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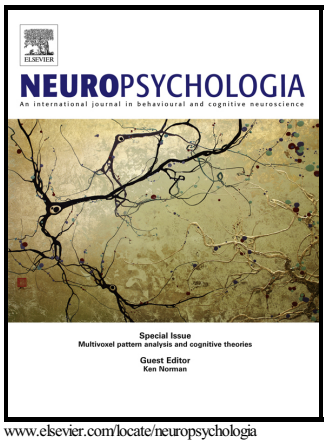

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Maturation and experience in action representation: bilateral deficits in unilateral congenital amelia

B.A. Philip[1], C. Buckon[2], S. Sienko[2], M. Aiona[2], S. Ross[3], & S. H. Frey[1]
[1] Psychological Sciences, University of Missouri, Columbia, MO
[2] Shriners Hospital for Children Portland, Portland OR
[3] Exercise and Sport Science, Oregon State University, Corvallis OR

Running title: Bilateral effects of unilateral amelia

Corresponding author: Scott H. Frey, freys@missouri.edu, 205a Melvin H. Marx Building, 1416 Carrie Francke Drive, University of Missouri, Columbia MO 65211, USA

Abstract

Congenital unilateral absence of the hand (amelia) completely deprives individuals of sensorimotor experiences with their absent effector. The consequences of such deprivation on motor planning abilities are poorly understood. Fourteen patients and matched controls performed two grip selection tasks: 1) overt grip selection (OGS), in which they used their intact hand to grasp a three-dimensional object that appeared in different orientations using the most natural (under-or over-hand) precision grip, and 2) prospective grip selection (PGS), in which they selected the most natural grip for either the intact or absent hand without moving. For the intact hand, we evaluated planning accuracy by comparing concordance between grip preferences expressed in PGS vs. OGS. For the absent hand, we compared PGS responses with OGS responses for the intact hand that had been phase shifted by 180^0, thereby accounting for mirror symmetrical biomechanical constraints of the two limbs. Like controls, amelic individuals displayed a consistent preference for less awkward grips in both OGS and PGS. Unexpectedly, however, they were slower and less accurate for PGS based on *either the intact or the absent hand*. We conclude that direct sensorimotor experience with *both* hands may be important for the typical development or refinement of effector-specific internal representations of *either* limb.

Keywords amputation; amelia; prospective; development; bilateral; representation