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The Structure of Arm and Hand Movements in a Spontaneous and Food Rewarded On-line String-Pulling Task by the Mouse

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Abstract

Arm and hand use by the mouse have been studied in a variety of tasks in order to understand the structure of skilled movements and motor learning, the anatomy and function of neural pathways, and to develop animal models of neurological conditions. The present study describes string-pulling by the mouse, a behavior in which a mouse uses hand-over-hand movements to pull down a string that hangs from the top of a test cage. Mice both spontaneously string-pull and also string-pull to obtain cashew nuts tied to the end of the string as food reward. To string-pull, mice sat upright and tracked the string with their nose and then made hand-over-hand movements to reel in the string. A string-pull movement consists of four arm movements (Advance to make purchase, Pull, Push to draw the string down and Lift to return the hand for the next Advance) and four hand movements (Collect to aim the hand, Overgrasp to position the hand, and Grasp to make purchase, and Release). The kinematic profiles of the string-pull movement is distinctive with each hand making similar movements at a rate of 4 cycles per second and with the Lift and Advance movements occurring at a higher speed than Pull and Push movements. The results are discussed

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