invariance may well be important for animals, but it has not yet been shown to have a preeminent role in determining which landmarks are remembered.

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MORRIS REPLIES — Bennett offers two criticisms of our proposed principle of 'landmark stability'. First, we have not equated the starting viewpoints between our groups; and second, other data indicate that animals can search appropriately with unstable landmark arrays. Although both criticisms are relevant, we doubt the significance of the first, and the second points to an important difference between our own and other studies.

Throughout training in our experiment, all rats frequently ran around the sidewalls before venturing into the central region from a point different from that at which they had first been placed. Accordingly, we doubt that the four nominal starting positions have any special status to the rats of either group. We would also draw attention to a study in the water maze (experiment 2 of ref. 1), where the starting-point issue was systematically investigated and shown to be without influence. Further, Bennett's calculations are incorrect because the relative positions of two landmarks, L+ and L− (as defined in our paper), were also changed randomly in group 'varied' rather than the whole array being translated randomly as he assumes.

A key difference between our own and other studies which have looked at unstable landmark arrays is that, with one exception[2], ours is the only study to specify the position of hidden food in relation to a single unstable L+ landmark. This is potentially different from the situation where two or more L+ landmarks are present because, in this case, animals can form a stable self-contained geometric "fragment"[3] which could represent the position of the hidden food irrespective of lateral translation. Thus, if there is local landmark stability, global stability may not be required. This resolves the apparent contradiction between Bennett's and our own results.

The results of several other experiments support our interpretation[4–6], although clearly it would be valuable to compare, with appropriate controls, the single-landmark and two-landmark case. Such an experiment is presently underway. We would not regard finding an accurate search for accessible hidden food (F+) in relation to a moving two-landmark array as an exception to our principle of landmark stability for precisely the reasons given above.

Much work is required to put the notion that spatial learning involves the extraction of geometric invariance on a firmer footing, or to disprove it, but we believe that our experiment has revealed an unexpected dissociation of fundamental relevance to the concept.

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Structure near the mantle's base

SIR — I am pleased to see that interest in resolving the fine structure of the D″ region of the mantle using short-period P waves has been revived by Vidale and Benz[1]. However, in an accompanying News and Views article[2], Wysession indicates that the presence of a layer of seismically fast material 130 km thick and 300 km wide at the base of the mantle inferred by Vidale and Benz[1] is an unexpected feature. Later, in reference to the high velocity layer, he comments: "The results are all the more intriguing because they do not occur with previous studies".

These statements are both incorrect and misleading. Evidence for the existence of such a layer in D″ has been published several times during the past 30 years[3–7], starting with the work of Carder[3]. These earlier studies suggest that such a high-velocity layer is widespread in the sense that its presence has been inferred in several widely separated regions of the deep mantle[4–7]. Clarification with a large dataset of high quality[1] is therefore a valuable contribution to our understanding of mantle dynamics. I emphasize that the high-velocity structure implied by the data of Vidale and Benz[1] for paths from China to North America is no different from that implied by our data[7] for paths from Asia to Australia.

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Alzheimer's response

SIR — The Scientific Correspondence[1] from Kruck contains several inaccurate statements about our Letter[2]. First, the purpose of our report was the analysis of neuritic plaque cores in brains from people with Alzheimer's disease. The elemental composition of neurofibrillary tangles remains to be investigated.

Second, Kruck is mistaken in the view that we have attempted to make any correlation between the presence of neuritic plaques and the severity of dementia. On the contrary, we state that to arrive at a neuropathological diagnosis of Alzheimer's disease "a minimum density of neurofibrillary tangles and neuritic plaques" has to be detected. The presence of plaques is a prerequisite for making a diagnosis.

Third, Kruck has failed to read our paper properly, for he refers to "Their specimen, stated to be from the brain of a patient with Alzheimer's", which ignores our clearly stated and tabulated results of the analysis of neuritic plaques in stained tissue from five, and unstained brain from four, Alzheimer's disease cases.

Fourth, Kruck alludes to our use of particle-induced X-ray emission (PIXE) but fails to recognize the significance of our use of this technique in combination with scanning transmission ion microscopy, which permits the recognition of a unique 'fingerprint' to identify, localize and elementally analyse neuritic plaque cores in unfixed, unstained brain tissue, for the first time. Kruck's comment concerning the absence of information in the report about the use of positive cellular matrix-bound control samples shows a lack of understanding about the physical mechanism underlying the PIXE technique. PIXE uses the removal of inner-core electrons and therefore the analysis is independent of the type of organic matrix being investigated.

Finally, we reiterate our opinion that until other researchers investigating the purported role of aluminium in the pathogenesis of Alzheimer's disease by the use of elemental microanalytical techniques address the issue of artefactual introduction of aluminium into brain tissue by the use of tissue fixatives and stains, controversy will persist over whether this element colocalizes in neuritic plaque cores, neurofibrillary tangles, or within neuronal compartments or organelles.

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