the distinctions from Hutchinson *et al.*: the foci plotted in Figure 1 for 'reorienting' (orange) and 'memory retrieval' (blue) are in the supramarginal and angular gyri, respectively, and are approximately 3 cm apart.

Other work supports anterior/posterior distinctions in VPC. For example, Cohen *et al.* [5] define borders between putative functional areas based on abrupt changes in global patterns of functional connectivity. Cohen *et al.* highlight an angular/supramarginal gyrus distinction as the prime example of a strong border of rapid change (see Figure 2 in [5]). Thus, the statement made by Cabeza *et al.* that 'the overarching view can also explain differences around the edges under the assumption that the strength of VPC connectivity with different brain regions differs gradually across VPC subregions' is not supported by efforts that have been made to directly test such a claim (see also [6]).

These distinctions between supramarginal and angular gyri provide strong counter-evidence against an 'overarching' view. Other data [6–9] strongly suggest that there are further divisions beyond the anterior/posterior distinction. For example, Nelson *et al.* [6] used functional connectivity mapping, functional network analyses, and differences in task-evoked fMRI activity to parcellate left lateral parietal cortex; the resulting data strongly favors a 'fractionation' view of VPC.

We welcome further discussion regarding the exact nature of fractionation in VPC and its relation to function, but we do not doubt its existence.

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Response to Nelson *et al.*: ventral parietal subdivisions are not incompatible with an overarching function

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Nelson, McDermott, and Petersen (NMP) [1] raised four main objections against an overarching view of ventral parietal cortex (VPC) function [2]. First, pointing to specialized subregions within visual cortex, they argued that fractionation is the 'standard view of cortical organization'. The existence of specialized subregions within a broad area, however, is a premise shared by both views [2]; the critical difference between them is that the fractionation view assumes that neighboring subregions can mediate unrelated cognitive processes, whereas the overarching view assumes that they mediate different aspects of a broad function. Contrary to NMP, the consensus in vision favors the overarching view, because aggregates of different visual cortex subregions mediate broad functional components of visual processing, such as those associated with the dorsal and ventral streams [3,4]. Likewise, subregions of lateral prefrontal cortex are assumed to mediate different aspects of a broad control function [5,6].

Second, NMP disagreed with our point that meta-analyses of fMRI activations do not show sharp dissociations between the supramarginal gyrus (SMG) and the angular gyrus (AG). A 'sharp dissociation', in our view, would entail obtaining evidence that a task frequently activates SMG but never AG, and vice versa for another task. To our knowledge, no meta-analysis has shown that SMG or AG was never activated by one of the functions we reviewed. For example, although perceptual reorienting activations are more frequent in the SMG and episodic retrieval activations in the AG [7], as we noted, perceptual reorienting activations are often found in AG, and retrieval activations in SMG. When these tasks are compared within-subjects, their activations do in fact overlap [8].

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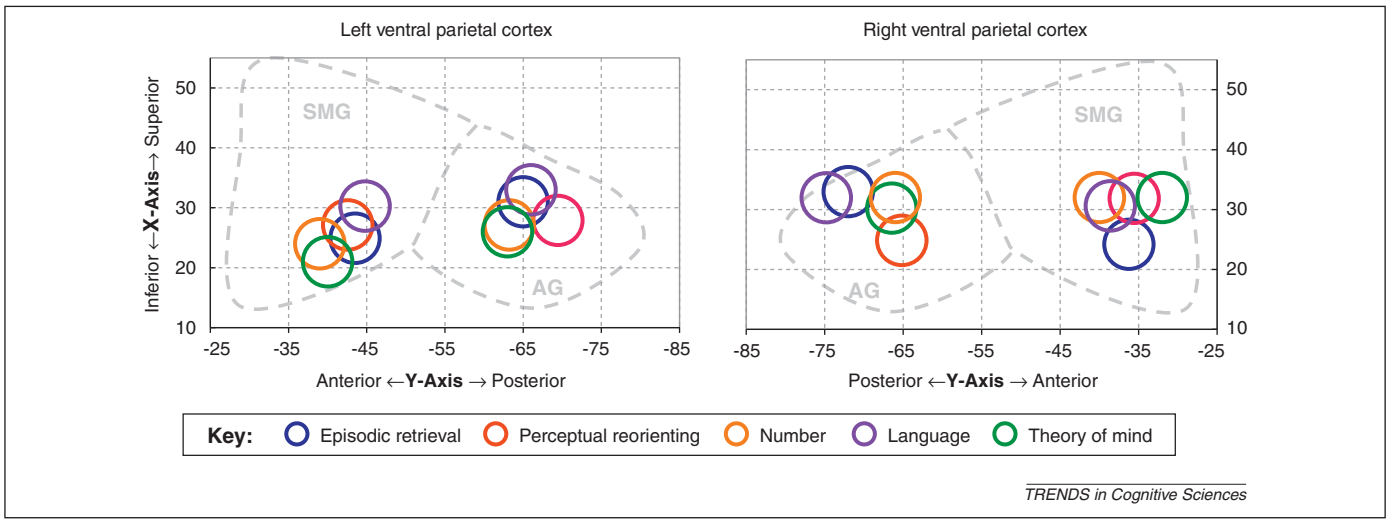

Figure 1. Activations for each of the cognitive functions in the legend can be found bilaterally in both SMG and AG. Within each cluster, the peaks for the different functions are so close that the larger activations around each peak undoubtedly overlapped. The sources from which the coordinates in each cluster were drawn can be found in supplementary material online. Talairach coordinates were converted to MNI coordinates. SMG and AG boundaries are only approximate.

Third, by showing that the coordinates of a few VPC activations for different functions do not overlap, NMP challenged our assertion that the various functions we reviewed can activate similar VPC subregions. This induction is equivalent to finding a baseball, a football, and a basketball fan who live in different cities and arguing that all fans of these sports live in different cities. Contrary to the fractionation hypothesis, Figure 1 provides evidence that the same VPC subregions can be activated by these different functions. The non-overlap observed by NMP may have more to do with the different characteristics of the tasks than their underlying function [8].

Fourth, NMP argued that studies using edge detection algorithms show that the boundary between SMG and AG is associated with rapid changes in resting-state functional connectivity. However, the connectivity patterns of SMG and AG differ in degree, not in an all-or-none manner. Depending on algorithm parameters, the number of edges identified between SMG and AG may vary. At any rate, differences in functional connectivity among VPC subregions are not incompatible with the overarching view, which does not postulate that the functions of these subregions are identical; it only postulates that these functions reflect different aspects of a broader common function.

An extreme fractionation view such as the one NMP seem to be defending would lead to a model of cortical organization in which the functions of neighboring regions are completely unrelated to each other. We find this position untenable. Why should functions as disparate as episodic retrieval, perceptual reorienting, number processing, language, and theory of mind be represented in close proximity within even restricted regions of VPC? We believe that they must be related by an overarching function, whether bottom-up attention, as we proposed, or some other overarching function(s) [9].

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.tics.2012.06.015

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