BEHIND THE WHEEL

By Dr Jon Stamford

Driving is, for many people with Parkinson's, a lifeline in their ability to maintain independence for as long as possible. In the UK, our fitness to drive is assessed every three years, sometimes more often.

Driving is a complex skill involving both cognitive and motor dimensions. You approach a T-junction. You want to turn right (across the traffic). It's busy and you will have to pick a gap in the traffic carefully. The car behind you is in a hurry. They honk their horn. You start to sweat.

Sound familiar? Of course. This is a job for the prefrontal cortex – an area of the brain involved in complex cognitive behaviour and, above all in decision-making. The kind of decision you make when you decide it's safe to move out into traffic. The prefrontal cortex weighs up how fast the traffic is moving, whether that lorry has seen you, and whether you should ignore Mr Angry behind you revving his engine. All of these choices and the decision taken and carried out is what we call the executive function.

We take hundreds of these kind of decisions every day. This is the kind of combined motor and cognitive task that many of us would not have thought twice about before Parkinson's. But now we hesitate more than we should. Or perhaps we press ahead when we should wait, flustered by other more aggressive motorists.

And it's not surprising that we sometimes make poor choices. The principal transmitter in the prefrontal cortex is dopamine and, although the losses are not as catastrophic as in the caudate or putamen, there is still significant reduction in prefrontal dopamine levels with progression of the illness. As we lose dopamine, we lose our ability to make those judgements. We become less confident in traffic.

We take risks or we are too cautious. It's difficult to get the balance right.

Of course there comes a point where individuals need to weigh up whether or not they should be driving. It's not enough to simply make a decision on the basis of medical diagnosis and age. Plenty of other factors such as speeding tickets, collisions, sleepiness and aggressive driving should also be acknowledged [1]. And of course there are ways of assessing driving skills without subjecting the driver or other road users to any danger. Driving simulators are increasingly used.

A study from Ehime University in Japan assessed the driving ability of people with Parkinson's using just such a simulator [2]. They found that impaired visual perception and cognitive abilities as well as infrequent driving predicted the likelihood of driving problems. Mostly people with Parkinson's were slow to brake, steered less accurately, and had slower reaction times. In particular, the study highlighted the extent to which people with Parkinson's were distracted by conversation.

Driving involves a complex mixture of attention, wakefulness, decision-making, spatiotemporal sense and action initiation. All of the stuff we do less well. But above all, the prefrontal cortex is responsible for perception. And that includes self perception – the very same sense of self perception we need to decide whether we're safe to drive. Ideally before somebody else decides for us.

1. Rizzo M (2011) impaired driving from medical conditions: a 70-year-old man trying to decide if he should continue driving. JAMA 305, 1018-26

2. Kyaw WT et al (2013) evaluating the driving ability in patients with Parkinson's disease using a driving simulator. Internal medicine 52, 871-876