wind/God, nor the 2O-decision of wind/God. The 1O-action/objective-state-evolution of any BB within the sail, is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by any BB within the wind. Any BB within the sail, is not 1O-controlled/1O-driven by any BB within the wind.)

My brain’s program feels like that the movement of the BBs within the finger/ball is controlled/driven/caused/decided/chosen/branched by the 2O-decision of my brain’s program – this is a superstition. Analogously, in a well-known experiment, the program of a pigeon’s brain feels like that the behavior of the pigeon’s body controls/drives/causes/decides/chooses/branches the presentation of food [96] – this is a superstition. Analogously, in this experiment, the program of the experimenter’s brain feels like that the clock controls/drives/causes/decides/chooses/branches the presentation of food to the pigeon – this is a superstition. Actually, the 1O-function 1O-controls/1O-drives/1O-causes/1O-decides/1O-chooses the movement of the clock, the presentation of food, the behavior of the pigeon’s body, the learning of the pigeon’s brain, the learning of the experimenter’s brain, and the learning of my brain. Any 2O-causality which conflicts with the 1O-SM/nirvana-experience, is actually a superstition. The pigeon’s brain, the experimenter’s brain, and my brain are all 1O-fated to use/learn some 2O-causalities/superstitions. *My brain (as a 2O-subject-ghost/subjective-object)* is still 1O-fated to use/learn some 2O-causalities/superstitions in the *future*, although *my brain (as a 2O-subject-ghost/subjective-object)* currently knows that these 2O-causalities/superstitions are 2O-causalities/superstitions. *My brain (as a 2O-subject-ghost/subjective-object)* has no way to actually/objectively break/interruptthe 1O-fate– that’s why the 1O-fate is called the 1O-fate.

If I am crossing a road right now, do I still need to look at both sides of the road? The present article is unable to provide a direct answer for this question. (Besides, the control logic of my brain’s program actually has no way to *reliably* forecast whether I will actually look at both sides of the road.) However, the answer for this question does not matter; the answer for this question will not make any actual difference; the answer for this question will not 1O-change anything. Whether I will actually look at both sides of the road, is 1O-fated by the 1O-function. So, *whether I will actually look at both sides of the road (as the 2O-effect)*, is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by *my brain’s answer for this question (as the 2O-cause)*, *my brain’s cognition regarding this question (as the 2O-cause)*, or *the current 2O-decision of my brain’s program (as the 2O-cause).* In other words, *my body’s 1O-action/objective-state-evolution (as the 2O-effect)* is not 1O-controlled/1O-driven/1O-caused by *my brain’s answer for this question (as the 2O-cause)*, *my brain’s cognition regarding this question (as the 2O-cause)*, or *any 2O-decision of my brain’s program (as the 2O-cause)*. My brain’s answer for this question, my brain’s cognition regarding this question, and every 2O-decision of my brain’s program, are 1O-fated by the 1O-function. The 2O-decision of my brain's program, is actually a MM (used by my brain’s program) which is fictionally postulated by my brain’s program (i.e., my brain’s theory of mind module)*.* *Whether I will actually look at both sides of the road (as the 2O-effect)*, is 2O-controlled/2O-driven by *the control logic of my brain’s program (as the 2O-cause)*. But my brain (as the 2O-subject) has no 1O-control over *the control logic of my brain’s program (as the 2O-object).* Although my internal monologue narrates that “my brain controls/drives/causes/decides/chooses/branches its own action” in natural language automatically/unintentionally – it actually means that “my brain (as the 2O-subject/2O-cause) 2O-controls/2O-drives/2O-causes/2O-decides/2O-chooses/branches its own action (as the 2O-object/2O-effect)”. Obviously, this is just my brain’s postmortem explanation based on the context of my 2O-SM. It takes 7 s for the human brain to do such a postmortem explanation for a motor 2O-decision. The clue is that it takes 7 s for the human brain to realize a motor 2O-decision [94], which means that it takes 7 s for the human brain to integrate/add/insert the new motor 2O-decision into the existing context of its 2O-SM (or in other words, it takes 7 s for the human brain to explain the new motor 2O-decision based on the existing context of its 2O-SM; it takes 7 s for the human brain’s theory of mind module to estimate/judge/know (based on the existing context of its 2O-SM) the new motor 2O-decision).

*The control logic of my brain’s program (as the 2O-cause)* is generating the present article (as the 2O-effect) based on the context of my 2O-SM automatically/unintentionally – my internal monologue (as the 2O-cause) is narrating the present article (as the 2O-effect) in natural language automatically/unintentionally. *The control logic of my brain’s program (as the 2O-cause)* is generating my life story (as the 2O-effect) based on the context of my 2O-SM automatically/unintentionally – my internal monologue (as the 2O-cause) is narrating my life story (as the 2O-effect) in natural language automatically/unintentionally. My life story is about the 2O-subject ghosts.

When a TM’s program is reviewing its past experience, the TM’s program can always find uncountable successful cases on 2O-avoiding 2O-categories (of situations). But on the other hand, the TM’s program can also find uncountable failed cases. However, the 1O-parallel-computation can 1O-create new 2O-causalities in the TM’s 2O-SM to explain all these failures.

For a TM’s mutually exclusive SMs, if the TM (limited by the knowledge the TM itself is able to have) has no way to 2O-prove/2O-disprove any of them empirically, these SMs can be called SM-options – for the TM. It’s absolutely fine for the TM to choose to believe any of them.

“What is being forecasted by a TM regarding its own future, is the actual future.” When a TM is postulating this, this postulation is a SM.

“What is being forecasted by a TM regarding its own future, is *not* the actual future.” When a TM is postulating this, this postulation is a SM too. When a TM is using this SM, this TM can simulate the actual future by another SM (e.g., the 1O-SM). Then, the actual future is like a finished script/story/book/simulation (which described the objective-state-evolution of every BB) for this TM to follow automatically/unintentionally, while this TM is not aware of the upcoming plot (in this script/story/book/simulation) in advance. Let us call this finished script/story/book/simulation the 1O-fate. Anything which 1O-follows the 1O-fate, is 1O-fated. The objective-state-evolution of every BB 1O-follows the finished-script/finished-story/finished-book/finished-simulation/1O-fate/1O-function. Or in other words, the finished-script/finished-story/finished-book/finished-simulation/1O-fate/1O-function 1O-controls/1O-drives the objective-state-evolution of all BBs.

“The 1O-parallel-computation is forecastably-1O-fated/unforecastably-1O-fated” and “the 1O-parallel-computation is not 1O-fated” are two SM-options. Let us call them SMC-1O-fated-1O-parallel-computation-Positive and SMC-1O-fated-1O-parallel-computation-Negative respectively.

As a TM in a 1O-parallel-computing-automaton, my brain postulates/believes that SMC-1O-fated-1O-parallel-computation-Negative is counterfactual in the 1O-parallel-computing-automaton, although this postulation/belief cannot permanently prevent my brain from using SMC-1O-fated-1O-parallel-computation-Negative.

A SM is a tool for forecast. The SMs are designed in order to forecast. The SMs are used (by a TM) to forecast the future. As soon as the TM uses a SM, the TM immediately gets the forecast made by this SM. (Some forecasts are (unnoticeably) wishful and hence fascinating/addictive.) Whenever the TM is using a SM, the TM is mentally living in the future as being forecasted by this SM. That’s why “mentally living in the present moment” is difficult for a brain.

Each SM has its neural substrate/underpinning in the brain. Multiple SMs might co-exist in a human brain at the same time. Being a MM, a SM is an abstract information/knowledge about what a human knows, rather than what she directly sees in her local environment, or what she directly reads from a text. “There are a thousand Hamlets in a thousand people's eyes.”

For a TM in a 1O-parallel-computing-automaton, the 1O-parallel-computing-automaton is the TM’s objective-reality.

“I am 1O/actually living in the objective-reality; I am *not* 1O/actually living in the reality of any other SM of mine” and “I am 1O/actually living in the objective-reality; I am *also* 1O/actually living in the reality of every other SM of mine” are two SM-options. Let us call them SMC-single-objective-reality-Positive and SMC-single-objective-reality-Negative respectively.

Just like physicists, my brain believes/postulates that I am only actually living in the objective-reality, and the objective-reality-SM is only a MM/representation/simulation of the objective-reality; the objective-reality is more actual/real than its SM. In this sense, I believe/postulate that the situation in the objective-reality-SM is 1O/actual/real, while the situation in any other SM of mine is 2O/virtual/imagined/perceived.

Logically speaking, everything a human knows, is somehow generated by her objective-reality (which includes her objective brain); all her SMs are somehow generated by her objective-reality, so they might be counterfactual.

The many-worlds interpretation is a SM. Let us call it the many-worlds SM.

When a TM postulates that all other conventionally-called “worlds” in the many-worlds SM only exist subjectively (in the TM’s subjective-reality), instead of existing objectively (in the TM’s objective-reality), this is another SM. Let us call it the one-world SM.

The many-worlds SM and the one-world SM are two SM-options.

If I postulate that all other conventionally-called “worlds” in the many-worlds interpretation only exist subjectively, this is a new interpretation of quantum mechanics. Let us call it the many-subjective-worlds interpretation.

Both the many-subjective-worlds interpretation and De Broglie–Bohm interpretation use the one-world SM.

In the many-worlds interpretation or De Broglie–Bohm interpretation, “God (i.e., the actual designer of a U-system – if the U-system was intentionally designed by a designer) does not play dice”.

In the many-subjective-worlds interpretation, we can imagine that a 1O-external-observer can restore the state of the 1O-parallel-computing-automaton to an earlier state in the history, and then restart the objective-state-evolution of the 1O-parallel-computing-automaton from that state. In this thought experiment, if the objective-state-evolution of the 1O-parrallel-computing-automaton keeps the same as the history, “God does not play dice”. (Let us call this scenario the nonstochastic many-subjective-worlds interpretation.) Otherwise, “God plays dice”. (Let us call this scenario the stochastic many-subjective-worlds interpretation.)

For a TM, “God plays dice” and “God does not play dice” are two SM-options, let us call them SMC-1O-stochastic-Positive and SMC-1O-stochastic-Negative respectively.

The SMC-1O-fated-1O-parallel-computation-Positive is compatible with the many-worlds SM, the one-world SM, the SMC-1O-stochastic-Positive or the SMC-1O-stochastic-Negative.

Logically speaking, quantum effects can follow the exhaustive-1O-function, while the exhaustive-1O-function is 1O-nonstochastic. In this case, the exhaustive-1O-function handles every BB uniquely. (Here the one-world SM and SMC-1O-stochastic-Negative are being used.) If a TM does not have access to this exhaustive-1O-function in advance, the TM cannot use this 1O-nonstochastic exhaustive-1O-function to forecast the activity of a BB 1O-nonstochastically. That’s why the activity of a BB looks 2O-truly 2O-random/2O-stochastic to this TM. Due to quantum effects, a TM is capable to make a 2O-truly 2O-random/2O-stochastic decision which can’t be forecasted by any TM within the U-system, but “2O-truly 2O-random/2O-stochastic” does not necessarily mean “1O-free”.

Let us suppose that a 1O-external-observer (who is located outside of a U-system) has access to this U-system’s 1O-nonstochastic exhaustive-1O-function *in advance*. Based on her knowledge, the 1O-external-observer should say that quantum effects are *predetermined* by this exhaustive-1O-function 1O-nonstochastically.

**2O-geometric-SM vs. 1O-geometric-model**

There is strong psychological evidence that human brains parse visual scenes into part-whole hierarchies and model the viewpoint-invariant spatial relationship between a part and a whole as the coordinate transformation between intrinsic coordinate frames that they assign to the part and the whole [19] [20].

If a TM has the subjective conscious experience of being immersed within a viewpoint-invariant spatial structure (from the viewpoint of an observer who is a geometric object being part of this spatial structure), the spatial structure is the TM’s 2O-geometric-SM which represents the spatial structure of the TM’s local environment (if the TM postulates that its local environment has a spatial structure).

A TM’s 2O-geometric-SM is relatively stable. A TM can use its 2O-causalities to unreliably forecast/retrodict the objective-state-evolution of the 2O-geometric-SM. The TM feels like that the state of the whole 2O-geometric-SM is certain at any moment. For example, I feel like that the state of the 2O-geometric-SM behind me is certain at this moment, although I do not see it right now.

The 2O-geometric-SM describes the spatial structure of a conventionally-called “macroscopic world”.

The 2O-geometric-SM is stored in a rat’s hippocampus, to be used in the mental time travel to evaluate potential/mental/intracorporeal path-options during vicarious trial and error [76][77].

For a TM, its 2O-geometric-SM is more real than its visual mental image. When a TM is in its lucid-dream, or is using a virtual reality entertainment system, it still has the 2O-geometric-SM. If a TM has visual hallucination, the visual hallucination is included in the 2O-geometric-SM. The entire 2O-geometric-SM is actually/objectively a visual hallucination of the TM.

The 2O-geometric-SM is like a film being watched by the TM. The TM postulates/perceives/imagines itself to be the protagonist in this film. The TM’s 2O-SM unreliably forecast/guess/foresee/reason the upcoming plot of this film based on the data/information in the past plots. The TM’s 1O-SM represents/simulates/models the objective-state-evolution of this film.

By default, the semantics of natural language (incorrectly/counterfactually) treats the *private* 2O-geometric-SM as the *shared* objective-reality. For example, “I am sitting behind you” actually means that “my avatar/representation is sitting behind your avatar/representation; both avatars/representations are geometric objects within my 2O-geometric-SM”. (This is more obvious, when I am actually in my lucid-dream.)

Based on a TM’s knowledge, “my 2O-geometric-SM is the *actual* objective-reality” and “my 2O-geometric-SM is not the *actual* objective-reality” are two SM-options. Let us call them SMC-2O-geometric-SM-objective-Positive and SMS-2O-geometric-SM-objective-Negative respectively.

SMC-single-objective-reality-Positive and SMC-2O-geometric-SM-objective-Positive are incompatible. SMC-single-objective-reality-Negative and SMC-2O-geometric-SM-objective-Negative are incompatible.

The TM’s 2O-geometric-SM is a MM reconstructed/generated from the (sensory) data/information being got/processed by the TM. The 2O-geometric-SM is mathematical.

The (sensory) data/information (which is being got/processed by a TM) is not allocentric. But a TM's 2O-geometric-SM uses allocentric mapping, in which representations of object positions are stable with respect to observer position; the 2O-geometric-SM has allocentric character [21]. For example, when I walk in a garden, I don’t feel like that the trees are walking towards the reverse direction.

In case the TM is a human brain, the TM’s 2O-geometric-SM is a three-dimensional Euclidean space, but the three orthogonal coordinate axes of the three-dimensional Euclidean space are not visualized inside the 2O-geometric-SM, so the 2O-geometric-SM does not look like a textbook example of a three-dimensional Euclidean space; imaginary objects are not visualized inside the TM’s 2O-geometric-SM, so a human brain can distinguish imaginary objects from subjective-objects, and can distinguish other SMs from the 2O-geometric-SM. An imaginary object (within another SM) is visualized by the TM, using the elements/components of some geometric objects (i.e., the avatars/representations of subjective-objects) within the 2O-geometric-SM.

Actually, what a human brain perceives in its 2O-geometric-SM, is not a three-dimensional Euclidean space, but only the spatial relationship/situation among some subjective-objects. The 2O-gemetric-SM is a visualized representation of the spatial relationship/situation among these subjective-objects.

Every SM (e.g., the 2O-geometric-SM) is being narrated (by cortical language network) in the same way as a lucid-dream/film/script/story/book/simulation or a multiplayer virtual reality entertainment system [22] is being narrated.

If a 1O-external-observer (who is located outside of a 1O-parallel-computing-automaton) extracts position information from the states of all BBs, the 1O-external-observer can imagine/visualize a geometric structure which uses the extracted position information as coordinates in a geometric space (which does not need to be a three-dimensional Euclidean space). Let us call the 1O-external-observer’s imagined/visualized geometric structure the (subjective) 1O-geometric-model. The 1O-geometric-model is the 1O-external-observer’s visual mental image.

The 1O-external-observer believes that, using the 1O-function, it can reliably forecast/retrodict the objective-state-evolution of the 1O-geometric-model. So, the 1O-external-observer believes that the state of the 1O-geometric-model is certain at any moment.

In a sense, the 1O-geometric-model describes the spatial structure of a microscopic world. Comparing to the conventionally-called “macroscopic world” (described by the 2O-geometric-SM), this microscopic world is closer to the actual world – the 1O-parallel-computing-automaton.

The 1O-SM is based on the space of the 1O-geometric-model. The objective-reality-SM is not based on any space.

The symbol “1O-parallel-computing-automaton” has different meanings under the 1O-SM or under the objective-reality-SM. When a TM uses the 1O-SM, the 1O-paralle-computing-automaton is imagined based on the space of the 1O-geometric-model. When a TM uses the objective-reality-SM, the 1O-paralle-computing-automaton is not imagined based on the space of the 1O-geometric-model.

A TM’s 1O-SM is a mental visualization of the TM’s objective-reality-SM.

The spatial structure of human brain’s 2O-geometric-SM is a three-dimensional Euclidean space. If the spatial structure of the 1O-geometric-model is also a three-dimensional Euclidean space, the two spatial structures can map to each other, so that every BB, geometric object or subjective-object (under the context of the 1O-geometric-model) can be located within the 2O-geometric-SM.

If the 1O-geometric-model is not a three-dimensional Euclidean space, the two spatial structures cannot map to each other, so that no BB, geometric object or subjective-object (under the context of the 1O-geometric-model) can be located within the 2O-geometric-SM. But apparently, it does not mean that the conventionally-called “macroscopic world” (described by the 2O-geometric-SM) and the microscopic world (described by the 1O-geometric-model) are actually using two different “objective spaces”, or actually using two different set of physical-laws [88][89].

As time goes on, the spatial movement of every BB within the context of the 1O-geometric-model, is 1O-determined by the 1O-function. So, the world tube of every subjective-object (within the context of the 1O-geometric-model), is 1O-determined by the 1O-function – this statement is contradictory with the 2O-causalities within a TM's 2O-SM.

When a TM postulates that only itself is actually experiencing a private subjective-reality, this is a SM. When a TM postulates that every TM is experiencing a private subjective-reality, this is another SM. When a TM postulates that no TM is actually experiencing a private subjective-reality, this is another SM. These three SMs are SM-options.

A TM is subjectively experiencing its subjective-reality. What a TM has access to, is always the content of its own subjective-reality. A TM does not have direct access to its so-called “objective-reality” (aka “physical reality”) in its subjective-reality. (This is more obvious, when the TM is actually in its lucid-dream.) A TM has no way to logically 2O-prove/2O-disprove that its so-called “objective-reality” exists objectively. A TM can at most *postulate/imagine* that its so-called “objective-reality” exists objectively. This is the position of solipsism.

When a TM postulates that the so-called “objective-reality” exists objectively, this is a SM. When a TM postulates that the so-called “objective-reality” does not exist objectively, this is another SM. These two SMs are SM-options. Let us call them SMC-objective-reality-objective-Positive and SMC-objective-reality-objective-Negative respectively.

Both SMC-single-objective-reality-Positive and SMC-single-objective-reality-Negative are incompatible with SMC-objective-reality-objective-Negative.

In the context of a TM’s 1O-SM, the 1O-parallel-computation of the objective-reality is *only* 1O-determined by the 1O-function; in the context of a TM's 2O-SM, the 1O-parallel-computation of the objective-reality is *not* only 2O-determined by the 1O-function.

In the TM’s 2O-SM, the TM's 2O-geometric-SM is a collection of geometric objects. These geometric objects are being referred by the 2O-SM in real time. In this way, the 2O-SM works as an extension/explanation/understanding of the 2O-geometric-SM, and works like an augmented reality on top of the 2O-geometric-SM. In this sense, the 2O-SM syncs with the 2O-geometric-SM. Alternatively, we can view the 2O-geometric-SM as an element/component of the 2O-SM.

In the TM’s 1O-SM, geometric objects can be defined under the context of the 1O-geometric-model. These geometric objects are being referred by the 1O-SM in real time. In this way, the 1O-SM works as an extension/explanation/understanding of the 1O-geometric-model, and works like an augmented reality on top of the 1O-geometric-model. In this sense, the 1O-SM syncs with the 1O-geometric-model. Alternatively, we can view the 1O-geometric-model as an element/component of the 1O-SM.

The 2O-SM defines the mathematical relation among the geometric objects within the 2O-geometric-SM. The 1O-SM defines the mathematical relation among the geometric objects under the context of the 1O-geometric-model. These two mathematical relations can be different. Either SM is a MM of the mathematical relation among a set of geometric objects.

According to the nature of the mathematical relation it defined, the 2O-SM can be used (by the TM) to (roughly) forecast/guest the future, so it can be used to make a decision; in practice usually the 1O-SM cannot be used to forecast/guess/foresee/reason the future, so it cannot be used to make a decision. So, in order to make a decision, the TM has to use the 2O-SM.

When observing/forecasting the 1O-parallel-computation of a U-system, a 1O-omniscient-external-observer will believe that, no matter a BB is currently inside the animal body or outside of it, this BB has no 1O-freedom during its entire life cycle.The animal brain’s subjective-reality (as a SM) has no way to introduce 1O-freedom to any BB (inside this U-system). Otherwise, the outcome of the 1O-parallel-computation depends on the animal brain’s subjective-reality, but physicists won’t believe that. Physicists believe that the animal’s subjective-reality depends on the outcome of the 1O-parallel-computation.

There is no way to change an animal’s trajectory in a U-system; the animal’s brain has no way to change the animal’s actual trajectory. More generally, there is no way to change the world tube of any subjective-object in this U-system. There is no way to change the 1O-fated 1O-parallel-computation of this U-system.

The animal’s brain can forecast its own trajectory based on its own knowledge. The 1O-omniscient-external-observer can forecast the 1O-parallel-computation (including the animal’s trajectory) based on her knowledge. Regarding the animal’s trajectory, the animal brain’s own forecast should be less accurate than the 1O-omniscient-external-observer’s forecast, because the animal brain has less knowledge than the 1O-omniscient-external-observer. Then, regarding the animal’s future trajectory, the animal brain has less knowledge than the 1O-omniscient-external-observer. So, comparing to the 1O-omniscient-external-observer, the animal brain feels more 2O-freedomin the animal’s future trajectory. (When we say that a TM inside a U-system has 2O-freedom, it means that the TM is supposed to have 2O-freedom from its subjective-perspective. Actually, the TM doesn’t have 1O-freedom.) Comparing to the 1O-freedom, the 2O-freedom is caused by the TM’s lack of knowledge; the 2O-freedom represents the TM’s uncertainty when forecasting the time series (let us call it the 1O-time-series) of the position of each BB within the TM itself.

From a TM’s objective-perspective, the extracorporeal-observer observes how the TM works as an ordinary/plain/nonsignificant subjective-object in the 1O-SM. The TM’s pending action is modeled/represented/simulated as an internal element/component of the 1O-parallel-computation of the 1O-SM, not as something (which is like an external force) outside of the 1O-parallel-computation of the 1O-SM. Because the TM’s pending decision is included by the TM’s intracorporeally simulated 1O-parallel-computation of the 1O-SM. This intracorporeally simulated 1O-parallel-computation (of the 1O-SM) is not decision-oriented. The 1O-baseline (of the 1O-time-series of the 1O-parallel-computation of the 1O-SM) recognized by the TM includes the consequence of the TM’s pending decision.

When a TM analyzes a future physical-event from its objective-perspective, the TM analyzes this physical-event, like analyzing a physical-event which already happened in the past (i.e., suppose that this physical-event will happen at 8am sharp tomorrow, the TM makes a mental time travel [32] into 8am tomorrow, to observe the happening of this physical-event, and to analyze this physical-event right after the happening of this physical-event). This is a *distorted* perception of time, if we define its perception of time from its subjective-perspective to be *accurate/straight*. In contrast, if we define its perception of time from its objective-perspective to be *accurate/straight*, the perception of time from its subjective-perspective is *distorted*.

Time matters because knowledge/ignorance changes [33]. A TM’s intracorporeal-observer is imagined (by the TM) to live in the present, and is imagined to have the knowledge/ignorance this TM current have. A TM’s extracorporeal-observer is imagined to live in the future (i.e., we fictionally/counterfactually imagine that, at this moment, its extracorporeal-observer is able to observe the 1O-parallel-computing-automon's future state), and is imagined to have the knowledge this TM is going to have in the future; a TM’s extracorporeal-observer is imagined to have no ignorance (regarding the future), like a 1O-omniscient-external-observer.

**Objective-reality-SM/objective-reality**

From the viewpoint of an TM within a Nonstochastic/Stochastic Game of Life system (or a two-dimensional/three-dimensional Primordial Particle System), human observers use an objective-perspective to observe the 1O-parallel-computation of a simulation of the Nonstochastic/Stochastic Game of Life (or the two-dimensional/three-dimensional Primordial Particle System).

From the viewpoint of a human who is actually/objectively located outside of a Nonstochastic/Stochastic Game of Life system, the Nonstochastic/Stochastic Game of Life system is a collection (aka union) of BBs. A BB in a Nonstochastic/Stochastic Game of Life system is a 1O-information stored in the computer memory – a BB is not a *mathematical* entity. A BB is not *autonomous*, because apparently a BB is 1O-controlled/1O-driven/1O-programmed by the computer program who is simulating the Nonstochastic/Stochastic Game of Life system.

From the objective-perspective of a TM within the Nonstochastic/Stochastic Game of Life system, a BB in the Nonstochastic/Stochastic Game of Life system can only be viewed (by this TM) as an *autonomous* *mathematical* entity, because the TM has no way to know the actual objective/physical form of the BB (in humans' world), and has no way to know who actually 1O-controls/1O-drives/1O-programs the BB (in humans' world). Or in other words, “a BB is an autonomous mathematical entity” and “a BB is not an autonomous mathematical entity” are two SM-options for this TM.

The computer program (which simulates a Stochastic Game of Life system) chooses each BB’s state from a set of possible states which are literally allowed by the stochastic-McKenzie-function. Apparently, the computer program can leverage the choosing of all BBs’ states, to intentionally influence the objective-state-evolution of the whole system systematically (for example, the computer program can help a favorite TM to achieve the TM’s (1O-fated) goal/aim, or help the favorite TM to solve the TM’s (1O-fated) problem), without literally breaking the stochastic-McKenzie-function. But apparently, no subjective-object itself can leverage the choosing – a subjective-object (e.g., a TM) can’t choose the state of any BB inside the subjective-object. A TM has no way to know/influence the systematic intention of the computer program – in case that the computer program has a systematic intention. So, from the objective-perspective of the TM, every BB are independent – the BBs don’t have an overall intention.

From the viewpoint of a 1O-external-observer who is actually/objectively located outside of a 1O-parallel-computing-automaton (i.e., only based on the data/information this actual 1O-external-observer should be able to get/process), it is logically possible that a BB (of this 1O-parallel-computing-automaton) is not a *mathematical* entity, and is not *autonomous* either.

However, for a TM in a 1O-parallel-computing-automaton, from the viewpoint of the TM’s extracorporeal-observer who is (subjectively) located outside of the 1O-parallel-computing-automaton (i.e., only based on the data/information the TM should be able to get/process), a BB can only be viewed (by this TM) as an (independent) *autonomous* *mathematical* entity, so the 1O-parallel-computing-automaton can only be viewed as a collection (aka union) of autonomous mathematical entities, although it is logically possible that a BB is not an autonomous mathematical entity from the viewpoint of an actual 1O-external-observer – the TM’s extracorporeal-observer is not an actual 1O-external-observer. (“Our external physical reality is a mathematical structure.” [42]) An autonomous mathematical entity is an objective entity *itself* (i.e., a *thing in itself*); it's not a *MM* of an objective entity. An autonomous mathematical entity is 1O-controlled/1O-driven/1O-programmed by itself. The state of every autonomous mathematical entity objectively evolves on its own.

For the TM, it is only logically possible that the so-called “autonomous mathematical entities” actually have objective/physical forms in *another world* (for example, in case the TM is in a Nonstochastic/Stochastic Game of Life system, humans' world is *another world*), or are actually 1O-controlled/1O-driven/1O-programmed by something else in *another world*. Only an actual 1O-external-observer should be able to know that.

From the viewpoint of a TM’s extracorporeal-observer who is located outside of a TM’s objective-reality (it’s like “from the viewpoint of a human who is located outside of a Nonstochastic/Stochastic Game of Life system”), the objective-reality is the 1O-parallel-computing-automaton.

In the TM’s SM of its objective-reality, its 1O-parallel-computing-automaton is a collection of the autonomous BBs. Unlike the 2O-SM and the 1O-SM, the TM’s SM of its objective-reality does not refer to the geometric objects within the 2O-geometric-SM or the 1O-geometric-model.

The 1O-parallel-computing-automaton is autonomous, in the sense that every BB is autonomous. The 1O-parallel-computing-automaton is the time series of the states of all autonomous BBs. The 1O-parallel-computing-automaton does not include vacuum (aka free space).

Nothing has 1O-influence to the 1O-parallel-computation of the (autonomous) 1O-parallel-computing-automaton. The objective-state-evolution of an autonomous BB, won’t 1O-cause any change in the objective-state-evolution of another autonomous BB.

A TM’s 2O-SM defines the mathematical relation/model among the autonomous BBs of the TM’s 1O-parallel-computing-automaton, based on the context of the geometric objects within the TM’s 2O-geometric-SM.

A TM’s 1O-SM defines the mathematical relation/model among the autonomous BBs of the TM’s 1O-parallel-computing-automaton, based on the context of the geometric objects under the context of the 1O-geometric-model.

“Matter”, "space" and “time” (as conventional concepts of human) are actually mathematical, not physical. “Matter”, "space" and “time” together represent a mathematical evolution (of the states of all autonomous BBs) – "matter", "space" and "time" together represents one thing. So, "matter", "space" and "time" are interdependent on each other by nature. The mathematical evolution (of the states of all autonomous BBs) is perceived by a TM to be the objective-state-evolution of matter upon space over time. In this case, this TM will imagine/postulate matter, space and time (it perceived) all to be “physical”.

A 1O-parallel-computing-automaton (e.g., a Nonstochastic/Stochastic Game of Life system) does not need to have actual matter or actual space, for a TM (within it) to perceive the objective-state-evolution of matter upon space over time. The TM cannot perceive the actual time which can be perceived by a 1O-external-observer. For example, the TM cannot perceive the pause/freeze of the objective-state-evolution of the 1O-parallel-computing-automaton (in case that a 1O-external-observer presses a "pause" button to pause/freeze it, and then presses a "play" button to resume/continue it).

The state of an aforementioned autonomous mathematical entity (aka BB) includes position information, and a TM inside the 1O-parallel-computing-automaton can imagine/postulate the position information to be coordinates in *its imagined/postulated geometric space (i.e., the 1O-geometric-model)*. From the viewpoint of a TM’s extracorporeal-observer (who is located outside of the 1O-parallel-computing-automaton), there is no so-called "objective space" (aka “physical space”) underlying this TM’s imagined/postulated geometric space; this TM’s objective-reality/1O-parallel-computing-automaton does not actually occupy a so-called "objective space". The so-called "objective space" does not exist objectively; it only exists in this TM’s mental imagination/visualization/postulation, subjectively. The so-called “objective space” is this TM’s pareidolia or visual mental image; the state of the collection of autonomous BBs is not this TM’s pareidolia. In other words, the so-called “objective space” is 2O; the state of the collection of autonomous BBs is 1O.

SMC-single-objective-reality-Positive and the SM “the so-called ‘objective space’ exists objectively” are incompatible. (BTW, when a TM uses the SM “the so-called ‘objective space’ exists objectively”, it means that the TM’s objective-reality/1O-parallel-computing-automaton actually occupies a so-called “objective space”, so that the TM’s 1O-SM and the TM's objective-reality-SM are actually the same SM. For example, in this case, a TM in a Nonstochastic/Stochastic Game of Life system believes that the system occupies a two-dimensional lattice which exists objectively.)

In summary, actually “objective space” or simply *“space” (as a conventional concept of human)* does not exist objectively. So, “objective space” is neither physical nor mathematical; “objective space” is only imagined/postulated to exist, by a TM.

So, there is no actual (spatial) movement/carrier in a 1O-parallel-computing-automaton; the autonomous BBs don’t actually move.

As 1O-external-observers to a Nonstochastic/Stochastic Game of Life system (or a two-dimensional/three-dimensional Primordial Particle System), humans watch the visualization of the computer simulation of the Nonstochastic/Stochastic Game of Life system (or the two-dimensional/three-dimensional Primordial Particle System) on computer screen. The visualization on computer screen is not part of the 1O-parallel-computing-automaton; the 1O-parallel-computing-automaton only includes the state of the collection of BBs in the computer memory. Humans feel like that the 1O-parallel-computing-automaton uses the space on the computer screen, which is not the case.

If the universe is a 1O-parallel-computing-automaton, where does the state of the collection of autonomous BBs store? How can the state of each autonomous BB change? Is the universe actually a simulation at the BB level? Or in other words, is each BB (of the universe) actually a simulation? Being a TM (which is a fuzzy subset of all autonomous BBs) within the universe (which is a 1O-parallel-computing-automaton), my brain has no way to find the actual/real answers of these questions.

For a TM, “my 1O-parallel-computing-automaton is actually a simulation at the BB level; each BB (of the 1O-parallel-computing-automaton) is actually a simulation” and “my 1O-parallel-computing-automaton is not actually a simulation at the BB level; each BB is not actually a simulation” are two SM-options. Let us call them SMC-simulation-Positive and SMC-simulation-Negative respectively.

From the viewpoint of my extracorporeal-observer (who is located outside of the 1O-parallel-computing-automaton), my extracorporeal-observer can imagine that God or an alien stores the state of every BB and changes the state of every BB, like a TM.

If the universe as a 1O-parallel-computing-automaton is actually a simulation (aka SMC-simulation-Positive), let us suppose that this simulation is running on a computer which is located outside of the universe. The computer can visualize the universe's 1O-geometric-model on its screen, for an alien (who is located outside of the universe) to watch. From my viewpoint, my extracorporeal-observer works like this alien. (If my brain can wake up to directly see the objective-reality where my brain is actually/objectively living in, my brain will directly see that itself is some data stored in the computer memory. However, in order to directly see from this viewpoint, my brain should be located outside of this computer (like the alien) – this is not the case. So, it is logically impossible for my brain to wake up to directly see the objective-reality where my brain is actually/objectively living in. But my brain can imagine that an extracorporeal-observer (like the alien) directly sees the objective-reality where my brain is actually/objectively living in.)

Similarly, my computer can visualize a Nonstochastic/Stochastic Game of Life system’s 1O-geometric-model on its screen, for me (who is located outside of the Nonstochastic/Stochastic Game of Life system) to watch. From the viewpoint of a pattern in the Nonstochastic/Stochastic Game of Life system, its extracorporeal-observer works like me.

Let us call a TM Alan.

From the viewpoint of Alan’s extracorporeal-observer (who is located outside of the 1O-parallel-computing-automaton), in the 1O-parallel-computing-automaton, the state of the collection of autonomous BBs evolves as time goes on, with a 1O-function to describe this autonomous 1O-parallel-computation; as a TM (which is a fuzzy subset of all autonomous BBs) within this 1O-parallel-computing-automaton, Alan cannot 1O-change/1O-control/1O-drive the 1O-parallel-computation of his autonomous 1O-parallel-computing-automaton. To 1O-determine the 1O-parallel-computation of this 1O-parallel-computing-automaton, the 1O-function is just enough. The objective-state-evolution of all autonomous BBs 1O-determines the 1O-function. (No matter Alan postulates/believes his 1O-parallel-computing-automaton to be mathematical or “physical”, as long as the 1O-parallel-computation of the state of the BBs follows the 1O-function, the activities of these BBs don't have any difference mathematically. No matter Alan has subjective-reality or not, the 1O-parallel-computation of the state of the BBs of Alan should follow the 1O-function. Otherwise, it simply means that the 1O-function need to be revised to reflect the 1O-influence of Alan’s subjective-reality.)

(A TM is 2O-driven by its 2O-SM/subjective-reality. For example, Alan is 2O-driven by his 2O-decisions. In a sense, *some* of the semantic information of the future 1O-parallel-computation is already stated in the semantic information of a 2O-decision of Alan. However, the semantic information of the 2O-decision is already stated in the semantic information of the 1O-function and the initial state of the 1O-parallel-computing-automaton – the 2O-decision is completely 1O-fated by the 1O-function and the initial state. So, the semantic information of the future 1O-parallel-computation does not *depend* on the semantic information of the 2O-decision at all – the future 1O-parallel-computation is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by the 2O-decision at all. Only if the 1O-function of Alan's 1O-parallel-computing-automaton as a mathematical function has to include the 2O-decision of Alan (i.e., only if there is no way to omit the 2O-decision from the mathematical function), which means that *the* *2O-decision is not redundant in the mathematical function (i.e., the semantic information of the 2O-decision is not already stated in the 1O-function, or in other words, the 2O-decision is not completely 1O-fated by the 1O-function – this is paradoxical)*, we can say that the 2O-decision has 1O-influence to the 1O-parallel-computation. In this imagined case (which is actually paradoxical), Alan works like God in his 1O-parallel-computing-automaton, through his 2O-decision. However, in this imagined case (which is actually paradoxical), a BB of the 1O-parallel-computing-automaton is not completely autonomous anymore, because it is also 1O-controlled/1O-driven by Alan's 2O-decision. In other words, if we imagine that the objective-state-evolution of every BB is completely autonomous, we cannot further imagine that any BB’s objective-state-evolution is 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branched by Alan’s 2O-decision – it is paradoxical.)

(We can add a particular pattern’s 2O-decisions into the 1O-function of a Nonstochastic/Stochastic Game of Life system, but obviously this pattern’s 2O-decisions can be omitted from the 1O-function as a mathematical function. It is paradoxical to design a cellular automaton which is 1O-fated by a 1O-function as a mathematical function, and the 2O-decisions of a particular pattern cannot be omitted from the mathematical function.)

In Alan’s objective-reality-SM, the 1O-function describes the only *actual* mathematical relation among the BBs of Alan's 1O-parallel-computing-automaton.

In Alan's 1O-SM, the 1O-function describes the only *actual* mathematical relation among the geometric objects under the context of the 1O-geometric-model.

The 1O-function is the only causality included in Alan’s objective-reality-SM/1O-SM; any other causality is not included in either SM. In either SM, with this only causality, everything actually happens (e.g., what Alan actually does) is the 1O-function's work; everything actually happens, is only caused by the 1O-function and the 1O-parallel-computing-automaton’s initial state; the 1O-function and the 1O-parallel-computing-automaton’s initial state are the only reasons/causes for everything actually happens.

For a TM, “the 1O-parallel-computation of my 1O-parallel-computing-automaton 1O-determines my subjective-reality” and “my subjective-reality 1O-determines the 1O-parallel-computation of my 1O-parallel-computing-automaton” are two SM-options. Let us call them SMC-objective-reality-rules-Positive and SMC-objective-reality-rules-Negative respectively.

SMC-1O-fated-1O-parallel-computation-Positive and SMC-objective-reality-rules-Negative are incompatible.

A human brain’s theory of mind module uses 2O-causalities to reason the inner states of a brain as a SM. Let us call this SM the 2O-mind-SM. The 2O-mind-SM simulates the situation in the latter brain's 2O-SM/subjective-reality (e.g., “the latter brain is scared”), based on the former brain’s physical symbol system. The 2O-mind-SM includes the former brain’s estimation of the latter brain’s Bayesian model. The former brain feels as if that the 2O-mind-SM resides inside the physical boundary of the latter brain – this feeling is only a postulation of common human’s theory of mind. (When I watch the face of a human in my real life, or when I watch the face of Mickey Mouse in a cartoon film, I see a virtual 2O-mind-SM behind the human face or Mickey Mouse’s face, but actually there is no such a virtual 2O-mind-SM behind the face – such a virtual 2O-mind-SM is actually a SM of mine. I feel like that the virtual 2O-mind-SM is visualized, like a picture/image/drawing/illustration.) The 2O-mind-SM is the 2O-subject of the latter brain as a 2O-object – in a brain surgery, we won’t find the 2O-mind-SM/2O-subject inside the latter brain. The relationship between the 2O-mind-SM/2O-subject and the latter brain (as a subjective-object) is like “the ghost in the machine [23]” – let us call this kind of “ghost” the 2O-mind-SM-ghost. The 2O-mind-SM is an imagined/postulated/fictionalized MM/pseudocode/construction/content to simulate/model/represent the (nonexistent) 2O-subject. In the former brain’s 2O-SM, the latter brain as a 2O-object is 2O-driven/2O-controlled by its 2O-mind-SM as the 2O-subject. But actually, every BB of the latter brain is only 1O-driven/1O-controlled by the 1O-function and the initial state of the U-system. The 2O-mind-SM is the former brain's roughly estimated MM of the program of the latter brain (as a TM). The 2O-mind-SM is the former brain’s roughly estimated MM of the MMs which are used by the control logic of the latter brain’s program. The 2O-mind-SM is like a pseudocode of the latter brain – the 2O-mind-SM is like a pseudocode which represents/models the latter brain’s program. The 2O-mind-SM does not model the human body which hosts/contains the latter brain. The 2O-mind-SM is an indivisible element/component of the former brain’s 2O-SM. The 2O-mind-SM as a MM roughly reflects certain details of the latter brain’s objective construction (e.g., the latter brain’s amygdala activation). The 2O-mind-SM is a subjective clue for the objective-consciousness of the latter brain. The former brain and the latter brain can be the same brain [57].

I know that the physical movement of every subjective-object is completely 1O-controlled/1O-driven by the 1O-function. So, when I feel like that a flying bird is different from a floating cloud, what is the actual difference between them? My brain does not have a 2O-mind-SM for a floating cloud, but has a 2O-mind-SM for a flying bird – this is the only difference. This difference has nothing to do with the flying bird or the floating cloud themselves – this difference is completely subjective.

When my brain uses the 1O-SM and intentionally excludes the 2O-mind-SM-ghost/2O-subject-ghost/subjective-reality-ghost, *every subjective-object (e.g., my brain)* is a philosophical zombie to my brain, like a puppet (which is 1O-controlled/1O-driven by the 1O-function). The cognition/mind of *a subjective-object (e.g., my brain)* which is being perceived by my brain, is *something (e.g., a 2O-mind-SM)* which is fictionally invented by my brain’s theory of mind module – the subjective-object itself does not have any actual subjective cognition/mind.

A TM’s every decision is actually made by the 1O-function, not by the TM itself (as the 2O-subject-ghost/subjective-reality-ghost/2O-mind-SM-ghost) – this is obvious from the viewpoint of a 1O-omniscient-external-observer. So, any decision does not change the objective-state-evolution of the objective-reality.

A TM’s program uses 2O-causalities to forecast the objective-state-evolution of its 2O-geometric-SM, to make a decision. The forecast/decision relies on the TM’s 2O-causalities.

At any moment, no matter what 2O-causalities a TM has, these 2O-causalities have no 1O-influence to the 1O-parallel-computation of the 1O-parallel-computing-automaton, because that these 2O-causalities are 1O-determined by the 1O-parallel-computation of the 1O-parallel-computing-automaton; the TM is 1O-fated to have/use these 2O-causalities.

If a TM believes that “the objective-state-evolution of a BB causes change in the objective-state-evolution of another BB”, this belief is a 2O-causality. The concept of “physical interaction” is based on this 2O-causality.

The autonomous objective-state-evolution of relevant BBs constructs the objective construction of each 2O-causality a TM has, and 1O-determines which 2O-causality is discovered by the TM at every moment.

The design of a TM’s program is based on 2O-causalities. For example, if a TM’s program is designed to play a multiplayer game automatically/unintentionally, this design is based on a 2O-causality “I am playing a multiplayer game – this is my actual situation”.

So, when a TM finds itself playing a multiplayer game automatically/unintentionally, this TM should be aware of that “I find myself playing this multiplayer game automatically/unintentionally, this situation implies that my program is designed to play this multiplayer game automatically/unintentionally; this multiplayer game is fictionally invented by my program as its own setting/pareidolia”.

The program of every vertebrate brain (as a TM) is designed (by Darwinian natural selection) to play a multiplayer game (automatically/unintentionally) with unlimited number of players/opponents. If we ignore the difference in design between any two vertebrate brains, we can imagine all vertebrate brains (as TMs) to be (inaccurate) clones of one single TM, and then imagine that this single TM is designed to play a multiplayer game with its own clones, while treating its own clones as players/opponents. The program of this single TM is designed to cooperate with some of its own clones, under the fictionally invented settings/pareidolias of this multiplayer game. (The 2O-geometric-SM is designed to be the most significant/obvious/explicit setting/pareidolia of this multiplayer game. Under the setting/pareidolia of the 2O-geometric-SM, this multiplayer game (i.e., the 2O-subject-ghost-game) is being narrated (by cortical language network) in the same way as a multiplayer virtual reality entertainment system is being narrated.) Then, we can imagine that all these clones (in the Earth ecosystem) are designed to play the same 2O-subject-ghost-game together, while each clone is designed to play this 2O-subject-ghost-game under the setting/pareidolia of its own 2O-geometric-SM. Similarly, we can imagine that two AlphaGo clones are designed to play a (multiplayer) Go game together, while either clone is designed to play a (multiplayer) Go game under the setting/pareidolia of its own intracorporeal/subjective Go board. In a 2O-subject-ghost-game, a vertebrate brain’s 2O-geometric-SM is the counterpart of an AlphaGo clone’s intracorporeal/subjective Go board (in a Go game); a vertebrate brain’s 2O-geometric-SM has the same function as the AlphaGo’s intracorporeal/subjective Go board; the 2O-geometric-SM is the “board” of the 2O-subject-ghost-game. Under the context/settings of *this “board” (i.e., the 2O-geometric-SM)*, every *move (i.e., physical activity)* of each player/TM/subjective-object, is 1O-fated by the 1O-function.

To a vertebrate brain, the 2O-subject-ghost-game is not just another game to play, but its real-world life; the situation in the 2O-subject-ghost-game defines/determines the meaning of its real-world life.

All vertebrate brains are playing the same 2O-subject-ghost-game as players. In this 2O-subject-ghost-game, each vertebrate brain is being trained (through its 2O-geometric-SM) by the experience of itself and others.

In contrast, a TM’s 1O-SM is narrated/simulated as a zero-player game – the 1O-parallel-comupting-automaton. In this sense, a 1O-parallel-computing-automaton is a zero-player game.

A TM's 1O-SM describes/models *a zero-player game (i.e., its extracorporeal situation/objective-reality)*; a TM's 2O-SM describes/models *a multiplayer game (i.e., its intracorporeal situation/subjective-reality)*.

Suppose Alan’s body 2O-decides to move itself, and then Alan’s body sees himself moves. So, Alan’s body discovers a 2O-causality “my body's movement is 2O-caused by my body’s 2O-decision”. Let us call it the body-causality. Actually, the objective-state-evolution of every *autonomous* BB in Alan’s body, is not 1O-controlled/1O-driven/1O-caused/1O-decided/1O-chosen/branchedby the 2O-decision of Alan body. In contrast, the 2O-decision of Alan's body is 1O-fated/1O-determinedby the objective-state-evolution of the autonomous BBs.

Based on the use of the body-causality, Alan’s 2O-SM treats a geometric object (in Alan's 2O-geometric-SM) as a (spatial) carrier called “Alan’s body”, which moves across the space (within Alan's 2O-geometric-SM) upon the 2O-decision of itself, like a self-driving car. However, there is no actual (spatial) movement/carrier in Alan’s objective-reality-SM, because there is no space in Alan’s objective-reality-SM.

In case that Alan is a vertebrate brain, Alan’s 2O-SM is narrated/simulated as a 2O-subject-ghost-game, where each TM is narrated/simulated to be a free/flexible/active player whose objective behavior is unpredictable/uncertain and not 1O-fated, and each player has 1O-freedom to act. The subjective uncertainty of the whole 1O-parallel-computing-automaton is forcedly/counterfactually 2O-divided/2O-categorized by Alan's 2O-causalities roughly, to assign/attribute to the narrated/simulated players respectively. Each player is a 2O-cause symbol being used by the 2O-SM to roughly represent a 2O-category of uncertainty. (Each player is a 2O-subject-ghost which is postulated (by Alan’s 2O-SM) to 2O-control/2O-drive a TM as the 2O-object.) Based on the current knowledge/ignorance of Alan, the upcoming behavior of each player has a number of possibilities, each possibility is actually a *small-scale-SM* (of Alan) regarding a specific player’s future situation. Each small-scale-SM is part of the large-scale-SM of Alan. The large-scale-SM is like a jigsaw puzzle, while each small-scale-SM is like a jigsaw piece; within a large-scale-SM, any two small-scale-SMs should be logically compatible. When Alan is solving this jigsaw puzzle, usually he has to unreliably forecast/guess/foresee/reason every jigsaw piece one by one, based on his 2O-causalities, while the 1O-parallel-computation of his 1O-parallel-computing-automaton is independent of his current/future 2O-causalities. (In case Alan is a human brain, in Alan’s 2O-SM, each player’s subjective-reality is represented by a 2O-mind-SM respectively, while the simulated situation inside each 2O-mind-SM should be compatible with Alan’s 2O-causalities. For example, Alan has a 2O-mind-SM about another player “this player is angry”, and has a 2O-causality “if I keep talking with this player, it’s highly possible that this player will argue with me.” If Alan 2O-makes a decision to stop talking with the player, this decision is compatible with the said 2O-causality. Alternatively, if Alan 2O-makes a decision to continue talking with the player, this decision is compatible with another 2O-causality “if I keep talking with this player, it’s possible that this player will agree with me”. No matter which decision Alan will 2O-make, Alan is capable to 2O-use a 2O-causality to explain the simulated situation inside his own 2O-mind-SM. Being part of the 1O-parallel-computation, the decision process is not something different from the 1O-parallel-computation; the decision process is a 2O-processing. So, the decision Alan will 2O-make, is 1O-fated. During the decision process, among the two contradictory 2O-causalities, which 2O-causality will win, is 1O-fated.) In case Alan believes that the 1O-parallel-computation of his 1O-parallel-computing-automaton is *2O-determined* by his current/future 2O-causalities, it’s difficult/tricky for Alan to label this belief to be counterfactual. Actually, Alan’s 2O-causalities are 1O-determined by the 1O-parallel-computation of his 1O-parallel-computing-automaton.

Suppose Alan encounters a dog. Alan has two small-scale-SMs regarding this dog’s upcoming behavior – “the dog will bark at me” and “the dog will not bark”. Alan has another two small-scale-SMs regarding his own upcoming behavior – “I will smile to the dog” and “I will not smile”. These four small-scale-SMs can combine to four different large-scale-SMs, e.g., “the dog will bark at me; I will smile to the dog”.

Based on his current knowledge/ignorance, Alan can counterfactually/wishfully suppose that both himself and this dog have 1O-freedom to actually trigger any of these small-sale SMs or large-scale-SMs to happen, which means that either player’s objective behavior is not 1O-fated, and means that which large-scale-SM will actually happen is not 1O-fated. I.e., every small-scale-SM and large-scale-SM has the 1O-chance to happen in the objective-reality; the exact large-scale-SM which will actually happen, is up to the players’ (1O-free) objective behaviors. (BTW, *only* when this counterfactual/wishful supposition is being used by Alan’s 2O-SM, the symbol *2O-regret/2O-disappointment* is meaningful. When the control logic of Alan's program (counterfactually/incorrectly) imagines/believes that Alan himself was capable to make a different decision/choice in the past, we can say that Alan's program "2O-regrets". Actually, Alan has no way to make the (imagined) different decision/choice in the past. When the control logic of Alan's program (counterfactually/incorrectly) imagines/believes that a different outcome (other than the current outcome) should appear at the present, we can say that Alan's program "2O-disappoints". Actually, the (imagined) different outcome has no way to appear at the present. (BTW, when the control logic of Alan's program (counterfactually/incorrectly) imagines/believes that Alan prevented a physical-event from happening, actually *this (imagined) physical-event (i.e., a potential/mental/intracorporeal situation-option)* has no way to actually happen; when the control logic of Alan's program (counterfactually/incorrectly) imagines/believes that Alan made a physical-event to happen, actually this (imagined) physical-event has no way to not actually happen.) The symbol *2O-regret/2O-disappointment* has a neural substrate/underpinning which plays a role in decision making [66]. Alan is 1O-fated (by the 1O-function) to have the 1O-fated emotion/feeling of regret/disappointment. Alan can subjectively experience the emotion/feeling of regret/disappointment. In Alan’s 2O-SM, the 2O-cause of the emotion/feeling of regret/disappointment is identified based on Alan’s 2O-causalities. In a TM’s 2O-SM, Alan’s regret/disappointment (as the 2O-cause symbol) has a nonzero Bayesian probability to 2O-cause Alan’s future behavior (as the 2O-effect symbol) to 2O-change. But actually, in the objective-reality, Alan's regret/disappointment (as the 2O-cause situation) and Alan's future behavior (as the 2O-effect situation) have no causal relationship.)

If we suppose that Alan does not have his current ignorance, which means that Alan knows which large-scale-SM will actually happen beforehand, then Alan cannot counterfactually/wishfully suppose that which large-scale-SM will actually happen is not 1O-fated, and cannot counterfactually/wishfully suppose any player’s objective behavior to be not 1O-fated. Alan supposes that his extracorporeal-observer does not have his current ignorance, that’s exactly why his extracorporeal-observer cannot counterfactually/wishfully suppose any player’s objective behavior to be not 1O-fated.

人类的语言很神秘。

比如鲁迅写的文章里的一句话，50位语文老师可以从100个角度做出100个解读。哪个解读是鲁迅本人真正想表达的意思？恐怕鲁迅听了某位特级教师的解读，也会想：“嗯，对，我是应该表达这个意思，这个意思表达的这么隐晦，我写的时候怎么就没想到？”

再比如，我现在说：“你看到你眼前的这些文字，是命中注定的。”我这句话是什么意思？我这句话里 的“命”和“注定”是什么意思？我想通过这句话表达什么意思？你会感觉到一个意思。但你感觉到的意思，就是我想表达的意思吗？我明天再说一遍那句话的时候，我心里想表达的意思，可能和我现在想表达的意思完全不同。同样那一句话，我自己在不同的时间和心情下，可以做出不同的解读。可我自己内心的解读，你又怎么能了解呢？

你感觉你懂我的话的意思。但实际上，你不可能知道我真的想表达什么意思。你只是从我写的文字里，猜测我想表达的意思。但是，你猜测我想表达的意思，并不是我真正想表达的意思。我用文字表达我想表达的意思。但你接收不到我想表达的意思。你只能接收到你的大脑猜测到的意思。你只能猜测我想表达的意思。

我现在应该问：“你懂我的意思了吗？”然后我应该请你用语言解释一下，我那句话里的“意思”这个词是什么意思？你明白“意思”这个词的意思吗？

看明白了吗？人类的语言神秘吧？

我们身在宇宙之中，很难想象自己跳出宇宙之外。

不要想象整个宇宙，想象一小块儿宇宙。从宇宙中切割出一个立方体（一个方块儿），想象这一个立方体的宇宙。想象这个立方体的边长是1米。也就是，一个方块儿，长1米，宽1米，高也是1米。这个立方体外面是真空，什么也没有。这个立方体里面，有一个铁丝网笼子，笼子里面有一只猫和一只老鼠。请问，这个笼子里会发生点什么？

当然，有很多种可能。其中一种是，它俩成了好朋友。

我想说的是，不管它俩之间会发生什么，这个笼子里会发生的事，是注定的。

为啥？因为这个立方体里面，除了真空之外，只有基本单位（BB）。如果基本单位太抽象，你可以近似的想象成，这个立方体里面，除了真空之外，只有原子。

只有基本单位又咋了？

不好意思，基本单位的一切物理活动，都遵守物理定律。科学家都是这么认为的。

所以，这个立方体里的一切物理活动，都遵守物理定律，相当于是一个量子物理实验。（比如，猫大脑里每一个基本单位的物理活动，都遵守物理定律。）这个量子物理实验的结果，是注定的。

就是说，不管猫和老鼠做啥，它俩要做的事，都是注定的。它俩会不会成为好朋友，是注定的，它俩谁也改变不了。

你该问了：“那么，到底啥叫注定？‘注定’这个词到底啥意思？”

由于人类语言的神秘性，你必须得猜测我说的话里面的“注定”这个词的意思。

简单的说，所谓“注定的”，就是“命运”或者“命”。那“命运”又是啥意思？所谓的“命运”，是“注定的”。“命中注定”嘛。

你听了我这话之后可能会想问：“瞧你这话说的！你说了跟没说好像差不多啊？”

那我就会这么回答你：“对，是差不多。最终，你还是得猜。”

如果有人跟你说，他有办法改变“命运”。他说的这个能改变的“命运”，和我说的“命运”就不是一回事儿。我说的“命运”是不能改变的，能改变的就不是“命运”。

可以预测的，是注定的。但“注定”不等于“可预测”。

比如，我可以说一支股票明天的收盘价是注定的，虽然现在我无法预测明天的收盘价到底会是多少。

再比如，那只猫会做啥，我也无法预测，虽然它会做啥是注定的。我不掌握它大脑里的神经元网络的详细信息，所以我没办法可靠的预测它会做啥。如果我实时掌握那个立方体里每一个基本单位的状态，根据这些数据，我可以可靠的预测那只猫在1小时后到底会做啥。我的预测应该比那只猫自己预测的更可靠。那只猫没办法可靠的预测它自己的命运，因为它的大脑没办法实时掌握那个立方体里每一个基本单位的状态。它的大脑本身是那个立方体里的一部分基本单位。

那只猫有可能会做一些它事后会后悔做了的事。如果我实时掌握那个立方体里每一个基本单位的状态，根据这些数据，我可以可靠的预测它会做的事，并且可靠的预测它做了这件事之后的后悔。也就是说，它会做的事，以及它做了之后的后悔，都是注定的，无法避免的。

那个立方体里的基本单位们，包括那只猫的大脑里的基本单位们。那只猫的大脑里的基本单位们的物理活动， 不影响那个立方体里的基本单位们的物理活动，是那个立方体里的基本单位们的物理活动的一部分。那只猫的大脑里的基本单位们做的事，是那个立方体里的基本单位们做的事的一部分。

那只猫认为它能决定老鼠的命运。但实际上，猫和老鼠的命运都由物理定律决定，基于那个立方体里的所有基本单位们的初始物理状态。

“具体到那个立方体里的某一个基本单位，它到底是属于猫还是属于老鼠？”这个问题的答案对这个基本单位的物理状态的客观状态演化过程不会有任何影响。不管这个基本单位属于谁，这个基本单位的物理状态的客观状态演化过程，都得受到物理定律的控制。这个基本单位的物理状态的客观状态演化过程，不受其他任何一个基本单位控制。在物理定律的统一控制下，各个基本单位的物理状态的客观状态演化过程相互之间是独立的、平行的。

那只猫决定不了它自己的命运，也决定不了老鼠的命运。但猫认为它都能决定。（猫也许还认为老鼠也能决定猫（或老鼠）的命运。）很明显，猫疯了。同样，老鼠认为老鼠自己能决定自己的命运，而且猫也能决定老鼠的命运。（老鼠也许还认为老鼠（或猫）也能决定猫的命运。）很明显，老鼠也疯了。它俩疯的地方完全一样。所以，它俩之间在互动时，都发现不了自己疯的地方。如果别人指出它俩疯的地方，它俩反倒会觉得别人疯了。

我们可以把立方体里的每个基本单位想象成一个悬浮在空气中的小水滴，把立方体里的所有基本单位们想象成悬浮在空气中的一朵云。然后，我们可以把猫想象成一个猫的形状的小云朵（“猫云”），把老鼠想象成一个老鼠形状的小云朵（“老鼠云”）。让我们想象猫云追上了老鼠云，并吞下了老鼠云。在猫云吞下老鼠云的过程中，猫云决定了老鼠云的命运吗？貌似是猫云决定了老鼠云的命运。但实质上，在物理定律的统一控制下，老鼠云里的每个小水滴分别独立的、平行的决定了自己的命运。或者换句话说，物理定律分别决定了老鼠云里每个小水滴的独立的、平行的命运。老鼠云里的每个小水滴的独立的、平行的命运叠加起来，就是老鼠云的命运。或者换句话说，老鼠身体里的每个基本单位的独立的、平行的命运叠加起来，就是老鼠的命运。所以，老鼠的命运不能赖猫。如果那只老鼠最终被猫吃了，那就说明物理定律注定了那只老鼠会被那只猫吃。如果我们实时掌握那个立方体里所有基本单位的物理状态，根据物理定律，我们可以可靠的预测那只老鼠的命运。我们预测出来的老鼠的命运，老鼠改变不了，猫也改变不了。它俩无法以它们自己的决定、选择、想法或行动推翻我们的预测，因为它们的所有决定、选择、想法或行动都应该会落入我们的预测之中。所以，如果那只老鼠最终被猫吃了，不赖猫，也不赖老鼠自己。猫和老鼠都没办法避免这个结果。这个结果是物理定律造成的。

当然，一个基本单位不是一个悬浮在空气中的小水滴。所以，我们所想象的猫云，并不是一朵真正的（悬浮在空气中的、由大量小水滴组成的）云。一朵真正的猫形状的云，不会有一只猫那么长的寿命。一只猫体内的基本单位的数量，远远超过一朵云中小水滴的数量。当然，一朵云里的一个小水滴，本身也是由大量基本单位组成的。一个小水滴周围的空气，也是由大量基本单位组成的。

在一朵真正的大云中，所有的小水滴们是一个整体。如果一个图灵机（通过一种算法）从这朵大云中识别出一朵像猫的小云和一朵像老鼠的小云，对这个算法而言，这两朵小云貌似两个不同的、独立的、平行的小云，（随着时间的流逝）这两朵小云的状态的客观状态演化貌似具有一定程度的独立性。因为这个算法分别的追踪了这两朵小云的客观状态的演化。这个图灵机可能会在这两朵小云的客观状态演化之间识别出一些（以这两朵小云的客观状态演化的独立性为前提假设的）二级因果关系（2O-causality)，比如：“这朵小云的移动速度比那朵小云快，所以这朵小云追上了那朵小云”。但实际上，如果我们完全不被这个图灵机的识别结果所影响，对我们而言，这两朵小云都只是同一朵大云的不同部分，这两朵小云各自客观状态的演化实际上没有独立性。因为我们不是分别的追踪这两朵小云的客观状态的演化，而是整体的追踪这一朵大云的客观状态的演化。或者换句话说，我们追踪这一朵大云里每一个小水滴的客观状态的演化。我们不试图在这两朵小云的客观状态演化之间识别（以这两朵小云的客观状态演化的独立性为前提假设的）二级因果关系；我们故意忘却这两朵小云的客观状态演化之间的（以这两朵小云的客观状态演化的独立性为前提假设的）二级因果关系。

类似的，在那个立方体中，所有的基本单位们是一个整体。如果一个图灵机（通过一种算法）从那个立方体中识别出一个猫的形状的小主观物体（subjective-object）和一个老鼠形状的小主观物体，对这个算法而言，这两个小主观物体貌似两个不同的、独立的、平行的小主观物体，（随着时间的流逝）这两个小主观物体的客观状态的演化貌似具有一定程度的独立性。因为这个算法分别的追踪了这两个小主观物体的客观状态的演化。这个图灵机可能会在这两个小主观物体的客观状态演化之间识别出一些（以这两个小主观物体的客观状态演化的独立性为前提假设的）二级因果关系，比如：“猫的移动速度比老鼠快，所以猫追上了老鼠”。但实际上，如果我们完全不被这个图灵机的识别结果所影响，对我们而言，这两个小主观物体只是同一个大主观物体（也就是那个立方体）的不同部分，这两个小主观物体各自客观状态的演化实际上没有独立性。因为我们不是分别的追踪这两个小主观物体的客观状态的演化，而是整体的追踪这个大主观物体的客观状态的演化。或者换句话说，我们追踪这个大主观物体里每一个基本单位的客观状态的演化。我们不试图在这两个小主观物体的客观状态演化之间识别（以这两个小主观物体的客观状态演化的独立性为前提假设的）二级因果关系；我们故意忘却这两个小主观物体的客观状态演化之间的（以这两个小主观物体的客观状态演化的独立性为前提假设的）二级因果关系。

类似的，一个图灵机可以在一个康威生命游戏系统里的两个小主观物体的客观状态演化之间识别出一些（以这两个小主观物体的客观状态演化的独立性为前提假设的）二级因果关系，比如：“在一个高斯帕机枪（Gosper glider gun）附近出现的一个滑翔机（glider）是由这个高斯帕机枪制造的”。但实际上，如果我们完全不被这个图灵机的识别结果所影响，对我们而言，这个高斯帕机枪和这个滑翔机只是同一个大主观物体（也就是这个康威生命游戏系统）的不同部分，这两个小主观物体各自客观状态的演化实际上没有独立性。

在一个客观现实（objective-reality)系统中，每一个基本单元作为这个系统的一个子系统，其客观状态演化具有独立性。但是，一个包含两个或更多基本单元的小主观物体（比如一个高斯帕机枪、一只猫）作为这个系统的一个子系统， 其客观状态演化并不具有（与其中的基本单元们的独立性不同的）独立性。或者换句话说，在这个系统中，一个包含两个或更多基本单元的小主观物体并不是一个独立的子系统，而只是两个或更多的独立子系统的集合。所以，以两个小主观物体子系统的客观状态演化的独立性为前提假设的、关于这两个“独立”子系统的客观状态演化之间的关系的二级因果关系，实际上只是一个图灵机的疯狂的、荒谬的臆想。

每一个基本单元的客观状态演化是独立的。我们也可以说，作为一个或更多基本单元的集合，每一个小主观物体的客观状态演化是独立的，所以两个小主观物体的客观状态演化之间的二级因果关系实际上并不成立。

那个立方体本身实际上是一整个大主观物体，猫或老鼠都只是这一整个大主观物体的一部分。猫和老鼠实际上不是两个不同的、独立的、平行的小主观物体。只是那个图灵机（通过一种算法）把猫和老鼠识别为（对这个算法而言）两个不同的、独立的、平行的小主观物体。就像一个图灵机（通过一种算法）从一朵真正的大云中识别出（对这个算法而言）两朵不同的、独立的、平行的小云，虽然（对我们而言）这两朵小云实际上只是同一朵大云的不同部分。

那朵真正的大云在客观上实际存在；大云中的每一个小水滴在客观上实际存在。但大云中的一朵像猫的小云在客观上并不实际存在，它只是被一个图灵机主观的臆想出来。

类似的，那个立方体在客观上实际存在；立方体中的每一个基本单元在客观上实际存在。但立方体中的一个小主观物体（比如那只猫）在客观上并不实际存在，它只是被一个图灵机主观的臆想出来。猫、老鼠和人类的大脑都这么臆想，所以猫、老鼠和人类的大脑都不觉得这个臆想是臆想。猫、老鼠和人类的大脑的结构和功能有很多相似之处，它们有同样的臆想并不奇怪。

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**Data Availability Statement**

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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