

Fostering Mental Well-Being through Creative Interaction: An Assessment of SOVIA

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Abstract

Therapeutic Computational Creativity is an emerging domain that challenges us to explore applications of Computational Creativity systems to mental health and wellness. This includes the assessment of creative systems for their ability to support well-being. In this paper, we assess this potential in the co-creative system SOVIA, which engages users in a creative interactive experience with Monet’s paintings. We conduct a user study followed by thematic analysis to ascertain SOVIA’s value for mental well-being.

Introduction

Recent years brought awareness to the importance of mental health. The COVID-19 pandemic came with a substantial mental health toll, making it more urgent than ever to find affordable ways to help people maintain mental health and wellness. Therapeutic Computational Creativity (TCC) is an emerging field within Computational Creativity (CC) that overlaps human computer interaction, art therapy, and psychology. While TCC does not aim to replace classical therapists, it can offer benefits with therapeutic endeavors (Pease et al. 2022).

Previous work in TCC focused on bereavement. One study explored current reminiscence practices and receptiveness to CC related tools with the bereaved (Cheatley, Moncur, and Pease 2019). The following year, a user study was used to analyze ALYSIA (Cheatley et al. 2020), a co-creative songwriting machine, to assess its utility in the bereavement process. Data from the study was analyzed using *thematic analysis*, a technique that allows researchers to identify patterns in data by discovering recurring themes, allowing them to examine common experiences and meaning throughout a group of participants (Braun and Clarke 2012). The study found that ALYSIA supports self-expression, as well as helps users reminisce and gain awareness of their feelings.

In this paper, we focus on the wellness potential of SOVIA (Gayhardt and Ackerman 2021), a co-creative machines that places most of the effort on the machine agent, while giving the user a simple and enjoyable experience that deepens engagement with Monet’s landscapes. A mixture of music with realistic and associated sounds creates an experience that mimics realistic elements in the art, while

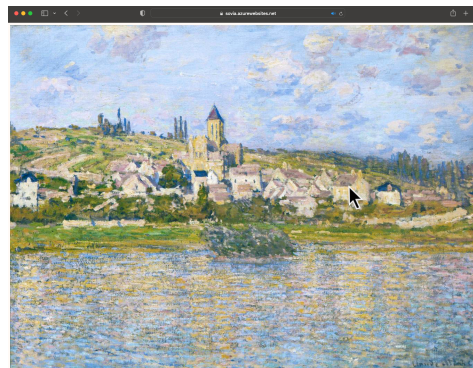


Figure 1: SOVIA offers a creative interactive experience that brings Monet’s art to life. The user can hear lively conversation when the mouse is hovered over a building, cicadas with distant birds when over grass, the wind blowing when hovering over the sky, etc. A soft backing track connects the sound corresponding to the current position in the painting. In this example, Monet’s Vétheuil (1879) is displayed on screen.

reflecting the gentle artistic reinterpretation of those objects through sound. As the user moves their mouse across Monet’s landscapes, they hear soundscapes that represent the portion of the painting that they are currently focusing on. This results in an active experience that differs substantially from engaging with the art at a purely visual level, and helps the user “step into the art.”

SOVIA works by utilizing computer vision methods to discover objects in Monet’s artwork (ex. water, sky, building, tree, etc) and associating those elements with a variety of pseudo-randomly selected sounds. Whenever a user hovers over a particular object (ex. tree), a sound corresponding to this object (ex. birds chirping) is mixed with the underlying music (see Figure 2 for an illustration). Since the user directs the sound through mouse movements, combined with the pseudo-random selection of sounds, the musical dimension of the experience is co-created by the user and machine in real time. SOVIA may be accessed here ¹:

¹To interact with SOVIA, click on the painting after it loads (may take several seconds) to start playing the sounds, then move

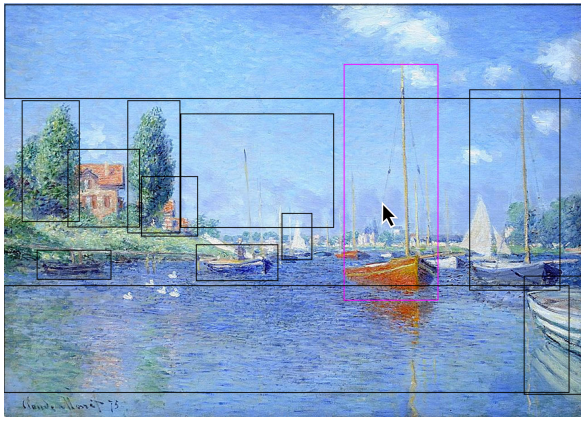


Figure 2: The bounding boxes detected using computer vision are labeled and mapped to a set of sounds, one of which is played when the cursor enters the box. The painting is of Red Boats, Argenteuil (1875) by Claude Monet. Photo Credit: WikiArt

<https://sovia.azurewebsites.net/> and a video demo can be found here: <https://youtu.be/XMMMBeukhb4>.

In our analysis of SOVIA's potential for wellness, our focus here shifts outside of bereavement, interviewing people from the general population to assess the value of SOVIA in a broader mental wellness context. In this study, we utilize open-ended interviews with thematic analysis. First we will go over the study's methodology, then detail the results and discovered themes, and conclude with a discussion of the findings and future work.

Experimental Setup

The overarching goal of this study is to evaluate the potential uses of SOVIA for mental wellness. The study took place over zoom where participants were introduced to SOVIA by verbal instructions and a live demonstration where they were shown how to navigate the system and how to discover new images. Afterwards, participants were asked to engage with SOVIA directly and to view at least three different paintings, but encouraged to look at as many as they wanted.

To allow the users their own (unbiased) experience of SOVIA, the researcher muted their audio and video while the participant was using the system. The researcher would not interrupt unless the participant had a question, was done using SOVIA, or 20 minutes had passed. Afterwards, a semi-structured interview was conducted with each participant to explore their reaction to and experience of SOVIA. The majority of questions asked were open-ended, for example, "How did SOVIA make you feel?" and "How would you describe your experience using SOVIA?" Questions that were not open ended had follow up questions so the participant could elaborate.

your mouse around the painting and hear how the soundscape reacts to your exploration of the art. Refresh to get a new painting.

Recruitment and Participants

Participants were recruited through snowball sampling and the research participation tool at Santa Clara University's psychology department, SONA. The only requirements was that participants had to be over the age of 18, speak English fluently, and have access to a computer and the internet. The 11 participants were anonymized with the assignments of P1-P11. Eight identified as female and three as male, P5-P7. Three, P1-P3, of the participants were career professionals in the age group of 51-57. They had different levels of educational background: P1 had a Bachelor's, P2 had a Master's, and P3 had a PhD. While the others were college students working on their bachelor's degree of varying majors between the ages of 18-25.

Artistic Affinity

Participants were asked background information about their interest in art, to determine if this affected experience with SOVIA. Most of the participants had a regular appreciation for art; that is, they enjoy art, but do not go out of their way to view it, and might currently participate in art casually through doodling, coloring, etc. However, some participants were more enthusiastic about art. P7 makes art while working on game development, as in 3D modeling and textures for world development. While P10 is an active hobbyist who enjoys drawing, painting, and pointillism art. Additionally, P4 was the most passionate about art, as she enjoys going to view art physically (international museums) and is often aware of local art exhibitions. She is also an active hobbyist who enjoys painting, photography, and cinematography. P9 seemed the least interested in art out of everyone, and admitted that she didn't care for it growing up. However, she now appreciates it more through her interest in makeup art. No participants had an expert level of interest in art, that is, none studied art academically or did art professionally.

Ethics

This study was approved by Santa Clara University's Review Board before data collection took place.

Results

Five major themes were identified in the user interviews: Calm, surprise, emotional association, control, and curiosity. We detail each below. Verbatim statements were kept mostly untouched except for the omission of the filler word "like", as it makes the statements easier to read.

Calm

All of the participants felt a sense of calm, peace or relaxation when using SOVIA. One of the first reactions many participants had when asked how they felt was this feeling of calm, "I felt.. very serene and I felt very calm and each photo is kind of like a different experience."(P4) "I think it's very calm like the picture itself is very beautiful and simple calming but then you add music, on top of it and I kind of feel it comes to life, a little bit like you can kind of sense the mood of whatever's going on"(P11) "I would say relaxed...

I guess, I could say happy because it, it was a cool experience and that I've never done before." (P9) "if you close your eyes, you can almost feel like you were in wherever the big painting was set in. It was just kind of peaceful."(P6)

Participants mentioned that they think SOVIA could be used as a de-stressor. One participant even had a real-time experience being soothed by using the system. P11 is a student who was stressed about school and upcoming finals and was thankful for using it, "Well actually I think that it kind of was nice, I mean it really did calm me down because, this is week 10 is very stressful.. It was... like just for a second it was just like okay chill... I feel kind of good right now."

When asked if they would use SOVIA again and when/why many mentioned that they could see themselves using it to break up events that can be tiring or induce stress. P3 said that they would see themselves using SOVIA in between meetings at work. P2, a speech and language therapist, works with preschoolers to 6th graders also mentioned that they could use it to break up work activities, "I think that's kind of a neat way to kind of to immerse yourself into it a little bit and...just gonna be a little relaxing break maybe at work between groups [of kids]". P4 voiced how she could see herself using it as a break or before a stressful event, "If I'm stressed out and I feel like also [I could use] it in between homework assignment is kind of like a break, or before a test to kind of get my nerves down or something like that."

P6 thought SOVIA could be used as "A tool to relieve anxiety... Kinda like get you in a better mindset to fix ... or get through whatever you're anxious about." P10 also mentioned that they could see SOVIA helping someone decompress if they are experiencing anxiety, "I felt that perhaps it's sort of like maybe an individual is going through a lot, and they have a lot on their mind. And so, something like this can kind of let them decompress ... focus more what they're seeing and what they're hearing. So I think it's kind of like when you have a panic attack or anxiety something like that, and then they tell you to list what you see or something in the room."(P10)

Some could see using SOVIA for meditation. P4 thought it could be used as a before bed meditation, while P5 saw it being useful for meditations to be present. "I think a different form of meditation but not really closing your eyes, but being present in the moment and just having your headphones in and just listening ... to the day sounds like practicing breathing." (P5)

Even those who felt that SOVIA wouldn't be their first choice for de-stressing, felt that it could be helpful under certain circumstances. "I don't know if it'd be the first thing that I go to for a de-stressor but I do think if needed, I could do that ... So maybe a before bed meditation type of thing."(P9). P10 shared that their primary choice for calming down involves going outdoors, but that they could rely on SOVIA if going outside was not an option. "I think it's nice... if I want to distress, I guess, maybe I would use SOVIA if it's late at night I can't really go outside".

Emotional Association

Using SOVIA reminded some participants of their lived experiences. Whether their experience was positive or negative affected their reception of certain sounds and visuals, and aided in recreating the feelings they had from that memory. For some users, it brought a sense of nostalgia, "I really like the birds chirping I feel like that's an association I have with like summer and good times, so that's how it made me feel like calm like at peace" (P8).

Other participants were reminded of an activity, "Some of the paintings just listening to the trees kind of reminds me of when I go on hikes. Or if I'm in my backyard and I just really need to de-stress... When I go on hikes it's when I have free time and it's basically moments and times when I don't really need to think about anything too deeply I can just let myself, be a little bit free now and I I don't have to be constantly thinking about worries my problems and so." (P10) "I do meditation and, many of the the sounds I heard... from the art form really kind of remind me of my meditation" P5.

Not all associations were positive. P7 didn't like the sky sounds "The wind makes me a little bit uneasy... wind just doesn't make me very happy". It reminds him of how he feels when in the wind "... whenever it's windy I get cold and stuff blows away and it's just hard to walk. And yeah something that's just like bad feelings that I've had in the past... it's like the worst thing ever"(P7).

Control

Many participants liked the sense of control they felt. They liked that they could choose the sounds they wanted to hear and when. For some, the aspect of control was a defining factor in their enjoyment of SOVIA. P7 details his experiences using SOVIA and where he chose to move their mouse. "I was able to go down into, the jungle area and then there was those birds... Then there was a little town and there's people talking ... [It was] very relaxing it was nice because, I could control what sounds I want I feel like I was like moving around in the picture, even though, it was just the mouse moving."

P7 also mentioned earlier in the interview that when it comes to game development he likes to do all aspects from coding, art, and design because he enjoys the sense of control. P6 also liked that he could pick what he heard "I like [that] you can kind of choose which sounds you heard in the painting. You could be next to the river and hear the water, or you can go into the air and hear the wind".

P4 liked the power she felt when using SOVIA and how she could create her own experience which enabled her to be creative, "feel like I could be creative as well, I felt like I had a lot of power and creating my own separate life. [It's like] I could kind of step back from reality for a second". While P3 compared SOVIA to the Calm app²; because it also uses nature sounds. However they preferred being able to control what they heard and they enjoyed that more.

²The Calm app consists of a variety of meditations, music, soundscape, etc. designed to aid with sleep and relaxation.

Curiosity and Surprised

At first thought, P3 said she felt relaxed after using SOVIA. When asked if relaxing is the only way she would describe the experience P3 said “I would put calming, I would put engaging it’s definitely kind of elicited curiosity.” P3 felt that it was more engaging because you are “connecting the sounds with the details and making you explore, so that you can hear new things... I felt like it made me notice the details of the painting more”. P1 also mentioned that it made them curious, “it was a calming effect, calming and curious I guess... it inspired me to touch different parts and and look at different parts of the painting and just curious like how does that, how does this work?”

As P11 reflected more on how SOVIA made her feel, she realized it actually made her very curious, “Like just really calm and relaxed and curious .. actually curious ... and some of the sounds weren’t what I was expecting so it was really cool.” She later described, “... I hovered over her house and on the previous one, there was people talking and then in the next painting... one of them was silent there’s no talking... It had more movement and wind, and all this stuff, so I think...it gets me curious like oh, what is going to happen next, what is this going to sound like that’s not what I expected yeah.” (P11).

Participants said that they felt moments of surprise when using SOVIA. P10 thought the unexpected was interesting and provided a unique point of view. “I think it’s sort of like an interesting thing perhaps that’s not the sound I expected to come from. Whatever I hovered over I didn’t expect to hear chimes for flowers, but I think that’s an interesting thing and that could sort of be in itself kind of a means of art like you know you overlay certain sounds over something and that’s someone’s unique perspective that perhaps you didn’t consider.” (P10).

Another participant also was surprised when they heard certain sounds “I just heard the voices I was kind of surprised because I was like Oh, I thought it was just like instrumental you know, but once I heard the voices that just like caught me off guard, but it wasn’t really scary it’s just like something surprising“(P8) Others expressed moments of excitement, “I was kind of excited to like see. Oooo what if I tap here, if I tap there.”(P2).

Discussion and Conclusions

In this paper, we examined the impact of SOVIA on human well-being through semi-structured interviews and thematic analysis. The overarching theme across all interviews is that using SOVIA gives rise to a sense of calm and relaxation. For some, using SOVIA reminded them of past experiences. A number of participants noticed they were curious, while others were surprised at moments, which fueled their curiosity.

Participants were asked to share potential applications of SOVIA. A plurality of them mentioned that they think it could be used in schools to help kids be more engaged with art. One participant, unprompted, revealed “I’m a school counselor and I was thinking this could be an interesting application to do with students.” (P1) Some felt that it could

help people with disabilities, such as ADHD, stay engaged when looking at art. Most also voiced that it could be used to de-stress or make one calm, whether it is between school/meetings, before bedtime, or other scenarios.

SOVIA appears to be a system of connection and transition, whether it is used emotionally or socially. Participants felt a deeper connection to themselves and thought others would benefit from its usage prior to class or therapy. Using SOVIA before counseling could open the mind for lower conflict engagement before couples or adolescent therapy, or as an ice breaker to meeting a new therapist. Use before yoga or massage could deepen the experience and render more medical benefit from those activities.

Given the themes detected, it will be interesting to evaluate the impact of using SOVIA with specific populations. Stroke survivors can experience anxiety, irritability, loss of memories, among other challenges³. They can also experience motor apraxia. SOVIA may have the potential to aid stroke survivors, by helping them restore a sense of balance when needed. It could also assist in recovering motor function of the left/right side of the brain since using SOVIA requires using a mouse or touch as the user navigates the artwork.

This was an early study of the efficacy of SOVIA in a therapeutic context. For future work, we would like to conduct a study on a larger number of participants, carried over a longer period of time, in order to assess the long term benefits of using SOVIA. The integration of standardized tests such as the Warwick Edinburgh Mental Wellbeing Scale (Tennant et al. 2007) and having participants provide daily journaling of their experiences will help gain deeper insights into the impact of SOVIA. We hope this study will help promote greater interest in the mental wellness potential of other creative machines.

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