Step-by-step Self-reliant Thinking with CAN(Communicative Art Network)

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This paper introduces a new interpretation of art experience by presenting CAN(Communicative Art Network), which allows viewers to achieve self-reliant thinking based on their art experience. CAN is a platform that consists of CAN AR Comment System and CAN SNS. We conducted a within-group experiment to explore how CAN influences the process of appreciating and sharing works of art. Our findings show that CAN allows users to accurately leave comments on artwork and select either voice or text input to effectively record comments. In addition, through CAN SNS, communication between viewers, artists, and docent can be actively carried out.

Additional Key Words and Phrases: Art, Communication, Social Media, Augmented Reality, Self-reliant Thinking

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1 INTRODUCTION

When appreciating an artwork, we tend to be embarrassed about our ignorance. Such sense of embarrassment restricts engaging art experience as it solidifies the thought that art is unapproachable. However, if we slightly change the perspective on art, appreciating an artwork can grant us opportunities to develop our thinking skills. Art should no longer be what we should 'know,' but rather should be considered as a medium to practice autonomous thinking. By concretizing the thoughts and impressions during an art experience, leaving records of them, and sharing them ultimately allow us to communicate with others based on self-reliant thinking. This is the true value of appreciating an artwork, which should be encouraged and supported. Digital technology, especially AR technology can be effective in supporting the process.

As a first step towards developing autonomous thinking skills, this paper presents CAN(Communicative Art Network), a new system that allows users to shape their thoughts and impressions by fully reflecting the users' original intentions, to document them, and to share them online. Based on a qualitative user study on CAN, this work intends to understand users' values and requirements, as well as find rooms for improvement. The key contribution of this paper is to present CAN(Communicative Art Network), a new system that encourages and supports self-reliant thinking during an art experience, and thus inspire designers within or outside the realm of art to utilize digital technology to promote an engaging experience. The findings show that how CAN assists users to improve their thinking skills during their art experience and further extending the communication beyond the physical exhibition space.

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2 RELATED WORK

The realm of art as the common ground, three research areas frame the study: AR as a tool for immersive experience; utilization of social media to extend the art experience beyond the physical space; and reflective engagement with art.

2.1 AR for Immersive Art

Using AR technology within the realm of art mainly centers on the immersive art experience. Researchers have investigated the distinct characteristics of AR that contribute in an immersive art experience. Such characteristics include erasing the boundary between the augmented world and the actual world [2] enabling interaction [1], and granting the option to choose between a plain and an augmented version of art [5]. While most of the research focus on adopting AR technology as a part of an artwork, this paper aims to shift focus on utilizing AR technology in the process of contemplating upon artworks. The essential features of AR technology, such as simultaneity [4], interactive elements, and the power to choose between the augmented and the actual version are the takeaway points, while only the subject of application is shifted from artwork itself to the thought process.

2.2 Social Media for Extending Art Experience

Social media in the aspect of extending art experience was mostly studied in the museum context [6, 7]. Studies reveal that the utilization of social media by museums allow a more engaging experience that extends after the viewing [6, 7]. An example of utilizing Instagram as sharing photos taken during the art experience at the museum of natural history illustrates how the users were able to create their own narrative through sharing the photos [7]. Museums are also starting to use social media in recognition of its influence in terms of distributing community knowledge [6]. This paper adopts the concepts of creating personal narratives through shooting photos and utilizing social media to create community knowledge, which are incorporated into the self-reliant thinking process.

2.3 Art and Reflective Engagement

In continuation with utilizing social media for extending the art experience beyond the physical space, leaving posts on one's art experience on social media platforms can be considered as a reflective engagement. A research utilizes the methodology of art journaling to explore reflective engagement with public art [3]. In terms of recalling one's impressions and thoughts that occurred during on-site experience based on on-site documentation [3], taking a photo and posting it on a social media platform along with comments that reflect the on-site art experience can be regarded as a reflective engagement in a 'digital' form. In this aspect, combining AR and reflective engagement through social media in the context of art is expected to create synergy in terms of self-reliant thinking.

3 SYSTEM DESIGN

In this section, we elaborate on the design components and the overall design process of CAN.

3.1 Exploring Design Space

3.1.1 Preliminary study. We conducted a survey of 187 people on Amazon mturk as a preliminary study to investigate the current status of sharing information on artworks and usability improvements. The survey was opened to anyone who has interest in artworks and those who responded to the survey received an allowance of $0.1. Surveys are divided into information recording aspects and information communication aspects. In terms of information recording, we asked how they recorded their appreciation/question about artworks and what difficulties they had. On the information communication side, we asked how they would like to share their comments and questions with other people. Also, several questions were asked which were related to sharing information with people with expertise such as Docent/Artist.

For the information recording questions, 62 percent of people said they wanted to record their impression or curiosity right after appreciating the artwork because they could not remember each piece of art later. One interesting thing is that 65 percent of people said they want to record their feelings or questions about a particular part of the artwork rather than the overall feeling of it.

Regarding the information communication questions, About 80 percent of people said they wanted to share their impression/question about the artwork with others and also want to see those. In addition, 85 percent of people said they hoped there would be an online community to share information about artworks that would enable them to communicate with Docent/Artists.

3.1.2 Pilot test. We went through a pilot test with the high-fidelity prototype on five professionals with expertise in artworks. We came up with three main design components: *augmented reality*, *crowd-sourcing*, *multiple modalities*. We decided to point out visual cue using *augmented reality* when leaving a partial review rather than overall review of artworks. This can give a vivid sense of immersion in appreciation. Also, if an artwork is a 3D work, it has the advantage of being able to point exactly what users want.

Next, we expect the following information sharing to occur over the CAN platform. First, the general public will be able to freely share their impressions/questions with people around them, thereby increasing interest in artworks. Second, professional knowledge of artworks will be shared by communicating with docent/artist. This will solve the needs of those who study art, who want to gain high-quality knowledge of art, and who are usually unable to communicate with artists due to space-time constraints.

Lastly, we included text features as well as voice when recording impressions/questions. It was an early idea to leave a review with a minimal voice only. However, the text function was also added because voices are sometimes unavailable depending on the circumstances. In addition, verbal expression and finger typing text feel completely different, and preferences may vary from person to person.

3.2 CAN System Description

CAN(Communicative Art Network) is a six-step system consists of two subsystems: CAN AR Comment System and CAN SNS. CAN AR Comment System is a four-step process of leaving a comment on an AR button, and CAN SNS is a two-step process of editing, uploading, and communicating online.

3.2.1 CAN AR Comment System. CAN AR Comment System allows the user to create an AR button, place it on a desired location, and leave a comment that corresponds with the location of the button (Fig 1). The 'Create Button' generates a green button on the middle of the screen. The button is a movable AR button, which is overlaid on the screen. The bottom text shows the current 'mode' the user is in. The user can drag the button with a simple touch. The left and right arrows next to the mode text are clickable buttons that allow the user to switch between 'move mode' and 'record mode.' In the record mode, the green AR button switches into a record sign. Once the record button is clicked, the AR button turns into a stop sign. The user is able to leave a voice comment while the button is a stop sign. The user can touch the AR button once again when the user is done. The steps regarding the voice comment are replaced with text inputs according to user preference. After leaving a comment, the AR button turns into a green square once it is touched, which means that the voice comment is stored at that particular location of the AR button.

The location of the fixated AR button and the voice comment information are combined together and converted into a post format. The post contains the screen capture of the artwork with the overlaid AR button, as well as the comment. Docent/artists are differentiated through badges. Posts by other users are viewable in the Feed Page, which can be accessed by clicking the 'home' sign.

4 EXPERIMENT DESIGN

We conducted user testing on 11 people over two days. Through this, we investigated how CAN actually affects artwork appreciation. Our main concerns are 1) whether CAN can be used to leave more accurate reviews, 2) whether voice and text can make it easier to record appreciation of the work, and 3) whether CAN can facilitate communication between docent/artist/user.

4.1 Methods

We looked at how CAN affects artwork appreciation and recordings. To this end, we conducted user testing. We prepared the within-group experiment for a small group of people(n = 11). We had an orientation to explain how to proceed with the user testing. The user testing procedure is as follows. First, participants appreciated the artwork displayed as usual without any information on CAN. They were given two to three minutes to appreciate freely. After that, a basic survey of appreciation of the artwork was conducted. Since then, we have proceeded an explanation of CAN to participants about the overall function of it(e.g., how to record comments/questions and how to view other people's posts on social network.) After participants appreciated the same artwork using CAN, they actually recorded their appreciation using the AR button and checked the recorded comments on SNS. After CAN testing, in-depth interviews were conducted with participants. The interview questionnaire was composed of questions about the effects of CAN's communication, art experience, and SNS usability.

4.2 Participants

The advantage of the within-group experiment is that not many people are needed. For small groups of people, we were able to compare situations in which there was no CAN platform. The total number is 11, consisting of six men and five women. We recruited participants through the portal of KAIST universities. To make the evaluation of CAN accurate, we recruited people who were interested in artwork. Most of the participants consisted of people who had visited the exhibition at least once within a month.

5 FINDINGS

The semi-structured interview results are categorized into three key concepts for each research goal. Participants' answers revealed that CAN allows users to accurately deliver comments or questions through AR buttons(RQ1), to easily leave comments by taking voice and text inputs(RQ2), and to communicate with other users including artists and docents(RQ3).

5.1 Allow users to accurately deliver comments(RQ1)

The three key concepts derived from the user interviews are 'intuitiveness', 'simultaneity', and 'concretization'. While 'intuitiveness' and 'simultaneity' are related to the usability of CAN, 'concretization' represents the first step of self-reliant thinking.

RQ1-1: Intuitiveness. Participants described that they were able to intuitively use CAN AR System because the process is simple and the UI design is familiar to them. P10 noted, *"It's simply dragging a button to the place I want, easy."* The interaction with the AR button is designed to be simple and easily accessible by users even without a tutorial. P9 mentioned, *"It's like a laser pointer."* Similarly, P11 said, *"I could see that the red circle means recording in process, shape is pretty obvious."* The metaphor of a 'laser pointer' commented by an interviewee captures the essence of the AR button to specifically point the desired spot. The design of the AR button was also easily associated with the recording sign.

RQ1-2: Simultaneity. The key feature of AR, which is simultaneity, is reflected in the CAN AR Comment System. P1 mentioned, *"I can see the artwork in the background, so I am still viewing it while I am pointing."* Similarly, P9 said,

"I don't have to take my eyes off of the artwork." The answers from the interviewees indicate that CAN AR Comment System did not interrupt their art experience, as they could simultaneously view the artwork while pointing. In fact, P10 stated, *"I can document my thoughts vividly while looking at the artwork."* Through the statement, it can be derived that such simultaneity was not only non-intrusive, but enabled the art experience to become more vivid.

RQ1-3: Concretization. Users are able to concretize their thoughts through visual cues and documenting. P9 mentioned, *"Sometimes, it takes a long time for me to even describe what I want to ask. CAN would make that process easy enough."* P2 also added on to this statement that, *"The more you are unfamiliar with the art, the more you have questions on specific points. I think CAN reflects such demands."* CAN AR Comment System allows the users to materialize their thoughts through the visual cues and speaking out loud or writing. In this way, they are able to effectively deliver what they actually have in mind.

5.2 Ease the process of leaving comments by taking voice and text inputs (RQ2)

The concept of 'customization', 'convenience', and 'reflection' effectively describes the second research goal. The first two concepts are related to the two modalities regarding the comment input, and the third concept describes how leaving comments acts as the second step of self-reliant thinking.

RQ2-1: Customization. Users are able to go through a customized experience by given the choice between voice or text input. P2 mentioned, *"Depending on the type of exhibition, I would want to choose between the two."* Similarly, P11 said, *"If I am with a friend, it would be better to use voice comments. But if I am alone, I get too shy, so probably text comments? It depends..."* Therefore, depending on the type of exhibition, the situation that the user is in, and personal preference, users can decide what is the best option for leaving comments.

RQ2-2: Convenience. The two types of voice and text input are complementary to each other, and they both are convenient in the sense that the input can be made at the moment and is directly mapped to the AR button. P11 stated, *"Voice comment seems convenient, because I don't have to type word by word."* Other participants also added that they would switch modes depending on the situation they are in. P1 mentioned, *"I don't need a separate app/physical note to write down my thoughts."* In a similar context, P7 stated, *"It matches with the button, so I don't have to talk about that again in my comments."* The commonality of the two input methods is that no other notes are required other than the CAN app and that each comment corresponds to the AR button.

RQ2-3: Reflection. Leaving comments itself is the starting point of reflecting an art experience. P7 mentioned, *"Even if the impression on the artwork was strong at the moment and you took a photo of it, it eventually fades away. It is very difficult to recall if you have not written down at the moment."* It is easy to forget the ideas and questions that arise during an art experience, even if a photo is taken. CAN AR Comment system enables users to leave comments that are mapped to an AR button, along with the artwork. In this sense, it would be easier to recall the ideas and questions and reflect upon them after returning from the art exhibition.

5.3 Facilitate communication among viewers/artists/docents (RQ3)

The concept of 'accessibility', 'information acquisition', and 'multilateral communication' effectively describes the third research goal. The first two concepts illustrate how CAN contributes in solving the inconvenience of the traditional approach. The third concept describes how facilitating communication acts as the final step of self-reliant thinking.

RQ3-1: Accessibility. On-site docent system operates in two ways: face-to-face docent guide and audio guide. P5 mentioned, *"It is difficult to get my schedules to fit with the docent tour schedule. Even if I do manage to participate, it is even more difficult to ask questions in the crowd."* The statement pinpoints two physical restrictions of the traditional face-to-face system, which are difficulty in fitting in with the docent schedule and difficulty in asking questions due to

time constraint. The audio guide, as P6 mentioned, has its obvious limits regarding interaction. CAN provides a solution for the existing limitations, by increasing accessibility based on online interaction.

RQ3-2: Information Acquisition. Comments from interviewees revealed that CAN was effective in acquiring information that is not easily accessible through search engines. P3 mentioned, *"There are unique insights you can get from only artists/docents."* P3 also stated that *"Googling has its limits."* The comments further illustrate how CAN acts as an additional channel of communication for obtaining specifically targeted information. P1 said, *"CAN would be extremely helpful for those who are studying art."* This comment shows how the information can be intriguing and academically inspirational.

RQ3-3: Multilateral Communication. The final step of self-reliant thinking is to enrich ideas and expand knowledge by sharing with others. P4 mentioned, *"I want to get information from docents, and also get insights from artists. It would be fun to see what other ordinary people like me think on an artwork."* P5 also stated, *"I would like to see an ongoing active debate on artworks."* The comments show how CAN SNS adopts the key feature of social media, which is sharing. CAN supports users in concretizing one's ideas, leaving them in a recallable form, and communicating based on those ideas to ultimately achieve self-reliant thinking based on their art experiences.

6 DISCUSSION

Our experimental results got several discussion points. First, most of the interviewees want to extend the CAN SNS platform to 3D, which has been stalled by 2D functionality. There can be a lot of information loss to check the evaluation of certain parts of the artwork using AR by 2D pictures on SNS. One of the interviewees said, "If posts can be checked in 3D on SNS, information sharing on artworks will be more accurate." Therefore, we put the expending the usability of CAN SNS to 3D on our future work. Secondly, the results of user testing showed that there were people who want to see other people's comments during appreciating an artwork and there are people who don't want to do so because they may be interrupted. Currently, CAN has made it possible to check other people's comments only on SNS so that users can be fully immersed in artworks while appreciating it. However, we also plans to create a choice function that allows users to see other's comments while appreciating the artwork if they want. Lastly, when people watched other's posts on SNS, the interviewees were curious about whether the posts were listed based on an artwork or the person who posted it. One interviewee said, "If the posts are listed based on the artwork, it will be very helpful to share information about it. I can check if the questions I want to ask are questions that have been asked before, and also it will be easier to immerse myself in one artwork." CAN is currently using tags to sort artworks. The ability to further develop these tagging functions and group artworks into one is also considered suitable for future research.

7 CONCLUSION

We designed and implemented CAN(Communicative Art Network), a new system that allows users to shape their impressions and questions by fully reflecting the users' original intentions so that it's much easier for them to reach self-reliant thinking. The CAN, allowing users to point out specific parts to make comments, to document them, and to share them through online, was designed based on the needs of autonomous thinking. Our within-group experiment for 11 people's interviews demonstrated that users can accurately deliver their impressions through the CAN AR comment system with freely choosing between voice and text input modalities. It also showed that CAN could enhance communication between viewers/artists/docents, enabling active information sharing about artworks. Our findings provided several important design implications for information sharing of artworks domain and we believe that our approach can be extended to a variety of self-reliant thinking.

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A APPENDIX

Fig. 1. CAN AR Comment System.

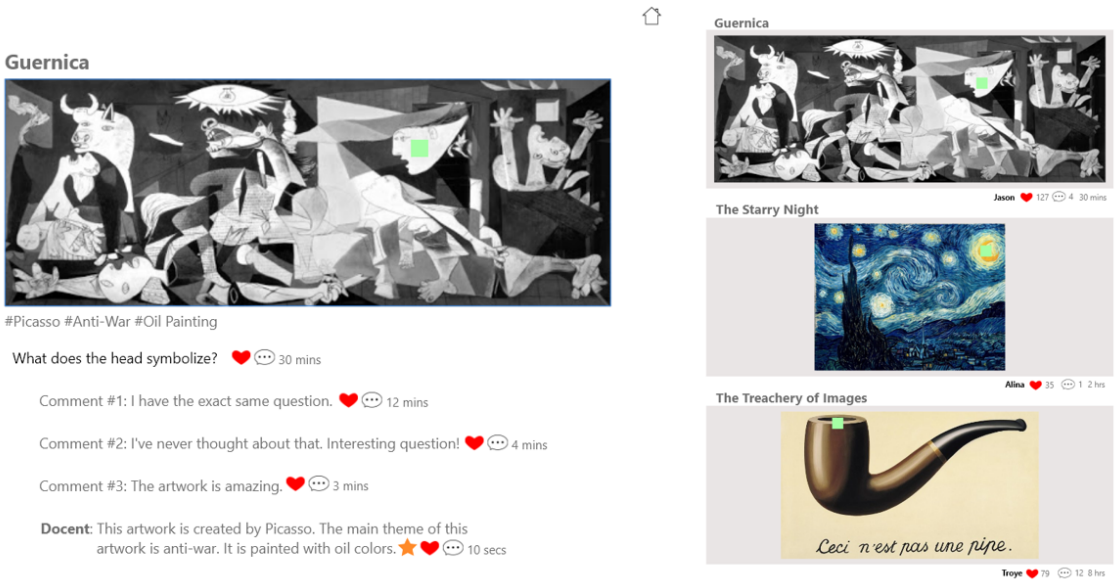

Fig. 2. CAN SNS

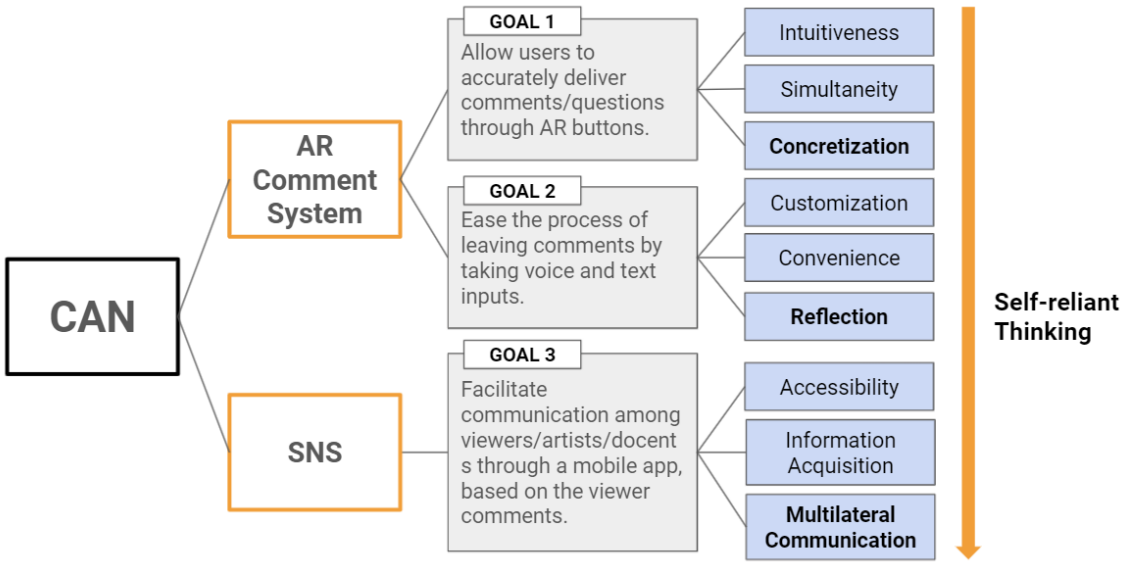

Fig. 3. Structure of the Key Concepts