

Population decoding allows us to extract high-fidelity information about movements that will occur in the near future. Since multiple movement parameters are encoded simultaneously in the same population of neurons, we have been gradually increasing the degrees of freedom (DOF) that a subject can control through the interface. Our early work showed that 3-dimensions could be controlled in a virtual reality task. We then demonstrated control of an anthropomorphic physical device with 4 DOF in a self-feeding task. Currently, monkeys in our laboratory are using this interface to control a 7-DOF arm, wrist and hand to grasp objects in different locations and orientations. This paradigm has been extended to a tetraplegic woman, who has been able to operate a high-performance prosthetic arm and hand to carry out reach and grasp tasks, characteristic of those performed in daily life with up 10-DOF.