

**Mimesis & Mocap DANM Thesis Abstract** by Chris(Topher) Maraffi, 11/01/09.  
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**Keywords:** Mimesis, Mocap, Marx Brothers Mirror Gag, Pantomime, Turing Test, Imitation Game, Memory, Machinima, Synthespian, Avatar, Uber Marionette, Eliza Effect, Gesture, Game Engine, Simulacra, and Magic Mirror.

### **Summary:**

My performative thesis project seeks to simulate embodied mimicry by digitally recreating the mirror gag routine, as immortalized in classic cinema by the Marx Brothers in their 1933 film *Duck Soup*. The goal of this research is to create improvisational comedic interaction between a live stage performer and animated 3D double, also known as an avatar or synthespian, so that the performer and audience react to the simulacra as an entertaining agent. This is a gestural approach to the Imitation Game or Turing Test, and it is intended to create an Eliza effect, or the willing suspension of disbelief, in the performer and audience. To this end, I will also seek to extend the anthropomorphism common in traditional puppetry to a digital puppet by integrating the avatar's movement in its native virtual environment into the theatrical set, through the perspectival device of the mirror reflection, to create a shared performance space for collaboration.

Through streaming motion capture (mocap) data into game engine AI software I intend to research a hybrid production technique that blends live pantomime with digital autonomous processes to enable the medium of code to become a creative partner in a movement dialogue. To minimize the technological risk of delivering the thesis performance in April, and to produce a clear roadmap for the desired interaction, I intend to take an iterative approach to this research by first producing a fully choreographed version, or a simulation of the simulation. This approach will allow me to build and test the conceptual framework that will ultimately support the technological approach, by first exploring representation, gesture, and memory between a living and synthetic body in a theatrical performance. Throughout this process, I will also be researching real interactivity using AI software, and will present the results of my research for use in future projects along the same line of enquiry.

### **Interactivity Synopsis:**

The performance part of my project involves a live performer on stage in a motion capture suit performing improvised movements. A digital 3D character that represents the performer is projected on an adjacent screen. The 3D character will respond to the performer by mimicking their movements, while also regularly responding with unexpected variations. The goal of the piece is to create a call-and-response dynamic between the performer and synthespian's embodied movements, that unfolds as a unique combination of human wetware improvisation and digital software simulation. Because

the movement is all based on the performer's movement, they are essentially improvising with a digital representation of themselves.

A specific example of theatrical mimesis in classic film is the Marx Brothers Mirror Gag. In this playful pantomime, one brother is dressed up like the other, and pretends to be a nonliving mirror reflection or copy of the original. The original brother tries to reveal the copy as a living impersonator by tricking them into making an error in their mimicry. The comedy occurs through the light competitive interaction, especially when the original's back is turned from the copy, who then is free to improvise without being caught. The dynamic of this pantomime raises issues of agency with the uncanny movement of the reflection as simulacra, and can be viewed as the original or pre-computer Imitation Game.

Simulating the mirror gag with a live performer and 3D character requires that the synthespian follow the movements of the performer with slight variations in the timing and position of the limbs, so that the mimicry is not entirely mechanical. If the performer turns away, however, the synthespian is triggered to simulate emotional, possibly even rude, gestures towards the performer. It is important for the success of the gag that the performer can see, out of the corner of their eye, the 3D character gesticulating behind their back. A real mirror may be placed on the other side of the performer, opposite from and facing the projected image of the synthespian, to enhance the visual interaction.

### **Interactivity Method:**

To create the simulation of mimicry on the synthespian, I intend to stream the data into a games engine using machinima style techniques. The performance data recorded by the motion capture suit and software must be digitally processed to incorporate slight variations in timing and position, before it is mirrored and assigned to the synthespian in realtime. The illusion of improvised movement is done through custom coded software, ideally using AI algorithms, to call and blend pre-recorded motion data from a library of clips by the same performer. The clips need to be blended locally to the character's global position in 3D Cartesian space, which should always be based on the mimicry data. The blending occurs whenever the data of the performer's head rotation registers greater than 70 degrees global Y rotation away from the synthespian, and the blending itself should not be linear, but speeded up to simulate rushed movement.

To emphasize the bodily movement, the performer should wear a generic mask, like a painted mime face, which is also modeled as the static face of the synthespian. The only moving part of the performer and 3D character should be the eyes, which will generally look at the other, but occasionally diverge and vary.

### **Interactivity Meaning:**

Simulating the mirror gag with digital technology raises the question of agency as a synthespian takes the place of a human pretending to be a non-living reflection of a live performer. The multiple layers of mimesis occurring in such a dynamic may produce an

uncanny Eliza Effect for the performer, and through repetitive movements with variations, may possibly achieve the effect for the audience as well. The variations in bodily and eye movement between the masked human and digital performers should increase this uncanny simulacra effect. The fact that the performer does not have complete control over what appears to be their own reflection may cause the perception of agency in the shared movement to become blurred, ideally leading to creative playful engagement with a digital other in a feedback loop of movement.

My thesis also explores the interactive digital puppet as the evolved materialization of several influential and prolific theatrical concepts such as Craig's *Uber Marionette*, and Artaud's *Body Without Organs*. This research also has practical applications for integrating software mediated synthespians with live performers in a scene to enhance creativity. In addition to leveraging my own experience as a dancer, mime, and animator, this project explores new applications for machinima style productions by exploring animism, anthropomorphism, empathy, and expressive interaction between a synthespian and an embodied performer.

**Committee Signatures:**

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