Research Article

Metaphysics of Thinging Machines Modeling

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This paper develops metaphysics of conceptual modeling based on thinging machine (TM). Conceptual modeling is used to design systems to build a high-level representation of a targeted domain in reality. Metaphysics is about the fundamental structure of such a reality, with the ultimate goal of gaining insight into what the modeled world is like at its most basic level. The issues involve key concepts (e.g., relationship, action, existence, event, and time) central to conceptual modeling that require clarification. According to some researchers, science does not sacrifice any integrity on the altar of metaphysical thinking, which serves as an aid in the quest for understanding. The TM modeling develops a high-level diagrammatic representation of a targeted reality that involves two modes of being: dynamic existence and static subsistence. The model's fundamental ontological unit is called *thi*nging *mac*hine (*thimac*). A thimac is an all-inclusive whole of five *actions*: create, process, release, transfer, and receive. Thimacs have these five capacities that undergo change when they are in the dynamic state. The two modes of TM are (1) subsistence, which includes static templates of thimacs, called *regions*, and (2) existence, which is populated with *events*. An event is constituted from a region, temporality, and a container of existence called *exicon*. TM existence is viewed as a "field" that binds actions and events together. This field is assumed to be independent of regions and time. Existence is not limited to thimacs because *loose actions* also exist. We claim that existence includes (1) a "pre-big bang" world occupied by loose actions and (2) a "post-big bang" world which is a blend of thimacs (thingness) and loose actions (nothingness). Loose actions are the source of generating thimacs.

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I. Introduction

Conceptual modeling is used to understand, communicate, and design systems in fields such as software engineering, database design, and business process management. The purpose is to build a high-level representation of a targeted domain in reality. This paper develops a type of metaphysics of conceptual modeling specifically based on thinging machines (TM) (reviewed in the next section). Such an undertaking involves metaphysical discussion of key concepts and phenomena (e.g., ontology, existence, event, existents, and time) that figure prominently in conceptual modeling. The involved metaphysics aims to produce an improved TM-based conceptualization of reality. The intention is to speculate on the reality implied by the TM model in a manner consistent with its conceptual representation. This may contribute to the view that the TM diagrammatic language is a possible structure of reality based on the claim that "the concrete world is a single, large structure... [which is] best analyzed as a certain sort of graph" [1].

In TM modeling, the world is a complex of things (called *thimacs*—to be defined later) that are constituted from *actions* and are the objects of (e.g., human) experience.[1]

To further distinguish this type of metaphysical work from classical philosophical and metaphysical subjects, we follow the claim that the research matter of conceptual engineering (to be presented later) focuses on improving concepts by designing better ones to clarify and better reflect reality [2]. Such an approach focuses on reconstructing old concepts and introducing new concepts. It may work hand in hand with the modern sciences to ask how we should think of some concepts (e.g., space and time) [3]. According to [2], science does not sacrifice any integrity on the altar of metaphysical thinking, which serves as aid in the quest for understanding.

A. Metaphysics in Computer Science

Metaphysics, as viewed in computer science, is not about mysticism; rather, it is about first principles that aim to break down complex notions into their most basic elements. It is about the structure of reality, with the ultimate goal of gaining insight into what the world is like at its most fundamental level. According to [4],

The tie of software design to metaphysics seems obvious upon reflection. It is our job to listen to loose descriptions of our clients worlds and try and encode them into a rigorous system of objects, relationships, processes and data – so rigorous, in fact, a computer can follow through with them. One of the hardest

problems in computer science, it is said, is naming things, which is very much a hard problem in philosophy.

B. Model-Building

The conception we (i.e., modelers) form of the world is a picture of what we call “world.” It is in accordance with this picture that we adapt to reality [5]. In science, it is always important to have a Weltanschauung (worldview) [5]. However, lacking a Weltanschauung in any study leads to clinging to a lower, more primitive level of technical detail and to fragmented academic or practical progress. By explicitly considering the worldview, an analyst validates the assumptions it dictates, which could lead to different conceptual models. In this paper, we introduce a diagrammatic Weltanschauung of thinging machines (TM).

We adopt the thesis that much metaphysics, especially of the contemporary systematic kind, might best be understood as model-building [6], in a specific sense of the term that draws on recent research in the philosophy of science. Accordingly, exploring the metaphysics of notions aims to establish quality assurance through a certain—to some extent—objective foundation, not subject to misapprehension or convention. The results strengthen the conceptual modeling foundation and supplement the metaphysics with a diagrammatic language tool that may be used to specify some of its concepts.

C. Diagrammatic Modeling

According to [7], to achieve effective, precise communication among workers in the IT industry, a standardized language capable of representing cognitive models across a variety of areas is necessary. Consider some of these languages. UML (Unified Modeling Language) is a general-purpose modeling language used in software engineering, developed to address this demand. UML is a tool for capturing and representing the essence of abstract entities, their relations, processes, and the behavior of different systems. For conceptual modeling where the ontology is critical, OntoUML was developed as an ontology-driven conceptual modeling language. It is designed to represent rich and complex knowledge about things, groups of things, and relations between things. Such languages can represent abstract conceptual structures and have the intrinsic capacity to be used in areas such as philosophy, where diagrams are used to represent philosophical concepts [7][8]. Fig. 1 shows an example of such an approach.

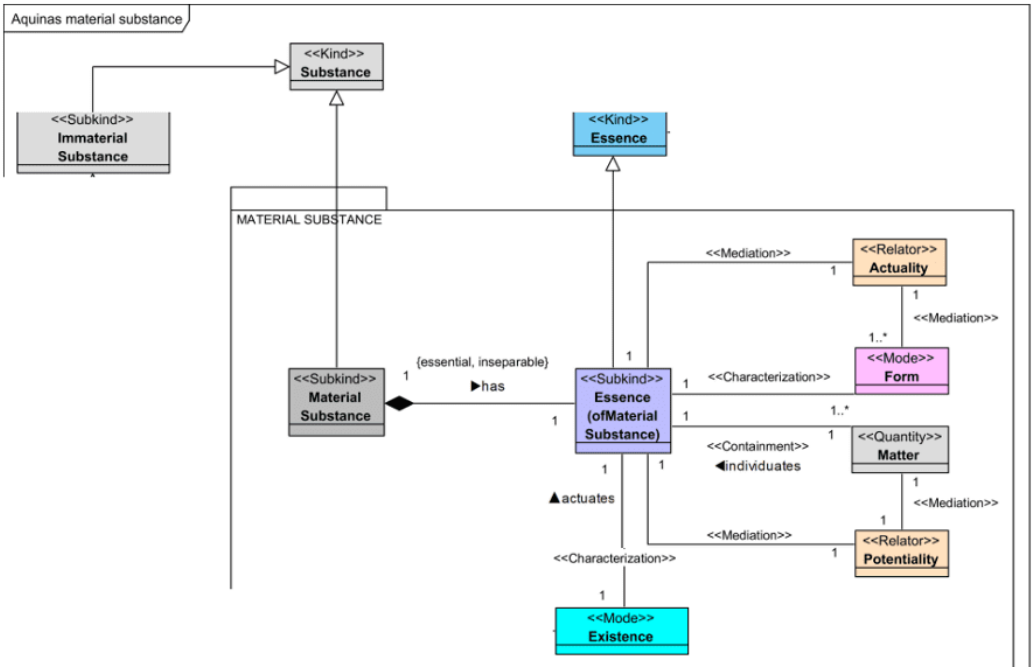

Figure 1. OntoUML diagram presents Aquinas's model of material substances (partial, from [7]).

It is a quite recent movement among philosophers, logicians, cognitive scientists, and computer scientists to focus on different types of representations, and much research has focused on diagrammatic representations in particular [9]. Today, images, diagrams, and graphs are considered a genuine component of the discovery, analysis, and justification of knowledge [10].

In philosophy, the diagram serves as an instrument for making evident the structures of ontology and epistemology [10]. This paper explores providing metaphysics with a diagrammatic language tool for exploring certain metaphysical concepts. In doing so, it paves the way for future research and application, establishing a rich, interconnected framework that resonates across many branches of knowledge. Such a venture strengthens the foundation for conceptual modeling as a high-level representation of a targeted domain of reality, focusing on key elements without delving into implementation details. According to [8], conceptual modeling diagrammatic languages could help philosophy by enabling mapping, explanation, clarification, and model checking of abstract conceptual structures, as such diagrammatic representations have standardized, potentially formalized bases.

D. Metaphysics and Conceptual Modeling

Metaphysics and conceptual modeling share an interest in many notions, such as object, attribute, class, relation, action, existence, event, time, etc. This aims to establish a holistic understanding of these common notions that transcends the boundaries between the two fields. The interdisciplinary framework is crucial for addressing foundational concerns about the nature of reality and its modeling.

Deliberations in the TM context involve the theory of things, subsistence, and existence, as they are superimposed on each other in reality. The results contribute to understanding conceptual modeling and introduce some metaphysical insights. In this paper, the focus is on existence.

E. Metaphysics

According to [11], it describes "what holds true of a *thing* just insofar as it *exists*" (italic added). In ancient and medieval philosophy, metaphysics was the "science" that studied "being as such," "the first causes of things," or "things that do not change" [12]. In the current conception, metaphysics is primarily concerned with developing generalizations from our best-confirmed scientific theories [12]. This approach includes ontological questions about the existence of abstract things, mental events, objects with proper parts, and temporal parts [12]. Some metaphysical issues discussed are which facts hold in *reality*. The task of metaphysics is to "explain the world" in terms of its fundamental structure [1].

In the strict sense, some researchers define metaphysics as the science of the principles on which cosmology, psychology, and natural theology are based. It is also viewed as the science of being as being [13]. It deals with things which, considered in themselves, are more fundamental than the material world. "To be" signifies the dynamic source and principle that makes real whatever is demanded by the essence of the subject it actualizes [13]. One of the connotations of *being* in the tradition of thought is *that which is most fundamental* to understanding the world or some aspect of the world. According to [14], *being* is fundamental in understanding the world: "The use of being encourages and permits the formulation of a system of understanding of the world in terms of its most general and universal of characteristics such as *being*, *all being* and *absence of being* which will be found to be capable of being the basis of a powerful system of understanding."

According to [15], "Metaphysics, at bottom, is about the fundamental structure of reality. The ultimate goal is insight into this structure itself—insight into what the world is like, at the most fundamental level." On Sider's view, metaphysics is about discovering the world's structure—and thereby determining which

concepts we should use. Accordingly, metaphysics involves the construction and evaluation of model classes. A model is an imagined or hypothetical structure that we describe and investigate to understand some more complex, real-world target system or domain [16]. Much metaphysical work, especially of the contemporary systematic kind, might best be understood as model-building, in a specific sense of this term that draws on recent philosophy of science [6]. According to [17], "developments in computer modeling [...] have the potential to contribute to what may be the most significant change in Western philosophy since the foundational work of Aristotle's teacher Plato in the 4th century BCE." In computer science, finding solutions to practical problems employs models of the world and applied metaphysics [18].

F. Conceptual Engineering

Rudolf Carnap argued that we can think of philosophy as useful in clarifying, modifying, and developing concepts to use in the empirical work of the sciences [19]. Philosophers may aim to *explicate* the concepts we need to do science. Explication means improving concepts to make them more useful for scientific theorizing by making them more precise and more fruitful for generalization. This approach points to a project to develop a method for undertaking, as a way of "engineering concepts" (or conceptual engineering), to aid scientific progress. Philosophical work may be directed at improving our conceptual scheme. Philosophy can be considered analogous to a certain kind of engineering. The central job of philosophy is to understand, repair, and renew our conceptual schemes. This involves re-engineering scientific, social, logical, and other philosophical concepts. Conceptual engineering may focus on the assessment, repair, retrofitting, or reverse engineering of concepts and how we should use them. It may also encompass much of the work in metaphysics (see references in [19]). Conceptual engineering may involve designing new concepts to serve some new, perhaps scientific, technological, or social purpose [20]. For example, philosophy can use computer science as a vehicle for experimental philosophy, which can provide practical tests of different philosophical ideas. The so-called philosophy of computer science is said to be concerned with conceptual issues arising from reflection on the nature of computer science.

G. Glimpse on Thinging Machines

The TM modeling presented in this paper is an exploration of how philosophical insights are applied to practical applications (e.g., high-level modeling of an enterprise in software engineering). It provides a resource for further research and application, ensuring that concepts and their representations resonate beyond the confines of academia. In this paper, we seek an ontological TM model that intends to reconcile

certain contemporary scientific notions. The aim is the knowledge of “one’s way” around with respect to the subject matters of related disciplines [21].

In TM modeling, the world existence is represented as a composition of things called *thimacs*. A thimac is an assemblage of generic *actions* (of doings). It is an all-inclusive whole of five *actions* that embraces static and dynamic modes of reality. Generic actions have no internal structure. This conceptual picture is similar to conceiving of “mathematics” as a mental construct. In TM, to assert reality implies both actuality and necessary potentiality as ways of being. In TM, a *real thing* can be a potential thing (a *region*) or an *event* (a referent or an existing thing).

H. Summary of Contribution in This Paper

This paper discusses a thimac-based metaphysical notion, an *existence container* (exicon), as a “piece of existence” that blends with the thimac region and time. The exicon is correlated to *pure being* in metaphysics. According to [13], “Anything which is real, from a stone to an impression, from color to a certain place in the universe, is a *being*. Being is not one class of things: all things, whatever class they belong to, are beings.” In analogy, every actual thimac is established upon exicon. Fig. 2 summarizes the thesis proposed in this paper as follows.

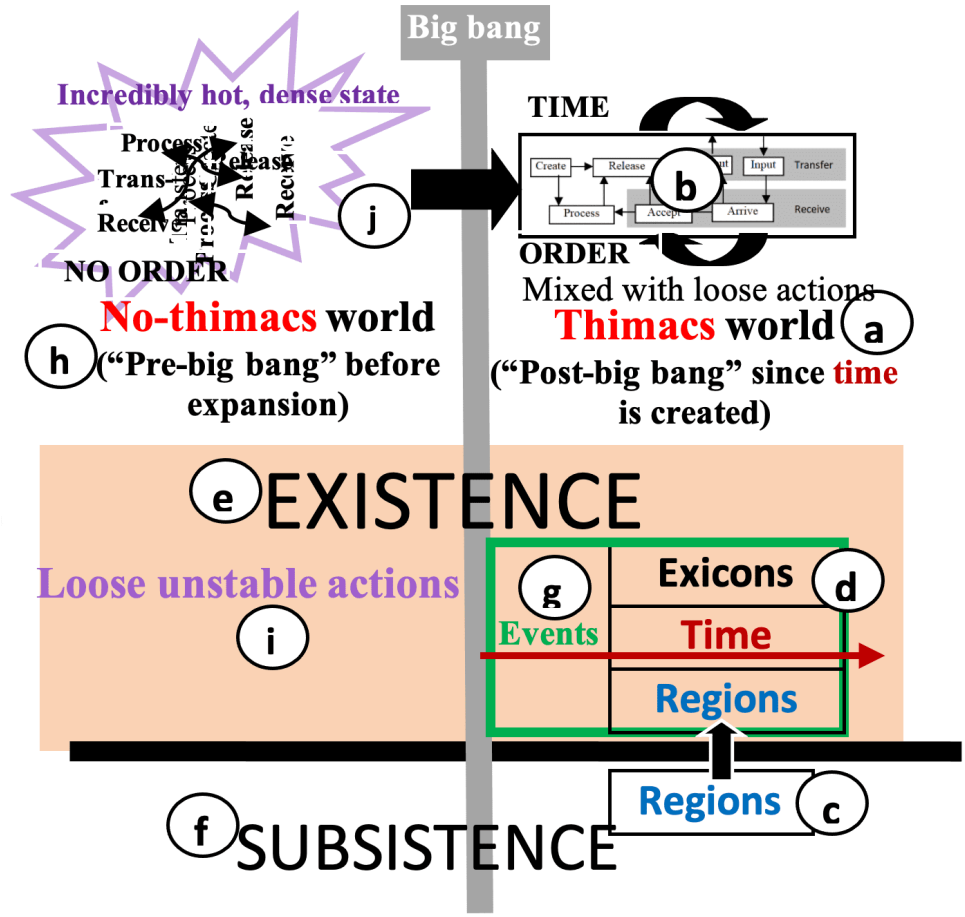

Figure 2. The complete metaphysical base of the TM model proposed in this paper.

A thimac is an all-inclusive whole of five actions: create, process, release, transfer, and receive. According to the thimac structure, subsistence includes static templates of thimacs, called regions, and existence is populated with events (regions, time, and exicons). TM thimacs' existence (union of exicons) is viewed as a "field"[2] that binds actions and events to each other. This field is assumed to be independent of regions and time. However, existence, in its entirety, is not limited to thimacs because non-thimacs (loose actions) also exist. Assuming the Big Bang thesis, we claim that the Big Bang generates thimacs, but the "pre-Big Bang" is a world of non-thimacs (loose actions). Thus, existence extends in both worlds: thimacs and non-thimacs. This leads to the conclusion that existence is independent of things (thimacs).

In this paper, our main interest is to clarify the nature of thimac by examining *what binds its actions together*. It turns out that this goal involves understanding the "reality" of thimacs, which requires

metaphysical exploration. Footnotes in the paper include those comments that would have slowed the flow of the text.

I. Sections

For the sake of a self-contained paper, the next section includes a repeat of materials about the notion of thimac world (a in Fig. 2) including the notion of thimac (b) and region (c) as represented by TM model. Section 3 provides illustrative examples of the TM modeling. In Section 4, we focus on the notion of TM existence (e). The section includes explanation of the TM ontological conceptual picture counting existence (e) and subsistence (f) and the construction process that produces events (g). Section 5 introduces a deeper metaphysical description of existence, specifically the topic of *what upholds pure existence*. This is related to the *exicon* (existence container—d) as a piece of existence "where" an event "lives." We discuss one classical way of understanding the notion of *substance* as an illustration of a similar attempt to the TM notion of exicon. In TM, existence stands on its own, divorced from intentionality or manifestation. It is defined as regions being somehow actualized. In Section 6, the focus is on the notion of exicon. In TM, "that which exists" (event) is a compound of a region, time, and a piece of existence called exicon, or "existence container." An exicon demarcates a single whole thimac existence. Section 7 contains the complementary world of non-thimac (h), the world of "pre-Big Bang." It is constituted by loose actions (i) in an "incredibly hot, dense state" (j).

Lastly, it is fair to warn that there is no claim in this article to be an expert on metaphysical or scientific topics. The discussion here is based on what has been understood about the TM Model in other fields, such as metaphysics and physics, through personal research.

II. The TM Model

In the context of TM, the metaphysical issue concerns how the TM universe "*really* is." The TM model is a form of the modern thesis[3] that challenges the classical view of a world constituted by things as "building blocks." The TM world is founded on a limited number of notions, e.g., thimacs (*thi*nging *mac*hines), actions, and flows.

In the TM model, we distinguish between the world of thimacs (roughly, *things* including things within things and things overlapping with things). Thingness is thimacness; every*thing* is a thimac. The thimac is an elemental feature of the perceivable world. The perceivable world consists of thimacs and complexes of

doi.org/10.32388/K9YMTF

these constructs. All things (viewed in TM existence level as events) and processes (nexuses of events) are thimacs, including minds (e.g., the idea of the sun in mind), bodies, time, and space.

Thimacs are defined in terms of *generic* (i.e., no sub-action) actions. In contrast, the TM world of non-thimacs (roughly, *nothing* or *no-things*) is a world of loose actions (actions without thimacs). TM actions do not have any superactions (extensions) or subactions (parts). Actions are units of the ultimate infrastructure in this universe and raw material for existence.[4]

A. On Thimacs

The idea that there is a fundamental kind of entity underlying all beings has a long history. For example, the Western philosopher Thales (624-545 BC) claimed that all is water. In TM, thimacs, as regions or events, are the core features of the world. Thimacs encompasses the traditional theory of matter, space, and time. The thimac can be defined in terms of the classical *thing* as *that about which something could be said*, and can be defined in its generality as a synonym for the notion of "being" of a thing.

The thimac structure is built upon basic, indivisible five genetic actions: create, process, release, transfer, and receive, where a thimac is characterized by the power to act and to be acted upon.[5] The thimac structure represents rules for ordering these primitives into a thimac. It is a generalized abstract logical form that enables us to create theories about the world. In TM, existence is a tightly interwoven fabric of thimacs and their actions.

The thimac is constructed by letting TM five actions follow each other in a certain order, as shown in Fig. 3. The arrows in Fig. 3 are like the silence between words; they are the slots of "background" where continuous actionality can break and pass through.

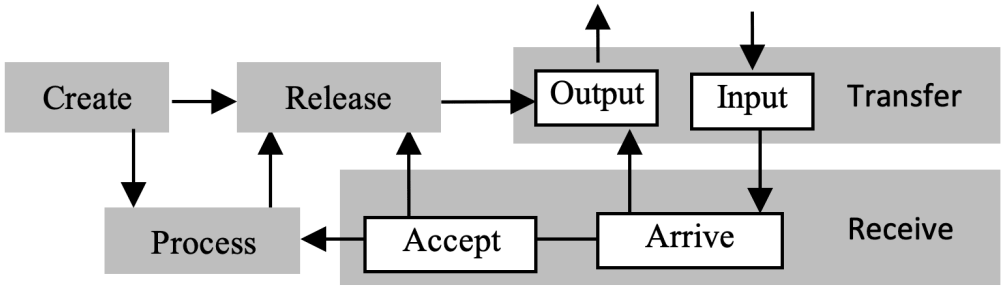

Figure 3. A (complete) thimac.

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Altogether, the thimac has three distinct perspectives. First, we can treat the thimac as an element (e.g., an entity type) distinct from other thimacs. Second, we can treat the thimac as a flow as it moves along different other thimacs. Third, we can treat the thimac in context, within or made up of other thimacs.

Thimacs have a certain relative autonomy and stability. The thimac captures everything that is formalizable, along with a structure of relationships among them. All things are units of thimacs. In comparison, *no-things* lack such a structure in relation to actions. In this case, actions are called *loose* actions.

Specifically, the TM actions of things are five.[6] In TM, a *thing* is defined as what is created, processed, released, transferred, and received, and what creates, processes, releases, transfers, and receives other things.

Thimacs are exemplified by different ways of descriptions (e.g., matter, concept, idea, fire, music, energy, electricity, map, etc.) In general, every "thing" and every "process" (complex thimac) is a thimac. Any amalgamation or assembly of thimacs is a thimac as long as there was a uniting process. Similarly, any subthimac is a thimac so long as it is distinguished from other subthimacs of the whole thimac.

Heidegger's hammer has many superthimacs, subthimacs, and flows: nails, wood, other building materials, the idea of building, the goal of creating shelter or protecting one's family, etc. They all contribute to the thimacness of the hammer in a complex, shifting, coherent sum of competing significances, resulting in a unity of the whole thimac.

Instead of *things*, the TM uses the action-based structure thimac. Multi-thimacs interlock to form an infinity of more complex integrated realities. Thimacs compose a further thimacs. A thimac contains all subthimacs applicable to that thimac in the world. A subthimac contains, in turn, finer subthimacs. Various thimacs overlap or combine to form the texture of the whole as a grand thimac. Any other thimac is always both a part of a greater thimac and may itself be a composition of smaller thimacs. Thimacs interact with other thimacs; new thimacs are generated, forming a vertical hierarchy. A thimac may include subthimacs (e.g., attributes). The subthimac is itself a thimac.

B. On Actions

TM's actions, shown in Fig. 3, are described as follows:

1. Arrive: A thing arrives at a thimac.

2. Accept: A thing enters a thimac. For simplicity, the arriving things are assumed to be accepted (see Fig. 3); therefore, the arrive and accept actions are combined into a single *receive* action.
3. Release: A thing is ready for transfer outside the thimac.
4. Process: A thing is changed, handled, and examined, but no new thimac is generated.
5. Transfer: A thing crosses a thimac's boundary as an input or output.
6. Create: Creation here refers to the process of a *subsisting* thing that becomes into *existence*; i.e., a thimac that *subsists* becomes to *exist* as an event. It is the subsisting/existing mechanism of a thimac to move from a subsistence to an existence mode of reality. At the static (potential) level, *create* is a logical possibility of realization at the dynamic (existence) level.

Note that, for simplicity, we sometimes omit the create label in a thimac under the assumption that the rectangle representing the thimac is sufficient to denote its existence.

Additionally, the TM diagrammatic model includes storage (represented as **a cylinder**) and triggering (denoted by **a dashed arrow**). Triggering transforms one series of actions into another (e.g., an electrical process triggers the generation of heat).

Non-thimacness is a world of loose actions and outside event-ness. "Nothing" is the absence of thimacness. It is where we lose structured actionality. According to [2], particle physics has introduced a new view of nothingness[7] that yields an ontology without what is tangible and concrete. The tangible and concrete need not be physically manifested, although the same forces and energies are present. Particles (thimacs) pop in and out of existence all the time.

The aim of using TM actions may be thought to be analogous to the ancient notions of the four elements: fire, air, water, and earth. According to [22], "These Elements do not refer so much to the physical elements of those names, as to subtle fields that consist of, or are composed of, or give form to, various elemental beings with a spiritual, mental, emotional, or semi-physical quality."

The thesis that things in the world are built from actions is claimed in many philosophies. In the Aristotelian convention, nature is characterized by movement; hence, what is unmoved is immaterial. In TM, movement indicates a thimac with three actions: release, transfer, and receive. In the Tibetan Buddhist tradition [23], the tangible world is movement (which generates phenomena), not a collection of moving things, but actions themselves. It is the actions that constitute the things that appear to us: they are nothing but actions. The actions are "a continued and infinitely and rapid succession of flashes of energy" [23].

On the other hand, the existence of matter which is actionless and homogeneous is flatly denied [14].

These “somethings” arising instantaneously and in series, these rapid flashes of energy are sufficiently like one another during the series to remain imperceptible to us, then suddenly occurs, in this series of moments, ~ different moment which catches our attention and makes us think that a new object has appeared [23].

Actions are indivisible. Each action is intermittent and advances by separate flashes of energy that follow each other at such small intervals that these intervals are almost non-existent [23].

C. TM Model

The thimac reduces the diversity of elements in TM reality to

- Static virtual structure (called *region*) and,
- Dynamic appearance or actualizations of that region (called *event* or *existent*).

Actuality (the community of all events) here changes its sense according to its perspective, i.e., past, future, and present. This structure is the way that all things in reality are constructed, the way their interiors are put together.

A thimac has two modes: a thing and a machine. TM has a static form (region) and a dynamic form (event or existents). The region is expressed by its thimac, and the event is its manifestation, whereby it is what it is. It involves a region and (objective) time. As we will discuss later, events also involve *pure existence*. The chronology of events is the time-based ordering of events.

The thimac’s constituents are formed from the five TM actions. The actions combine to constitute the whole of the thimac, preserved even when passing from one action to another and persisting in the same action. At the dynamic level, each existing generic action (generic event) in the set of discrete actions interpenetrates the next, forming a dynamic continuity in which time and action are inseparable.

The thimac can be an “object” (patient) to actions of other thimacs or a “subject” (agent) that acts on other thimacs. Despite the differences among actions, the totality of the thimac focuses on what they have in common: actionality (changability). An action is a unit of actionality within thimacness. The TM modeling is built upon the primacy of actionality in the context of thimacness.

In its full manifestation, a thimac is a machine (i.e., what acts on) that creates, processes, releases, transfers, and receives some other thimacs; simultaneously, a thimac is a thing (i.e., what is acted on) that is being created, processed, released, transferred, and received by some other thimacs. Thus, a thimac, as a

thing, is a patient that undergoes changes (created, processed, released, transferred, and received), and, as a machine, serves as an agent that brings about changes to other thimacs or to itself (e.g., a doctor treats herself). At the most basic explanatory level, we conceive the thimac as constituted by two kinds of capacity, which we label “thing” and “machine.” A thing constitutes the thimac’s capacity to be affected, whether by itself (i.e., one “part” or capacity of the thimac affecting another) or some other thimac (machine). In contrast, the power of machinery is the ability to initiate its actions from itself on other thimacs (things).

The thimac is a thing with a “structure” formed by the flow of other thimacs through it. It is a machine with five actions that operate on things. It is anything to which reference can be made, whether potential or actual, and has the actions structure. Furthermore, as we will see later, the thimac is what manifested in TM existence.

D. Events

The thimac-oriented model adopts the Stoics distinction between two domains of being: actuality and potentiality [24]. TM reality is viewed in terms of static thimacs (regions) and time-conditioned events. Events reflect the totality of thimac that exists.

Actuality and potentiality are familiar Aristotelian notions. For Aristotle, matter is potentiality; it has the potential to become many things. In TM, matter is a thimac, just like other thimacs, has potentiality and actuality.

Some thimacs lack the capability to exist (be an event) as “standalone” (roughly, independent) thimacs (e.g., color); however, they have the potential to be created within creation (becoming within creation). This “becoming” is contained *within* a larger context of creation. It refers to “coming to be an event” through which the actuality (eventivity) grows. After all, existing thimacs (events) are part of actuality and time-bound existence that form the existing world of individual events, each with its own region, temporality, and self-*being* (later called exicon).

Imagine the *first* particular color (an orange) emerged after the Big Bang, so there was no “color” in the sense we understand it. It is a novel creation that is registered in the thimacs (things) catalog (e.g., in natural order). Later, the emergence of this thimac (e.g., orange color) is easier (more probable) in a continuous actualizing process, where created thimacs (events) interact and co-create using existing thimacs, rather than originating from a virgin (e.g., colorless) process at every instant. Creation, in this case, is rearranging specific thimacs to create new thimacs.

A block of marble has the *potential* to become a statue; the sculptor's *form* actualizes that potential, giving the marble its specific *being* as a statue. In TM, the marble is a thimac, and a "statue shape" is a thimac that is processed to create a statue (event). This blueprint (of what is actualized) is called a region. In this case, *creation* has its potentiality and actuality, where potentiality includes non-arbitrary structural prototypes (thimacs) of events. Actuality includes temporal and other essential aspects (e.g., materiality).

The region is linked to the concept of event at the existence level; hence, the static level provides the structural framework of reality. At the static level, there is neither actual space nor actual time, so the potential world as templates (regions) has harmony among the thimacs. A region is actualized as an event to realize the statue at the existence level. The TM static templates provide coherence for the structure of reality.

All phenomena are constituted by a rapid succession of instantaneous *events* or a succession of changes following each other with a speed that is far beyond our faculties of perception and understanding.

Generally, *event* here means "something which happens" [23]. TM events result from the joint workings of (generic) actions, time, and *exicons* (pure pieces of existence, to be discussed later in this paper). TM events can be thought, experienced, and valued, and any thimac is a potential event. These thimacs may be the aggregates of other thimacs.

Bertrand Russell proposed that the mind and the body are constructed from the same fundamental "stuff," which he termed *events*. A body is a collection of events occurring in the same place in spacetime. "Matter" is a structure of events. In TM, the fundamental "stuff" is TM actions formulated into thimacs. Actualized thimacs (existents) are TM events. Existence is constituted from events and loose actualized actions. This TM thesis is detailed in the remaining sections of this paper.

E. Forward Picture of the TM World: Loose Actions

The outside of the holistic thimac (world) may contain non-thimacs; hence, no subsistence, no existence, single actions, clumps of them, or scattered constellations of generic actions that lack thimac structure. We can imagine "loose" (non-thimac) actions appearing and disappearing in a "void," or forming new thimacs. The loose action is modeled as actions without *create*. Note that process, release, transfer, and receive are elements needed to manufacture thimacs. They are parts that have function only in the context of thimacs.

It is possible that there is a level of non-thimac structures and loose actions (e.g., quantum particles), but we will not discuss such non-things, non loose action world. The thimac and its actions form our basic

reality, and everything must be defined in terms of them.

III. Examples of TM Modeling

Things, numbers, sets, concepts, rainstorms, heat waves, songs, headaches, and propositions are thimacs. The thimac is an all-inclusive notion of a whole, integrated representation of all things and processes. All aspects of reality can be modeled using thimac.

Previous research includes many examples of TM models in various types of applications, such as, to mention a few, business processes [25], phone communication systems [26], event Classification in Log Audit [27], and service-oriented systems [28]. This section includes further TM models.

A. Example 1: Energy Flow in Construction Engineering

According to the BTS site [29], one of the main uses of building physics is in modeling the energy balance of buildings. An energy balance involves categorizing all energy inputs to a building and identifying their uses within it. The basic equation for an energy balance is *Energy In = Energy Out – Energy Stored.* Building physics is important for understanding buildings in terms of running costs, energy efficiency, heat loss and thermal performance, ventilation needs, infiltration, thermal comfort, and occupant satisfaction.

In a typical domestic house, the energy inputs will include electricity from the grid, gas from the mains, solar gains from the sun, and internal/metabolic gains from the occupants.

Whereas the energy outputs will be electricity used by appliances, heat from the radiators, hot water use, and heat losses through the building fabric and ventilation. In addition, a certain amount of energy may be stored in the building fabric depending on the thermal mass of the construction [29] (see graphical description in Fig. 4).

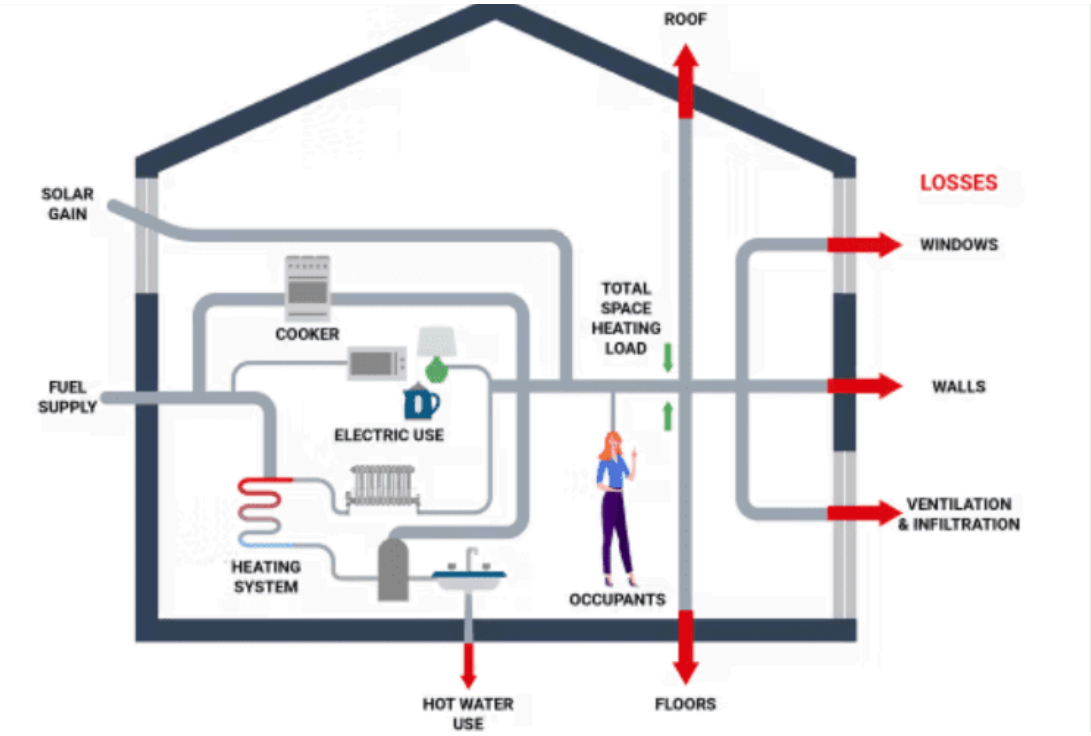

Figure 4. Energy balance of a typical domestic house (from [29]).

TM Static Model

We represent Fig. 4 in TM modeling as shown in Fig. 5.

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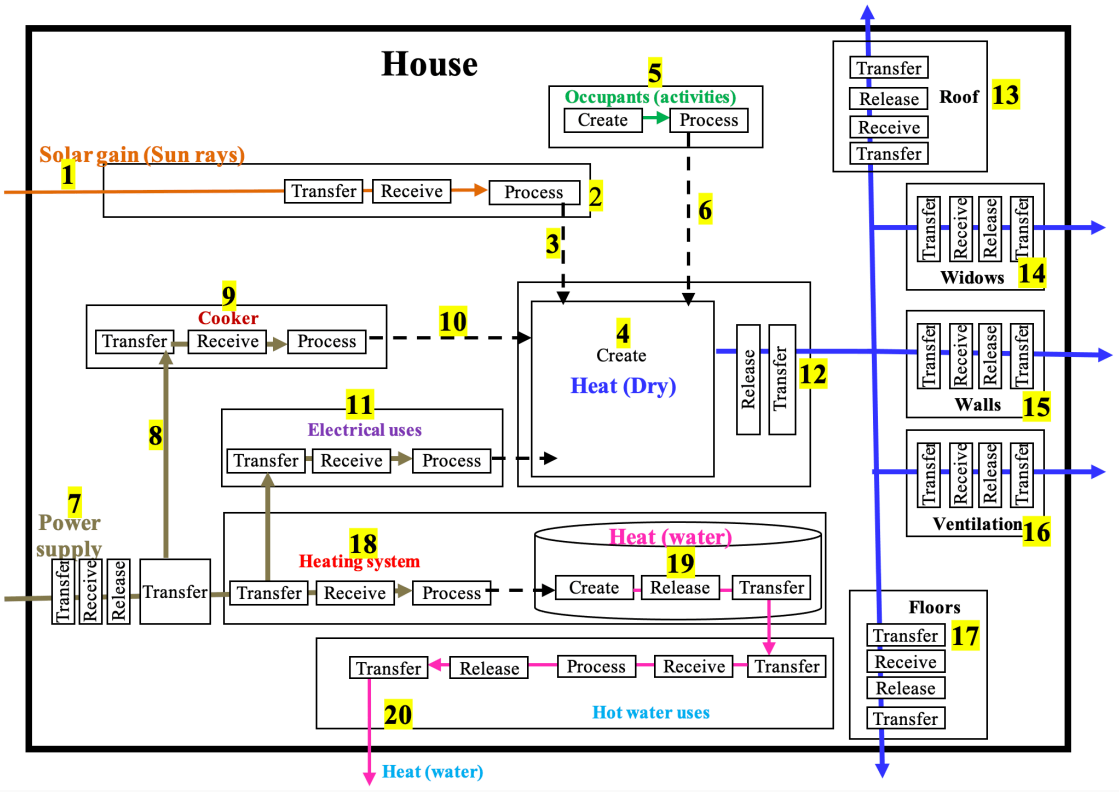

Figure 5. Static TM model: Energy balance of a typical domestic house.

In Fig. 5, the thimac *House* includes different subthimacs. The yellow numbers will be used to describe parts of the diagram.

- First, the sum (1) is utilized (processed) (2) to cause (dashed arrow) (3) to generate heat (4).
- Similarly, occupant's activities (5) cause (6) the creation of heat (4).
- Additionally, the power supply (7) powers (9) the cooker (10), generating some heat (4).
- Similarly, electrical uses (11) create some heat (4).
- The heat generated in (4) would be released (12) through the roof (13), windows (14), walls (15), ventilation (16), and floors (17) outside the house.
- Likewise, the heating system creates hot water (18), and hot water uses (19) release heat into the water outside the house (20).

TM Dynamic Model

An event in TM is a subdiagram of the static TM model in temporal existence. Fig. 6 shows the representation of the event: "*The sun rays reach the house*." For simplicity's sake, we will represent events by

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their regions. Accordingly, the set of events in the house example can be specified as follows (see Fig. 7).

- E_1: The sun rays reach the house.
- E_2: Occupants make activities.
- E_3: Power supply connected to the house.
- E_4: Cooker is used.
- E_5: Electrical appliances are used.
- E_6: Heat (dry) is created.
- E_7: Heating system generates hot water.
- E_8: Hot water is used.
- E_9: Hot water is released outside the house.
- E_{10}: Heat is release outside the house from roof, widows, walls, ventilation and floors.

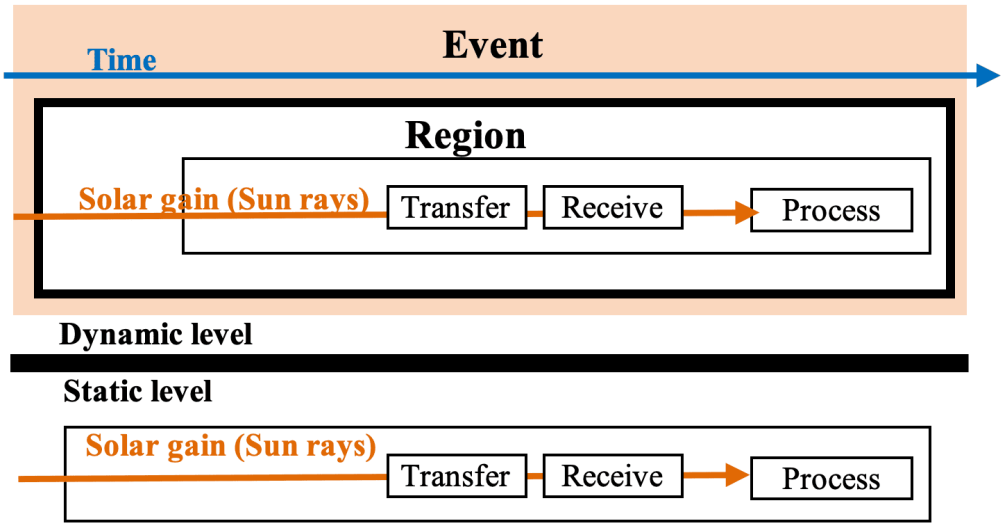

Figure 6. Event: *The sun rays reach the house.*

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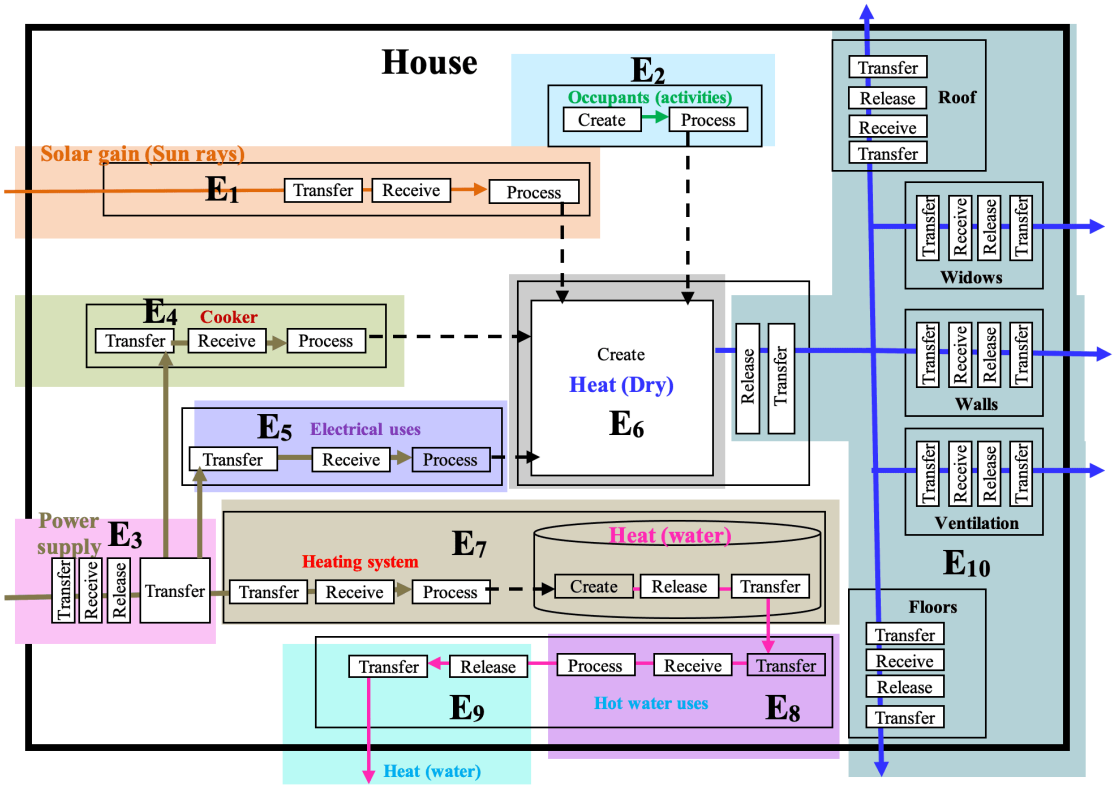

Figure 8. Chronology of events.

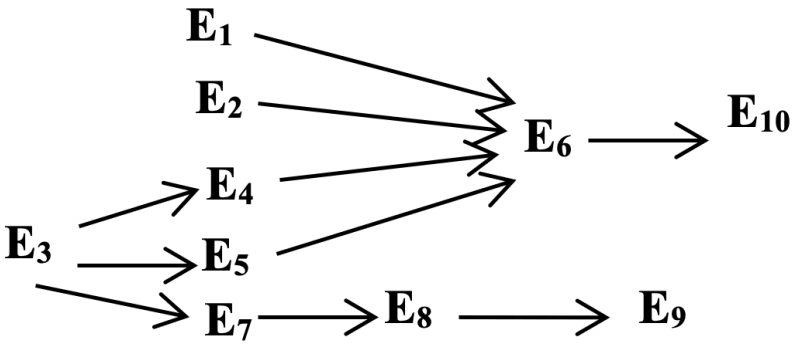

Figure 8. It shows the chronology of events for the house.

B. Example 2: Modeling Lying

This example shows TM modeling that involves a moral situation. Few moral questions have greater bearing on our conduct than questions about the morality of lying. Any theory about the moral status of

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lying presupposes an account of what lying is [30]. We assume that a lie is a false statement. The dictionary defines lying as a false statement made with the intent to deceive others. The definition of lying needs a condition to rule out the possibility that one believes that what one says is true [30].

TM provides a diagrammatic language for representing and analyzing the involved situation. A lie is treated as a thimac. Consider the ethical situation that includes a murderer demanding the whereabouts of his intended innocent victim. The situation is modeled as shown in Fig. 9. The answer is modeled according to the Kantian ethics. Fig. 10 represents the dynamic model, and Fig. 11 shows the chronology of events.

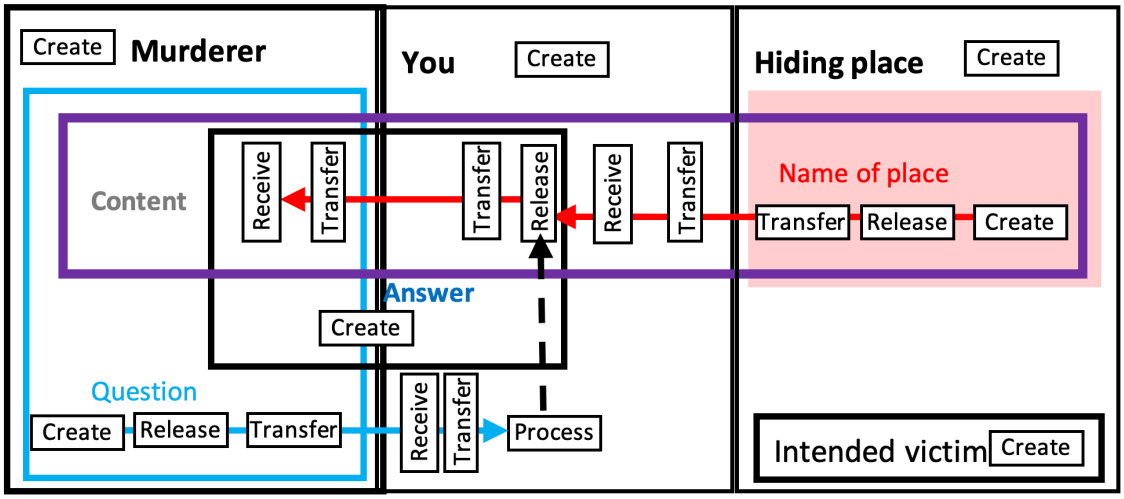

Figure 9. The ethical situation involves lying to a murderer.

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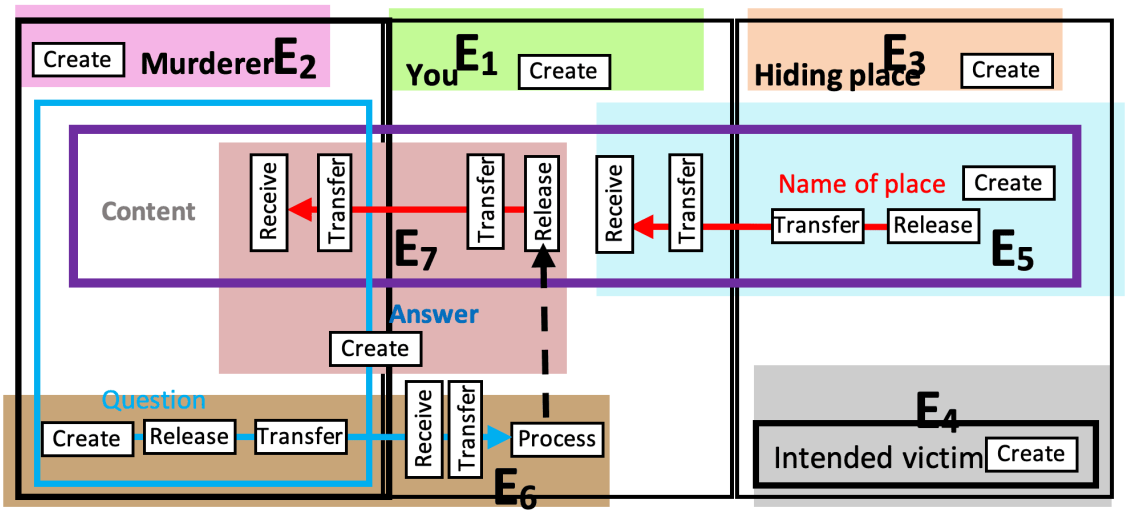

Figure 10. The dynamic model of lying to a murderer.

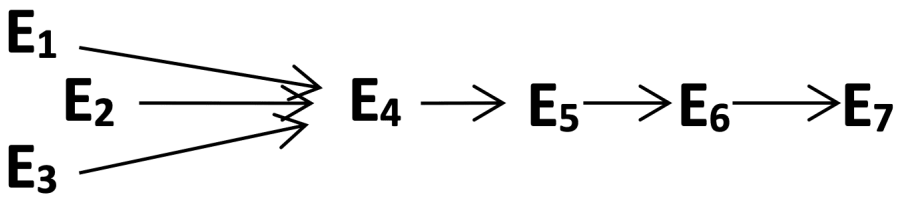

Figure 11. The chronology of events.

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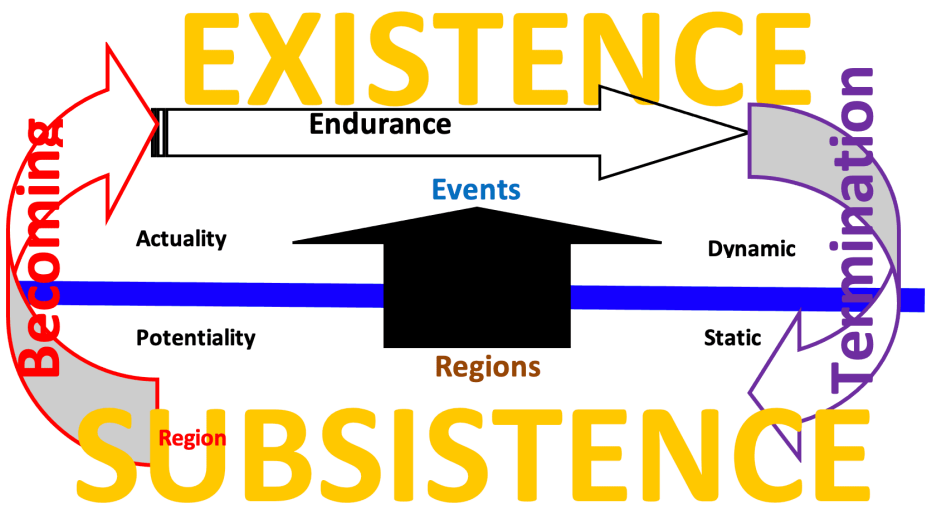

Figure 12. The process of actualization

IV. TM-Based Metaphysics

In this paper, we focus on the existence of TM. Generally, such a notion encompasses questions about the concept of existence at large, where the TM event is what "happens." This will be used to develop a deeper metaphysical description of existence. In TM, existence stands on its own, divorced from intentionality or manifestation. It is defined as regions being somehow actualized.

The TM model involves two modes of reality: *dynamic* existence and *static* subsistence [31] (see Fig. 12). Subsistence is a mode of reality in which we consider a thing apart from its existence. This subsistence is discussed in detail in [31].

As shown in Fig. 12, existence involves *becoming*, *endurance*, and *termination*. Becoming is the process of creation as a transformation from potentiality to actuality. In becoming, the event becomes the final product of a series of becoming that reminds us of the processes involved in Zeno's paradoxes. Note that each phase of becoming involves a thimacs. Thimacs are the bricks of building an event. In TM, there is no interest in the intermediate subevents that precede the final event. As in Zeno's paradoxes, reaching, say, half or three-quarters of a distance, etc., is just an unregistered (irrelevant) step toward the destination. The process of becoming can be exhausted in the final event when it runs out of thimacs [32]. Endurance is the prolonged existence of an event over time. Subsistence/existence *transformation* includes: becoming (potentiality to actuality) and termination (actuality to potentiality). Existence here covers everything, e.g.,

inorganic, animal and vegetable life, and man. According to [11] (referring to Rand), it is a mind-independent reality, which can be perceived and understood by (human) consciousness.

Consider an event realization in TM. Fig. 13 shows a general view of this construction process that produces events. In this section, we focus on the shadow area in Fig. 13 that includes the so-called *thimac pure existence* (called *exicon*—existence container).

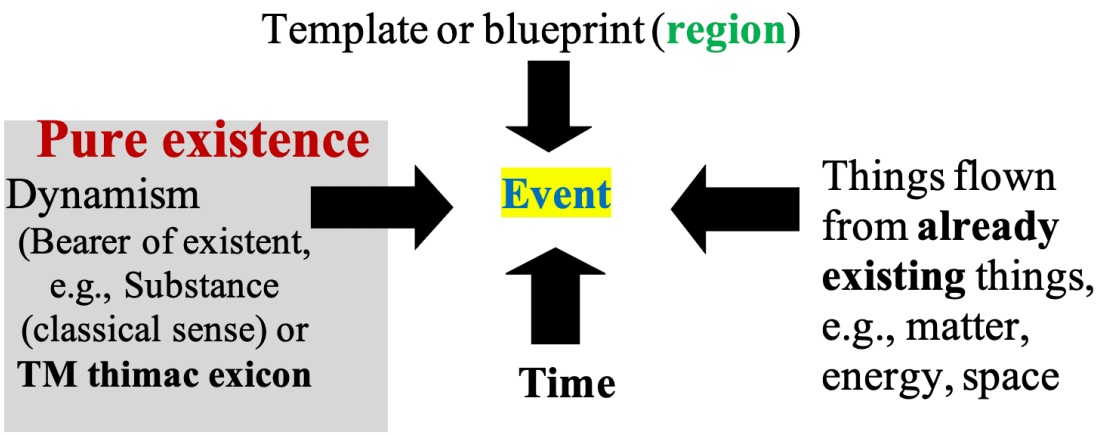

Figure 13. An event construction. Note that a *generic event* is defined as create, process, release, transfer, or receive.

V. What Upholds Existence

The aim in this section is to reach something that upholds *pure existence*. In TM, pure existence is existence without region or time. We develop a thimac-based notion called *exicon* as a piece of existence "where" an event "lives." The union of these exicons forms, but does not exhaust the "space" of existence; additionally, we propose that existence includes loose actions.

We discuss, first, one classical way of understanding the notion of *substance* as an illustration of a similar attempt to the TM notion of exicon. It was proposed to develop a single fundamental ingredient from which things were formed and which governed all occurrences (called "events" in TM). In TM, substance roughly corresponds to "TM event-ing" (actualized thimacs).

A. Substance

In philosophy, a thing cannot exist without having some *properties*. The conception of *substance* derives from the notion of individual *object*, which contrasts mainly with properties and events [33]. In the Aristotelian scheme, substance is a composite of *matter and form*, and such a structure introduced existence as the reason for its reality [34]. Aristotle views *existence* as an essence: essential properties of individuals [35]. A cat instantiates (actualizes) the property of being hungry; however, the cat is himself an individual, he is not instantiated by anything, i.e., "only properties are instantiated; individuals only instantiate" [35].

The issue here is: *Is existence instantiated*? In the TM model, the so-called *individual* is a TM event. This event is actualized by region, time, and a piece of pure existence. Thus, "*This chair (TM event) exists*" means its region is supplemented with time, and these two ingredients are grilled in some piece of existence called exicon. No distinction in this approach is made between an individual (thimac) and a property (subthimac).

In the nonTM approaches, the *form* is inseparable from matter within individual *substances*. In TM, the form is the region, and substances (e.g., matter) are thimacs that flow into the region (of another thimac). For example, the *form* of a tree is the actual structure (TM region) and essence *within* every individual tree. In TM, this essence is the event's time and exicon.

Substance is also interpreted to mean those things that are the fundamental entities of a system, e.g., atoms and ideas [33]. There are some discrepancies in such a metaphysical view. For example, Thomistic metaphysics tends to present the form and essence as if they were the same notion [36].

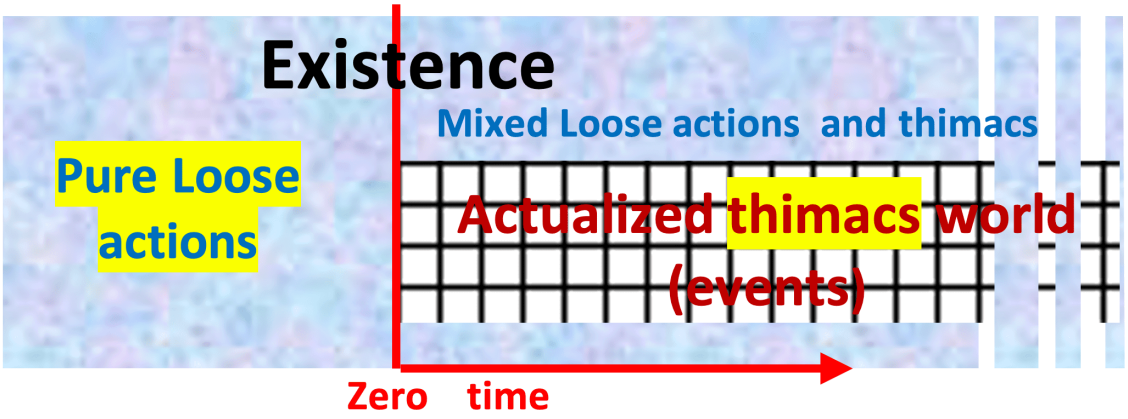

Figure 14. It shows the metaphysical framework of existence that will be proposed in the remaining part of this paper.

B. Pure Existence

TM pure existence, as a whole, encapsulates events and "thimacless loose actions" (see Fig. 2 in the introduction). It is related to the "notion of pure substance in general," standing under or upholding properties [33]. According to Locke, properties must belong to something and cannot subsist without something to support them. They belong to objects, but what are objects over and above their properties? [33].

A (fundamental) substance is something upholding existence, i.e., a thing that exists on its own, to which genuine being is attributable [13]. It is "stuff" that is ontologically basic and permanent, from which all else is made. According to [37],

Substance, like the water that makes up the hailstone, is essential Being, the ultimate uniformity, but also the ultimate heterogeneity. In this conception, being emanates from itself, and must thereby combine with anything it encounters or touches. The being of water is its impurity—it is absolutely solvent, absolutely able to admix with every other element. "Pure" water, like "pure" being, would mean absolute death, a wiping clean of all the diversity of life. And thankfully so, for, just as it is the universal impurity of water that allows for life, so too it is the impurity, heterogeneity, and universal solubility of Being that makes metaphysics itself both possible, and necessary.

Additionally, TM pure existence can be related to the classical notion of *apeiron* described as "containment within the ordering contexts of space and time" [38]. The apeiron is variously interpreted as "the

unintelligible; the many; the moving" [38]. The apeiron is "a boundless giver of boundaries, and Heidegger, for his part, associates it with Being itself" [38].

In physics, a related notion to something that upholds existence is *spacetime*. More specifically, *spacetime* tries to answer the question: *What does the universe consist of?* In the context of Einstein's general theory of relativity, space and time are fused into a single entity, spacetime. One view is that spacetime is a *substance* with an essential nature distinct from that of its occupants: a thing that exists independently of the processes occurring within it [39]. It is a real, not a passive *container* that exists even without objects in it—like an empty stage where events play out. Everything in the world is spacetime (this position is called super-substantivalism—see [40]). Spacetime is the entirety of all space through all time. In a real spacetime, each event sits in some local neighborhood of events, which in turn sits inside a larger neighborhood of events, and so on [39].

Sir Isaac Newton defended a specific view of space and time as absolute space and time, as an empty container that exists and will continue to exist even if no human beings or objects existed [41]. Leibniz said that space is the order of coexisting things. Order means the distance between things, and time is the succession of coexisting things. Space and time are so closely related because spacetime paints a certain picture of a thing's existence.

VI. TM Exicon

Metaphysics explores concepts such as "creation from nothing," "Aristotle's unmoved mover," and the Big Bang theory. TM metaphysics aims to provide a metaphysical foundation for TM modeling without making any claims about application outside that context.

A. Big Bang and the Beginning of Thimacness

In TM modeling, we claim that a world of thimacs has appeared as a result of an event such as the Big Bang. We have already demonstrated that all things and processes in this world are types of thimacs. Additionally, we claim that the "pre-Big Bang" world is a world of *thimacless actions* constituted by loose TM actions in what is usually described as an "incredibly hot, dense state." Hence, *existence* extends across the Big Bang, where the "pre-Big Bang" is populated by TM loose actions, and the "post-Big Bang" is additionally populated by thimacs.

Loose actions have the capacity for change (create, process, release, transfer, and receive), but lack the capacities of an agency or patiency within the structure of thimacs. Such actions lack a thing "that is doing

them" or a thing that is "being done by them," e.g., a processing without a processor or being processed, and a transferring without a transferor or transferee. Being a certain action, e.g., creation, is not the concept of having an action, e.g., creates, or being subjected to an action, e.g., created. Being a certain action does not need time. Having an action or being subjected to an action is accompanied by a tense, i.e., now, past, or future, or an event.

In our TM modeling, we speculate that a pure existence is a "force" that binds events together. It is the cradle of all events. The action *create* at the actualization level represents the entire event, as illustrated in Fig. 15. If we abstract, i.e., ignore the "activities" of the event, and focus on the event *itself* as a whole, we find that *create* represents the "existence" of the thimac that activates the other actions, as illustrated in Fig. 16. This pure layer of existence (i.e., *create* itself) is assumed to be independent of the presence of other *generic* events (e.g., process, release, transfer, and receive). It underlines the existence of thimacs and the primeval state of the TM actuality. The justification is that TM existence is not limited to thimacs because (loose) actions also exist. We claim that the Big Bang generates thimacs, but the "pre-Big Bang" is a world of non-thimacs, i.e., loose actions. Thus, existence is a mixed phenomenon of thimacs and non-thimacs. This means that existence is independent of *things* and *processes* (actualized thimacs); hence, an event incorporates a piece of existence that is separate from region and time.[8]

B. Existence Container (Exicon)

Accordingly, in TM, "that which exists" (event) is a compound of a region, a time, and a piece of existence, which will be called exicon, "*exi*stence *con*tainer." An exicon demarcates a single whole thimac existence. It is the perceiving of "that which exists" while ignoring its region and time, as just *there is a piece of existence there*. In summary, the TM event is constituted by (see Fig. 17),

- The exicon where an actualization takes its "place."
- A TM region submerged into existence (supplemented in the "becoming transformation" by matter, space, etc.).
- The real-time ingredient.

Outside events world, there are (a) loose actions and (b) an absence of existence. Note that,

- *Non-existence* means the absolute lack of actions because thimacs incorporate (generic) actions.
- *Nothing* means lacking thimacs, that is a loose actions world.

To speak of *nothing* is not to turn it into *something*; rather, it is to speak of loose actions. Loose actions are not *something* (thimacs); hence, saying nothing is attributing *being*[9] to these loose actions. *Nothing exists* means *non-thimac exists*. Loose actions are activity seeds in existence and a source of the emergence of thimacs.

Figure 15. Create as the dynamic whole of the thimac-based event. (Image from the Internet – modified).

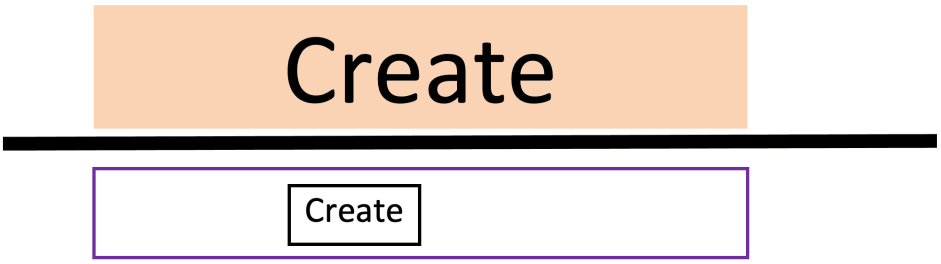

Figure 16. A pure thimac.

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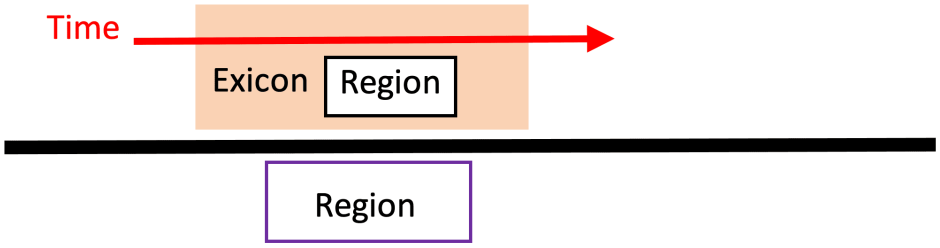

Figure 17. Composition of a region, time and exicon

A pure existence of thimac (see Fig. 17) involves a thimac that has a single action: *create*. The dynamic version of thia pure existence indicates that *there is some existence* there, without structure. We may describe this as something that upholds existence, i.e., a bit of existence on its own; later, a genuine being can be attributed [13]. Accordingly, human consciousness perceives an exicon, even though it is unperceived, e.g., feeling something without knowing what it is. Consciousness is a faculty for perceiving exicons. Such a topic is the subject of further TM-based research.

A region outside existence is a potentiality. The potentiality is viewed as a "grand repository" of possibilities. When a region comes into existence, the becoming

i. Carves its exicon and,

ii. The region and exicon are fused in time; thus, an event emerges.

An exicon outside an event is an undifferentiated, loose-action-based existence without permanence or identity, like some water in an ocean; it becomes distinguishable when a fish occupies it. Empirically (e.g., since the Big Bang), we may observe that the general striving is for more exicons to support thimacness. Such a striving compels existence to prosper like a wildfire that naturally spreads and grows larger and more intense in its quest to consume more and more resources.

The subsisting things require something out of themselves in order to reach their existence. This something is the machine of *becoming* that supplies the region (as a mere plan) and the ingredients (also thimacs) of reality, such as matter, space, energy, and "simple actualized thimacs" (e.g., "a piece of wax") that contribute to real objectifications of specified events. An event is generated when the exicon provides the "plate" of a region, supplemented with such things as matter, as a source thimacs that already exist. Thus, the exicon provides "the plate of cooking" for the becoming into existence. *Grand exicon* is the union of all exicons as an inexhaustible mass inside which actuality is situated.[10]

For example, consider the phenomenon *encountering* [13] as a thimac. In TM, it is realized as an event. It comprises several independent subevents that have their own exicons (beings) unified by the complex encountering exicon. Similarly, "*A person plays the flute*" is realized as a complex event. A TM event (hence its exicon) is either simple or composite. Thus, "*Rose's smile*" refers to *Rose* as an event and "*Smile*" as a subevent.

A composite of exicons seems to have a special type of unity similar to cubes of ice in water that dissolve in the containing water. This is illustrated in Fig. 18, where the events are represented as ice cubes in a freezer (we can imagine each event has its own freezer), and each event is a solid version (representing a realization) of a certain amount of water.

C. Existence Exists

Thus, Rand's thesis that "existence exists" can be restated that the events' existence, as a whole, is a union of exicons. However, there can be no *individual* exicon without a region inside an event. That is, a piece of (thimac) existence by itself cannot "exists as exicon" without a region. To be an exicon is to be an exicon of region. Exicons, thus, cannot form events without regions. Note that in TM, there is a difference between the *total (thimac) existence field* and the *particular exicons of an event*.

Fig. 19 illustrates the idea of a region that provides an exicon with content. In the case of pure existence, we know definitely that the event is there (exists), but we do not know its realized region. Analogically, the region is Pinocchio, and the exicon gives him existence in real time (change). This indicates that existence segments (exicons) provide "life" to regions, where each region is provided with a particular piece of existence.

Accordingly, a time-based event is a composition of a region and exicon. The subthimacs of the region, such as materiality and energy, are provided during the becoming process, in which time is assumed.

D. The Exicon: Further Exploration

The exicon is what makes a *thing exist as a unified, banded-together set of actions* (individual existence). It is a piece of the fabric of existence itself that activates when blended with region and time into an event. The event involves a proper balance between the whole and its parts. The entire exicon of event constructs comprises separate subexicons of subevents reflecting its thimac structure of subthimacs. A compound system of exicons has its own pure existence, and its subexicons have their own pure existences, forming a

type of holism. In general, upon actualization (becoming), the exicon “activates” (pops up) itself with its region, which is molded in it.

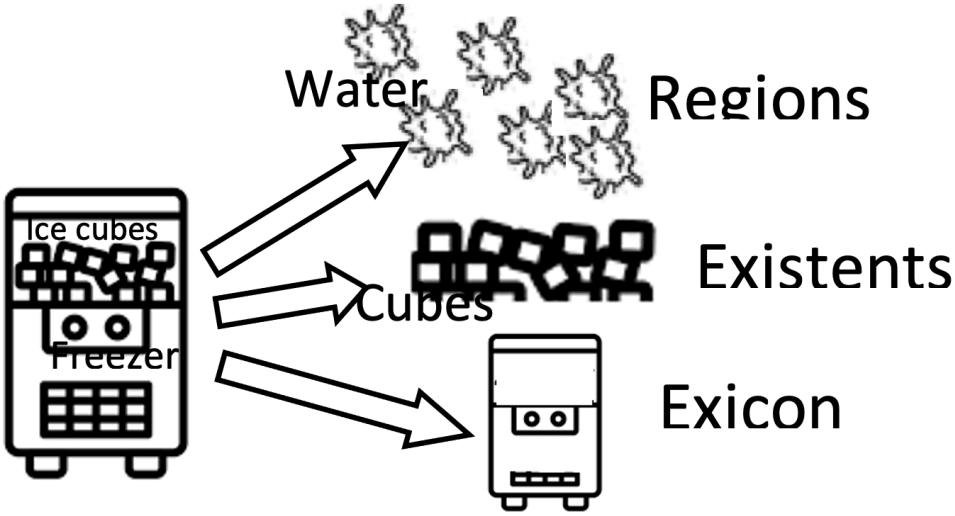

Figure 18. Illustration: The exicon, event, and region.

Figure 19. The exicon (Original image from https://themindsjournal.com/what-happens-when-you-feel-empty-inside-navigating-emotional-emptiness-and-finding-inner-fulfillment/).

The exicon is inherent in every event (thus, thimac) of existence. According to [13], the concept of thing (TM *event*) is derived from adding to being (TM *existence*) a general positive mode that expresses that which is

found within all beings, namely, essential content (TM *exicon*).

The individual exicon is not a thing (thimac). It is a capable of existing only when it is actually exists (similar to the Megarian view[11]). The exicon is a stuff that has no thingness (thimac) nature. What is actually created is the event. We find the exicon in every part of the anatomy of the thing (e.g., all subthimacs). It is the blood in that it spreads throughout the existing thimac (event), bringing existence to all the different existing subthimacs (subevents).

The exicon is a particular kind of construct of pure existence that provokes the event as a whole, made up of actions or subevents. It may be thought of as a kind of force field that gives rise to or manifests actualization over time. Without time, an event exists as a frozen actualization.

E. Change

Change is defined in TM as the action of creating, processing, releasing, transferring, and receiving. As mentioned previously, *becoming* is a TM *process* in the general sense of the word. For example, a chameleon that changes from brown to green can be modeled in terms of two events, as shown in Fig. 20 (upper). The chronology of events can be specified by a time diagram [42] as shown in Fig. 20 (bottom). In TM, thimacs come into existence, for the first time, in a temporal sequence, some before others. For example, the first appearance of water in the universe as an existing thing preserves its region. Afterward, the region is infused with the existence of water. The region serves as the blueprint for subsequent water production (see [43]).

Consider the example of breaking an arm as a change from an unbroken arm to a broken arm, as shown in Fig. 21. Some researchers consider this change as an event by itself. In TM, this “change” is viewed as a dynamism that involves two events. The TM time diagram (Fig. 21—bottom) involves an overlapping of two events: one is vanishing and one is rising.

Change (actualized create, actualized process, etc.) and time are inseparable. Actualized changes are located and ordered in time. Time is a mechanism to *update* existence (actualized create, process, etc.). The updating change takes time.

The exicon construct persists as a whole exicon and as divisions of subexicons throughout actions change (create, process, release, transfer, and receive) of the region. This is illustrated in Fig. 22. The figure can be interpreted as follows: The thing exists (created), and the action release is actualized, the output (transfer) is actualized, the input (transfer) is actualized, and the receive is actualized.

Note that the exicon and the region mix to form events (by default, time assumed). The event is the wholeness of the mixture. The mixture keeps each one separate, something like the mix of material body and life in humans. When the event "life" ends, the exicon and region disperse.

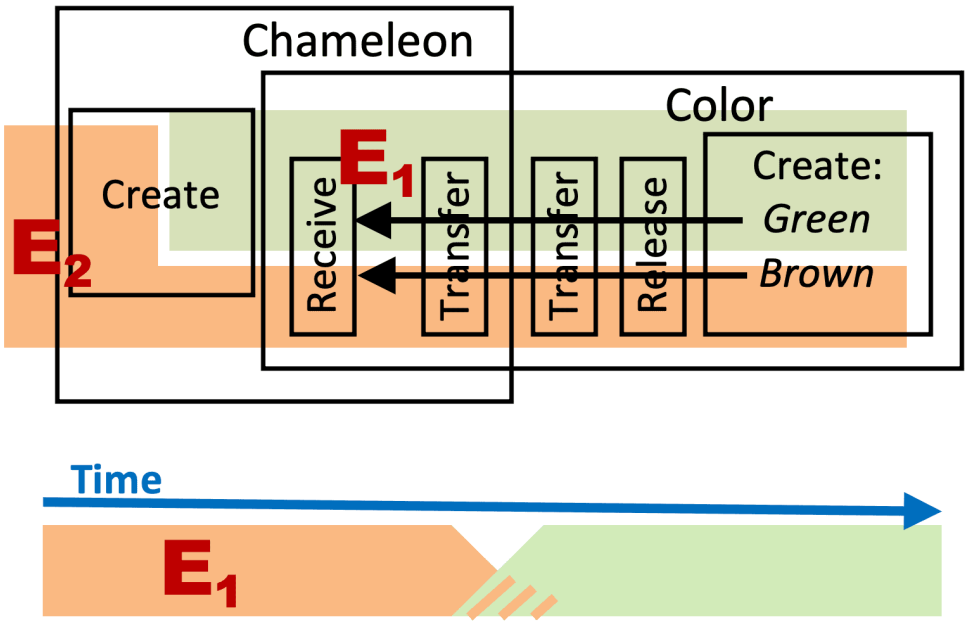

Figure 20. Change in terms of two events.

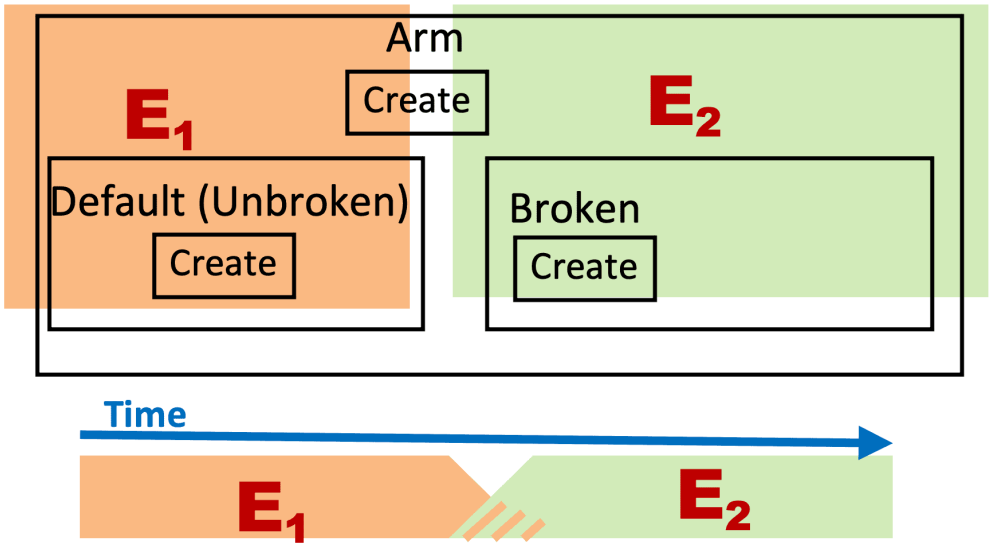

Figure 21. Transformation between two events.

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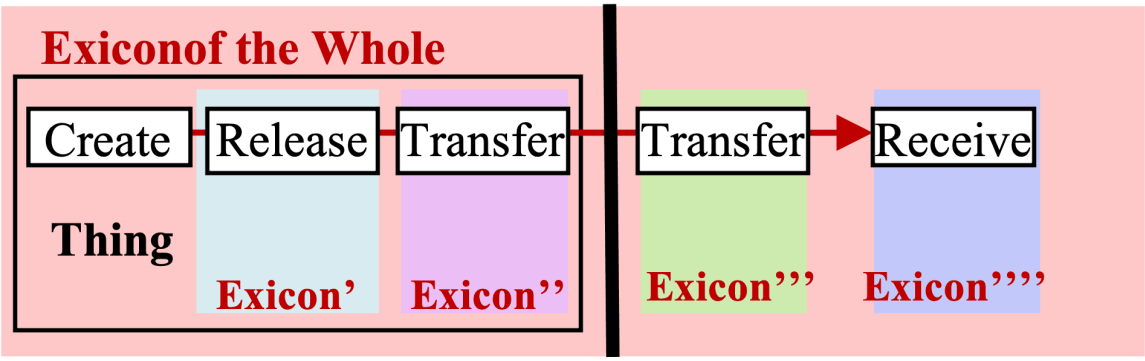

Figure 22. The exicon of a thing persists though actions.

For illustrative purposes, in the diagrams, we sometimes show the region inside the exicon and other times show it separately. The exicon superimposed on the region thus adds a breath of dynamism.

Descartes [44] discussed an example involving a piece of wax taken from a honeycomb. It has a certain taste, smell, color, shape, and size; it is hard, cold, and it makes a sound when it is struck. When it is placed near the fire, the taste, smell, color, shape, and size disappear. Fig. 23 represents the TM model of this change in the wax. The underlying purple color is an exicon that preserves the identity of the wax even though all its original properties (subthimacs) are stripped off. The original wax is heat-processed to become a processed wax.

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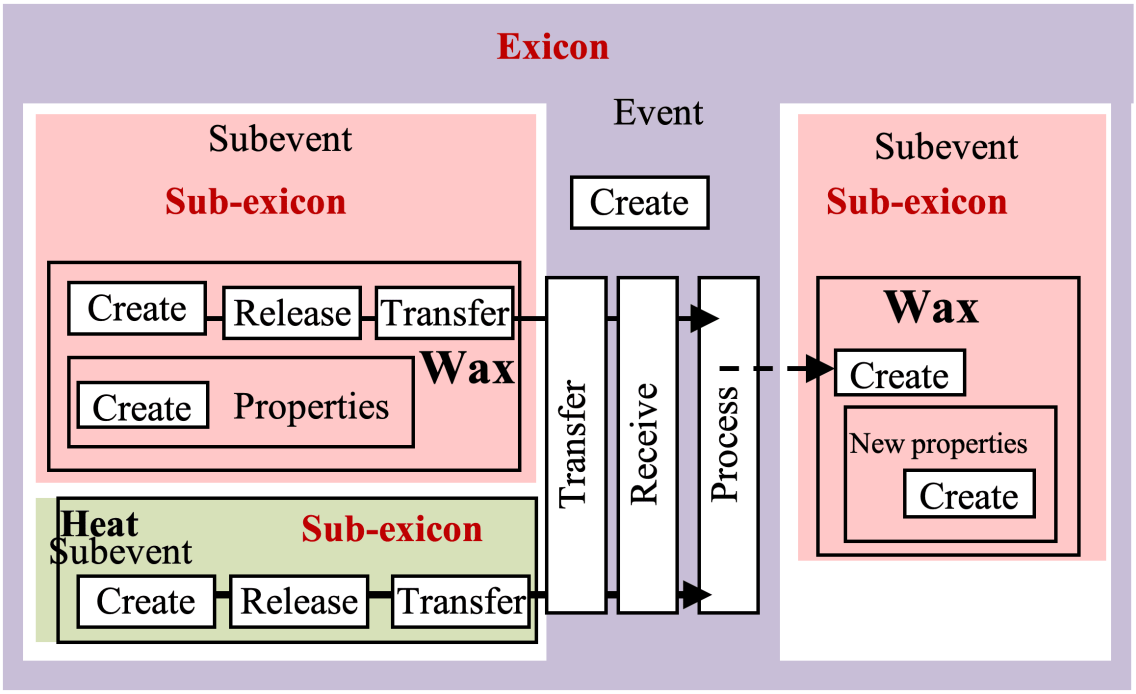

Figure 23. At the existence level, the exicon is preserved.

Identity in TM is not the totality of all of its characteristics. The identity of "being wax" is defined by its TM-history. The original wax and the processed wax differ in their history (the underlying process involved). Their unity comes from being in a single exicon, the exicon of the heating process. Ontologically, the purple box in Fig. 23 can be viewed as a large ice cube formed from three sub-ice cubes.

VII. Loose Actions World

Loose actions underlay thimacs, and both[12] produce the "dynamic" fabric of a continuum existence. Actions and thimacs reflect the interrelated actions in the superstructure of the entire universe. Every thimac arises from loose actions. Loose actions constantly recreate themselves, requiring nothing outside themselves to exist, and form a self-organizing universe. They can interact recursively to form the stable, coherent structure of thimac.

Such a world of thimacs and loose actions is analogous to the notion of space[13] as a complicated discrete structure that consists of a "very large number of discrete intrinsically identical 'atoms of space'" [45], where, in TM, they are termed as actions and patterns of actions (thimacs). The continual manifestation of actions and events (action in thimacs) knits the structure of existence. Generic events (generic actions) are

connected through their thimacs. Accordingly, actions, or in other words, "dynamicity," is the very nature of the world.

Next, we focus on the notion of action *per se*. In contrast to the thimac world, the world of loose actions is one in which actions have no context, i.e., no things: no need for agents or patients of actions. It is an existence in which there are stuffs (namely, actions) that are not things. This world is an ever-changing flux of actions, mere transitory pulses of relative independence.

A. What Is an Action?

TM *actions*, in themselves, do not provide a framework for the locus of the kind provided by things (thimacs). *We* would not be able to have ideas of create, process, release, transfer, and receive, by themselves, without our ideas of things (thimacs) interacting in various ways. Actions, in the loose action world, are the source of bringing things (thimacs) into being (emergence). Loose actions make a thimac as a co-operation of actions to produce a whole that is other than the sum of its parts.

A loose action is not a thing (thimac). It is a generic *process*, in its general meaning, or the so-called "atom of process" as a fundamental unit of change, or what Alfred North Whitehead called an "actual occasion" or "actual entities" as "atomic pulses of existence." According to Whitehead, these units of change (TM loose actions) are the process itself—the act of becoming or self-realization. They are generic because they are indivisible, discrete moments in the passage of time (inside thimacs) and have a definite "beginning" and "end." The TM actions, or "atoms of process," are often compared to the quantum of action (Planck length/time), which marks a limit to the divisibility of spacetime.

Thus, the world of TM loose actions (i.e., create, process, release, transfer, and receive) forms the environment that surrounds thimacs in the "post-Big Bang." It is a world of pure processes (in the general sense of the term) where there are no processors or processees. A pure process (TM process outside a thimac) is a process without a thing that processes and a thing to be processed. It is creating without a creator or createe, transferring without a transferor or transferee, receiving without a receiver or recipient, etc.

In the TM theory, we assumed that thimacness is grounded in loose actions or the castellation of loose actions. These loose actions or non-thimac castellation of loose actions may be called in the literature no*thing*ness (non-thimac-ness).

doi.org/10.32388/K9YMTF

B. Nothingness

The classical question of "*Why is there something rather than nothing?*" is answered in TM: nothing is the world of loose actions, and some*thing* means thimacness. Here, *nothing* does not refer to nihilism. In TM, nothing (loose actions) is the source of things (thimacs) because things are structured actions. Nothing constitutes loose actions that are no things because things are thimacs.

Heidegger seems to call loose actions *nothing*. According to Heidegger's thinking, *nothing*[14] *exists* because, without it, determinate thought, logic, science—inquiry itself—would be impossible [46], "Only because the nothing is manifest can science make beings themselves objects of investigation" (quoted in [46]).

The world of existence is composed entirely of positive existents or forces: loose actions and (actualized) thimacs. The pool of these forces spread out as a coherent (quantum) field of an unbroken whole of *excitation*. For example, the "loose action" of TM *create* is just an excitation of the existence field (the pool of thimacs and loose actions). The loose actions portion of existence is filled with elusive, all-pervading loose actions, which serve as the foundation for existence (see Fig. 24).

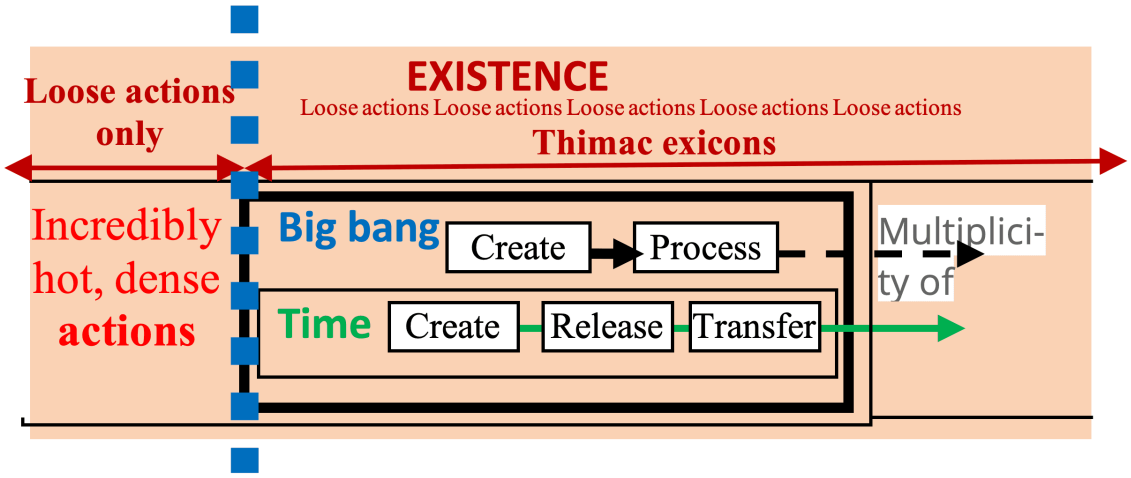

Figure 24. Existence before time

In Fig. 24, the "pre-Big Bang" world is filled with these loose actions. In the "post-Big Bang," thimacs can essentially dissolve back into the loose actions, which are the source of all thimacs.

The field of loose actions is a level of existence distinct from thimac-based events. That is, it exists, and it is a source of thimacs' existence (TM events). It continually "thimac-s," i.e., generates thimacs. A single

physical “spot” in this field bonds to a certain thimac. The loose actions interactions may be conceptualized according to the thimac actions into three knots of excitations:

1. *Create/decreate (negative creation)* excitation,
2. *Release/transfer/receive* excitation, and
3. *Change (process)* excitation.

A non-active action is non-active when there is “no thing (thimac)” to act or acting on. Loose actions *exist* as unactualized change taken in itself prior to the change. The thimac-based existence is when players are in a playing team (thimac), whereas the loose action-based existence is when the players (loose actions) are currently not in the playing team (the active whole). The thimac is the recipient thing of change, and loose actions are an arbitrary collection of passive actions. The passive action may itself become part of a thimac undergoing a change, e.g., a bench player becomes a member of the playing team.

This microscopic realm of loose actions is a world unoccupied by thimacs. It is a shadow of the macroscopic thimacs world, roughly, as Plato’s forms relate to the material world or the quantum physics macroscopic realm that supplements Newton’s physics worldview.

Loose actions lack the “being” characteristic: i.e., create without creating a thing, process without processing a thing, release without releasing a thing, transfer without transferring a thing, and receiving without receiving a thing. Note that a *thing* is defined as what creates, processes, releases, transfers, and receives, and what is being created, processed, released, transferred, and received. It is the subject that acts and the object that is being acted on. A loose action cannot act on things or be acted on by things. It is a broken “machine” that only participates in other broken machines, e.g., forming a more complex broken machine, being a part of another broken machine, etc.

In classical physics, the loose action-ness is empty and, therefore, nothing happens in such an area of existence. In quantum physics, the loose actions “sea” of existence sparkles with random *energy* fluctuations (unrealized creation, processing, releasing, transferring, and receiving). For example, the *position* of a loose action is imprecisely measured.[15]

Existence is an exicon-based composition of thimacs and loose action beings. Thus, exicons include two types: thimacs-based (thingness) and loose-actions-based (no-thingness). The antimac (anti-thimac: broken machine of loose thimacs) is similar to the notion of *Yin*,[16] which is sometimes described as an “insubstantial” (void, emptiness, or silence) force that complements *something*. It is not non-existence, but a necessary opposite or shadow to the “substantial” thimac or *Yang* (form, matter).

The instability of loose actions is that an action continuously changes into other types of action, creating a "soup" of actions. Initially, the totality is a soup and, at the end, the totality is a soup; thus, there is no change regardless of the moment of observation.

Change comes with order, i.e., a difference in order. *Randomness* (lack of structure/thimacness) does not change; all states of affairs in a mesh of actions remain indeterminate and lack the laws that regulate situations. Even if we know the initial state (e.g., in quantum mechanics), in nothimacness we cannot predict future actions, whereas in thimacness we can, e.g., *release* is followed by *transfer*. It is true that the result may be a different instance of randomness, but at the macroscopic level, it is still randomness.

These loose, unstable thimac-less actions form an ocean that flows around this thimacs world and from which thimacs are made. The non-thimac world complements the thimac world. The question about how actions formulate thimacs may be *postulated* in future research. Further research may explore the nature of these actions (e.g., their origins) and the meaning of actionlessness. Nothingness is having no thimacs. No*action*ness has no actions. A statement like "*Nothing cannot exist*" is stated in TM as "*Noaction cannot exist*."

TM "thing," in this context, just means any sort of entity, whatever. The assumption here is that non-thimacness (loose action-ness) produces thimac-ness. Accordingly, non-thimacness "exists" (as loose actions) before time, as the Big Bang led to the creation of many thimacs, including time and space. In TM, an event requires a region (including space as a subthimac), time, and an exicon. The exicon, as a "pre-Big Bang" nothing, provides the environment for the event.

This is a rephrasing of Rand's thesis that "*Creation* means the power to bring into existence an arrangement (or combination or integration) of natural elements that had not existed before" [11]. For example, the Big Bang was an expansion event of non-thimacs (loose actions) that already existed [11].

The becoming process transforms regions into actuality and assigns exicons to them. Thus, the materiality of the created thing comes from the actualized subthimacs of the region. This process continues without the Big Bang, as the real oxygen and hydrogen participate in forming water (Fig. 25).

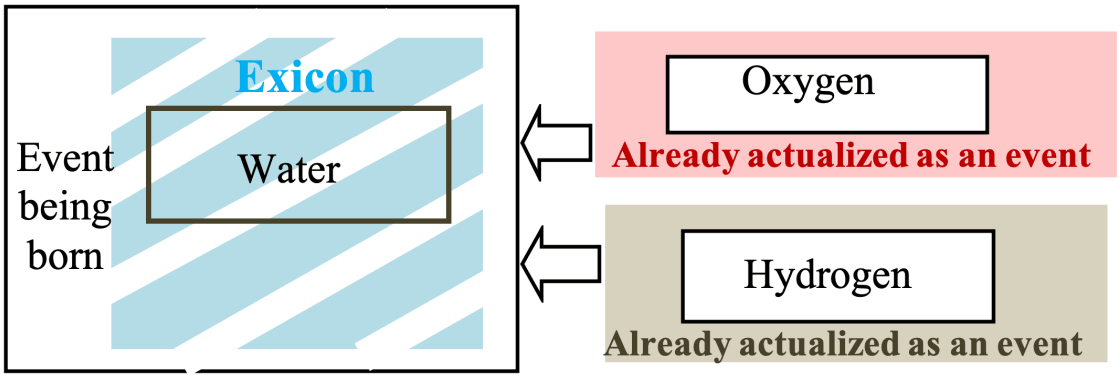

Figure 25. The becoming (actualization) of the water

Physics recognizes many first-time creations. For example, at about 0.0001 seconds after the Big Bang, quarks, for the first time, can combine in groups of two and three to become neutrons, protons, and other types of heavy particles. At the end of the first three minutes, we observe an event that provides nucleosynthesis of the light chemical elements, such as deuterium, helium, and lithium [see references in [31]].

The point here is that, after the first time creating a new thimac, a region is inherent in events and can participate in new events accordingly. So, in answer to the question about where the static level "exists" (in analogy to Plato's ideal world of forms), the answer is that the regions are inherent within events.

The exicon may be thought of as similar to the notion of a *substratum*. In philosophy, according to [47], "a substratum is like a bulletin board on which one can attach various announcements [in TM, regions]. As such, the substratum achieves two features: 1) it selects a single *substance* [in TM thimac event] (thereby individuating it), and 2) it holds the properties of a given substance [in TM, its region] together." Note that the continuity of eventity (actuality) and the integration of past, present, and future are based on the exicon. In this case, the event has the same region and same exicon.

Example: Reference [47] describes cutting a worm in half so that both halves survive independently and go on to live separate lives. Fig. 26 shows modeling of this situation, where a region of the original worm returns to subsistence, and its exicon dissolves, triggering the creation of two new exicons.

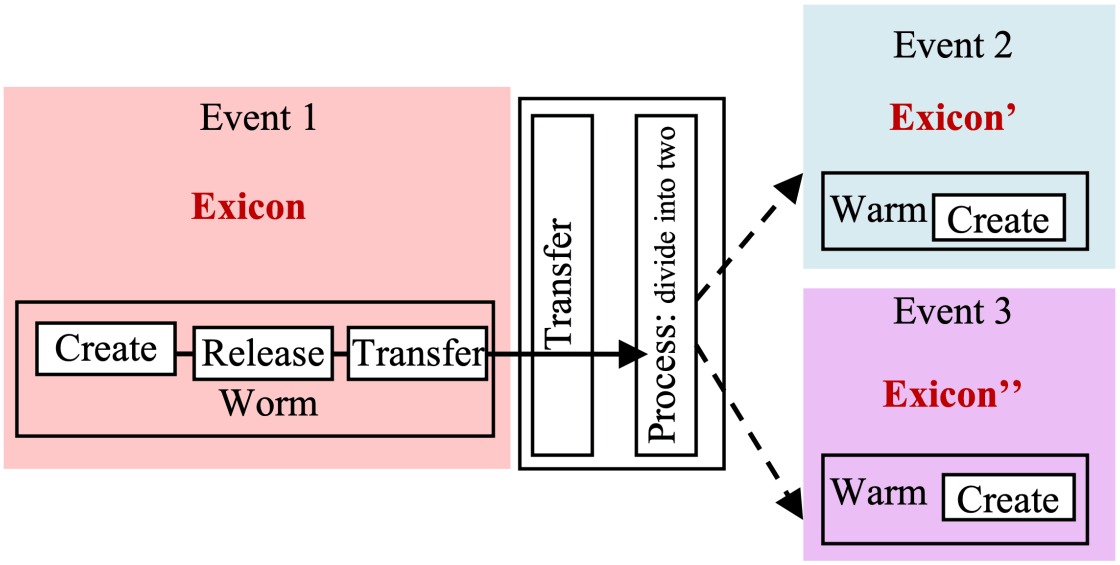

Figure 26. A region that returns to subsistence, thus, its exicon dissolved to trigger the creation of two exicons.

VIII. Conclusion

Conceptual modeling, e.g., TM, is used to design systems to build a high-level representation of a targeted domain in reality. Metaphysics, at bottom, is about the fundamental structure of reality. This paper explores how insights from metaphysics can be applied to TM modeling. We seek a metaphysical foundation for the TM model, intending to reconcile certain contemporary scientific notions with basic TM principles.

We present a thimac-based metaphysical notion, called an existence container (exicon), as a "piece of existence" that blends with the TM thimac region and time. The exicon is correlated to *pure being* in metaphysics. TM thimacs' existence (union of exicons) is viewed as a "field" that binds actions and events together. TM existence, as a whole, includes non-thimcs (loose actions). Assuming the Big Bang thesis, we claim that the Big Bang generates thimacs, but the "pre-Big Bang" is a world of non-thimacs (loose actions). Thus, existence extends in both worlds: thimacs and non-thimacs. This leads to the conclusion that existence is independent of things (thimacs).

The results contribute to further understanding of TM conceptual modeling and introduce some metaphysical insights. Such a work provides metaphysics with a diagrammatic language tool that can be used to explore some metaphysical concepts. In doing so, it paves the way for future research and application, establishing a rich, interconnected framework that resonates across many branches of

knowledge. Such a venture strengthens the foundation for conceptual modeling as a high-level representation of a targeted domain of reality, focusing on key elements without delving into implementation details.

Further research may explore the nature of human actions, e.g., their origins.

Footnotes

[1] This topic will be discussed in future research.

[2] In the sense of magnetic *field*, gravitational *field*, etc., e.g., a TM action is just an excitation in the existence field, like a wave in an ocean.

[3] This thesis views the world in terms of universal flux of events and processes.

[4] Later, we will incorporate time and so-called existence containers in this picture.

[5] *Power*, here, refers to change of actualized (events) thimacs, e.g., (from [48]) fire has a power to melt gold and gold has a power to be melted. According to [48], referring to Locke's doctrine of "power," "Power thus considered is twofold; viz. as able to make, or able to receive, any change: the one may be called 'active,' and the other 'passive,' power."

[6] Note that these actions are not the so-called states. A state is an *entity* possessing its own existence (e.g., ontological conceptualization of a distinct entity), whereas a TM action is a pre-entity notion.

[7] In classical physics, "nothingness" was primarily associated with the vacuum—an empty space devoid of matter and energy.

[8] This is related to what the Greek Anaximander called a finite germ, *gonimon*, that is separated off from the *Apeiron* (boundless).

[9] *Being* (reality) includes TM thimacs and actions in their static and dynamic modes. *Existence* includes events and dynamic actions.

[10] This notion is related to the Greek Anaximander's *Apeiron* (boundless) and Aristotelian *archē* (source).

[11] For example, the builder retains his capacity to build houses even when he is not currently engaged in the process of building.

[12] Note that time and space are thimacs; hence, the spacetime is incorporated in this picture.

[13] Note that in the world of thimacs and intithimacs (existence), two different events occur at the same time, and each event has its piece of existence (exicon).

[14] TM non-thimac.

[15] This type of antimac may be related to what is called “virtual” particle in quantum physics.

[16] In the famous yin-yang metaphysics.

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Declarations

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.