

# Creativity in VR: Constraint versus Exploration

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## INTRODUCTION

Virtual Reality (VR) systems offer several advantages over traditional approaches for certain design tasks, such as fast prototyping and visualisation of 3D shapes with storage and dissemination capabilities. However, VR may itself affect creativity positively or negatively, for example through the different styles of interaction used, the high levels of immersion offered, or the different levels of constraints imposed. In designing creativity-support tools that use virtual environments, we need to use the features of the technology to their best advantage, and limit how much they naturally impede creativity. For this, we must first consider how the creative process may be affected by these factors.

## CURRENT WORK

Historically, research on the cognitive mechanisms underlying the creative process has been somewhat limited and contradictory. While many agree that a 'creative' design is one which is both original and practical [1], how such a product arises remains highly debated.

One influential model of the creative process is the Geneplore model of Finke, Ward and Smith [2]. This proposes that creativity arises from generating generic forms prior to invention, which are then explored to produce creative results, as informed by mental synthesis experiments conducted by Finke. In these, participants generated objects from three 3D shapes, to fit a category; in some conditions participants generated a shape before receiving the category, and Finke argues that this 'preinventive phase' leads to more creative designs by allowing greater exploration.

## Mental and Physical Synthesis

Finke's experiments were replicated with the addition of a physical synthesis condition, where participants used

physical shapes [3]. However, contrary to Finke's work, a preinventive phase was not seen to improve overall creativity, but only to raise originality at the cost of practicality, with a strong negative correlation between the two. The results suggest that any higher creativity from a preinventive phase is due to increased constraints on participants, as unusual shapes force more original ideas so as to fit the category.

## Virtual Synthesis

The features of VR make it possible to address the issues of constraint and exploration in creativity. For example, mental synthesis need not have a constraining effect of gravity or of the shapes' solidity, but this may stretch the participant's imagination. VR allows manipulation of these factors, which is not feasible with physical shapes. This also allows a study of the suitability of VR for supporting creativity.

Pilot studies with Java3D and VRML show that gravity and solidity seem to affect the types of shapes created. Therefore, research is currently underway using Second Life (an online VR environment), which aims to support creativity and uses a physics engine which can be manipulated to vary levels of constraint, as well as allowing access to a wide range of potential participants. The results of this work will aim to help develop an environment or toolkit to better support creative design.

## ABOUT THE AUTHOR

The author has a BSc in Computer Science (Lancaster University), an MRes in the Design and Evaluation of Advanced Interactive Systems (Lancaster University, Psychology Dept.), and is a 3rd year PhD student in Lancaster University's Computing and Psychology departments, studying creativity in virtual environments.

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