The Making of Inner Workings

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Abstract

From implementing the stylized design and motion of characters made from both rectilinear shapes (Paul, the brain, office crowd) and lyrical ones (the heart, beach crowd), to animated internal organ characters residing within an exterior human shell, to 2D animation projected on a CG character's forehead, Inner Workings was an ambitious short film project that provided countless visual and technical challenges for the Inner Workings team.

Keywords: design, animation, short film

Concepts: Applied computing → Arts and humanities → Media arts

1 Stylization

Every character in Inner Workings is a visual metaphor. The brain is stubbornly rigid; therefore his design consists of essentially a cube with eyes, a mouth and arms. At the other end of the spectrum, the heart is a free spirit, a bubbly lover of life, soft and round. How do we exercise a full gamut of emotions and expressions to tell a story with characters consisting of such limited and simplified physical features? Paul, the human they battle for control over, must therefore oscillate between both personalities - stiff and loose, his poses and movements both rigid and lyrical. The challenge visually and technically then is to design, build, rig, and animate a human character who can transform between the two styles instantly to convey to the audience which of the internal organ characters has the upper hand at any given moment.

In addition to the turmoil within Paul, there are the throngs of human characters that populate the world he lives in, and the visual metaphors extend to them as well. Paul's coworkers look strikingly

like him, an army of cubic forms living a sad, repetitive existence. Conversely, in order to get to his mundane workplace Paul must pass a stretch of beach, filled with happy-go-lucky (and therefore curvaceous) surfers and sunbathers. Designing, modeling, rigging, and animating a single set of crowd characters in a short is an ambitious (some might say foolish) task, much less two completely different crowd types with radically opposing physical features and personalities. Because of this, creating and executing these two "species" of crowds in an efficient manner was paramount.

2 Characters within a Character

Paul's body is literally a vessel, the cozy home to a motley crew of lovable organs - brain, heart, lungs, guts, bladder, muscles, and veins, all of which must be able to move as he moves. Working within such tight quarters created all sorts of camera and compositional challenges for layout, hierarchical and structural complications for rigging, staging and acting limitations for animation, and shadow and light placement issues for lighting.

Perhaps even more challenging were the day-to-day workflow challenges. In Maya, how does an artist visualize the interior organ characters through the exterior cavity of their host in order to do their work? More specifically, how does an animator visualize the bounds of the human silhouette they must navigate and stay within?

3 2D / CG Animation Integration

The 2D sensibilities of story artist and first-time Director Leo Matsuda impact the look of the film most literally in the form of the 2D animated "visions", which illuminate the brain's forehead and represent the thoughts and concerns of the brain itself. In order to facilitate this, the production of the 2D animation required its own design and assembly process, and had to be completed early in the shot production pipeline to support dependencies downstream - Editorial, Layout, and CG Animation all depended on the timing and positioning of the 2D components to be locked.

The 2D animation itself was done by our Character Design Supervisor (and animator) using TV Paint, and then edited and assembled in Nuke in coordination with Editorial. In order for upstream departments to visualize the 2D animation in Maya, it was rendered and textured onto cards which were constrained to the brain's forehead in Rigging. Lastly, for the final film images the 2D animation artwork was projected using a camera constrained to the brain's forehead via Nuke in Lighting.