Article

Consciousness As a Phenomenon of Memory

Henry Grynnsten*

Abstract

Consciousness has been a mystery for thousands of years. The idea behind this article is that consciousness can be explained by way of the phenomenon of déjà vu. This state seems to come about when a synchronization error appears in sense signals going to the brain. From déjà vu, where there seems to be a memory of the present moment, one can work out that consciousness is a function of memory. Data from the senses are separate, while we see the world as a total experience. This means that the data are bound together in some way. Human consciousness can be explained as a phenomenon that arises when sense data are repeated at a short interval in the brain. The reason that humans have consciousness may have to do with language learning. Consciousness possibly appeared simultaneously with language, in a short span of time, and it is consciousness that makes human language possible. There was such a great advantage to using language, that all Homo sapiens acquired it.

Keywords: Consciousness, memory, phenomenon, language, human.

1. Introduction

The question of consciousness has been described as a hard problem, a term famously coined by David Chalmers [1]. It often seems that the subjective experience of consciousness influences our theories about it, so that it becomes hard to put your finger on it. Philosophers have come up with various theories through the ages. Perhaps it is everywhere, in rocks, or even in atoms [2]; perhaps it is a fundamental part of nature like space and time [3]; perhaps it is only an illusion and we only think we are conscious, so that there is no hard problem to solve [4]; perhaps it is an unanswerable question [5].

These theories and others may have their advantages, but some of them do not place consciousness in the brain, or do not explain its evolutionary cause.

*Correspondence author: Henry Grynnsten, Independent Researcher, Sweden. E-mail: grynnsten@hotmail.com

1. Chalmers, D: ”Facing Up to the Problem of Consciousness”, 1995. http://consc.net/papers/facing.html
2. i.e., panpsychism.
3. Hoffman, D. D: ”The Origin of Time In Conscious Agents”, 2014. http://cogsci.uci.edu/~ddhoff/HoffmanTime.pdf. See also David Chalmers in the TED Talk ”How do you explain consciousness?”, 2014. https://www.youtube.com/watch?v=uhRhtFFhNzQ
4. Daniel Dennett calls his view about consciousness “illusionism“. See Dennett, D. C: ”Illusionism as the Obvious Default Theory of Consciousness”, 2016. https://ase.tufts.edu/cogstud/dennett/papers/illusionism.pdf
5. I.e new mysterianism, according to which the hard problem of consciousness is too hard for humans to solve.

Some scientists, and philosophers like John Searle with his biological naturalism [6], place consciousness in the head of the human being, and think that it can be explained by processes in the brain. This is the basis for the model presented here.

An idea of how consciousness could come about can be based on normal consciousness and the experience of déjà vu, which is a dislocation of normal consciousness. That almost everyone has experienced déjà vu indicates that it might be a key to understanding consciousness, since it affects consciousness.

Déjà vu is an experience that as many as 70 percent of all people have had [7], in some surveys 80, 90, or even 100 percent, though lower in others [7], while the rest maybe have forgotten or not been able to put a name on the phenomenon. Some are reluctant to admitting the experience, out of fear of being seen as abnormal [8].

A third experience, of heightened awareness, a counterpart to déjà vu, may be hypothesized. This would be much rarer, and may not even have a name, but will be briefly described below, since, if found, it could bolster the ideas here presented.

2. How Consciousness Arises

When we receive input from the senses, it is synchronized in the brain. We all seem to hear and see and smell etc. the world all at the same time. Our own experience tells us that different sense data are connected together in the brain, in one way or another. Let us call this the synchronization. The claim is not that this occurs in a specific region or site or by a specific mechanism in the brain, it is just shorthand for the way, whatever it is, in which disparate senses are synchronized for an experience of the world.

To summarize:

1) We have different senses that give us sense data;
2) We experience sense data not as separate, but as a total experience;
3) Therefore, in some way, sense data are synchronized; and
4) For convenience, in this article, this [i.e. point 3] is called the synchronization.

6. See for example Ford, J. B: ”Aspects of John Searle's biological naturalism“, 1999; “... according to biological naturalism, mental phenomena are higher-level physical features of the brain, but are totally caused by lower-level neurophysiological processes ...“. https://minerva-access.unimelb.edu.au/handle/11343/114496
7. Brown, A. S: *The Deja Vu Experience. Essays in Cognitive Psychology*. Psychology Press, 2004. p. 34–37.
8. Brown, p. 30.

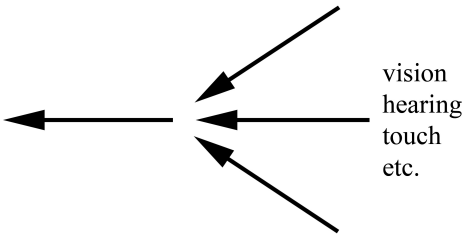

Fig. 1. Sense data are bound together in the brain

The synchronization – i.e. the connecting together of sense experience, however it occurs – might be the key to human conscious experience. The feeling of consciousness that humans experience could come into being by a doubling of the synchronization of the sense data, possibly by electrical and/or chemical impulses being doubled, making a reprise. If sense data are synchronized, which we can deduce from the fact that we see and hear etc. all at the same time, then it is possible that this synchronization, this binding together, which occurs once, could in some way be repeated.

In fact Robert Efron, looking into déjà vu, discovered that the temporal lobe receives incoming information twice, once directly into the left hemisphere of the brain and once by a detour via the right hemisphere [9].

Déjà vu can be defined as "any subjectively inappropriate impression of familiarity of a present experience with an undefined past" [10]. It is a phenomenon where we feel familiar with something we should not be familiar with. Normal memory follows from us having come across something before. So when we feel familiar with a present experience in déjà vu, that would mean that the brain has already become familiar with the present experience. This indicates that the feeling of familiarity might come after an unconscious primary experience, which in fact means that it is a double experience. This double experience means a doubling of the sense data.

This resembles the double perception explanation of déjà vu, which explains it by two perceptions in quick succession [11]. It also resembles dual process explanations of the phenomenon. Of four different types of disruption between the two separate cognitive processes proposed, one is caused by "an atypically long separation of two functions that are normally immediately contiguous" [12]. Already in 1897, E Parish suggested that an abnormal widening

9. Robert Efron's paper was "Temporal Perception, Aphasia and Déjà Vu", 1963, https://academic.oup.com/brain/article-abstract/86/3/403/260382?redirectedFrom=fulltext, described by Obringer, L A in "How Déjà Vu Works" at https://science.howstuffworks.com/science-vs-myth/deja-vu4.htm
10. Vernon M. Neppe quoted in Brown, A. S. P. 17.
11. Brown, p. 173 ff.
12. Ibid, p. 127–128.

"between sensation and perception" leads to déjà vu [13]. Alan S Brown also sees a similarity between this, the separated process idea, and double perception, as well as a neurological explanation that proposes that "information from the primary and secondary sensory pathways" reach the cortical processing centres with an unusual delay [14].

In 1895, Myers proposed a dual consciousness consisting of a subliminal and supraliminal self. The subliminal self records events continuously in the moment, while the supraliminal lags behind, but is the one we are consciously aware of [15].

All these ideas, while not talking about consciousness per se, seem to point in the same direction, of a doubling of sense data. You could call the first self-awareness, and the second self-consciousness, which, the two together, leads to the consciousness of humans.

By explaining consciousness as a phenomenon of memory, one gets around the problem of one specific thing being its source. It is not one thing, it is a succession of things. By being a combination of several things in time, no one single thing has to bear the burden of somehow giving rise to consciousness.

In normal consciousness, because of this repetition or doubling, you are just on the brink of feeling that you have experienced everything before. A little shift of normal consciousness, and the vivid sensation of déjà vu appears. Instead of the clear memory of déjà vu there is a feeling of being present in the here and now. This can be described as "I recognize myself" or "I am", "I am here" or "this is here and now". It is here that the "I" would come into being.

The result is, as David Hume puts it, that "The mind is a kind of theatre, where several perceptions successively make their appearance ... They are the successive perceptions only, that constitute the mind ..." [16].

This is not a homunculus argument, that there is a small man inside the brain who experiences this feeling. On the contrary, this model shows that there is no separate entity that is the self in the brain. The feeling of the self is in that sense an illusion. Consciousness clearly exists, but it does not indicate any separate entity or self in the brain. We are individuals with consciousness, but there is no self.

Just as animals, even primitive animals, can be shown to react to stimuli through the senses and thus feel in some way, in the same way a human can feel consciousness. There is no need for a homunculus or any mysticism.

13. Ibid, p. 132.
14. Ibid, p. 133.
15. Ibid, p. 134.
16. Hume, D: *A Treatise of Human Nature*, 1739–40. https://www.gutenberg.org/files/4705/4705-h/4705-h.htm

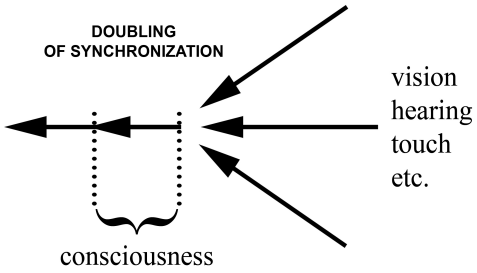

Fig. 2. The binding together of sense data can be repeated

There has long been an idea that déjà vu is caused by neurons firing out of sync. It is the contention of this article that it is when this doubling of the sense data is increased by a certain amount of time that we get a strong feeling that we have experienced everything before, a contention that has some antecedents in previous déjà vu research, as mentioned above. It is a feeling that is sometimes accompanied by depersonalization, a detachment of the self. The sense data in déjà vu begin to feel more like a memory than a direct experience, which shows that there has arisen a distance between the first and second binding together of sense data. Efron found that the brain registers the second piece of information as a memory because it had already been processed [17].

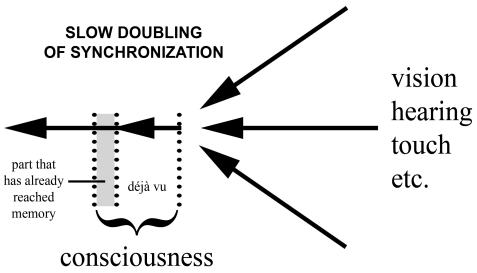

Fig. 3. Slow doubling of synchronization gives rise to déjà vu

If this is true, there might be a corresponding experience when the synchronization is faster than usual, when the distance between binding 1 and binding 2 decreases by an unusually large amount, a phenomenon, if found, that could bolster the explanation of déjà vu described here.

17. Obringer.

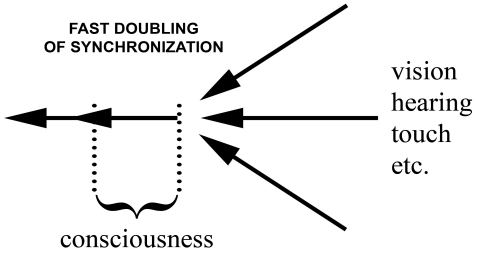

Fig. 4. Hypothesized fast doubling of synchronization

This could result in the opposite of the depersonalization of déjà vu, and be a state of heightened awareness of the self, if the supposition is true. It would be tempting to assume that this state is identical with jamais vu, the feeling of unfamiliarity with familiar places, objects or people, which is much rarer than déjà vu [18], but this might be a case of too easy parallelism and the explanation for the two phenomena could be two quite different mechanisms. However, déjà vu and jamais vu have been viewed by many researchers as "opposite ends of a familiarity dysfunction" [19].

To continue the supposition, the fast doubling of the synchronization might be a state that is just as distinct as déjà vu, but very different, and like it perhaps lasting only 10 to 30 seconds. This state may be described in the literature, but besides jamais vu it would also possibly not be identical with the "heightened awareness" described by meditators, since it would have such a short duration.

So the normal function of consciousness can be deduced from an experience close to normal consciousness, déjà vu, where synchronization is malfunctioning, that is experienced at some time by many people, perhaps most. If the second state could be demonstrated to exist, it would strengthen the argument here presented.

3. Why Consciousness Arose

Why do humans and only humans have [human] consciousness? What is it that humans do that no other animals do? Cognitive neuroscientist Merlin Donald writes that humans evolved "skilled rehearsal and explicit memory retrieval" [20], and this was used for language. According

18. Brown, p. 104.
19. Ibid, p. 106.
20. Donald, M: "The neurobiology of human consciousness: An evolutionary approach", 1995. https://www.sciencedirect.com/science/article/abs/pii/002839329500050D

to Donald, apes do not rehearse to improve performance [21], and they are the animals that are closest to humans cognitively. Explicit recall "depends heavily on having a symbolic system in place in the brain" [22].

Language is the most distinctive thing besides consciousness that differentiates humans from other animals, so you could assume that these two phenomena are connected in some way. If one presumes that they arose quite independently, one would need one mechanism to explain why consciousness arose, and another for why language arose, but in this article the assumption that they arose together and simultaneously is explored. This assumption does not seem to immediately encounter any logical obstacles.

It is thought that humans evolved cooking from around half a million to two million years ago. Over time this led to adaptations in the human body to cooked food, including a bigger brain [23]. This eventually led to consciousness, which made learning of language possible [24], and great advantages accrued to those who made better use of language. The "talkers" could outcompete their enemies and outsmart rivals, and store complex knowledge in their minds.

A creature with language as a tool has a clear advantage over one without language, since humans dominate all other species. The question is how far humanity would have come with just consciousness and no language at all, but it seems likely that once consciousness is in place, this will inevitably lead to better communication systems in some form.

Exactly how the doubling of sense data appeared, and if it first came about in one individual as a mutation, is not something that this article tries to explain. But through the doubling of the synchronization, by having increased consciousness of what we experienced, we were able to acquire language. By this means, we could sort out the interesting, new words or forms, and improve our language use. Soon only those who mastered language remained, all others having been outcompeted, or having disappeared for some other reason. There are now no human groups who cannot learn languages.

21. Donald, M: *A Mind So Rare. The Evolution of Human Consciousness.* W W Norton & Company 2002 [2002]. P. 142.
22. Ibid p. 163.
23. Wrangham, R: *Catching Fire. How Cooking Made Us Human*. Profile Books 2010 [2009].
24. An idea developed in Donald's *A Mind So Rare.* Donald argues that we can only learn consciously. He takes the example of reading; "The total conscious load imposed during the learning of advanced literacy skills is enormous and absorbs our attentional capacity for years." But then it becomes automatic and we no longer need to use enormous conscious capacity to read. [pp. 231– 232] Unconscious learning does happen, but for example learning during sleep is "extremely basic", writes Bahar Gholipour for Live Science, "Can You Learn Anything While You Sleep?", 2019. https://www.livescience.com/64920-how-learn-during-sleep.html.

Human ancestors in all likelihood had some forms of vocalized communication. Meerkats and other animals can probably change alarm calls depending on the situation [25]. Our close relatives the chimpanzees produce a range of vocal signals, but this communication is static, it does not accumulate over the generations and does not constitute a language. However, after humans achieved consciousness, our ancestors would have been able to consciously process these pre-existing vocalized signals, organize and elaborate them, extend their meaning, as well as to apply them to new situations. This elaboration would then become the new repertoire, which could be used without much reflection. But this new repertoire would then be subject to new conscious processing, and so on, until the stage of full, human language was reached.

Pidgin and creole languages show how quickly a language can come into being. Pidgin first develops when speakers of mutually unintelligible languages meet and have to communicate. Both the grammar and the vocabulary are very limited. Children of pidgin speakers then learn the language in the process called nativization, and develop creole, a full language with fully developed grammar and vocabulary [26]. Linguist John McWhorter says that "... of the languages extant today, the ones that most closely approximate the first language are creoles ..." [27].

This process can of course only be achieved by creatures with human consciousness – it may be unnecessary to point this out, but it has never been possible to teach any other animals human language. Animals communicate by static systems, while language is continuously changing. These are two entirely different modes of communication. Clearly, human communication requires mental flexibility, i.e. consciousness.

For gradualism, this would mean a slow evolution in tiny incremental steps from 10 to 20 to 30 to finally 100 per cent of modern human consciousness and language, say over hundreds of thousands or half a million years. If human ancestors had full consciousness at any point in the process, they would be able to quickly evolve full languages without intermediate steps.

If consciousness appears suddenly it must mean that those who are now conscious will be able to perform an operation similar to those who create pidgin languages. The early humans did not have full languages to work with, but they did have some kind of vocalized signals. These people, who were modern, conscious humans, must of course have had the same capacity to create a means of communication that is close to the pidgin languages as present-day humans. In fact, talking about deaf children without contact with sign language, a group of researchers write

25. Townsend, S W et al: "Flexible alarm calling in meerkats: the role of the social environment and predation urgency", 2012. https://academic.oup.com/beheco/article/23/6/1360/191395.
26. See, for example, Crystal, D: *The Cambridge Encyclopedia of Language*. Guild Publishing 1988 [1987], p. 334–337.
27. McWhorter, J H. *The Power of Babel. A Natural History of Language*. Perennial 2003 [2001], p. 301.

that "There are circumstances under which a small group of people can form a language apparently out of nothing" [28].

This developmental stage from pre-language signals to full language could thus have occurred very rapidly, only to reach a kind of ceiling – the ceiling that is exemplified in full human languages. And clearly there must be a reason for the existence of a ceiling in the complexity of language. Both the saltationist and the gradualist must explain why language no longer evolves [only changes].

At some point we reached this language plateau, since all human languages seem to be roughly equally complex [29]; they can all be translated into the others without too much loss of information.

From this time, we can surmise that language only changed in content, not in overall complexity [though local complexity of various parts of a language can and does increase and decrease], which indicates that consciousness also remained at the same level.

This would mean that language cannot develop far beyond current overall complexity [for general communication purposes] without a corresponding increase in consciousness, and vice versa [without going into if either language or consciousness can in practice reach a "higher" level]. If humans can develop a much more complex language with current consciousness, there would be examples of this, which there are not. If there were humans with much more advanced consciousness, they might use language at the level of complexity we see in any current or past language, but they would distinguish themselves in some noticeable way. Clearly there are not and have never been superhumans, that is humans that are to us as we are to other primates. Geniuses still fall within a kind of general range of human intelligence.

It is not a coincidence that children develop consciousness at the same time as they learn language. By 5 months, consciousness and memory are on their way, [30] and by 6 months, "most babies recognize the basic sounds of their native language". [31]

28. Meir, I et al: "Emerging Sign Languages", 2010.
http://sandlersignlab.haifa.ac.il/html/html_eng/pdf/EMERGING_SIGN_LANGUAGES.pdf
29. Linguist David Crystal writes that "... every culture which has been investigated, no matter how 'primitive' it may be in cultural terms, turns out to have a fully developed language ... Anthropologically speaking, the human race can be said to have evolved from primitive to civilized states, but there is no sign of language having gone through the same kind of evolution … There are no 'bronze age' or 'stone age' languages … All languages have a complex grammar: there may be relative simplicity in one respect [e.g. no word endings], but there seems always to be relative complexity in another [e.g. word position]." Crystal, p. 6.
30. Gabrielsen, P: "When Does Your Baby Become Conscious?", 2013.
https://www.sciencemag.org/news/2013/04/when-does-your-baby-become-conscious
31. The National Institute on Deafness and Other Communication Disorders [NIDCD] : "Speech and Language Developmental Milestones". https://www.nidcd.nih.gov/health/speech-and-language

”Perhaps language is even a necessary condition for consciousness” writes Psychology Today [32]. Or perhaps consciousness is a necessary condition for language.

This leads to the further observation that there are no zombies in the philosophical sense, since to learn a language you have to be conscious. I know that I am conscious, but how do I know that you are conscious? Because you use a language. Of course you can program a computer to give sophisticated answers to questions, but that is automation, not “using language” as humans do.

A person might talk during sleep, i.e. in an unconscious state, but he or she still learned language while conscious. The same goes for other exceptions: the individual must at some point before such an exception have been conscious for a considerable amount of time, the time that is required to learn a language.

It is also possible to date the appearance of consciousness: it would have happened conjointly with the development of language. McWhorter, for example, thinks that a mutation created a genetic instruction or predisposition for language, that it happened once, and possibly around 150,000 years ago [33]. Changing this supposed predisposition for language to consciousness makes the idea fit into this article. Crystal also is of the opinion that language “emerged within a relatively short space of time”, and gives a possible date as late as 30,000 years ago [34].

It is thought that humans first started using abstract signs around 200,000 years ago. Language most likely developed before humans spread out from Africa around 60,000 years ago [35], which means that consciousness would also have arisen sometime between those dates, perhaps 70,000–100,000 years before present. Noam Chomsky talks about a sudden creative explosion around 75,000 years ago and connects it with language. “Well, what would have happened? Whatever happened ... would be some rewiring of the brain” [36].

Others, however, think that language could go as far back as 500,000 or 600,000 years before present [37]. That would also push back the appearance of consciousness to that time. An alternative to a quick development of language is a slow, gradual evolution over long time periods.

32. Haladjian, H. H: “Consciousness and Language“, 2016. https://www.psychologytoday.com/us/blog/theory-consciousness/201608/consciousness-and-language
33. McWhorter, p. 8.
34. Crystal, p. 291
35. Noam Chomsky are among those who suggest an origin for language at about 70,000 to 100,000 years ago. Bolhuis J. J; Tattersall, I; Chomsky, N; Berwick, R. C: “How Could Language Have Evolved?”, 2014. https://chomsky.info/20140826/
36. Chomsky, N. in ”Grammar, Mind and Body – A Personal View”, a talk in 2012 at ”The 2011–2012 Dean's Lecture Series”, at around the 1:13 mark. https://www.youtube.com/watch?v=wMQS3klG3N0
37. Dediu. D. and Levinson, S. C: “On the antiquity of language: the reinterpretation of Neandertal linguistic capacities and its consequences“, 2013. https://www.frontiersin.org/articles/10.3389/fpsyg.2013.00397/full, and Quentin D Atkinson, University of Auckland, personal communication, 13 Oct. 2019.

The conclusion is that it is more likely that consciousness emerged suddenly rather than gradually, that it made it possible to construct language out of pre-existing vocal signals, and that this process very quickly led to a full language in a process similar to the one from pidgin to creole. This first language, also very quickly, reached a plateau of complexity that is the same as in all modern languages.

4. Animals and Awareness

You could make a distinction between animal awareness and human consciousness. If any animal had human-like consciousness, it would certainly be able to speak or at least show cognitive abilities on a par with humans in some way.

Therefore, it is reasonable to make a distinction between human consciousness and animal awareness. This is also useful as it can clarify what exactly is under discussion.

Awareness clearly varies between animals, from insects to primates. Some animals pass the mirror test, most do not. There is a gradation, beginning at an unknown, and perhaps unknowable, starting point, up to and including animals who pass the mirror test.

This means that awareness gradually developed during the evolution of animal life on Earth, leading to great diversity. But there was a clear break when humans became conscious, there is a qualitative difference between animal awareness and human consciousness. A great many species of animal have some form of awareness, but only humans have consciousness.

There seems to be a progression of what has been called consciousness from the “lowest” kinds of organism up to the “highest”, i.e. the human. This has led a great number of people, both lay people and scientists as well as philosophers, to assume that this progression is more or less inevitable and will lead to ever higher levels of consciousness and intelligence. A further idea has been that life on other planets also has gone through this evolutionary progression, so that there will be aliens with super-intelligence.

However, human consciousness could be a rare occurrence in the universe, while awareness is common [since many animals seem to have it]. There is no evidence that human consciousness will continue advancing to higher levels. Instead, there could be a continued progression and diversification of awareness without consciousness in animal species. There is no reason to assume an automatic, progressive development of human consciousness, which appears to be a singular occurrence on Earth, but we know that awareness in animals has developed for hundreds of millions of years.

5. The Speed of Consciousness

By the model presented here it is even possible to arrive at what might be called the speed of consciousness. It is 300 milliseconds.

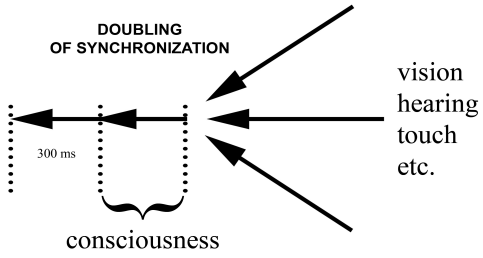

Fig. 5. The speed of the doubling of the synchronization

This is based on research where it has been found that the brain has decided to act before we are even conscious of it. In one experiment the human guinea pigs got electrodes attached to their scalps and were told to push a button at will; "it took a third of a second from the time the motor cortex initiated the instruction to act before the subject was conscious of the intention to act. In other words, the actual decision to act started the action sequence before the conscious decision to act" [38].

We cannot decide to act before we have received the sense data that there is anything to do in the first place. So the decision to act must come after the sense data has entered the brain, and, as demonstrated, consciousness catches up after the decision has been taken unconsciously, and that is after 300 milliseconds. In déjà vu, there is often a feeling of time slowing down [39]. This would agree with the model presented here of the increase of the time of the binding together of sense impressions during déjà vu.

The experiment also confirms the conclusion in this article that there is a kind of doubling of the synchronization of sense data, since clearly the decision to act repeats, first "unconsciously", then consciously.

6. Why Consciousness Is Static

A side effect of the pressure to learn language was that [human] consciousness spread, and the strange feeling we all carry around in our heads and seems to be so mysterious to us became the same for all humans.

38. Described in an article by Diamond, M: "Awareness Consciousness as Agent of Causation and Action", 2019. https://medium.com/the-philosophers-stone/awareness-consciousness-in-causation-and-the-flow-of-time-97caefcfa71f
39. Brown, p. 188.

For consciousness to spread from maybe a single individual there had to be an evolutionary pressure, and that pressure seems to have been language. However consciousness appeared, it was then used for language, which had such great advantages on an individual level that consciousness-language spread, and everyone who lacked this mental technology suffered great disadvantages.

Now both language and consciousness are essentially static [40]. The reason that language has been maintained, and not been lost by some human groups, must be that language fills an essential role, and for language learning to be possible there is a need for consciousness. Again, there is a great divide between static animal communication and human language, that never stays still and is always in flux.

It is probably hard in any society to find a mate if you lack language. You cannot easily communicate your intentions without language in a language-based society with complex rules. This means that there is constant pressure to learn language, so consciousness has to be maintained at a certain level.

But why has language and consciousness not evolved in complexity? Three possible explanations are:

1) There was and is no evolutionary advantage to even more complex language – we can communicate quite well inter- and intra-personally with the language we have, even develop philosophy and science.

2) Due to structural reasons, the human brain cannot develop to a level where it could give rise to the "higher" consciousness necessary to easily manage a much more complex language [i.e. a language so complex that no current human could learn it, just as no ape can learn a human language]. This does not necessarily mean, however, than *any* brain, with the right starting conditions, could *not* develop "higher consciousness" via an evolutionary process.

3) A much more *meaningfully* complex language is not possible to develop in the first place. For example, there are 3 cases in English, but 15 in Finnish, but Finnish is not "better" for communication than English. So a language with 1,000 cases would be more difficult [and take longer] to learn, but would probably not be better at communicating anything. Maybe language as a communication system simply cannot develop beyond a certain level – a level that we reached very quickly after we became conscious.

40. Chomsky, N. in "Grammar, Mind and Body – A Personal View", says about language development: "So nothing's happened for about 50,000 years", i.e. the last 50,000 years.

7. Conclusion

Through the mechanism of the doubling of the binding together or synchronization of sense data, [human] consciousness can be explained as a phenomenon that arises when sense data are repeated at a short interval, i.e. 300 milliseconds, which means that a memory element is involved; consciousness is a phenomenon of memory. When this distance is increased, one experiences déjà vu.

Consciousness appeared simultaneously with language, probably in a short span of time, and it is consciousness which makes human language possible. This means that consciousness can be surmised through the use of language: any creature using a full language would have consciousness, according to this model. There seems to be something missing in the description if one imagines a creature that had consciousness at a human level and no language or other flexible communication system. If language at a human level can be acquired without consciousness, the question is why no other animal can talk.

Answers to several questions can be begin to be answered with the help of this model of consciousness: how and when language arose, why language does not change in complexity, the future of consciousness and language, as well as other phenomena.

Consciousness does not result from not a single thing but from a succession of things in time. It is not a single structure, and it is a phenomenon of memory.

Acknowledgements: I would like thank the following for being helpful in various ways: Hawk Alfredson, Quentin D Atkinson, Tony Elgenstierna, Ahrvid Engholm, Peter Heft.

Received June 23, 2020; Accepted July 25, 2020

References

Offline resources:

Brown, A. S. [2004]: *The Deja Vu Experience. Essays in Cognitive Psychology*. Psychology Press, 2004.

Crystal, D. [1988]: *The Cambridge Encyclopedia of Language*. Guild Publishing 1988 [1987].

Donald, M. [2002]: *A Mind So Rare. The Evolution of Human Consciousness.* W W Norton & Company 2002 [2002].

McWhorter, J. H. [2003]: *The Power of Babel. A Natural History of Language*. Perennial 2003 [2001].

Wrangham, R. [2009]: *Catching Fire. How Cooking Made Us Human*. Profile Books 2010 [2009].

Online resources:
All resources accessed on 7 March 2020

Adachi et al [2003]: "Demographic and psychological features of déjà vu experiences in a nonclinical Japanese population". https://www.ncbi.nlm.nih.gov/pubmed/12695735

Bolhuis J. J.; Tattersall, I.; Chomsky, N.; Berwick, R. C. [2014]: "How Could Language Have Evolved?". https://chomsky.info/20140826/

Chalmers, D. [1995]: "Facing Up to the Problem of Consciousness". http://consc.net/papers/facing.html

Chalmers, D. [2014]: "How do you explain consciousness?". https://www.youtube.com/watch?v=uhRhtFFhNzQ

Chomsky, N. [2012]: "Grammar, Mind and Body – A Personal View". Talk at "The 2011–2012 Dean's Lecture Series". https://www.youtube.com/watch?v=wMQS3klG3N0

Dediu, D. & Levinson, S. D. [2013]: "On the antiquity of language: the reinterpretation of Neandertal linguistic capacities and its consequences". https://www.frontiersin.org/articles/10.3389/fpsyg.2013.00397/full

Dennett D. C. [2016]: "Illusionism as the Obvious Default Theory of Consciousness". https://ase.tufts.edu/cogstud/dennett/papers/illusionism.pdf

Diamond, M. [2019]: "Awareness Consciousness as Agent of Causation and Action". https://medium.com/the-philosophers-stone/awareness-consciousness-in-causation-and-the-flow-of-time-97caefcfa71f

Donald, M. [1995]: "The neurobiology of human consciousness: An evolutionary approach". https://www.sciencedirect.com/science/article/abs/pii/002839329500050D

Ford, J. B. [1999]: "Aspects of John Searle's biological naturalism". https://minerva-access.unimelb.edu.au/handle/11343/114496

Gabrielsen, P. [2013]: "When Does Your Baby Become Conscious?". https://www.sciencemag.org/news/2013/04/when-does-your-baby-become-conscious

Gholipour, B. [2019], "Can You Learn Anything While You Sleep?". https://www.livescience.com/64920-how-learn-during-sleep.html

Haladjian, H. H. [2016]: "Consciousness and Language". https://www.psychologytoday.com/us/blog/theory-consciousness/201608/consciousness-and-language

Hoffman D. D. [2014]: "The Origin of Time In Conscious Agents". http://cogsci.uci.edu/~ddhoff/HoffmanTime.pdf.

Hume, D. [1739–40]: *A Treatise of Human Nature*. https://www.gutenberg.org/files/4705/4705-h/4705-h.htm

Meir, I.; Sandler, W.; Padden, C.; Aronoff, M.: ""Emerging Sign Languages", in *The Oxford Handbook of Deaf Studies, Language, and Education*, Vol. 2, 2010. Edited by Marc Marschark and Patricia

Elizabeth Spencer.
http://sandlersignlab.haifa.ac.il/html/html_eng/pdf/EMERGING_SIGN_LANGUAGES.pdf

The National Institute on Deafness and Other Communication Disorders [NIDCD] [2017]: "Speech and Language Developmental Milestones". https://www.nidcd.nih.gov/health/speech-and-language

Townsend, S. W.; Rasmussen, M.; Clutton-Brock, T.; Manser M. B: "Flexible alarm calling in meerkats: the role of the social environment and predation urgency", 2012.
https://academic.oup.com/beheco/article/23/6/1360/191395

Obringer, L. A. [2006]: "How Déjà Vu Works" at https://science.howstuffworks.com/science-vs-myth/deja-vu4.htm

Personal communication:

Atkinson, Q. D. [2019], University of Auckland, email 13 Oct. 2019.