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Rehabilitative devices for a top-down approach

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ABSTRACT

Introduction: In recent years, neurorehabilitation has moved from a "bottom-up" to a "top down" approach. This change has also involved the technological devices developed for motor and cognitive rehabilitation. It implies that during a task or during therapeutic exercises, new "top-down" approaches are being used to stimulate the brain in a more direct way to elicit plasticity-mediated motor re-learning. This is opposed to "Bottom up" approaches, which act at the physical level and attempt to bring about changes at the level of the central neural system.

Areas covered: In the present unsystematic review, we present the most promising innovative technological devices that can effectively support rehabilitation based on a top-down approach, according to the most recent neuroscientific and neurocognitive findings. In particular, we explore if and how the use of new technological devices comprising serious exergames, virtual reality, robots, brain computer interfaces, rhythmic music and biofeedback devices might provide a top-down based approach.

Expert commentary: Motor and cognitive systems are strongly harnessed in humans and thus cannot be separated in neurorehabilitation. Recently developed technologies in motor-cognitive rehabilitation might have a greater positive effect than conventional therapies.

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