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A comparison of three-dimensional and two-dimensional analyses of facial motion

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ABSTRACT

The purpose of this study was to compare the amplitude of facial motion obtained using three-dimensional (3-D) and two-dimensional (2-D) methods. The amplitude of motion of fifteen facial landmarks during five maximal animations (smile, lippurse, grimace, eye closure, and cheek-puff) was quantified in 3-D and 2-D using a video-based system. Results showed that the 3-D amplitudes were significantly larger than the 2-D amplitudes, especially for landmarks on the lower face during the smile animation. In the latter instance, the 2-D amplitudes underestimated the 3-D amplitudes by as much as 43%. The difference between 3-D and 2-D amplitudes was greater for 2-D amplitudes obtained from one camera rather than from multiple cameras. The results suggest that a 2-D analysis may not be adequate to assess facial motion during maximal animations, and that a 3-D analysis may be more appropriate for detecting clinical differences in facial function.

KEY WORDS: Facial motion, Three-dimensional, Two-dimensional.

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