Conversation Balance: A Shared VR Visualization to Support Turn-taking in Meetings

Jialang Victor Li
jli394@ucsc.edu
University of California, Santa Cruz
Santa Cruz, California, USA

Max Kreminski
University of California, Santa Cruz
Santa Cruz, USA
maxkreminski@gmail.com

Sean Fernandes
University of California, Santa Cruz
Santa Cruz, USA
semafern@ucsc.edu

Anya Osborne
University of California, Santa Cruz
Santa Cruz, USA

Joshua McVeigh-Schultz
San Francisco State University
San Francisco, CA, USA

Katherine Isbister
University of California, Santa Cruz
Santa Cruz, USA
semafern@ucsc.edu

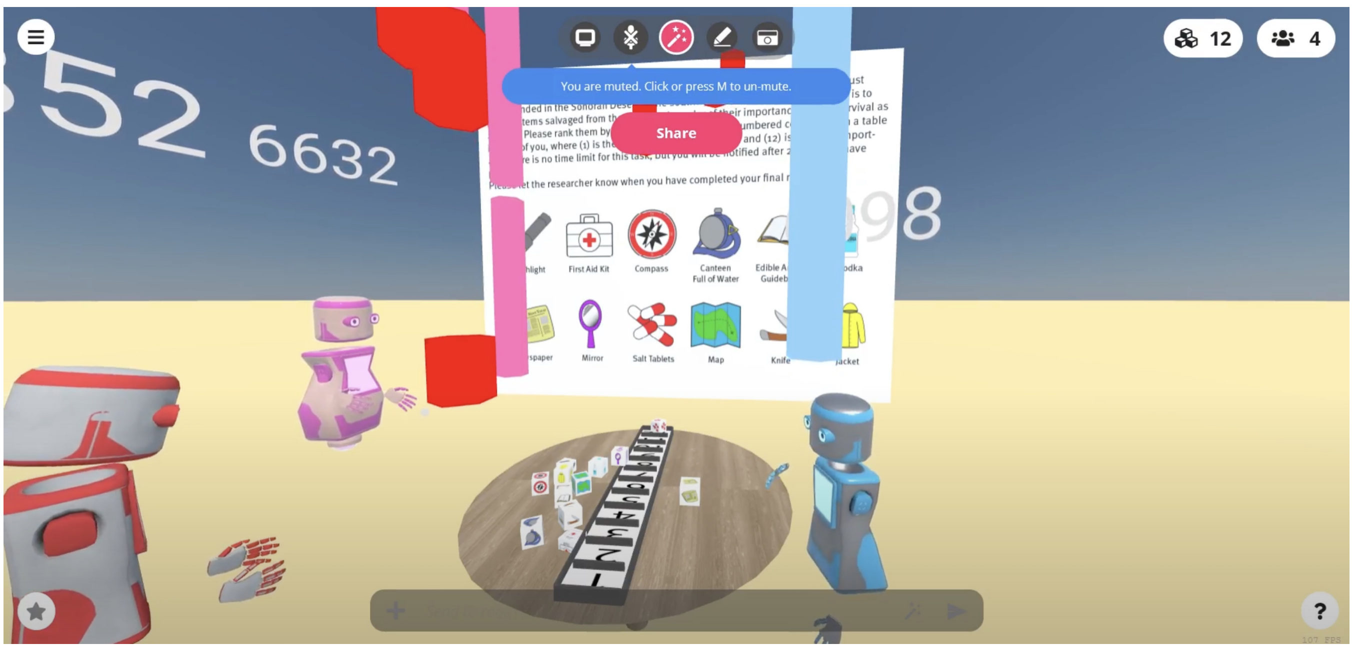

Figure 1: Demonstration of the VR Environment.

ABSTRACT

This interactivity demonstration provides users with a visualization of their conversational turn-taking, within a shared Virtual Reality (VR) environment. It is intended to help support balanced communication in remote meetings. This prototype is part of a larger research project focused on developing VR tools to improve online meetings with designed affordances that take advantage of VR's unique properties to help people with balancing participation, time management, coming to shared decisions, following an agenda, and achieving social connection and support for ideas. Ultimately, these prototypes help show the potential for using VR to make online meetings more effective and satisfying. At CHI, users will have a chance to try out the conversation balance system either in-person at the conference venue, or as a remote group if they are attending virtually.

KEYWORDS

Social VR, virtual reality, social augmentation, social affordances

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1 INTRODUCTION

Since the spread of COVID-19, the world has pivoted to a remote working lifestyle, where people's work lives are connected everyday through distributed technologies such as Slack or Zoom. However, having access to tools like these does not necessarily increase the ability for people to develop more successful collaborative professional experiences. In particular, research has shown that it can be difficult to host effective workplace meetings virtually [6],[4]. HCI research has emphasized the role that technological mediation can play in augmenting perception, memory, sense-making, media capture and distribution, and in particular underscored the important role that social forms of distributed cognition can play in supporting new capacities of human coordination [11],[5].

In our larger research project, we propose developing novel technical social augmentations in networked Virtual Reality (VR) to enhance workplace meetings conducted using VR. Existing work in the area of transformed social interaction in social VR has, thus far, focused largely on design interventions at the level of individual perception (i.e. individuals perceive differently which, in turn, impacts social behavior) [7],[9],[3]. By contrast, our approach emphasizes the trans-formative potential of social affordances, perceived simultaneously by multiple participants. In this Interactivity demonstration, we plan to show one of our prototypes, which is focused on conversation balance during work meetings.

2 CONVERSATION BALANCE PROJECT OVERVIEW

Conversation Balance refers to the balance of the communication engagement among participants in a meeting. Research has shown that greater parity of conversational turn taking is predictive of group performance [13]. Additionally, having balanced communication is especially crucial for promoting creativity in meetings [10].

To support balanced turn-taking in conversation, We created a visualization of how often and for how long people talk during a meeting, and implemented it in a shared VR environment.

Our design choices for the visualization were informed in part by a prior research project, The Conversation Clock [1]. Designed by Bergstrom et al., the clock visualizes conversation through a projection on the surface of a table in the shape of several concentric circles, where each moment of the clock matches the color of the participant who is speaking (Figure 2a). The researchers noted during their study that the clock was primarily observed by listeners, and not by the speaker. Thus, it is possible this visualization could provide a form of "encouragement" to non-speaking participants to engage in the conversation.

We first designed our conversation visualization as a combined column of colored balls that increases in a cylinder shape the more participants spoke (Figure 2b) Each ball was color matched to a participant's avatar color. However, through user testing we found there was a network latency issue of showing the balls accumulating over time. We could only show a few moments of the conversation visualized in this way, and had to disappear the record of the conversation over time in order to keep the shared experience smooth.

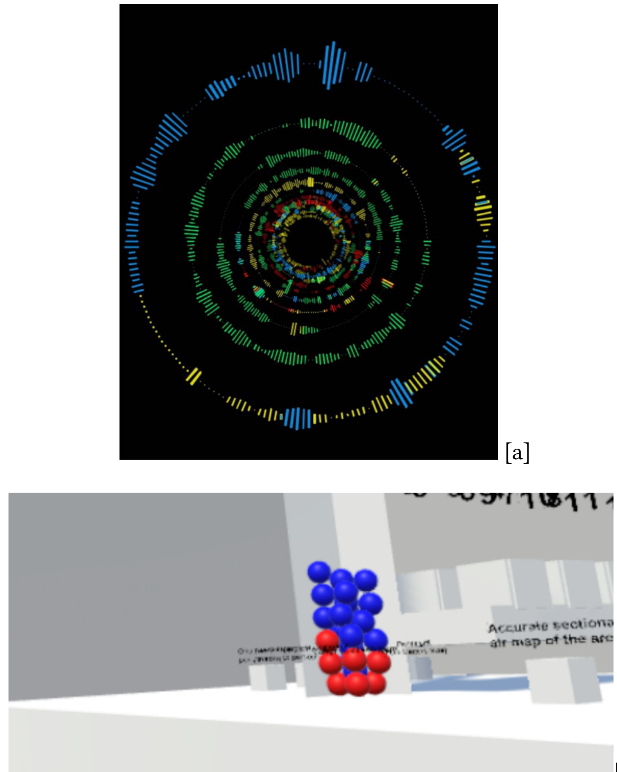

[a]
[b]

Figure 2: The Clock visualizes conversation past as inner circles, while the outer circle is present/recent conversations and the width of the circle matches speaker volume (a). The ball visualization are combined in a column that matches the speaker's avatar (b).

For the current visualization, we opted for cylinders that would appear over the conversation, growing based on speaker turn duration (Figure 1). This is easier to render and allows us to maintain an ongoing record of the conversation floating above participants, that clearly maps to participant turns. Each visualization cylinder will render in the color of each participant's avatar and steadily float upwards into the sky. The longer a participant speaks, the longer the elongated tubes float upwards. Participants can move back at any time, to take a look at the summary of talk duration for each other.

The visualization is situated in an environment that supports conversation about a particular task. We created a VR version of the Desert Survival Task (DST) [8]. This task is commonly used to evaluate group problem solving, for example in Tennent et al.'s work on Micbot [12]. In one of the initial pilot studies, we decided to eliminate 3 of the 15 items from the DST since they tended to cause confusion among participants' survey answers [2]. Since the task is being done in the VR environment, we designed an alternative ranking system to paper and pen (or keyboard and touch pad). There is a shared tray table with numbers listed for ranking and twelve items in the form of blocks which the user can move around (Figure

3). We also added a white board in the center of the environment that contains the instructions for the DST. Participants are able to pick up and move the cubes into their desired ranking on the shared tray table.

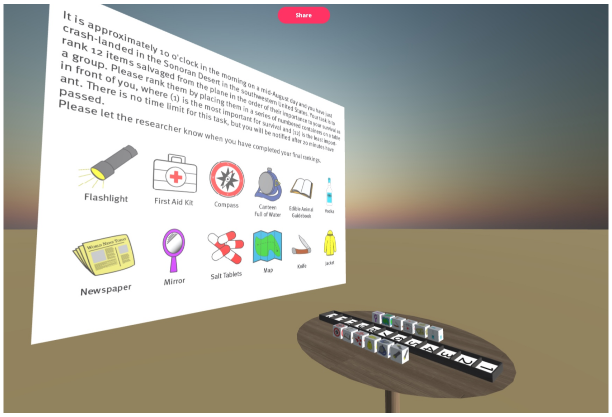


Figure 3: Desert Survival Task Instructions and object tray, in the shared VR workspace.

3 EXPERIENCING THE PROTOTYPE AT CHI

Because the Conversation Balance prototype experience takes place in VR, it is possible to support both onsite and remote participants in the interactive experience. We plan to bring headsets for onsite participants, so that up to three can join in (Figure 4b) . We can also allow remote participants to join the conversation, either using their own VR headset, or using their web browser (though that will mean it is not a fully immersive experience) (Figure 4a).

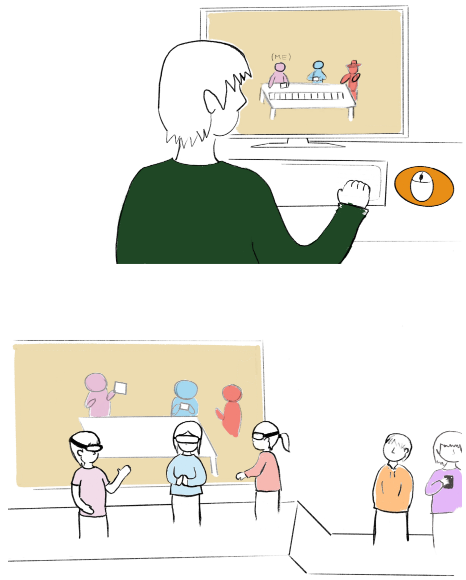
The VR environment for remote and onsite visitors has the same design, functionality and objects. Inside the VR environment, participants will see a white board with the Desert Survival Task instructions, a table with a shared tray on top with numbers listed for ranking, and twelve items in the form of blocks which the user can move around (Figure 3). Because Interactivity typically involves short interactions with demos, we anticipate explaining the DST to people, and having them try out discussing items for 3-5 minutes, while experiencing the visualization. Others waiting their turn will be able to see a projection of what participants are seeing, on a large screen.

In the beginning of the session, the administrator will enter a back-end code on the console to trigger the elongated cylinder visualization. Then the users will interact with one another by communicating through the VR headset Microphone to discuss their rankings and reasoning. The cubes can be picked up by the user by either of their hands while holding the trigger button on their controller, releasing the trigger will automatically drop the item cubes. 3-5 minutes should give visitors a sense of what it's like to have the conversation visualization taking place while they meet.

4 FUTURE WORK AND LIMITATIONS

We have used the Conversation Balance prototype in a controlled experiment in which teams of three complete the Desert Survival Problem either with or without the visualization, and are currently analyzing results. Of course, the choice of elongating cylinders above participants is only one set of design choices out of many possible ones, for a conversation visualization in VR, and we will be interested to get feedback from visitors about what they think of this design, as we move forward with our larger research project of augmenting workplace meetings in VR.

In terms of the value of having conversation visualization support in VR, we can see applications beyond business meetings to other contexts such as classroom conversation, or group therapy sessions, for example. We hope that prototypes like this one can be inspiring to others working to develop future collaborative work environments in VR as well as other XR contexts.



[a]

[b]

Figure 4: A remote visitor can join the demo using desktop mode via a browser link we send out(a). Three participants can interact at once at the CHI Interactivity demo session using separate headsets (b).

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