Visual manifestation of body schema abnormalities in a case of alien hand syndrome

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Due to localized damage to right parietal cortex, LD lacks proprioceptive, kinesthetic and tactile sensation in her left arm. She quickly loses all awareness of the arm unless it is in view or in physical contact with an unaffected part of her body. Occasionally, she will unintentionally assimilate another arm in view, feeling that her arm’s position is fleetingly transported to that location.

Davies (1973) found that afterimages of one’s own limbs fade if the limb is moved away from the location at which the afterimage was formed, perhaps due to a conflict between visual and proprioceptive input. In Carlson et. al. (ECVP 2008), we found that this effect could be extended to grasped objects. LD’s, normal (right) hand replicates the previous findings—movement of her hand and/or objects in its grasp caused their afterimages to fade. Objects moved via a manually-operated mechanical device did not cause fading. In contrast, movement of her alien (left) hand and a grasped object led to fading of the hand’s afterimage, while the object’s afterimage persisted.

The rubber hand illusion is induced in normal subjects by stroking their hand while they view a rubber hand being similarly stroked. As expected, LD had fleeting experiences of the illusion even without tactile stimulation. This was enhanced by dimly illuminating the rubber hand in an otherwise dark room—she could not shake the feeling that her left hand was at the rubber hand’s position. When the experimenter manipulated the rubber hand, LD reported clear (and distressing) proprioceptive sensations. We found that this effect was dependent on several visual frames of reference. For example, a hand placed to the right of her body evoked no feeling if she faced and looked forward. But if she turned her head and/or looked to the right of the hand, the proprioceptive sensations returned.