Social distance as a measure for Uncanny Valley Effect

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As robots are made to appear more human, their likeability trends upward [1]. However, this trend is broken when they became almost-but-not-fully humanlike. Such robots are perceived as creepy or scary, similar to zombies or prosthetic limbs. This sudden dip in likability is labeled Uncanny Valley (UV). The non-linear relationship between the human-likeness of an object and the observers' sense of affinity was first described in the context of human-robot interaction but it is also important for neuroimaging, developmental psychology, animal studies, etc [2]. Currently, there is a disagreement about likeability as a measure for UV [3]. Therefore, in this study we will introduce *social distance* as a new measure. Our second aim was to investigate the scope of the phenomenon itself so we tested whether people with prosopagnosia and social anxiety also experience UV. We were hoping to distinguish between perceptual and sociological nature of the effect.

The same four groups of Psychology students (18 - 24 years) took part in two experiments. Participants in the first group (6, out of which 4 males) had prosopagnosia. The second group (13 participants, 4 males) had low score on social anxiety and the third group (13, 2 males) had high score [4]. The last, control group (18 participants, 5 males) had normal face recognition and a medium score on social anxiety.

In both experiments, the stimuli were 4 families of faces (2 male/2 female). Each family consisted of a couple of human and robot faces morphed on 8 levels. In the first experiment we measured standard likeability on a 7-point scale. Interaction of morphing and participant's group was significant ($F_{(27,81)}$=6.087, p<.000). Main effects, morphing ($F_{(9,351)}$=21.687, p<.000) and difference between the four groups ($F_{(3,39)}$=6.610, p<.001) were also significant. Participants with high level of social anxiety express the lowest likeability. Also, the most significant difference was among them and the control group (p<.000). Finally, we observed UV for each participant's group except the one with high level of social anxiety.

In the second experiment we introduced social distance on 7 point (Bogardus inspired) scale and repeated the procedure from the first experiment. Again, both interaction ($F_{(27,81)}$=5.047, p<.000) and the main effects were significant (morphing: $F_{(9,387)}$=14.868, p<.000; groups: $F_{(3,43)}$=12.392 p<.000). The highest social distance was measured for the participants with high social anxiety. UV was demonstrated for controls and the group with low social anxiety, but not for people with prosopagnosia and high social anxiety.

Our results extend the insights on UV by adding another measure and specifying population susceptible to this effect.

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