# Neural Circuits for Conflict Resolution: Insights from Visual Perception

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Conflict control is the ability to adjust one's behavior to rapidly changing environmental demands. Conflict resolution, the effect of control, is considered a core executive function, and the subject of a long-standing and active research area. One of the key questions is whether the brain engages a central and general resource to resolve conflicts in sensory and motor representations (domain general), or whether specific neural processing pathways engage distinct adaptations to resolve conflicts (domain specific). Such questions are frequently investigated either by using paradigms where conflicting sensory and motor representations are resolved within the experimental paradigm, or where task switching is employed to investigate component processes of cognitive control and its resolution.

Although not previously considered in this light, a bistable figure presents a unique opportunity to investigate mechanisms involved in sensory and perceptual conflict because a single stimulus elicits two mutually exclusive, and conflicting, percepts representing alternative organizations of the same visual input. These alternative percepts can be conceptualized as a conflict situation which can be temporarily resolved by switching to the other percept. Although neuroimaging studies have previously confirmed the involvement of specific brain regions that contribute to these high-level cognitive and visual processes, there is no established framework to describe the underlying neural mechanisms. In this talk I will suggest that a fusion of cognitive control and visual perception models may provide insight into the neural mechanisms that underlie both.

We have recently shown that the lateral occipital cortex is dynamically coupled with each of two distributed patterns of neural activity depending upon whether the percept elicited by the bistable figure was "default" or "alternative" (Karten, et al, 2013). The two distributed patterns included core nodes of the default mode (task negative) and frontal parietal (task positive) networks, and were most highly coupled to each other during the "alternative" percept whereas they were less coupled during the "default" percept. Surprisingly, the regions associated with the *non-engaged* percept exhibited the highest connectivity to the lateral occipital cortex. Together, these findings reveal a dynamic organization between two domain general networks (task positive and negative) that are engaged during the resolution of conflict as generated by a bistable figure, and suggests that these large scale systems in the brain may play a previously unappreciated role in the flexible adjustments to environmental demands that involve conflict and its resolution.

Karten, et al, Brain Connectivity,(doi:10.1089/Brain.2012.0119).