A Functional Theory of Consciousness: The Transformation of an Unconscious Mental State into a Conscious One

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 **Abstract**

The present paper attempts to address the question of how an unconscious mental state (M) can be transformed into a conscious one, by developing a ‘functional theory of consciousness’ (FTC). According to the essential assumptions of this theory, the cognitive system includes an innate *consciousness-generation* mechanism that creates consciousness and an *enabling-consciousness condition* that triggers the above mechanism to automatically confer consciousness on certain states or processes once this condition has been fulfilled. As a result of their activation, the individual becomes aware (conscious) of the M. This theory can be applied successfully to certain empirical observations and it overcomes several problems, which the higher-order thought (HOT) theory has failed to solve.

Keywords: Cognitive psychology, Consciousness, Mental states, higher-order thought (HOT) theory.

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In recent decades there has been a dramatic increase in the number of articles and books presenting philosophical, theoretical, and empirical studies that have attempted to explain consciousness (e.g., Brown et al. 2019; Gennaro, 2012, 2023a; Seth & Bayne, 2022; Van Gulick, 2022). This wide body of research has focused on a number of problems, and many and varied theoretical and empirical solutions have been proposed (e.g., Gennaro, 2012; Tye, 1995; Seth & Bayne, 2022; Van Gulick, **xxx**). For example, Tye (1995) presented ten problems of consciousness, including “the problem of mechanism” that questions how subjective mental sensations could be generated by a physical mechanism, or “the problem of duplicates” that deals with the possibility of zombies and the ramifications of this (im)possibility for phenomenal consciousness. The solutions suggested thus far have been rejected by most researchers and as a result these problems continue to trouble the scientific community (e.g., Carruthers & Gennaro, 2020; Rakover, 2018, 2021). Huge efforts have been made to explain the neurophysiological mechanism in the brain that generates consciousness, but such attempts have failed to offer satisfactory solutions to the classical mind-body problem concerning the relationship and interaction between consciousness (mental activity) and the brain (physical activity) (for a review see Gennaro, 2023a; Rakover, 2018, 2021; Seth & Bayne, 2022; Van Gulick, 2022).

In light of all this, the following question has been raised: What functional cognitive-mental processes are necessary for explaining questions about consciousness; in particular, what transforms an unconscious mental state (M) into a conscious one? In order to answer these questions, one has to assume that the following four subsystems are necessary (the discussion will focus mainly on visual information):

(a) *visual-perceptual processing* is the mechanism that performs the function of processing visual stimuli.

(b) *consciousness-generation* is the mechanism that creates consciousness and confers it on different states and processes.

(c) *enabling-consciousness condition* is the condition that triggers mechanism (b) to automatically confer consciousness on certain states or processes when this condition has been fulfilled. The (c) condition determines when (b) is operated. Without it, the individual’s mind would probably be flooded with a ceaseless stream of conscious states and processes.

(d) *observation-manipulation* (OM) processes are mechanisms that act on self-consciousness and introspection, and also on one’s own inner conscious ability to manipulate one’s mental states and processes. However, it should be noted here that I will not focus on these processes, but will only offer a sketch of them so as to give an overall picture of the proposed theory. The main reason for this is that (d) processes are so complicated that they cannot be adequately discussed within the framework of the present article (e.g., Kriegel, 2023; Schwitzgebel, 2019).

Subsystem (a) is part of the normal cognitive system, which deals with inputs, encoding, storage, and retrieval of information from memory. By contrast, the other subsystems are additional hypothetical assumptions that are important for improving our understanding of consciousness. Based on these subsystems, the present paper proposes a new approach, the ‘functional theory of consciousness’ (FTC), aimed at providing an answer to one of the most important problems debated in the literature (e.g., Gennaro, 2012; Lycan, 2004; Rosenthal, 2004, 2005; Tye, 1995; Van Gulick, **xxx**): What makes a mental state (M) a conscious-M? Or how is an unconscious-M transformed into a conscious-M?

FTC expands on and develops Rakover’s (2019) previous preliminary outline of a new approach to consciousness. The theory is part of the cognitive-mentalistic system and includes the above four subsystems, which can be divided into two categories: (1) the bestowing of consciousness and (2) conscious observation-manipulation processes. These subsystems can be conceived of as being anchored in hereditary mechanisms that have developed in an evolutionary way and have matured as a result of the normal development of the individual; they can be characterized as functioning in a very fast and automatic manner, and most of their operations (except for their output, which may enter conscious states) are unconscious.

Marr (1982) famously put forward a three-level analytical framework. FTC has not been developed on either the implementation (neurophysiological) level or the algorithmic level, but rather on the functional (computational) level. On this level, the theory is characterized in terms of its goals; how it operates (e.g., the stages of information processing); and the rationale on which it is based. FTC is based on the above four assumptions, which should be viewed as theoretical assumptions to be evaluated in terms of their degree of success in proposing sound explanations for different empirical observations and also in overcoming certain objections which have been raised against other theories of consciousness, especially higher-order thought (HOT) theory (Rosenthal, 2004, 2005).

For the purposes of the present paper, an M is understood in the following terms. A system T represents an observational system O, when T’s symbols and their relations map certain aspects of O and their relation. In view of this, an M can represent either an individual’s external world or inner private world. For example, a cat can be represented in one’s cognitive system by hypothetical internal symbols [signified by e.g., M(cat)], which can be lingual or pictorial. This representation mediates between the external world (the stimulus) and the individual’s response.

Consciousness is a very complex and controversial concept (e.g., Gennaro, 2004, 2023a; Van Gulick, 2022). Here I refer to consciousness as the unique subjective experience of a person who perceives a stimulus in the external world or in their internal world. This is consistent with Nagel’s (1974) famous “What is it like?” approach and other views such as that of Gennaro (2012), who has followed Nagel. In addition to the fact that consciousness of an M represents the content of the appropriate stimulus, consciousness is accompanied, I argue, by a certain meaning of life, i.e., the feeling of being alive or a sense of aliveness (see Rakover, 2021). For example, David becomes conscious of the environment in which he exists, the posture of his body, some of his emotions, and the thoughts running through his mind (he is also aware of part of his consciousness). Above all, he is conscious of being alive, i.e., he has the feeling of ‘aliveness’”. Rakover (2021) distinguishes between two main types of ‘life-meaning’. An *innate* meaning of life is associated with the conscious perception of sensory and emotional stimuli, such as sight, hearing, pain, and fear. An *acquired* meaning of life is related to the internalization of the goals and behavioral norms of the society to which the individual belongs. Usually, life crises are associated with a loss of the *acquired* life-meaning, which may lead to extreme acts such as suicide attempts.

I propose that what differentiates a human being from a very complex and sophisticated robot is the fact that a person exists in a state of consciousness, which is accompanied by a feeling of ‘being alive’. For example, one consciously sees a red flower and this very perception is connected with the feeling of being alive.

The paper is organized in the following way. In the next two sections, FTC is presented and applied to account for several observations. In the discussion section, two issues will be examined: (1) the degree of success of FTC in providing answers to important theoretical-observational questions, and (2) the extent to which FTC manages to answer various problems that have previously challenged HOT theory, in a simple and satisfactory manner. Although, as mentioned above, many theories attempt to offer an explanation for consciousness, the present article will focus on the HOT approach for two reasons. First, there is no accepted theory that explains how consciousness is created by neurophysiological activity in the brain; second, of all the theories that try to explain how an unconscious-M becomes a conscious-M, much of the discussion in the academic literature has centered around HOT theory (e.g., Brown et al., 2019; Carruthers & Gennaro, 2020; Gennaro, 2012, 2023b; Rosenthal, 2004, 2005).

**(1) FTC: bestowing of consciousness**

To introduce the subsystems of FTC, I will examine a simple episode from everyday life, an ‘**ordinary evening**’ in the life of a normal person, Mr. Smith. He sits down on the couch to watch television, holding the remote control in his hand. The large TV screen hangs on the white wall facing him. To the right of the screen a luxuriant plant with rich green leaves stands in a flowerpot. Above the screen hang two pictures: prints of self-portraits by Vincent van Gogh after he cut off an earlobe and Rembrandt van Rijn in his twilight years. Smith consciously grasps all these details (the wall, TV, flowerpot, and two pictures) at once. He even perceives the floor of the room and the fact that he is holding the TV remote control in his hand, but his conscious perception of these is not as sharp as his perception of what is in front of him; it is, rather, a weak conscious perception. He activates the remote control and gives his full attention to the action movie playing on the screen facing him. All the other details around him disappear from his awareness – he no longer perceives them.

The immediate question that arises here is: How can these changes in Smith’s perceptual awareness be explained? The answer to this demands an analysis of Smith’s phenomenal observations (for a review and discussion of consciousness and the unity of consciousness, see Brook & Raymont, 2021; Gennaro, 2012) on three levels:

(a) the wall, TV, flowerpot, and two pictures were perceived at the same level of consciousness; (b) the level of awareness of the floor and the remote control were much lower relative to the level of awareness of perception of the above five items; and (c) when Smith’s consciousness was focused on the film projected in front of him, his awareness of all the other details disappeared.

These three visual phenomenal observations can be explained by three hypothetical, theoretical, innate, and automatic processes: (a) *visual-perceptual processing*; (b) *consciousness-generation*; and (c) the *enabling-consciousness condition*. Hypothetically, these processes work in the following ways.

First, the five visual items of the ‘ordinary evening’ undergo very fast and unconscious (parallel) *visual-perceptual processing* within the cognitive system. The results of this process are represented appropriately in five different mental states (Mi where i signifies different M), which reflect the objective properties of the visual stimuli, and the connections between them (e.g., size, color, and spatial relationships).

Second, the process of *consciousness-generation* confers consciousness on each of the five mental states. It is assumed that the process of conferring consciousness (C’) on a given Mis as follows. A constant maximal level of C’ interacts with a given M; the result of this interaction, the level of the outcome C’ of that M [C’(M)], depends on the degree of information processing that M has undergone. [This interactive process is similar to the multiplication of Mi by a constant C’, which yields an outcome C’ of M: C’(M) = C’·Mi. Note that when the units of measurement of C’ are known, a certain constant, K, can be used in such a way that K·[C’·Mi] will result in measurement units equal to those of C’ (see, e.g., Rakover, 2002).] It is worth noting that the current theory favors the possibility that a constant maximal level of consciousness interacts with (e.g., multiplies) Mi over the possibility that the level of consciousness changes as a function of various possible variables. The main reason for this preference is that for the purposes of the current theory the former simpler possibility is sufficient.

Third, the conferred consciousnessmay be conceived of as a field composed of a huge number of consciousness units. Although a large M is induced by a wide field of consciousness (a high number of consciousness units) and a small M is induced by a narrow field of consciousness (a small number of consciousness units), both have the same level of consciousness. The reason for this is that the induced consciousness is maximal and in the present case it does not decrease in its degree, because of the following reason. In order for Mi to represent stimuli in the world in the most veridical and objective way, the information represented in the M has to undergo maximal beneficial visual-perceptual processing. As a result, the processing level of all Mi is the same (maximal) and therefore the C’(M) of each of these Mi is likewise the same and maximal.

Since the five items (wall, TV, flowerpot, two pictures) are perceived with the same level of consciousness, the perceiver has the cognitive impression that these items constitute a unified field of consciousness, a whole conscious picture. Another factor that contributes to this impression is the very fact that all these stimuli appear at the same time and in the same location in Smith’s visual field. Furthermore, the impression of unity of consciousness is enhanced by the feeling of being alive (aliveness, vitality) that accompanies every conscious sensation. For example, the perceptions of the wall, the TV screen, the flowerpot, the two pictures, all of these together and each separately are accompanied by the conscious feeling of being alive, a feeling that strengthens the unity of the cognitive perception. (It should be emphasized that although the feeling of being alive accompanies every conscious sensory perception, a person becomes alert to this especially in cases where their sensory system is damaged. This can diminish a person’s sense of aliveness.)

It is worth noting that the perception of these five items as one unit of consciousness is not equal to the perception of the face as a whole unit, although the face also includes different features that appear in the same place: hair, forehead, eyes, nose, mouth, and chin. An important reason for this difference, according to the findings of previous research, is that the face has a special brain area for processing facial information (e.g., Kanwisher & Yovel, 2006; Rakover, 2002, 2013).

Fourth, the cognitive process of (b) *consciousness-generation* endows M with consciousness when the (c) *enabling-consciousness condition* is met. The process of conferring C’ on M is automatic, unconscious, and very fast. Any information, whether it pertains to a low-order (LO) M or a high-order (HO) M, will receive C’ as soon as condition (c) is met. This condition is analogous to the well-known concept of short-term memory (STM, or the working memory). A widely accepted view is that when information is retrieved from long-term memory and enters short-term memory, it enters a state of consciousness, that is, one becomes conscious of this information (see, for example, Friedenberg & Silverman, 2016). Note that in this respect, with the use of the STM construct, the present theory bears some similarities to the Dispositional HOT theory proposed by Carruthers, 2000, 2004.) Given these characterizations, it is possible to outline several interesting features of these subsystems.

1. C’ can be conferred on M only when the *enabling-consciousness condition* is fulfilled(it enters STM).
2. When the *enabling-consciousness condition* is terminated, the C’ of M is removed and M becomes unconscious; a reentrance of this M into that condition regrants C’.
3. At any given time, the *enabling-consciousness condition* encompasses a limited number of Ms. Based on experiments in sensory memory (e.g., Sperling, 1960) and everyday observations, one may propose the following. It is possible to consciously hold only one visual field (which consists of a large amount of information) at the same time. For example, if Smith sees a cat on a couch, this picture is in his consciousness. However, if Smith turns his head slightly, he sees the flowerpot and peripherally perceives the cat on the couch.
4. Since the *enabling-consciousness condition* encompasses a limited number of Ms, an incoming new-M has to replace the previous C’(M) (i.e., the incoming new-M has to make room for itself). Thus, the previous C’(M) loses its C’ (it exits this condition and the individual ceases to be aware of the previous M).
5. If the new-M supplements the information of the previous C’(M), both the new and the previous Ms are combined. Thus, the individual becomes conscious of both Ms as parts of a whole picture.
6. When two Ms, one from the external world and one from the individual’s inner world, compete to enter the *enabling-consciousness* condition, C’ is usually bestowed on the external M because of its survival value. If the external stimulation is blocked, as in the case of experiments in sensory deprivation, this increases the chance of internal conscious-Ms fulfilling the *enabling-consciousness* condition, which would have destructive consequences. Indeed, experiments in sensory deprivation in which the sensory stimulation of seeing, hearing, touching, etc. is blocked have shown detrimental effects, such as visual hallucinations, disorientation in time and space, inability to concentrate and think clearly, and restless behavior (see Zubek, 1969). However, if the importance of the internal information exceeds that of the external information, consciousness will be conferred on the former and not on the latter.

These points can be illustrated with two examples of ‘**switch views’** of consciousness. First, Smith sees a house in front of him (he is aware of the house). He turns around and sees a black cat (he is aware of the black cat). He is no longer conscious of the house but only of the black cat. The C’(house) is transformed into an unconscious-M. In the second example, Smith sees somebody who approaches him and says “What’s up, my dear friend?” After a brief moment he becomes aware that this is his former companion from the army whom he has not seen for many years, and he responds “Hey Dan, it’s good to see you, how are you?” In this case, the unconscious information about Dan’s identity (old friend) is retrieved from Smith’s long-term memory and activated, so that it becomes conscious.

Fifth, although the level of C’(M) of the five items that make up the **ordinary evening** scenario is uniform, the conscious perception of each and every item is different: it depends on the content of each one and on the level of information processing it undergoes within the cognitive system. Information processing also explains the following two observations: (a) Smith’s level of processing of the floor and the remote control were low and therefore their C’(M) was likewise low, and (b) because Smith’s attention was completely focused on the film projected on the TV, the information processing of the other stimuli around the TV dropped to zero level, and as a result they disappeared from Smith’s consciousness.

**(2) FTC: an outline of the observation-manipulation subsystem**

Humans are able to introspect, that is, to conduct internal observation of their conscious feelings and thoughts, which requires being aware of their consciousness. So how does FTC handle this phenomenon? The answer to this question lies in the fact that one can be aware of one’s own consciousness, as illustrated by the following example. David consciously sees a cat [C’·M(cat)]. Given the realization of the *enabling-consciousness condition*, he is aware of being conscious of a cat, if [C’·M(cat)] is represented by the OM subsystem with linguistic or visual symbols {C’·OM [C’·M(cat)]}. This means that David is aware of being conscious of seeing the cat: C’ is conferred on the OM that represents [C’·M(cat)]. In other words, it is possible to view this situation of being aware of awareness: David focuses his inner attention on [C’·M(cat)]. As a result, he becomes aware of consciously seeing the cat by using language that represents this event, e.g., by saying to himself: I am aware that I am consciously seeing this cat.

 The assumption that OM represents the cat’s image leads to the conclusion that the content of the awareness of the awareness is the cat’s image itself, i.e., OM represents this image. Furthermore, since OM is assumed to be an internal cognitive process, one may assume that this process is capable of conducting several operations on the content of the perceived image, such as mental rotation and increasing or decreasing the size of the image (e.g., Kosslyn, 1975; Shepard & Metzler, 1971).

**Discussion**

The discussion deals with two important issues: (a) evaluations of FTC, its advantages and disadvantages, and (b) several criticisms of the HOT approach and the extent to which the present theory is able to deal with them straightforwardly.

*Evaluations of FTC*: So far FTC has been able to explain two everyday observations. Regarding the first of these, the **ordinary evening**, answers were given to two important questions: How do the conscious perceptions of several items receive the impression of C’ uniformity? And how are different degrees of C’ created in the perception of different items in a person’s field of vision? Both answers are based on the degrees of information processing that the visual inputs undergo.

The second observation, based on **switch views** of consciousness, offers an explanation for the fundamental question: How does a shift from the observation of visual field A to the observation of visual field B result in the lack of awareness of A and the awareness of B? The explanation is based on the assumption that the *enabling-consciousness condition* is able to handle a limited amount of information (in a similar way to STM).

Here I will add another daily observation, ‘**train ride**’, which deals with the common phenomenon whereby an individual is conscious of a certain subject at a given moment, then becomes unconscious of it for a period of time, and remembers it sometime later. David travels from town A to town B by train. The goal of his trip, which he thinks about when he plans it, requires him to get off the train at station B and meet Miss Smith, the secretary of Dr. Arnold, who has offered him a new job (let us call it the Travel Goal). The journey takes about two hours and during that time David reads a detective novel and forgets about the Travel Goal. At station B David puts the book away in his bag, gets off the train, immediately thinks about the Travel Goal, and is pleased to be aware that he has remembered the Travel Goal.

The three subsystems (a) *visual-perceptual processing*, (b) *consciousness-generation*, and (c) the *enabling-consciousness condition* must be addressed to offer an explanation up to the moment when David becomes aware that he is once more thinking about the purpose of his journey on arrival at his destination. These assumptions also account for the fact that David was not conscious of the Travel Goal during the train journey, since he was aware of the new information provided by his reading of the novel, and the Travel Goal did not occupy his mind. Subsystem (a) offers an explanation for the retrieval of the relevant information from his long-term memory (LTM) once David gets off the train at station B, which serves as a cue for the adequate recall. Given that David closes the book and the relevant information about the Travel Goal is retrieved from his LTM, the two subsystems (b) and (c) begin to process the retrieved information: the information of the Travel Goal reenters subsystem (c). Finally, after consciousness has been conferred on the Travel Goal, the inner *observation-manipulation* subsystem comes into play and David enters a state of awareness of his conscious thinking about the Travel Goal.

As can be seen, FTC manages to explain a number of examples from everyday life. I will now examine the extent to which this theory succeeds in answering some of the questions about consciousness that have proven difficult to tackle in the literature.

Question (1): Does FTC offer a mechanism that explains how consciousness arises from neurophysiological processes in the brain?

The answer is no. However, two points should be emphasized here. First, until now I have not found any theory that positively answers this question – an answer that is accepted by the scientific community. Even so, the literature does offer interesting theories about correlations between neurophysiological processes and certain indices of consciousness (e.g., Brown et al. 2019; Carruthers & Gennaro, 2020; Gennaro, 2012, 2023a,b; Rakover, 2018, 2021; Seth & Bayne, 2022; Van Gulick, 2022). For example, it is interesting to note that Brown et al. (2019) proposed an association between the activation of the prefrontal cortex and HOTs.

Second, the present theory does not claim that a positive answer to question (1) is impossible. It may be interpreted as proposing certain theoretical-cognitive mechanisms [subsystems (b) and (c)] that mediate between the mental level and the neurophysiological level, mechanisms that may direct research to the relevant brain correlates. Thus, this theory is in line with the approach of cognitive psychology, which views information processing as being located somewhere between the mental level and the neurophysiological level (e.g., Rakover, 2007; Von Eckardt, 1993).

Question (2): Does the present theory offer an explanation of how an unconscious-M becomes a conscious-M?

The answer is yes. Both submechanisms, (b) *consciousness-generation* and (c) the *enabling-consciousness condition*, account for this matter. When an unconscious-M, which results from the processing of a stimulus input or is retrieved from LTM, fulfills the requirement of (c), mechanism (b) confers consciousness on it and it becomes a conscious-M (analogously, when information enters STM it becomes conscious).

Here a very important question arises: Can any unconscious information become conscious? The answer is no, not all unconscious information can become conscious. For example, it seems that visual information, which goes through different stages of processing, cannot become conscious at each stage of the process. Only the information in the final stage of processing may be conferred with C’. Moreover, various neurophysiological states and processes (physiological, electrical, and chemical) in the body and in the brain will never become conscious. It could be proposed that if these ever became conscious, the chances of survival would drop rapidly.

Question (3): Does FTC explain why a person receives the impression of a unified field of C’, different levels of C’, and self-awareness?

The answer is yes. All four submechanisms, (a) *visual-perceptual processing*, (b) *consciousness-generation*, (c) the *enabling-consciousness condition*, and (d) *observation-manipulation* (OM), are involved in solving these problems. The main factor to consider in answering questions about unity of consciousness and different levels of consciousness is the degree of processing that the visual information in question undergoes. Since the level of conferred C’ is maximal, what determines the consciousness level of each representation is its processing level. When the level of processing is maximal, the level of consciousness of all the items appearing at the same time and in the same place in the individual’s visual field is also uniform, thus creating a feeling of conscious unity. Furthermore, given that every conscious-M is accompanied by a sense of ‘being alive’, this feeling contributes to the impression of unity of consciousness.

As for self-awareness, I believe that it would be beneficial to analyze an additional everyday phenomenon, “**staring blankly**” (**gazing vacantly**), which may also be considered as an introduction to question (4) below. In this regard, for example, Gordon observes a certain sight, let us say a natural landscape, but he does not really perceive what he sees, because his mind is completely occupied with solving a very important or complicated problem. According to the present theory, the explanation here is built on the level of processing of the stimuli in question: low and shallow processing of the landscape and high processing of the internal problem that preoccupies Gordon’s mind. Furthermore, it can be assumed that Gordon may be aware that he is staring blankly at the landscape. In this case, Gordon turns his inner eye to the state of staring. This means that the OM subsystem comes into action and, on the one hand, represents M(staring), and on the other hand makes Gordon aware of this state; he may say to himself “I’m just staring blankly at the landscape.”

Question (4): Can FTC offer explanations for the phenomena of hallucinations and philosophical zombies?

Hallucinations and zombies can be conceived of as two opposing behavioral phenomena. In hallucinations, the individual reacts behaviorally to an unreal stimulus and their response is the result of the activity of the cognitive-mental system. The individual is convinced that they see a stimulus (which does not exist in reality) and reacts accordingly, for example when someone puts their hand into the fire to pick a beautiful red rose which is not really there. In contrast, the zombie responds to existing stimuli exactly as a human would; its behavior does not differ from that of a human being, but it does not experience any conscious sensation, for it lacks consciousness. For example, a zombie reacts with behavior that suggests fear when it sees a cobra snake slithering towards it, but it does not have any conscious feeling of fear in the way that a human feels afraid at the sight of an approaching snake. [In philosophy, zombies are used as a way of demonstrating that consciousness cannot be explained materially (e.g., Chalmers, 1996). However, the purpose here is not to discuss this argument, but rather to examine the question of whether the present theory may offer an explanation for the possibility of zombies.] Could FTC account for these two phenomena?

The answer is yes. The hallucination phenomenon can be explained in the following way. On the assumption that Smith has consumed certain drugs, it is possible to suggest that as a result, a number of memories stored in his LTM are retrieved. These memories meet condition (c) (by analogy, they are transferred directly to STM) and are subsequently bestowed with consciousness thanks to subsystem (b). Therefore, Smith believes that what is represented in his consciousness, what he sees in his mind, is reality.

In contrast to the above positive answer, according to FTC the answer regarding the question of the possibility of creating an actual zombie is negative. The main reason for this lies in the fact that all FTC’s subsystems, which deal with bestowing consciousness, are the result of an evolutionary development that has always gone hand in hand with the developments of other human systems and subsystems – a mutual evolution that eventually generated the human being. And because (a) a zombie is an artificial product that did not develop evolutionarily as a human being, and (b) consciousness, which did develop evolutionarily, is of enormous and necessary importance in human behavior, it is reasonable to conclude that no zombie will be able to perfectly imitate human behavior.

(2) *Criticisms of HOT*: Briefly, according to HOT theory, an unconscious-M becomes a conscious-M when it is represented by a higher-order-M. For example, one becomes aware of the mental state of ‘seeing a cat’ when there is a HOT that represents (one is thinking of) ‘seeing a cat’. Rosenthal (2005) writes: “But when a thought represents something as being present, having that thought does make one conscious of that thing. […] we are conscious of those states by having thoughts about them. And because these thoughts are about other mental states, we call them higher-order thoughts (HOTs).” (p. 5). It should be mentioned that in most cases a HOT is conceived of as an unconscious-M. Rosenthal writes, “… when a state is conscious, we’re never conscious of an accompanying HOT as relying on some inferential process.” (p. 6).

The HOT view has encountered many objections (e.g., Byrne, 1997; Carruthers & Gennaro, 2020; Gennaro, 2004, 2012, 2023b). Although these criticisms have received certain replies, the polemics continue. In this section, I present several interesting objections to HOT theory and show how FTC can effectively cope with them. Note that my intention here is not to critically survey these objections, but to emphasize how the present theory copes straightforwardly with these criticisms.

(a) *Logical problems:* Rosenthal (2004) writes, “It is occasionally held that explaining a state’s being conscious in terms of one’s being conscious of that state is circular, since it explains consciousness in terms of consciousness (e.g., Goldman 1993: 366).” (p. 17). This objection is rebutted by Rosenthal (2004), who proposes that one has to differentiate between what it is to be conscious of something and what it is for a state to be conscious, and by Gennaro (2004), who suggests that a HOT is not itself conscious. However, Rowlands (2001) believes that the circularity argument holds because the concept of a mental state is itself anchored in the concept of consciousness. Furthermore, several researchers have suggested that the argument of infinite regress can be put forward against HOT (Carruthers & Gennaro, 2020; Gennaro, 2004; Rowlands, 2001). Since an unconscious-M becomes a conscious-M thanks to its relation to a HOT, the question arises: How does a HOT itself become a conscious-MS? This is a question that leads to an infinite regress. A possible counterargument runs as follows: In the event that a HOT becomes conscious, Gennaro (2004, 2012) suggests that the discussion here is about introspection, a situation in which the individual directs their conscious attention to a conscious-M, while the state of conscious attention is accompanied by an unconscious HOT (a third-order M).

(b) *Logical problems:* *The FTC approach*: Before I discuss the FTC approach, it is useful to think about a new problem, the issue of ‘multiple connections’. As mentioned above, a possible response to the logical problems cited is to assume that a HOT is unconscious. Unfortunately, however, this assumption raises the problem of multiple connections. According to HOT theory, when two unconscious-Ms are related [the HO mental state is related to a LO one] the LO mental state becomes conscious (e.g., Gennaro, 2004, 2023b). Given this, and the reasonable hypothesis that in LTM there is a huge number of unconscious-Ms, one may wonder how it is that one’s mind is not flooded with conscious-Ms, arising from the many connections among these unconscious-Ms. There are endless external and internal stimuli that could trigger different representations stored in LTM, causing many connections that, as a result, may flood the cognitive system with conscious mental states. [Of course, the relationship between LO-M and HO-M can be defined in such a way that some of the problems related to this relationship disappear (see Gennaro’s discussion of this, 2023b)]. The multiple connections problem may be conceived of as being anchored in the idea of the ‘complexity’ problem (for a review, see Carruthers & Genarro, 2020). Briefly, there is a huge number of conscious-Ms, with each M requiring a HOT to become a conscious-M, and as a result the degree of the complexity of Ms increases immensely.

 For FTC the logical and multiple connections problems do not pose any difficulty. The present theory is not undermined by these objections because all the subsystems of FTC are inborn, automatic, and unconscious processes. Both the circularity and the infinite regress arguments are stopped by these subsystems, which are mechanisms with which one is equipped from birth. Multiple connections (the possible relation between any two LTM-Ms) do not threaten FTC, simply because there is only one way that an unconscious-M becomes conscious, and that is when subsystems (b) *consciousness-generation* and (c) the *enabling-consciousness condition* are activated.

As mentioned above, (c) the *enabling-consciousness condition* has certain similarities to the well-known construct of STM; it is also reminiscent of the inner visual spotlight and Dennett’s (1991) Cartesian theater. These concepts were designed to deal with the fact that a limited amount of information can be remembered and contained within consciousness for a short time (about 20 seconds). While the first two constructs are anchored in experimental results (e.g., free recall in the case of STM and the distribution of spatial attention in the case of the visual spotlight), Dennett’s Cartesian theater is an ironical explanation of conscious perception which is based on a homunculus who sits in a tiny theater within the mind and consciously watches what is staged there.

Nevertheless, the present theory is different from these constructs. First, FTC does not locate its subsystems in specific places in the mind/brain – it is delineated theoretically; second, as mentioned above, FTC is not supposed to explain how consciousness emerges from the neurophysiology of the brain – it is a functional theory that presents several successful explanations to tackle several queries. Finally, there is no need to postulate the existence of a homunculus (leading to infinite regression) because the processes that handle consciousness in FTC are innate and have evolved evolutionarily.

(c) *HOT is not a necessary condition for C’*: It is unnecessary, since phenomenal consciousness, a conscious-M, can occur without high-order thought. Today, many animal behavior researchers agree that at least the supremely intelligent animals (e.g., apes, dogs, cats, dolphins, etc.) have phenomenal consciousness, meaning that they are conscious of the information detected by their senses (e.g., sight, hearing, touch) and their emotions (e.g., pain, fear, pleasure by tickling) (see Allen & Trestman, 2016; Rakover, 2007; Seager, 2004). The problem is that HOTs have to confer consciousness on these Ms, but there are major doubts as to whether animals (and also human infants) possess such advanced higher-order Ms. How one can explain consciousness in animals without recourse to HOTs has sparked dispute. The standard response to this problem is that there is an appropriate HOT, but it is not endowed with the complex and sophisticated qualities that are attributed to this kind of high-order M (e.g., Gennaro, 2023b; Rosental, 2005).

(d) *HOT is not a necessary condition:* *The FTC approach*: Since it is assumed that FTC’s subsystems are innate and developed in accordance with the evolutionary theory, one may suggest that (b) *consciousness-generation* and (c) the *enabling-consciousness condition* also exist in the cognitive systems of animals (and infants) although at a lower level than that of a mature human. Thus, animals may have consciousness (e.g., Rakover, 2007). However, it is doubtful that animals possess self-consciousness or the ability to be aware of their awareness. For example, the debate continues over whether Gallup’s Mirror Test can provide unequivocal experimental results that indicate self-recognition in animals (can a chimpanzee really recognize itself in the mirror?) (see Allen & Trestman, 2016; Gallup, 1998; Povinelli, 1998). According to the present theory, another system for representing the awareness of consciousness – C’(M) – (e.g., languish) is required. While empirical observations indicate that emotions and sensory information are conscious in animals, it is difficult to find experimental evidence to support the hypothesis that animals can be aware of their awareness.

(e) *HOT is not a sufficient condition for C’*: It is not sufficient, since (1) LO-M receives consciousness from a HOT even though the higher-state M does not correspond to the lower state, i.e., the HOT misinterprets the LO-M, and (2) a HOT occurs without LO-M. According to HOT theory, the HO-M relates to the LO-M and the LO-M thus acquires consciousness. This raises the following problems: How can HOT theory deal with the possibility that one thinks that one sees a *red* flower [(HOT(red)] when in fact one sees a *green* flower? Or how can the HOT approach account for a situation where there is [HOT(red)] without a LO-M? While Rosenthal (2005) holds the view that such situations are possible and do not pose a challenge to HOT theory, Gennaro (2023b) posits that such misinterpretations are improbable (e.g., Carruthers & Gennaro, 2020; Gennaro, 2004, 2023b; Rosenthal, 2005).

(f) *HOT is not a sufficient condition:* *The FTC approach*: The present theory deals with these problems by emphasizing the following. According to HOT theory, consciousness depends on the relationship between two mental states (HO and LO), whereas according to the present theory, this relation is not important. If any information activates (b) *consciousness-generation* and (c) the *enabling-consciousness condition* this entails a transition from a state of unconsciousness to a state of consciousness. The difference between HO and LO mental states does not lie in the conscious experience itself but in the contents of the Ms, in what is represented by these two different Ms.

**Summary and conclusion**

It has been shown that FTC is able to explain a number of everyday phenomena and tackle several problems which have been raised mainly against HOT theory. These achievements are based on the fundamental assumption that *consciousness-generation* and the *enabling-consciousness condition* are mechanisms of the cognitive system. Although these two features have been described at the functional level without being substantiated by appropriate neurophysiological processes in the brain, it can be suggested that FTC provides simple and straightforward explanations. In addition, FTC proposes a new aspect of consciousness, which none of the previously published theories of consciousness have discussed, i.e., ‘life-meaning’ (innate and acquired) and the sense of being alive – or feeling of ‘aliveness’ (see Rakover, 2021).

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