

Chapter XXX

Virtual Collaboration in Immersive and Non-Immersive Virtual Environments

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ABSTRACT

This chapter reviews contemporary research on virtual collaboration. In particular, we focus on synchronous communication and collaboration processes in virtual conferencing environments. In a virtual conference, interactants are geographically distant but their avatars (virtual representations) appear in the same virtual conference room. Two types of virtual collaboration are examined. First, we review new findings on research in immersive virtual conferencing. Next, we review recent findings on social interaction in non-immersive virtual conferencing. Specifically, we examine the impact of social interaction on these communication technologies. Finally, we conclude with speculation about the future trends in virtual collaboration.

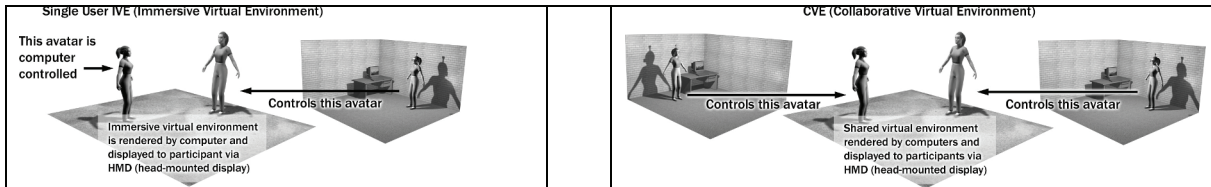
INTRODUCTION

Virtual Collaboration in Immersive and Non-Immersive Virtual Environments

What is virtual collaboration? Virtual collaboration is a type of collaboration that occurs when colleagues and team mates, who are physically distant, use computer-mediated communication

(CMC), rather than face-to-face (FTF) communication to accomplish their shared goals (Wainfan & Davis, 2004). Virtual collaboration is quickly becoming a widely used method of working with others in remote locations, particularly as employers move towards hiring more telecommuting employees. The type of CMC used for virtual collaboration can be text-based, video, audio, or in our case, virtual, which can incorporate the former channels of communication into a

Figure 1. Example of a human-avatar interacting with a computer-avatar vs. an immersive CVE where both interactants are human-avatars



shared computer generated space. Additionally, we can also differentiate between synchronous (interaction occurs in real time) and asynchronous (interaction that does not occur in real time and is variable in latency of response between interactants) forms of virtual collaboration. The focus of this chapter is on synchronous virtual collaboration. Specifically, we will address contemporary research on virtual collaboration in immersive and non-immersive environments.

What is a virtual environment? Also known as virtual reality, a virtual environment is a computer-generated representation of a physical environment that can be real (e.g., a virtual recreation of a crime scene) or imagined (a virtual conference room that is not modeled on any physical conference room) (Blascovich, et al., 2002; Biocca & Levy, 1995; Kalawsky, 1993). While a virtual environment may recreate stimuli that engage any number of the senses—there can be visual, auditory, olfactory, and haptic virtual environments—the present chapter focuses on virtual environments that engage only the visual and auditory senses. Such a virtual world is rendered on a computer and displayed to interactants in one of two ways. If it is an immersive virtual environment (i.e., it envelops the participant; IVE), the world will be displayed through a head-mounted display (HMD), which projects the virtual world in 3D. In this case, the interactants' motions are tracked and rendered so that they perceive motion and their collaborators see their movements rendered and updated veridically. If it is a non-immersive

virtual environment, it will be displayed on the rendering computer's monitor. Finally, individuals may encounter one of two different types of avatars in virtual environments: human-controlled or computer-controlled avatars (see Figure 1). The research reviewed in this chapter focuses only on collaborative virtual environments (CVE), in this case a specific type of CVE: virtual conferencing environments where all interactants are represented by human-controlled avatars.

The purpose of this chapter is to review current research on virtual collaboration. Specifically, we will focus on synchronous communication and collaboration processes in virtual conferencing environments. Although interactants are physically separated, they appear to be in the same virtual conference room. In the room, a visual stand-in, called an avatar, represents them. While avatars in online-games often are cartoonish and non-humanoid, there is a strong tendency towards the use of humanoid avatars in conferencing situations (Anderson, Ashraf, Douthier, & Jack, 2001; Slater & Steed, 2002). We will be examining literature on two types of virtual collaboration: immersive and non-immersive.

BACKGROUND

What differentiates virtual collaboration from FTF interaction? How is the communication mode different? A review of the literature indicated that compared to FTF, virtual collaboration groups

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