# The Model of Consciousness: An Analysis of Causation, Self, Gödel's Incompleteness, and Buddhist Philosophy

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# The Model of Consciousness: An Analysis of Causation, Self, Gödel's Incompleteness, and Buddhist Philosophy

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**Abstract.** This paper examines the limitations of analytical and computational methods in understanding reality, highlighting the secondary role of language and mathematics, which often leads to paradoxes. Gödel's incompleteness theorems underscore the inherent incompleteness and undecidability in logical and computational systems, such as the Turing machine. We propose that consciousness, operating as a non-material and chaotic finite-state machine (FSM) devoid of self-referencing, can achieve a complete and decidable understanding of reality. This contrasts with the self-referencing nature of logical systems that leads to paradoxes and limitations. Through a conceptual model of the mind inspired by *Theravāda* Buddhist philosophy, we suggest that awareness of causation is free from self-referencing and coherent with the unpredictable yet causal and deterministic nature of reality. This alignment offers a pathway to a deeper and more comprehensive understanding of causation. The model illustrates the tight integrity between consciousness and causation, proposing that awareness of the present moment of causation can transcend the limitations of Gödel's incompleteness theorems. This awareness, free from analytical and computational constraints, preserves the integrity of conscious experience and provides a complete and decidable understanding of reality. Future research will focus on developing techniques to sustain this awareness, potentially leading to wisdom and deep insight into the fundamental nature of existence.

## 1. Introduction

The mathematical formulation of reality[1] limits our comprehension of it. In contemporary research on the mind, the inherent biases in language and mathematics have been extensively analysed [1, 2]. The mathematical and logical constructs diverge from fundamental experience. What is conveyed in communication is a secondary interpretation underpinned by various biases.

Mathematicians establish axioms to translate observations into computational, analytical, and simulation models [3]. The Turing machine [4] represents one such method that translates rules and axioms to execute computations aimed at problem-solving. Before Gödel's incompleteness theorems [5] and Turing's work on the halting problem [4], many mathematicians believed that any problem could be interpreted and solved mathematically using such machines, presuming completeness and decidability in computations.

Later, Gödel's incompleteness theorems [5] challenged the completeness and decidability of rule- and axiom-based systems. This proved that our understanding of mathematical formulation and computations is incomplete. It posits that undecidable or unprovable knowledge exists within solutions. Gödel's incompleteness theorems assert that in any sufficiently powerful formal system of mathematics capable

[1] In this paper, we limit our exploration to causal reality (see Figure 1). Buddhism affirms the existence of non-causal reality mutually exclusive from both material and mental realms [1].

of expressing basic arithmetic (such as Peano arithmetic), there are true statements that cannot be proven within the system. The theorems indicate that this incompleteness or undecidability stems from self-references in the rules and axioms of the system. These self-referential statements give rise to paradoxes and constrain formal systems from fully describing themselves.

When understanding reality and how things behave in nature, *causation* plays a crucial role. Some believe causation is primitive, basic or fundamental, while others argue it is derivative, a construct or a byproduct. As per David Hume and Simon Blackburn [6], causation is patterns composed by the human mind in response to regularities in nature. From their viewpoint, the explanation of the cause and effect is unknown, but how things behave can be analysed. Further, causation is not part of reality but a human construct that depends on the laws of nature. In contrast, Richard Swinburne [7] argues causation is a fundamental of reality. Causation cannot be explained by anything else, such as patterns, regularities or laws in nature. Similarly, Robin Le Poidevin [8] describes causation as primitive, which cannot be explained by other constructs or concepts. In fact, the other concept can be explained by causation. Most notably, he argued that *time* is derived from a change and attributed to cause and effect. That is, to the direction of cause and effect, time flows. However, Huw Price [9] argues that laws of physics do not explain the direction of time, and backward causality is also possible.

A common feature across many causal philosophies is the notion of self-reference or subjective experience. It is believed that the brain's highly recursive neural network, fundamental to logic, language, and axioms, brings forth this perspective [10]. This intrinsic recursion gives rise to self-referential mindsets, perceptions, and philosophies, thereby making axioms, mathematics, analysis, and computations inherently incomplete and undecidable. In contrast, in *Theravāda* Buddhist philosophy, reality is governed by both simultaneous and forward causation, reflecting interdependent relationships and cause-and-effect [11, 12, 13, 14]. In this view, no state is self-referencing, and each cause leads to a unique effect, highlighting a deterministic progression from one state to the next. However, while the progression is deterministic, future states can still be unpredictable, leading to a *chaotic* system. Therefore, even though logic, mathematics, language, and computations are incomplete and undecidable, reality, underpinned by causation, is complete and decidable. Incompleteness and undecidability emerge from the self-referencing axioms, definitions, and rules of the states that happen in brain cognition and not in causation.

In the exploration of causation, contemporary research [15, 16, 17] discusses how consciousness underpins integrity in change and the behaviour of reality. Consciousness has been modelled in the process of integrating it into the behaviour of reality [15]. The model proposed that consciousness is intricately interwoven with reality and maintains integrity with the behaviour of reality. Furthermore, everything is subject to change while maintaining integrity with underlying consciousness. The integrity of the behaviour of reality, perceived through awareness, is attributed to consciousness. This integrity is causal, deterministic, and unpredictable due to complexity. The research suggests that the mind is fundamental and underpins causation. The reality we analyse and describe is a perception that has been subjected to transformation and bias and is a mental illusion constructed by the mind [1].

In this study, we investigate the feasibility of transcending self-referencing to achieve a complete and decidable understanding of reality. We explore the role of consciousness in causation and the emergence of secondary constructs within mental causation. Building on *Theravāda* Buddhist philosophy of consciousness, contemporary research, and new postulates, we developed a model of consciousness to examine the emergence of self-referencing. Furthermore, we propose a methodology to overcome self-referencing to attain a complete and decidable comprehension of reality.

## 2. Methodology

First, we want to clarify the terms used in this research. There exist three fundamental forms of reality: *nāmarealm*, *rūparealm* and *Nibbāna* [1, 18, 19, 20]. In this research, we limit our exploration to causal reality (see Figure 1). The term *rūparealm* refers to the true physical reality that exists independently of

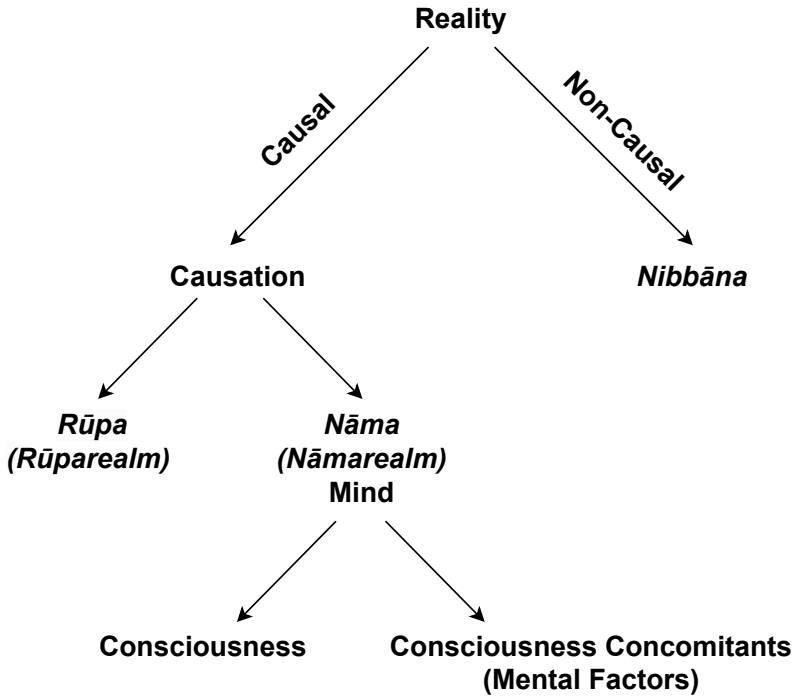


Figure 1: The fourfold ultimate realities are represented by the leaf nodes of the tree diagram [1]. *Nibbāna* exists as a unique, non-causal reality, while the *nāmarealm* and *rūparealm* are causal realities governed by the principle of causation. The *nāmarealm* consists of a single stream of consciousness and is a sequential process where each consciousness cycle with focus inseparably emerges with a harmonious subset from the consciousness concomitants or mental factors. The term *Mind* is sometimes used as a single word to represent the entirety of the non-material *nāmarealm*. In contrast, the *rūparealm* consists of diverse types of materiality (*rūpa*).

the mind. *Mind*[2], as a high-level abstraction term, exists independently of *rūparealm*, which we use to convey broad concepts of the mental realm, referred to as *nāmarealm*. Although mind and *rūparealm* exist independently and have fundamental differences, they interplay and create the perceived causal reality. The mind is driven by the consciousness cycle, a binary pulse that makes the consciousness sequential [15]. Each consciousness cycle emerges in the mind with non-separable consciousness concomitants or mental factors that underpin feelings, perception, and mental formations. While the mind is an abstract term, consciousness and mental factors are fundamental components of how the mind functions.

Consciousness is non-material and fundamental to reality. Consciousness cannot be reduced to the brain or any other physical construct, as suggested by reductionism. This non-material aspect of consciousness governs the non-local reality [17]. Therefore, the interaction of consciousness is unavoidable when one fully realises reality. Contemporary research suggests that consciousness is a sequential process that relates to a single state of reality at a given instant and underpins awareness when the process continues [15, 16, 17]. Further, they propose that the mind or consciousness cycle is the shortest duration for an observer to be aware of the change in reality.

Drawing from recent research [15, 16, 17], we propose a model of consciousness by postulating:

[2] Throughout this research, the *mind* we refer to is the individual mind, which serves as the foundation for subjective experiences, distinct from any cosmic or supernatural concept.

(i) Consciousness is a fundamental dimension in reality that underpins causation and is non-material.

(ii) Consciousness is a chaotic process, meaning it is causal, deterministic, and unpredictable.

(iii) The chaotic process of consciousness is a sequential finite-state machine (FSM).

(iv) This chaotic sequential FSM illustrates forward causation through state transitions from cause to effect. Simultaneous causation is reflected in the interdependent attributes within each state. It excludes backward causation and self-referencing states.

(v) The chaotic sequential FSM of consciousness is complete and decidable.

Even with an infinite input space that can be subject to awareness, consciousness operates within a finite number of states, which can be represented by a finite-state machine (FSM). The perception of infinitely diverse experiences arises from the complexity and diversity of the input space. Since consciousness is sequential and operates at extremely high speed, this mental experience is flawless and preserves integrity with our awareness.

Consciousness is causal, deterministic and unpredictable. This chaotic nature of the consciousness FSM emerges due to input from the outside environment and the inherent complexity of the consciousness FSM itself. The completeness and decidable nature of consciousness emerged from the causation. Since the consciousness process is causal without self-referencing or backward causation, completeness in consciousness is not subject to Gödel's incompleteness theorems. Even though consciousness is chaotic due to its inputs, its function as an FSM is causal and deterministic, which completely decides its behaviours.

### *2.1. Finite-State Machine of the Mind*

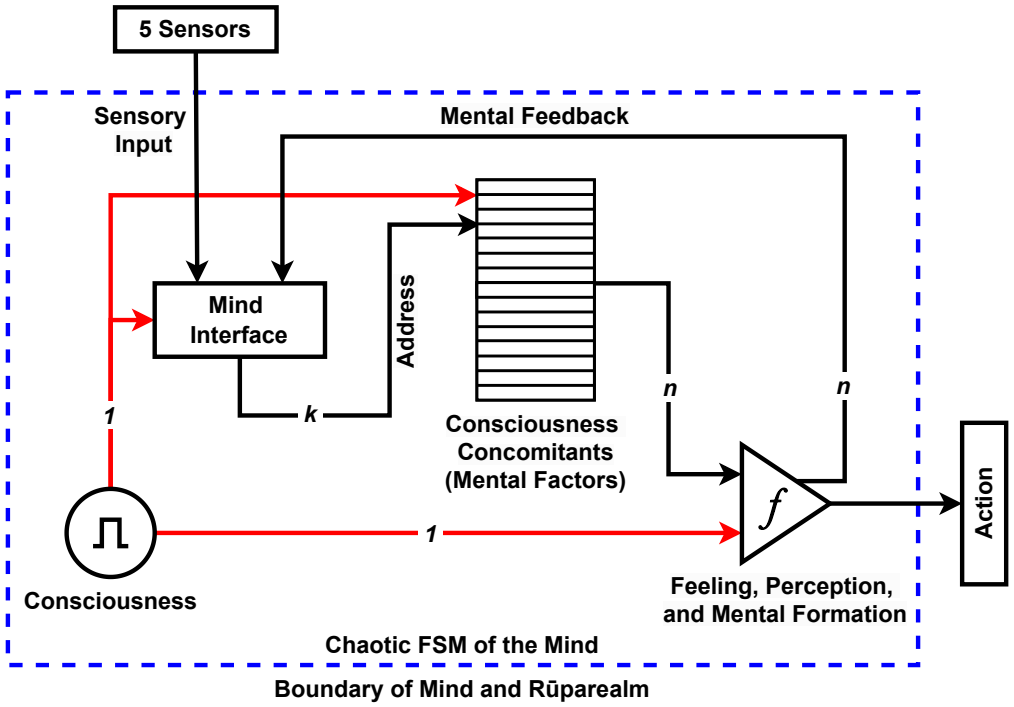


Figure 2: The chaotic sequential finite-state machine of the mind. A mental state is processed at each consciousness cycle, determined by the previous state and sensory input. While there are finite states in the mind that transition causally and deterministically, the future state is influenced by external input and feedback loops. This makes the finite-state machine unpredictable and, therefore, chaotic.

The mind functions as a chaotic sequential finite-state machine (FSM) (see Figure 2). The consciousness cycle represents the shortest duration required to become aware of any changes in the causal reality (i.e., *nāmarealm* and *rūparealm*). The diagram illustrates an FSM where the future state is influenced by both external sensory input and an internal mental feedback loop. Although this FSM operates causally and deterministically, it becomes unpredictable due to the continuous input from the five external senses and the internal feedback loop, making it inherently chaotic. The FSM states in the mind underpin feelings, perceptions, mental formations, and actions (see Figure 3). A given state of the FSM can give rise to various feelings, perceptions, and mental formations, depending on the different external sensory inputs and the internal mental feedback, which follows a chaotic process.

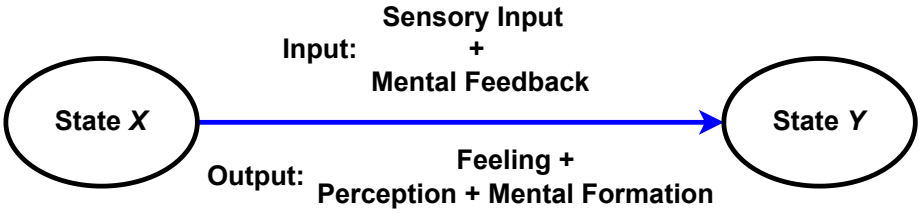


Figure 3: The chaotic transition process of the finite-state machine of consciousness. A given state of the FSM can be associated with diverse feelings, perceptions, and mental formations based on varying external sensory inputs and internal mental feedback.

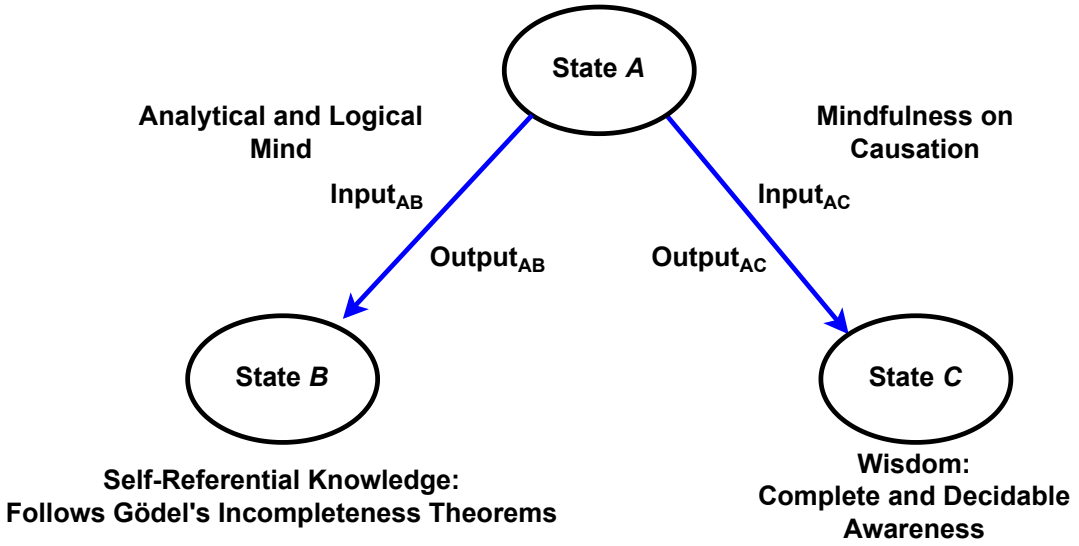


Figure 4: State transition differentiating self-referencing and causation. With self-referencing, the finite-state machine (FSM) is incomplete and undecidable, whereas causal awareness brings completeness and decidability to the FSM of consciousness.

Figure 4 demonstrates how state transitions occur in the mind on the different occasions of self-reference and causal awareness. In a given state $A$, the state can transition to state $B$ if the mind self-referenced on the input and states. In practice, when we analyse, model, and communicate, there is always self-referencing, as described in Gödel's incompleteness theorems. In contrast, if the mind is mindful of causation, the state transits towards state $C$. State $C$ focuses on cause and effect, where the understanding of reality is complete and decidable.

## 3. Discussion

The intertwining of self-referencing and causation has long influenced philosophical outlooks worldwide. It leads to misconceptions about the fundamental nature of causality. In exploring causation and consciousness, *Buddhism* has made a significant contribution. Buddhism describes reality as inherently causal and rejects self-referencing, offering insights into this relationship. Buddhist teachings, exemplified by *sakkāyadiṭṭhi*, reject the notion of inherent selfhood, prompting a deeper inquiry into causality beyond the self-referential system [21]. A historical exchange between *Arahant Mahinda* and King *Devanampiya-Tissa* illustrates this intersection [22]. *Arahant Mahinda* is the son of Emperor Ashoka, who brought Buddhism to Sri Lanka in 253 BC. King *Devanampiya-Tissa* ruled Sri Lanka at that time. *Arahant Mahinda's* questions (denoted by M) about identity and relationships to check the intelligence of King *Devanampiya-Tissa* and the King's answers (denoted by KDT) challenged conventional awareness on reality:

(i) M: "What is the name of this tree, King?"
KDT: "This is a mango tree."

(ii) M: "Are there more trees like this?"
KDT: "Yes, there are many mango trees."

(iii) M: "Are there other trees besides this mango tree and other mango trees?"
KDT: "Yes, there are many other types of trees besides mango."

(iv) M: "Are there other trees that are non-mango trees and other mango trees?"
KDT: "There is this mango tree."

(v) M: "Do you have relatives, King?"
KDT: "Yes, I have many relatives."

(vi) M: "Are there people who are not your relatives?"
KDT: "There are many people who are not my relatives."

(vii) M: "Are there people other than your relatives and non-relatives?"
KDT: "Yes. That would be me, sir"

(viii) M: "Good! You are intelligent enough to listen to the *Dhamma*."

Through this dialogue, the king demonstrated his awareness of self-referential knowledge. The questions posed reflect the essence of *Russell's paradox* [23, 24], revealing the limitations of self-referencing in set theory, a concept later generalised by Gödel's incompleteness theorem to apply to all logical systems. By listening to the follow-up *Dhamma*, the king gained wisdom on causation that transcends the notion of the self. This narrative emphasises the importance of critically examining self-referencing tendencies to improve our understanding of causality.

The profound awareness of causation requires the transcendence of the self. Buddha elucidated this in *Bāhiya Sutta* [25]. That offers a compelling perspective on perceiving causation in reality. While *Bāhiya* is not a monk or an avid meditator, his instantaneous attainment of enlightenment following a teaching of causation from the Buddha underscores the potency of this concept. The Buddha's instruction to *Bāhiya*, "*Bāhiya*, you should train yourself thus: in the seen will be merely what is seen; in the heard will be merely what is heard; in the sensed will be merely what is sensed; in the cognised will be merely what is cognised,". By recognising the causation, individuals can surpass self-referencing and attain profound wisdom of the presence of existence.

Any logical system having self-referencing moves into paradox, which Buddha discussed in his first sermon *Dhammacakkappavattana Sutta* [26]. As per *Dhammacakkappavattana Sutta*, there are always true and false extremes which should be avoided through wisdom. These extremes should be transcended through the middle way, focusing on causation through meditation without analysing it. Because wisdom is devoid of analysis, the right understanding cannot be communicated in a language, analytical or logical framework [1, 2]. Wisdom should be realised by the individual through their own conscious fundamental experience individually. The same concept is discussed in Gödel's incompleteness theorems, which states

that in any sufficiently powerful formal system of mathematics capable of expressing basic arithmetic, there are true statements that cannot be proven within the system. While Gödel didn't explain how to overcome this fundamental paradox, he explained that self-referencing is the root cause of this limitation. Following the delivery of the *Dhammacakkappavattana Sutta*, in his second sermon *Anattalakkhaṇa Sutta*, Buddha stated that one who sees the truth transcends the self or *sakkāyadiṭṭhi* [21]. While Gödel's incompleteness theorems highlight that self-referencing imposes limitations in both mathematics and formal logic, Buddha taught that self-referencing the five aggregates—form, feeling, perception, mental formation, and consciousness—limits the understanding of reality, leading to attachments and, consequently, suffering [27, 19].

In our previous model of consciousness [15, 16, 17], we postulated that:

(i) Only consciousness and change are the fundamentals of reality,

(ii) Consciousness is a sequential process that relates to a single state of reality at a given instant and underpins awareness when the process continues,

(iii) Consciousness cycle is the shortest duration to be aware of the change of reality through awareness,

(iv) Consciousness constructs space-time based on awareness and underpins causation by interplay with matter and energy, which is perceived as *rūparealm*.

In none of the above postulates on consciousness is the notion of self or being present. Consciousness and change govern reality as a cause-and-effect process, or causation. As this causal process continues, it constructs awareness. Reality behaves in such a way that awareness is preserved, maintaining the integrity of conscious experience. Without being mindful of causation, the notions of observer, self, and self-awareness emerge. The notion of self and observer introduces self-references, which underpin languages, axioms, mathematics, logic, arguments, and various other frameworks. Any system underpinned by such self-referencing frameworks follows Gödel's formal system and becomes incomplete and undecidable. In contrast, if awareness is focused on causation, there will be no self-references, resulting in a complete and decidable understanding.

## 4. Conclusion

Consciousness enables the comprehension of causation. One who is mindful of consciousness experiences the causation. The awareness of the fundamental experience in the present moment in the mind, devoid of analysis or computation, is free from self-referencing and transcends Gödel's incompleteness and undecidability of reality. However, consciousness is inherently chaotic (i.e., causal, deterministic, and unpredictable), making causation also chaotic and our understanding constrained by this chaotic nature of reality. This means that reality is unpredictable, yet understanding is complete and decidable from moment to moment through the awareness of causation. Analysis and computations lead to the loss of mindfulness of causation, constructing secondary concepts with self-references, and creating incompleteness and undecidability. In the future, we will analyse possible techniques to make us mindful of the fundamental mental experience of causation without analysis and computations, leading to wisdom.

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