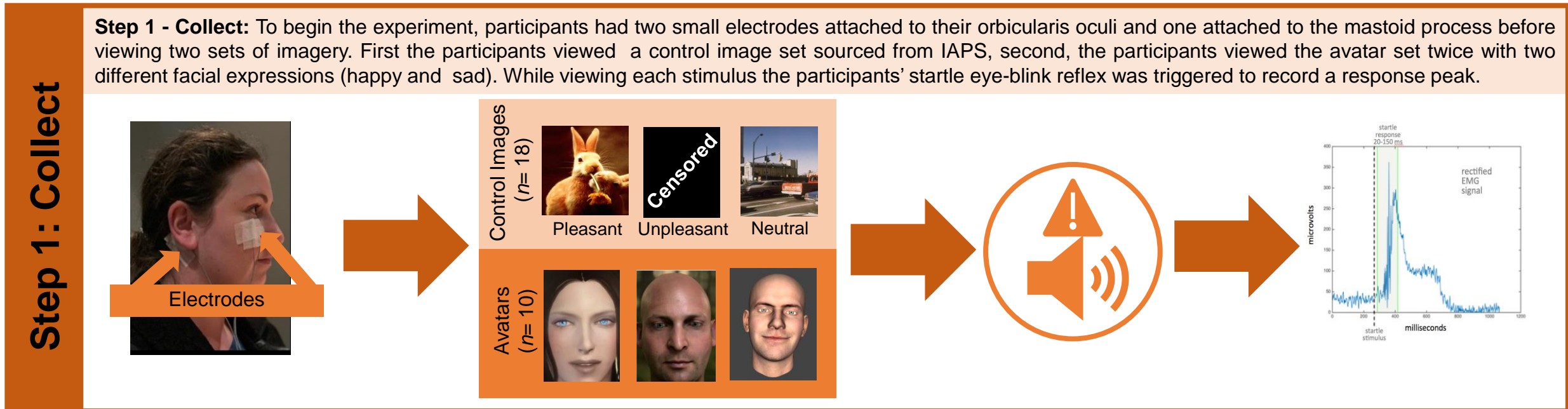


A Pilot Study for Using Facial Electromyography to measure Avatar Realism and Uncanniness Perceptions through the lens of Gender(Sex)-Based Differences

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Despite the variety of applications that use avatars (virtual humans), how end-users perceive these avatars is not fully understood, and accurately measuring those end-user perceptions remains a challenge. To more accurately measure end-user responses to avatars, this pilot study uses a novel approach to examine and categorise end-user facial electromyography (f-EMG) responses. These responses can be categorised as pleasant, unpleasant, and neutral using control images sourced from the International Affective Picture System (IAPS) (Lang, 1995). This approach may also account for variability between participant responses to avatars. However, given the large amount of variability in f-EMG responses, solely measuring the peak of an f-EMG response without the appropriate context may render these comparisons somewhat meaningless (Halaki & Ginn, 2012). Thus this novel approach seeks to add context to the responses to enable a deeper analysis. Additionally, this novel approach taken here can assist in comparisons of avatars, such as gender(sex)-based differences. This novel approach is outlined below:

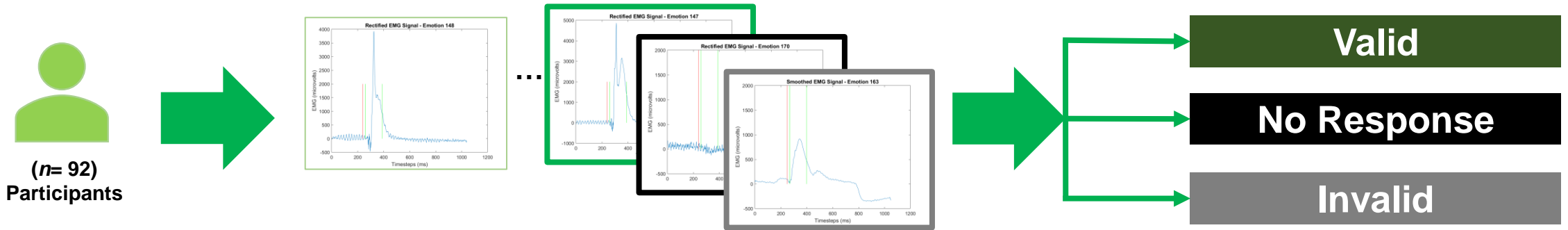


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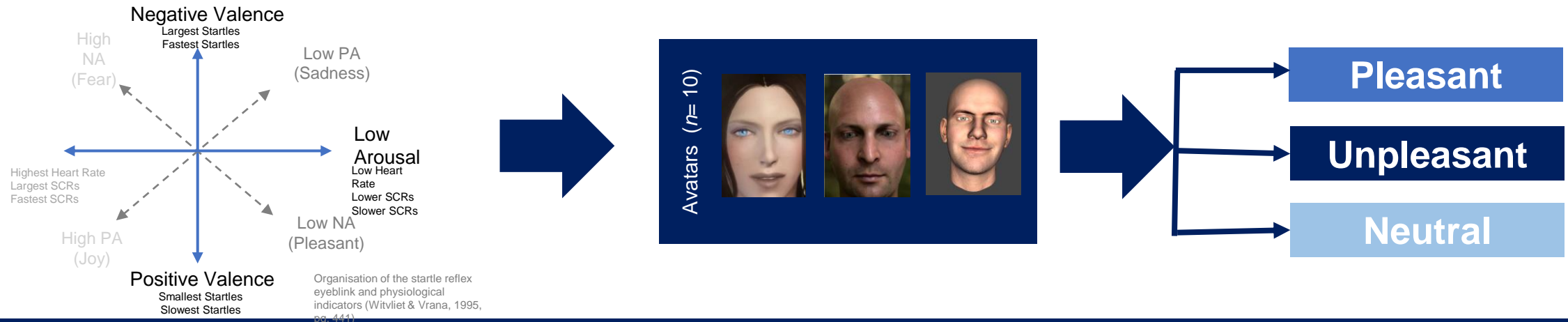
Step 2: Verify

Step 2 – Verify: Once collected, each of the individual responses for the ($n= 92$) participants was verified as either Valid, Invalid or No-Response (Blumenthal, et al., 2005) (Total number of responses verified is 3,496).



Step 3: Categorise

Step 3 – Categorise: After verification, the valid responses can be mapped to the model below from Witvliet and Vrana (1995). Using a nearest neighbour calculation, from the mean responses to the control image set, the responses to the avatars can be categorised as pleasant, unpleasant or neutral

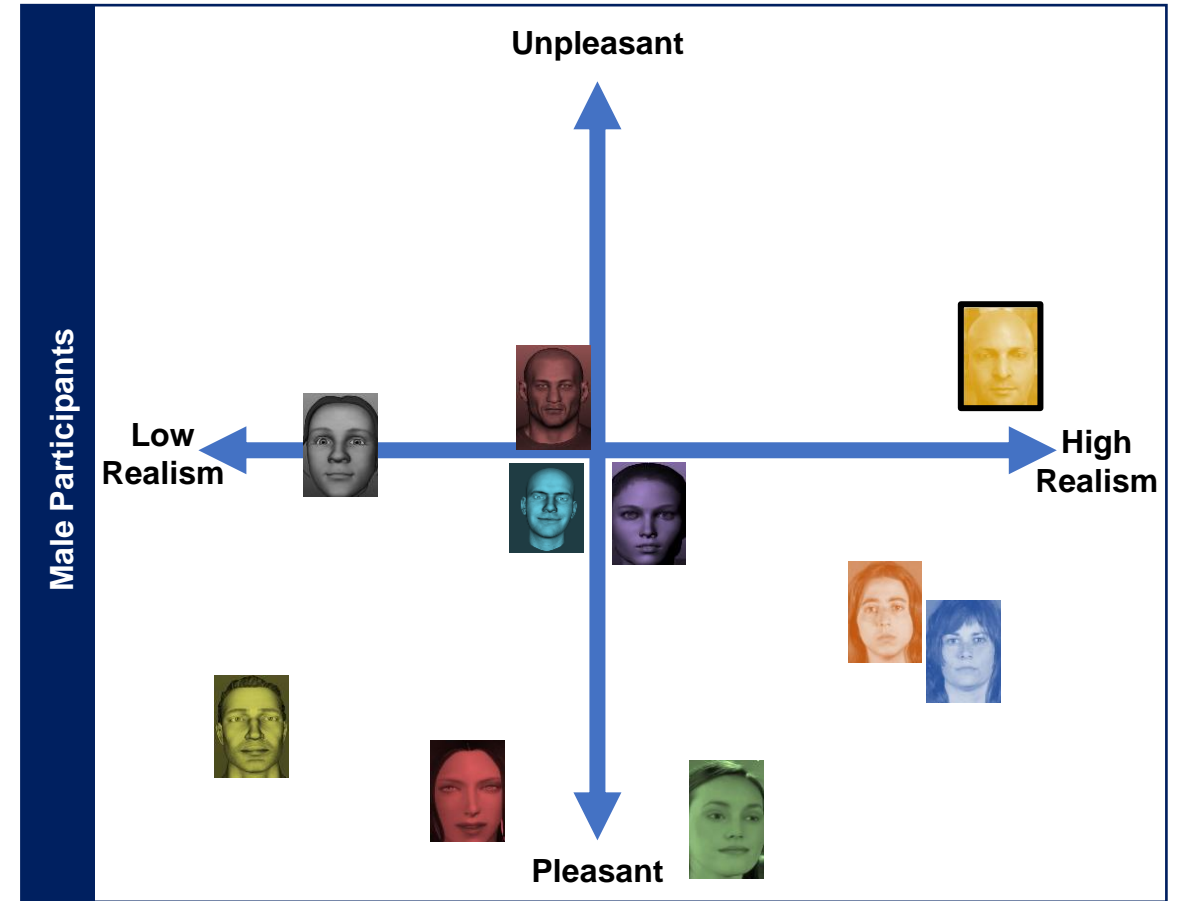
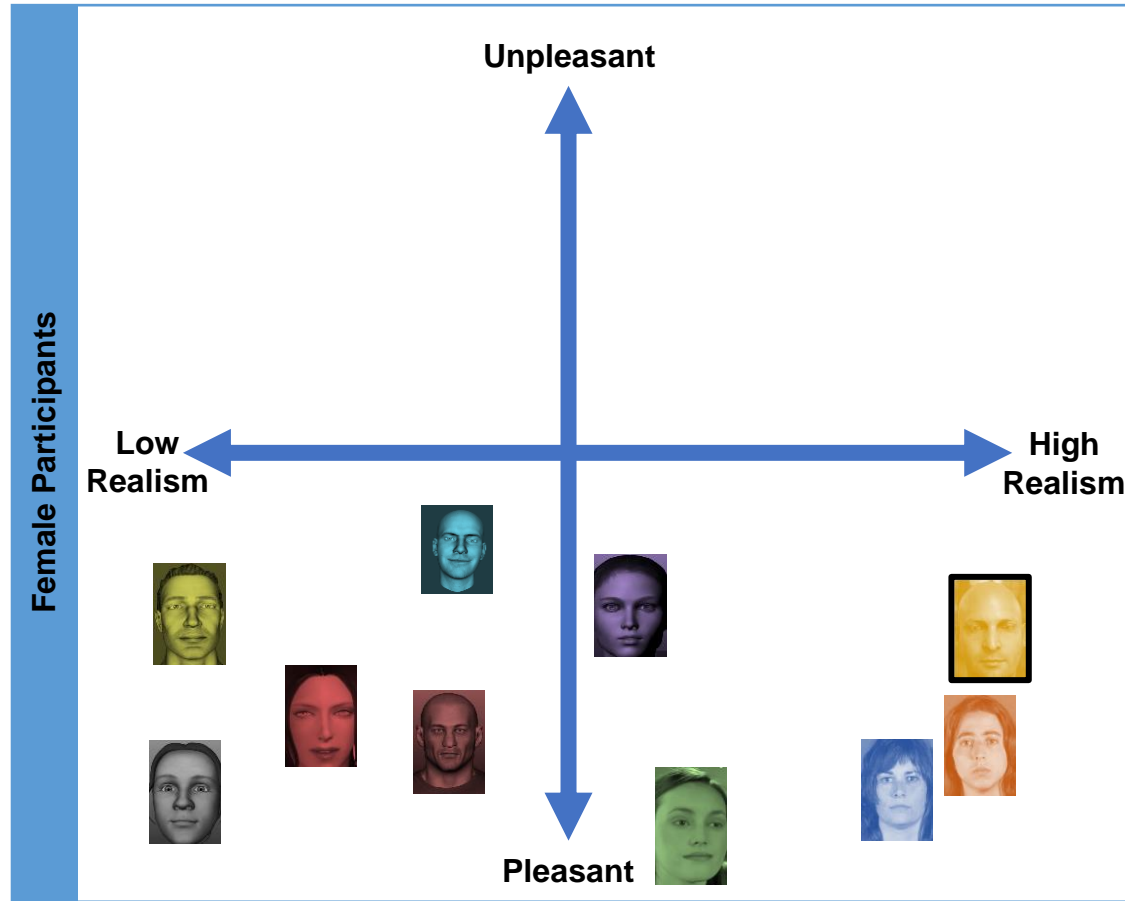


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Step 4 – Analyse and Interpret: Finally, the responses can be analysed and interpreted, showing some interesting differences between female and males participants. For example, the high realism male avatar (pale yellow, black border added for readability) is categorised as pleasant by the female participants but the males have a more neutral response to this avatar.

Step 4: Analyse & Interpret



*Note: The results shown here met the following condition - each avatar displayed a neutral-to-happy expression when shown to the participants as outlined in Step 1. The colour coding of the avatar images is present here to enable an easier comparison and was not present in the experiments

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Outcome of the Pilot Study

Pilot Study Recommendations and Summary

Using this method may allow avatar developers and designers to better understand how end-users objectively perceive an avatar. The recommendation of this approach is to aim for an avatar that returns a pleasant, neutral, or pleasant-neutral response. Unless an unpleasant response is the intended experience for the end-user, where an unpleasant rating would be the aim when examining the end-user response to an avatar. This approach demonstrates a novel and useful way forward to address some of the known variability issues found in f-EMG responses, and responses to avatar realism and uncanniness that can be used to examine gender(sex) perceptions.

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