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  Motor planning: The long, winding and recurrent road from sensory input to motor output

  Reaching to a visual target results from a complex series of neural computations that serve to transform the visual signals into neural commands to move the limb. Evidence suggests that associative areas of the parieto-frontal network play a crucial role in this process by defining a motor goal both in visual and body coordinates. Yet it remains unclear whether a visual representation of the motor goal still holds when a target is defined by non-visual, proprioceptive cues. In this talk I will present a series of recent investigations in which we assessed movement-related brain activity while manipulating the sensory modality of a spatial target (e.g. visual or proprioceptive). The results show that the sensory nature of a target critically influences: i) the spatio-temporal pattern of brain activity in parietal and premotor areas, and ii) the functional properties of neuronal activity within these structures. These findings support the contention that a motor goal is simultaneously represented in visual and body coordinates, but suggest that the relative weighting of each frame of reference is heavily contingent upon the sensory context of the action.

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