The Stone People Effect: A Visual Generated in Houdini

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THE STONE PEOPLE EFFECT: A VISUAL GENERATED IN HOUDINI

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ABSTRACT

The short film *RhizComics*, created in collaboration with Jason Helms, explores comics and comic theory. The opening scene showcases a special effect created in Houdini made to illustrate the ideas in *RhizComics*. The effect involves two characters morphing into stones and tumbling to the ground. This paper documents the production design for the scene and the steps taken to achieve the effect.
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Houdini, a software program created by Side Effects, is a procedural modeling, animation, effects, and rendering application [Wiki12-b]. It was used to create the special effect that opens the short film, *RhizComics*, which is an adaptation of Dr. Jason Helms’ dissertation titled *Rhiz|Comics: The Structure, Sign, and Play of Image and Text* [Helm10]. In the dissertation, Helms discusses comics and comic theory, exploring the different ways a reader comes to understand comics. To enhance Helms’ ideas, the film opens with an animated version of a comic that Helms features in the dissertation. The comic depicts two philosophers sitting poolside while having a conversation. In the animated version, a Houdini effect is applied to the two men in which they mutate into stones and collapse to the ground. This paper explains the procedures used to create the effect and the production design decisions that informed it.

The opening scene of *RhizComics* originates from the first of four excursuses in Helms’ dissertation (Figure 1.1). Helms himself wrote and drew the entire comic, in which two men have an esoteric, tongue-in-cheek conversation about philosophy, comics, and how the mind processes thoughts. In its adaption for the screen, the comic is transformed into a motion comic with camera movements, special effects, and music. As the two characters speak, their bodies suddenly change to stones and at the end, the stones crumble to the ground.
The idea is that the conversation becomes so deconstructive that they themselves deconstruct. The name, *the Stone People effect*, was derived from this transformation.

The Stone People effect was achieved using Houdini software [Side11]. Houdini was chosen for the benefits that come from its node-based workflow system and for an existing node type, the *Creep surface operator* (*Creep SOP*). Starting from a tutorial procured from Side Effects’ website [Side11], the final effect was achieved after additional compositing, texturing and editing of the sequence. What follows is a detailed look at the process.
Production on the Stone People effect began with a tutorial from the Side Effects website [Side11]. Titled Creep Tool With Copy Stamping [Side11], the tutorial teaches the user a procedure using the unique Creep SOP and a technique called copy stamping. With these two tools, each face on a polygonal mesh can be converted into a three-dimensional stone with its own unique shape. Each stone occupies the same place as the face, leaving the shape of the mesh intact. From here, each stone contains the properties to act as a mesh on its own. Gravity is applied to each stone and once rendered, the stones can be seen falling and colliding with a ground plane.

While the tutorial certainly proved useful to the production, two features made the implementation of the Stone People effect more efficient. Houdini’s node-based workflow made the task of converting upwards of 15 mesh files more efficient and the Creep SOP provided a distinct way to achieve the final results.

2.1 Node-Based Workflow

One of the unique elements of Houdini’s workflow is the node-based system provided by the interface design. In a node-based system, every step in the workflow is accessible. The ability to make changes at any location in the network is essential when creating a dynamic visual such as the Stone People
effect. In Houdini, a *network* refers to a group of nodes. Conversely, in Autodesk Maya’s workflow, adjustments are only allowed in certain areas and, often times, those made earlier in the process may no longer be accessible. The following description from Side Effects’ website describes the benefits of working in a node-based system:

A procedural network is a collection of nodes connected together that describe the steps needed to accomplish a task. In Houdini, *everything* is procedural which means that modeling, character rigging, lighting, rendering and visual effects all benefit from this approach. Visual effects artists have traditionally gravitated to Houdini because a procedural workflow is ideal for creating effects with particles and dynamics. For other parts of the pipeline, going procedural has many benefits which can be used by studios who want higher levels of productivity and by artists who want more control over the creative process.

You can then use tools to add to the network or work directly with the nodes to manage the results. You can add nodes, delete nodes, by-pass nodes, and comment nodes. You can also copy and paste nodes or networks between projects. You can even create nodes that contain other networks inside them then share these custom nodes with colleagues. Instead of creating external scripts and pipeline tools to manage your work, the networks give you a pipeline right inside Houdini [Side11].

The ability to manipulate this pipeline proved essential to the workflow in *RhizComics* because of the manner in which the characters were converted to stones. The meshes of both characters were separated into individual pieces in order to provide more control over the dynamics affecting the stones and to ensure more efficient render times. Because of Houdini’s node-based workflow, the ability to plug each mesh file into the network rather than replicate the steps every time made for a more streamlined production. Figure 2.1 shows the Houdini network for one of the meshes.
Figure 2.1: A node tree from the production.
2.2 The Creep SOP

Houdini contains certain node networks with preset functions that give the user the ability to apply frequently used actions without reinventing them. One of these nodes is the Creep SOP. SOP stands for *Surface Operator* and is defined as an “operator with a program that edits geometry point attributes [Side11].” Other types of operators include particle operators (POPs) and shader operators (SHOPs). The Creep SOP is a node which...

...deforms and animates a piece of geometry across a surface... This operator changes each of the source input geometry points into a new space. The X and Y components of the source points will become the U and V positions on the surface. The Z component becomes a displacement along the surface’s normal at the (U, V) position [Side11].

The Creep SOP is the first major step in the pipeline for the Stone People effect. Once the character’s mesh is imported into Houdini from Maya, a stone shape is attached to it through the Creep SOP. This process causes the stone shape to attach to the mesh along its surface. The copy stamping tool is then used to make copies of the stone along the mesh’s surface, thus enabling the stones to maintain the shape of that mesh. For example, the character’s head retains the appearance of a head, only instead of a solid surface, the head is comprised of individual stones. Figure 2.2 shows a comparison of the head before and after it had been converted to stones. Note that the hair mesh was removed before the conversion was made.

The Creep SOP, found only in Houdini, enabled the successful implementation of the Stone People effect. Along with the node-based workflow,
the production benefitted from using these functions. Other computer graphics software programs could have been used to create the effect, but Houdini’s unique features proved advantageous to the production of *RhizComics*. Additionally, the tutorial provided by Side Effects’ website contributed immensely to the Stone People effect. Without it, the effect would most likely have headed in a lesser direction.

Figure 2.2: A head mesh replaced with stones.
CHAPTER THREE
IMPLEMENTATION

Once the meshes were prepared following the Creep SOP tutorial, additional steps were needed to fully integrate the effect into the film. The production continued with texturing, compositing, and editing. In this chapter, those steps are described in more detail. With the technical background explained, an understanding of the meaning behind the film is necessary to truly understand its depth and purpose. This chapter will also expound on the concepts and intentions behind *RhizComics*.

3.1 The Meaning Behind the Stone People Effect in *RhizComics*

The technique used to create the Stone People effect is only a means to an end, and everything is in servitude to the story told in *RhizComics*. The function of the effect is not merely for the enjoyment of seeing a visual effect unfold onscreen, but more crucially, to inject additional meaning to the opening scene. The tension created during the scene lays the groundwork that something eerie, baffling, and beautiful is about to happen. Viewers do not know what will occur, but they want to find out.

In Helms’ dissertation, one of the prevailing themes was the idea that a comic is composed of parts that work together but can just as often collapse. That collapse is necessary to avoid confining comics to a single definition. For
example, in the *Far Side* comic by Gary Larson (Figure 3.1), the initial impulse is to label the content of the thought bubble as text. Upon closer inspection, the text actually serves a larger purpose: it is a visual representation of a newspaper’s classified section. The layout of the classified section contributes to the representation as well, but the text is equally as important. To Larson, the idea that the reader understands the image as a newspaper ad is more crucial than the actual meaning of the words. The meaning of the words are still important,
but the greater value comes from its visual representation [Helm10]. In Helms’
terms, the notion that text can be both a symbol of a word and an image makes
the traditional notion of text collapse. This idea correlates to the Stone People
effect. The conversation between the two characters is tongue-in-cheek and
contains a healthy play on words and their meanings. The more they engage in
verbal witticisms and deconstruct their meanings, the more they deconstruct
themselves, to the point where they break down into stones and collapse upon
themselves.

3.2 Preparing the Effect from the Tutorial

The tutorial provided the foundation for the Stone People effect and from
there, the effect was applied to the opening scene in the *RhizComics*. The
conclusion of the tutorial is the transformation of the mesh from a single smooth
surface to a group of individual stone shapes (Figure 3.2). Gravity has been
applied and when rendered, the stones fall onto the ground plane and begin to
roll, as seen in Figure 3.3. As mentioned earlier, the node tree is set up so that
the mesh can be easily swapped and the file can be used repeatedly.
Figure 3.2: The final set-up with the Grid, the DOP Network, and a Ground Plane.
Figure 3.3: The rendered image sequence.
3.3 Applying the Effect to Two High-Polygon Human Models

After the effect was established using a simple grid mesh, the next step was to apply that simulation to two high-resolution human models. Retaining the shape of the meshes was key so that when the characters turn completely into stone, the outlines of their figures would remain evident. The process of reducing the high-poly mesh on the models while maintaining the shape yielded some challenges. If the mesh were not reduced enough, the stones would overlap and the shape would be lost. Additionally, the render time proved too expensive for stones that were ultimately not needed or even wanted in the high-poly mesh.

A workable solution involved separating the mesh into smaller parts, then reducing the mesh of each of these smaller parts as much as possible, and finally applying the effect on each part individually. Since both human models were created in Maya, Maya was used to subdivide the models. The process of subdivision was simple: for each body part (head, shirt, pants, left hand, right hand, etc), that part of the mesh was isolated by deleting the other parts, then exported into a new file by itself. In the new file, the Maya function *Reduce* was used to lower the poly count (Figure 3.4). Monitoring the face count was crucial; if the visual effect depended upon the number of faces on a mesh, then the lower the number of faces, the faster the render and the clearer the image. One of the early problems encountered was that the *Reduce* function was limited to a maximum number of reductions, which often resulted in a high remaining face count. Another problem was that even if the mesh could be reduced, it would
become unrecognizable from its original shape. Eventually, the mesh required some manual deletion to refine some of the areas. In most of the files, the face count was kept under 300 facets, as a higher number would result in expensive render times. Overall, about 15 files were created, each containing a different mesh from the two models.

Figure 3.4: The face count and reduction of a head model.
3.4 Applying the Models to the Node Tree

Since the next step was to import the objects into Houdini, the files required conversion into the OBJ format. Once the OBJ was imported into Houdini, the existing mesh in the node tree was replaced with the OBJ. To do so, a File SOP was added to the node tree to which the OBJ file was attached. The File SOP then replaced the Grid SOP (Figure 3.5). The software computed the calculations on the new meshes, producing results that were evident immediately. Figure 3.6 shows a comparison between the original model, the reduced model in Houdini, and the model with the stone effect applied.

Figure 3.5: A simple file swap between the OBJ and the Grid to set up each mesh.
3.5 Texturing the Stone People

At this stage, the models needed specific textures. One advantage in using images that were comics-based was that realism was not a requirement. Instead, keeping the characters within the color scheme and design that Helms created was a top priority. The textures were actually stitched together using pieces from the background of the excursus (Figure 3.7). Since the texture on the models was the same as the background, it simultaneously blends with the background and, with the differences between two-dimensional and three-dimensional renderings, contrasts against it. The three-dimensional aspect of the characters is enhanced, but then flattened again because it matches the background. The idea is to create layers that play with the eyes, just as Helms does with his ideas concerning the way text is read. To add a texture to the node tree in Houdini, a UV Quick Shade SOP replaced the Color SOP. The texture file was loaded inside the Color SOP and the polygons were textured (Figure 3.8).
Figure 3.7: The two textures used on the models: clothing (left) and skin (right).

Figure 3.8: The polygons with the skin texture applied.
3.6 Rendering the Stone People Effect

With the texture in place, the following step was to light the scene and adjust the camera. In the excursus, the scene takes place outdoors by a pool during the day; therefore, the lighting set-up attempts to recreate this environment. A point light was placed strategically in the scene corresponding to the key light position in the environment, deduced from lighting patterns in the scene. The lighting scheme is simple but effective.

Ideally, the camera used in the Maya scene should be imported in the Houdini scene so that the same coordinates with respect to the object are used. In order to export a camera from Maya that can be used in Houdini, the export file type was set to field book type (FBK). After importing the FBK file into Houdini, the scene was ready to render. The scene called for only a portion of the action to be used, not the entire sequence; therefore, rendering was limited to a specific frame range. The edits in the scene were planned in storyboarding to gauge the flow, which dictated the rendering of all the effects. The file format used for each image output was a portable network graphic (PNG), as it supports a transparency layer which was needed during compositing when the effects were combined with the background images.

3.7 Compositing the Assets in Shake

Once the assets were created, Shake was used to composite them together and prepare the scenes for editing. One of the major issues at this step
was the background. Fortunately, the source image of the first panel from the excursus possessed a high enough resolution for use in multiple perspectives. The opening scene used combinations of long shots, medium shots, and close-ups. With the background represented as a single two-dimensional image, creativity in shot layout was necessary. Both the perspective of the shot and the quality of the image were required to remain consistent when switching between the different points of view. Once the perspective of each asset was set properly, all renders were combined in Shake. Some slight color correction was required, as the rendered images from some of the Houdini files did not match the others. This problem was fixed by brightening the image sequences to match the luminosity of other rendered shots. An issue with the scale of each body part emerged, as the two models were not the same size; therefore, adjusting the scale of the bodies to fit their allotted area was necessary. The background image was refined by removing the original drawings of the characters and filling the empty space with cloned pixels from other parts of the image. Figure 3.9 shows one of the node trees from the scene.

Many of the creative decisions, such as color, perspective, scale, and content, were determined prior to compositing, yet opportunities remained to make modifications. At this step, the final image was put together for the first time. One problem that emerged was that the perspective on the head of one model did not match his torso, which required modification in Houdini and re-rendering. This step also revealed that the decision to use the same textures as
the background proved to be a positive one, as the overall look and feel of the scene felt seamless rather than stitched together.

3.8 Editing the Sequence in Final Cut

The final step was editing all the composited scenes into a sequence with the existing shots in Final Cut. Attempting to match the renders to the pacing of the storyboards required a number of steps. First, a series of flickering shots reveal a body part such as a hand, which turn into a cluster of stones, hinting that something strange was transpiring between these two characters. The flickering was achieved by cutting back and forth rapidly between the original shot and the

Figure 3.9: One of the node trees in Shake.
shot with the Stone People effect applied. Next, Photoshop was used to refine the background so that the flickering appeared as one shape crossfading into another instead of one image placed on top of the other. Shots of individual body parts turning completely to stone followed and finally, the stones collapsed in a staggered release. Cutting to wider shots revealed that the entire body was turning to stone and tumbling to the ground.

The progression from human to stone creates tension, builds suspense and even confusion. This final feeling is not necessarily undesirable, however, as uneasiness or confusion often results in more attentive viewing. For instance, an observant viewer may notice that, though the falling stones are reflected in the pool, the reflections of the original drawn characters remain unaffected (Figure 3.10). A conscious decision was made to leave the reflections intact. Allowing the reflection to remain, even after the bodies have disintegrated, tells the viewer that this setting is no ordinary world and the rules of logic may not apply. Anything can happen.

3.9 Music and Sound

Since the opening scene contains text-based dialogue and no spoken dialogue, a deliberate decision was made to use music as the main soundtrack. The energy and emotion from the music enhances the ideas presented in the scene. Titled Brownie, the song was written by Moby and was provided with a free license from his website, mobygratis.com [Moby12]. Moby specializes in
smooth electronica music, which is ideal for *RhizComics*. The music needed to be prominent yet not distracting, energetic yet not demanding. While it plays as important a role as the characters in the scene, it could not impose upon the scene. Moby’s music fit these themes well, providing a rhythmic beat that moves the film along while being smooth enough not to detract from the action onscreen.

The music contributes to the tone and feel of the scene as well. The characters are engaged in a high-brow conversation, but they never take
themselves too seriously and the tongue-in-cheek style of Helms’ writing exemplifies this sentiment. Appropriately, the chosen music also contains an element of humor and lightness. Finally, *Brownie* succeeds in bringing a sense of modernity to the scene, as it is digitally composed electronica music and highlights the contemporary ideas explored in *RhizComics*.

Though music is the main soundtrack, sound effects appear briefly in the beginning of the scene. The scene opens with sounds of birds singing and natural, outdoor atmospheric noise. The momentary realism that the sound effect provides is meant to ground the viewer in the world presented to them, creating a false sense of security. Only moments later, the music takes over and the journey into what is actually a strange world begins. The music and sound in the scene play a pivotal role in the overall look and feel of the piece.
CHAPTER FOUR

RESULTS

After combining the Side Effects tutorial with the efforts in texturing, compositing, and editing, the Stone People effect in the opening scene of RhizComics achieves its goals. In particular, three specific methods proved most effective. First, the use of Helms’ drawings as the background and as textures for the scene works well because of their high-resolution quality and the seamless appearance they produce. Second, the Stone People effect provides an engaging visual illustration with realistic motion, aimed at promoting the storyline. Finally, creative editing techniques in Final Cut are applied to unite the shots and complete the storyline through rhythm and timing. The images that follow are from the final version of RhizComics.

4.1 Helms’ Drawings

Fortunately, a high resolution digital copy of Helms’ dissertation was provided for the production of RhizComics. The image from the first excursus provided the source image for multiple levels in the opening scene of the film, including the background image against which all the action is set. Figure 4.1 shows the evolution of one of the characters featured in the scene. The top left image is the original drawing; the top right shows the alterations with the drawn character removed, the background filled using Photoshop, and a 3D chair from
Maya placed in the scene; the bottom left contains the 3D human model with textures applied; and the bottom right shows the human model replaced by its stone counterpart. The quality of Helms’ drawing made possible the ability to avoid pixellation within the scene and enabled the image to be easily patched after the drawn character was removed.

As mentioned earlier, the textures used by the human models have two functions. One is to provide a surface for the models; the second is to play with the viewer’s eyes by surfacing the characters with the same texture as the background. The fact that the textures from the skin and clothing are also found elsewhere in the image adds to the storyline. In the scene, the characters participate in a self-referencing conversation where they continually play with the viewer’s expectations. The self-referencing surfaces actually contribute to the
puzzle and the overall strangeness of the scene itself. An additional third function provided by the textures is that the color, tone, and lighting remain consistent throughout the scene because they originate from the same drawings.

4.2 The Stone People Effect in Action

The Stone People effect not only provides a visually dynamic illustration to the opening scene of *RhizComics*, it strives to enhance the narrative as well. When the stones begin to appear, flickering between a character’s hand and the stones, a certain sense of uneasiness should emerge. What is happening? Why is it happening? Figure 4.2 shows the first glimpse of the flickering. As the scene continues, various body parts morph into stones one by one, until eventually the characters’ entire bodies are consumed (Figure 4.3). Finally, the stone bodies collapse, unable to hold their shapes. Starting bit by bit, they begin to fall, and eventually everything crumbles (Figure 4.4). The collapse highlights what is occurring in the scene narratively as well. The two characters’ conversation becomes more and more playful and self-referential. It also sets up the upcoming discussion in *RhizComics* about comics, introducing the idea that image, text, and reflection will be dissected for the rest of the film.
That's part of it. That's negative deconstruction. But there is an affirmative deconstruction as well that maintains each, and maintains separation and difference while recognizing that each exists on the basis of the other.

That's part of it. That's negative deconstruction. But there is an affirmative deconstruction as well that maintains each, and maintains separation and difference while recognizing that each exists on the basis of the other.

Figure 4.2: Two shots that flicker back and forth in the film.
Figure 4.3: A sequence of the head collapsing.
4.3 Creative Editing

With all the assets prepared, editing the film was the final step. More than simply tying together loose ends, the editing portion of any film can truly set the tone and style. Great editing can improve a film; however, poor editing can undoubtedly ruin it. In *RhizComics*, many elements came to fruition during the editing process. Editing provided a way to convert a drawn comic into a motion comic, giving drawings the opportunity to come alive. It allowed one single image to be transformed into an active four-minute scene. Editing was the technique used for adding the text boxes to the scene which provided a way to combine the Houdini footage with the still images. Finally, editing made possible the ability to creatively pan and scan Helms’ drawing to build a variety of shots. These techniques give *RhizComics* its unique style.
CHAPTER FIVE
CONCLUSION

While the Stone People effect is successful in accomplishing its goals in 
*RhizComics*, room for improvement exists. Refinements could be made in the 
pipeline to allow production to run more smoothly. Improved methods in 
processing the high-polygon meshes would produce better and quicker results in 
*Houdini*. Additionally, maintaining consistent control of the camera angles would 
eliminate several of the problems encountered during compositing and editing. 
These two issues are easily fixable, but only after the production was completed 
did their existence become obvious.

5.1 Improving the Methods Used on the Models

The two human models used in *RhizComics* were procured from previous 
productions and so were restrained to conditions specific to their productions. 
One of those conditions was the high polygon count. For several of the polygon 
meshes that were imported into *Houdini*, the face count was just too high for 
practical use, even after manual refinement of the mesh. At times, modeling an 
object that had a rough likeness to that object proved more effective than 
attempting to reduce the high-poly model. For instance, the shirt on the right 
character was composed of three cylinders with some manual deformation. Once
the Stone People effect was applied, the look of the stone mesh still resembled a shirt. In the future, using a low-poly model from the start would be more practical.

5.2 Maintaining Camera Angles

Maintaining consistency among the different perspectives used throughout the production would have eliminated some issues. Some steps in the production of *RhizComics* failed to do so. During compositing and editing, several perspectives of the characters did not match across shots. Another problem occurred when the torso on one of the characters did not match his head. Issues such as these are easily fixed by consistently monitoring the way that the cameras are used across files. Some possibilities for monitoring the camera include: following the storyboards closely each time a new file is created, importing the same camera into each file, and maintaining the cameras across software applications.

5.3 The Future

Future goals with *RhizComics* (Figure 5.1) include submitting to film festivals, conferences, and other events related to the ideas in this research project. Recently, the project was part of a digital “poster” session at the Carolina Rhetorics Conference at Clemson University. The project was presented to scholars and students researching rhetoric, composition, pedagogy, media, communication, and other related studies. In addition, the project also qualifies
for film festivals that seek participants with specific backgrounds, such as student films, regional origins, and ethnic heritage, to name a few. Finally, yet another world is open to the project through Helms’ work with comics. Interest surrounding comic arts is high, which creates more opportunities for the project, including submission to the Comic Arts Conference [Wiki12-a]. As Helms is the expert on comics and RhizComics, the project will continue with him onboard as it progresses to its next chapter.

Figure 5.1: The title screen from RhizComics.
REFERENCES


