UABDIVULGA
BARCELONA RECERCA I INNOVACIÓ

06/2012

Time perception with John Wearden

"I try to understand why for old people days are long and months pass quickly"

Do old people perceive time differently than young people? Does time go faster when we are having a good time? Does time pass more slowly the more we look at the clock? And how do animals perceive time? During his visit to UAB, coordinated by researchers Judit Castellà Mate and Santiago Estaún Ferrer, a professor of Pychology at Keele University in the UK, John Wearden spoke to us about different sorts of time perception, on how we perceive time depending on our conditions and everything that surrounds us, and also a little on history of experimentation related to time perception.

John Wearden is Professor at the University of Keele in the UK. He has worked ontime perception for over thirty years, first in animals and later exclusively in humans. He applied the *scalar timing theory,* developed for animals, to humans for the first time, and this has now become a leading theory. He has done several kinds of research related to time perception: from

experiments or mathematical models to historical research and has published over 100 articles on these topics.

How humans perceive time?

This depends on the task they are doing. For relatively short times we use an internal clock. But we are more complicated than that. Humans can make judgments of time based on external influences. For example, we can use distance to calculate the time that we would take to go somewhere. Therefore, the answer depends on what kind of time we are talking about. Scholars distinguish between what is called prospective and retrospective time. Prospective time is when people know they have to time something. In contrast, retrospective time is when you have to infer the time that has passed. For example, suddenly someone asks me: “how long has been since this interview has started?” I can not know exactly, but I can use my memory, and the number of things that have happened to calculate the elapsed time. Humans in real life do this kind of timing quite a lot. Prospective time is quite well explained by laboratory experiments but retrospective time is much more mysterious. Some fields of study have benefited from studying patients suffering from some kind of brain damage and that caused problems with, for instance, memory. But seems that this does not happen with time perception, there is no time amnesiacs. That is, there don’t seem to be any patients as bad at time perception as amnesiacs are at memory.

How does time perception change during our lifetime?

Old people, generally, say that time passes more quickly as you get older. There is research on this, and also anecdotes. For example, an experiment asked old people “goes time faster than when you were young?” Most did agree that time passes quickly when you are old. But my mother, who is 90 years old, and does everything on her own, says that days are long, but, paradoxically, months pass quickly. How can that be? Maybe there are different sorts of time judgments when we look at time. My mother has a very restricted life, and not many things happen during the day, so days go slowly. But, why do months pass quickly? With a French collaborator, I am trying to do a proper study on this.

How do you explain that "time passes quickly when you are having fun and slow when you are bored?"

In an experiment we asked 200 students about time experiences in real life. People answered in the way that you might have expected, time passes slowly if you are bored and fast, if you are having fun. But if you look carefully on how these statements were written, we will see the nuances in them. The reports of time passing fast were almost always like this: “I went to a party and it finished, I looked to my watch and it was 5 o’clock in the morning” which is pretty late even for Spanish people, “therefore, time passes quickly”. There are several interesting things here. First, we need an external time marker, the watch or the pub’s closing or the sun’s rising. We see this time marker and then conclude that time passed quickly. We do not think that time passes quickly when the event is happening, we are too busy. However, anecdotes about slow time were like this: “I work on a shop on Saturdays and there are no costumers, so the last hour passed very slowly”. Again you have an external marker of time, but there is a difference. In these cases, people experienced time going slow while it is passing. So, time passing slowly or fast seem to be two different phenomena. When you are in a slow situation you really feel it whereas when

you are in a quick situation you don't really feel it, you just infer afterwards that time went quickly.

Do animals perceive time differently than humans?

Animals do not speak, and presumably they do not have the capacity of make inferences about time like humans. In addition, there is a widespread believe that animals only think in present time but not in future. Some recent experiments suggest that this is not completely true. Moreover, animals have been very important in the human time perception studies. The leading current theory for humans' time perception, called scalar timing theory, was originally invented for animals. The application of this theory to humans was very revolutionary. There was lots of animal data. For example, experiments showed that certain areas of the brain, as the basal ganglia, which depend on dopamine and that have always been thought to be related to movement, are important in time perception. If the dopamine levels increase, time perception changes in a way consistent with an internal clock-like timer "speeding up". This is not necessarily very directly applicable to humans. However, animals results got people interested in schizophrenic patients, that produce too much dopamine and in Parkinson patients, that have too little dopamine. But the results are not easily interpretable. There are some studies that suggest that Parkinson patients have a slower internal timer but there are other studies that have not found this.

We have seen that you also have done historical research. How has time perception changed historically?

During the 1860-70s in Germany and France the experiments on perception began seriously. For example, Wilhem Wundt, who had a large laboratory for experimentation with more than 100 assistants, made some experiments on time perception. For many years, time perception was on an equal footing to other sorts of perception until it became isolated or marginalized for reasons that nobody fully understands. If you take a modern book on perception you will find, for example, a hundred pages on visual perception, fifty on auditory perception, and twenty on taste and so on. But there will be little or nothing about time perception. Why? One reason could be that there is no organ for time perception or not an obvious organ at least. In the 1920s, the idea of internal clocks, an internal mechanism for time perception, arose. The idea started in France and later went to the United States with Hoagland.

What did Hoagland discover?

Hudson Hoagland was an American psychologist whose interest in time perception came from an anecdote. His wife was ill with flu, he went out for a moment, and when he came back, relatively quickly, his wife said: "Where have you been? You've been away for ages!" Then Hoagland had the idea of an internal clock that works by chemical processes, and which, like all chemical processes, is accelerated with heat, in this case from the flu. Hoagland then did what every self-respecting experimental psychologist would have done, he experimented on her. Over the next week, as she gradually recovered from flu, he got her to count to sixty at a rate that she thought was one count per second. He found that the hotter she was, the faster she counted, which is consistent with a "speeded up" internal timer.

And now, how is research on time perception developing?

Now there is a lot of neuroscience related to time perception. But for neuroscience it is difficult to know exactly what is happening and where in the brain things happen. For example, the basal ganglia, famous from rat experiments, often, but not always, are activated in neuroscience-based time perception experiments, when people are scanned while performing timing tasks. Certain parts of the cortex also seem to be activated in relation to time, but, again, not always. I am skeptical about the modern trends to reduce everything to neuroscience, I am a psychologist and there is no doubt that there is some brain mechanism, but whether you can find it easily, that is another issue. I think that, ideally, theoretical models based on neuronal mechanisms, combining both disciplines, will be the way forward.

Miquel Carandell

View low-bandwidth version