

The man who looks inside people's heads

Chris Frith talks to Lance Workman about schizophrenia, scanning and more

I've noticed that a lot prominent psychologists I interview didn't start out in psychology – is this how it was for you?

It's funny you should say that because when I left school my intention was to do maths and physics, and that is indeed what I started to do. But in my gap year a friend of my fathers told me about cybernetics and information processing and I thought, this is far more interesting than maths and physics! Despite this I did go to Cambridge to read physics. There I discovered that after one year you could actually do psychology as a half subject and I thought this would fit in with my interests in cybernetics and information processing. So I went to my tutor and told him I'd discovered you could do this. He said, 'Yes, I know about this, but I didn't think any of my students would be crass enough to want to study psychology!'

So it was quite frowned upon back then?

Well I think it still is. But I was very lucky at Cambridge at that time because we had lectures from Richard Gregory and Donald Broadbent, who were in the forefront of the cognitive revolution, and we even got lectures from Hick (of Hick's law). Those were the sort of people who very much inspired me early on.

You began your studies in the 1960s – do you think that our view of how the brain works has changed a lot since then?

Well, certainly it has changed for me, because when I started in psychology I didn't really think about the brain at all. It was only as part of my work on

schizophrenia that it became clear that I had to think about what the brain had to do with these problems and the ways that sufferers were expressing things.

I was very taken with cognitive neuropsychology that began in the seventies. You remember they had these box and arrow diagrams of cognitive processes, and one of the implications of these sorts of diagram was that there were different boxes related to different parts of the brain or different brain systems. Then during the 1980s technology made it possible to have right alongside the box labels like 'prefrontal cortex'. So there was a shift from purely cognitive models to the direct study of brain activity.

Talking about schizophrenia, it was actually your book on the cognitive neuropsychology of schizophrenia that got me interested in the area back in the early 1990s. But today a lot of people don't like the label. Where do you stand on the notion that schizophrenia doesn't exist, but rather

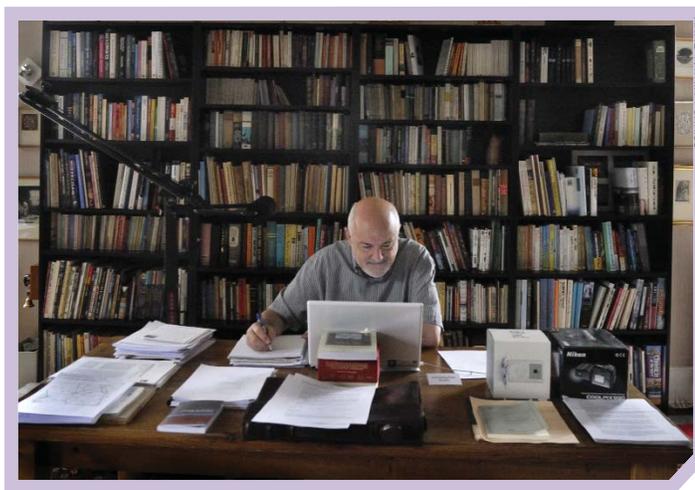
it is part of a natural continuum and that it's just a label for an extreme point on that continuum?

If I was feeling aggressive I would say I suspect these people have never actually worked with anyone with schizophrenia! My own approach has always been that psychology is not going to explain everything about schizophrenia. But it is going to be relevant to understanding the symptoms. It is perfectly true that you can get hallucinations and delusions in other disorders and there are diagnostic problems about the overlap of symptoms between schizophrenia and depression. Also there are patients with neurological damage who show such symptoms. But I am not entirely happy about the continuum idea because it tends to muddy the waters. We need to bear in mind that criteria for diagnoses can and do change regularly.

If you put someone with a diagnosis of schizophrenia in a PET scanner, what happens when they are having hallucinations?

This was actually one of the first things that we did when we got hold of a PET scanner. It is technically difficult, not because of the scanning, but because you need a patient who has hallucinations sufficiently often, but not too often. So in the course of a one hour scan they will be hallucinating roughly half the time and half the time not hallucinating. You also have to have them sufficiently motivated to hold down a button during the experience of the hallucination. This isn't easy. What you find is evidence of activity in the speech production areas, not just speech reception areas, which is consistent with the idea, crudely speaking, that hallucinating can occur when patients are talking to themselves but they are not aware of this – a sort of sub-vocal speech.

Scanning techniques like PET and fMRI have been around for quite a while now. I'm no expert but I get the impression they are becoming more refined. Can we now visualise a



Chris Frith – this portrait will form part of a Royal Society exhibition

lot more than we used to, and do you think there will be further developments?

That is a very good question. fMRI, which is the method of choice for me, has been around since the mid 1990s so that's not that long ago really. And I would say that the developments that have happened are relatively small. From a technological point of view the strength of the magnets has increased from two to as many as 10 Tesla. The stronger the magnet, the better the spatial resolution of the picture of the brain. Speaking as a psychologist, the important developments are to do with how you design the experiments and to some extent how you analyse the results statistically. So I would say that the developments, which are happening, are small quantitative improvements rather than qualitative changes.

In terms of further developments, what we really need, to make big progress, would be a portable fMRI. The problem with this at the moment is they have to be maintained at extremely low temperatures by liquid helium. But I was speaking to a physicist recently who suggested we may be on the verge of a room temperature scanner. If we could achieve that then we might make a big leap forward.

What about plasticity of the brain – can your scanning techniques tell us anything about this?

There's an interesting study conducted by my friends in Denmark, where I am a visiting professor. They use a device where you have a stimulator placed on your tongue, a sort of plate with lots of little rods that stick to your tongue, which is attached to a video camera so you can teach people to distinguish various different patterns, such as a letter 'T' for example, by touch. People can learn to distinguish shapes quite well. Now if you scan them, before and after, you find that the people who have been blind from birth are actually using their visual areas to do this task, so it lights up when the tongue is stimulated, whereas the normal controls are not using these areas. This is interesting in itself, but if you then apply TMS – transcranial magnetic stimulation – to the back of the head around the visual cortex most people see flashes of light as you would expect. But if you TMS these blind people who have learned to use their tongues with this device they feel a tingling in their tongue which is somatotopically

mapped. So this is a good example of how we can look at brain plasticity using these new techniques.

You've been involved in developing a new area, 'neural hermeneutics'. Can you explain what that means?

Hermeneutics is the discipline concerned with interpretation and translation. It was originally developed in Germany in the 18th century. People were translating the bible into German, and obviously there were all sorts of problems such as, how do you know your translation is correct?

One of the ideas that developed from this was that you must take into account historical context when you translate. In a sense, good translators will know more about what the author intended than the authors themselves because

"there must be some trick the brain uses to enable me to get inside your head"

a good translator has taken into account all the background. The famous American philosopher Quine basically proved that perfect translation, and indeed communication, is impossible because, for example, you say something to me and I interpret what you mean but I can never check whether what I think you mean is what you actually meant, because I can't get inside your head. It seemed to me that the study of social interactions is the key to this problem because social interactions work extremely well for, say, 90 per cent of the time. So there must be some trick the brain uses to enable me to get inside your head and that relates to theory of mind and representations of the world. That's basically what 'neural hermeneutics' is about.

I wanted to ask you about autism. Your wife Uta Frith is an expert here and you have worked with her on this – why do you think the rate of diagnosis has increased so dramatically in recent years?

Well nobody really knows, is the honest answer, but Uta has a nice slide where she shows the increasing incidence of autism starts in 1988 the year that the film *Rain Man* was released. So it's possible that the increase in cases is partly a matter of awareness, which that film promoted. But also the criteria for the diagnosis have changed in recent years. In the 1970s when it was 5 in 10,000 you had to have a very specific collection of quite severe signs and symptoms before you got the diagnosis, but now with the agreement that there is a spectrum of autistic disorders people who were previously thought of as merely eccentric

now fit under this umbrella leading to about 90 per 10,000 today.

It's interesting that between you both you have conducted a lot of work on autism and schizophrenia. I interviewed John Bradshaw about two years ago and he sees some big parallels between schizophrenia and autism. Do you see there are parallels or are they quite separate problems?

This is very interesting because historically before autism became a recognised disorder, it was often considered a psychosis or 'childhood schizophrenia' and one of the big changes in the 1970s was that they became two completely different disorders. Childhood schizophrenia was recognised as being exactly the same thing as adult schizophrenia – they were younger but had the same symptoms. In contrast autism is there from early childhood and has a different course. Certainly in those days hallucinations and delusions had nothing whatever to do with autism. But also I remember from those days you would sometimes see people in long-stay hospitals, in the days when there were still long-stay hospitals, who were in a back ward and had been there for years and years and who were labelled as having schizophrenia. Many of them would now be given the diagnosis of autism.

In fact for that reason I wrote a paper many years ago precisely talking about the relationship between autism and schizophrenia. And Uta's work, as I am sure you know, in the study she did with Simon Baron-Cohen and Alan Leslie, demonstrated a lack of theory of mind in autism. My work on schizophrenia suggested that these patients also have a theory of mind problem, but in a sense the opposite way round to what you see in autism. So people with autism don't realise that other people have intentions, while people with schizophrenia see intentions in others that aren't actually there.

It's a corny question, but what is it like working with your wife?

Marvellous! Well, there is a story that, in the golden age of Hollywood, they had lots of husband-and-wife script-writing teams. Apparently the producers used to say, it's marvellous having husband-and-wife script-writing teams because they are actually working all of the time, even in bed.

Do you find you 'talk shop' at home?

Yes, we do talk shop at home, and our children used to get rather cross with us!