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The Science of Motor Control Can Bring Back a Smile for Those With Muscle Dysfunction

A child's smile is something we take for granted. But muscle dysfunction can turn a simple expression of joy into a challenge. Surface electromyography provides a noninvasive method of sensing muscle activity that can be used for muscle rehabilitation -- and to bring a smile to a child's face.

- 5 A special issue of the journal *Biofeedback* presents the case study of a 4-year-old boy who sustained seventh cranial nerve palsy¹ at birth, affecting facial muscles on his left side. Through fourteen 1-hour sessions using surface electromyography, he learned to control these facial muscles. Facial nerve impairments can be overcome naturally, without rehabilitation, in as many as 70 percent of cases. However, that rate drops to 61 percent when the paralysis occurred during pregnancy. This disorder can affect oral functioning, taste, and even protection of the cornea. This case offered the additional challenge of capturing and holding the attention of a 4-year-old child, who did not necessarily have an interest in repeatedly exercising his facial muscles. Therapy was undertaken because his paralysis affected not only his smile, but also his ability to eat and close his left eye. The child had an overall droopy appearance to his face.
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- 15 Sensors placed on the boy's skin recorded the appropriate targeted muscle activity and rewarded him when he successfully used those particular facial muscles. The appropriate response would activate a DVD, playing a desired movie. If the response was not repeated, the DVD stopped; a "good smile" reactivated the machine. Over the course of 8 weeks, the boy improved his ability to hold his smile from 11.2 seconds to 66.5 seconds. Unexpected positive comments about his smile from both the child's grandmother and his teacher offered needed encouragement during his therapy. This showed that the learning in the laboratory was being put to use in the child's life. These comments also provided a good outside evaluation of his improvement -- because the quality of a smile can be hard to gauge.
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From ScienceDaily (Aug. 21, 2012)

Sum up this article and explain the main ideas using your scientific knowledge

¹ Palsy: atrophie, paralysie