### Category
Cognition and Action

### Project title
Brain plasticity for body augmentation

### Associated Researcher(s)
Amy Orben, Bob Carlyon, Duncan Astle, Tamar Makin, Tom Manly

### Project details
In recent years, there has been increased interest in augmentative technologies that enhance the physical and cognitive abilities of the human body. These innovative devices introduce various theoretical and practical neuroscience challenges: What resources can the brain employ to control a body part that has never been there before? In this project, we work with the Third Thumb (Dani Clode Design) – a robotic finger, designed to allow the user to single-handedly perform typically bimanual tasks. This technology provides innovative solutions for increasing the functionality of disabled individuals in daily life, including stroke patients, children with developmental hand malformations and even people sustaining temporary arm injury. We will recruit individuals from these patient groups and train them to use the Third Thumb, using a combination of at-home and lab-based training programmes. To facilitate successful Thumb skill learning and generalisation, we will need to consider key cognitive principles relevant to strategy, explicit knowledge, adaptation, reinforcement learning, abstraction of motor planning, motivation, multitasking, interference and agency – all necessary for successful implementation, and mastery, of motor augmentation. We will use a range of behavioural, physiological, kinematic and neuroimaging techniques to better assess the neural basis of successful integration of the augmentation device into the human body representation.