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## When time stands still

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Weekends fly by, Monday lasts an eternity. Can a physicist explain why?  
Sanjida O'Connell investigates

It is Monday morning and the weekend has flown by. The working week stretches ahead. Time, for most people, has an illusory quality. Our perception of time is, apparently, connected to space, without past, present or future. Now a physicist from Slovakia has rewritten the rules of physics in an attempt to connect physical space-time and our subjective experience of time.

Dr Metod *Saniga*, currently at the Universite Libre in Brussels, has used not only our everyday sense of time to create his model, but also what to many of us seem to be warped perceptions of time, gathered from the mentally ill or drug users. For example, in *Confessions of an English Opium-Eater*, Thomas de Quincey wrote: "The sense of space, and in the end the sense of time, were both powerfully affected. Space swelled, and was amplified to an extent of unutterable and self-repeating infinity. This disturbed me much less than the vast expansion of time. Sometimes I seemed to have lived for 70 or 100 years in one night."

Accounts such as these fascinated *Saniga*, who was also inspired by Raymond Moody's book *Life after Life*, which describes near-death experiences. "This book was banned in my country under the communists," says *Saniga*. "I had to find a black-market copy. But it triggered my search for an explanation. These people were shocked because they thought time was immutable, but time and space lost their rigidity."

*Saniga* discovered from his research into the psychological perception of time that a distortion in the sense of time is always accompanied by a distortion in the perception of space.

One of the most pronounced perceptions is the sense of time standing still, accompanied by the feeling of two-dimensional space. An account by a mentally

ill patient reported in a German book, *Die Raumllichkeit der Melancholischen*, by H. Tellenbach, reads: "Sometimes time had totally stood still. Even space had changed. I see everything as if it were just a background...everything is flat."

The other common kind of altered consciousness is where subjects claim to perceive the past, present and future all together, says *Saniga*. "They recount a feeling of 'eternity' and find themselves in a space of infinite dimensions." Using a type of maths called projection geometrics, *Saniga* has created a model of time which contains both these subjective views and the more conventional objective view of space-time. They are connected by a mathematical link called the Cremona transformation. "This may be an important step towards bridging the gap between physics and psychology. The important thing is that I treat space and time as different but connected because we experience them as interconnected," he says.

His work is not without detractors. "For a physicist the distinction between past, present and future is an illusion. Einstein said it was an obstinate illusion," says *Saniga*. But for him it is a feature of the real world: "My model says that this is a real feature of the world because it is underpinned by maths."

Dr Jonathan Smith, a mathematician from Iowa State University, is excited by *Saniga's* work. "He is tracking distortions in space and time using a mathematical model," he says.

"But the big question he has not addressed is why we perceive time as we do. Why does our brain compute time in the way that it does, where in the brain is this implemented and why do we sometimes suffer from distortions of time?"

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