the breeding ground and facilitates an effective use of the instrument.

Between and across approaches, our goal remains the same: to enable a person to grow and facilitate the perception of wellness in his being in the world. This is the most ambitious result we should strive for. To use Maria Montessori's words: "*proof of the correctness of our educational action comes from the child's happiness*".[4]

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Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Article first published online: May 11, 2016. - Manuscript accepted: May 5, 2016. - Manuscript revised: March 8, 2016. - Manuscript received: September 8, 2015.

(*Cite this article as*: Trabacca A, Russo L. Pediatric rehabilitation: a changing panorama in the high-tech era? Eur J Phys Rehabil Med 2016; 52:593-4)

Online version at http://www.minervamedica.it
European Journal of Physical and Rehabilitation Medicine 2016 August;52(4):594-5

Technology-aided behavioral programs for helping persons in or emerged from a minimally conscious state

Dear Editor,

Persons in a minimally conscious state (MCS) or emerged from such a state, who are affected by extensive neurological damage, pervasive motor impairment and lack of speech, tend to be passive and isolated. Recently, technology-aided behavioral programs have been arranged to help these persons improve their situation and preliminary data are promising.[1, 2] The programs rely on computer systems to regulate the presentation of various stimulation and choice options, and microswitches (sensors) to help the participants deal with those options with minimal responses. Six basic program levels can be identified from the studies conducted in this area. The first four levels concern MCS participants and the last two levels participants emerged from a MCS with receptive language skills.

First level: the program allows the participant to access a set of preferred stimuli (*e.g.*, music) through a simple response.[1] The participant is provided with a microswitch (*e.g.*, an optic or pressure device) that he or she can activate with a response such as finger movement or eyelid closure. Each response occurrence is followed by a brief activation of the preferred stimuli. Acquisition of the link between response and stimuli enables the participant to gain control over the stimuli and have an active role in deciding his or her level of sensory input, with advances in response engagement, alertness/attention, and social status.[3]

Second level: the program allows the participant to access two different sets of preferred stimuli through two responses.[1] The participant is initially provided with one microswitch suitable for a specific/simple response to access the stimuli of the first set. Subsequently, the participant is provided with a second microswitch for a second response to access the stimuli of the other set. Eventually, the participant (a) alternates the use of the two microswitches in separate sessions so as to practice each response and access each set of stimuli regularly or (b) has both microswitches simultaneously to choose between stimuli and responses freely.

Third level: the program allows the participant to access preferred stimuli and request for caregiver attention.[4] The participant is initially provided with a microswitch to access preferred stimuli. Then, he or she is provided with a second microswitch whose activation leads the computer to emit a verbal request for caregiver attention. Eventually, both microswitches are available simultaneously so that the participant can choose between specific stimuli and caregiver attention freely.

Fourth level: the program allows the participant to choose within groups of stimuli.[2] The computer presents brief samples of the single stimuli. In relation to each sample, the participant can perform a positive choice response (*i.e.*, by activating the microswitch available) or a negative choice response (*i.e.*, by abstaining from microswitch activation). A positive choice response leads the computer to present a segment of the sample-related stimulus. At the end of the segment, the participant can choose an extension in the presentation of that stimulus, by new microswitch activation. A negative choice response leads the computer to present the next stimulus sample of the sequence.

Fifth level: the program allows the participant to communicate via text messages,[4] that is, to select and send messages to preferred partners and also receive messages and have them read out by the computer. The sequence to select/send a message begins with the computer listing the names of the partners. When the participant selects a partner (by activating the microswitch after his or her name), the computer lists the messages available for that partner (*e.g.*, "how are the children?", and "I

love you"). Once the participant selects a message (again by microswitch activation), the computer sends that message out. The participant can have any incoming message read out through microswitch activation.

Sixth level: the program allows the participant to choose among and within communication and occupation options.[2] For example, the computer may present options such as music, videos, text messages, and statements/requests. If the participant chooses (by microswitch activation) music or videos, the computer presents a variety of song titles or videos' titles. When the participant chooses one of them, the computer plays it for 2-3 min. If the participant chooses text messages, the conditions are as described above. If the participant chooses statements/requests, the computer presents boxes with phrases asking for body movements, stating basic needs, and requesting for information, respectively. Choosing a phrase leads the computer to verbalize it aloud so the caregiver can hear and respond.

Sixth level revised: if a participant is affected by global aphasia, the aforementioned program needs to be revised. It might, for example, be limited to options such as music, videos, and statements/requests and rely totally on visual images.[2] Initially, the computer may present visual images of those options. If the participant chooses music, the computer may present the photos of various singers. Choosing a singer would lead the computer to play one of his or her songs. If the participant chooses videos, the computer may present a number of 5-s video clips in succession. Choosing a video clip would lead the computer to present the corresponding video. If the participant chooses statements/requests, boxes with images replacing the aforementioned phrases would appear. Choosing one of the images would lead the computer to verbalize the corresponding sentence to allow the caregiver to hear and respond.

In conclusion, the six program levels described above (including the revised version of the sixth program level) and the preliminary data obtained by the early studies assessing them seem to offer a new perspective for persons with serious multiple disabilities. It might also be noteworthy that the technology required for those programs is relatively simple and inexpensive.

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Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Article first published online: December 2, 2015. - Manuscript accepted: November 30, 2015. - Manuscript received: September 24, 2015.

(*Cite this article as*: Lancioni GE, Singh NN, O'Reilly MF, Sigafoos J, Olivetti Belardinelli M. Technology-aided behavioral programs for helping persons in or emerged from a minimally conscious state. Eur J Phys Rehabil Med 2016;52:594-5)