

all wake and pay attention — to bosses, teachers and traffic — is misplaced. A huge research effort at the Ludwig Maximilian University of Munich known as the human sleep project has shown the hopelessness of trying to alter preferred wakefulness patterns.

The project began in 2000 with the launch of a web-based questionnaire about sleep and wake times on working days and free days. A quarter of a million individuals around the globe have since participated. It provides a rich source of research data, and one mined with particular glee by those chronobiologists who are natural owls and have a grudge against a society that habitually imposes inflexible school and work times.

A landmark study of the data showed that late and early chronotypes have a bell-curve distribution across all populations. And within their own chronotype, all individuals are, relatively speaking, earlier risers as children, become much later as adolescents and then become slowly earlier as adults (T. Roenneberg *et al. Curr. Biol.* **14**, R1038–R1039; 2004).

Another study, which considered data from across Germany, demonstrates the unrelenting power of the Sun (T. Roenneberg *et al. Curr. Biol.* **17**, R44–R45; 2007). The country spans nine degrees of longitude, so the Sun rises 36 minutes earlier at its most easterly point compared with its most westerly. Whatever their individual chronotype, physical and biological time for these people diverges on average by an extra four minutes with each longitudinal step.

The discomfort that some of these chrono-victims feel is magnified across the vast geographical swathe of Central European Time. In summer, midnight on the clock is, astronomically speaking, actually 11 p.m. in the Czech capital, Prague, but barely 9.30 p.m. in the western Spanish outpost of Santiago de Compostela. The Spanish habit of dining at 10 p.m., when many Czech restaurants have long since closed, starts to make sense.

Other studies have shown the power of biological time. Night owls, including adolescents who are driven sulking from their beds to attend school long before they are truly awake, spend large parts of their weekends ‘catching up’ on missed sleep (M. Wittmann *et al. Chronobiol. Int.* **23**, 497–509; 2006).

## Honey trap

*Psychology drives some overindulgence — and it could help us to resist.*

**T**ake a look at the chocolate spilling from your cupboard shelves, the left-over Easter eggs and the fondant-filled bunnies. How do you feel? Do you recognize that combination of wanting to do something and yet knowing that perhaps you shouldn't?

If you can conquer the call and ignore the stimulus, walk away without indulging, then well done you. Everyone else: you may feel bad as you wolf it down, but please don't feel too bad. You are merely feeling what it means to be human. You are Hamlet, agonizing over the pros and cons of a single goal: to eat or not to eat.

Psychologists call this particular form of internal torture approach-avoidance conflict. The outcome is binary, but the cognitive processing that goes into the decision is oscillatory. Should I or shouldn't I? As we near the goal (reach for the chocolate) we feel the pull of the bathroom scales, and so we back away again to avoid the guilt that eating it causes. As we do so, we imagine the taste in our mouth and approach the chocolate once more. In a very human way, this back-and-forth means that, whatever we decide, the effort is stressful and the outcome unsatisfying.

One theory of addiction suggests a severe imbalance in this ‘push-me-pull-me’ dynamic. Most people who have an addiction, from gambling and smoking to substance use, are aware of the damage their habit causes. But they find it easier — pathologically so — to

And placing activity meters on wrists to monitor movements 24–7 shows that, although people will adjust their bedtimes to daylight-saving time, peaks and slumps in their activity remain ruled by their separate, fixed, biological clocks (T. Kantermann *et al. Curr. Biol.* **17**, 1996–2000; 2007).

Whereas the power of astronomical and biological time remains, modern life weakens the light–dark cycle that connects them. City dwellers tend to spend most of their days working indoors, where lighting levels can be 40 times weaker than average daylight. Night time is no longer particularly dark thanks to electric lighting both indoors and in the streets. Camping experiments in the mountains, in which people have to live outside during daylight hours and have no source of light beyond the campfire, show that night owls quickly become much earlier chronotypes.

Daylight-saving time is far from universal. And experience in other countries shows that it is not necessary. Japan and South Korea, like most Asian countries, see no need for it. Most African countries don't either. Ukraine observes it — but after annexation by Russia in 2014, Crimea chose to align its time with Moscow, which does not observe daylight saving.

In Europe, some politicians, prodded by data on the counter-productivity of enforcing inflexible social timetables across an entire population, and also by evidence that shift workers who live against their biological clocks have a higher incidence of metabolic diseases, have opened a debate on the value of making the change every six months.

Fixing time will not fix its problems. To do that, we need flexibility not in the time displayed by the clock, but in our attitude to it. One high school in Germany this year decided to allow its older students the option of beginning classes at 8.50 a.m. instead of 8 a.m., anticipating that the adolescents would be more alert and capable of learning by then. Britain is looking at changes too. Perhaps more of society should wake up to the opportunities. ■

approach their goal than to avoid it.

Can their balance be restored? Some research indicates that it can. Studies involving people with alcohol dependence suggest that physical actions to represent the conflict — pushing away repeated pictures of alcohol to make them smaller or pulling them closer to make them larger — can be manipulated to change the amount a person consumes. (The pushing mimics avoidance and encourages less drinking.) The effect seems to translate to the clinic, with people being treated for alcohol dependence more likely to abstain from drinking if this computerized task is included in their therapy.

Could the same idea work for chocolate? And, on a larger scale, could it help to address the growing obesity crisis? As nations such as Britain introduce sugar taxes (see page 551), could a little psychological nudge help to blunt our collective sweet tooth too?

Some research suggests so. In one study, students who spent some time being tricked to push away pictures of chocolate — they thought that they were responding to the shape of the image, not its content — ate less of a chocolate muffin than did colleagues who pulled the images closer (S. E. Schumacher *et al. Appetite* **96**, 219–224; 2016). The problem is that other research has found contrasting results. In one experiment, students who were trained to avoid chocolate images actually went on to eat more of the real stuff (D. Becker *et al. Appetite* **85**, 58–65; 2015).

There are psychological subtleties to unwrap here. Existing motivation to avoid chocolate, and cravings to approach it, might be influencing the results. As always, more research is needed, and shouldn't be too difficult to arrange. One study advertised for volunteers with the phrase: do you like chocolate? And who could avoid that? ■

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