Notes on Leibniz thought experiment

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Leibniz thought experiment of perception, sensing, and thinking is reconsidered. We try to understand Leibniz picture in view of our knowledge of basic neuroscience. In particular we can see how the emergence of consciousness could in principle be understood.

Gottfried Wilhelm Leibniz, Monadology (1714), §17:
“Besides, it must be admitted that perception, and anything that depends on it, cannot be explained in terms of mechanistic causation – that is, in terms of shapes and motions. Let us pretend that there was a machine, which was constructed in such a way as to give rise to thinking, sensing, and having perceptions. You could imagine it expanded in size (while retaining the same proportions), so that you could go inside it, like going into a mill. On this assumption, your tour inside it would show you the working parts pushing each other, but never anything which would explain a perception. So perception is to be sought, not in compounds (or machines), but in simple substances. Furthermore, there is nothing to be found in simple substances, apart from perceptions and their changes. Again, all the internal actions of simple substances can consist in nothing other than perceptions and their changes.”

We would like to reconsider Leibniz thought experiment, presented about three centuries ago. Today we know, that at a tour inside the elementary working parts are the neurons, which push each other by means of electrical activity. Following Leibniz closely it is evident that we can not find at any special location anything from which we could explain perception, sensing or thinking. This hypothetical special location of perception, sensing or thinking we would call consciousness or I or self. However with that notion we would not gain any insight.
In contrast, it is immediately clear that any special location of perception, sensing and thinking leads to contradictions: suppose, we could detect a special location of perception, sensing and thinking, then, in a further expansion in size we could again go inside and would only find working parts, pushing each other. Indeed, in terms of neurons, we know that the neuronal signals do not converge anywhere. If we consider for example a visual sense, we know that the signals already behind the retina are divided into different neuronal structures and do not come together anywhere. Any kind of convergence at some location of perception would require some new kind of inner eye. We would not be any step forward – this contradiction is usually denoted as infinite regress (see for instance the discussion in [2]). The crucial point in Leibniz thought experiment is to recognize that there is no special location of perception, sensing or thinking. However, in contrast to Leibniz conclusion, it appears quite natural to explain these phenomena from the interactions of neurons themselves. Hence, we should assume that perceptions, sensing, and thinking do not arise at a special location, but are developed in the whole neuronal system.

From the picture of working parts pushing each other we draw the conclusion that the processes in our brain are deterministic: in any kind of mill, consisting of mechanical parts any movement is caused by the preceding ones. The cascade of mechanical processes appears to be inescapable. Indeed free will has no meaning in a neurological context since causal processes contradict anything free. Also, trying to employ quantum mechanics to escape from causality [3–5], we do not see any way to explain freeness in terms of the randomness we encounter in quantum mechanics.

Realizing that perception, sensing, and thinking appear from the cascade of neuronal processes in an unfree manner we will in the following talk about the emergence of these phenomena. Using the expression emergence we stress that there is nothing like an illusionary “inner location” where perception, sensing, and thinking are formed.

Let us think this thought further. Imagine, under anesthetic, in our brain one neuron after the other would be replaced by an exact copy. Since no neuron would be the special location of perception, sensing or thinking, we would in no step replace this special location.
After recovering from anesthesia we would not recognize any change. The neurons would interact in the same manner as before and our perception, sensing, and thinking would appear in the same way.

Of course, it makes no difference whether we replace the neurons one by one, or at once. Likewise in the latter we would develop perception, sensing, and thinking in the copy in the same way! Hence, suppose that we replace under anesthetic our body by a copy, nothing like I or consciousness or self would be lost. That is, our perception, sensing, and thinking is not attached to certain neurons, but appear from their activities.

Let us further imagine that we could replace each neuron in turn by an electronic device, which replicates exactly the same functionality as the original neuron. As before we would not remove in any step a location of perception, sensing or thinking. In this way we finally would be replaced by a machine under anesthetic and this machine would develop the same perception, sensing and thinking and we could not feel any difference!

Obviously this picture of the emergence of perception, sensing, and thinking is contrary to the accepted opinion. We are convinced to have some kind of I – a location where perception, sensing, and thinking is formed. Why are we subject to this illusion?

The crucial point here is to see how the usage of I appears in our thoughts: let us consider an example of a perception, for instance the smell of an apple. If we communicate to someone this perception, we say, for instance: “I smell the scent of a fresh apple”. We would use grammatical first-person in order to communicate our own perception, distinguishing it from a perception of someone else. But what happens if we do not communicate this statement but only realize the smell? This thinking must be something emergent, so we can understand it if we suppose that thinking is nothing but silent communication. Hence, we think, in an emergent sense, “I smell the scent of a fresh apple”. Therefore we suppose that thoughts are in this sense always a way of communication and this implicitly seems to originate from a location of perception, likewise denoted by “I” in our example. In this way the illusion of a location of perception, sensing, and thinking is unavoidable – a machine would develop the same illusion of a location of perception, sensing, and thinking (compare with the “zombie” in [6]).
The question arises whether we, replaced by a machine, could become immortal? We guess the answer is yes, supposing we could exactly represent the circuit of tens of billions of neurons (for an attempt see for instance [7]).

[1] Gottfried Wilhelm Leibniz, in *Leibniz The Monadology and Other Philosophical Writings*, translated by Robert Latta, Kessinger Publishing Co (July 2007) ISBN 978-0548164266.

[2] Rosenthal, D. *Two Concepts of Consciousness*, Philosophical Studies 49: 329-359 (1986).

[3] Bohm, D. *A new theory of the relationship of mind and matter*, Philosophical Psychology, 3: 2, 271-286 (1990).

[4] Pribram, K.H. *Brain and Perception: Holonomy and Structure in Figural Processing*, Taylor & Francis (1991) ISBN 978-0898599954.

[5] see also Atmanspacher, H. *Quantum Approaches to Consciousness*, The Stanford Encyclopedia of Philosophy (Summer 2011 Edition), Edward N. Zalta (ed.), URL: [http://plato.stanford.edu/archives/sum2011/entries/qt-consciousness](http://plato.stanford.edu/archives/sum2011/entries/qt-consciousness).

[6] Chalmers D., *The Conscious Mind: In Search of a Fundamental Theory* Oxford University Press. ISBN 019511789, (1997).

[7] Markram, H. *The Blue Brain Project*, Nature Reviews Neuroscience, 7, 153-160 (2006).