regulation in their meeting in November.

The cost of doing nothing
But what if food prices keep fluctuating and rising in the long term? An FAO report from 2009 found that "in 2007 and 2008, mainly because of high food prices, an additional 115 million people were pushed into chronic hunger." After the price dip due to the finance crash, food prices have already exceeded their highest level of the 2008 spike now, so hunger is back on the agenda, and estimates of the number of people affected range from 925 million to 1.3 billion.

"Dramatic price hikes are disastrous for the world's poorest people, says WDM's Murray Worthy. "Kenyan farmers told World Development Movement researchers how they had to sell their last cows during the last food crisis just to be able to feed their families. Others are forced to keep their children out of school, forgo essential medical treatment, or stop buying healthy foods like vegetables in order to be able to afford basic grains."

Further knock-on effects may include regional unrest, instability and civil war, and large-scale migration. Therefore, even the wealthiest countries, where the cost of the daily grocery shopping isn't a life or death issue for most, will ultimately feel the consequences of the price increases.

"Leaving speculation unchecked is not an option in a world where around a billion people go hungry. The US has already moved to curb excessive speculation, and similar proposals are on the table in Europe. Clear, hard rules are needed if we are to bring stability back to food markets, and regulators must not be swayed by the pleas of the tiny financial elite who currently benefit from the lack of controls," WDM's Murray Worthy concludes.

Ultimately, the highly paid gamblers populating the trading floors in Chicago, New York, London and Frankfurt will have to take heed of what their mothers must have told them many years ago: don't play with your food — or with anybody else's either.

Michael Gross is a science writer based at Oxford. He can be contacted via his web page at www.michaelgross.co.uk

Q & A

Rodrigo Quian Quiroga

Rodrigo Quian Quiroga is a Professor of Bioengineering and the head of the Bioengineering Research Group at the University of Leicester, UK. He graduated in Physics at the University of Buenos Aires, Argentina, and obtained his PhD in Applied Mathematics at the University of Luebeck, Germany. Before joining the University of Leicester as a lecturer in 2004, he was a post-doctoral fellow at the Research Center Juelich, Germany, and a Sloan fellow at the California Institute of Technology, USA. In 2010 he obtained the Royal Society Wolfson Research Merit Award. His main research involves the principles of neural coding, especially for visual perception and memory. For this he analyses single-cell recordings from epileptic patients.

What turned you on to neuroscience in the first place? I guess it was a long-standing interest in how the brain works. I confess that as a high school student I didn't like much biology; it seemed too boring. But anytime I heard something about the brain it was a different story, it was like science fiction, magic. I didn't know at the time that I would end up working on this. By then, I thought I would become a physicist studying cosmology and the origins of the universe. While doing my final year project on chaos theory to get my degree in physics, I was given some electrocardiogram data to analyse. After a couple of weeks I realized that this wasn't really for me and I would rather spend my time studying signals from the brain. I clearly remember my supervisor telling me: if you can get the data, fine; but at the time there were very few places in Argentina where I could get digital EEG recordings (they were recorded on paper) for applying chaos methods. I more or less knocked at the door of one of these places and was lucky enough to meet the person who became my first mentor in neurophysiology, Horacio Garcia, who happened to be very interested in all this crazy chaos business. Then I was hooked, and physics became a very handy background to studying the brain.

After chaos theory, how did you start working with wavelets and synchronization? After finishing my degree in physics and working for three years in a neurology institute in Argentina, first in neurophysiology and then specifically epilepsy, I moved to Germany to do a PhD in applied maths, basically about the application of wavelets to the analysis of evoked potentials. At the time I came up with an extremely simple way to see single-trial evoked potentials (i.e. without averaging several trials) and started using this method, based on wavelets, to correlate single-trial changes with different learning processes. The method was *ad hoc*, fully supervised and lacked mathematical beauty, but I didn't care, it worked fine and it was good enough to study many interesting questions.

When I was finishing my PhD, I went to a meeting in Dresden where I met Peter Grassberger. He invented the 'Correlation Dimension', the most used method from chaos theory (together with the Lyapunov exponents) for determining if a system is chaotic. I had to give a short talk about chaos theory and EEGs and I was petrified. I really thought the results from applying his method to EEG signals were very misleading and felt this was the right thing to say, but there he was, sitting in one of the front rows looking at me. I was expecting him to jump out of his chair anytime, but he agreed with me and claimed that it was not his fault if people didn't know how to use his method. This got me a job and for a couple of years I worked with him on statistical mechanics and the synchronization of chaotic systems, developing methods based on non-linear dynamical systems and applying them to data from epileptic patients.

Why didn't you continue working on EEGs? EEG signals are as complex and challenging as it gets. You really need a lot of effort to get a clear result, not only in the data processing but also in designing clever experiments that address some interesting question (and it may be difficult to come up with something new and interesting after 80 years of EEG research). For this, a background in physics and signal processing is really useful. There are quite a few interesting questions still to be answered, but at some point I felt it was not enough, at least for me (I mean no disrespect to people doing EEG research). I felt that to get a better picture of how the brain works I should learn more about single-cell recordings, especially because my background was in physics and maths, not in neuroscience.

This was the time when I moved to Caltech with a Sloan fellowship and was lucky enough to work in the lab of Richard Andersen, who does single-cell recordings in monkeys, and Christof Koch, who was collaborating with Itzhak Fried at UCLA doing single-cell recordings in humans. After years struggling to squeeze a bit more information from EEG signals, to see single neurons firing was a thrill; you could see how they respond with the naked eye, no need for sophisticated analysis or even averaging. Of course, things are not that easy and interesting questions typically need a more detailed and advanced analysis. I then started working on developing a new spike-sorting method, given that the one I saw other people using took ages and a lot of supervision. The use of this new method was crucial to discover the 'Jennifer Aniston neurons' in the human hippocampus (neurons that fire very selectively to particular concepts such as Jennifer Aniston). So, that was it for EEG, although I keep coming back to them but using a trendier name: local field potentials (LFPs). In fact, some of the more interesting questions regarding the activity of neural populations require the analysis of LFPs, which brings me back to my starting point.

Do you have a favorite paper? There are many, but I think I should mention the one that most influenced me, which was actually wrong! It was a paper published in the mid-eighties claiming that EEG signals, at least in some stages, were a chaotic system (Babloyantz, A., Salazar, J.M. and Nicolis, C. (1985). Evidence for chaotic dynamics of brain activity during the sleep cycle. Phys. Lett. *111A*, 152-156). That was it! I was working on chaos and I now had the perfect excuse to deal with the brain. But my search for evidence of chaos in EEGs failed miserably, and I later learnt about another paper (Pjin, J.P., vanNeerven, J., Noest, A. and Lopes da Silva, F. (1991). Chaos or noise in EEG signals; dependence on state and brain state. Electr. Clin. Neurophysiol. *70*, 371-381) showing that, after a more careful examination, the claims of the first paper didn't hold. Even worse, I later realized that the question was not that interesting (at least outside the physics community, where it could be taken as an interesting example of a chaotic system) as it won't tell me much about how the brain works. But this first paper, as incorrect as it was, was the one that got me into neurophysiology.

Do you have a scientific hero? When I was a physics student, I used to like Richard Feynman a lot. He was somebody who was awarded a Nobel price in physics, gave amazing lectures (the books coming out of these lectures are a classic for every physics student) and also joked like a kid and enjoyed life. I always remember the story he tells in "Surely you are joking Mr. Feynman" when, during a sabbatical in Brazil he managed to march with a "Scola do Samba" playing his bongo (to the surprise of the concierge of his hotel, who had previously recommended him to watch the march pass by).

I don't think I have many heroes these days; perhaps my favorite Argentinian writers: Borges, Cortazar, Sabato (who was also a physicist) and Fontanarrosa. But I do admire the brilliance and attitude of my former mentor, Peter Grassberger. He was always very sharp and incisive and could stay absorbed in the discussion of an idea to the extent of almost missing a flight. He also has a very honest attitude towards publishing, as he will not try to publish something that he is not sure is good enough. If you see his name on a paper, you know it is something good and worth reading.

Do you have any strong views on journals and the peer review system? Dealing with the peer reviewing process can sometimes be a pain, but it's clearly something we have to go through to improve our papers. It is also important for having some minimum guarantee that something is likely to be good science (if it is published in a respectable journal). Another option is that everything is published in databases, like cond-mat in physics, but then the number of articles would be overwhelming and we wouldn't have any idea (unless we know the authors) which of the many papers are good and which a waste of time. In neuroscience we are lucky that most journals have a quick turnaround. In other disciplines (like control engineering), journals may take several months or even more than a year to reply and once the authors get the feedback they can hardly remember what the paper was about. So, although we may be disappointed by the comments and decisions of editors and referees, it is important that the feedback is fast so that we can move on quickly.

What is your greatest ambition in research? Basically, to keep doing what I like to do, to keep investigating the questions that puzzle me. My research deals with perception and memory — how percepts are encoded in the brain and how they are worked on and linked to create new memories. What I would really like to do is to record from thousands of neurons to see at least part of a network encoding for particular concepts, to see how these neurons talk to each other and how the activity of this network changes dynamically for creating new memories, the flow of consciousness, and so on.

Department of Engineering, University of Leicester, Leicester LE1 7RH, UK.
E-mail: rqqg1@leicester.ac.uk