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## Parallel Interacting Channels in the Initiation and Specification of Motor Response Features

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### ABSTRACT

The present report summarizes a series of experiments conducted in normal human subjects to characterize the processes by which information derived from a visual target is used to initiate a simple motor response and to specify the features of its trajectory. We sought to determine which aspects of response trajectories subjects prepare in advance of target presentation, and the rate at which subjects specify amplitude and direction. We also wished to determine the relationship between the processes leading to response initiation and those that specify response features.

Subjects were required to produce isometric flexion and extension impulses at the elbow aimed to predictable and unpredictable targets of three different amplitudes in each of the two directions. To control response initiation, we used both traditional reaction time methods and another procedure, the *timed response paradigm*, that allowed us to systematically vary the time between stimulus presentation and response initiation.

Under all initiation contingencies, subjects were able to prepare accurate responses to predictable targets. However, when subjects were required to aim a response to an unpredictable target within a known range, they prepared responses with a default amplitude prior to target presentation. This default amplitude was close to the center of the target range. Over an interval of 200 to 300 msec after target presentation, response amplitude was progressively specified to conform with the target amplitude both by progressive improvement in the scaling of the initial phase of the trajectory and by corrections made to the ongoing response. When both the amplitude and direction of the required response were unpredictable, subjects prepared a single default amplitude, but selected a direction at random. After target

