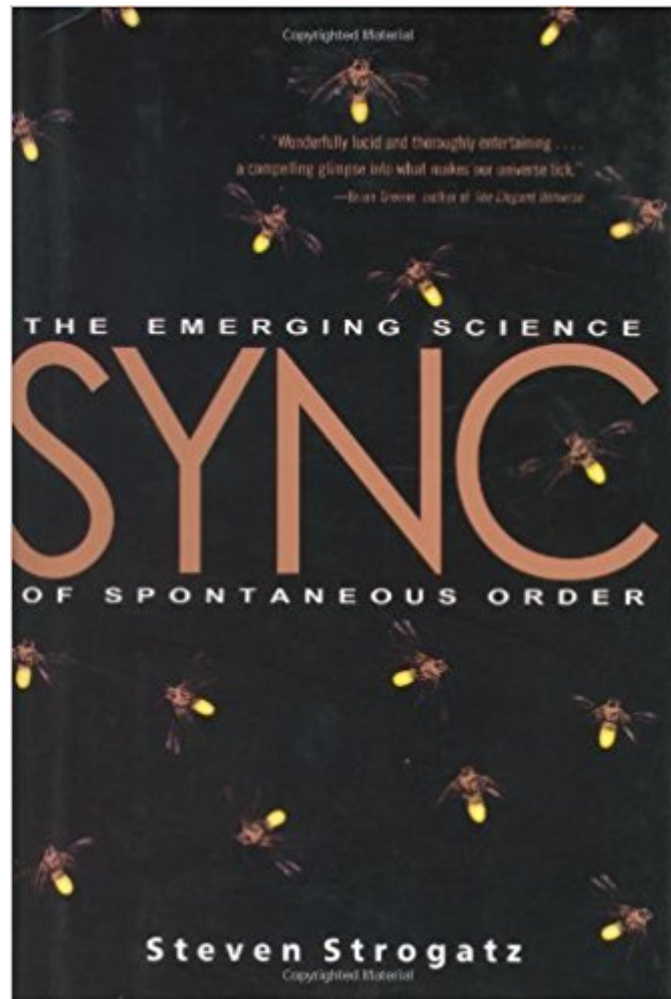


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# Sync: The Emerging Science Of Spontaneous Order



## Synopsis

At the heart of the universe is a steady, insistent beat, the sound of cycles in sync. Along the tidal rivers of Malaysia, thousands of fireflies congregate and flash in unison; the moon spins in perfect resonance with its orbit around the earth; our hearts depend on the synchronous firing of ten thousand pacemaker cells. While the forces that synchronize the flashing of fireflies may seem to have nothing to do with our heart cells, there is in fact a deep connection. Synchrony is a science in its infancy, and Strogatz is a pioneer in this new frontier in which mathematicians and physicists attempt to pinpoint just how spontaneous order emerges from chaos. From underground caves in Texas where a French scientist spent six months alone tracking his sleep-wake cycle, to the home of a Dutch physicist who in 1665 discovered two of his pendulum clocks swinging in perfect time, this fascinating book spans disciplines, continents, and centuries. Engagingly written for readers of books such as *Chaos* and *The Elegant Universe*, *Sync* is a tour-de-force of nonfiction writing.

## Book Information

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When you have a flight to catch early in the morning, you'd like to sleep early in the evening. You go to bed but you stay awake until your usual bedtime. When you stay up for a late party, you'd like to sleep in until noon. But you wake up tired and can't fall back asleep. Why can't you sleep for as long as you need to? Why can't you fall asleep when you want to? The culprit is a small cluster of neurons right at the bottom of your brain. These cells have the amazing power to synchronize their activity to each other and to the cycle of day and night. Their combined effect is to regulate your bodily functions along a fixed 24-hour cycle. Your body temperature, hormone secretions, and a

myriad other functions are regulated by this internal clock. And so is your sleep-wake cycle. Your day contains two "forbidden zones," for most people around 10 am and 10 pm, when your brain dictates that you can hardly fall asleep. Slightly after lunch your brain says it's a good time for a nap, as so many cultures discovered on their own. Between 3:00 and 6:00 am, it's so hard to stay awake that shift workers call this time the "zombie zone". Most catastrophic accidents that depend on human error, like Three Miles Island and Chernobyl, occur at this time. For all of their importance in helping people sleep well and avoid accidents, understanding the neural clock is among the most difficult problems facing science today. It requires understanding how thousands of cells, connected together in complicated ways, manage to coordinate their behavior. New mathematical concepts have been developed over the last few decades to tackle this kind of problem. Synchronization is exhibited by stock markets, brains, and many other things we'd love to understand better.

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