The Effects of Emotional Expression on Gaze Behavior and Electrodermal Activity in an Immersive Virtual Environment

Exposé for the Bachelor Thesis of Konstantin Willeke

Engaging in and maintaining eye contact with another person is an important part of nonverbal communication. With regards to psychophysiology, the establishment of eye contact yields a robust skin conductance reaction and heightened arousal (Helmiem, Kaasinen, & Hietanen, 2011). It is furthermore well established that emotional expression of another human being may result in avoidance or approaching behavior, but it is less well understood how emotional expressions influence gaze behavior.

According to Argyle and Deans (1965) equilibrium model theory, there is a tradeoff between different nonverbal behaviors, such as eye contact and spatial proximity, to ensure a relatively uniform arousal level. This suggests that, for example, following confrontation with an angry facial expression, an initial high arousal will be mediated by keeping a greater interpersonal distance and avoiding eye contact. In line with this, Hall (1966), coined the term proxemics to describe the spatial behavior that human beings engage in, such as different zones surrounding each person (exemplary the social space from 3.0 to 1.2m and the personal space from 1.2 to 0.4m around the body). Intruding these zones, will result in higher arousal and being uncomfortable. Thus, physiological arousal when interacting with another human being is heavily influenced by the emotional state of the other person, the spatial distance as well as the mutual gaze.
However, studies looking at the connection of these phenomena usually rely on laboratory experiments with heavily confined settings as well as pictures of faces instead of real persons (see Adams & Kleck, 2005 for example). In order to test the predictions of these models in a setting with higher ecological validity, an experiment within an immersive virtual environment (IVE) was conducted. It has been shown that IVEs are a useful tool in assessing different cognitive phenomena (McCall, & Blascovich, 2009), where a real world experimental implementation is not feasible. Furthermore, IVEs provide a high level of controllability and are still considered to have a high ecological validity. Using an IVE, Bailenson et al (2003) could find a link between the spatial proximity that a person kept to a virtual character (also called agent) and to heightened arousal using skin conductance measurements.

Along those lines, we created an experiment where people moved around an agent, with varying emotional expressions (neutral, sad, angry) in a bogus memory task. During this task the gaze of the agent is following the participant. The physical proximity, the direction of gaze as well as the skin conductance, a measure of physiological arousal, were recorded for the entire time.

Based on previous findings, we expect to find a connection between gaze behaviors and arousal, such as that the more time people are engaging in eye contact, the higher the arousal, should be.

Second, we hypothesize a higher arousal when engaging in eye contact with an angry agent as opposed to a sad or neutral agent.

Third, we assume that when in close physical proximity to the agent, the gaze of the participant is averted in contrast to when being further away.
References

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