

# The neural underpinnings of creative design

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- [Design, Manufacturing And Engineering Management](#)
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*Research output: Contribution to conference › Poster*

## Abstract

Neuroimaging investigations of creativity aimed towards uncovering its precise neural underpinnings have thus far been unable to reach firm conclusions. A systematic review and meta-analysis of fMRI visual creativity studies (Pidgeon et al., 2016) showed activation of the right PFC including right middle and inferior frontal gyri and right precentral gyrus, thalamocortical nucleus and left middle frontal gyrus. However, substantial variance in the regions engaged across studies suggests that activation differs according to task-specific factors, such as whether tasks emphasise novelty, function or aesthetics of generated solutions. Furthermore, no study to date has examined creative idea generation in professional designers. In the present fMRI study we recorded the neural activity of 29 professional engineering designers while they generated ideas in response to creative (open-ended) and innovative (constrained) design tasks. Performance on both tasks was found to be associated with greater activity in the left cingulate gyrus and right superior temporal gyrus compared with a design manipulation control task. Furthermore, region of interest analysis restricted to pre-frontal regions revealed no significant differences in brain activity between the creative and innovative tasks. These findings are consistent with previous studies highlighting the role of left pre-frontal regions in supporting controlled semantic retrieval processes as well as the inhibition of unoriginal or irrelevant ideas during creative tasks. The results also align with previous studies suggesting that the right superior temporal gyrus facilitates insight during creative problem solving. Finally, the results show that creative and innovative design tasks recruit similar brain regions in professional designers.