The study was approved by the North East Newcastle and North Tyneside 1 Research Ethics Committee (15/NE/0254) and Durham University Department of Psychology Research Ethics Committee.

Participants

Fifteen people with PSP (8 female, Mage 69.5, age range: 53–80 years, Mdisease duration 35 months), 16 with Parkinson’s Disease (Mage 68.2, age range 58–78, Mdisease duration 62 months) and 15 Age Matched Controls (Mage 69.7, age range 58–80) volunteered to take part. All participants in the PSP group met the National Institute of Neurological Disorders and Stroke and Society for PSP, Inc. (NINDS-SPSP) (Litvan et al. 2003) criteria for clinically probable or definite PSP. All participants in the Parkinson’s Disease group fulfilled the UK Brain Bank Criteria for a diagnosis of PD (Hughes, Daniel, Kilford, & Lees, 1992). These inclusion criteria were established prior to data analysis. Participants had the choice of participating in their own homes during a home visit by DS or in the Psychology Laboratories at Durham University. Fifteen people decided to participate at home (7 PSP, 7 PD, 1 AMC) and 31 came to the laboratory (8 PSP, 9 PD and 14 AMC). Participants took part having taken their usual medication.

All participants gave informed consent and the study was conducted in accordance with the BPS code of ethics. The sample size was based on exceeding the sample of 8 participants per group collected by Rafal et al., (1988) and was not established with an apriori power analysis. Eye-movements were recorded using a BioPac Systems MP150 with EOG100C amplifier modules recording horizontal and vertical EOG at 500 Hz. Stimuli were generated using a Cambridge Research Systems ViSaGe graphics card and displayed on a 17-inch monitor. Saccade target was a black spot (1degree of visual angle) presented on a grey background.

Visual Search Task: In the lab the experimental stimuli were generated using a Cambridge Research Systems ViSaGe graphics card and displayed on a 17-inch monitor. In the home experimental stimuli were generated using Eprime-2 software and presented on a 17-inch monitor. Responses were collected using a two-button box. The visual search target was a blue ‘c’ shape oriented at 45°. In the Feature search task the all distractor items were also blue ‘c’s, oriented at 215°. In the Conjunction search task distractors could also be ether blue ‘c’s, oriented at 215° or yellow ‘c’s, oriented at 45°. Array items were presented at 10° from the centre of the screen on a black background. In 4-item arrays the stimuli appeared on the cardinal compass directions (N, E, S, W). In 8-item arrays stimuli appeared at cardinal directions and intermediate points (N, NE, E, SE, S, SW, W, NW). Some participants (7 PSP, 8 PD and 7 AMC) were presented with 16 item arrays in addition to the 4 and 8 item arrays. Participants sat about 50cm from the display. Corsi Blocks Task: The experimental stimuli were generated using Eprime-2 software and displayed on a 17-inch monitor. Responses were collected on a KeyTech MagicTouch touchscreen attached to the monitor. Participants used a stylus. The same equipment was used for lab and home testing. Participants sat about 40cm from the display. The height of the monitor was adjusted such that the centre of the screen was at eye level for each participant. The stimulus array consisted of 12 grey discs (diameter of 2.2°) and a black fixation point presented on a white background. The array subtended 20° x 6°. Memoranda were indicated by the appearance of a black disc (diameter of 2.2°) in one of the placeholders.

Procedures

Visual Search: The tasks began with the appearance of a fixation point for 1000ms, followed by the appearance of a search array comprising 4 or 8 items. This array remained present until a response was made. Participants were instructed to press one button when a target was present, and the other if the target was absent. They were also instructed to fixate the centre of the array and try not to make eye-movements. There was a 2:1 ratio of 8 item arrays to 4-item arrays and a 2:1 ratio of target present to target absent trials. On target present trials the target appeared at each location in the array with equal probability. All participants completed one block of 36 practice trials and two blocks of 108 experimental trials.

Corsi Blocks Task: The experimenter initiated each trial with a button press. Trials began with the appearance of twelve placeholder discs arranged in a 6 x 2 array flanking a fixation point. The array was oriented along either the horizontal or vertical axis. After 1000ms a sequence of memoranda were presented, starting with one up to a maximum of nine locations. Each placeholder could only flash once per sequence. Memoranda appeared for 250ms and there was a 250ms delay between consecutive items in a sequence. After presentation of the final item, the placeholder array disappeared and there was a 5 second rehearsal interval. The array then reappeared and participants responded by touching the placeholders in the order in which the items had been presented, using a stylus. On some trials participants accidentally pressed the screen or made an inaccurate pointing movement (i.e. they aimed at the correct location but landed outside the target area). In these cases the trial was repeated with the same number of items in a different configuration. There were 3 trials at each level of difficulty. If at least 2 of the three sequences were correctly recalled an additional item was added to the sequence and the participant did 3 more trials. The task ended when participants made a mistake on two or more trials. Span was measured 3 times for each array orientation. Participants were instructed to maintain fixation on the central fixation point during each trial. Memory span was calculated as the mean of the 3 memory spans at each orientation. Horizontal and vertical spans were assessed in blocks. The order of presentation was counterbalanced across participants.