# Toward a Theory of Consciousness[1]

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More effort is needed to arrive at a complete theory of consciousness that provide a satisfactory explanation of conscious experience. Some considerations that may inspire and contribute to such a theory are described. The hypothesis that consciousness can result in evolutionary advantages only as a consequence of its participation in and its effects on decision making is considered. The hypotheses that consciousness is an intrinsic property of reality and that encoded information gives rise to a unique conscious experience is considered as well as if evolutionary processes shape the consciousness/system interface, and an abstract information-based reality. It is suggested that implementation of the non-event-based conscious decision making strategy may be the only possibility of creating artificial intelligent systems that have free will.

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## 1 Introduction

In this research paper, I describe some considerations that may inspire and contribute to a theory of consciousness.

## 2 Consciousness considerations

### 2.1 Conscious decision making principle

By evolutionary processes, some human ascendants evolved visual sensory perception that enabled new responses to input from their environment and therefore resulted in evolutionary advantages. However the *conscious visual experience* cannot result in any evolutionary advantages... unless consciousness takes part in and improves decision making. I therefore put forward the conscious decision making principle which is stated as

*Consciousness can result in evolutionary advantages only as a consequence of its participation in and its effects on decision making*

If we for a moment assume this principle to be true, we can then ask if evolutionary advantages are a neccesary requirement for a species and its decendants to have a specific capability in the long term? Evidence in support of a yes answer would be evidence in support of consciousness participating in decision making.

I argue that there is no such thing as a neutral capability that neither results in an evolutionary advantage or disadvantage in that every capability increases energy requirements for survival, which is an evolutionary disadvantage. We can ask if a capability result in evolutionary disadvantages, will decendants lose the capability in the long term? There is some evidence that evolutionary processes cause similar optimiza-

tions. In a process called synaptic pruning, the human brain removes neural connections that are not often used and this might be done to improve both operational and energy efficiency thereby reducing energy requirements for survival.

### 2.2 Consciousness as an intrinsic property of reality

Now I consider consciousness as an intrinsic property of reality. The conscious reality hypothesis is then

*Consciousness is an intrinsic property of reality*

We know that the human brain encodes sensory input as an internal representation using neural networks. This internal representation in the memory of a human encodes more information than for instance a chunk of rock of similar mass, which is mostly repetition of the same simple pattern. Consider the information-based conscious experience hypothesis

*Encoded information gives rise to a unique conscious experience*

This hypothesis enable us to in theory measure or estimate the level of consciousness of a system during a short period of time as the average number of bits of information per unit time that make up the conscious experience of the system. One thing to notice is that equal information-based representations gives rise to the exact same conscious experience due to the uniqueness requirement.

The subjective conscious experience can be accounted for by information accessibility and information encoding. To give rise to a non-trivial conscious experience, information must be both accessible and suitably encoded, and to enable conscious decision making, a suitable consciousness/system interface (hereafter referred to as C/S interface) must be avail-

able. In conscious artificial intelligent systems, information should be encoded in such a way that it gives rise to a useful conscious experience for those systems. This require that the information encoding has been reverse engineered to know how certain encoded information is experienced.

## 2.3 Do evolutionary processes shape the consciousness/ system interface?

I propose that evolutionary processes shape the C/S interface of members of species and that this might happen like what is described next. New or removed connections of the C/S interface to functionality like memory, sensors, and muscles and changed encoding of information collected from the environment change conscious experience and participation in the decision making process. Changes result in evolutionary advantages and/or disadvantages that affect the success of members of species and of whole species.

For instance conscious experience may result in evolutionary disadvantages due to specific limitations. Members of a species may gain evolutionary advantages by developing new memory, sensors, muscles and/or change information encoding. A conscious experience may also result in evolutionary disadvantages due to specific expansion e.g. a case of information overflow that cause confusion and poor decision making. Members of a species may gain evolutionary advantages by changing information encoding that contribute to poor decision making.

## 2.4 Shaping conscious experiences

Suggestion from hypnosis and anchoring from neuro-linguistic programming can be used to shape the conscious experience of a person – such as for instance have the person experience a green car when the person would otherwise experience a red car. It is unclear if the person actually sees a green car (color switch) or if the associated language is changed (language association switch). The latter may be more plausible as the former would require changes to the visual system that seems to provide no evolutionary advantage.

## 2.5 Decision making strategies

There are several decision making strategies. The event-based algorithmic strategy is where an event, say a user starting an application in a new process on a computer, cause the computer to execute algorithmic-based software – basically a sequence of processor instructions. When executed by an ideal computer, the execution of the algorithm is deterministic, which is advantageous in some situations.

The event-based probabilistic strategy is where an event cause an information processor to make a decision based on a set of possible decisions each having associated selection probabilities. As a result of an event, the probabilities associated with some possible decisions may change and therefore perhaps affect future decisions.

The event-based random strategy is a special case of the event-based probabilistic strategy where each decision has associated equal selection probability.

For the above strategies there must be an event that initiate execution of the strategy. I propose that there exist a decision making strategy unlike any other strategy in that it does not require an initiating event to execute the strategy – the non-event-based conscious decision making strategy. This strategy create events rather than rely on an event to initiate execution of the strategy. I predict that conscious entities require a suitable C/S interface to be able to make use of this strategy, if it exist. Then detection of this strategy can be used as a basis of consciousness tests – tests that will determine the level of consciousness of a system.

We may discover that the event-based probabilistic strategy result in an extreme focus on decisions with largest associated selection probabilities unless an event-based algorithmic strategy prevent this. A conscious entity with suitable C/S interface may be able to make decisions other than those with the largest associated selection probabilities and that are not determined by any predefined algorithm. Implementation of the non-event-based conscious decision making strategy may be the only possibility of creating artificial intelligent systems that have free will.

## 2.6 Information-based reality

Under the assumption that the conscious reality and information-based conscious experience hypotheses are both true, we can consider if there is a single physical world out there external from our conscious experience that our C/S interface connect to using channels of information.

We can take the point of view of reality that it is an abstract information medium encoding information that gives rise to a unique conscious experience. Then we make no assumptions about the nature of the concrete information medium. What a conscious entity experience is based on possibly transformed information. The properties of the original information may be different from those of the possibly transformed information that gives rise to a conscious experience and the properties of what is part of the conscious experience may be different from those of the transformed information upon which it is based.

We now face the task of describing the properties of such an information medium. It is not a certainty that this medium, if it exists, must encode only the information of one single dynamic universe with three spacial dimensions and one time dimension with time always flowing forward. The medium could have intrinsic rules that cannot change and other rules that are imposed by C/S interfaces and the information that is accessible to them and therefore can be changed. What are the details of the conscious decision making mechanism? Many questions remain to be answered.

## 3  Conclusion

More effort is needed to arrive at a complete theory of consciousness that provide a satisfactory explanation of conscious experience. In this research paper, I have described some considerations that may inspire and contribute to such a theory. I considered the hypothesis that consciousness can result in evolutionary advantages only as a consequence of its participation in and its effects on decision making.

I then considered consciousness as an intrinsic property of reality and that encoded information gives rise to a unique conscious experience. I considered if evolutionary processes shape the consciousness/system interface, and an abstract information-based reality.

I suggested that implementation of the non-event-based conscious decision making strategy may be the only possibility of creating artificial intelligent systems that have free will.

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