A monkey that controls a robot with its thoughts. No, really ~Miguel Nicolelis

The author talks about some amazing insights into Brain-Machine Interface research through some of his experiments done on Aurora(a female monkey). The motor cortex of the brain controls our voluntary activities such as moving our hands/legs, muscular movements, etc. In response to stimuli, the cortex generates a signal, produces the requirement motion and the brain receives a response signal from the outcome of this motion(e.g., while eating, the motions of hands are produced to eat, and the signals from taste buds of the tongue is the response signal received by the brain). In the authors' experiment the cortex signals were directly read using a brain implant chip and digitalized and sent to an artificial arm, and the response signal from the outcome was sent back to the brain, which in this case was signals received by her optic nerves through her eyes seeing to capture a dot on a digital screen using a joystick. The mapping of motions of this artificial arm to brain signals was previously learned using brain signals and actions produced while Aurora was using her natural arm. Now, when the natural arm was constrained to move, Aurora within a span of a few weeks adapted to moving the artificial arm setting up a new sensory pathway in the brain for this new arm. After this adaptation, Aurora was able to move both her artificial and natural arm. Hence, a new bionic arm was augmented to Aurora hinting that brain signals are not constrained to do tasks within the body but can be extended to control a whole new exoskeleton outside it. Later, it was shown that the mechanical arm could be replaced by an avatar or virtual arm and still would do the task intended. In another interesting experiment, the brain signals of a monkey were sent all the way from Duke to Japan wherein it made an autonomous robot mimic the movements and the monkey was made to see this and rewarded every time the robot walks correctly hence improving the adaptability of the robot. The authors' idea is to put all above knowledge in situations, where patients with certain neural/spinal cord damage are incapable to send the motor cortex signals to desired organs, in such cases, the signals may be directly read through a Brain-Machine/Computer Interface(BCI) into an exoskeleton that would perform the required tasks. Although traditional prostheses use mechanical supports to mimic motions and not brain signals, with the advent of state of the art technologies, Neuralink would play a major role I suppose in BCIs', prostheses may be fed with signals from nerves as well, bringing a better synchronization of movements. This could give us as well a whole new insight into coming up with cyborgs kinda fictional stuff.