

**From:** Seth Lloyd <[REDACTED]>  
**To:** "jeffrey E." <jeevacation@gmail.com>  
**Subject:** Re:  
**Date:** Sun, 23 Oct 2016 16:48:29 +0000

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Right: but how self aware does one have to be? One of the most profound development in robotics over the last fifteen years has come because researchers into human walking realized that the skeleton and muscles are put together in such a way that walking occurs naturally through 'falling forward' and putting one step in front of the other. The way the bones, tendons, and muscles operate is then to walk naturally: one takes step after step unconsciously, and the conscious mind is engaged in minor error correction in making decisions which direction to go, how to avoid obstacles, etc. As a result, walking takes place almost without self awareness. As you say, if one tries to be too conscious about it, it is exhausting.

So it is as you say: our consciousness of what may happen a few fractions of a second in the future dictate our actions a few milliseconds in the past. It is indeed like a kind of time travel.

On Sun, Oct 23, 2016 at 10:56 AM, jeffrey E. <jeevacation@gmail.com> wrote:

that is true but the issue is SELF aware , first. , an error correction within bounds. it is off when walking down the steps , but if you look down and try to have it operate , not a good result. it is slow. few choices. the error correction will keep you from suicide. - hopefully , unless overwhelmed or exhausted. . as we know the consious appears to make the moves a few miliseconds after the firing decision to take action occurs. . the fun question was what if there were a limited backwards causality, for living systmes in fact my concious in the future dicated the firing a few miliseconds ago. . I thought that two time frames, could exist, seperated by a few miliseconds. so the time wouldnt have to be in the same space time frame. one universe slightly ahead of the other. sort of a spiral.

On Sun, Oct 23, 2016 at 10:44 AM, Seth Lloyd <[REDACTED]> wrote:

Dear Jeffrey,

That is poetic!

Well, there is a clear evolutionary advantage to consciousness of others and to self-consciousness. That ability to say, if she does this, I'll do that, but if she does that, I'll do something else, is key to dealing with others, and directly leads to agreements, deception, etc. That is, having even a simple model of others' behavior, and of one's own future actions, conveys a strong advantage.

Of course, such models are necessarily incomplete. When one models oneself, one always leaves out the vast majority of things that are going on, as you say. In my paper, 'A Turing test for free will,' I show that the incompleteness of one's own model of oneself is responsible for one's inability to predict one's future decisions, a key component of free will.

Similarly, one'e models of others are also incomplete, so that other people constantly behave in surprising and unpredictable ways. Because of the necessary incompleteness of our conceptions of ourself and others, error correction is key, as you say. We must operate in a way that allows us to function even in the face of constant unknowns. Evolution drives us towards this error correcting ability.

Although I am phrasing this in a way that is less poetic than you!  
Time for me to tilt the table more to the horizontal for a bit and watch those

balls lazily roll around.

Seth

On Sun, Oct 23, 2016 at 8:00 AM, jeffrey E. <[jeevacation@gmail.com](mailto:jeevacation@gmail.com)> wrote:

I already enjoyed it . i will just catch up to it. why does living things pose such an undecipherable system. ? I suggest an error correction system. is an expensive add on. the vast majority of things going on in your body is unknown and like dynamic guard rails. . think of it like flippers on a pin ball machine. emotions tilt the machine, overwhelming the rate of balls and making the flippers useless. . meditation tilts the table more towards the horizontal. . . when you reach out your hand to pick up a glass the concious makes error corrections , it does not really decide to pick it up. it would be nice if the hard problem was easy :)  
?

On Sat, Oct 22, 2016 at 7:58 PM, Seth Lloyd <[REDACTED]> wrote:

Sure: let's talk tomorrow. Any time in the afternoon. (Or, we could talk yesterday!)

Seth

On Fri, Oct 21, 2016 at 5:33 PM, jeffrey E. <[jeevacation@gmail.com](mailto:jeevacation@gmail.com)> wrote:

tomorw? lets assume that like a weak signal you can go back but only for 1 second before the signal fades. ? an error correction.

On Fri, Oct 21, 2016 at 5:31 PM, Seth Lloyd <[REDACTED]> wrote:

Dear Jeffrey,

My apologies for not responding sooner: I was off email for the last few days.

Of course thoughts are constructed from neural signals that move much slower than light but let's just take the suggestion that they move faster than light seriously. A couple of things would happen.

First of all, since going faster than light translates into the ability to send signals backwards in time, this has implications for game theory. If you know your opponents moves in advance -- and they know yours -- this restricts the set of strategies to non-cheating, non-deceptive strategies. I believe

that in such games one should be able to show that Nash equilibria are all optimal: unlike in prisoner's dilemma, there is no incentive for cheating. This is sort of the opposite of what you are suggesting.

There is a sense in which thought processes are taking place in an extended setting simultaneously throughout the brain, so that faster than/slower than light is not so meaningful. In this setting, as you and Martin suggest, there is probably some pretty strong evolutionary advantage for consciousness or sense of self reference. Indeed, just to ask the sort of question, If he does this, I'll do that, but if he does this other thing, I'll do something else, requires a sense of self reference: one is modeling what one oneself will do in the future. This does indeed allow for extended cycles of deception and intent, which I think we agree are very important at least for human behavior.

I'd enjoy talking further so give a call any time you like.

Yours,  
Seth

On Tue, Oct 18, 2016 at 7:12 AM, jeffrey E. <[jeevacation@gmail.com](mailto:jeevacation@gmail.com)> wrote:

if you have a moment i have a quick question. - assume for the moment that living things unlike physical things. have a component that travels faster than light. . thoughts? or call it x . it would explain the inability of detection by conventional means. martin and i are working on game theory of self awareness. the evolutionary benefit of what some call consiousness. the conjecture is that is no more than a dynamic error correction system. slow. easily overwhelmed and able to do simple tasks. if the mathematics of biology and physics were symmetrical. physics woudl live in the slower than light , and biology in the faster. . deception and intent in biooogy , none of it in physics. .

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