Are there any Body-movement Differences between Women and Men when they Laugh?

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Abstract
Initial computer-based experiments indicated more intense movement of women's shoulders and men's elbows, but further investigations are still needed.

Keywords: Laughter Motion Analysis, gender-based differences, behavioral pschology, gesture

1. Introduction

Smiling differences between men and women were reported (LaFrance 2000; 2003; 2013). Women smile more than men, especially between the age of 18 and 23. However, the expressiveness of females is not more across all facial actions (McDuff et al., 2017).

There are also body movement differences between males and females (Davis and Weitz, 1981). Male body posture, for example, was more open in (Cashdan, 1998).

Most these differences have been attributed to power, environemental, social, or cultural aspects in (Jäncke, 2018), yet the interaction between the influences and hormones levels are not fully understood.

2. Computer Based Analysis

We analyzed body movements of males and females when they laugh. Body movements were extracted from 186 laughter videos using OpenPose (Cao et al., 2019), which is a pose estimation deep learning model. The videos were taken from NDC-ME dataset (Heron et al., 2018).

The movement of a body part m was represented as time series s_m: $[s_m^1, s_m^2, ..., s_m^n, ... s_m^N]$, where s_m^n is the displacement of m in video frame n. $s_m^n = p_m^n - p_m^{n-1}$, where p_m^n is the cartesian position of m in frame n.

We compared body movement signals using the Fourier Transform. The frequency-domain was chosen to detect any potential artifact that could bias body movements signals (i.e., high-frequency noise from OpenPose).

3. Results

Fourier transform of thorax and shoulders movements were on average higher for females while males had higher Fourier transform of Elbows movement (see Figure 2). The difference became clearer with higher laughter intensities, and it was not limited to a small frequency range but covered most of the spectrum.

The results could be affected by the small size of the studied sample: 14 participants (different cultures/countries), 186 videos (38% for females). Other influencing factors could include age and context. Since all videos were recorded for sitting people in free dyadic conversation.
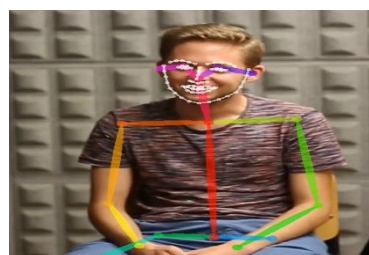

Figure 1 A sample pose extracted from a video.

4. Acknowledgements

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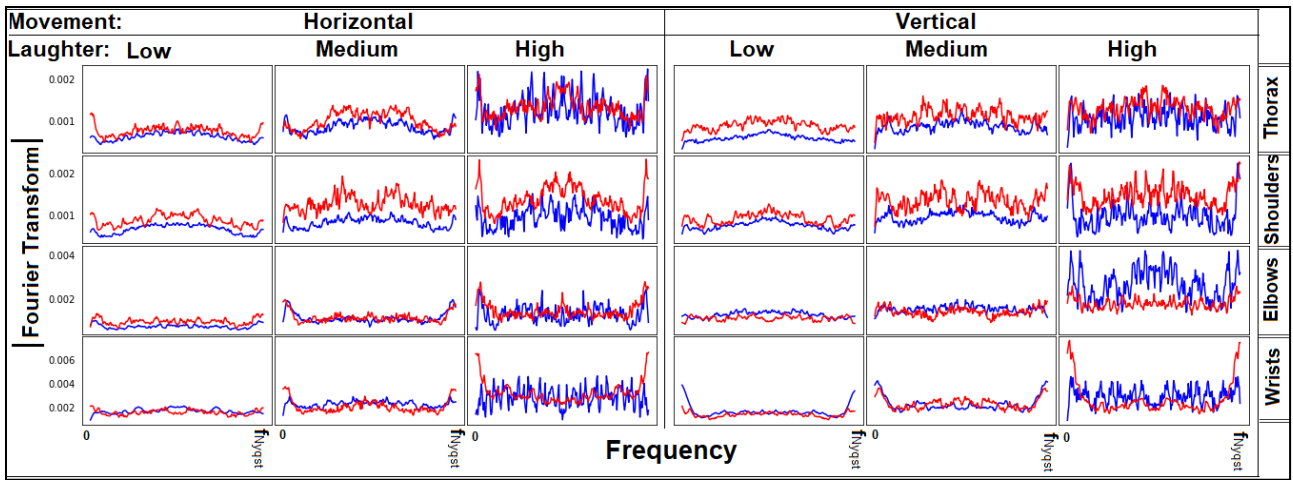
Figure 2 Average Fourier transform of a body part movement (red curves are for females, and the blue ones for males). Each Row represents a body part. Each column represents a pair of a laughter intensity (low/medium/high) and a direction of body part movement (horizontal/vertical). The x-axis represents the frequency between 0 and Nyquist frequency at 50 frames per second. The y-axis represents the mean amplitude of Fourier Transform.