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Natural Funativity

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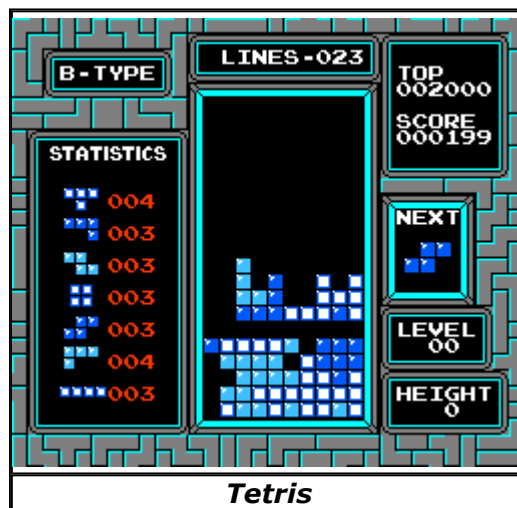
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What makes a game fun? It's a question that seems central to the process of making good games. But it's an elusive and subjective question. The dictionary defines 'fun' as a source of amusement or enjoyment, but that's not very helpful. And yet somehow, for years we have been creating games without really understanding why we human beings find some activities to be fun and others boring, pointless or worse. It's not too surprising, since humans have also been creating art for at least 30,000 years and we're still arguing about how to define it. To paraphrase the old saying, we may not be able to describe fun, but we know it when we have it. But game designers are an inquisitive lot, and in recent years there has finally been some significant progress in getting close to the answer of just what fun is all about.

When LucasArts Entertainment Company was still known as Lucasfilm Games, our boss was Steve Arnold, who had been drawn into the games industry at Atari after years as a child psychologist. This made him uniquely qualified not only to understand the audience for our games, but also to manage and motivate a bunch of young game developers. One of the first things he would ask us when we presented a new game concept was: "What is the Funativity Quotient?" It was a question that encouraged us to think about just what aspects of the idea would make it fun, and I was always intrigued by the implication that fun could be categorized, defined, perhaps even measured. But how do we get at the underlying roots of fun?

Paleolithic Pastimes

When it comes to questions about the underlying reasons for human preferences and behavior, the obvious starting place is our evolutionary history. We share basic drives for survival and reproduction with our fellow creatures. In addition, humans, as well as other primates have a strong dependence on the social interactions that establish and maintain our place in our families and communities. To understand human evolution, it's necessary to look back well beyond the last few hundred years of modern society and technology, beyond the last few thousand years of civilization, to the preceding hundreds of thousands of years that really made us who we are. Scientists agree that the majority of our genes were shaped during the time of our hunter-gatherer ancestors, and their primate and mammalian predecessors. So we have to consider the way humans lived tens of thousands of years ago and more to see the survival significance of many of our genetic preferences.



It is also necessary to look back in time because modern technology and the trappings of civilization can mask or distort the evolutionary sense behind our drives or interests. Take, for example the, sweet tooth. In modern society the desire for sweets has created huge problems of obesity, tooth decay, and early diabetes. Why would so many people have an urgent desire for candy when it is so bad for us? If you look back in history, the answer is clear. The ability to refine sugar is a relatively recent thing, and refined sugar in sufficient quantities to make it cheap and accessible to the masses even more recent. For those hunter-gatherer ancestors, an urge for sweets drove them to find and eat ripe fruits and berries, which were in fact good for them. This same fruit is now ironically spurned by kids, in favor of much more concentrated and less healthy sugary snacks and drinks. This principle that I'll refer to as *Refined Sugar Syndrome*, or RSS for short, also applies to many of the things that people do for entertainment that have become less helpful, or even dangerous, in modern society. This is particularly relevant for video games, as the technology behind them has in effect made possible a concentrated, particularly potent play experience that is both very new in its expression and very old in its origins.

Games are a specialized form of play, and play goes so deep into our history that we see it in other species. Everyone has seen puppies and kittens playing with their siblings, tumbling and nipping, stalking and leaping. That's a way for them to practice the survival skills they'll need as adults (or at least, that their ancestors needed before people made them into pets!) For dogs that are social creatures like us, this also provides a chance to establish dominance and to learn to live with their peers. Johan Huizinga makes note of this in his book *Homo Ludens* (Latin for Game-Playing Humans) and also believes the drive to play is fundamental to humanity. People share this instinct to play, and our larger brains and complex social structures have caused us to extend that play well into our maturity. So not surprisingly, when you really look at not only games, but all human entertainment, you see that at its heart it is all about learning about survival and reproduction and the necessary associated social rules and behaviors.

"Anyone who thinks there is a difference between education and entertainment doesn't know the first thing about either."

- Marshall McLuhan, Communications Theorist

The first time I heard that quote I thought it was an overstatement, but the more I've learned about education and entertainment, the more I realize McLuhan was right. Young children love to imitate adults, and their play, alone or in groups, often involves emulating adult behaviors. Human babies are born at an unusually early and helpless stage of development compared to other species, to let our large brains develop and grow outside of the womb without further increasing the dangers of childbirth. This shifts a burden on us to continue learning throughout life. Play activities are, of course, common throughout childhood, and the technologies of video games have helped promote interest in play well into adulthood. Our modern fast-changing global culture has put even more emphasis on the ability to keep learning throughout life.

But remember that we have to look at our hunter-gatherer ancestors to get a better idea of evolutionary influences that made us the way we are. Let's consider a hunter coming home with a haunch of antelope, enough to feed his family for a few days. What should he do next? Modern research suggests that foraging is a very efficient method of subsistence, and there were many hours available for other tasks. Our successful hunter could go right out again to hunt some more and try to make another kill. Of course there are people who are driven to work at survival tasks every moment available - today we call them Type A personalities - but most people balance that with other activities. One alternative for our hunter was to just rest, sleep or otherwise conserve his strength until a growling belly motivated him to brave the dangers of the savannah again. Like work, we all need some rest time too for peak efficiency, and simple genetic and cultural variation ensures that some people prize rest more than others. That kind of personality is also well-represented today. But there's a third alternative to work or rest.

"We must do a few things to survive. Everything else is entertainment."

- Marvin Minsky, Artificial Intelligence expert, at GDC lecture March 24 2001

Consider three hypothetical tribe members, Aagh, Bohg and Cragh. They've come back from a

successful hunt where a critical spear-toss downed an elk, and they brought back enough meat to feed their families for several days.

Aagh goes right back out to track down a deer he saw earlier. He'll keep his hunting skills sharp that way, but it can be dangerous work, and even though deer are safe prey for most of human history there have been plenty of dangerous predators in the wild hunting for us as well. Aagh may not come back in one piece from this unneeded hunt, and any deer he finds may not get eaten before they spoil.

Bohg passes his time by kicking back and catching nothing more challenging than some rays. He is well rested by the next hunt, but also out of practice, and his muscle tone has deteriorated. But he has a great tan.

But Cragh's brain, by random chance, is wired a bit differently. He finds it boring to sit around doing nothing. He finds it pleasurable to balance a piece of wood on a rock, and then throw stones at it until he knocks it over. Like Aagh, he is building survival skills - but does so in the safe confines of home. Like Bohg, he stays safe - but also stays fit and slightly improves his chances for success in the next hunt. Over hundreds of thousands of generations, those genes that Cragh carries are more likely to spread, and the activities - including games - can also be passed on through word of mouth in the tribe from generation to generation.

This is not to say that the more proactive survival strategy of Aagh or the more passive one of Bohg are not also useful - given changing circumstances, like the food supply, danger from predators or climate, and actions of neighboring tribes, spending leisure time playing will not be the best thing to do all the time. But it's easy to see how it crept into our human repertoire of genetic and societal survival tricks. Evolution theory suggests that diversity is also a necessary survival trait in the long run, so there will always be a large bell-curve cluster of people who prefer the mainstream, most popular approaches to survival, but also some people with more obscure or unusual preferences. But now we have a logical basis for a theory to explain why so many people gain pleasure from leisure-time activities that in one way or another honed their ancestors' survival skills.

The Natural Funativity Theory

As most experienced game developers know, one of the toughest tasks is picking a suitable name, and this theory is no exception. Stealing... that is, borrowing from other sources is one proven method. From Darwin's theory of evolution we have the process of Natural Selection, and by cross-breeding that with Steve Arnold's question of "What is the Funativity Quotient?" we get the name Natural Funativity. But what does it mean? It's easiest to explain by breaking the theory down into three basic areas.

Physical Fun

The simplest place to see a connection between our evolutionary heritage and games and entertainment is in the physical arena. Our primary urge is the survival instinct. Anything that directly threatens our survival automatically commands our full attention. It's not surprising that games, and in fact most of entertainment, use themes of survival to similarly capture the attention of players.

The use of this physical realm in entertainment is a clear contributor to the success of movies, books, TV shows, news features, and of course games that focus on the activities of soldiers, violent criminals, police, and others who deal in matters of life and death. Anything that involves threats to survival and the successful (or unsuccessful) attempts to counter those threats is likely to get a large audience. As shown in the parable of Aagh, Bohg and Cragh, it makes perfect sense that we're hard-wired by evolution to enjoy improving our survival skills from the simple logic that early humans who perfected those skills were more likely to survive to become our ancestors in the first place.

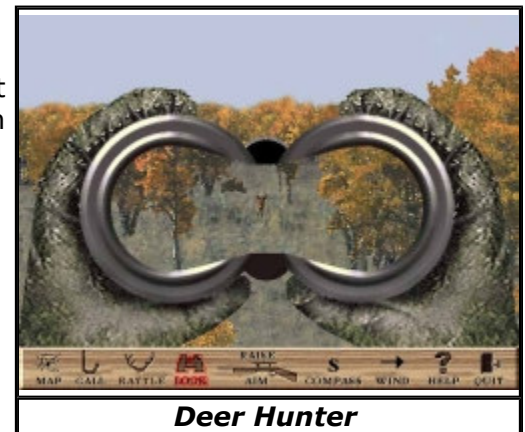
Some major factors for survival ability in a hunter-gatherer society were strong muscles and good coordination. This explains why sports are popular within most cultures, and that sports that focus on

physical strength and team cooperation (much like ritualized tribal combat or hunting) can be of particular interest to men. Individual sports like jogging, swimming, or cycling are of general interest and all serve to build strength and stamina. In another example of how RSS (Refined Sugar Syndrome) applies to games, the desire to gain skill in quickly escaping possible predators, animal or human, or chasing down prey has become abstracted into high-speed racing not only on foot but on bicycles, motorcycles, cars, sailboats, speedboats, and pretty much any other conveyance. Our ancestors passed on no instinct to lust after 450 cc internal combustion engines - but we did inherit a desire to be able to move faster by any means available. And although cars are much too recent to have affected our genes, our ancestors have been tool users for over a million years, long enough to encourage an appreciation for any good, efficient tool.

In addition to sports that have abstracted some physical skills, the perfection of actual hunting skill is also popular. The computer game *Deer Hunter* was a surprise hit in 1997, and today some Japanese businessmen excuse themselves from meetings when their cell phones tell them they have hooked a virtual fish and need to reel it in. Not all popular games need to focus on complex fantasy or science fiction themes, or cutting-edge 3D graphics if they can tie into this fascination with basic survival, as reality TV shows have also discovered.

But physical fun doesn't just apply to the hunting side of hunter-gatherers. There are a huge number of popular entertainments that involve gathering. Casinos packed with slot machines recreate berry-picking, abstracted and refined into an RSS-related compulsion. People pack their homes with sets of commemorative plates, ceramic ducks, or Beanie Babies. And in video games, ever since *Pac Man* started gobbling little dots, we've moved on to collecting hearts, coins, and stars, and popular RPG's that encourage players to gather hundreds of items, and of course there is *Pokémon's* "gotta catch 'em all."

There are other physical activities that tie into our survival instincts. Exploration is a popular component to many games, whether it is the traveler's desire to see exotic places and range far and wide, or a more local exploration, finding the best places to get specific resources, the friendliest shopkeepers, and the safest nooks and crannies. Improving one's knowledge of immediate surroundings is a survival skill co-opted by games genres from RTS to RPG and FPS. And all of these games also tie into another skill that goes back into human prehistory a million years and more - tool use. Many games are directly focused on use of tools, from the craft-oriented play of single- and multi-player roleplaying games to the ubiquitous use of hand weapons in many game types, to abstractions of tool use in simulations of complex machinery like flight simulators, racing games and military vehicle simulations. It can even be argued that all video games that use standard console controllers or PC keyboard and mouse are building our hand/eye coordination and tool use skills. New interface devices are expanding the possibilities even further beyond hand tools. It's interesting to note that so much of Physical Fun is tied in some way to our upright posture that freed the use of hands millions of years ago.



That posture change also made possible a physical activity popular in many human cultures that can be traced back to our distant ancestors: dancing. Even though it took video games many years to go from creating couch potatoes to fostering *Dance Dance Revolution* dervishes, now the popularity of movement games is assured, and new input devices like the EyeToy seem destined to expand the range even further. These interface devices also make real-world interaction between players at the same console more dynamic, a factor that is very relevant to social survival skills. Surely there are also other unexplored possibilities where other popular entertainment forms will eventually migrate to the video game domain.

Social Fun

Evolution focuses not just on the survival of individuals, but also the issue of reproduction and all the

associated matters of meeting and attracting mates. For many years video games had limited opportunity to exploit that dynamic and prowess at games has not exactly been known for attracting mates. But the advent of online multiplayer gaming and the persistent popularity of playing even single-player games in group settings are changing that preconception. Cell phones, instant messaging, and GPS-based games that put people in contact with each other in the real world are likely to further the social aspects of video games.

We are tribal creatures, forming groups and constantly watching and responding to each other. We share these traits with our primate relatives, but we also go a step beyond what chimps and gorillas are capable of. We spend lots of time talking to and about each other. This is a relatively new thing for video games, but there are many non-game forms of entertainment based on various types of social fun. There are social gathering-type activities like shopping, trading collectible items of all sorts, chatting about where to locate bargains, or who throws the best parties, and even just pure social-bonding activities like going to parties or gossiping with friends. The development of language in its spoken form has added levels of indirection to our ability to learn survival skills and key information. We don't have to see something first hand to learn about it, we can hear or read about it. With the innovation of storytelling people learned to spread information that may be many steps removed from the original subject of the story, and the oldest surviving stories and epic poems show that matters of survival and finding and keeping mates have been of great interest for as long as stories have existed. Storytelling was our first type of virtual reality, and is now so much a part of everyday human culture that we take it for granted.

The uniquely human ability to pass on stories and thereby learn important practical, moral, and social lessons has been invaluable to us. Since the more recent developments of drawing and then writing we have been able to experience stories without even having direct access to the original storytellers, and even more recently the printing press and now movies and television have literally let us see someone else's story, and these various forms of storytelling now rank among peoples' favorite forms of entertainment. And remembering the basic premise of Natural Funativity, it's easy to see how these also are ways that we learn how to deal with situations critical to survival, reproduction, and their social equivalents that in human society are often linked to social standing.

Games have harnessed social fun in a variety of ways. Many games have some kind of story or at least characters drawn from stories, starting with early text and graphic adventures, and now showing up in role-playing games and action/adventures like *Half-Life* and *Halo*. The rise of multiplayer and then massively multiplayer and persistent world games have made intensely social gaming experiences possible, including virtual communities, tribes, and even real-world marriages and friendships. MMOs like *EverQuest*, *Star Wars Galaxies*, and *Dark Age of Camelot* and even single player games like *The Sims* have provided inspiration for storytelling in Internet chat rooms. These social trends are likely to continue as both the aforementioned new hardware like cell phones and GPS systems are increasingly adapted to gaming, and other trends like ubiquitous broadband access, improved AI and voice recognition all make new kinds of social interaction possible.

The Sims in particular bears special consideration here, as it is so intensely based on the opportunity for people to observe and manipulate the basic social, reproductive and survival circumstances common to everyday life. Some of the multiplayer games with the largest audiences are not the expensive MMORPGs, but rather simple Flash versions of card games like Hearts and Poker that serve mostly as an excuse to use text or voice chat between players. Most popular board games have similar social aspects that are at least as important as their tokens and dice.

Even as physical fun is associated with our upright posture and tool use, social fun is associated with another important human advantage, our language ability. But that doesn't quite cover all types of fun. Certainly some of the popular entertainment forms mix physical and social elements freely. Team sports are one clear blend, and people not only participate in sports but also treat them as a social activity by watching them and talking about them. Similarly, people may spend as much or more time talking about shopping and where to get the best goods at the lowest prices as they do actually going out and getting them. The courtship rituals that may include dancing, going to shows and movies and concerts, or going out to dinner all mix physical and social aspects. The MMO games also supply a continuous spectrum of activities blending simulated active physical hunting and gathering,

and actual social interaction, grouping, and conversation, as well as objective and subjective social status within the game.

But there are types of fun that don't quite fit the mold. In the games field, one very popular game that seems to have virtually no connection to physical or social fun was the classic *Tetris*. *Tetris* was popular with a wide range of ages, and was one of the few games that crossed over the gender gap as well. There is a little physical tool-use related fun in *Tetris*, but rotating and dropping shapes doesn't account for the hours of play value it provides. The main action does not resemble an aspect of hunting or gathering like so many other popular games, and there is no exploration to speak of, or story. In fact, *Tetris* is about as story-free as a game can get. And yet it is a perfect way to develop survival skills in one remaining area where humans differentiate from the rest of the animal kingdom. It involves an organ you're busy using right now.

Mental Fun

Our large brains are the answer. Even though we use our intelligence with physical and social fun, there is an entire set of entertainment activities including quite a few video games which focuses primarily on mental fun. We practice and improve our mental abilities in our leisure time just as we exercise our muscles and build social relationships. It fits in neatly with our other differentiating features as humans, as our brains are arguably the most important unique feature we have, with more complex structure and (proportional to our body size) much larger than others in the animal kingdom. Our intelligence, hand and tool abilities, and language all complement each other and it is difficult to separate out how they all developed in the historical record. Our larger brains and intelligence certainly made it possible for our ancestors to make and use increasingly more complex and varied tools and carry on more useful conversations. Our tool use and ability to coordinate our hunting and gathering through conversation has obviously helped to make our ancestors more efficient as hunters and gatherers, which in turn let them find enough food to support their large brains (which take a disproportionate share of our food energy). And our language ability has let us pass on knowledge about making tools, and has helped us survive socially and cooperate to compensate for some of the challenges that very large brains have caused, like difficult childbirth and children who remain helpless much longer than other young.

The essence of intelligence is the perception and manipulation of patterns. *Tetris* excels in letting us exercise this ability. In fact it was the observation of game designer Brian Moriarty (designer of *Beyond Zork* and *Loom*) that people love to find patterns in things which led me to this realization. Other games that excel at this range from video games like *Bejeweled*, through various toys and pastimes like crossword puzzles, jigsaw puzzles, or physical puzzles like *Rubic's Cube*. Even appreciating music is a form of mental fun, since music is patterned sound just as poetry and song are patterned words. The Natural Funativity theory suggests that these mental games should teach us something that was useful for survival to our cave-dwelling ancestors. Although the literal action of *Tetris* is at best a severe stretch to link to survival activities, the more abstract function of quickly recognizing - and acting - on patterns is quite useful.

Consider how important it must have been for our ancestors to pick one limping antelope from a herd and follow it by the difference in footprints, or the value in being able to quickly find and grab ripe berries while avoiding thorns, to discern edible mushrooms from poison, or to notice the subtle cues of color and shape that meant a Sabertooth was lurking in the brush. This also helps explain the Natural Funativity value of various hobbies that have little obvious survival value but also involve pattern recognition and appreciation, from stamp and coin collecting to appreciation of all forms of art and music. The survival benefit is not in the actual collecting of coins or CDs, but in the mental fun of recognizing patterns. It is a workout for the brain.

Blended Fun

It has been convenient to break down fun into these three categories, although in practice most forms of entertainment combine two or all three in a continuous spectrum. For example, the game of baseball has its obvious physical aspects of throwing, catching, hitting, and running, social aspects of

cooperation and competition and the stories of the exploits of individuals and teams, and mental aspects of statistics and rules, as well as the many split-second evaluations and decisions that ballplayers must make in the course of a game. Or, to take a video game example, a MMORPG like *EverQuest* combines the direct physical aspects of using the keyboard and mouse with the simulated physical aspects of movement and combat in the 3D world, the social aspects of teamwork, conversation, guilds, status, cooperation and competition, and the mental aspects from high-level quests and strategic planning down through individual choices of character advancement to low-level moment-to-moment evaluations of tactics.

Applying Natural Funativity

As promised in the introduction to this article, there are many ways to apply the theory in the practical aspects of game development. First and foremost, an understanding of the reason why our instincts have made us so fascinated with the aspects of survival in a hunter-gatherer society can help in evaluating new game concepts, or increasing the appeal of existing concepts. By tying game play to these key aspects of hunting, gathering, exploration, social interaction and status, and pattern perception we can capture the interest of large numbers of players and make games more fun.



The fourth rendition of *Gran Turismo*

Understanding that our key interest in survival comes from evolution shaped by millennia of life on the African veldt filtered through the lens of survival in our modern society helps us comprehend the appeal of all sorts of game types and gameplay mechanisms. The appeal of a racing game like *Gran Turismo* may seem well removed from the veldt, but remembering RSS we can see that the basic physical appeal of learning to move as quickly as possible, the social appeal of competing with our peers and gaining status and recognition, and the mental appeal of perceiving constantly changing patterns in the midst of a race and acting on them instantly and correctly all connect back to our prehistory.

In my freelance design work I have begun to use this theory to help give me insight on which alternatives to choose when I am in the midst of a game design, or analyzing the strengths and weaknesses of a game in development. As long as any discussion of fun is kept at the purely subjective "I'll know it when I see it" level, it is very difficult to achieve consensus or make decisions on any objective basis, but it gets much easier when a possible game feature can be measured against its ability to deliver on physical, social, or mental fun as described here. It is also particularly helpful when evaluating the success of a popular rival title. Some unimaginative game developers simply lift features wholesale from whatever has sold well before, without questioning just what is it about those games that made them popular, and consequently run the risk of taking the least fun

aspects of a game. A deeper understanding of the nature of fun makes that process much more practical.

Others on Fun

Are all forms of entertainment explained by Natural Funativity? I have yet to find any significant exceptions. Humor, including jokes, puns, and even slapstick pratfalls are a bit of a special case, as laughter is a signal meant to alert others in our social group about the harmlessness of a spurious threat (a view shared by V.S. Ramachandran in his book *Phantoms in the Brain, probing the mysteries of the human mind.*) The theory of Natural Funativity also makes sense in describing the appeal of not just entertainment but many other more serious areas of human interest, like art, music, various addictions, even science and religion, but that goes beyond the scope of this article.

Many other authors have their own takes on various aspects of fun and its origins. Jon Boorstin in his book *The Hollywood Eye* breaks film into the Visceral, Vicarious and Voyeuristic, corresponding to Natural Funativity's Physical, Social, and Mental fun. Stephen Pinker's books are very illuminating, particularly *How the Mind Works*. And other game designers have been probing this area as well, notably Raph Koster, Chris Crawford, Nicole Lazzaro, Jesse Schell, and Brian Upton.

Future Funativity

Where does this lead in the future? Although some people have aspirations to create a formula or even a program to churn out game concepts or to exhaustively analyze and evaluate games, I think this is an aberrant side effect of the fact that game development is a multidisciplinary craft that includes a lot of programmers and software engineers. Video games are software, but are also at heart very concerned with creative and subtle psychological points, and like novels, plays, and film I expect that people will reject any overly mechanical attempts to codify them.

But like those other older forms of entertainment, it's clear that we are learning more about the structure and internal grammar of games and interactivity. As more researchers focus on games and more colleges and universities offer courses in game development, it's inevitable that there will also be more insights into the nature of fun. I also fully expect that we will increasingly find common ground with other developers of all forms of entertainment, as with genetics, once one looks beneath the surface it is apparent we have more in common than our surface features would suggest. I certainly expect to see the principles of Natural Funativity used increasingly to make games more fun. And who knows - some day we may even learn how to define and measure that elusive Funativity Quotient.

Natural Funativity. by Noah Falstein [Design]. 2 comments.Â One of the first things he would ask us when we presented a new game concept was: "What is the Funativity Quotient?" It was a question that encouraged us to think about just what aspects of the idea would make it fun, and I was always intrigued by the implication that fun could be categorized, defined, perhaps even measured.

Understanding fun-the theory of natural funativity. In Rabin, S. (Ed), Introduction to Game Development File. Chen, J. (2007).Â Mathiak, K. and Weber, R. (2006), Toward brain correlates of natural behavior: fMRI during violent video games. Human Brain Mapping, 27: 948

File. Weber, R., Ritterfeld, U. & Mathiak, K. (2006). Natural Funativity, by Noah Falstein. Weâ€™ve talked a lot about what is fun, and from the MDA Framework we know there are different kinds of fun. But why are these things fun in the first place, and not other things?