Matters arising

Visuospatial impairment in Parkinson's disease: does it exist?

Sir: Visuospatial function in Parkinson's disease has been the subject of several investigations. Conclusions, however, are contradictory. Della Sala *et al*¹ and Brown and Marsden² recently reported their findings: no visuospatial impairment could be demonstrated. One can raise objections to both studies, however.

Brown and Marsden² tested 15 Parkinsonians (14 taking levodopa) on a Spatial Choice Reaction Time task. This task tested visuospatial function, in our opinion, on two levels: on an elementary level by discrimination between left and right, and on a complex level by involving mental rotation. As the authors stated themselves, there is no direct proof that no verbal strategy was used, implying the possibility that something different from visuospatial function was tested. Admitting that spatial function is not a unitary entity, it seems fit to quote De Renzi *et al*:³ "...space perception has been studied at a rather complex level, one at which it is difficult to disentangle the influence on performance of spatial as compared with praxic, intelligence and memory factors. It seems reasonable to expect that a more definite answer might be obtained by employing elementary tasks, which tap the basic mechanisms underlying spatial perception." Della Sala *et al*¹ employed such an elementary task, by asking the patient to forecast where a slanted line would intersect a horizontal line. Their test could be considered a sophisticated version of Benton's line orientation test.⁴ An advantage is that results can be more readily quantified and that subjects have to indicate exactly where the line intersects instead of choosing from a fixed number of possibilities. The authors suggest that the absence of any visuospatial impairment in Parkinson's disease, in contrast to other studies, might be due to the fact that their sample of patients is highly selected. We should like to stress this point: all patients were younger than 70 years; all were on levodopa substitution therapy; all were in-patients and, most importantly: patients were excluded with "any sign of everyday impairment of their ability to cope socially". Thus patients who did show visuospatial impairment on a clinical level were effectively excluded from their study.

We also investigated visuospatial function in Parkinson's disease⁵ and our findings are in contrast with those of Della Sala *et al*¹ and Brown and Marsden.² We used the rod

orientation test (ROT) as described by De Renzi *et al*³ and, in addition, the line orientation test and the facial recognition test.

Forty three of 44 patients (all without levodopa substitution therapy) had abnormal results on the ROT, while on the orientation test and the facial recognition test respectively seven and 17 failed. The last mentioned tests and the test used by Della Sala *et al* might be specific for visuospatial function but are in our opinion less sensitive than the ROT. It has been admitted, however, that it is still an open question whether all these test do indeed explore identical aspects of visuospatial behaviour.

In our opinion, there does exist a visuospatial impairment in Parkinson's disease, although it might very well be that this cannot be demonstrated at more complex levels, or missed, when basic mechanisms are tested in a highly selected sample of patients. As Della Sala *et al* stated the problem consists of sample bias and test bias: Many tests probably screen different aspects of spatial behaviour.

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Visuo-spatial impairment in Parkinson's disease. Does it exist?

Spinnler and Della Sala reply:

Hovestadt *et al*¹ published a paper supporting early visuo-spatial disorders in Parkinsonians.

These conclusions are at variance with Brown and Marsden² and our own findings.³ As Hovestadt *et al* state in their letter they agree that sample-biases (that is strict exclusion of "demented" Parkinsonians) and test-biases (that is elementary nature of the spatial task employed) actually made it unlikely to find poor performers in our study³ and on the contrary with different constraints, to find them in their own.¹ We actually did exclude from our study all Parkinsonians with general cognitive impairment and only included those patients whose spatial impairment under scrutiny could not be traced back to general cognitive deterioration, but would appear as "specific" feature of their nigro-striatal disorder. We take the present opportunity to outline our views beyond those listed in our paper.³

(1) *Sample-biases.* Parkinson's disease is a progressive degenerative condition for which the hypothesis might be put forward that in an unknown number of patients the degenerative process will sooner or later encroach also upon systems other than its nigro-striatal first target. This being the case (a worthwhile hypothesis suggested by clinical observation on unselected patients) longitudinal surveys on a carefully selected sample of early Parkinsonians would be likely to find, in time, an increasing number of patients adding to their motor problems also cognitive impairments. By means of such experiments sound answers could be gathered on the cognitive role specific to the striatum, possibly on its neuropsychological features as well as on its natural history. Longitudinal, PET and transmitter studies would provide the ideal correlative variables to the possible spreading of the damage from subcortical to neocortical (viz, prefrontal structures)⁴ and their connections. Cross-sectional studies, on the other hand, are in our opinion unable to give accurate results, essentially because they cannot avoid lumping together patients at poorly predictable degrees of their extra-striatal involvement (that is, patients with a more or less severe pre-frontal or even diffuse cortical encroachment). Put in other words, progressive diseases (such as Parkinson's or Alzheimer's disease) can supply information suited to reconstruct healthy functioning of the brain, only if the experimental designs take into account the progression of the deterioration, that is they are longitudinally structured starting from patients in early stage.

(2) *Test-biases.* The question of elementary vs complex spatial tasks plays its role at the moment of drawing a conclusion of experi-