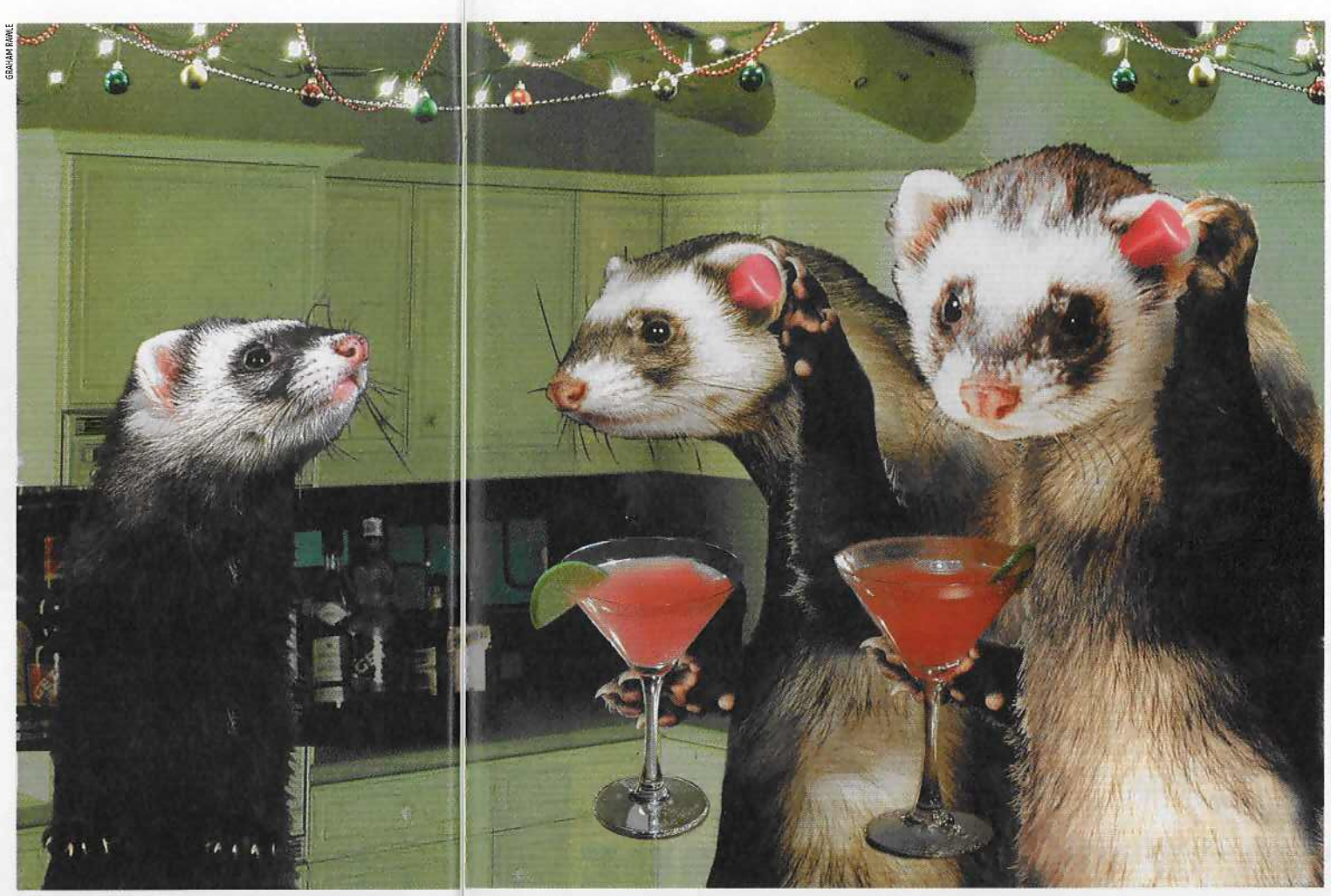
Did someone say sex on a peach?

Crowded bars and noisy parties are no fun if you have a hearing problem. Maybe the ferrets can help



GRAHAM RAWLE

THE party is in full swing, the wine is flowing and the conversation is lively. Or at least I think it is. I've spent most of the evening smiling, nodding – and not having a clue what my friends are talking about. Tonight I am partially deaf, and the party is no fun at all.

Being able to follow a conversation through the din of a busy pub, bar or club is something most people take for granted. But for anyone with a hearing problem – and worldwide that's one in seven people – this is not so easy. Now researchers are at last starting to understand how the brain deals with this task, raising hopes that people with a hearing impairment might be able to function better in a noisy world – and perhaps make the party season less of an ordeal.

In a room full of people all talking at the same time, the chances are that the frequencies of different voices will overlap, making it difficult to distinguish one voice from another. People with normal hearing deal with this problem using what British polymath Colin Cherry called the cocktail party effect, making use of cues such as tone, pitch, volume and, most importantly, the direction from which the sound hits the ear. Being unable to pick up such cues is one of the most distressing aspects of partial deafness.

"In clubs it's horrible," says Duncan Bulling, who has been profoundly deaf in his left ear since infancy. "It's really confusing because I can't tell where noises are coming from. If someone calls my name I end up turning 180 degrees to try and work out where they are."

Part of the reason this is so difficult for Bulling and countless others is that to accurately locate where a sound is coming from requires input from both ears. The brain detects the minute difference in the time a sound takes to reach each ear and uses this, along with other cues, to home in on the sound's origin.

To get an idea of how not being able to do this affects everyday living, I put an earplug in my left ear and set off for work. At first it's no problem. I find it easier to talk on the phone, as the noise of the office no longer intrudes on my "deaf" side. It's easier to concentrate too, because most of my colleagues sit on my left: their conversations become nothing more distracting than a low background rumble.

As the day wears on, though, problems start to emerge. When an interesting discussion breaks out, I struggle to keep up. Quick chats at the photocopier require an unusual amount of concentration. Someone walks past, says something to me and, before I have chance to say "pardon?", is gone. It might have been important; I have no idea. By lunchtime I'm fed up, exhausted and developing a headache.

Luckily for me, I only have a few more hours of my self-imposed deafness to go. For the millions of people who have to live with this problem day in, day out, though, there is at least a glimmer of hope on the horizon. Earlier this year neurophysiologist Andrew King at the University of Oxford demonstrated that a plugged ear need not be a permanent setback – at least for ferrets. Although ferrets don't spend much time at cocktail parties, they need to be able to localise sounds to catch prey, find mates and avoid danger. As a species they are intelligent and easy to train, so they make the perfect subjects for behavioural experiments.

King placed his ferrets inside a "ring of sound" made up of a circle of loudspeakers, each with a water spout attached (see Diagram). The ferrets were trained to respond to a sound coming from one of the speakers by walking towards it and licking the water spout. Once they could do this consistently, the researchers plugged one of the ferrets' ears to mimic the effects of partial deafness. As expected, the ferrets' accuracy at locating the correct speaker fell dramatically.

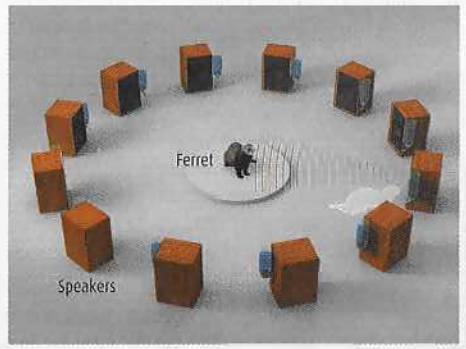
"Ferrets don't spend much time at cocktail parties but they need to localise sound to catch prey"

Repeating the experiment daily for 24 days saw the ferrets' accuracy gradually improve until they were almost as good at localising the sound as they had been before the plug was fitted. When the plug was removed, the ferrets' skills quickly returned to normal. Several weeks later, the researchers refitted the plugs. This time, the ferrets' performance fell much less sharply than first time round. For the first time, it had been proved that adult animals can relearn how to localise sounds.

King's team has done similar experiments with human volunteers, with encouraging initial results. "We measured the effects of blocking one ear for a few days and found, as expected, that localisation accuracy is initially severely degraded, but then improves," he says. Meanwhile Sam Irving, a graduate student at the UK Medical Research Council's Institute of Hearing Research in Nottingham, wants to pin down exactly which part of the brain is controlling this recalibration. His prime suspect is a region called the olivocochlear bundle, which receives information from hair cells of the cochlea in the inner ear and feeds back signals to the cochlea telling it to boost its response to weak sounds and damp down strong ones. Irving speculates that this "tuning" of the ear by the brain allows us to adapt our localisation skills as our ears and head grow during childhood.

RING OF SOUND

Ferrets are trained to identify which speaker a sound is coming from by licking a water spout attached to the speaker. Ferrets with normal hearing can do this. When fitted with one ear plug their accuracy drops, but with regular training they can recover their skills



This ability of the brain to retune the ear could be what enables the partially deaf ferrets to relearn how to localise sounds: the ferrets' brains might simply be changing their interpretation of the sound they were getting from their ears.

There is a catch, however. In King's experiments, the ferrets' ability only improved after intensive training. Ferrets that wore an earplug but did not practise every day had not improved when they were retested after six weeks. In the same way, occasional visits to noisy pubs are unlikely to do much to improve your ability to pinpoint sounds. Nevertheless Dave Moore, director of the Institute of Hearing Research, thinks it may be possible to train people to recover some localisation skills. The key, he says, is the right kind of training. "It's like the difference between going to a specialist football clinic and having the odd kick-around."

David McAlpine, director of the Ear Institute at University College London, isn't so sure. He is unconvinced by several studies suggesting that deaf people fitted with a hearing aid or cochlear implant can learn to locate sounds. "When someone maintains they can hear where the dog is, for example, it is often because they can hear the dog, and associate it with being outside," he says. "This is not localisation." Nevertheless he accepts that a better understanding of how the brain copes with localisation could result in more effective hearing aids and implants.

For now, though, there's no substitute for choosing a nice quiet pub. The evening of my experiment, with my left ear still plugged, I arrange to meet Bulling for a drink. After we have seated ourselves so that each of us is talking to the other's good ear, we find we can converse without too much trouble. In fact, I tell him, it's nice to have the distraction of other people's conversations blotted. "Yeah," he says. "But it's much harder doing this on a Friday night." **Caroline Williams** ●