
PLAYPENING
CREATIVITY FOR ALL
thesis by
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Playpenned

Creativity for All

by William Rihn

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Approved:

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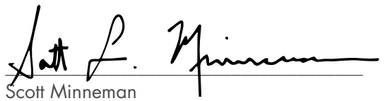

Scott Minneman
Thesis Advisor

May 18th, 2013

Dedicated to my father, Joel Rubenstein, who first ignited my passion for video games on an Apple][and to my grandfather, Murray Ziller, who fanned the flames.

You are both missed.

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Lego bricks, building blocks of creativity

Pipe Cleaner Creature Glasses Man

Quick Start Guide: Thesis Goals

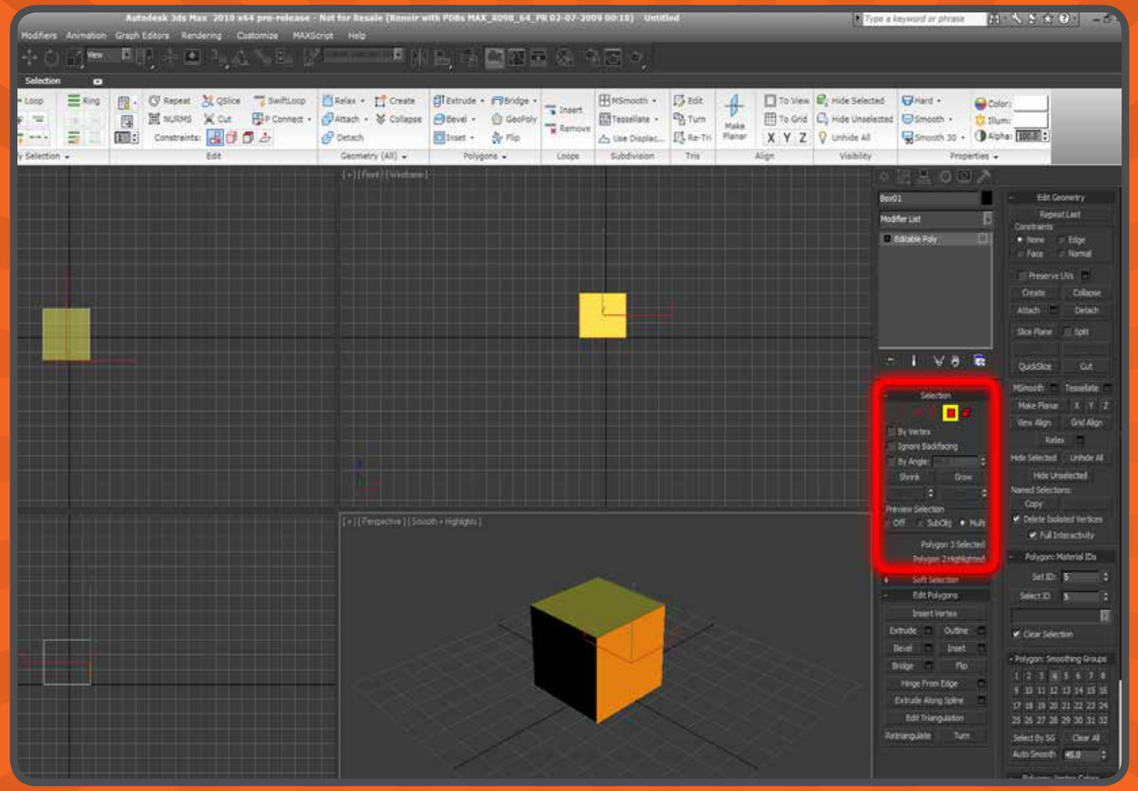
Creativity

Creativity drives change. Creative people have the essential qualities that evolve culture and fuel social change. Creative people drive outside-the-box thinking, offering fresh approaches in fields ranging from engineering to design, from education to entertainment. Without creativity, and by extension creative thinking, we wouldn't have innovation—fire, the wheel, electricity, the Internet, movies, artwork, games, microchips, cars, flight, or even civilization itself.

However, much work cordoned off as "creative" is often marginalized as mere amusement or imaginative escapism. Yet creativity is the essence of human experience, a rich outlet. I believe we need to nurture creativity from the playpen to its adult equivalent: the office cubicle. Without creativity, we're no more than a buzzing cloud of insectoid drones.

Fun

Fun is the best friend to and motivator of creativity. Fun in this context is not defined as mindless entertainment. Instead, I mean the feeling of fun that comes with deep engagement. For me, nothing quite achieves this sort of



A screenshot from Autodesks's 3D Studio Max.
Key geometry tools circled in red.

engagement like a video game. Digital entertainment is the new-old frontier; it has been around for over 60 years, but exists only relatively recently as a socially accepted form of immersive storytelling.

Video games continue to gain ground in the realm of education: from old titles like *Mathblaster*, where you solve math equations to advance to the next level, to *America's Army*, a series of first person shooters and army recruitment tool. In *America's Army*, before gamers are allowed to enter the first person shooter game mode, the player is required to take a virtual "boot camp" tutorial, which includes an interactive lesson to revive a person using CPR. Why might an army recruitment tool require a realistic course in CPR before being able to participate in the shoot-em-up aspect that attracts potential soldiers to the game in the first place?

Mathblaster

CPR Dummy from America's Army 3

According to game designer Jane McGonigal, if you can master something in a game, you can perform the same function in reality. She states, "games give us the opportunity to learn and master new challenges, and usually we learn skills that we can pass on to the other gamers in our lives" (*Reality is Broken*, Chapter 5). Thus, compelling gamers to practice CPR in a virtual environment primes the player to perform emergency resuscitation in the real world. The Information Age allows us to disseminate games worldwide via the Internet within mere minutes, it seems like a no-brainer that the virtual world will drive the future of education.

Simple Interface

So how might we achieve this? Well, 3D geometry is a start – and an important one. Not everyone can afford a machine shop in his home; a

From the Blog: Conversations with Myself
February 5th, 2013

Some Assembly Required

Some assembly required. It's a theme prevalent from our childhood toys straight through our Ikea years and into old age. If you've put something together, do you consider yourself to have made it? To have assisted in its creation? Probably not.

But why? Is it the concept that we didn't create the building blocks of the overall object? We didn't cut the Ikea plank and apply the wood veneer ourselves; we didn't determine how large it is or how much weight capacity it can hold. Yet without our intervention, this object would not exist.

We determine where it goes, what it holds, and what goes on around it. In that way we're still creators. So maybe it's because we were following directions, not necessarily due to the prefabricated nature of Ikea parts. Though if you were following a stitching or knitting pattern, you likely would say that you made the scarf.

Consider the Ikea hackers: people who use Ikea parts and repurpose them into their own do-it-yourself projects. Using the same parts, sometimes modifying them, and adding a few extra elements (such as more screws), this community has filled the gap between Ikea prefabricated furniture and those whom have a wood shop in their garage.

Not only useful, but fun as well: I have personally turned a shelf and drawer rack into a sliding keyboard tray for my desk and another shelving unit into a stand for my monitor and speakers.

Let's also consider Legos: we may not make the blocks, but neither do we diminish from the creativity that they afford. Children (or adults) feel accomplished both when following directions and creating something from their own imagination. Just as I felt accomplished repurposing two shelves to suit my own needs. What was originally an Ikea

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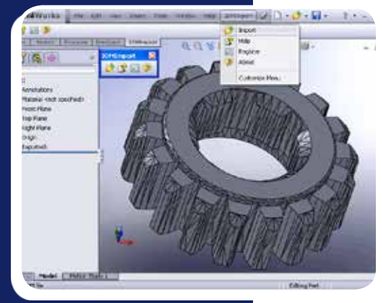
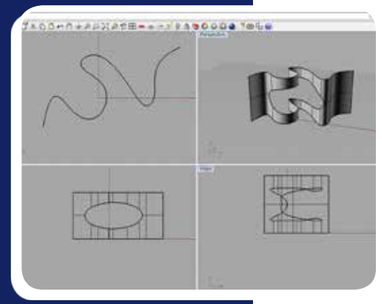


Solidworks



Rhino 3D

laptop or tablet is more viable as a workspace. The virtual environment allows for the minimization of size and cost with present-day portable technology, which are the first key hurdles to overcome.

While there are already creative tools such as *3D Studio Max*, *Rhino 3D*, *Blender*, or *Solidworks*, my goal is something one can just dive into. Why? Their interfaces are so overburdened with legacy methods and a multitude of buttons that they have solidified themselves as professional tools requiring extensive training to master. In a nutshell: We need a simple interface.

Enter the gaming world. The interface in any good game will show you only the information that you need to know. It will not clutter your screen with irrelevant buttons nor show you options for one action when you're clearly performing another. Overall, game interfaces must be highly contextual in order not to distract from the task at hand. The interface is the means, not the end, and should not take center stage. Combined with narrative tutorials, video games succeed where creative tools have failed by allowing new users to learn quickly as they go.

The target user for Playpenned evolved with the development of the tools themselves – this work is designed for the novice and hobbyist. What I set out to explore is how a creative game can allow players to export assets—the visual and audio items that comprise games—for use in creating new games, adding to existing games, or even 3D printed to the real world.

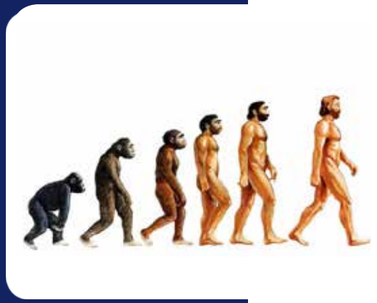
Frederick desk I have made my own. There are no other desks exactly like it, so why not consider it my creation?

This same accomplishment can be applied to the virtual world. I did not code or texture the world of Minecraft, but the castle made of blocks is my own design. I did not model the mesh geometry of my creatures in Spore, but I arranged them to my own liking and specifications. I did not make the character creator for games such as Skyrim, but the settings I have modified have made my avatar uniquely mine.

I can say with certainty that these prefabricated objects and environments have allowed me to be more creative than if I had to make each piece of the puzzle myself. Sometimes it's simply fulfilling a need with leftover parts that I have on hand. Other times it's trying to create something for fun within the constraints that I am afforded. I can think of no reason why such concepts could not easily be adapted to virtual creative tools, whether virtually assembling an action figure, furniture model, or landscape.

An "Ikea Hacker" desk made from Ikea pieces.

Installation Guide: Tool Mechanics



Evolution is good

All of the tools we possess evolved through trial and error. Ingenuity and refinement. Figuring out which spear flew farthest with the truest path to catch the next meal. Imagine a world without constant design interventions, and you imagine a world without vibrancy, color, innovation, and joy. Without perpetual design innovations, we would not have the tools we use to hunt or cook, to fish or farm, nor to sail and fly and launch satellites into orbit. Creative design enhances our ability to think critically, imagine, problem solve, and offers us a form-based vocabulary for expressing culture.

I argue alongside those who believe we can improve education and spark new paradigms in technology by leveraging creative design approaches. Yet this requires openness to creativity, and specifically to making as a way of learning and thinking. Because creative making is considered more leisurely than educational, it is viewed as an expendable skill when educational institutions are strapped for cash and budgets dwindle.

My thoughts now dwell in numerous areas: What would happen if we developed a set of accessible creative tools? What if these tools became as simple as building a house out of Legos? What if the tools themselves leveraged all the aspects of games? What if there were games that allowed players to export objects to make other gaming experiences? What might happen if a teacher could make a game? A doctor? A child struggling through psychological traumas? What if the SAT were a game?

Minecraft Render
http://gameplaceftw.wordpress.com/2013/03/04/top-15-minecraft-creations/

Nascent Days

Choplifter

Minecraft Gameplay

For me, all of these questions can be traced to my youth: When I was a young boy and games were mere arrays of dots: Pixels whizzing about in a cathode ray tube, illuminating images and text on my screen. I have evolved with these technologies; I am a video game native, in that the early days of modern video gaming coincided with the early days of my youth. Back then, before the dawn of Google, it took more than a few mere keyboard strokes to unlock the mystery of gameplay. While game magazine walkthroughs and purchased codebooks were an option, I never felt the need to allow a proxy to play my games for me. Instead, my friends and I would lose ourselves in a game for hours, traveling through a virtual maze, sometimes battling frustrating months of failure. But the pay-off was superb: The moment when I or one of my friends would figure out how to advance to the next level. It was exhilarating.

We live in times where games continue to evolve, creating ever more immersive and interactive storylines. And yet that sense of wonder and joy is rarely captured anymore. The feeling of accomplishment is often preempted by a quick search on the Internet or the ability to purchase in-game (with real currency) an object of supreme power to provide an upper hand. However, all is not lost.

New niches of games reach to recapture this experience of yore. These games are commonly referred to as "sandboxes," so dubbed because while there is usually a creative component, there is not necessarily a single

From the Blog: Conversations with Myself
February 12th, 2013

Pushing My Buttons

I can remember the first time I tried to do anything in a 3D modeling program. The grand designs I was going to create. The exquisite textures I'd apply to make the models realistic. The praise I would get from the game modification community for the impressive work I had done. Alas, the dreams of a teenager.

Instead I got a frustrating interface full of buttons and a language all its own. The one thing I could make was a teapot… because there was a button that simply dragged a premade one out. Rendering that teapot was another story.

I was tired of it looking like virtual clay. I finally had a shape, despite not creating it myself, and wanted to make it look real. I decided that I wanted it to be gold—to represent my impending royalty. I managed to make it a matte yellow. Then I managed to setup a very harsh light. My attempts to apply a texture, however, generally led to a warped image of a gold bar that would contort itself around my borrowed shape.

This, of course, was in 3D Studio Max. So I decided that maybe the program wasn't right for me. That maybe I was starting off a little too far into the realm of professional programs. I tried Truespace, Maya, Lightwave, and a few assorted others. It was all the same: complex geometry and even more complex interfaces.

As this was a time before YouTube, I was limited to text tutorials. Among those, I found many for differing versions of the programs that I had. There were also the infuriating times when I did exactly as described and did not get the desired results. Each program had its own quirks that one had to be aware of: bugs, operation issues, and risks of crashing.

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Blender 3D

ZBrush

overarching objective throughout the game. Your game continues as long as you are making something and everything you do is an accomplishment: There are no cheat codes to tip the scales in your favor; everything must be achieved within the constraints given.

My affinity towards these sorts of games spurred a desire to make my own. However, after years of attempting programming or fighting with 3D modeling software, I remain thwarted. The amount of work it takes to make a game alone is immense; the disparity between the realms of coding versus that of artistic asset creation is great. As a result, I decided to go the route of 3D modeling, as my interest was more visual; I'm no code monkey.

What did I find? Tools. Tools that could fill an anthology. Each with a function and implementation slightly different from its competitive counterpart. Numerous methods of doing the same task differently in each of these programs, despite all being designed to fulfill the same function of 3D construction. The way one moves an edge in *3D Studio Max* may be similar or completely different from the way one accomplishes the same motion in *Blender* or *ZBrush*. *Maya* may render differently than *Solidworks*, which also renders differently than *Rhino 3D*. Did I mention these programs allow for different rendering engines? In the end, I was forced to pick sides (generally dependent upon an instructor or institution) and then expected to do what I could with the suite I had learned. While multiple techniques of accomplishing similar tasks may be a boon for experienced users of a software suite, for the uninitiated this is a situation overwhelming to beginners and to those interested in adding their own voice to a game via user-generated content.

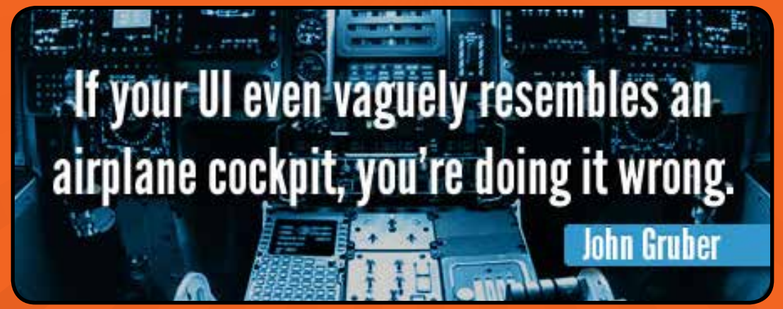
How unfortunate: User-generated content is the future, and presently a major part, of gaming. It is a world where game content is added not by the developer, but by a player of the game. It's a sweet deal for all – developers

From the Blog: Conversations with Myself
February 12th, 2013

I would not attempt any more 3D modeling exploits until a few years later. In the interim, I would enjoy playing games with character creation portions and even found myself enjoying the customization process more than the games that contained them. If only 3D modeling were as simple.

For the most part, 3D has remained a complex process with a steeper learning curve than necessary. SketchUp was the "new hope" for a new paradigm in modeling, but fell short enough that Google decided to sell it. Why haven't we learned from games? Why haven't we turned them into games? Why isn't it that simple?

I think it can be. I think it should be.



John Gruber of www.daringfireball.net

Team Fortress 2

Counter-Strike

benefit as players must have already purchased their game to be able to use it, and it's also a great deal for other players who get the added content to their game for no cost.

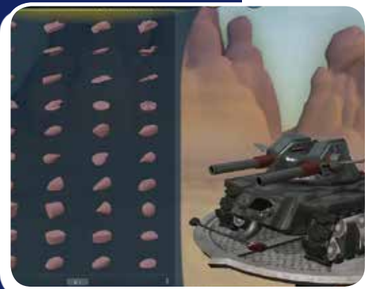
Sometimes the content is a single item or a replacement model for a specific object, or it can be a much more advanced change. These changes are usually called total conversion modifications, or "mods" for short. Sometimes these mods become so popular that they achieve commercial success, usually when the developer of the original game buy them, as was the case with *Counter-Strike*, *Team Fortress*, and *Day of Defeat*. All three of these games began by teams of players (primarily of Valve Software's *Half-Life*; the exception being *Team Fortress*) banding together to create their own gaming experience. The free modifications became so popular that the properties were bought by Valve and some of the team members were hired.

Other times mods can spawn new genres in gaming, as was the case with the MOBA, or Multiplayer Online Battle Arena genre. It began with the *Aeon of Strife* map for Blizzard's *Starcraft* and was followed up by the *Defense of the Ancients* map in Blizzard's *Warcraft III*. Additional offshoots include the *Storm of the Imperial Sanctum* for Blizzard's *Starcraft II*; Riot Games' *League of Legends* standalone game, inspired by *Defense of the Ancients*; and the currently under-development *DOTA II* being developed by an original designer of the *Defense of the Ancients* map now employed by Valve Software.

With the simplicity of digital distribution afforded by the Internet, mod teams are more often coming together to form their own development studio as was done by Unknown Worlds Entertainment to create *Natural Selection 2*. What all these games have in common is that without user-driven content, they would not exist. Imagine if we could open the proverbial

Creature Creator Texturing in Spore

Drag and Drop in Spore



Vehicle Construction in Spore

floodgates—imagine if you didn't have to be a trained or self-taught guru to contribute to your favorite game. All these teams were populated by those with a background in programming or 3D modeling—in some cases, students of those disciplines—with ambitions to break into the game development business. How many ideas are we missing out on because the methods to create them are too complex for their inventors?

Making stuff is immensely fun and rewarding even when accomplished without a professional toolset. Legos or Lincoln Logs are terrific analog examples. It's also incredibly fun and addictive to create in a virtual environment. One aspect of the videogame *Spore* is the creature creator, where you design creatures using premade appendages with evolution points as currency. You are constrained only by your imagination and the points you have accrued developing the personality of your miniature monster, which allows creations ranging from bipedal humanoids to blobs of numerous eyes, arms, mouths, and feet.

The development of the organism is considered by many to be the most fun and interesting portion of the game. According to Rachel V, a 26-year-old illustrator and lifelong gamer in San Francisco who plays video games eight to 12 hours a week, "the creature creator was definitely the most fun part of the game, everything else was repetitious, basically just continuing to do something until you get to the next stage of whatever." While the overarching goal is to develop a civilization from single-celled organisms to a sentient space-aged civilization by earning the points to spend on evolutionary "upgrades," the creature-creator component has many aspects of the aforementioned sandboxes: you can create to your heart's content and whatever you come up with is from your own creative flow. Everyone who has played the game embraced this making — there are near-limitless combinations of creatures to make. The game's main mode, however, was

Character customization in Saints Row: the Third
Takeaway: We like sliders.

Saints Row
Body Customization

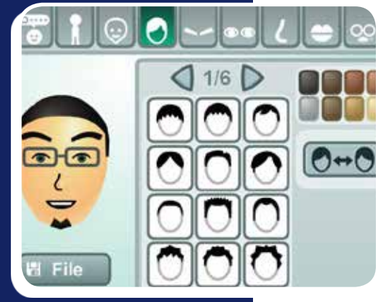
Bruce Willis created in Saints Row

generally viewed as bland and repetitive. It comes as no surprise that the most popular cheat for the game is to disable the need to collect points (which limit creative options) in favor of unrestricted creature assembly.

This type of imaginative engine exists in many other games, such as the role-playing genre, where players construct and name an avatar for the game world. In role-playing games, the player assumes the identity of the protagonist and can customize numerous aspects of their character, most notably the aesthetics. The options to modify the 3D model vary so greatly that it is extremely rare to find an identical-looking player without explicit instruction. The customization options can be so complex that players devote more time to creating custom characters than playing the game itself. An example of this is the community for *Saints Row: The Third*. Members have dedicated some of their time to recreating famous celebrities and characters from other intellectual properties within the game's character customization engine. These range from realistic models of actor Bruce Willis to Gollum from Lord of the Rings, from Marlon Brando's portrayal of Vito Corleone in *The Godfather* to Robert Downey Jr.'s portrayal of Tony Stark in *Iron Man*, and from the comic book villain Red Skull to horror antagonist Freddy Kruger.

Red Skull and Vito Corleone in Saints Row

Chracter Customizer in Skyrim



Mii Maker on Nintendo's Wii

The same has even been done with the Mii Maker on the Nintendo Wii, and while the graphical options are limited, there are many advantages to having the challenge of constraint. According to Jane McGonigal, "By removing or limiting the obvious ways of getting to the goal, the rules push players to explore previously uncharted possibility spaces. They unleash creativity and foster strategic thinking. The feedback system tells players how close they are to achieving the goal." (*Reality is Broken*, Chapter 1) There is a certain joy when recreating something by using nontraditional means and a sense of triumph when one feels they have gamed the system.

While these games were never intended to be tools in a professional realm, they are worthy for analysis: What have we learned from them? We allow games into our lives for social stimulation, virtual exhilaration, and for education. Our astronauts, military, doctors, and drivers-in-training rely on games for simulation. Yet there remains a reluctance to accept games as a professional tool.

But why? We know games do an excellent job acquainting a new player with a game's interface—a necessity both for engrossing a player within the virtual realm and for acclimating new players. Now imagine if a game was as complex to use as a 3D-modeling editor: unable to rapidly make sense of the interface, players would become first discouraged and then outraged. They would harshly criticize the steep ramp towards immersion and reviewers would unilaterally pan it. While there are always a few nuances to learn in a new game, not many want to play one complex enough to require extensive instruction. Developers would have a commercial flop on their hands. The experience of a game is immersion and story, that is, the interface is the means to that end. If UI complexity is a design flaw we would not tolerate in a game, why do we tolerate it in our creative tools? Why do we allow our vision to be stifled and our productivity limited?

From the Blog: Conversations with Myself

February 19th, 2013

Reasons for Making

Making stuff is fun, but sometimes we need to motivate people to do it multiple times. While I might be willing to spend countless hours to create something just so I might point to it and proclaim, "I did that," does not mean everyone else will. How might we motivate such creativity in the masses?

From my point of view: make it a fun game.

It is no secret that my thesis deals with reimagining 3D geometry in the form of creatures, humanoids, and objects, but it took a while before I realized that I had to make it more than just creativity for creativity's sake. There had to be something else—some other element. Sure, making it simpler to use would allow more people to approach the program and thought process, but I want them to view it as more than a novelty. I want them to think about the next thing they will make, not just make one thing and never give it another thought.

The solution seems to be to make it more of a game than a tool. What I am now imagining is a game/tool where you have to perform objectives and can level up. Leveling up will unlock new tools you have access to, which means you can modify more materials.

The objects you make could be outfitted on your creature creations and can allow them to do battle with other people's creatures. This provides the motivation and a reward feedback loop for those who become invested in this creative game. Winners could garner prizes and recognition for the objects they've made for their creatures while learning how to modify things in 3D.

I'd play it.

The user experience for a 3D modeling program should be simple enough to allow for our imaginations to be unchained while making 3D geometry, not an exercise in frustration as we fiddle around with different tools and methods in order to find one that works to bring one's imagination to the screen. While trial and error is a key part of ideation, I argue that the method of input is broken if a program's interface requires even the most advanced users to waste countless hours trying to sort it all out. Those hours constitute creative time better applied to other areas of engagement with a game – it is the difference between being a flexible creative and being a mindless tron, wandering some digital maze. The time we could save is a valuable commodity that could be used elsewhere, whether working on other assets, taking a break, or even playing other games. Unfortunately, the game development field has a sordid history with overworking employees during the crunch prior to release and "in 2004, Electronic Arts was criticized for employees working extraordinarily long hours—up to 100 hours per week—and not just at "crunch" times leading up to the scheduled releases of products"(Wikipedia). How much of their time was spent needlessly on trial and error? The creative mind works infinitely faster than the interface between the brain and machine. Simplifying these interactions brings us one step closer to the productive equivalent of warp drive. Removing trial and error potentially means turning the overworked creative into an extinct species.

From the Blog: Conversations with Myself
February 26th, 2013

Demographics Rant

In light of the in-progress critiques of February 23, 2013, there was one primary critique: the proclaimed desire that I narrow down who my audience is. While I understand the desire to have a more specific target when developing an idea, I very much do not want to limit those I hope to attract. Maybe it's just semantics, since I have let my design "philosophy" be focused on high school and college aged persons when thinking about the interactions in the interface.

Why? Simple. They're an age group that are used to computers and games. They are old enough to have been exposed to the real life equivalent of the tools they would interact with virtually and likely have also experienced the differences in materiality. They are at an age where learning can be done with relative ease, are quick to adapt, and on a precipice of their problem solving talents kicking into high gear.

Do I need to say this, though? If so, I refer you back to the above: numerically I suppose they would range from 14 to 23 years old. That's less than a decade and I desire broad appeal.

Is it so heinous to suggest that something can be made to appeal to a broader audience? Yes, the primary players of video games are teenage boys, but that doesn't necessarily mean they're the only ones interested. There are younger children who play, adults who play, even (now) senior citizens who play!

Perhaps they're outliers, not because they're abnormalities in their age group, but because designers have forced them out by not trying to appeal to them.

Maybe we need to keep outliers in mind in order to bring them into the fold. My audience is that of similar mindset.

Not age.

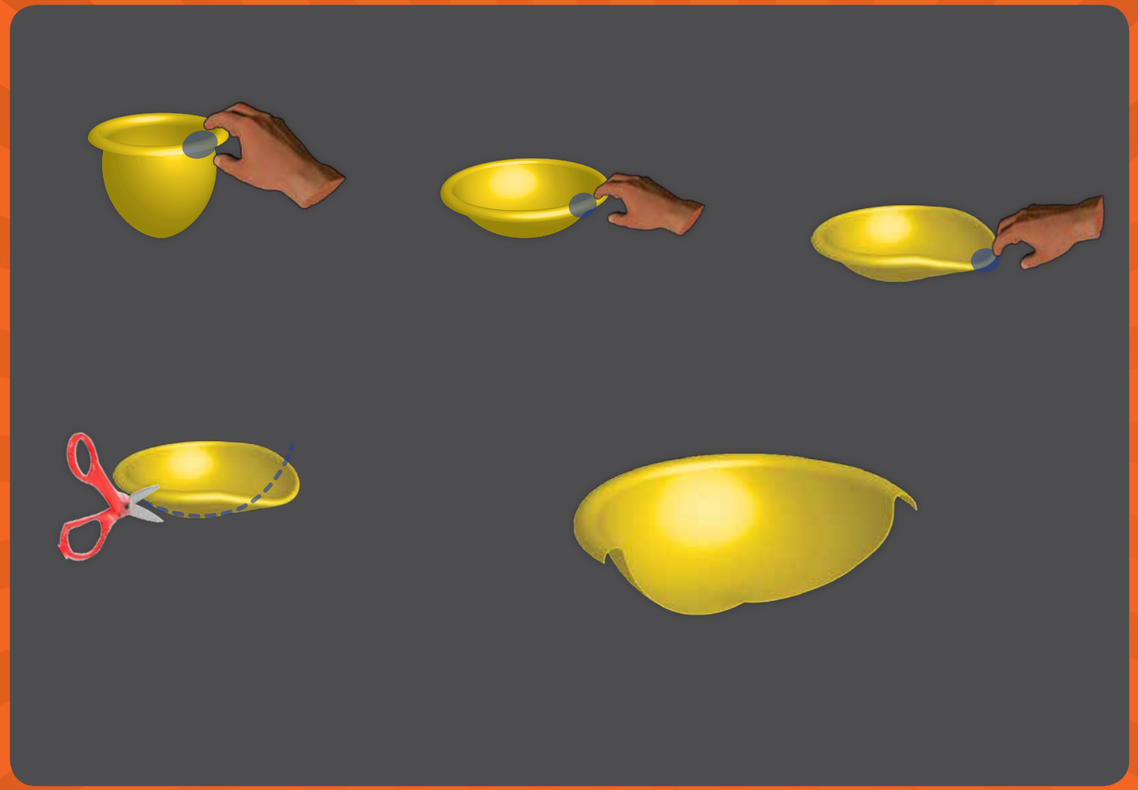
The Tools of the Trade

A cursor is an amazingly simple device: a pointed icon (usually an arrow) floating around the screen to select objects (usually icons) in order to interact with them. To introduce a new simplicity, we must first introduce a new complexity. The cursor is the virtual representation of an index finger on the mouse button, the single most important avatar a computer user has. Yet it lacks depth. There is no reason why the cursor needs to be constrained to the 2D world when flying in a 3D space. For your experience with Playpenned, it does not. Your cursor is not only personified by its own 3D model, but will also orbit the model you are working on. Adjusting the camera angle will temporarily lock the cursor in place, so that you might resume creating from the same exact point.

The following cursors will allow for the modifying of your 3D creations.

The Hand Tool

The Hand Tool is the most basic tool and the first one all Playpenned makers will access. Just as you can grab an object in real life, the virtual carpals allow you to grab, move, stretch, or pull objects together and apart. Unfortunately, you're not a super human, so the Hand Tool will be limited to the virtual malleable materials you like wax, clay or thin plastics, but you can still let your imagination run wild on your path towards unlocking new cursor instruments!



An illustration of how Playpenned would handle changing a vase into a bowl plus a few modifications.

The Thumbtack Tool

The Thumbtack Tool is another general-purpose tool that players have access to at the beginning of Playpenned. Its function is simple: it will allow the player to create a point on a model to snap another object to. For example, if you had a triangle and wanted to attach a cube to a non-snappable region, [point of order: by default any area where an object forms an edge point or midpoint will be snappable by default] you could use the Thumbtack Tool to orbit around your pyramid, drop a point, do the same to your cube, and then attach the two objects together at their corresponding points. It's just like adding virtual magnets to two or more objects in order for them to attach at a single point.

The Scissors Tool

We know scissors are designed to cut. Simply put, if you need to slice and dice, the Scissor Tool has what you're looking for. It will enable you to orbit around your model and lock in a cutting vector. Once that is accomplished, you can change the angle of the scissors and use your mouse scroll wheel to determine the length of the cut. As with ordinary scissors, this tool will only cut through thin or soft materials. You'll need to unlock one of the Saw Tools to cut through tougher supplies. You can use thumbtack hotspots made with the Thumbtack Tool as starting and ending points for a cut.

> *The remaining tools must be unlocked by completing objectives with default or previously unlocked cursor tools. Playpenned is an evolving game in the age of the Internet and new tools will be added and tweaked, this list is only an example of some that are unlockable.*

From the Blog: Conversations with Myself
March 5th, 2013

Paid to Play

Not to be confused with pay to play, where you're generally playing a monthly fee a la World of Warcraft for access to the server or League of Legends where you can purchase in-game items for real world money. I'm talking paying players to play.

Abandon sanity, all ye who venture here. Begin the ranting of a possible madman.

Is it really such a stretch for people to be paid for playing a game? Look at any major sports team. They're not just paid, but paid immensely well. Sure, they're pros, and there are already professional gamers that make a decent chunk of change playing games, but the sport of it all is not what I'm talking about.

I'm talking about paying you to make stuff. It just so happens that you'd make that stuff in a game. Maybe a company desires some community asset help; why not offer a few bucks to someone who can make it for you? Certainly cheaper than hiring a full time professional modeler; but we're not in this to put 3D artists out of a job, we're in this to expand the creativity of the player base.

Sure, the monetary incentive would be a big pull for some. However, why not the competitive nature? Incentivized cash prizes certainly motivate people to "like" things on Facebook or profess their love on Twitter, maybe this is a marketing tactic. Or maybe there is no real currency involved, but a karma based value system that shows your contribution. Karma points that could be used to buy other assets for your own use or simply to prove that you're the greatest player/maker that Playpenned has ever seen. It's an interesting concept and it has relevance.

Continued on next even page…

The Drill Tool

Part of the Hand Tool allowed you to poke holes into soft materials such as clay or wax, but unless you've developed superpowers, you can't push your finger through denser materials like wood and metal. Fortunately for you, the Drill Tool can be equipped with numerous drill bits for your hole-making needs in hardened materials. Be careful, though, if you're not steady enough with the controls, you might just drill too far or lose control and make the hole too wide. If you break your drill bit, you might have to unlock another if you don't have any extras!

The Hammer Tool

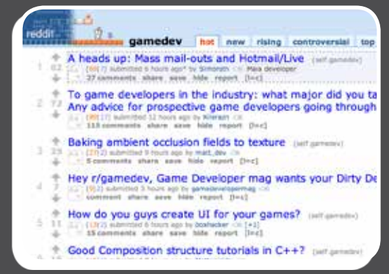
It's hammer time. Need to smash something? Dent it? Bend it to your will and make it submit? The Hammer Tool will fulfill your needs. The farther back you pull to swing, the deeper the dent will be. Once again, don't be too hammer crazy or you're bound to pound your precious model into a pancake. Picking the right hammer head is also key: do you want a rubber mallet for some finishing touches or do you need to show your material who's boss? The rubber mallet is good for subtle changes, but won't be able to impact metal.

From the Blog: Conversations with Myself

March 5th, 2013

Take the social news aggregate, Reddit, for example. People can "up vote" postings they like and "down vote" those that they don't—the points don't mean anything, but the system keeps track of them and shows others. It's certainly proven to be addictive to those who need to obtain as much karma as possible, even to the point of supposed "karma conspiracies" where people with multiple accounts fake entire interactions.

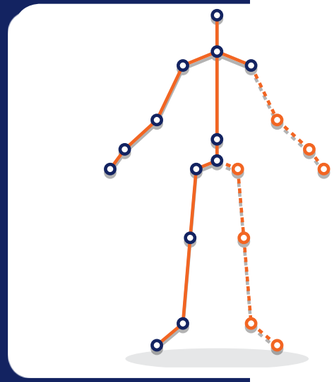
Whether used for good or evil, it is a sign that any creative game needs a way to not only show others your creations, but also have some sort of economy that allows for trading, buying, and ego boosting. The fun of making things is that we're not doing so in a bubble! We want others to use and see our work, to make our imagination's creations come to life and serve a purpose. Besides, who doesn't like healthy competition?



Reddit.com

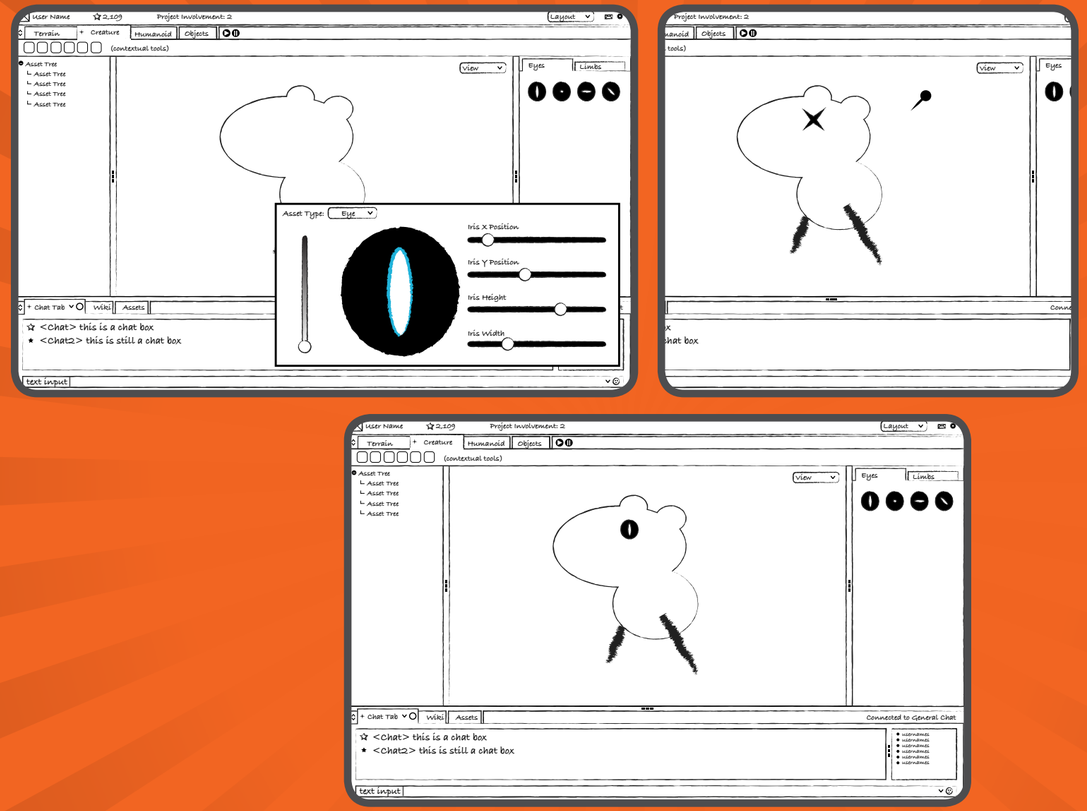
The Saw Tool

Choose your saw: hand or powered chainsaw? The handsaw will only get you so far, but the chainsaw will cut through materials like a hot knife through butter. Don't be too overzealous, though, using a chainsaw on softer materials like clay can cause a rough edge or sloppily rip through more of your overall model than intended. Hand saws will power through materials like clay and wood, but you will need a power saw to cut through tougher materials like metal or stone.



Connecting Dots

Sure, we have these cursors, but where do you begin? Simple: with your imagination! There are multiple options to start with: you can make a skeleton by connecting dots on the screen or you can take a picture of a stick figure to generate the structure of a shape. You can always refine the skeletal structure without needing to start your model from scratch. These skeletal structures aren't just for humanoid models or creatures: if you have a rough idea of that kind of object you'd like to create, Playpenned can search the library of models to modify and suggest which objects to begin with. It will also match the layout from your sketch and arrange the models together accordingly.



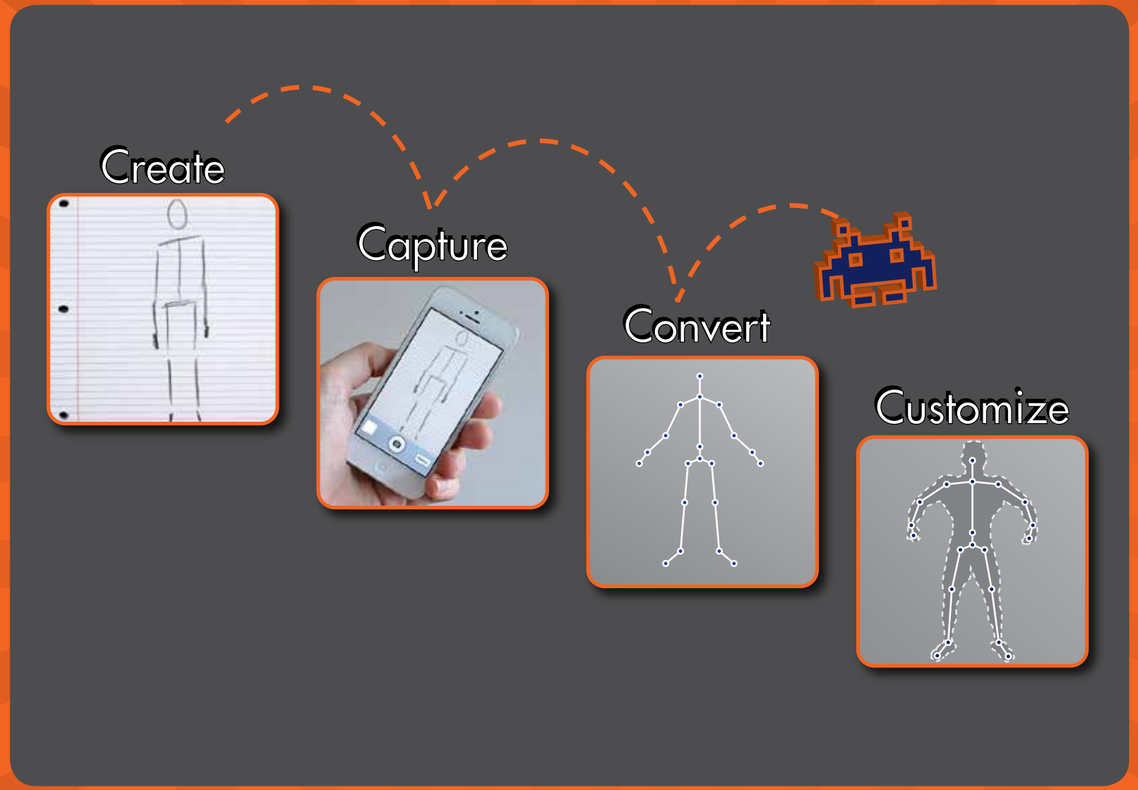
Interface wireframe concept of drag and drop, thumbtack points, and slider adjustments.

Pre-fab Fabulous

Playpenned has been designed to eliminate the need for traditional 3D modeling. This means that you will never have to modify object meshes by selecting vertices, edges, faces, or polygons. The method of editing revolves around modifying preexisting 3D geometry from the object library with the aforementioned cursors. If you know how a real-life tool works, you can apply that same knowledge to the game. If you aren't familiar with one of the cursor tools' real-world counterparts, you'll be able to apply the knowledge gained from experimenting in Playpenned to the real world. If you have an object in your home that you'd wish to use but does not exist in the object library, you can use the same camera previously used to generate a new model to add to the aforementioned library. Playpenned will use multiple images from different angles to generate a model and texture that you can add to the object library for other Playpenned players to use.

Texturing

You aren't bound by the texture of the prefabricated objects. You aren't even bound by traditional materials in the creative mode (creative mode is unlocked after completing the missions to unlock all the tools and materials). It is simply a matter of dragging a material from the material library onto a part of your model. You can even paint over part of your model to use as a mask, either to apply the material to that specific area or exclude that area from materiality changes.



Four key steps to go from inception to geometry

Capture the motions of your fingers to animate

Animating

Animating an object can be a difficult task, which is why the entire process of creating an object, creature, or humanoid uses the skeleton as the basis for motion. You can use premade animations from the animation library by simply selecting them and assigning to certain behaviors (for example, assigning a standing animation to the idle behavior and a running animation to the running behavior). You can also modify existing animations slightly by tweaking the location of parts at keyframe points or use new technologies, such as a Microsoft Kinect sensor, to capture your own acted out motion. With these 3D capturing technologies, you could move a toy model in the way you'd imagine the animation or use your hand to for animated motions such as walking your fingers over a desk surface.

Exporting

You've put in the blood, sweat, and tears. You've meticulously sculpted, sliced, diced, and textured. You've selected and modified premade animations or have captured your own. You've made it through the objectives and have unlocked the creative mode. So what's next?

Well, that's up to you. Your creature can be armed with the objects you've made and make its way to the arena for battle in Playpenned's own minigame. Or you can take the result of those creative juices you had flowing and export your creations out of the Playpenned sandbox. This means that if you're creating your own game or were designing objects for a preexisting virtual world, your models are ready to be exported to open formats containing the geometry, textures, and animations. You can then bring these into whatever game engine supports modifications and downloadable add-ons.

From the Blog: Conversations with Myself
March 26th, 2013

Scanners

No, not the movie where the guy's head explodes. We're talking about scanning documents. You've likely had to do this countless times for work or school; scanning a document to digitize it or even to fax it. Imagine if you could scan more than a page. Well, now you can.

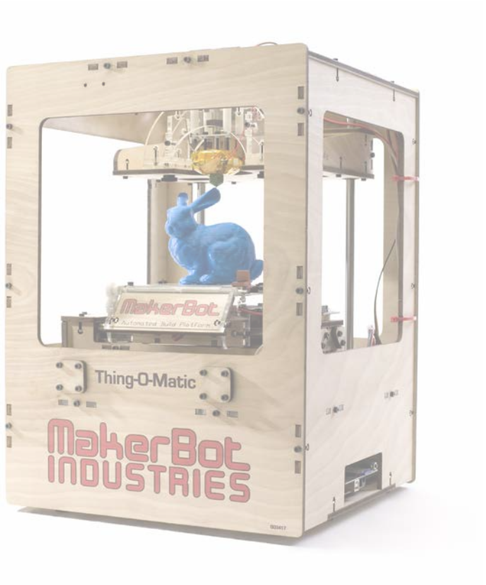
The world of scanning is opening up to 3D geometry and 3D scanning can reshape the future. It's already being done on a professional level with motion capture for films: you may have seen imagery of actors, clad in spandex and what appears to be ping pong balls, moving around a set while their movements are translated to a computer. It's been around for a while and has allowed for performances like those done by Andy Serkis in Lord of the Rings and King Kong to come to life on the big screen. Motion capture has also upped the ante for animation realism in 3D video games.

It's now entered the home: people are hacking X-Box Kinects and using them to capture 3D motion; two or more Kinect sensors in complementary positions can turn any space into a low-cost home motion capture studio. However, it also goes a few steps further.

The old school motion capture primarily just captured the motions of connected points while ignoring the mass of the actors themselves. However, with new technology, such as found in the Kinect, the sensors not only mark the skeletal structure but also the body mass of the individual. While it may almost seem like the industry learned to run before walking, as we like to associate animation as increased difficulty over static geometry, animation can be "cheated" by simply monitoring the movement of points in a virtual stage; in a nutshell, it was done by just monitoring the X, Y, and Z coordinates of the moving points.

Continued on next even page…

Alternatively, you could export your model to a 3D printer, where your creation will be born into a physical existence. It can exist purely as a static sculptural structure or printed with functional joints to create your own action figure. With Playpenned, anyone can be a toymaker or add to the depth of their favorite games.



From the Blog: Conversations with Myself
March 26th, 2013

Three-dimensional scanning of mass, however, changes the ballgame, especially when combined with 3D printing. Missing a specific kind of object that you have duplicates of elsewhere such as a button? Scan it and print yourself a new one. Break a toy? Scan it, fix it, print it.

How might this fit in with my thesis you ask? Simple: in my world of modifying 3D geometry, I imagined it without the traditional editing tools of vertices, faces, polygons, edges, and splines. I wanted it to be from a pre-established and pre-made list of models for the player to use and subsequently slice up to fit their own purpose. This becomes a lot easier if that geometry can come from scans of objects in your home. Looking for a specific shape like the statue on your mantle but can't find it? Scan it, share it, modify it—this turns your entire home into the virtual workshop I'm envisioning on screen. It's very exciting.

What about the technology? Sure, we have the ability but won't it be too expensive for people to get these 3D scanners and printers? Yes. For now, it's a bit pricey to get in on the ground floor, but that's always the case for early adoption. There are, however, multiple methods. Autodesk already has an application for the phone that will generate a textured 3D model by taking multiple pictures of the object at differing angles and Makerbot has gotten the cost of their 3D printer down to a few hundred dollars. Not everyone has a place for a 3D printer, but we all have cell phones with cameras these days and creating geometry with pictures is already a core concept of Playpenned. It is a no brainer to extend that same concept to editable 3D objects.

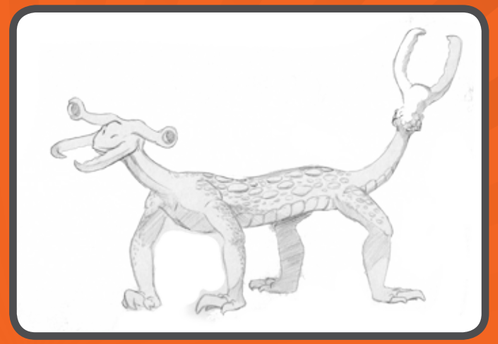
Research and Development

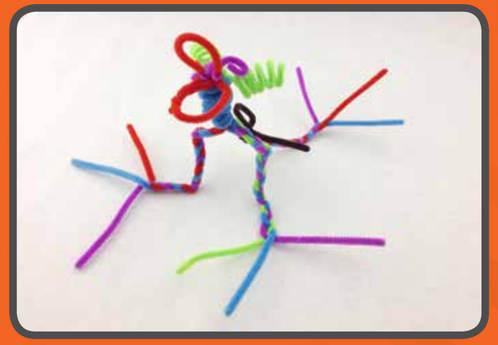
Launch the Probes

Field testing and the user experience are essential parts of my project – creativity is such an ephemeral idea, I had to be diligent in my testing to understand how it was other people wanted to play in this space. There are a variety of ways we play or work and certain ways expect things to work. My challenge was to search for trends and outliers, moments of joy and frustration. To distill them to their most useful basic methods so that I might achieve the holy grail: uninhibited creativity.

Let there be simplicity

I began with an ambitious goal: How to reimagine an entire suite of tools for game developers. This toolset would be designed to simplify as much of the game development process as possible. While a daunting challenge, I had to dive in and get working, so I started by speaking to independent game developers on the GameDev section of the social site *Reddit*. (For those unfamiliar, Reddit.com is a social news aggregate where people can post links or create self posts akin to a forum. Other users can either approve with an "up vote" or disapprove with a "down vote." Posts with more of these karmic "up votes" make it to the front of the main page to be seen by





Illustrations interpreted from pipe cleaner creatures.

most of the site's millions of users.) *Reddit* allows for new communities to come together – covering a range of interests from politics to funny pictures, to independent game development. These communities, or "subreddits" as they are known, can be a great resource once one has weeded through the numerous cat pictures populating the site.

Frustration and Motivation

Common rendering glitch

I wanted to understand what game developers found frustrating: What was it they hated about the process? I quickly found out there are numerous complaints, some obvious, others less so.

For instance, programmers want an easier means of obtaining or creating art and artists wanted an easier means of programming a game on their own. Developers crave an easier method for assembling indie game teams—they wanted to leverage the collaborative and location-free capabilities of the Internet. One programmer longs to find reliable artists, having dealt with bombastic creatives that never deliver. This brought one of the major pitfalls of independent game development to my attention: Teams often dissolve before completing the project.

> *Fun Thought: What if you played a game that made a game? Even if it was simply a passive result rather than your primary reason for playing? Your creations could be paired with those from other players and if one participant vanished, someone else would seamlessly replace them.*

Motivation is another pain point of the development process. Quite often, a developer – whether working solo or as a part of a team – starts out

wildly excited about a game. As the tough task of creating the game becomes reality, the developer burns out and gives up after only a few days or weeks. As phrased by Reddit user *skocznymroczny*: "I often get stuck in analysis paralysis. It seems my game loop can never exceed 40 lines of code. I try to figure out the best design and as a result I never progress over the 'press arrow keys to move character' phase."

A surprising complaint was too much input. To quote Reddit user *TheChosenOne570*, "As someone that dabble[s] in independent games. I make it myself, but everyone thinks their input is valuable and I should adapt my game because they have an idea. Shut up!!! If you have an idea, you make the game! I try to be polite 'that's not consistent with my artist vision,' but really what I'm saying is 'shove it up your ass.'" I concluded my research with some of these game developers by showing a wireframe concept for how a new suite of tools may be formatted and how the interactions might work.

Why Should I?

Despite the complaints and frustrations, one of the unanticipated surprises was that while many developers wanted new tools to easily achieve what they currently could not, they were resistant to changes made in areas they held proficiency. When it came to the concept of simplifying a coding engine for a coder or a graphics tool for an artist, the response was most often along the lines of: "Why? Why should I convert to your method when I already know this one?"

The resistances to retooling the status quo are also mirrored in the professional realm. One of the most-used game engines for both independent

and bigger budget games is called *Unity 3D*, which provides the necessities of game development ranging from programming libraries and a terrain editor to publishing methods and plugin support. I inquired whether or not *Unity* had any interest in expanding the toolset into something that was a friendlier developer tool, such as the inclusion of a simple 3D modeler. The short answer: no.

Kuba Cupisz, one of the programming gurus working at *Unity 3D*, stated that *Unity* believes in focusing on core functionality, to make it as good and bug-free as possible. Supporting add-ons through their application programming interface, or API, allows other users to develop scripts and plugins for *Unity*.

This creates a symbiotic relationship between *Unity* and its customers. It allows the engine to amass new functionality without the company diverting resources from core experience improvement. If someone else wants to make a simple to use 3D modeling program for *Unity*, he could do so with the freely available API. Other than that, *Unity's* asset store provided a way for programmers to quickly obtain artistic assets. As Kuba stated bluntly, "the idea is the biggest problem [in game development]." It was after this discussion that I knew it was time to head in a different direction.

Stay on Target! (We're too Close!)

One of the complaints of Reddit user *Mutant321* was "Time (or lack thereof). Game development is not a hobby you can spend a couple of hours a week on and expect to get much out of it. I can often find 10-15 hours a week (on a good week), and that's barely enough to get everything done that I want to get done. 20-25 hours would probably be better, but I'm never

going to have that much time. The end result is that about 50% of the cool stuff I want to do never gets done."

But why not? Game development is creation at its finest! There's story, artwork, sounds, animations—you're literally creating a virtual world as the Almighty incarnate! Who wouldn't want to do this if he or she could? With my background in 3D modeling, my love of customizing characters in games, and the importance placed upon character design, I found 3D geometry to be the prime candidate for an overhaul. My goal was to make game development accessible as a hobbyist activity.

I began by conducting a series of interviews with potential users: hobbyists. I sought out high school students and teachers, creatives in different industries, and those who enjoy playing games but don't have the training to model their own graphics. The feedback was resoundingly positive: a new method of creating stuff? Sounds cool! Thomas R, a seventeen-year-old high school student preparing to enter college for 3D game development exclaimed excitedly, "If I could [get work done] just like I'm playing a game, just like playing *Minecraft* or *Skyrim*, that'd be awesome!" Excitement levels only increased when my intention of allowing such assets to be exported to games or 3D printed into toys became clear.

Some of the takeaways from interviews and studying creative games: People like sliders, those options one can adjust when making an avatar in a game or console like the Nintendo Wii. The constraints set reasonable boundaries and don't overwhelm the player. Drag and drop is another method of customization that is immensely popular: it allows for a live ideation as a character or object is updated on the fly depending on the selections of a player. What you see is what you get. With the realization that these character customization components of games are miniature games in their own right, it finally dawned on me: What if this tool was also a game?

The scorpion-rabbit pipe cleaner monster chosen to be modelled.
Created by Rachel Vanderpool

Interpretive concept sketch

Modelling

Pipe Cleaners

I then spent considerable time seeking a creation method in the physical world that would be both simple and appealing to a broad audience. Paper was easily customizable but didn't capture the constraints like character creation engines. Legos are well known and easy to use, but their form – cuboid construction – narrows the maker's possible outcomes.

I settled on the children's art class standard, the classic, colorful pipe cleaner. Malleable enough to form any shape imaginable, but requiring specific construction if one intended their creation to stand. It provided the proper amount of customization within the confines of easily making an object without needing instruction. In fact according to Rebecca H, making pipe cleaner monsters is a favored pastime for killing time while waiting in lines at the Penny Arcade Expo, a series of gaming festivals held in Seattle, Boston, and Australia.

Two rounds of pipe cleaner creation commenced. In the first round, participants had unlimited time to create their creatures and could only use pipe cleaners. In the second round, participants had access to laser cut joints, newer thicker pipe cleaners (in addition to the thinner version used in round one), and could look at the building materials as long as they wanted. However, once construction began, a creator would only have ten minutes to assemble the creation. During both instances, the majority of participants reported that creating something was an enjoyable thing to do and even caused alleviation in stress. The time limit was also preferred because setting a limit offered the creator a sense of accomplishment and "doneness." It also added a feeling of play to the work and prevented the participant from making constant changes in a futile attempt to achieve a nonexistent perfection. Knowing that there was a specific end point alleviated some of the anxiety of unlimited construction time.

Colorized illustration of the creature

To 3D… and Beyond!

The final phase of my proof-of-concept was to select a couple of the pipe cleaner creations and to model their geometry. Fortunately, Autodesk had recently released their *123D Creature* application, which made it simple to build up a skeleton, similar to the pipe cleaner models by connecting dots (also similar to the concept of Playpenned's skeletal editing system), and adding mass. I then colored the models based upon the pipe cleaner colors chosen, divided the exported model in *Rhino 3D*, rigged and animated it with *Poser*, before finally bringing it into the *Unity 3D* engine where one can now control the virtual creature in a virtual environment. Thus it demonstrates the creative process from imagination to physical to virtual, and finally to controllable creation. The creature was also 3D printed as a small figurine.

This process was fun, but it was also exhausting. There were numerous instances where I had to fight with several of the aforementioned programs to properly render or animate or texture the creature model. The numerous frustrations and upwards of twenty hours spent in the "trial and error" loop only solidified my belief in this thesis. It should not be as complicated to do this as it presently is!

A screenshot from the Playpenned Playtest game.

Why Games & What If

> *The truth is this: in today's society, computer and video games are fulfilling genuine human needs that the real world is currently unable to satisfy. Games are providing rewards that reality is not. They are teaching and inspiring and engaging us in ways that reality is not. They are bringing us together in ways that reality is not.*
>
> *-Jane McGonigal, Reality is Broken*

Games can give us a lot more than entertainment. They're an untapped creative outlet because of the amount time and training required to make them. This statement does not diminish the creativity that goes into games produced by both large and independent studios. Rather, this statement is designed to provoke a thought: What if anyone could make a game?

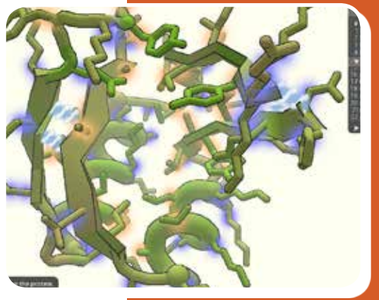
What if there was a simpler method of designing and coding and implementing a game idea? What would the consequences be if a teacher could make a game or modify one made by another instructor to suit their needs? How would students react if these games were their homework instead of photocopies of pages from bland textbooks? What if the SAT and other intimidating standardized tests were redesigned as games? Would students perform better? Retain knowledge longer? Would students who test poorly do better with the same questions in a game?

Laura D is a high school science teacher in rural New Jersey, though she has previously taught inner city children in chemistry and corrective math courses. When asked about using games in education, she says, "I used a game system for corrective math called sumdog.com, worth checking out, the kids loved it and I loved it, they played games against each other or other students or a computer and they were games they were interested in, and I could see their progress." When asked if she would be willing to learn a new tool she states, "I would be willing to learn something as long as it was simple for my students to use." With educational games having a proven track record and the willingness of educators to learn new tools, why are we not capitalizing on this?

What if a scientist or a researcher could make a game? According to Jane McGonigal, "Every single day gamers spend a collective 30 million hours working in *World of Warcraft*" (*Reality is Broken*, Chapter 3). This is in one of many games; what if this brainpower could be leveraged to solve scientific problems? Some early examples of this are *EteRNA* and *Foldit*.

EtERNA is a game where your actions matter. According to the *EteRNA* website, "By playing *EteRNA*, you will participate in creating the first large-scale library of synthetic RNA designs. Your efforts will help reveal new principles for designing RNA-based switches and nanomachines – new systems for seeking and eventually controlling living cells and disease-causing viruses. By interacting with thousands of players and learning from real experimental feedback, you will be pioneering a completely new way to do science. Join the global laboratory!"

EteRNA



Foldit

Portal 2

Similarly, *Foldit* is a puzzle game of protein folding that helps scientists fight diseases. On the Foldit website you can find numerous reasons and explanations including, "Q: How does my game playing contribute to curing diseases? A: With all the things proteins do to keep our bodies functioning and healthy, they can be involved in disease in many different ways. The more we know about how certain proteins fold, the better new proteins we can design to combat the disease-related proteins and cure the diseases." Imagine the power of leveraging millions of human minds, simultaneously, and solving these major problems. The stage is already being set with games like Mojang's *Minecraft* and Valve's *Portal 2* making their way to the classroom via *MinecraftEdu* and *Teach with Portals*, respectively. All hail the human supercomputer!

Concluding Thoughts: A Manifesto

Creativity is important and fun. Education is important and games are fun. Creative tool interfaces tend to be complex, but their videogame cousins do an excellent job teaching and introducing new users to the components necessary to successfully immerse one's self in the virtual environment. Let's toss all these things in a pot, simmer for an hour, and see what we get.

That would be Playpenned, the conceptual game that simplifies 3D modeling for the hobbyist. It is the first step towards a creative engine for the masses, a virtual workshop housed in ether of the cloud and able to be transmuted into mass via 3D printing or rendered into games – a driving force behind a new kind of game developer and player-generated content. Herald of the player-maker.

No more traditional vertices, edges, or faces. No more Boolean unions or divides; no more modeling in a vacuum. We have physics and familiar tools. Hammers hammer and fingers can grab; trial and error can be an iterative creative method rather than multiple attempts to make something work.

We can drag and drop. Objects, animations, poses, textures. If it hasn't been done before, something similar can be our starting point because we no longer reinvent the wheel. It's exciting. It's exciting because we can show an idea. It's exciting because of the many possibilities.

It's exciting because we don't know what it might lead to.

Frequently-ish Asked Questions

Q: You talk about character creators. How is your concept different?

A: In some ways, it's not. However, character creators in games are limited to that game they are in. You cannot export your characters to 3D printers or for use in other games. I aim to fix that.

Q: Is this just a rip off of Spore?

A: Spore was one of my main inspirations. Since the game was first announced I longed for a day when I could make all 3D models in such a fashion. Unfortunately, that day has yet to come.

Q: Is this a tool or is it a game?

A: Both. It is a game in the sense that you have to unlock tools in order to use more materials. Once you have completed the game objectives, you can go into a creative mode where you are unrestricted with tools and materials. In this sense, the objectives in the game act as a tutorial to teach the program. There are also optional mini games, such as using your objects with your creature, but those are bonuses that do not influence the models you make. They can, however, influence your profile.

Q: What profile?

Playpenned is not a sandbox devoid of connection; it leverages the Internet and connects you to other players. Your profile tracks what you have made, how many other plays have used your creations, and your mini game achievements.

Q: Can I keep my creations private?

Yes.

Q: How would this be used to make a game?

This project reimagines the 3D modeling aspect of game development. However, if given the chance (and more time), I'd love to rethink methods of coding. Until then, this is just the first step in making game development approachable by hobbyists.

Q: Scanning 3D items seems too futuristic to be real. Are you making this up?

Nope. The technology already exists to scan 3D items. You can use multiple Kinect sensors to scan 3D movement, small 3D scanners are popping up on sites like Kickstarter, and there are phone apps that allow you to generate 3D textured models by taking pictures of an object at multiple angles.

Q: Why the interest in 3D printing?

Because technology is cool and it's the closest thing we've got to Star Trek technology. Besides, who wouldn't love to create their own toys with a game? You'd be holding something birthed by your own mind!

Q: Do you really see this impacting education?

A: Yes. There are numerous studies that have shown the benefits of educational games, but allowing educators to customize them can potentially make it more personable to students. Not to mention that games are limited by commercial success rates. This would not be the case if it were in an educator's arsenal of tools.

Q: Would you make this open source?

A: If made, I imagine Playpenned as a free-to-use closed source program for security purposes. I would, however, want a completely open API.

Q: What do you get out of a project like this?

A: I love games. Always have, always will. I also love user interfaces. This project has allowed me to combine both of these interests while address the immense frustration I have had with 3D modeling software.

Q: So where can I get a copy? This sounds great!

A: It would be a dream to have this concept made and I hope to get there one day. Unfortunately, the complexities require numerous programmers with a skillset beyond my own, so only this book and the playtest currently exist.

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Moving Forward

Next Steps

Ideally the next stage would be the development of this platform, followed by approaching other complex issues with the goal of simplification. Even now, as I am preparing this book for printing, the folks at *Adobe* are pushing new papers discussing the needs of creativity in the classroom—citing the belief creativity should be taught as its own subject like math or science. Additionally a new creative sandbox game, *Starbound*, has had great success crowd funding preorders and gaining many new followers—including myself. Clearly the preceding concepts and desires of this book hold enormous merit.

Afterword: Musings

What if you could do anything? In an instant you're a master of everything, what would you do? What would the implications be? As masters of all, how would come of group dynamics? Would our friends be human or animatronic robots of our own inception? Would we achieve humanity 2.0? 3.0?

My context is the virtual realm, so what if all of game development was easier? Would god games, where the player steps into the role of a deity and controls the universe, find themselves influencing our attitudes? Give into ego? When the virtual achieves photorealism, would we leave it? Would we prefer this matrix to reality? Would the movie *Surrogates*, where people life their life via mechanical avatars while staying in their home come to fruition? At what point does a perfect simulation replace what it mimics? Will we achieve utopia, dystopia, or remain suspended between the two?

Farewell

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And thank you, reader, for your interest in my thesis. I hope this text was an enjoyable and thought provoking experience. If you have any questions or feedback, I can be reached via my portfolio site at:

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SYNOPSIS

HAVE YOU EVER HAD AN IDEA BUT NOT THE TECHNICAL SKILL TO IMPLEMENT OR MAKE IT? MAYBE YOU DIDN'T HAVE THE RIGHT TOOLS. MAYBE THE RIGHT TOOLS DON'T YET EXIST.

BUT WHAT IF THEY DID?

LETS SIMPLIFY THE EXPERIENCE OF 3D MODELING. LETS MAKE IT MORE APPROACHABLE TO NOVICES AND HOBBYISTS. WHAT MIGHT THE IMPLICATIONS BE? WHAT IF ANYONE COULD BE A VIRTUAL CRAFTSMAN? WHAT IF YOU'RE PLAYING A GAME TO MAKE YOUR CREATIONS? IF YOU COULD PHOTOGRAPH A STICK FIGURE TO BEGIN A SKELETAL STRUCTURE OR GENERATING 3D PARTS FROM ITEMS AROUND YOUR HOME, WHAT WOULD YOU MAKE?

PLAYPENNED ADDRESSES THIS AND MORE A REVOLUTION IN CREATIVITY FOR ALL.