Supplementary information S1 (box)

Activiation likelihood estimation (ALE) meta-analysis — methods

In the past few years, the fMRI ‘lie detection’ literature has grown large enough to permit generalizations beyond what can be gleaned from individual articles1-3. To characterize which regions of the brain are frequently active during tasks of deception, we conducted a meta-analysis of the fMRI literature on lie detection using the activation likelihood estimation (ALE) method (REF. 4; for an earlier review, see REF. 2). The ALE technique quantifies the degree of anatomical overlap across published neuroimaging studies based on peak-voxel coordinate information. Here we briefly describe the procedure used to select pertinent findings from the literature, how these findings were converted into maps of ALE values, and the results of this meta-analysis.

To compile all relevant findings from the literature, we searched for existing publications on deception, using electronic databases of scientific articles (e.g., PubMed, ISI Web of Knowledge) and search terms relevant to fMRI studies of deception (e.g., “fMRI deceive,” “fMRI deception”, “fMRI lie”). Results from this search were then refined, based on the following factors: (1) the study must have used fMRI; (2) results must have been obtained from a whole-brain, group analysis of healthy, young adults; (3) the study must have conducted a statistical contrast indexing deception, reporting one or more foci in standardized coordinate space; and (4) the results reported in the study must not have been reported (in part or in full) in any other study included in our analysis.

Findings were further refined to specific contrasts that assessed whether brain activity was greater during intentionally false responses than during truthful responses. Whenever possible, in situations where there were experimental factors beyond deception, the main effect of deception was used. In contrast to a prior meta-analysis2, contrasts that were confounded with other related factors (e.g., differences in recognition memory) were not excluded, yielding more liberal inclusion criteria. This approach yielded a total of 321 foci from 28 independent statistical contrasts across 23 different studies (Supplementary Online Information S2 (table)). Four foci were excluded as they fell outside of the mask used during analysis in GingerALE (see Supplementary Online Information S2 (table)).

ALE map generation was performed via GingerALE software (version 2.1; http://www.brainmap.org/ale/), using a random-effects approach designed to assess the spatial consistency of results across studies4. Foci were converted into a common stereotaxic space (MNI; using the Lancaster transform5) and ‘modelled activation’ maps were generated for each contrast designed to capture their respective spatial uncertainty. These maps were then combined across studies to produce a voxel-wise estimate of ALE values. Using a random permutation approach, a null distribution was calculated and each ALE value was assigned a p-value. The ALE map was then thresholded at a p-value of .05 (False Discovery Rate corrected) with a cluster extent threshold of 200mm3.

References


