

Significant proportion of people with Parkinson's disease struggle with instruction-based learning, study finds

September 6 2021



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A new study led by Dr. Beth Parkin, senior lecturer in psychology from the Cognitive Neuroscience Group at the University of Westminster, has

discovered that a substantial proportion of people with Parkinson's disease have precise deficits when learning from instructions, and these problems are associated with differences in brain functioning.

New collaborative research conducted by Dr. Parkin at Westminster and a team led by Professor Adam Hampshire at Imperial College London examined the brain activity and behaviour of people with Parkinson's disease, age matched controls and younger adults. The team found that the patients who showed problems learning new rules did so because of deficits early in the learning process when new representations are bound or encoded in memory. However, once memories are made, these people did not have problems with forgetting.

The study, published in *Brain Communications*, investigated these deficits further using multiple brain scanning techniques including functional Magnetic Resonance Imaging (fMRI) which shows where blood flows in the brain, as well as MR Spectroscopy which shows the chemical composition of the brain. People with Parkinson's presenting problems learning new rules showed abnormalities in [brain activity](#) at the point when new memories were being made. These included reduced activation in regions associated with learning in the frontal, parietal, and anterior caudate parts of the brain. These problems were also associated with lower levels of GABA in the [prefrontal cortex](#), which is the main inhibitory neurotransmitter or chemical messenger in the brain.

Parkinson's disease causes varying problems of memory and mental functioning both in terms of type and rate of decline, therefore a deeper understanding of these problems is crucial as they predict decreased quality of life in those effected. An inability to learn new rules from instructions are central to a person's functioning as this ability is ubiquitous in everyday life, as making use of explicit instructions is the most efficient way to learn novel goal directed behaviours.

The researchers hope that this work could aid the development of personally tailored treatment approaches. For example, bespoke therapies could be designed that target the specific neural systems disrupted determined by a detailed characterisation of cognitive impairments.

Talking about the research, Dr. Beth Parkin said: "These findings not only tell us about the [brain](#) mechanisms underpinning the cognitive problems experienced in people with Parkinson's, but they also have clinical implications. In particular, the problems detected here are likely to interfere with other clinical assessments of mental functioning, as they all rely on the patient's ability to learn from instructions. Therefore, we recommend the assessment of instruction-based learning as an important first step before other neuropsychological assessments are undertaken."

More information: Beth L Parkin et al, Dissociable effects of age and Parkinson's disease on instruction-based learning, *Brain Communications* (2021). [DOI: 10.1093/braincomms/fcab175](https://doi.org/10.1093/braincomms/fcab175)

Provided by University of Westminster

Citation: Significant proportion of people with Parkinson's disease struggle with instruction-based learning, study finds (2021, September 6) retrieved 9 May 2024 from <https://medicalxpress.com/news/2021-09-significant-proportion-people-parkinson-disease.html>

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