Enhancing Spatial Cognition to Improve Pattern Recognition within Mixed Reality Environments

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1. ABSTRACT

This research is focused on using a variety of forms of visualization combined with computer vision within mixed reality environments to understand more about architectural patterns and processes. Can we use this new space created by mixed reality to increase the capacity to process, analyze and transform architectural data? Do the web of relationships made possible between the physical, digital and conceptual aspects of augmented space increase the potential for knowledge formation via pattern recognition? To what extent can the affordances of mixed reality environments including new visualisation and interaction methodologies lead to such measureable improvements? How will interacting in these environments affect the relationship between spatial cognition and visualisation?

2. INTRODUCTION

The use of mobile and wearable technology places a renewed emphasis on spatial cognition. The 'geo-technology' industry is growing rapidly and as a result there is a wide variety of spatially referenced data becoming available. According to Malevich (2006) the best way to approach the design of mixed reality or 'augmented space' is to consider it as an architectural problem because the application of meaning on space is a native concern. This paper will begin by examining this apparent relationship between the practice of architecture and the augmentation of space. The aspects and definitions of spatial cognition and pattern recognition will be reviewed with an emphasis on why these skills are valuable in themselves and potentially transferable into many other contexts and learning disciplines. The technical challenges will then be considered and the question of how to evaluate such high level skills will be addressed.

2.1 Augmented space as an architectural problem

There are many methods and techniques used to create mixed reality components and environments but one of the most prevalent is via AR (Augmented Reality) markers. The AR marker is used as a mechanism to combine the physical world with an interactive, two or three-dimensional virtual world. Once triggered via the marker this virtual world could consist of a video, a three-dimensional model or an animation which is displayed via the mobile screen in the actual context.

These markers are effectively both 2D and 3D at the same time depending on how they are being activated and viewed. Architectural data is also most commonly represented by a mixture of two and three-dimensional data which typically reflects the developmental journey from the drawing (process) to the object (product). 3D architectural models usually provide visual overviews of the entire space in which spatial forms and users will coexist.