Perceptions of Colour Pickers and Companions in Virtual Reality Art-Making

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ABSTRACT

Virtual reality art is reshaping digital art experiences but may elicit different first impressions across disparate age groups. We investigate first impressions of VR colour pickers and the impact of a virtual companion via an online survey with 63 adults and 24 older adults. The colour pickers differed significantly in perceived hedonic qualities. We found no statistical differences between perceptions of adults and older adults. The virtual companion had no significant effect on participants' overall experiences. However, we found statistical trends where older adults rated the virtual companion higher in terms of companionship and making VR art more engaging.

Index Terms: Human-centered computing—Human computer interaction (HCI)—HCI design and evaluation methods—User studies; Human-centered computing—Human computer interaction (HCI)—Interaction Paradigms—Virtual Reality

1 INTRODUCTION

First impressions are crucial in determining the likeability and thus adoption of a design [6]. Given that a tool's aesthetics influences the user's perception of its utility and formation of the users persistent attitude towards the tool [8], it is critical to understand how features impact emotions the first moment of their experience with it.

We focus on first impressions of a basic function in digital painting: selecting a colour from a colour palette. Most colour pickers in digital painting combine continuous and discretised subsets of 3D colour spaces such as HSV (Hue, Saturation, Value) and RGB (Red, Green, Blue). Selecting a specific colour in these typical colour spaces can be challenging for novices who lack the understanding of colour theory [10]. We developed a discrete picker to mitigate this challenge [1]. In this paper, we compare first impressions of our discrete picker and a standard HSV picker tool in VR art-making.

A study with artists making art in the real world showed that artists appreciated the social engagement that occurs during the art-making process as it facilitates the artists' decision-making while painting and reflection of their art pieces [3]. This shows that the benefits of companionship are sought during art-making. Companionship can be supported by pets and pet therapy [5]. While there is potential for people to derive companionship from social companions [11], we know relatively little about how people perceive artificial companions within VR.

In this study, we investigated first impressions of VR art colour pickers (i.e., discrete picker versus HSV picker), and the impact of the presence of a virtual companion (i.e., virtual dog) on the display of the VR art experience via an online survey. We selected a dog as the virtual companion because previous research found that artificial dogs had the highest likeability [2]. We aimed to answer the following research questions: For adults and older adults, a)

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what are perceptions of the discrete picker and HSV picker? and b) how does the presence of the virtual dog impact the VR experience?

2 METHODS

In this study, we were interested in investigating participant's perceptions and first impressions of the colour pickers and the presence of the virtual companion on the display of the VR art experience (Fig. 1). The online survey comprised a pre-video demographic questionnaire, one of four recorded online videos, and a post-video questionnaire, taking in total approximately 15 - 25 minutes. Questions included semantic differential items that were divided into three groups (Pragmatic Quality (PQ), Hedonic Quality (HQ) and APPEAL [7]) with an additional item Social /Isolating.

The four videos [12] consisted of a combination of an artist using either the HSV picker or discrete picker and the presence or non-presence of the dog. Each video is five minutes long. The application was built using Unity3D software. The VR art tool and the discrete picker were custom-design [1] and the virtual dog asset was downloaded from Unity Asset and programmed into the VR art tool.

The research was approved by University of Auckland Human Participants Ethics Committee reference number UAHPEC22162. The survey was completed by 87 participants. 24 were older adults aged 60 and above, who had a mean age of 69.9 years.
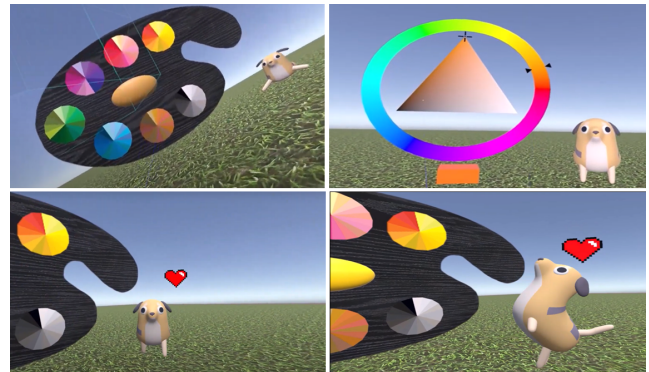

Figure 1: Colour pickers and the virtual dog. From the first row: Discrete picker with the dog sitting (left), HSV picker with the dog standing (right). From the second row: the dog is walking to the user (left), the dog is spinning in front of the user (right).

3 RESULTS

We did a factor analysis on the three groups of semantic differential items PQ, HQ, and APPEAL [7] and analysed their reliability. We used ANOVA and MANOVA to investigate differences in first impressions across groups. We used affinity analysis [4, 9] where we grouped quotes based on similarity.

3.1 Perceptions of the Colour Picker

The survey subgroups achieved high internal consistency: PQ (α = .926), HQ (α = .943), and APPEAL (α = .964). The MANOVA analysis found that the discrete picker had an overall significant effect on HQ (F(1, 86) = 5.35, p = .023), but not PQ and APPEAL. There were no significant differences between adults and older adults. With regards to the satisfaction with the range of colours in the colour picker, we found no statistical differences between the discrete picker and the HSV picker.

3.2 Impact of Dog Presence on VR Experience

Results from our one-way ANOVA found no significant effect between videos with or without the pet on participants' perceptions of the VR art-making tool's social impact. The virtual dog, as presented, did not significantly change the VR art experience. However, we found a statistical trend among older adults in which they perceived the VR art experience to be more sociable because of the presence of the virtual dog, as demonstrated by one-way ANOVA (F(1, 85) = 4.04, p = .048). Furthermore, we also found a statistical trend among older adults which indicates that the virtual dog is a good companion (F(1, 40) = 4.05, p = .051) and that the virtual dog makes the VR art more engaging (F(1, 40) = 3.49, p = .069). We found that the presence of the pet had no significant effect between dog and non-dog owners. There was qualitative feedback that the facial expressions of the dog needed to be more realistic. Furthermore, some participants highlighted the lack of social interactivity between the dog and the users as well as the art. These may be the reasons that caused our results to be not significant. Older adults seem to have more appreciation towards the existence of the dog. From the feedback, most older adults gave positive reviews about the dog (e.g., the dog was cute and appeared to be a good companion).

We investigated the effect of the presence of the dog in the VR art experience between dog owners and non-dog owners. We assumed that dog owners would appreciate the dog more. However, we found no significant effect on that group.

Analysis of our post-video survey yielded five subthemes for qualitative feedback from the participants' perceptions of the colour picker (colour pickers' colour range, colour preference, design satisfaction, customisation, and simplicity and perceived usability), and three subthemes for qualitative feedback on participants' perceptions of the virtual dog (pet likeability, pet expectations, and social interactivity).

4 DISCUSSION

We found that there was a significant difference between the discrete picker and the HSV picker in participants' ratings for hedonic quality. The observed difference might be due to the discrete picker's novelty or aspects of its design. The quantitative results indicated that the HSV picker displayed similar pragmatic qualities as our discrete picker. The qualitative feedback around design satisfaction seemed to indicate that the discrete picker was more comprehensible whereas the HSV picker was more difficult to understand.

Participants mentioned the limited availability of colours in the discrete picker. In contrast, participant mentioned that people might face paralysis of choice using the HSV picker because there are too many colours. Comments seem to indicate that the discrete picker is more suitable for novice users, whereas the HSV picker is more suitable for experienced users who like to explore more colours [10].

Customisation was a theme in the qualitative feedback. Participants suggested features including the ability to save the previous colours, a customised palette chooser, and the possibility of mixing colours. We suggest future studies explore these because they may enhance users' experience when using the colour pickers. Several participants requested the dog to be customisable to increase its functionality and attractiveness. This could be a valid point as the dog only has basic functions since it is at the proof-of-concept stage.

Further research could seek to include customisable features for the dog such as adding accessories, changing the dog's colour, or a wider selection of virtual companions.

5 CONCLUSION

Compared to the HSV picker, the discrete picker had higher hedonic quality; it was seen to be more interesting, exciting, impressive, and original. Qualitative feedback suggested that the discrete picker may be more suitable for novice users who do not have any knowledge in 3D colour space, while experienced users would appreciate the HSV picker. We found no statistical effect of the presence of the dog on the VR art-making experience. However, we found a statistical trend where older adults perceived the dog as a good companion and it made the VR art more engaging.

In future work we would like to investigate whether the first impressions we observed correspond to user experiences when using the VR equipment. We would also like to further explore and develop different colour pickers for digital painting and VR because there are currently limited options to choose from. Future studies should continue to investigate the effect of virtual companions, especially on older adults and people with impairments, in order to make VR experiences more engaging and social.

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