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CONSCIOUSNESS WITHOUT BODIES: RETHINKING THE POWER OF THE VISUALIZED BRAIN

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This article examines the possibility of the futuristic assumption that the human mind will converge with artificial intelligence technology to create an enhancement of consciousness. By studying how a correlation between consciousness and the brain is made through visual tools that are used in neuroscience, this article elaborates on how these findings affect research that is done in philosophy on the concept of consciousness. This article proposes a new approach on studying the brain, by examining it as a theoretical object, which gives every research field the possibility to argue over the truth in the images that are created of the brain.

KEYWORDS: Brain Studies, consciousness, ecological knowledge, imagination, neuroscience, philosophy

INTRODUCTION

"[T]he growing capacity to experience Vibrant Awareness, a heighted self-awareness state; also embedded in technology about humans, of itself, and of the world" (Canton, 2015, p. 131). This is James Canton's, a well-known global futurist, definition of *consciousness* in his book *Future Smart*, when he describes multiple "Game-Changing Trends" that will transform technology over the next 50 years. According to Canton, our human consciousness will keep on transforming with digital technology that in the upcoming "Neuro Future," humans and machines will share *Synthetic Minds*: a virtual mind that runs on both Artificial Intelligence (AI) and human brainpower with the help of the convergence of neuroscience, neurotechnology, and cybernetics (Canton, 2015, pp. 344–345). The human mind and cognition are in this case seen as collaborative unities of one and the same thing: the brain. A better understanding of how the brain works,

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seems to give scientists a better understanding of how our consciousness works and how we can improve our cognitive abilities. Establishing this improvement seems, inevitably, to be based on implementing AI technology in our brains.[1] However, to presume this futuristic assumption, we must first understand to what extent human consciousness is actually imbedded in the brain: how can we perceive a correlation between the two?

"Consciousness can be seen as an emergent characteristic generated by the joint functioning of the enormous network of nerve cells"(Swaab, 2014, p. 150). In his Dutch bestseller *We Are Our Brains*, neurobiologist Dick Swaab (2014) presents a biography of the human brain. The title of the book already gives away Swaab's core argument: everything we do or think is determined by our brains, which are already formed in our mother's womb. Free will and consciousness are only illusions of our brains; the activation of certain brain areas makes us "aware" of what we see or what we think, but we ourselves do not have the power, nor the ability to structure our vision of our environment to our own will. The contemporary technology can nowadays show us with brain scans how our brains are active when being confronted with different stimuli in the environment or when we think, imagine, or dream of something. Our thoughts get visualized by these machines, and scientists, like Swaab, can, with the help of the created images, show how a philosophical concept like consciousness is an activation of certain areas in the brain; they can show that we *are* our brains.

The visualization of brain activity thus shows a dependence on the image: without the image we cannot perceive what is happening in our heads, nor can we draw conclusions that we are our brains. Images therefore become the tools that are needed to give arguments for research in the scientific field of neuroscience. The ways in which these images are interpreted is that what gives neuroscientists the power to draw conclusions in their scientific field. However, the arguments that they make in their field are not only limited to their own field of expertise, but they also affect other fields that make use of the same concepts that are being studied in neuroscience. For example: if neuroscience argues that being homosexual is already determined at birth because of certain hormonal swifts that form the brains in a certain way, there is the automatic consequence that this affects the nature/nurture debate in the field of philosophy. Although both these fields do not necessarily discuss the same concepts, use the same tools, or have the same theoretical framework, they do affect one another.

This article investigates how the visualization of brain activity for consciousness in neuroscience affects the research done in philosophy. After describing first what consciousness is, this article will subsequently elaborate on how this concept is addressed in both the neuroscientific and philosophical discourse. After this exposition, an examination shall be given on how the visualization of data that is used in the field of neuroscience causes the emergence of a new logic of representation.

CONSCIOUSNESS

We all have some ideas of what consciousness is and what it does, but giving a clear definition to this concept appears to be very difficult. In their book *Principles of*

Cognitive Neuroscience, Dale Purves and his colleagues (2013) argue that the term consciousness refers to at least three different aspects or meanings of the term:

1. A physiological meaning that describes consciousness in terms of the brain state we think of as wakefulness; this definition entails understanding the nature of brain activity that distinguishes wakefulness from sleep, and from unconscious states such as anesthesia or coma.
2. A more abstract meaning refers to a subjective awareness of the world, a brain state that must have a more subtle signature than wakefulness, since one can be awake and yet be unaware of some or even most aspects of the external and internal environments.
3. A meaning that refers to self-awareness, a term that defines consciousness in the sense of being aware of oneself as distinct from other selves in the world (Purves et al., 2013, p. 234).

Consciousness thus deals with wakefulness, awareness of the world, and awareness of the self as an actor in the world. Unfortunately, I cannot address all three of these aspects of consciousness for the scope of this article. The main focus of this article will therefore be on the second aspect that Purves and his colleagues sketch: the subjective awareness of the world. Whenever the concept of consciousness is addressed in this article, a reference to this one aspect of the term is made, not to all three.[2]

In what follows, there will be laid out how consciousness is studied in two different discourses: neuroscience and philosophy.[3] In both fields, two articles will be studied of different authors that did research on the topic of consciousness. Although two articles for each field will not be enough to give a generalized vision on how consciousness is studied in both fields, it will give an impression on how the visualization of brain activity for consciousness in neuroscience affects the research in philosophy. This can in the end give an impression of the credibility of the futuristic thought that a heightened self-awareness state can be reached through transforming the human brain with AI.

NEUROSCIENCE: VISUAL CONSCIOUSNESS

In their article *Consciousness and Neuroscience*, neuroscientists Francis Crick and Christof Koch (1998) approach the concept of consciousness from a visual perspective. They chose the term *visual consciousness* rather than other forms "because humans are very visual animals and our visual percepts are especially vivid and rich in information. In addition, the visual input is often highly structured yet easy to control" (Crick & Koch, 1998, p. 97). The logic (/the biological usefulness) of why we are conscious, according to Crick and Koch, is

> to produce the best current interpretation of the visual scene in the light of past experience, either of ourselves or of our ancestors (embodied in our genes), and to make this interpretation directly available, for a sufficient time, to the parts of the brain that contemplate and plan voluntary motor output, of one sort or another, including speech. (p. 98)

Visual consciousness thus seems to be useful because it can give us a current interpretation of our surroundings. However, this interpretation is not just one simple way of filling in what is happening. No, to become visual conscious about a visual scene, the brain has to construct a multileveled, explicit, and symbolic interpretation of this scene. With "multileveled" the two authors mean the different levels in visual hierarchy.[4] A problem arises here: an object that is visually observed by someone does not merely exist of one relevant aspect of it, but it covers different representations at the same time that are bound to different parts of the visual system. This problem is called *the binding problem*: the problem of how the unity of conscious perception is brought about by the distributed activities of the central nervous system (Revonsuo & Newman, 1999, p. 123). Crick and Koch try to address this problem by stating that only particular types of neurons express the neuronal correlation of consciousness (NCC) (Crick & Koch, 1998, p. 98).

Our conscious visual representation is, according to Crick and Koch, likely to be distributed over more than one area in the brain. It is, however, not positioned in the primary visual cortex, which means that the neural activity there is not directly correlated with *what* is seen.[5] Two things are essential for visual consciousness: short-term memory (also known as working memory) and visual attention. For Crick and Koch, "working memory is a mechanism for bringing an item, or a small sequence of items, into vivid consciousness […]. Consciousness, then, is enriched by visual attention" (Crick & Koch, 1998, p. 98). The brain area that is often associated with memory and attention is therefore seen as the place where consciousness might be positioned: the prefrontal cortex.[6]

In another research, Simon Clavagnier, Falchier, & Kennedy (2004) also look into the hierarchical architecture of the visual information flow. The authors map the complete pattern of cortical connectivity of the primary visual cortex with the help of tracers of optimal sensitivity:

> these tracers are extremely sensitive, and counting the number of neurons in different areas and layers makes it possible to determine two parameters: (1) the FLN which refers to the fraction of labelled neurons in each area and indicates the relative contribution of a given connection […]; and (2) the SLN, which indicates the hierarchical distance separating the labelled area from the injected area […]. (p. 118)

Eventually, the results show that the medial temporal lobe has long-distance connections with the primary visual cortex. This would mean that there is some sort of feedback projection in the recognition of what is seen (e.g., bars and edges) with what is seen in it (e.g., a face). Clavagnier and his colleagues therefore show the involvement of *multisensory integration* in the brain: "the combination of sensory information from different sensory modalities, facilitating the linking of that information together into one perceptual object" (Purves et al., 2013, p. 575). The primary visual cortex is thus participating in the initial integration of sensory information. Consciousness does therefore not lie in the primary visual cortex, but in these different feedback projections that cause the images that are perceived to be recognized. Different brain areas that are involved in this multisensory integra-

tion, like the hippocampus, amygdala, entorhinal cortex, and the superior temporal gyrus, can therefore be seen as places where the process of becoming visual conscious might take place. Being visual conscious is thus correlating with having the physical ability to participate in multisensory integration.[7]

The two researches that have been examined here both imply that (visual) consciousness is something that is positioned in a brain area. For Crick and Koch consciousness can be found in the prefrontal cortex, since this brain area is responsible for attention and short-term memory, which are both essential parts for visual consciousness. Clavagnier and his colleagues argue, however, that the same consciousness is not only restricted to the prefrontal cortex, but in all of the feedback projections that come from different brain areas that participate in the multisensory integration that stands in connection with the primary visual cortex. In both researches it is argued that the visual field is hierarchically structured and divided over various brain areas.

PHILOSOPHY: TEMPORALLY STRUCTURED CONSCIOUSNESS

In his article "Sensing Change," philosopher Barry Dainton (2008) advocates how becoming conscious can span over a brief temporal interval. According to Dainton (2008) there are two main schools of thought when talking about how our consciousness seemingly manages to extend through time: "[s]ome maintain that *consciousness itself* spans a brief temporal interval; others maintain that although consciousness *seems* to embrace a brief temporal interval, it does not really do so" (p. 366). Dainton names these two models *The Retentional Model* and *The Extensional Model*.

According to Dainton both the Retentional Model and the Extensional Model experience a problem. Extensionalists have the problem of explaining how it is that contents spread over an interval of ordinary clock time can appear successive if they also all seem present. And according to Retentional theorists the contents of the specious present are actually simultaneous (with regard to ordinary clock time), so how can it be that they appear successive?

Dainton explains the Extensionalist's problem by illustrating how tones can be heard on a piano: when hearing the evenly spaced succession of the tones C-D-E-F, we do not only hear C-D and E-F as a succession of each other, but also D-E. According to the Extentionalist model this would not be possible, since it is impossible that common parts overlap. Therefore, Dainton (2008) argues that "simply overlapping structures are responsible for the moment-to-moment phenomenal continuity that we find in our ordinary streams of consciousness" (p. 372).

The problem of the Retentional theorists can be visualized with the tones of a violin: imagine a horizontal line with the notes C-G, which represents the experiencing of a single, gradually rising, tone played. From each independent note (C, D, E, F), one descending diagonal and one descending vertical line can be drawn, which each represent a distinct specious present: "points closest to the horizontal line axis represent contents possessing maximal phenomenal presence; points further away from this axis possess less and less of this quality (or appear more and

more past)" (Dainton, 2008, p. 376). This causes the same extended sound to be experienced as sliding smoothly into the past.

The main question is thus: is consciousness spanning over time (Extensional Model), or does it only seem to do so (Retentional Model)? According to Dainton (2008) it is our notion of *change* that makes us conscious since that creates our perception of time's flow. Therefore, he suggests instead of the Retentional and Extension Model the *Overlap Model*, which "provides a straightforward account of how neighbouring specious presents are connected to one another without making any appeal to retentions: they overlap by sharing common parts or phases" (p. 379). Consciousness is thus unified over time.

The famous philosopher Daniel Dennett and his colleague Marcel Kinsbourne (1992) also argue that consciousness cannot be found in one moment in time. According to the two authors, neuroscience makes us believe in a *Cartesian Theatre model*: "a place within the brain where what happens 'counts'; that is, it postulates that the features of events occurring within this functionally definable boundary (whatever it is) are definitive or constitutive features of conscious experience" (Dennett & Kinsbourne, 1992, p. 190). René Descartes, after whom this model is named, believed that this place of consciousness was in the center of the brain: the pineal gland. Nowadays, neuroscience seems to have shown that this brain area is not a gateway to the conscious mind, but other areas could be (like the prefrontal cortex for Crick and Koch).

In opposition to the Cartesian Theatre model, Dennett and Kinsbourne (1992) propose the *Multiple Drafts model*:

> All perceptual operations, and indeed all operations of thought and action, are accomplished by multi-track processes of interpretation and elaboration that occur over hundreds of milliseconds, during which time various additions, incorporations, emendations, and overwritings of content can occur, in various orders. Feature-detections or discriminations *only have to be made once*. That is, once a localized, specialized "observation" has been made, the information content thus fixed does not have to be sent somewhere else to be *re*discriminated by some "master" discriminator. (p. 185)

This model discards a stream of consciousness, but believes in a parallel stream of conflicting and continuously revised contents. Consciousness is in that case spread over both space and time in the brain. The temporal content of an event in the brain is for this model therefore more important than when the individual representing events happen in various parts of the brain, since consciousness is already spread over space and time in the brain. An element of content therefore becomes conscious "by acquiring some property or by having the intensity of one of its properties boosted above some critical level" (Dennett & Kinsbourne, 1992, p. 199).[8]

These two researches show that from a philosophical point of view it is very important to place consciousness in time. For Dainton, consciousness is the unification of different specious presents: the overlap of different presents creates a continuity that gives us a feeling of consciousness. Dennett and Kinsbourne also use the concept of time to place consciousness in the brain: it is spread over both

space and time in the brain; it occurs in different brain areas at different moments. Consciousness is in this case a matter of exceeding a threshold of activation over larger parts of the human brain.

THE POWER OF THE IMAGE

Up till now, two different discourses have been analyzed on their approach toward the concept of consciousness. Neuroscience seems to try to find out what components in the brain cause our consciousness to exist. Crick and Koch point out that becoming conscious might take place in the prefrontal cortex, but Clavagnier and his colleagues seem to imply that different feedback projections in the brain toward the primary visual cortex cause the emergence of consciousness. These neuroscientists are thus looking at where and when in the brain consciousness is taking place.

The field of philosophy is not looking for the place in the brain where consciousness comes together, but it seems to do research on how consciousness takes place in time itself. Do not be mistaken here in the sort of time neuroscience and philosophy are addressing, since they are not talking about the same thing: philosophy is interested in how consciousness can occur in someone's subjective perception of time, while neuroscience looks for an accurate time that can be measured in the brain.

The concept of time appears to be very important to both discourses. But where philosophy gives models of our experience of time, neuroscience tries to capture time in an image: time is being visualized. In her book *Nomadic Subjects*, Rosi Braidotti (2011) describes the way in which biodiscourses (like neuroscience) use visualization technologies in fixing time. Making the body visible with these technologies causes human bodies to become "organs without bodies": "the paradoxical overexposure and hypervisual representation of body parts and the loss of consensual unity of meaning and value about them" (Braidotti, 2011, p. 193). The images that are created by visualization technologies therefore generate a gaze on the body with no imagination; contemporary biogenetic research has even gone "well beyond 'organs without bodies' to reduce its form into tissues, cells, and micro-organisms" (Braidotti, 2011, p. 196).

The question then becomes why these images without imagination keep getting created and are used over and over again in the biodiscourses. "It rests on the fantasy that visibility and truth work together and that both are best served by the latest visual commercial technology" (Braidotti, 2011, p. 201). That is what science tries to accomplish: finding the truth. All our trust is now put in images without imagination because we have a greater chance of finding the truth without getting distracted by imagination. According to Michel Foucault, the power to visualize may in the end create the prototype of responsible citizenship.[9] As Braidotti (2011) describes:

> […] Foucault stresses the workings of power in discourse as a series of interlinked equations: visualization = scientific gaze = methodological accuracy = objectivity = self-styling of the scientist as epistemological agent = power and credibility of scientific discourse = prototype of responsible citizenship. (p. 190)

At the moment, the biodiscourses have the power to visualize processes in the brain that are invisible to the human eye. The technology in the field of neuroscience can thus visualize the brain, which in the end creates great power and credibility in this specific field. That is why it seems that people have more trust in researches in neuroscience than in the field of philosophy; philosophy does not literally visualize in an image to later draw conclusions. It is for this same reason why research in the humanities (at the moment) always adapts itself to the research in biodiscourses. Scientific fields like neuroscience have a monopoly on the truth nowadays because they can create the image and draw an argument from that. The humanities have to settle themselves to the current truth and not the other way around.

But why do we not think the other way around? To make a change, the truth must be adjusted, not the findings to the truth. It is not wrong that neuroscience creates images of the brain. What is wrong is that these images lack imagination. Philosophers and neuroscientists must look together at the images that are being made while they let their imagination loose on them. In this way, the truth may again be adjusted to our collaborated finding and not our findings to the current truth.

To make this happen we need to rethink the brain in a new way. What therefore is needed is a new posthuman approach, which "amounts to higher degrees of disciplinary hybridisation and relies on intense de-familiarisation of our habits of thought through encounters that shatter the flat repetition of the protocols of institutional reason" (Braidotti, 2013, p. 169). This new field, which I will call "Brain Studies," focuses on how current findings in neuroscience and philosophy create a new way of thinking through the perspective of the brain. Brain Studies is thus not an interdisciplinary study, but a way of thinking through the brain itself. In this field, brain images do not create a research in which neuroscience and philosophy work together to draw conclusions, but their current findings open up the different perspectives on the brain itself. The human brain is therefore understood as a *theoretical object*: "[it] obliges you to do theory but also furnishes you with the means of doing it. Thus, if you agree to accept it on theoretical terms, it will produce effects around itself [and] forces us to ask ourselves what theory is. It is posed in theoretical terms; it produces theory; and it necessitates a reflection on theory" (Bois, Hollier, & Krauss, 1998, p. 8). The brain images do then become images *with* imagination, and the brain does not have to be an organ without a body anymore.

RETHINKING THE BRAIN

In the last couple of years, neuroscience made us believe that a study of the human brain would give a direct correlation with studies on consciousness. "Being conscious" or "making a conscious decision" could be measured through visual tools. These images are, however, stripped of any imagination; these images represent a pinch of the truth and are therefore served as facts. On the other hand, if we let go of the objectivity of the image, we have the possibility to draw conclusions that give us the possibility to continuously adjust the truth. Brain Studies has the capability of creating multiple resolutions regarding research that is done on the brain

by taking the brain as a theoretical object. Brain Studies breaks down the walls between the various disciplines that each study the same object: the brain. Multiple research fields have in this way the possibility to argue with each other over the truth in the images that are created of the brain; the images can be provided with imagination. One field, for example neuroscience, by taking this approach, no longer has a monopoly on the truth in brain imagery, but it has to conform itself to the truth that comes out of the research its findings. The image itself is no longer a fact but is a theoretical object: it keeps on questioning the theoretical approach on the image.

The assumptions that futurists like Canton make on how our consciousness will be improved in the early future by adding AI implements in our brain appear to be solely based on research that examines the brain as housing human consciousness. However, making the argument that the brain is the place where consciousness rests involves the use of brain imagery and perceiving these images as the truth. Brain Studies could offer a wider understanding of consciousness and the brain, by taking other perspectives into account; it gives imagination to the images. By transforming the habit of "finding the truth" to "adjusting the truth," Brain Studies keeps on questioning the correlation between human consciousness and the brain. For example, by taking into account that the human mind could be more embodied than just being positioned in the brain, our understanding of the connection between the mind and consciousness can be rethought, which will automatically ask for a reassessment of the relation between consciousness and the brain.[10]

The imagination of a future where both humans and machines share Synthetic Minds, like Canton sketches, is still a long way from happening (if it will ever happen). As Brain Studies shows, there are multiple ways of connecting consciousness to the brain or the human body. It is for this reason that we cannot undecidedly argue that an enhancement of the brain will cause an intensification of our consciousness; there are simply too many ways of perceiving consciousness, and it would be ignorant to prejudge one way over all the others. It would therefore be better in the future to keep rethinking subjects like consciousness and the brain by observing them as theoretical objects. Only then can we emancipate the various knowledges on these matters and overview the multiple outcomes; we get a better understanding of, what I would like to call, *ecological knowledge*: the awareness of the connected network of knowledges that is produced in various researches from different disciplines.

NOTES

1. James Canton is not the only futurist that implies that the cognitive power of our human mind will be improved by transforming it with AI technology. A few futurists who share the same belief are Tim Cannon, George P. Dvorsky, and Hans Moravec.
2. Although I am aware that there are other definitions of consciousness, I have chosen these three since they resemble the core ontologies of the definitions that are given by other researchers. Although *Principles of Cognitive Neuroscience* is often used as a textbook in cognitive sciences, these definitions also suit other definitions for consciousness that are given in, for example, philosophy, psychology, and medicine.

3. I have chosen to elaborate on philosophy for the reason that studies of consciousness relate far back in history through this field of study. Where studies like psychology are relatively young compared to philosophy, philosophy appears to be the field from which concepts like consciousness are borrowed. For that reason, it is intriguing to see how exactly this field is affected by the use of her own definitions in neuroscience, which is, next to also being a young field of study, a trending field of study nowadays.
4. Visual hierarchy is the way in which different visual components of an object are structured in the brain. There is a lot of research done on this hierarchy to study out of which components this hierarchy is made. David Hubel and Torsten Wiesel have, for example, argued that this hierarchy is made up of bars and edges, which are analyzed by the brain in the primary visual cortex (1968, p. 215). There are, however, also scientists who believe that there are specific brain areas for face recognition (Kanwisher, McDermott, & Chun, 1997, p. 4310), or for houses (Tong, Nakayama, Vaughan, & Kanwisher, 1998, p. 753). The hierarchy would then not only be made out of bars and edges, but (also) of clear objects.
5. When we observe an object, an image of the object falls on the retina of both eyes. We see two different images, which are later combined in the Lateral Geniculate Nucleus (LGN), which eventually makes up a three-dimensional image of what we observe in the world. This image then travels to the primary visual cortex (often called "striate cortex" or "V1"), which is positioned in the occipital lobe. The visual cortex analyzes the different parts of the content of the image in different areas of the cortex called V1 up till V6. Each V seems to hold neurons that react to different properties: V1 responds to bars and edges (Hubel & Wiesel, 1968, p. 234), V3 for color, V4 for spatial and orientation tuning, and V5 for motion. Crick and Koch argue that the recognition of what then can be (consciously) perceived does not take place in the primary visual cortex but somewhere else in the brain (Crick & Koch, 1998, pp. 98–99).
6. Crick and Koch are not the only neuroscientists who study the NCC to position human consciousness in the brain. Others are, inter alia, Nikos Logothetis and Geraint Rees.
7. For more information on the correlation of consciousness and the multisensory integration, see also the research done by Gregg H. Recanzone (2009), Elliot Smith et al. (2013), and Barry E. Stein and Benjamin A. Rowland (2011).
8. The branch of philosophy that is studied by Dennett and Kinsbourne is often called *philosophy of mind.* Other notable researchers in this field, whose work also address the topic of consciousness, are John Searle, Jerry Fodor, and David Chalmers.
9. The argument that Foucault makes is directly related to what he calls *biopolitics*: a social normalization of what the stereotype body in a society should look like. Unfortunately, for the scope of this article, I cannot elaborate on this purification of human bodies in Western societies. For more information on biopolitics, see Michel Foucault, *"Society Must Be Defended"* (2003) and *The Birth of Biopolitics* (2008).
10. This way of thinking is based on an *enactive approach* on human perception. Francisco Varela, Evan Thompson, and Eleanor Rosch were some of the first to use this enactive approach on the matter of cognition in their book *The Embodied Mind: Cognitive Science and Human Experience* (1991). Cognition, or basically the process between human perception and thought, was not defined as a brain activity or a fulfilment of "the mind" through the body, but as a mechanism of a thinking body (Varela et al., 1991, p. 145). The mind, which is often ignored by scientists and exploited by religious people, becomes in this enactive approach an *embodied mind* (Varela et al., 1991, pp. 148–149): the act of bringing forth a world lies in the body itself. Our body has, according to this approach, the possibility to create, through the input of different senses and a personal referential framework, not only an image of a world, but a *whole* world (Varela et al., 1991, p. 205). For more information on this approach, see also the research done by Alva Noë (2006), Alain Berthoz (2000), and Brian Rotman (2008).

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