

## Designer's Notebook: Breaking the Rules (Ernest Goes To The Movies)

By Ernest Adams

Spoiler warning! This column gives away details about the movie *The Matrix*, although since until last Saturday night I was probably the only person in the western world who hadn't yet seen it so it's unlikely that anybody reading this can have it spoiled for them.

We game developers love movies about computers, especially if they have virtual reality and other neat concepts like that in them. So I figured I'd better see *The Matrix*, after all, I hurried down to the cinema to watch *Tron* when it came out, and what a mesmerizing experience that turned out to be. Didn't you love that scene where Bruce Boxleitner passionately kissed a computer program? Ok, she looked like a woman, but the movie told us quite unambiguously that she was a piece of software. Now, I admit that on occasion I have been tempted to give my monitor a little smooch, a kind of congratulatory peck on the cheek when I finally evict a really evil bug from my code. But I've never actually planted a big old smack on a subroutine, and frankly, I can't imagine what Bruce Boxleitner got out of it.

So I finally got around to watching *The Matrix* and it was just awesome how they shot the entire movie through a green filter. I would never have thought of that. And how does it stack up as computer movies go? Well, to start with, it gets a ten out of ten for being extremely hip and stylish. We've got all the required elements: skin-tight, shiny black clothing, gritty urban environments, unnecessary sunglasses, loads of gratuitous slow-motion violence, and nice camera work. Pity everything's green, but what are you going to do - I suppose worlds projected by computers are just green (except for Quake, which is brown). Anyway, the old hip-meter was redlined (or should that be greenlined?) from start to finish.



**The Maxtrix: green filter**

But there were some slightly funky plot elements - one inexcusable deus ex machina resurrection (Tank's) and another more excusable one because Neo apparently is literally a deus... ex...machina. It was interesting, although biblical allegories normally make me want to yell, "Find your own plot you lazy slob!" at the author. There were some other unexplained logic gaps too, but with enough special effects a movie can dispense with logic, right?

There was one other thing that kind of shattered my suspension of disbelief though; the whole premise of the film. In a nutshell, it was human beings being farmed by evil machines for the energy their bodies produce - electricity and body heat.

I'm sorry but that's just stupid. It's not only goofily impractical - I'm willing to pretend that you could find a way to do it if you worked hard enough - but also completely pointless. There's this little thing called the First Law of Thermodynamics, which I'm sure every evil machine knows by heart. It states very simply that you cannot get out of a system more energy than you put in. The machines were necessarily expending more energy keeping those human beings alive - not to mention simulating an artificial world as well - than they could possibly have gained from them. Imagine if, instead of human beings in vats, the evil machines were keeping endless rows of hamsters, each with its own hamster wheel attached to a generator. They would still have to feed the hamsters and the energy in the hamster food must be greater than the energy produced by the hamsters. They would be better off to burn the hamster food in a power plant instead.



**The Matrix: humans used as batteries**

(Where does the hamster food get its energy? From the sun, but of course in *The Matrix* the human beings have blocked out the sun, so the machines couldn't actually grow any grain to feed the hamsters anyway. But there's still coal, oil, gas, uranium, hydro, the wind, the tides, and geothermal energy to tap - any of which would be more efficient than using human beings, or hamsters.)

So, ten out of ten for style, but only three out of ten for knowing what the hell they're talking about. Now, I'm sure this is not a popular view. I can already hear the jeering: "Man, you are such a nerd! That movie was totally radical, and only a serious propeller-head would be quibbling about the First Law of Thermodynamics in the face of so much awesomeness."

To which I say, "guilty as charged." My tolerance for scientific ignorance, at least in worlds where science matters, seems to be shrinking all the time. I'm completely livid about the Kansas State School Board's decision to exclude evolution from the public school curriculum, for example. *The Matrix* is a techno-thriller, so in my opinion it ought to get its technology right - at least where it affects the whole point of the movie.

That said, however, I know I'm being hypocritical. After all, Sonic is an irradiated hedgehog in red tennis shoes for God's sake. I, in the game industry, have some nerve demanding that other media uphold the laws of nature. Who cares, anyway?

Actually, who cares varies quite a lot, and as a game designer, you have to be very sensitive to what your audience will and won't put up with. There's a quality that a good game has for which I don't have a name. It's not credibility; most computer games aren't remotely credible anyway. It's more than just engendering suspension of disbelief. I can only describe it in terms of its opposite: when a game doesn't have it, its players frequently yell "Bullshit!" at the screen and throw down the controller. It's a quality of being true to its own inner laws, true to itself, and true to the player. If you cheat on the player, disappoint him, trick him, or do something that makes no sense (or worse yet, require that he do something that makes no sense), then you're lacking the magic quality.



**Sonic The Hedgehog**

This quality is not the same from genre to genre. There are several ways to break the rules of the real world in a computer game, and the consequences of doing so aren't always the same.

First there's the underlying physics in a simulation. The guy that headed up EA's 3DO development team was a Ph.D. physicist, and he insisted that any 3DO game which simulated the real world - like *John Madden Football*, to take an example totally at random - must have Real Physics™. So the team worked and worked on making the physics as real as possible. This had exactly the consequences you would expect, and in the end, they took all the Real Physics™ back out again. After that it played much better.

Fudging the physics in simulations is done all the time. Whether it's the right thing to do or not depends on your motivation for doing it. If you're doing it to improve gameplay, as we were, then go to it and God bless. If you're doing it to make a game harder, by creating a situation that a player has a hard time coping with because it doesn't resemble the real world, then I think you are in effect cheating. There are more honest ways of balancing your game.

But suppose we had broken a different real-world rule - the rules of football itself. This is strictly forbidden. Mr. Madden would never have tolerated it nor would our customers. The sports genre is an area where you can't cheat. If you're going to simulate a real-world sport, you have to get the details of that sport right or the players, not to mention the reviewers, will roast you.

Military vehicle simulations are another area where you have to get it right - some of the time. Serious fans of military hardware know every detail of the gear, and they want the simulation to be accurate both in appearance and performance. However, not all the people who buy flight sims are serious fans of military hardware. Some are just people who want to fly around and blow stuff up. For them, you need to make the plane easy to fly and the stuff easy to blow up. Most importantly, you need to let your customers know which kind of a sim you're selling them: a hyper-accurate one or a light, easy one. This needs to be clear on the box and in the ad campaign. If you're ambiguous about it, you'll probably end up disappointing both camps.

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So what about science fiction like *The Matrix*? SF breaks rules all the time. How do we decide which ones we can get away with and which we can't? To start with let's again distinguish between fudging for the sake of gameplay and creating a premise that flies in the face of known science. Fudging is Ok. Impossible premises may or may not be Ok; it depends on how much you're expecting the audience to swallow. One thing that is not acceptable is that anything goes. That's one of the problems I have with Superman - his powers seem to be extremely elastic, and in the movie he even reversed the flow of time. Nope, sorry, they lost me there - if he could do that, he could fix anything and everything.

On the other hand, a time-honored SF technique is to break only one rule and then see what happens. H.G. Wells did it wonderfully in *The Time Machine* and again in *The Invisible Man*. His protagonists were fully human and subject to all human frailties, but one could travel through time and one was invisible. His novels explored the possible consequences of possessing these powers - sobering in the former case, tragic in the latter. I would suggest that you adopt a policy to break no more rules than you have to. The more rules you break, the more unbelievable and even ridiculous your game becomes.

The other thing to look at is how egregious the violation is and whether or not it's already familiar to the audience. Take hyperspace, for example. Most spacegoing science fiction stories depend on some form of faster-than-light star drive. Einstein's special theory of relativity seems to prohibit this in normal space, but that doesn't preclude us postulating hyperspace or wormholes or some other kind of gimmick that does an end run around him. Audiences are used to this, and you don't have to be specific about how it works - in fact, it's better if you're not. Han Solo talks about "making the jump to hyperspace" and that's all they need to know.

However, you need to avoid things that the audience is going to find patently absurd. Hyperspace is not patently absurd because there's nothing in our everyday experience that explicitly prohibits it. I find the idea of farming humans for their body heat patently absurd, but I imagine most of the people who watched *The Matrix* didn't give it that much thought. In *The Andromeda Strain*, Michael Crichton postulated a life form that contained no proteins. Here I'm out of my depth. Biologists probably think this is hilarious, but I'm not educated enough to know, and so it doesn't bother me. But it didn't ruin the movie since it wasn't central to the plot. The key discovery in *The Andromeda Strain* (spoiler coming) was that the organism could survive only within a very narrow pH range - the balance between acidity and alkalinity. That's entirely believable, because Earth organisms have similar limitations.

When you do fantasy or cartoon-style games (and I put Sonic and most other action games in that category) then you throw away the rulebook. Magic exists, dragons breathe fire, and bears carry birds around in a backpack - whatever you



*The Matrix: ten on style but is it credible?*

want. That doesn't mean there are no rules, just that you have to write your own. They still have to make sense in the context of your world, and you still have to avoid causing the player to throw down the controller and shouting "Bullshit!"

You can challenge the player; you can frustrate the player (within limits); but you should try not to do anything that will anger him and above all, earn his contempt or disgust. Computer games are fantasy worlds where rules are made to be broken. But know that you're breaking them - think about it - and then choose wisely which ones you break.

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