BRUNO MANGYOKU

Night exercises

Our movements during sleep reveal surprising connections between dreaming mind and waking body, finds **Michelle Carr**

IT WAS the wreckage of yet another TV that finally convinced one man to seek help. Psychologist Antonio Zadra remembers the patient well. "When we asked what brought him in, he said, 'Well, that's the third TV set that I threw at an intruder who isn't there. It's getting damn expensive.' "

Zadra, who studies sleepwalking at the University of Montreal, is interested in why anyone would do things like this in their sleep. And it turns out that the answer is important to all of us.

You might think that when you close your eyes and drift off, your body basically shuts down, and dreams then play out in your head. Due to the inhibition of muscle movement, or muscle atonia, that normally occurs during dreaming sleep, most of us don't act out our dreams or have one-sided conversations. Just 1 per cent of people sleepwalk regularly. But three-quarters of us will talk in our sleep and a third of us will sleepwalk at some point. And we all occasionally shift position or mumble. Now we are learning that even the seemingly subtle twitches and murmurs we make actually have a surprisingly important impact.

Work by Zadra and others is revealing that our bodies play a far more active role in what happens during sleep than people generally think – and not just for sleepwalkers or people chucking appliances at the wall. Their findings suggest that movements in our dreaming minds, or sleeping bodies, serve a far more fundamental purpose, one that shapes how we move and talk in our waking lives.

Despite spending roughly a third of our lives in the land of nod, what exactly sleep is for, and why it is so crucial to our health, largely remains a mystery. Little by little, we are solving the problem: we now know that sleep is essential for laying down memories, clearing out the gunk that builds up in our brains during the day and even staving off cognitive decline. And there are countless ideas about the purpose of dreams – from a way to rehearse for life-threatening situations in the real world to working through thorny problems without life's many distractions.

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Our sleeping movements might be more than just a glimpse into our dreams, though. It is becoming clear that a few hours' kip makes a difference to our coordination. Research has consistently found that sleep improves performance on motor tasks, from tracing a design from a mirror image to improving reaction times or performance in sports like tennis or basketball. Such findings suggest that while we're out, the brain is replaying our recent movements and strengthening these motor memories. So perhaps our night jiving is related to this?

Up until now, most of the evidence for the strengthening of motor memories comes from animal studies. For instance, when a rat with a chip implanted in its brain learns how to navigate a maze, we can watch in real time as the map of the labyrinth is encoded in the hippocampus, an area associated with specific memory for places. When we observe the rat's brain during rapid eye movement (REM) sleep, when most dreams occur in humans, the same neural patterns occur, as if the brain is replaying the trajectory through the maze.

To see if unusual physical movements in our sleep, known as parasomnias, could correspond with us replaying things we've learned, researchers have started studying some of the more animated human sleepers – from those who let out light grumbles or sit up in bed, to more extreme cases when people eat, drive or even have sex while asleep.

To try to learn more, neurologist Isabelle Arnulf and her team at the Pierre and Marie Curie University in Paris invited 19 regular sleepwalkers to spend a few nights in their lab. Before they bedded down, the sleepwalkers – and 18 people who don't sleepwalk – learned a game that involves tapping blocks placed around their bodies as quickly as they could.

Nothing much happened during the first few nights that the participants slept in the lab. But then Arnulf and her team finally saw something in one of the sleepwalkers: ›