



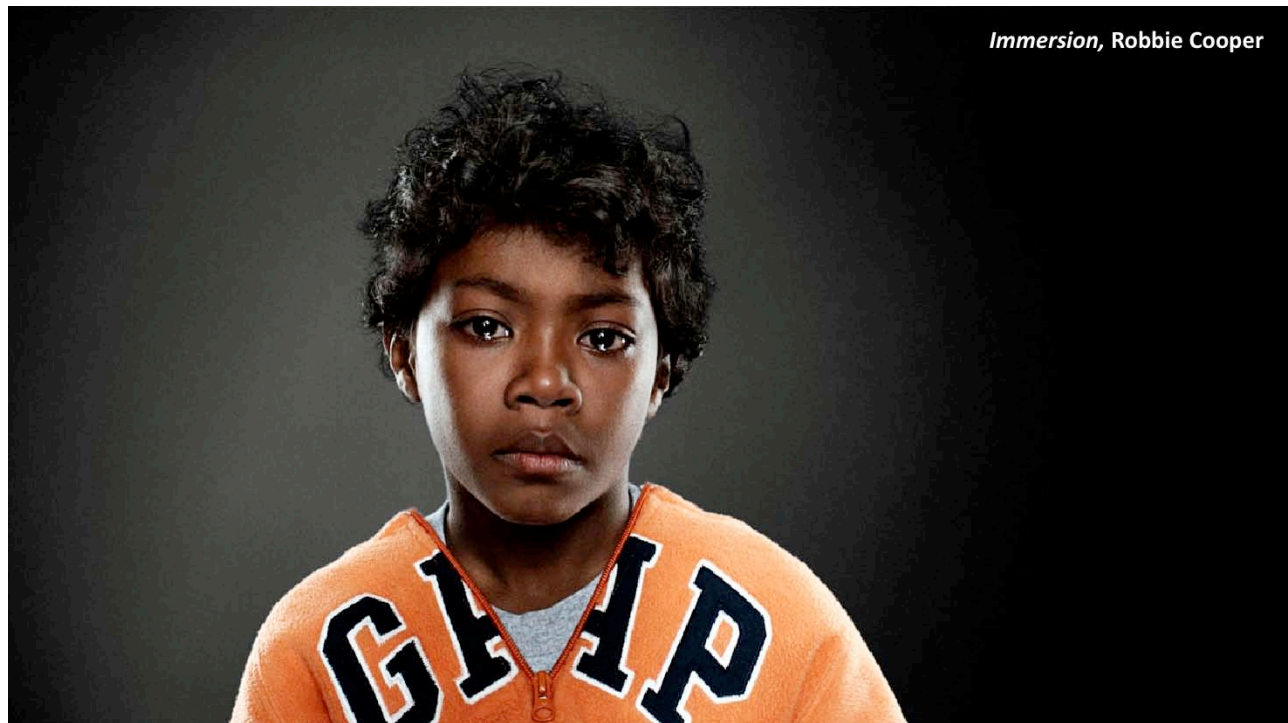
ATTENTION, NOT IMMERSION

**Making Your Games Better
with Psychology and Playtesting,
the *Uncharted* Way**

@rich_lem

Richard Lemarchand
Lead Game Designer
Naughty Dog


Wednesday, March 7th
GAME DEVELOPERS CONFERENCE
SAN FRANCISCO, CA
MARCH 6-8, 2012
EXPO DATES: MARCH 7-8 **2012**



In the minutes leading up to the beginning of my presentation, I showed a short film called *Immersion* by the photographer and video artist, Robbie Cooper.

You can find it on the internet at:

www.youtube.com/watch?v=HfOUhwhdUV0



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Good afternoon, everyone, and welcome to my talk. Please silence your phones, and fill out the Electronic Evaluation forms when you receive them. Thanks in advance to the awesome Conference Associates who are helping us out here today, and all throughout the conference, and thanks to Robbie Cooper for the use of his short film *Immersion*, which I just showed!

My talk today is the first arty, wannabe-intellectual game design talk that I've given at GDC, so I'm pretty nervous in case you think it's a load of old bollocks, but please bear with me. It's also rather long, and I might go over the hour, but I'll try and go fast. Let's do it!



My name is Richard Lemarchand, and I am lucky enough to be a Lead Game Designer at a fantastic studio called Naughty Dog. I've been a professional game designer for a little over twenty years now, working mainly in character-action games, and I've worked at Naughty Dog for nearly eight years.

I was either the lead or the co-lead game designer on all three games in the *Uncharted* series...

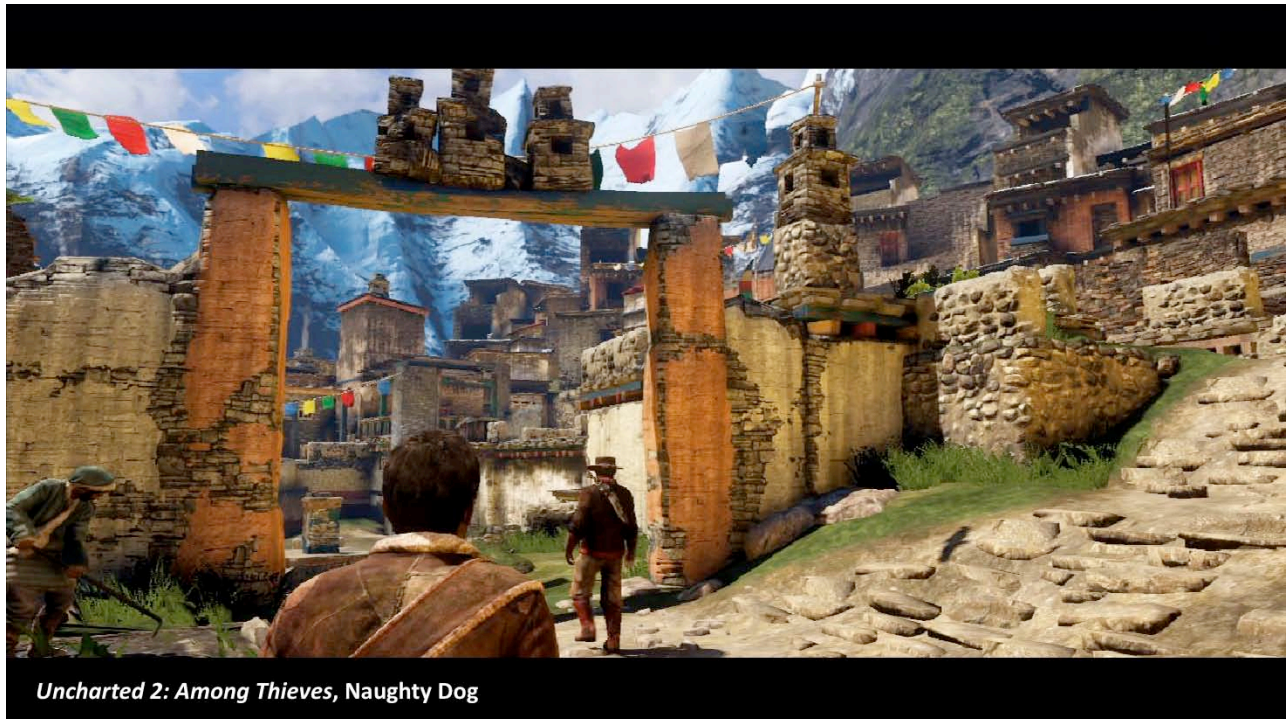


...culminating in *Uncharted 3: Drake's Deception*, which we released last November.

We've had terrific success with *Uncharted 3*, and even though I'm not going to put too much of a focus on the *Uncharted* games today, later on I'll tell you about some of the playtesting techniques that we used to improve and polish our latest game.

philosophy & design

But as well as leaving you with just a little bit of practical takeaway today, I have two other goals for my talk, both of them to do with game design philosophy, and both of which I hope will be useful to you in your game design practice.

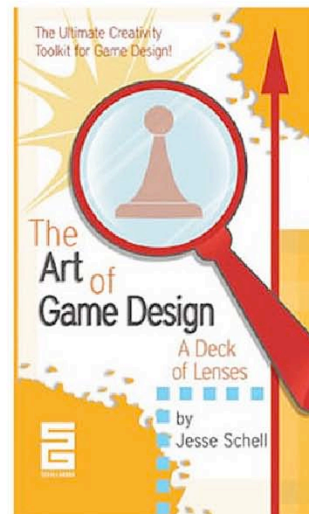


Uncharted 2: Among Thieves, Naughty Dog

One of them relates to my thoughts about the value and nature of what gets called 'experiential' gameplay.

We've used this kind of gameplay to powerful effect in the *Uncharted* series – for example, in the peaceful village sequence in *Uncharted 2* – but it's also being used in many different ways by many different types of games, from the world of triple-A, to indie and art games.

We'll get back to this towards the end of my talk.



But my first and biggest goal is given away by the title of my talk.

In the grand tradition of Jesse Schell's Game Design Lenses, where Jesse gave us a set of language for talking clearly about many different aspects of the game experience, I want to give us just one new lens: the concept of 'player attention'.

attention

Attention, in the way that psychologists talk about attention, is very important when we're discussing the core of a good videogame experience, but it rarely gets discussed by designers here at GDC. I'd like to see if there's something we can do about that.

Part of the reason I'm interested in this is because I'm hungry for knowledge about the human mind. And not just the kind of knowledge that science gives us, but the insight into the lived human experience that we can get from art. And what better art form to explore these questions with, than that of videogames?

The other reason that I want us to start talking about attention is my dislike, some might say my unreasonable dislike, of a couple of innocent words.

immersion
immersive

Here they are: poor old 'immersion' and 'immersive'.

immersion
immersive
engaging
engagement

Their relatives 'engaging' and 'engagement' are a bit better, but not much.

We use these words all the time when we're talking about what makes games great, but do we really understand what they mean?



Their literal sense seems confusing: when we're immersed in a game, what are we under the surface of?

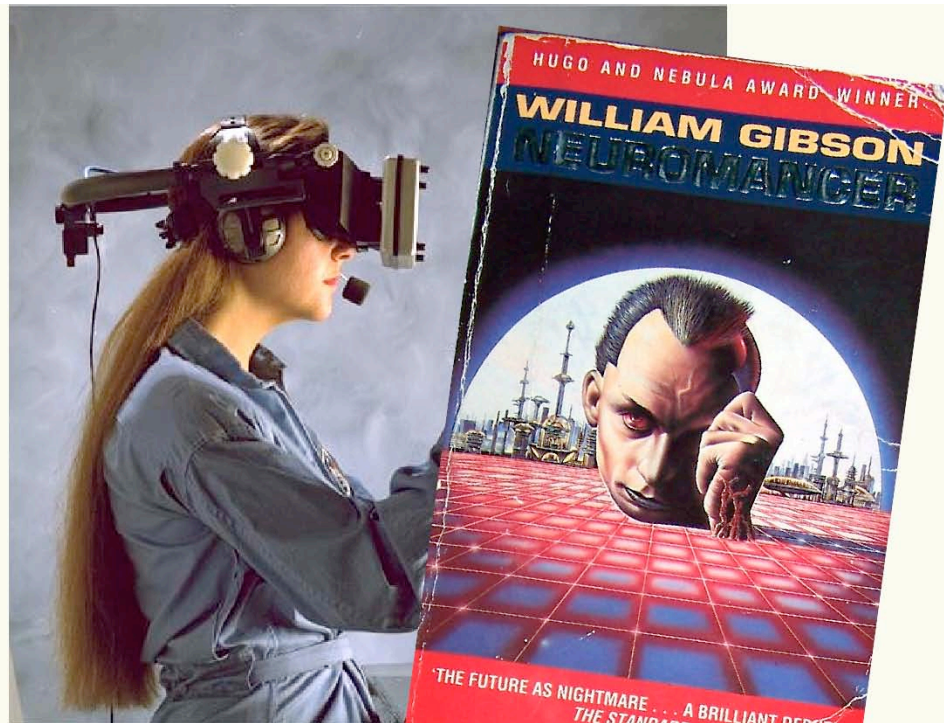
Are we inside the gameplay, or the graphics, like James Woods making out with his creepy TV in David Cronenberg's film, *Videodrome*?



In their landmark 2003 book, *Rules of Play*, Katie Salen and Eric Zimmerman talk about something that they call, 'The Immersive Fallacy'.

They say that there's an idea, prevalent among game designers and media theorists, that "the pleasure of a media experience lies in its ability to sensually transport the participant into an illusory, simulated reality ...(one) so complete that ideally the frame falls away so that the player truly believes that he or she is part of an imaginary world".

They go on to claim that this conception is a mistake.



The use of the word immersion in this sense, which refers to our going beyond the boundary between our day-to-day world of IRL and into some machine-mediated consensual hallucination – to borrow some poetry from William Gibson – comes from the world of virtual reality.



And it's an alluring idea – certainly the level of identification that we have with the protagonists in a movie or the hero of a game would suggest that we get caught up in fantasies quite thoroughly, and the amount of time we spend 'grounding' the reality of the world of *Uncharted* in lots of different ways is testament to the importance of helping an audience suspend their disbelief.



But the claim that you can make someone forget who they are, and start to believe that they're someone else, just by enveloping them in pictures and sounds of another place and time, doesn't seem quite right to me. It doesn't do justice to the game artisans who craft experiences that get and hold our attention in many different, ingenious ways.

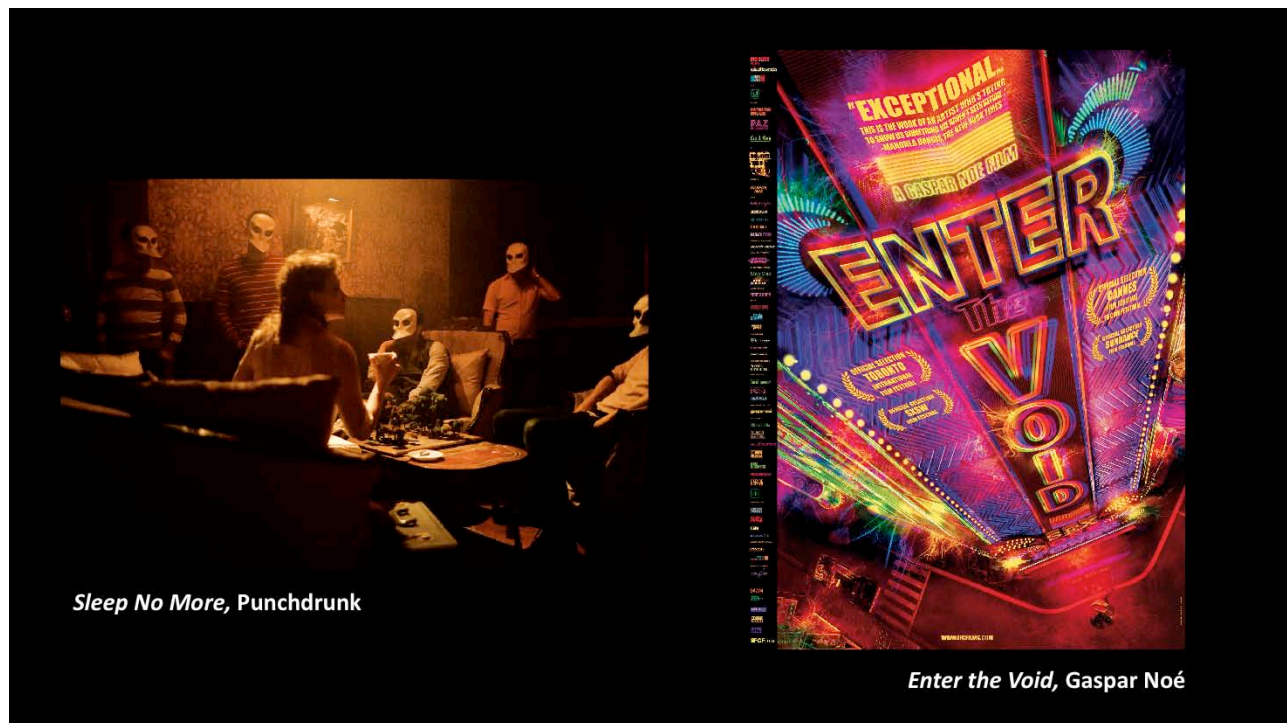
And even if we could pull off this trick, of making you believe that you are someone else – would we really want to?



If I could reach into your mind, make you forget who you were while leaving your skills and emotions intact, and have you literally believe that you were Nathan Drake, hanging out the back of a cargo plane with the desert floor a quarter-mile below you, and gun-wielding enemies above you, you probably wouldn't be excited and entertained in the way that everyone at Naughty Dog hopes for, for players of our games...



...you'd almost certainly be scared witless! No disrespect, you understand.



Sleep No More, Punchdrunk

Enter the Void, Gaspar Noé

I do think that games, interactivity and what you might call 'overwhelming sensory inundation' can change our identity in interesting ways that are worthy of a lot more exploration. The interactive theatrical production *Sleep No More* and Gaspar Noé's film *Enter the Void* are two great, entirely different demonstrations of that fact.



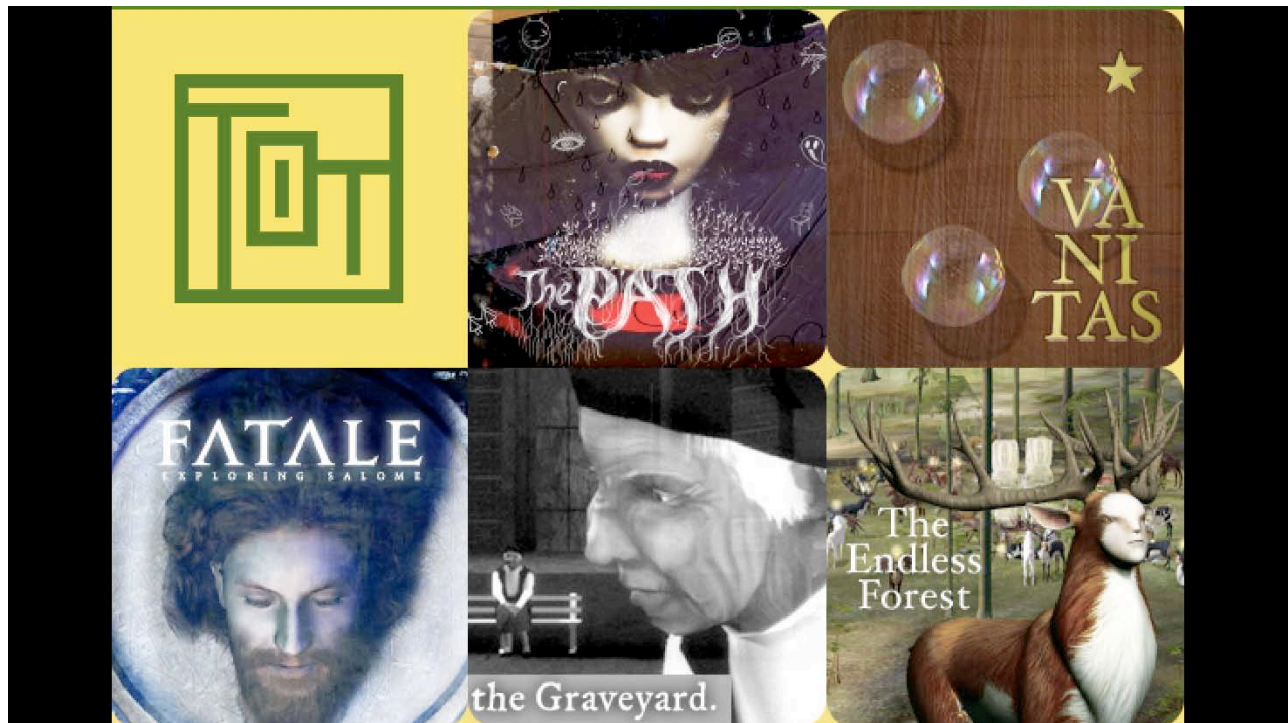
Dinner Date, Stout Games



Deadly Premonition, Access Games

And here are some recent games that have played with the strange relationship between a game's protagonist and its player: Jeroen Stout's *Dinner Date*, and Swery's *Deadly Premonition*.

Both of these games show us that things aren't quite as simple as our having a one-to-one identification with a game's hero.



...as do just about all of the games by Belgium-based artgame developer, Tales of Tales.



Now I don't want to be that semantics-quibbling guy. I actually think that the word immersion is fine when we use it casually, and when we're sure what we're talking about.

Virtual reality is very interesting and important, and high-fidelity wraparound simulations are immersive in the true sense of the word. But in the context of TV-based videogames the word immersion is a bit of a buzzword, and can point us in the wrong direction when we're trying to analyze the games we love, especially if we start talking about being immersed in gameplay.



So how do I want us to talk instead?

Well, it's really pretty simple.

getting attention

holding attention

Videogames entrance us by getting our attention, and then they give us what we'd call a compelling experience, by holding our attention.

Loosely defined as the cognitive process of paying attention to one aspect of the environment while ignoring others, attention is one of the most widely studied and discussed subjects in the whole of psychology. So let's take a closer look at it.

Attentional Bottleneck

For many years, scientists believed that the human mind could only pay attention to one thing at a time. Psychologists call this our 'attentional bottleneck'.



The game designer Colin Northway has talked interestingly about this on his blog in terms of ‘attention splitting’.

For example, StarCraft players call attention “the third resource”, and expert players attempt to steal attention from their opponents with raids and harassment.



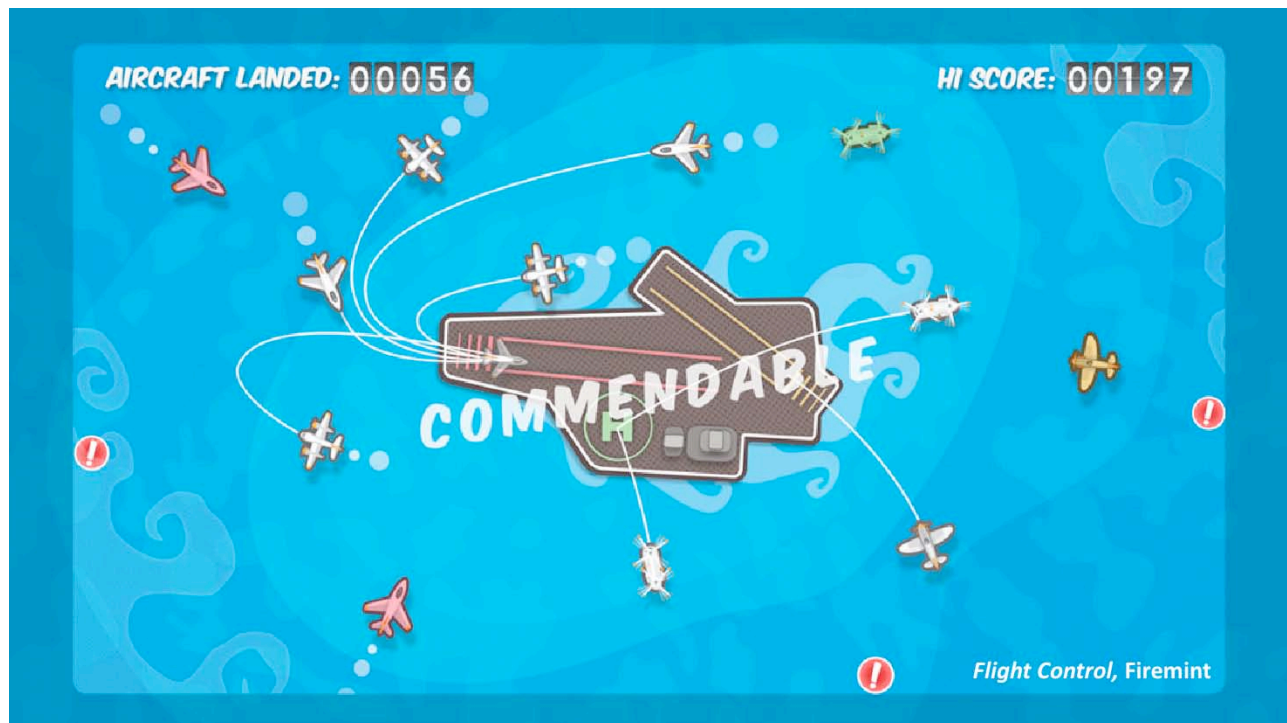
Attentional Bottleneck is important for game designers to think about. In many games we have to keep track of lots of different pieces of information: how much health we currently have, how much ammo we have left, where the enemies and other threats in the level are, and so on.

If the player only has so much attention to go around, we as designers have to stay aware of this so that we don't overwhelm them.

Vigilance

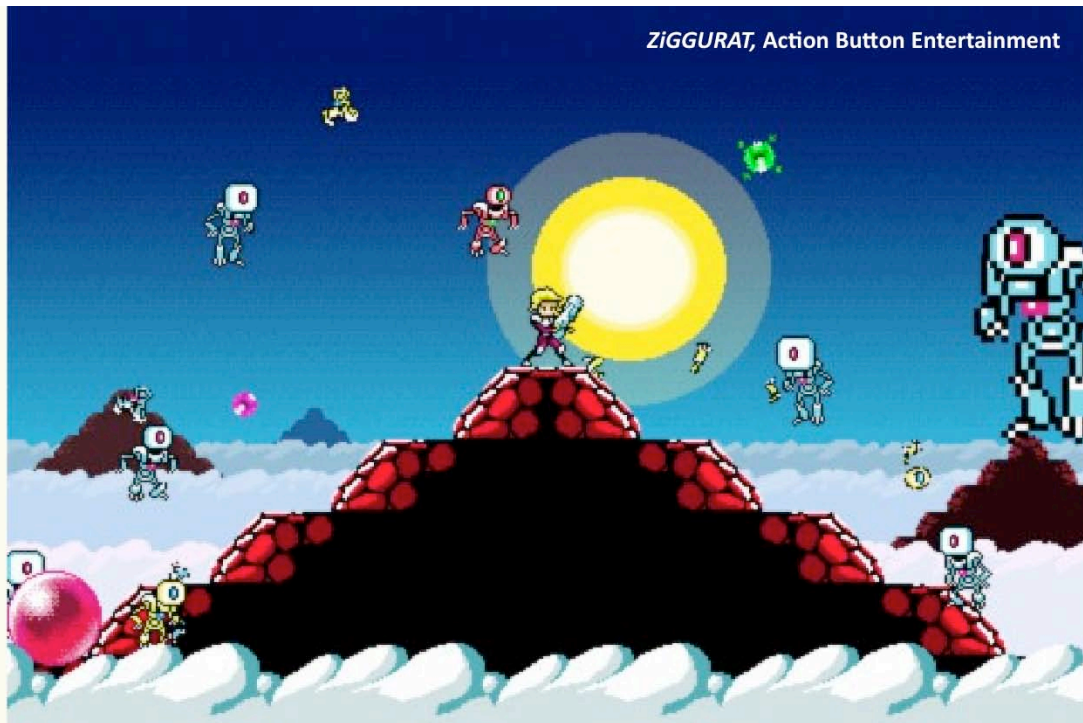
We now know that that's not quite true, that we can only attend to one thing at once: our unconscious minds are always monitoring the world for the arrival of important new information.

We call this 'vigilance', and it has been studied a lot since the 1940s, because it's central to some very important jobs...



...like air traffic control, military surveillance and even lifeguarding.

Totally relevant to game designers, of course: we're betting on the fact that our players are going to be able to be vigilant, for hours on end, whether you're keeping an eye out for aircraft in *Flight Control*...



...or staying eyeball-dryingly vigilant for incoming enemies in Action Button's awesome *ZiGGURAT*.

Vigilance Fatigue

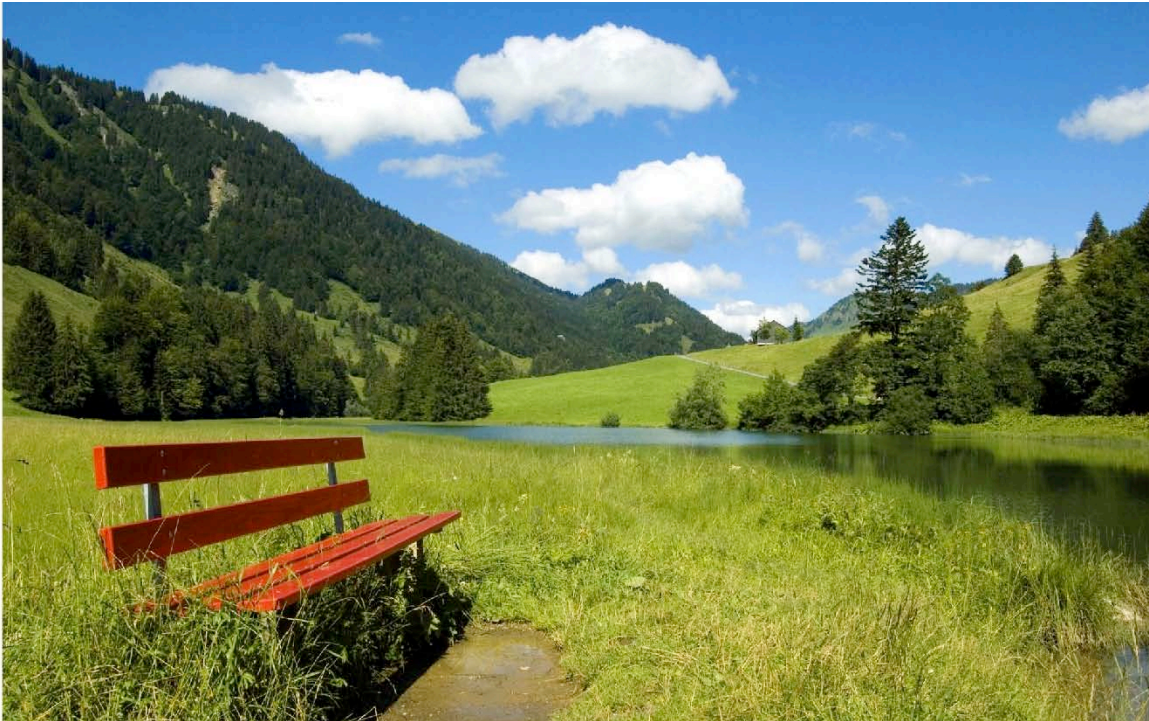
But it's tough to be vigilant, though: we all suffer from something called 'vigilance fatigue', which means that, after the first fifteen minutes of paying close attention to something, we become much more likely to miss new relevant information if the sensory footprint of the new information is small or weak.



Scientists used to think that the more boring the task, the quicker vigilance fatigue kicks in, but recent research shows that it's just as much of an issue for interesting vigilance-based tasks, like the ones in games.



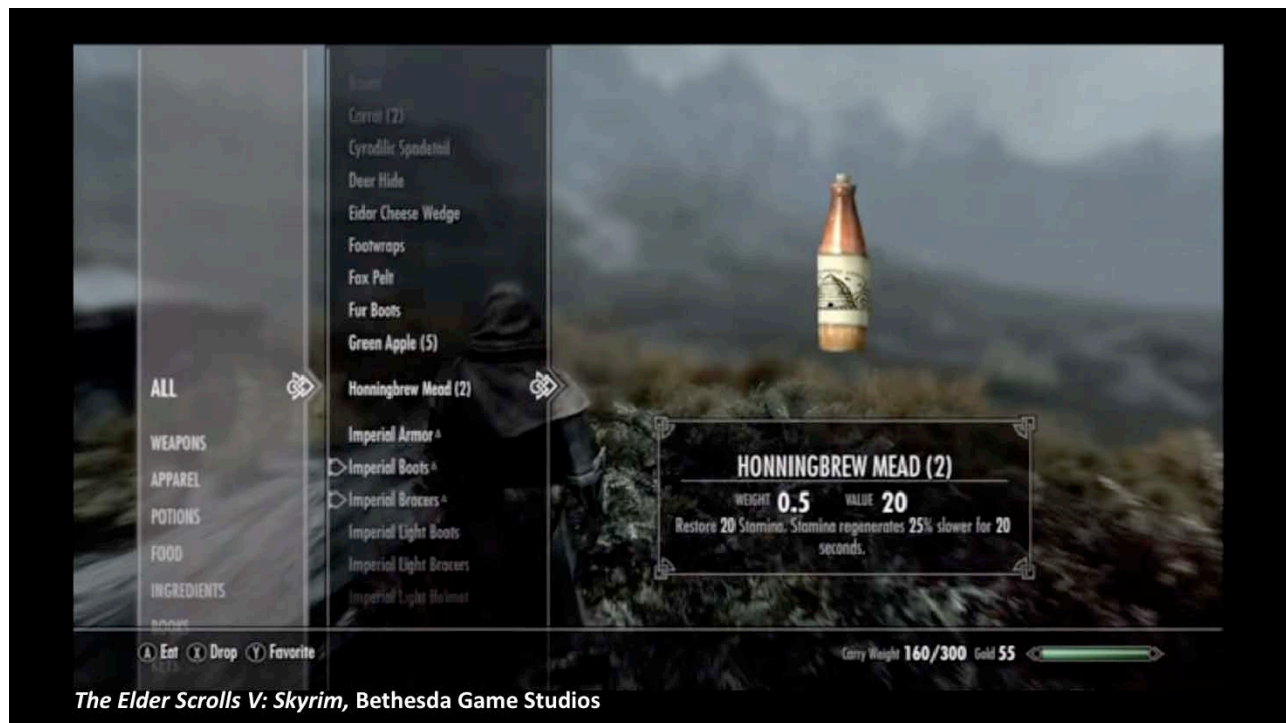
People focusing on the same task for a long time eventually become distracted, irritable and impatient – think of your mental state at the end of a six-hour online FPS jag, or a protracted raid in an MMO. If you're anything like me, it's probably somewhat agitated.



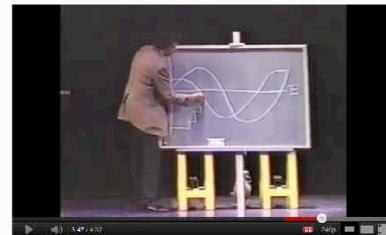
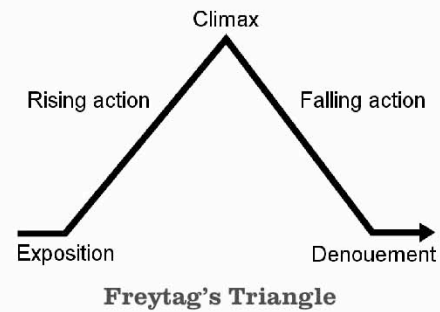
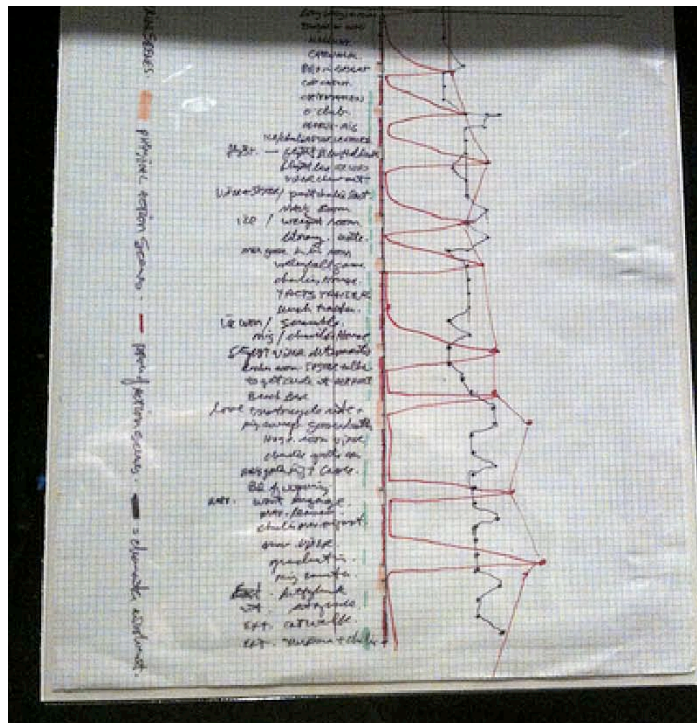
But switching to another activity – especially one that is low stress, or, interestingly, contains pastoral scenes of nature – can restore our ability to be vigilant.

en.wikipedia.org/wiki/Attention_restoration_theory

That probably explains the pattern of self-guided player activity in a game like...



...*Skyrim*, as we cycle between exploration, combat and lengthy periods of messing with our inventory.



Kurt Vonnegut on 'The Shapes of Stories'

This need that we have, to rotate between different tones and intensities of visual activity, explains why movie-makers talk about ‘pacing’.

Here's an 'intensity graph' that writer-producer Warren Skaaren made for the movie *Top Gun*, as well as Freytag's famous triangular graph of dramatic structure, and Kurt Vonnegut on *The Shapes of Stories* (which you can check out on YouTube):

www.youtube.com/watch?v=oP3c1h8v2ZQ



Uncharted 3: Drake's Deception, Naughty Dog

And we certainly think about pacing a lot when we're planning the Uncharted games, and we space out intense periods of combat with less intensive exploration and problem solving, and with experiential sequences like *Uncharted 3's* "Lost in the Desert" montage.

To wrap this section up, I want to quickly tell you about the two different kinds of attention we have.



brotherbrain.tumblr.com

The first kind is something I've been exploiting every time I bring up a new slide, using what's called your 'orienting reflex'.

This big change in your visual field has almost certainly succeeded in attracting your attention to the screen, and it does so in a way that you don't have any real control over.

Reflexive Attention

Sudden loud sounds and motion have the same affect, as do the mention of your name, anything that threatens your survival, and just plain novelty - anything new and different.

This is called 'reflexive attention' and, broadly speaking, it happens at the back and at the sides of the brain.

Executive (Voluntary) Attention

The other kind of attention that we have is 'executive' or 'voluntary attention'.

This is the attention that we're in charge of, which we choose to direct - which we have what's known as 'executive control' over.

Executive attention is one of a group of executive functions, which also include problem solving and the way we monitor our own actions, and it takes place primarily in the front of the brain.



But our executive attention can be tricked, as it struggles to organize the world, and it has a tendency to assume that the world is continuous and predictable.

You might be familiar with the brilliant “Person Swap” stunts pulled by the British illusionist Derren Brown, where a victim ends up giving directions to two different people, without even realizing that the person they’re talking to has changed.

You can see video of Derren Brown’s “Person Swap” stunts, here on YouTube:

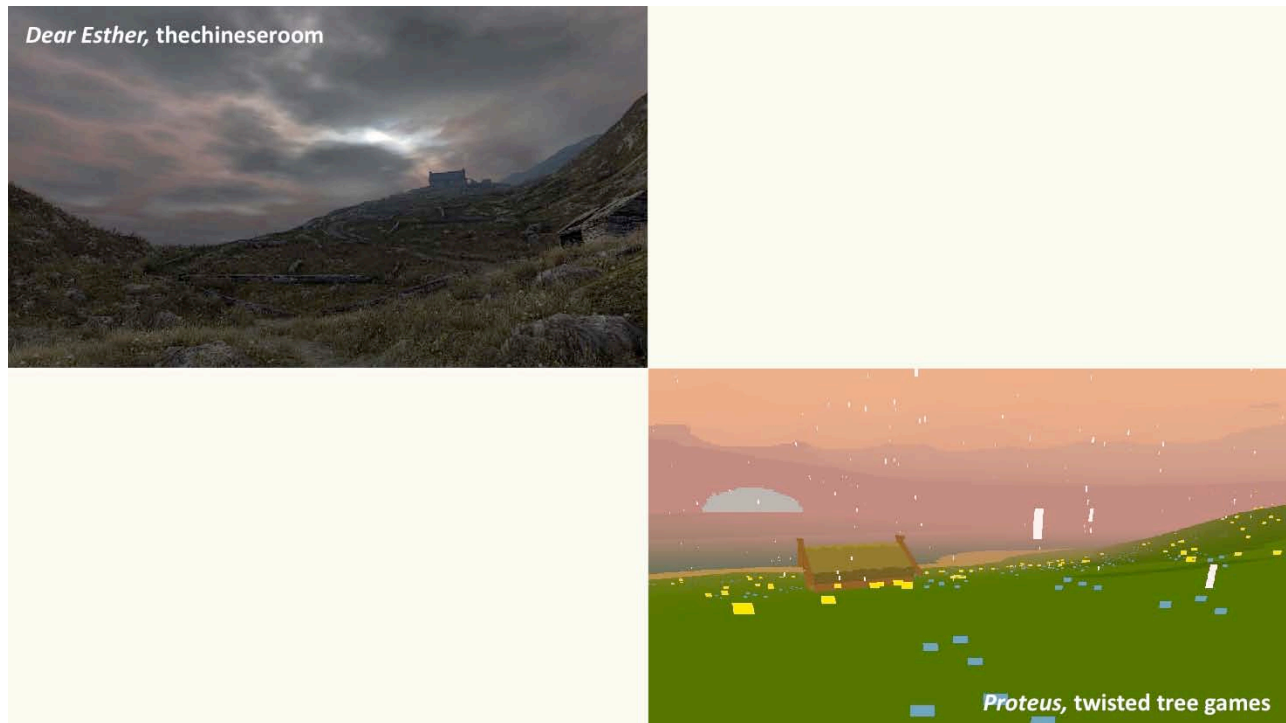
www.youtube.com/watch?v=UYeJ1BHHDlg

Executive Attention & Agency

The whole spectrum of executive functioning, where we make choices, and take actions, is right at the heart of our craft as videogame developers.

This is what we're talking about whenever we talk about 'agency', but it seems that we rarely talk about what the player is choosing to pay attention to.

I wonder if that's because our executive attention is "out of sight, out of mind"?



In any case, I think we shouldn't forget that the players of the games we design have a freedom and a capacity to express themselves, simply by choosing what to pay attention to next, before they even act. I don't know that the mainstream of videogames often take advantage of this in a thoughtful way, and I'll admit to often being guilty, as a character-action game designer, of thinking of the player as pretty reflexive, running from one shiny thing that we've placed in their path to the next.

Games like the contemplative *Dear Esther* and the atmospheric *Proteus* take a quite different approach, of course.

Proteus, developed by Ed Key with a reactive ambient soundtrack by David Kanaga, is one of my favorite games of 2011, and if you enjoy meditative interactive experiences and haven't yet played *Proteus*, you should seek this game out as fast as you can.

Anyway, that's a ten-cent tour of what cognitive scientists know about attention. If you're interested, there's lots more good stuff to learn about on Wikipedia.



So attention is probably important for game designers, right? Like other kinds of entertainment designers, we have to guide our audience's attention to things that enrich their experience, and away from things that don't.

For example, game designers specializing in level layout use the 'weenie' technique borrowed from theme park design, to orient the audiences' attention to landmarks in the environment, and then provide sequences of cues and revelations that guide the players to where they choose to go.

How Do Videogames Get and Hold Our Attention?

If we're going to talk about the ways that videogames get and hold our attention, instead of talking about immersion, we'd better take a quick look some of the ways they do it.

When I first sat down to think about this, I decided that most attention 'grabbers and keepers' in videogames fall into one of these three categories:



beauty story gameplay

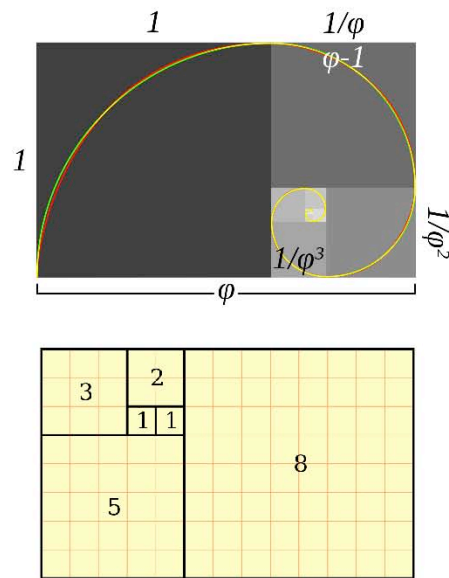
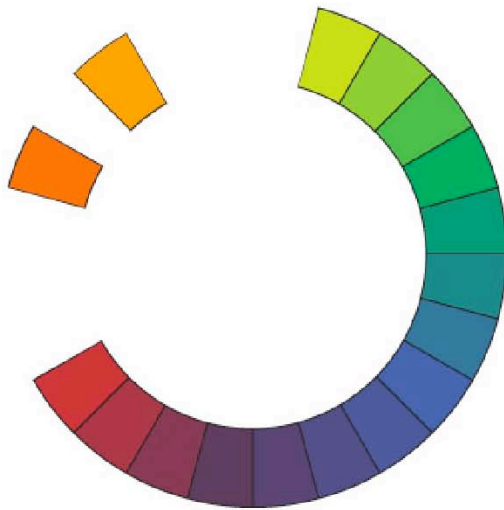
...beauty, story and gameplay.

This list seemed like a pretty good starting point, but it was going to change, the more I thought about it.

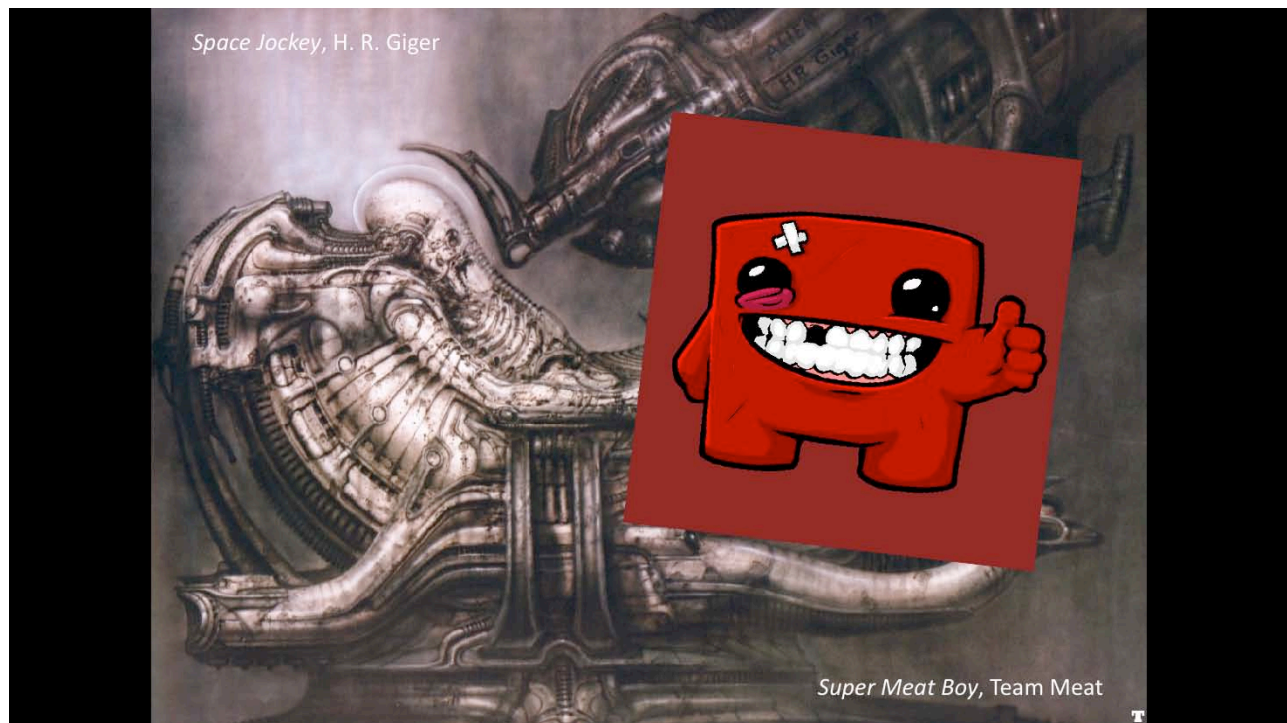


Let's begin with beauty. The simplest thing I could think of that gets my attention in videogames is great art.

You can talk about beauty in terms of symmetry, coherence, harmony and ideal forms.



You can also express it with logic and number: we know about complementarity of color, the Golden Ratio and the Fibonacci sequence.



But when I thought about it some more, beauty didn't seem to be quite the right word. Not everything that gets our attention like this is traditionally beautiful: think of the striking work of H. R. Giger, or how much of the art we love is cute or zany.

So I thought that maybe a better word than beauty was aesthetics. That way we can include a wider range of tastes and philosophical ideas.

beauty **story** **gameplay**
aesthetics
contrast

gets ★★★
holds ★☆☆

But then I started looking for a way to describe this in even more general terms, by talking about something that draws attention to itself by virtue of its difference from those things around it. So I decided to think like a graphic or interface designer and call this 'contrast'.

That way, this category can include anything in our sensory field that leaps out at us, that grabs our reflexive attention in a way that is useful to our executive attention.

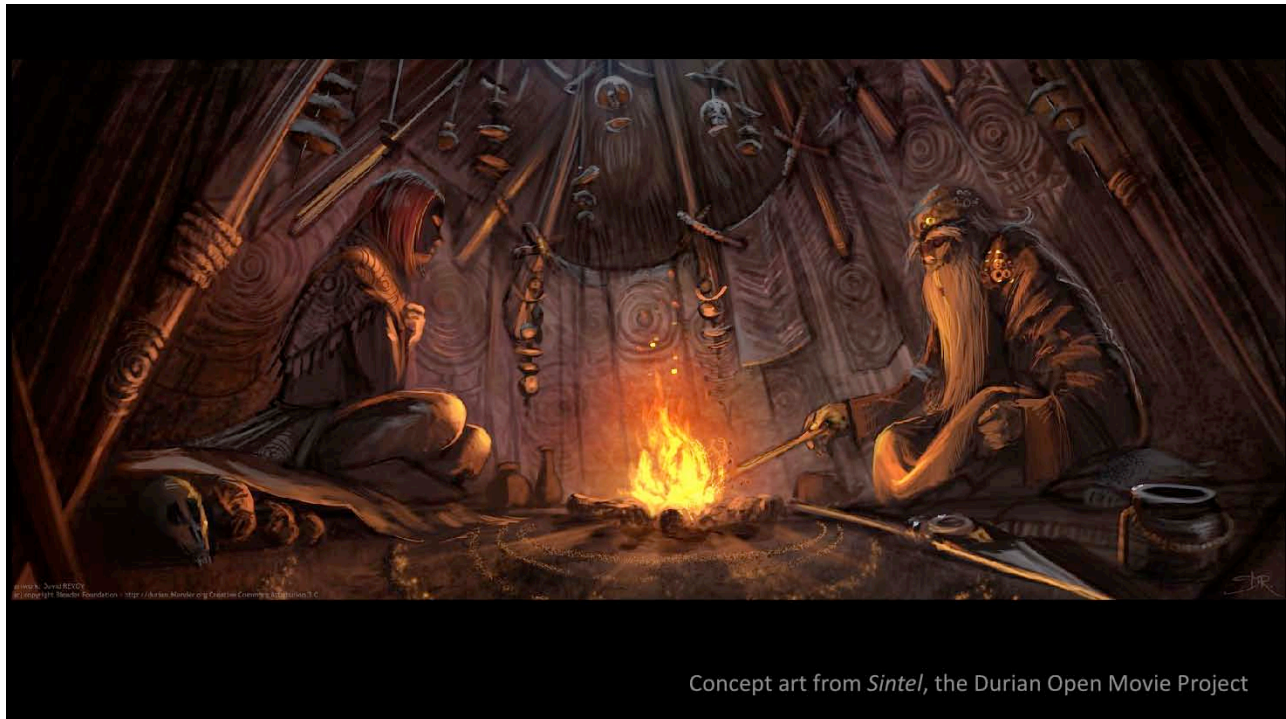
Things in this first category, 'beauty – aesthetics – contrast', easily get our attention. They grab our attention quite powerfully, in ways that we don't have much resistance to.

However, these kinds of things don't hold our attention for that long; think about the way that people only spend an average of 30 seconds looking at even the most famous paintings in the world. We easily tire of the contrast in a scene, and our attention needs to move on to something else.



My second category starts out as 'story'.

Of course, story is a hot-button topic for game developers. My hope is that if we talk about it in terms of attention, we can make it less loaded.



Concept art from *Sintel*, the Durian Open Movie Project

Story and games are almost certainly oldest human cultural traditions, and both demand and occupy attention.

Think about an early human shaman holding his village entranced around a fire with his tales of the gods and the birth of the universe.



However, unlike the linear story that's woven into the playful space of Uncharted, not many videogames have a story in a traditional sense, so I pretty quickly changed this section to 'narrative', to encompass many different kinds of games, from Rock Star's brilliant systemic narratives to Daniel Benmergui's new game, *Storyteller*.



Even the fact that a rook is shaped like a castle, and a knight is shaped like a horse, is narrative.



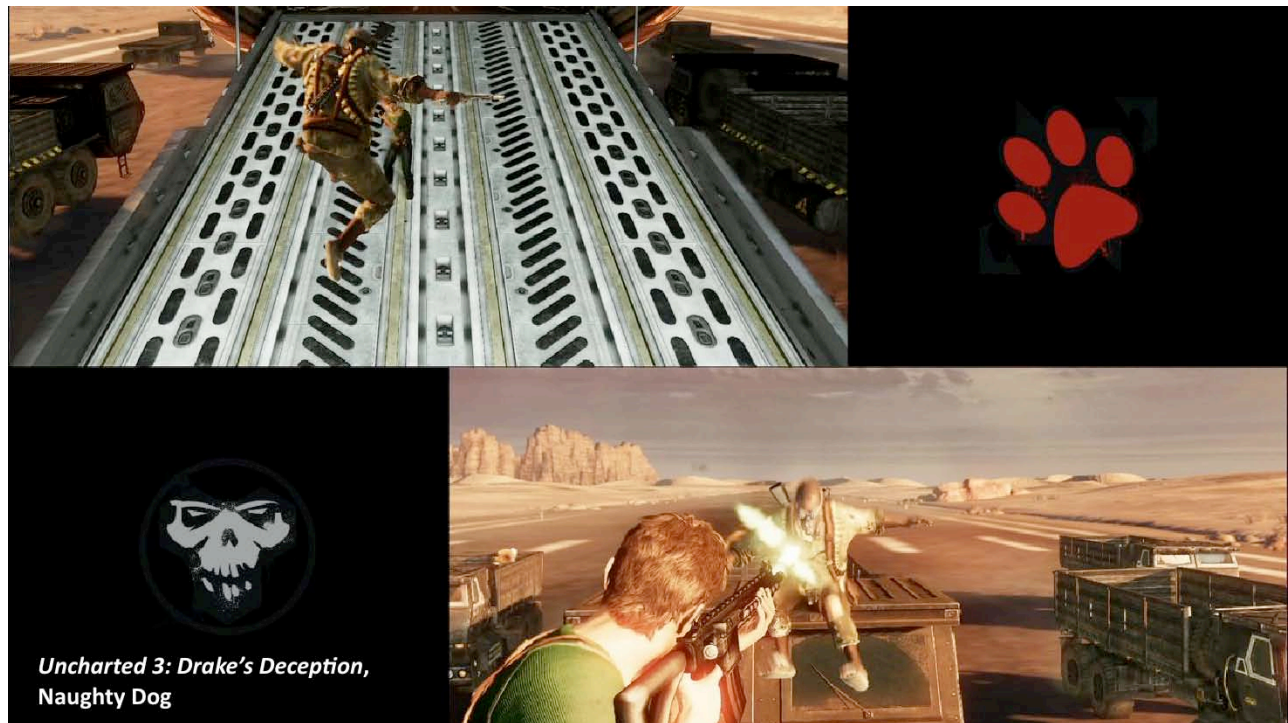
But to generalize even more broadly, this is all to do with social stuff. A 2007 study at Florida State University showed that we exhibit 'attentional adhesion' not only towards people that we're attracted to, but also towards people that we perceive as rivals for their affections.

Suddenly, it seems scientifically comprehensible, the interest that we all, men and women, gay and straight alike, have in the attractive, noble, crafty cast of...

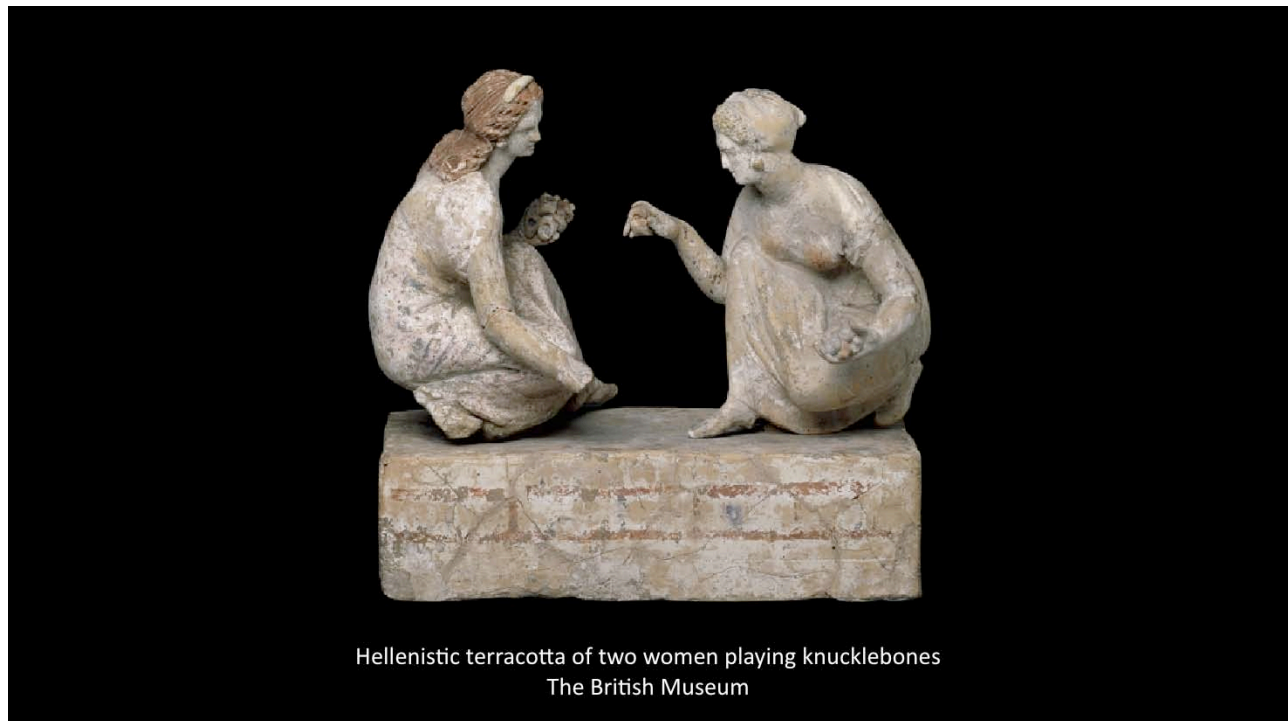


...Downton Abbey.

Opening the door to the social in this way will also let us talk about how social games of all kinds hold our attention...



...whether it's a split-screen co-op game of *Uncharted 3*, or the social aspects of Facebook games.



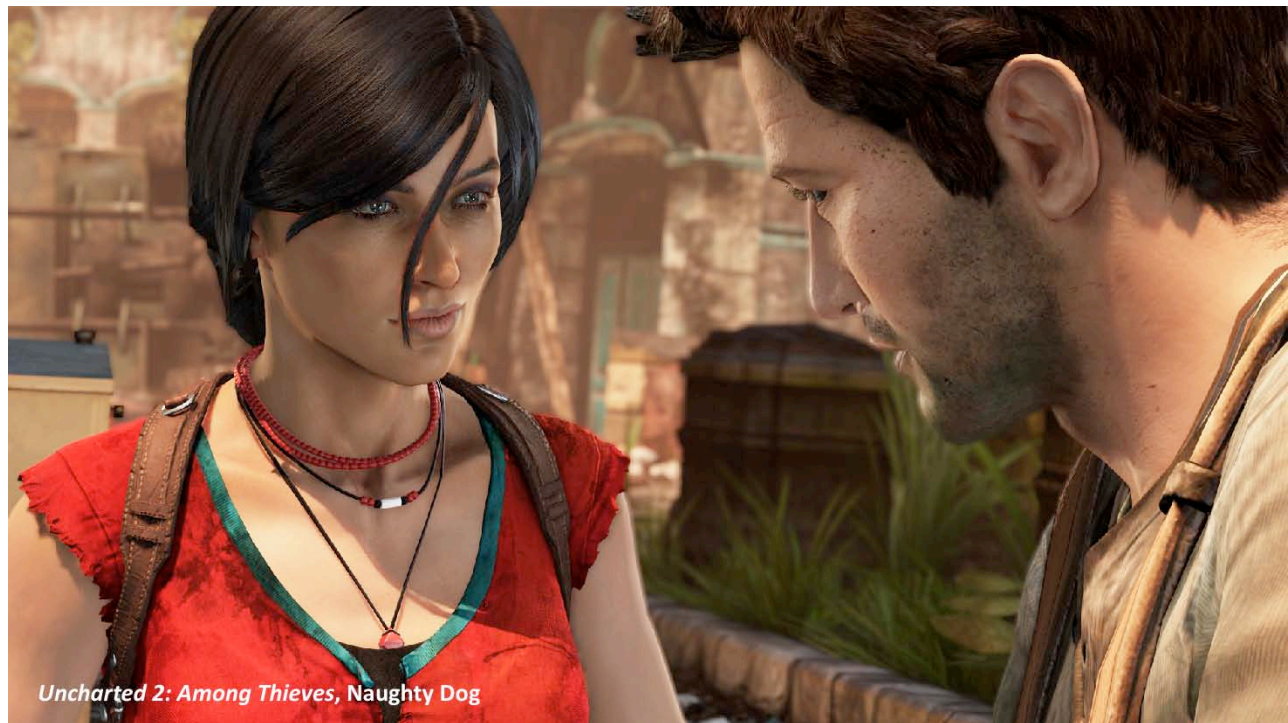
The developmental psychologist Michael Tomasello has written about something called ‘the joint attentional scene’, and describes how a shared experience of a third thing plays a fundamental role in our intellectual and social development, and might even be what gives us our essential humanity.

Professor Janet Murray, author of *Hamlet on the Holodeck*, has run with the idea of ‘joint attention’ in the direction of games – you should check out her work.

One paper in which Professor Murray of the Georgia Institute of Technology discusses joint attention is:

Toward a Cultural Theory of Gaming: Digital Games and the Co-Evolution of Media, Mind, and Culture

www.lcc.gatech.edu/~murray/PC0403_Murray.pdf



Thinking about the social also made me think that this is why we've had so much success with the character-driven stories in the *Uncharted* series.

By putting a focus on the people in the game, their fears and hopes, and the moment-to-moment nuances of the relationships between them, we've been able to get and hold people's attention much more easily than by trying to use more abstract, plot-driven stories that focus on the power structures or the history of a fictional world.

beauty
aesthetics
contrast

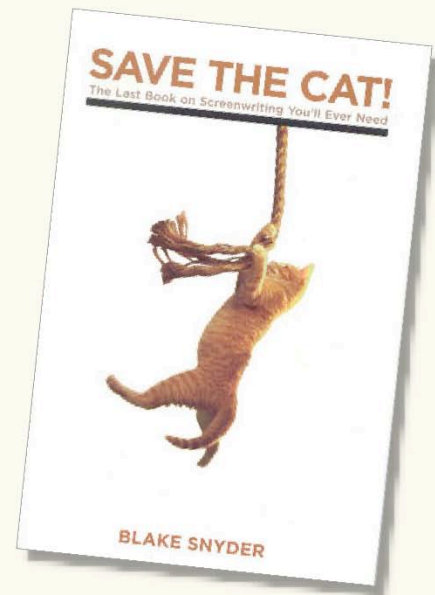
gets ★★★

holds ★☆☆

story
narrative
social

gets ★★☆

holds ★★☆



Now, I think it's averagely tough to get someone's attention with this 'story – narrative – social' stuff. Screenwriting books like Blake Snyder's *Save the Cat* are full of advice about the challenging task of quickly establishing characters that are likable or empathic, so that we'll want to follow them along their path.

I think that narrative also has an averagely strong hold on people's attention, and in a way that is curious because it doesn't decay very quickly over time.



Episodic fiction, where we might have to wait days or even weeks between chunks of story, is a testament to that.

There's an anecdote about people in the 1800s lining the docks in New York City, waiting for the latest episode of Charles Dickens' serialized story, *The Old Curiosity Shop*, to come in on the boat after a particularly spectacular cliffhanger.



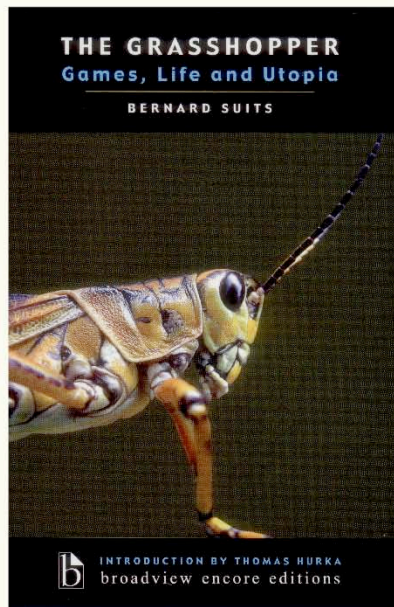
Poster by Rachel Morris

My last category is gameplay.

Games are made of several parts. They have rules – their mechanics – that interact in a systemic way with players and resources to produce dynamics, which in turn yield emotional responses – aesthetics – for the players.

You'll recognize this as the 'MDA' model proposed by Robin Hunicke, Marc LeBlanc and Robert Zubek – if you haven't read their paper about MDA, you should definitely look it up on the web. It acts as a great, concise explanation of how gameplay works to hold our attention and impact our emotions.

www.cs.northwestern.edu/~hunicke/pubs/MDA.pdf



The philosopher Bernard Suits defines a game as the voluntary attempt to overcome unnecessary obstacles in pursuit of specific goals.

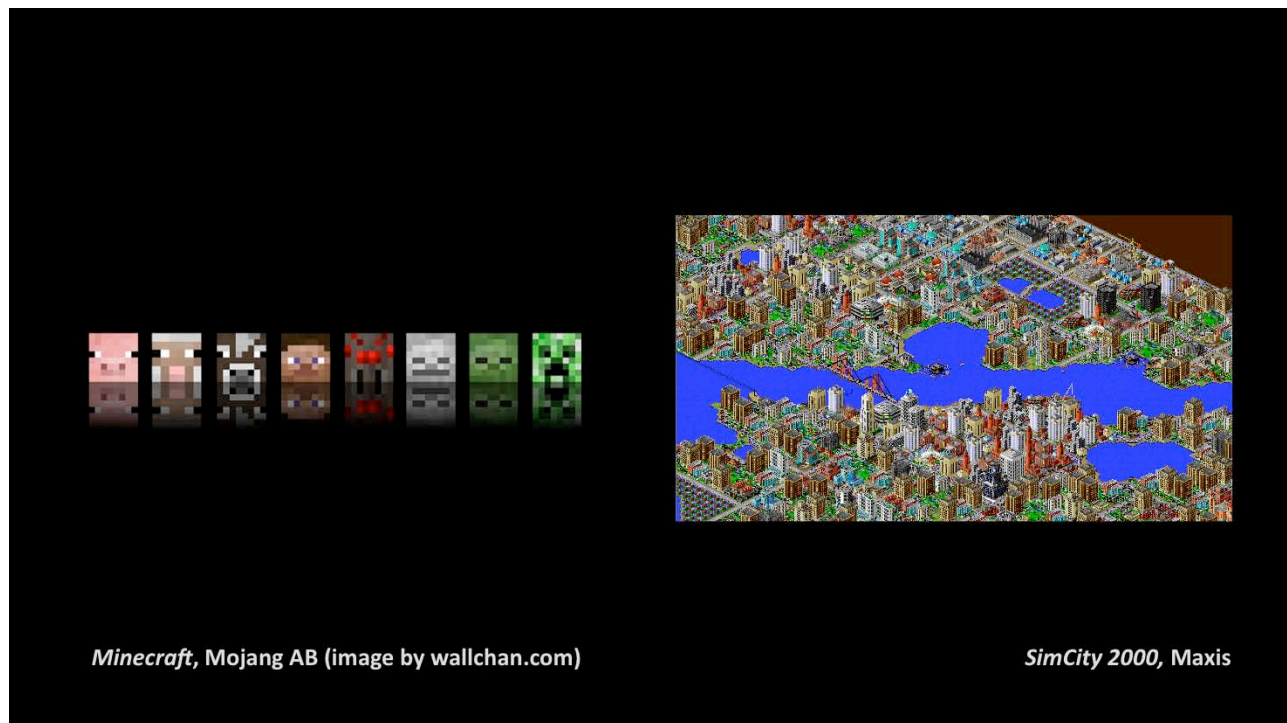
Goals are what make a game different from a toy or a free-play session. We work towards long-term goals by means of attainable short-term goals that we put together strategically to get there, like “roll the dice” or “shoot the enemy”, or even as simple as “take cover”.

These build into compulsion loops by way of letting us reach satisfying points of resolution – the end of my turn, the dropping of the enemy...



...or the collapsing of three clumps of grass into a bush in Spry Fox's brilliant *Triple Town*. We string these loops and goals together into a gameplay experience of many hours.

This is also related to Jaime Griesemer's famous conception of the 'thirty seconds of fun' in *Halo* – where an underlying pattern of player activity is repeated, with continual variation, to create the long-term enjoyment of the game.



But there's a problem with calling this category 'gameplay': not all the videogames we love even have goals, and so by our best definitions they're not very gamelike, strictly speaking.

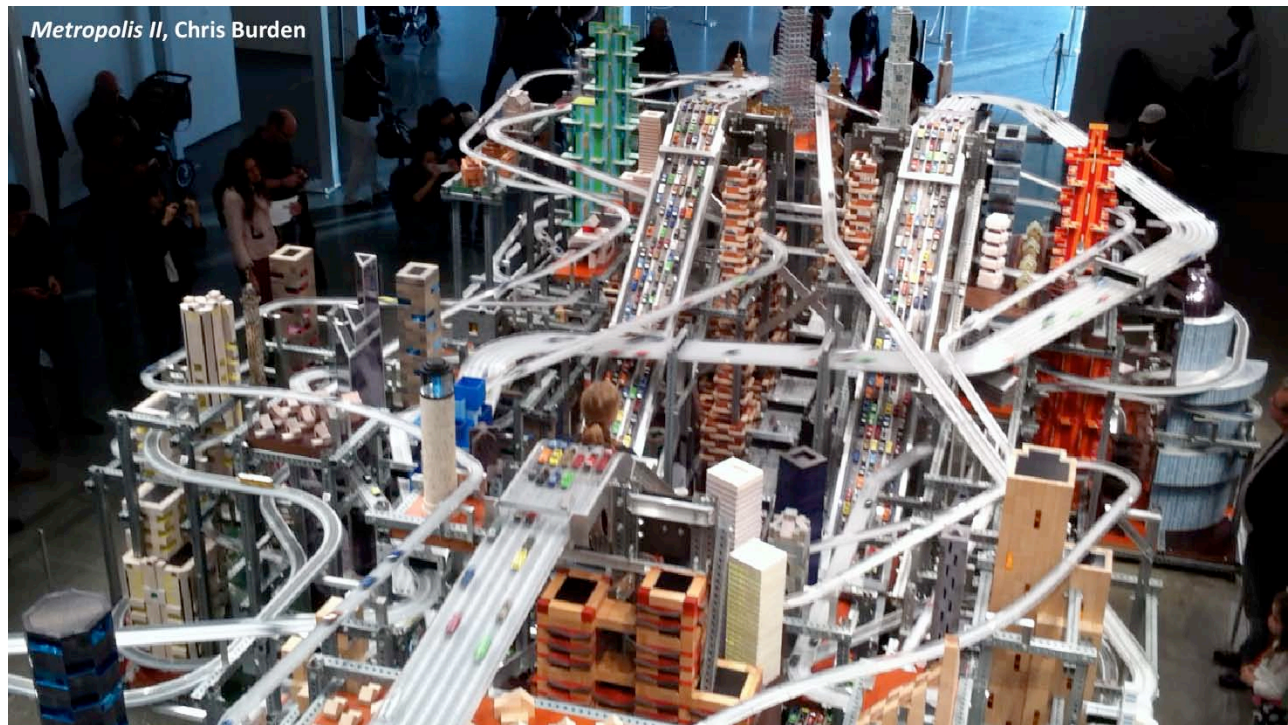
Minecraft, before the single player game came along at least, and *SimCity* are two videogames that are very open-ended, but which I've played compulsively for dozens, maybe hundreds of hours; they are clearly doing something right to hold my attention, but quite how they're doing it has always been something of a mystery to me.

I'll come back to this later.

beauty	story	gameplay
aesthetics	narrative	ludism
contrast	social	
gets ★★★	gets ★★☆	
holds ★☆☆	holds ★★☆	

So I almost changed this category to 'interactivity', but let's call it 'ludism' instead, like 'ludic', from the Latin 'ludus', which describes play of all kinds, not just games, and which acknowledges the playful attitude at work here.

This scheme needed a bit of pretentious Latin, anyway.



I think that when the human mind finds a system, it loves to study it, if the moving parts of the system are easily visible to us. Chris Burden's art installation *Metropolis II*, which I recently saw at the LA County Museum of Art, is a system whose dynamics are plain to see, and it's fascinating. Those are all *Hot Wheels* cars.

You can see a short film about *Metropolis II* on YouTube, here:

www.youtube.com/watch?v=llacDdn5yIE

We come for the regular structure and repetition in the system, which gives our minds something to grasp quickly - like the way that waves lap into the shore...



...or the self-similarity of this Romanesco broccoli - but then we stay for the variability in the system - the ever-changing patterns in the flickering flames of a fire, or the variable schedule of reinforcement in the payout of a slot machine.

So to make things even more inclusive, I'll also call this category 'systems'.

beauty	story	gameplay
aesthetics	narrative	ludism
contrast	social	systems
gets ★★★	gets ★★☆	gets ★☆☆
holds ★☆☆	holds ★★☆	holds ★★★

When a system of rules, resources, interactions and goals are well designed, gameplay is like mental catnip to us. I think that this gameplay – ludism – systems category is the hardest to get a player's attention with; for example it can be tough to teach a board game to someone who hasn't played it before and isn't that interested, and we have to work very hard to design videogame opening sequences, like the beginning of *Uncharted 2*, which grab new players' attention quickly. Simple mechanics probably get your attention more quickly, since they're easier to understand.

But as Jason Rohrer pointed out in his keynote at the Montreal International Game Summit last year: games are clearly the form that is best at keeping people's attention. While a film struggles to keep you for longer than three hours, tops, a great videogame can hold your attention for dozens, hundreds, even thousands of hours.

This is also where the depth of a game becomes important. Game depth is a little hard to define, but let's say a deep game is one that produces a large number of interesting choices in a comprehensible way from a compact, elegant set of rules. The deeper the game, the greater the opportunity it has to hold your attention for a long time with its gameplay alone.

It's probably true to say that a game holds your attention best when you feel that you haven't completely understood its complexity. Thanks to my colleague Kaitlyn Burnell for that insight – check out her talk on Friday.

Good videogames get and hold our attention

beauty
aesthetics
contrast

gets ★★★
holds ★☆☆

story
narrative
social

gets ★★☆
holds ★★☆

gameplay
ludism
systems

gets ★☆☆
holds ★★★

I hope you're somewhat agreeing with me by now, that we can cut through the confusion about what 'immersion' and 'engagement' mean simply by saying: good videogames get and hold our attention, using a mix of the elements in these three categories.

Also, you can start to see how we could freely mix and match stuff from these categories to make different styles and genres of game, drawing on them to serve each of our unique, individual creative goals.

We can also keep them in mind to use them when we need them. Just when we're losing the player's attention with one category, we could pull them back in by deploying another. A very simple example of this would be the way that we vary the graphics and add new mechanics into the mix as a game progresses.

Good videogames get and hold our attention

aesthetics – narrative – ludism – and everything else

A great painting gets and holds our attention

aesthetics – sometimes narrative

A good movie gets and holds our attention

aesthetics – story – narrative – social

Sports get and hold our attention

aesthetics – narrative – social – gameplay – ludism

We often get into difficult arguments, when we try to compare videogames to other forms like the movies.

By using this concept of attention to look at other forms, I hope we can get a clearer idea of what videogames are and aren't like. This framework cuts us loose from subjective, ideological evaluations of the value of different forms and leaves us free to evaluate what does and doesn't work: functionally and artistically

Whether we're discussing games, film, sports, or even just some drunkard falling over at a party, the kinds of statements we can now make are simple and to the point, and we can more easily draw out the ways in which each of these things are similar to, and different from one another.



As we learned from Colin Northway and the *StarCraft* players: human attention is a limited resource – there's only so much of it, and there's a cap on the rate at which it can be parceled out. It diminishes and recharges over time.

But you can improve your attentive capacity. In fact, the games we make are helping people to do just that. Ongoing research from Daphne Bavelier's group at the University of Rochester shows that people who play action videogames have better, faster visual attention skills than people who don't.

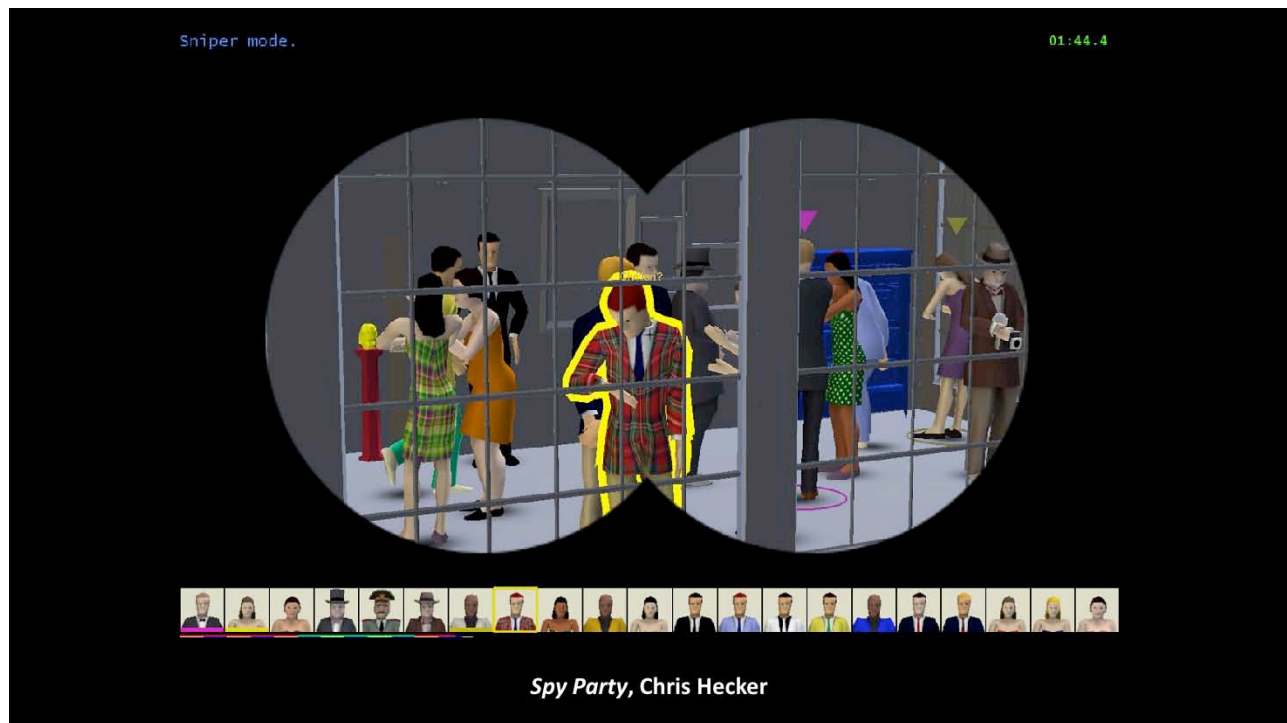
psych.wisc.edu/CSGreen/csg_nature_03.pdf

www.bcs.rochester.edu/people/daphne/VisionPDF/hubertwallander.pdf

*Arcadia, Gamelab*

Since attention is a resource, you'd think that it would be great subject matter for videogames.

There haven't been that many games that are explicitly about attention – you can find some very simple attention-training games on the web – but there are a couple of interesting ones that I'm aware of: Eric Zimmerman and the team at Gamelab made a game a few years ago called *Arcadia*, where you had to play multiple action games at once...



...and Chris Hecker's game *Spy Party* is all about using the player's attention as a resource that they have to manage.

In fact, I'd like to claim that attention is *the basic currency* in which videogames trade, and in which nearly every other cultural form trades, too.



I really wanted to talk about game addiction today, which is a difficult, polarizing but interesting subject, and I can't help but feel that we should talk about it more as a community of game designers. I kept coming back to it when I was writing this talk, because of the relationship between game addiction and attention.

Addictive games pull your attention back to them over and over again, and then hold it for a long time. Games that cause people addiction-related problems in their lives are perhaps too good at getting and holding that particular person's attention.

Unfortunately, it would take more than an hour to do this subject justice, but I hope that someone at another GDC can come back to this subject and run with it.



So the player has all this attention, which they're bringing to bear on our games. How is that practically relevant for game designers? I don't have time to speak to every kind of game, so I'll tell you about our experiences from the development of *Uncharted*.

Often in our games, we want to direct the player's visual attention to an aspect of the environment – a ladder, a door, an enemy, or even a simple ledge.

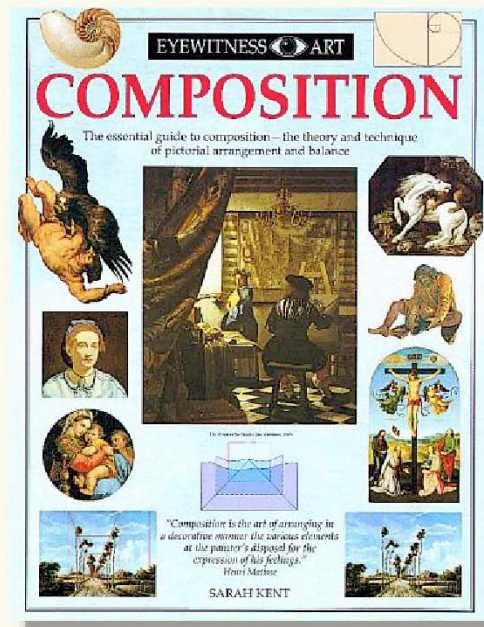
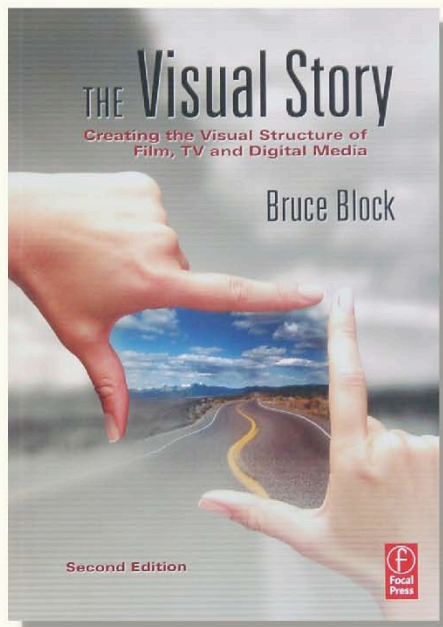
There are lots of things that impact the visibility of things in an environment: the silhouette of an object, the background that it's against, its hue, saturation and value, all of which are affected by the lighting of the scene.

Then there's the composition of the view of the scene and the lines and shapes within it, the density of detail and any animation that it contains. If even one of these things is out of whack, the player won't see what we need them to see. Every *Uncharted* game has presented literally thousands of these kinds of challenges for us to overcome.



There are a couple of simple tips to know about here. We've found that players rarely look outside the central part of the screen unless it's to look at meta-information like the HUD, and that causes them to miss things that might be in plain sight, but that are out in a corner.

Also, players are more attentive to things in the lower half of the screen than the upper half, because of something called 'visual gravity'.



Bruce Block talks about these elements and many more in his excellent book, *The Visual Story*, which should be required reading for every videogame developer, and I also like this book, *Composition* from the great DK Eyewitness Art series, for some simple tips about the way that 'lines of force' in a composition drive your eye around a scene.

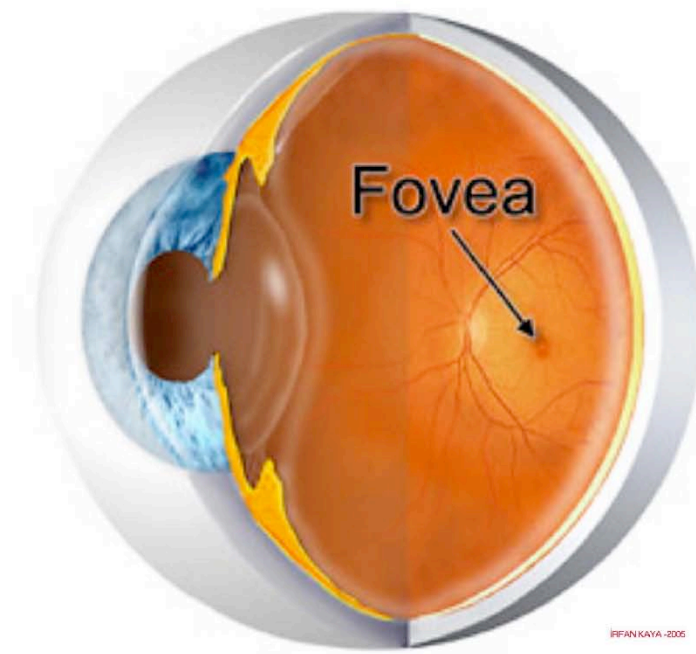
The takeaway for game designers here is that subtle details in the art of your game don't just make it more or less pretty: they make it possible for the player to play your game, at all.



Robin Hunicke, who works at thatgamecompany, told me that working on *Journey* they created a new term for this: they called it 'attentional design', and you can see it at work in the opening moments of their game.

The way that the player's attention is drawn first to the character that they will play, by the character's isolation in the frame, the suggestion that the character is now controllable, because it has risen to its feet. The establishment of first the hill as a short-term goal for the player, through the use of attention-grabbing detail and animation, and then the mountain as a long-term goal for the player, by a change in camera position that frames the composition in such an impactful way: all these are subtle ways of designing to direct the player's attention towards the mechanics and goals of the game.

Robin told me that even these simple-seeming things took many hours of work to accomplish, and I know from our work on the *Uncharted* series just how hard we have to work to direct the player's visual attention in subtle ways like this.



Now Visual Attention is a lot weirder than you might think. We can only see a clear, sharp image with a tiny part of our retinas – something called the fovea. It's right in the middle of the retina, it's about a millimeter across, and it's responsible for a full half of the signals that travel down your optic nerve.

If you hold your arm out at arm's length and look at your thumb, then the width of your thumb is about the size of this tiny piece of visual acuity you have.



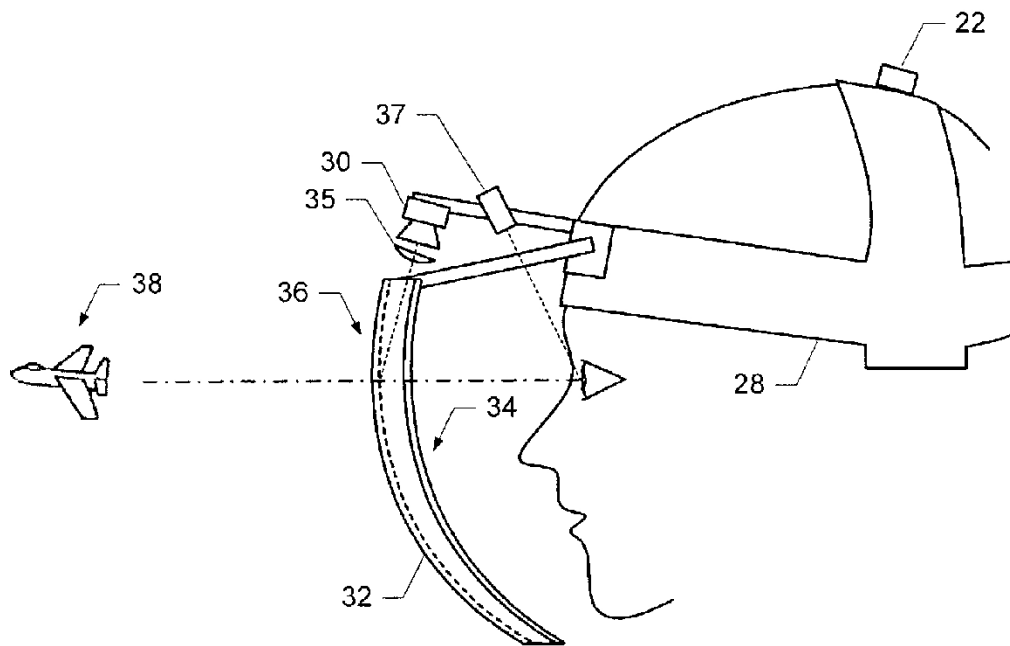
Foveation Movie by Jiří Lukavský
Institute of Psychology, Academy of Sciences, Prague

Because of this, we can't look at a scene in fixed steadiness, the way some other animals like birds do. Instead, we build up a 3D picture of the world by zooming our eyes around it with quick, simultaneous movements called saccades, punctuated by periods of rest called fixations.

Saccades are actually the fastest movements that the human body can make, and we tend to fixate on clusters of detail, explaining a lot of the stuff that's in the *Eyewitness Art Composition* book.

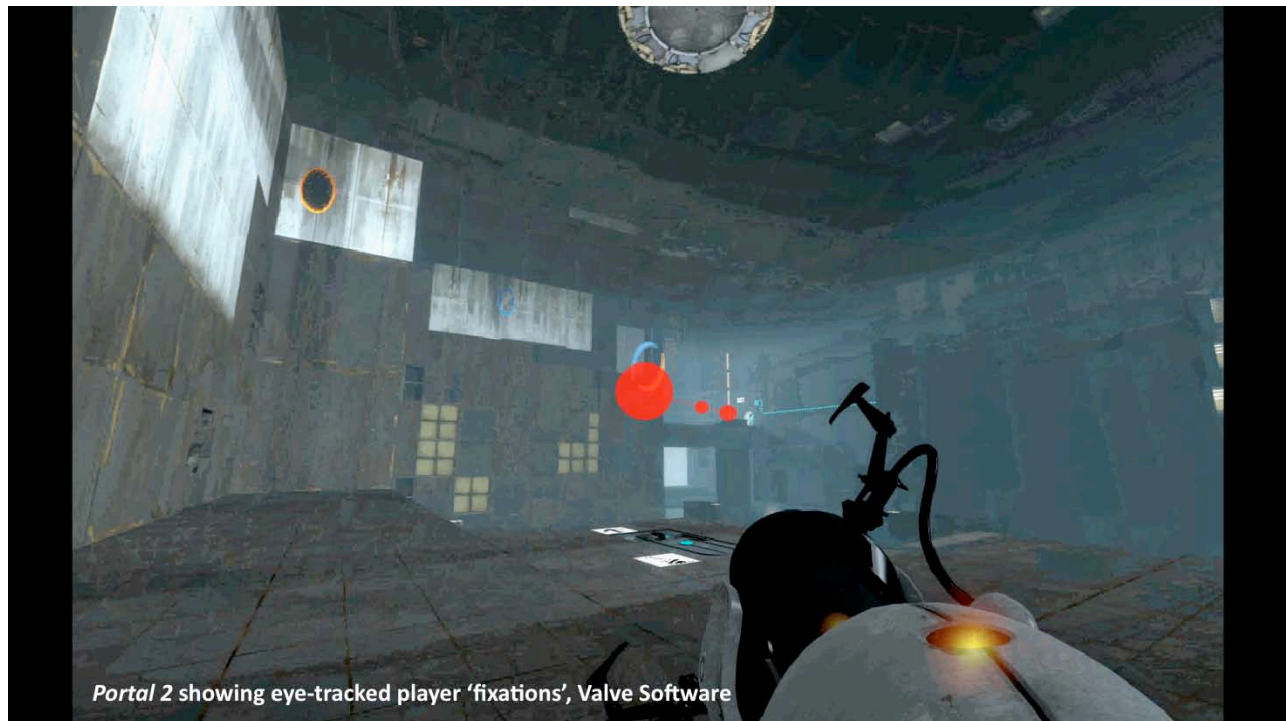
You can see psychologist Jiří Lukavský's "Foveation Movie" which explains this phenomenon, here:

www.jirilukavsky.info/foveation-movie



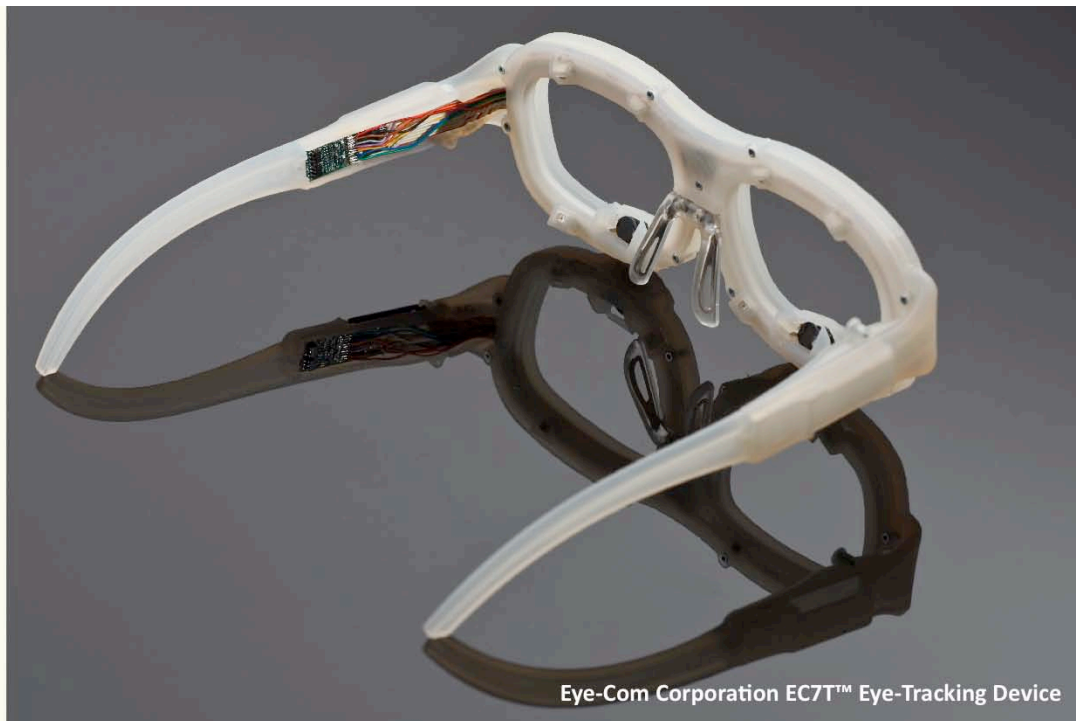
So knowing this, you'd think we would want to set up eye tracking equipment to be able to see exactly what our players are fixating on. And boy, would I like to.

I've always been fascinated by the kind of technology that can be used to see exactly where on a screen someone is looking, and I'm itching to get my hands on some eye-tracking kit, but it's not something we've done at Naughty Dog.



Valve have had some experience using eye tracking as part of their playtesting process - in fact, they even rigged *Portal 2* so that you could play it using your gaze to aim the Portal Gun around the level.

This kind of technology is an amazing boon for paralyzed people, of course, and we'll be seeing a lot more of it in the future. It'll become cheaper and more usable, and I think that eye-tracking technology could well become standard equipment for game developers, and maybe even game audiences, over the next ten years.



However, right now, eye-tracking technology is still very expensive – around ten thousand dollars a seat, I believe. And even if you could afford eye tracking, it might not be desirable. In his excellent talk at GDC in 2009, Valve’s biometrics expert Mike Ambinder mentioned a study that showed that, when people know that their eyes are being tracked, they move them around somewhat differently.

So how else can we keep track of the player’s visual attention, to make sure that the attentional design techniques that we’re trying to use are working? Well, of course we study our player’s attention all the time, when we’re using one of our most important game design tools: namely, playtesting.



Playtesting

Photo by Ellen Giamportone

I'm sure everyone here knows about the importance of playtesting, although you'd be surprised to hear how many game developers still make do without it.

We playtest our games all the time on each other, as we're developing them, of course.



But the kind of playtest I'm talking about now is formal playtesting, with groups of ten "Kleenex" playtesters from the general public who have never seen our game before, and who we'll only use to test it once.

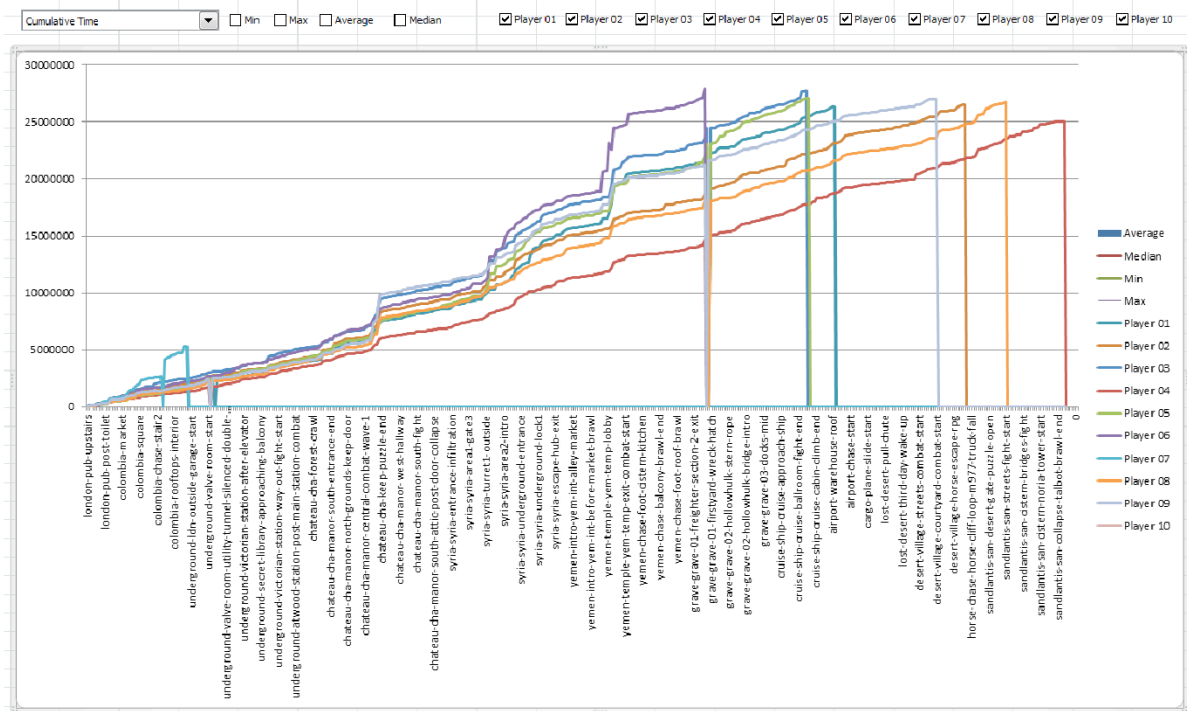


When I joined Naughty Dog, to help finish *Jak 3*, we ran perhaps four or five playtests. For *Uncharted 3*, we ran twenty-one tests over the course of the last six months of development.

**Naughty Dog Playtest Station**

We run these tests in-house, in a dedicated playtest room. Each playtester's station has a networked PlayStation 3 with the build of the game we're testing, headphones and a networked DVR box that will capture video of the game to our network as they play it.

Screens separate the stations from each other, so that the players can't see each other's games, even accidentally, and we ask them not to talk during the playtest.



Because we want to be as scientific as possible, we're ruthless about not giving them any help with what they're playing. As the players play, the game records certain information about the gameplay session and posts it to a database on our network - we call this our 'metric data'.

Uncharted 3: Drake's Deception
Single Player Playtest – July 28th–29th, 2011

Name: _____

Age: _____ Date: _____ Seat Number: _____

Please read each statement or question carefully and give your feedback by circling a number on the scale.

For example, for a statement, you should indicate how strongly you agree or disagree with the statement. You should interpret the numbers as follows:

- 1: I strongly disagree with this statement
- 2: I disagree with this statement
- 3: I neither agree nor disagree with this statement
- 4: I agree with this statement
- 5: strongly agree with this statement

Example: This example shows how you should respond if you "Agree" to the statement:

I would prefer to play this game than the one I currently play at home

1	2	3	4	5
Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly agree

PLEASE REMEMBER TO ALWAYS CIRCLE NUMBERS, NOT WORDS

1. I liked the **QUALITY** of the **GRAPHICS** in Uncharted 3.

1	2	3	4	5
Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly agree

At the end of the playtest, we get the playtesters to fill out a questionnaire about their experience, and conduct an exit interview, which we record. These are useful to help track the improvement in the players' perceptions of the game from test to test.

We always see a slow, gradual improvement, which helps us stay sane in the knowledge that the game is getting better, and we also get some interesting, if anecdotal, game design perspectives from the exit interview.

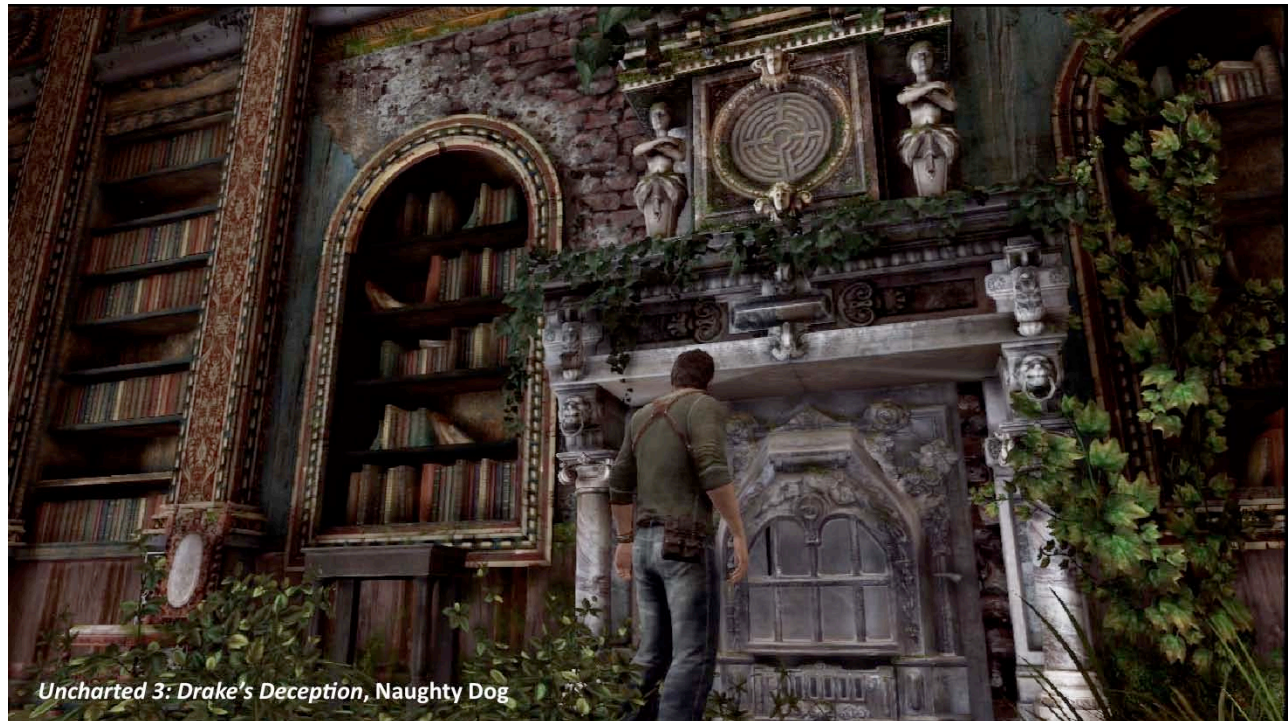
Table of Player Deaths

	Min	Average	Median	Max
colombia-museum-break-in-roof	1	1.9	1	7
colombia-chase-fence	2	2.2	2	3
colombia-rooftops-tiles	2	2.8	3	4
syria-syria-turret1-outside	1	2.3	2	7
syria-syria-rpgesus-trapped	2	5.9	6.5	9
syria-syria-area2-start	1	2.9	2	8
syria-syria-area2-return	1	7.5	8	14
syria-syria-escape-hub-exit-mid	1	3.0	2.5	8
syria-syria-escape-bridge	1	3.1	2	8
yemen-temple-yem-temp-exit-combat-mid	1	2.2	1	8
grave-grave-01-freighter-section-2-exit	1	3.4	3.5	6
grave-grave-01-firstyard-start	1	3.7	3.5	9
grave-grave-01-firstyard-combat-mid-left	0	1.4	0	10
grave-grave-01-firstyard-combat-mid-right	0	5.3	6.5	11
grave-grave-01-firstyard-wreck-hatch	0	3.1	2	9
cruise-ship-cruise-container-fight-mid	2	5.0	4.5	8
cruise-ship-cruise-ballroom-fight-start	1	5.4	6.5	10
cruise-ship-cruise-ballroom-fight-mid	3	7.6	8	11
cruise-ship-cruise-chandeller-climb	1	2.8	2	9
airport-car-field-start	1	2.3	1.5	8
airport-car-field-mid	1	2.3	1.5	7
sandlantis-san-desert-battle-start	1	4.9	6	7
sandlantis-san-cistern-noria-tower-start	0	3.1	2.5	6

Immediately after the playtest, we take a look at the metric data, which lets us visualize how playable the game is.

One way we do this is by compiling a table of how many times the players died in each small chunk of the game, using the conditional formatting in Excel to see when the average and maximum deaths for each bit of game exceed certain thresholds.

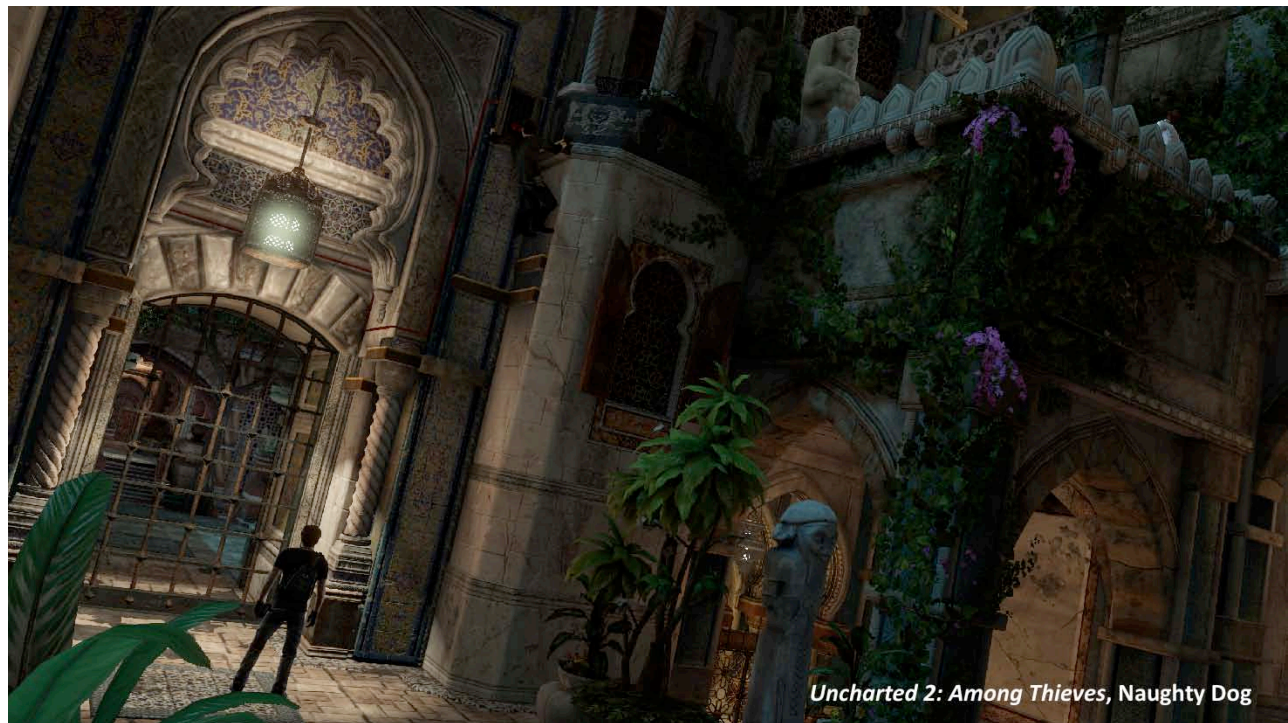
This is very useful for alerting us to the parts of our game that are still too hard.



But back to attention. One way that we can track our players' attention without expensive equipment is ridiculously simple: it's just by watching them play – or by watching their gameplay videos later. In a game like ours, it's easy to see when someone isn't seeing something, or has forgotten their goal.

When players repeatedly run right past the object they're meant to be interacting with, it's a pretty sure sign that they can't see it. If they go up to it from time to time and try to use it, but then leave it alone for a long time, you know they can see it but they don't think it's important.

We make notes about these situations as we see them arise, make fixes between playtests, and then watch out for improvements in the next test. Just by doing this, you can make an amazing difference to the way your players' attention moves over the sensory surface of your game, and you can seriously improve the amount of fun that players have with it.



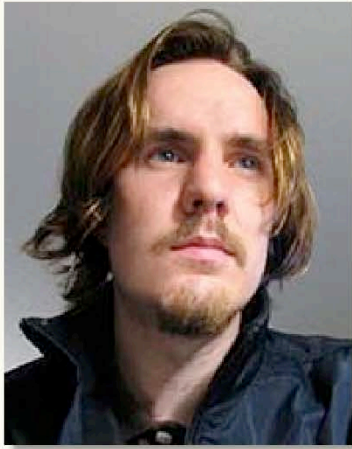
But what about tougher problems, where the player's attention isn't so easy to observe? Well, you can use your metric data in some clever ways, to get a handle on these kinds of issues.

The environments in *Uncharted* are visually very dense – thanks to our brilliant artists, there's a lot going on in the picture of any random *Uncharted* screen shot. Like we were just discussing, it's easy for things that are important to gameplay to get lost among all that visual information.



Because of this, we faced a nasty recurring problem in the Uncharted games, one that dated all the way back to the beginning of the series. We found that players would often have a difficult time spotting the edge grabs in the environments.

This was usually a disaster for us, because it would stop them climbing onwards to the next part of the game. The problem was compounded by the fact that players would also get distracted by things that looked like they were climbable, but weren't.



Teagan
Morrison

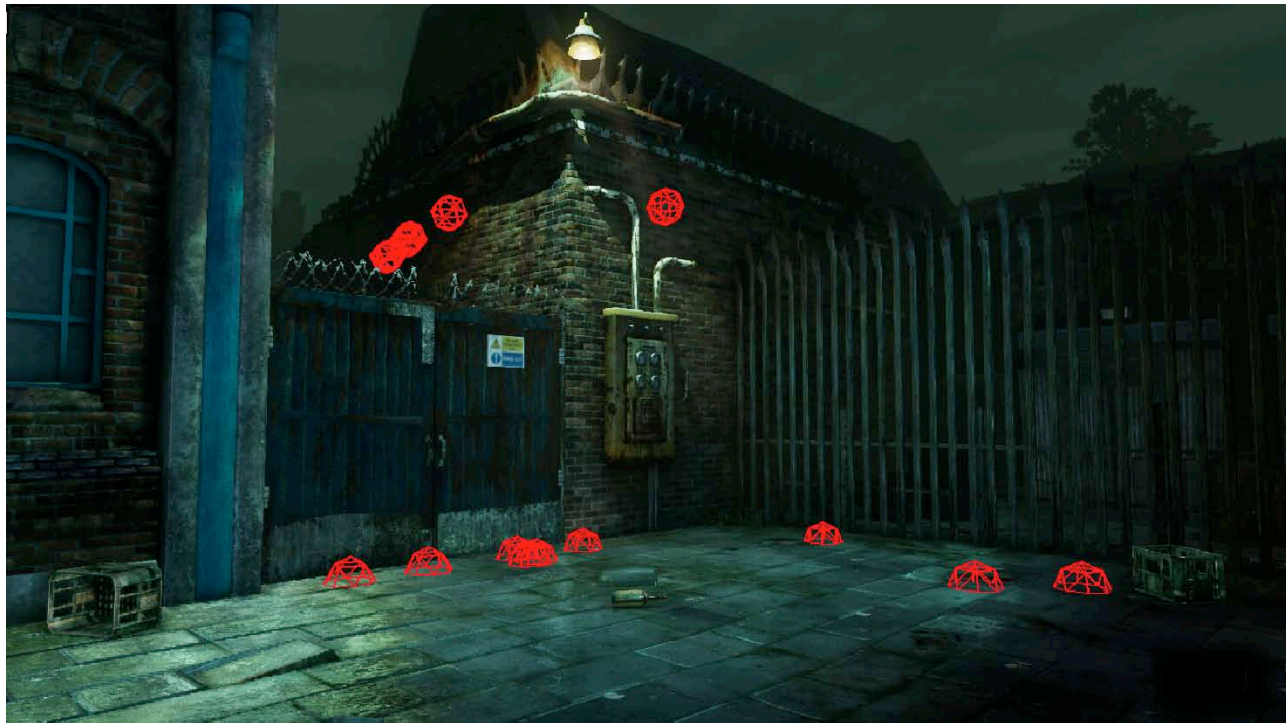


Travis
McIntosh



Jaroslav
Sinecky

The solution to this problem was quite brilliant, and it came from these three handsome men: Lead Technical Artist Teagan Morrison, Lead Gameplay Programmer Travis McIntosh and Gameplay Programmer Jaros Sinecky.



What we did was to set up a system that we only used during playtests, that would record an XYZ coordinate every time the player pressed the jump button and didn't end up jumping up to a ledge, but instead jumped up and down on the spot.

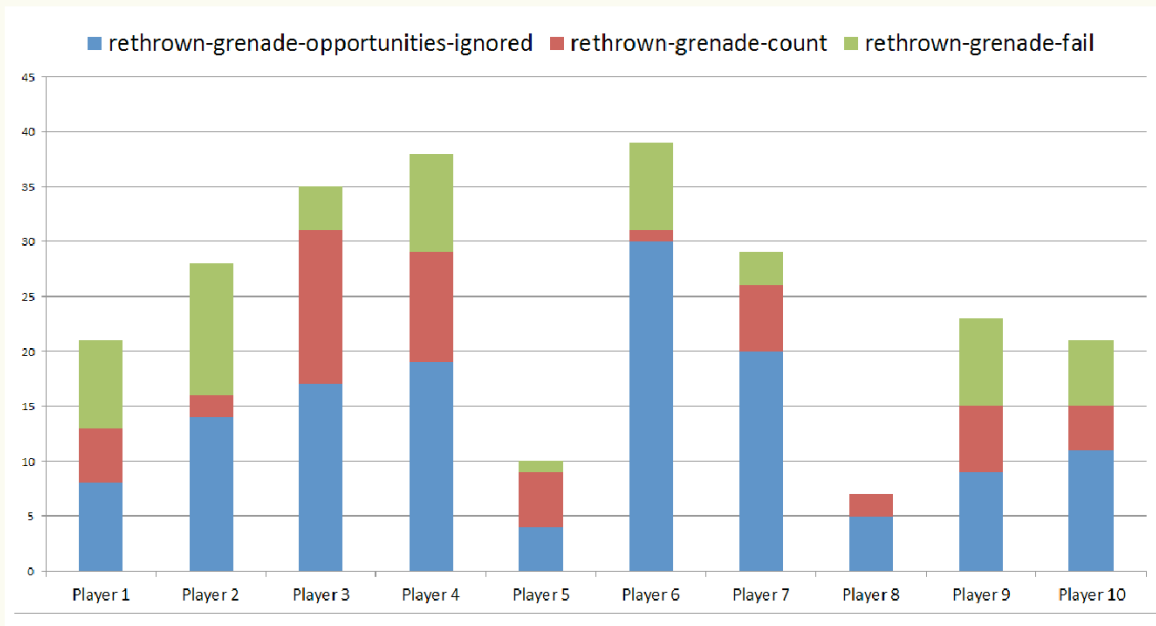
We wrote those coordinates to the metrics database on our network, and then when the playtest was complete, exported this data back into the game and put a little red sphere where every thwarted jump had taken place for every player in the test.

We called this our 'bad jumps' system. You could immediately see the bad jumps clustered beneath objects that looked like edge grabs, but weren't, and they told us what we needed to fix.



In the days after each playtest, the environment artists would go through their levels with the 'bad jumps' turned on, changing the artwork of the things that our playtesters thought had grabbable edges, to make them look less grabbable.

We were able to make a huge difference to the game by doing this, and we were really satisfied by the results that we got from setting up just this simple system.



We invented some other similar attention-tracking metrics for *Uncharted 3*. How often did players pick up a new gun, hold at it for a moment, and then drop it again in favor of their old gun? That was easy to record in our metric data.

So was the data you can see here: the number of successful and failed attempts that players made to throw back grenades, instead of ignoring the throw-back mechanic.

This technique seems like it could be applied to widely different kinds of games, too - I'm sure you can imagine them for whatever style of game you're working on, depending on its mechanics.

*“Not everything that
can be counted counts,
and not everything
that counts can be counted.”*
Albert Einstein

Before I wrap up this section, I want to assure you about something that always bothers me whenever I hear a talk about the psychological predictability of human beings, and the way that we can use numerical measurements taken from our players to make decisions about the creative path that we should take with our games.

These are tools, like any other, and just like a knife, they can be used to peel a delicious apple, or commit a horrible murder. It's often good to be scientific in a technical art like ours, but you shouldn't go any further with these techniques than your gut instincts as a designer and as a creative person tell you that you should go.

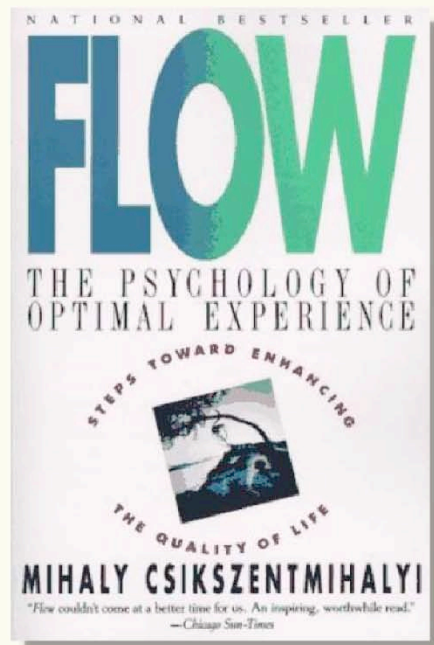
What you're trying to do is to make sure that your game is landing with players in the way that you intend it to land. You're trying to get rid of the stupid oversights that stop your game from being fun and interesting, while leaving in enough chewy stuff that players want to sink their teeth in to your game, over and over again.

This also applies to my whole invocation of the concept of attention. I'm not trying to be reductive, and explain things away in terms of psychology and brain science: that would be a mistake. This is just one more lens that we can use to look at what we're doing when we're designing a game.



So now let's get to the topic I want to close on: the subject of 'experiential' videogames, what they have to do with attention, and why I think they're important.

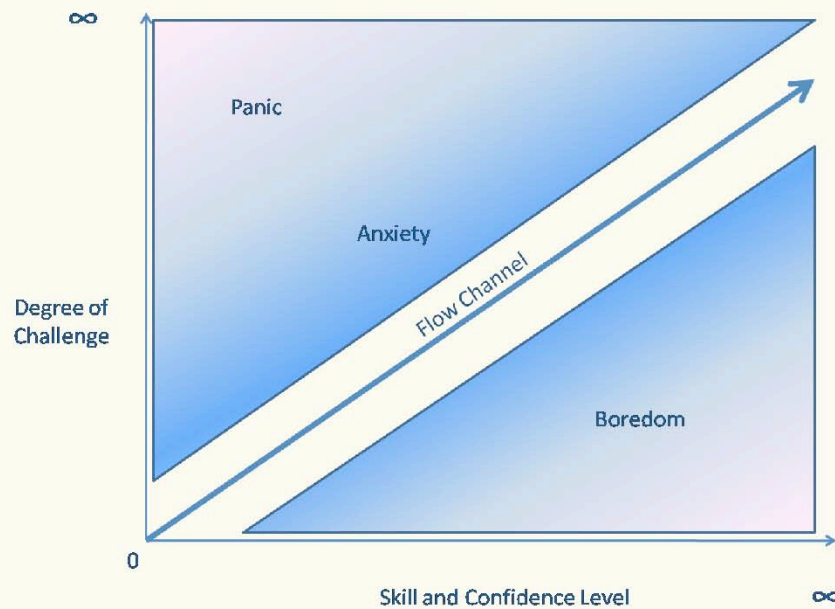
I'm sure that some of you have been wondering why I haven't yet mentioned a concept that seems obviously connected to attention and the psychology of videogames. I'm talking about the concept of 'flow'.



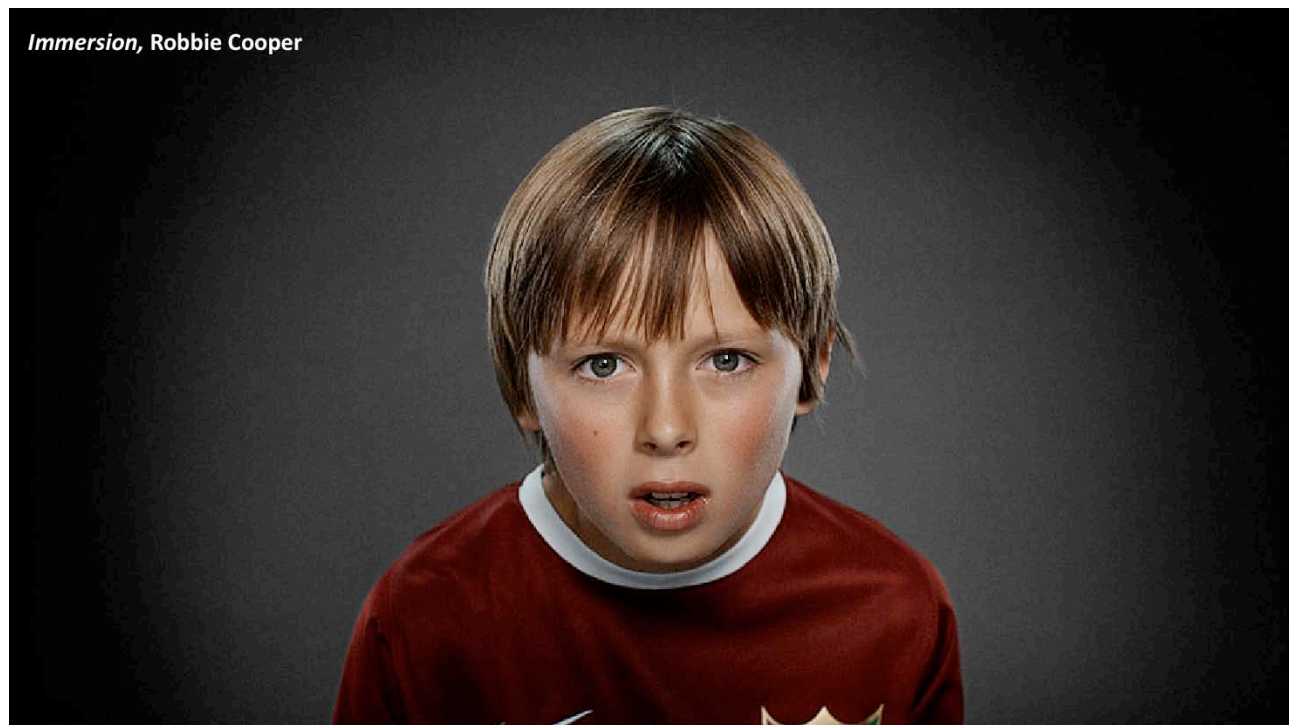
Flow is, of course, the state of optimal experience described by the psychology professor Mike Csikszentmihalyi, and it's been much discussed here at GDC over the years, for the strong ties that it has to games.

When we're in a flow state, our attention is held and is very highly focused, whether we're doing needlepoint, speed-typing or playing *Triple Town*. Our attention is right where it needs to be: on the subject matter we're engaged with, helping us handle the tasks at hand while our vigilance watches out for incoming tasks that we're going to have to deal with.

We lose some awareness of ourselves, of our bodies in particular, and we experience strange time distortion effects, as hours seemingly pass in minutes, or moments stretch out, allowing us to act more rapidly than we otherwise could.



When we are in a flow state, we are riding the boundary between mastery - where things are easy - and challenge - where our abilities are being tested. If the system's too hard, we'll get frustrated, if it's too easy, we lose interest. In either case, we drop out of a flow state: the system has lost our attention.



When we are in a flow state, we are acting in a system as if it was a game, manipulating the system towards certain goals.

However, we wouldn't always want to call this system a game – surgeons are often used as example cases of people who go into a flow state, and we agreed earlier that some videogames like *Minecraft* don't even have explicit goals, and yet millions of people, myself included, go straight into a flow state when they pick *Minecraft* up.

In trying to solve the puzzle of how we can go into a flow state in non-game systems, I finally understood how *Minecraft* holds my attention so completely.

extrinsic & intrinsic goals

In the public debate about gamification, we've talked a lot about extrinsic and intrinsic goals.

We know from educational and industrial psychology, going all the way back to the 1930s, that intrinsic goals are better motivators than extrinsic goals. It's the playing of a game for its own sake that holds our attention, not the promise of some eventual reward.



I realized that I create my own intrinsic goals in *Minecraft*, and that is what puts me into a flow state. I make a game of *Minecraft*, by imagining a back-story where I need to stay alive, to unlock the mysteries of my uniquely-generated world, and in order to stay alive, I have to engage with the system around me, exploring the environment, and using it to make the tools that aid me in my quest.

The goals set for themselves by other people who play inside the system that is *Minecraft* might be quite different, like building a scale model of the USS Enterprise or a working 16-bit processor.

What's common for all of us is that we've had a profound experience of a flow state that was only possible because of the goal-setting attitude that we brought to bear on an open system.

(At GDC, I showed a portion of the movie "Between Two Cities [Minecraft 7.5 km Railroad]", uploaded to YouTube by NewEonOrchestra.)

www.youtube.com/watch?v=g-tSxazq2BA

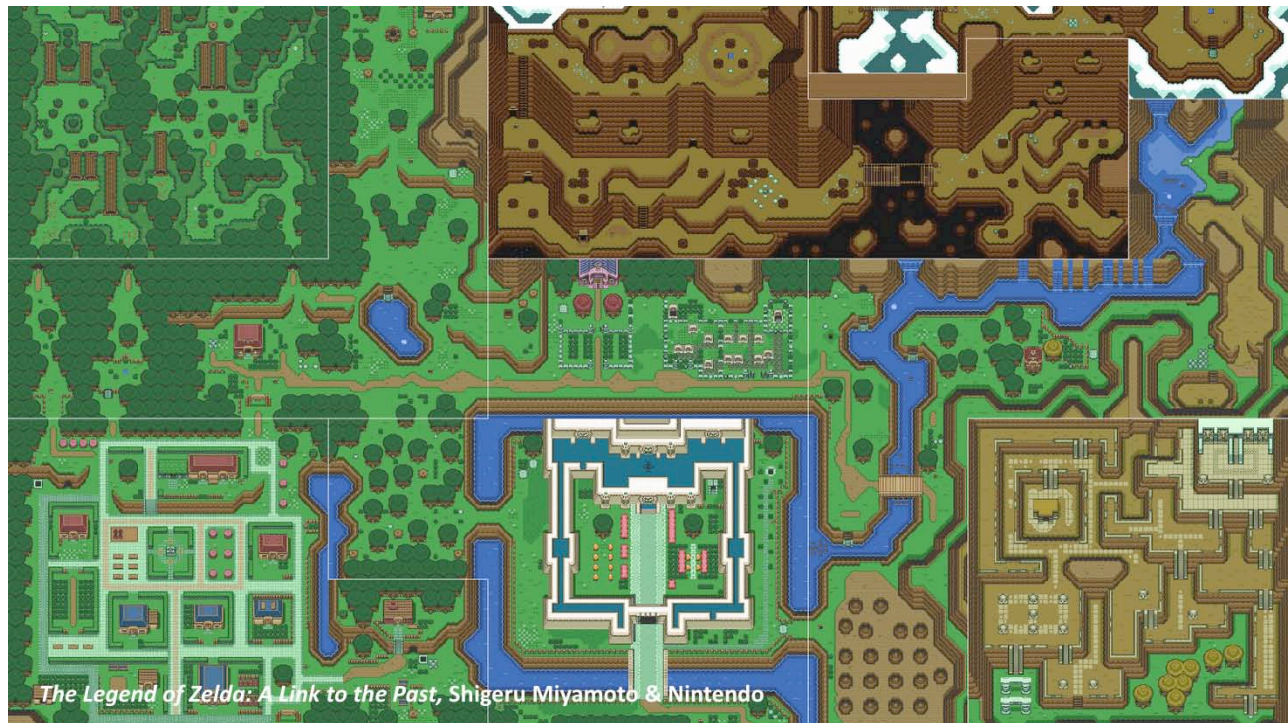
The Autotelic Experience

auto – self

telos – goal

This is what the Csikszentmihalyi calls ‘the Autotelic Experience’ (from the Latin *auto* – self, and *telos* – goal).

Autotelic people are internally driven, and exhibit a sense of purpose and curiosity. Because of their nature, they’re more autonomous and independent, and less easily manipulated with threats or rewards. They love to explore systems, for the sake of the exploring.



All human beings are autotelic, to some extent, but our generations, the ones that have grown up playing videogames, are very lucky, because we've been trained to be more autotelic than any other generation of humanity before us.

The games that we've played have cultivated our curiosity, our independence and our ability to manipulate rich systems in goal-setting ways.



Far Cry 2, Clint Hocking & Ubisoft Montreal

I'm sure you or people you know have had deep, rich play experiences in *Red Dead Redemption*, *Far Cry 2* and *Skyrim* without following the main storyline of the game at all, or by running pacifist play-throughs: this is testament to the power of the autotelic experience.

Experiential Games

Daniel Benmergui



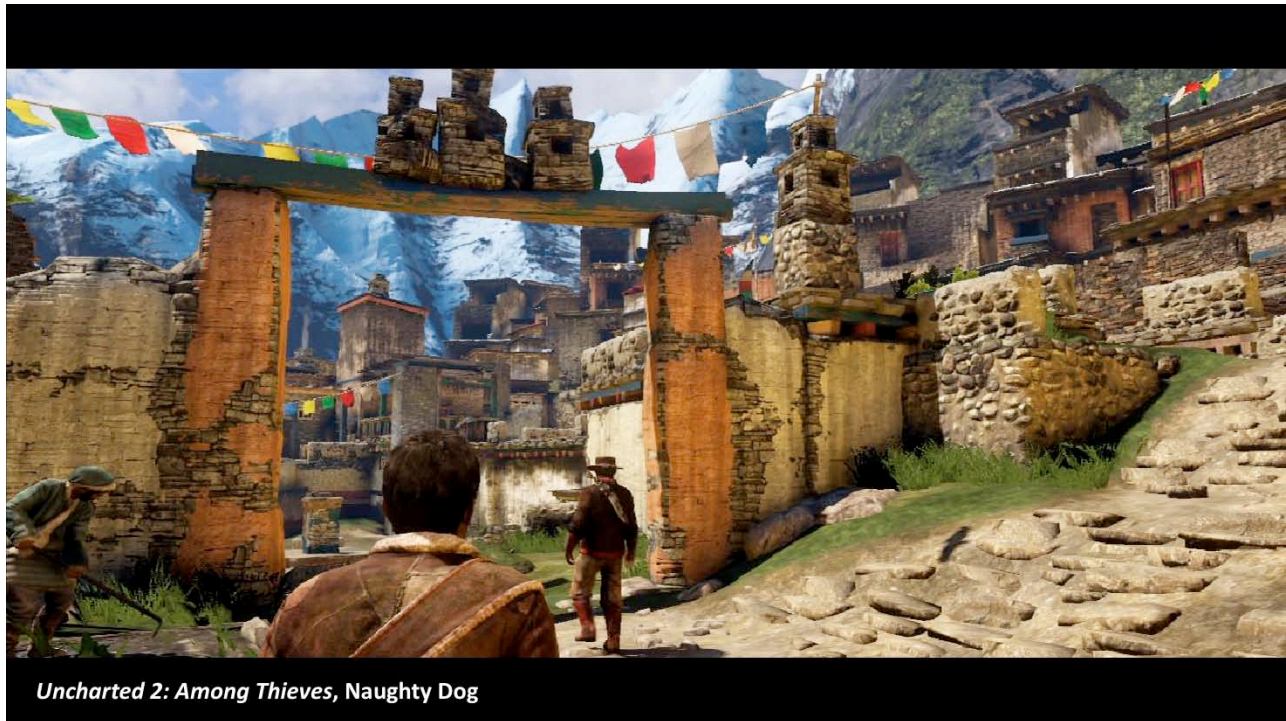
As far as I know, Daniel Benmergui first coined the term ‘experiential games’ on his blog all the way back in 2007.

Broadly speaking, these are games that forgo explicit goals and traditional game compulsion loops in favor of systematized, open-ended, explorative experiences, often in pursuit of an artistic impact.



Early attempts at these kinds of games and interactive art experiences frequently struggled to hold people's attention for very long, compared to traditional videogames, because they had a tendency to rely on aesthetics and narrative – the categories that are the least effective at holding our attention.

However, as game aesthetics and narrative elements have become more systemically interesting, new opportunities have opened up for experiential games because of this autotelic drive we carry round with us. In my IndieCade talk last year I described the way that Tale of Tales' game *The Graveyard*...



...gave me the confidence to push through the experiential “Peaceful Village” sequence in *Uncharted 2*, even when some people on our team didn’t think it was going to be a success.

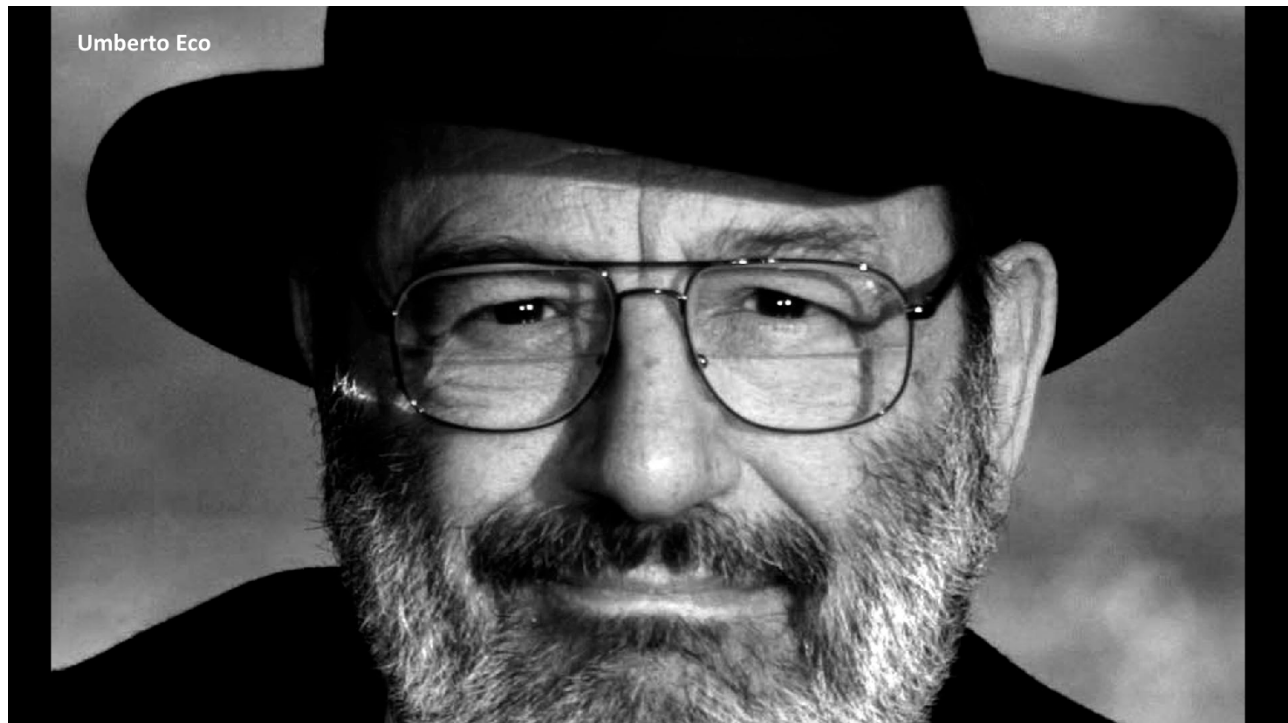
The calm beauty of the scene, and the pleasure of the simple, systemic narrative elements we scattered through it held people’s attention for just long enough to create a powerful moment at an important point in the game.

Players who were curious and explorative found plenty to reward their curiosity. Players oriented towards the ultimate goals of the game were able to move through the scene quickly, and soaked up enough of the calm atmosphere to reset the intensity of the game in preparation for its final act.

You can find my IndieCade talk online if you’re interested to hear more about this.

www.g4tv.com/videos/55682/indiecade-2011-keynote/

www.youtube.com/watch?v=ZPju14BmOLY



Videogames are special, in their opportunities for non-linearity of meaning, but they're not unique in this regard. Philosophers have thought for years that so-called linear artistic forms offer similar opportunities.

In his 1962 book, *The Open Work*, the Italian author and scholar Umberto Eco, most famous for his novel, *The Name of the Rose*, argued (and I'm quoting from Wikipedia here, rather than Eco himself):



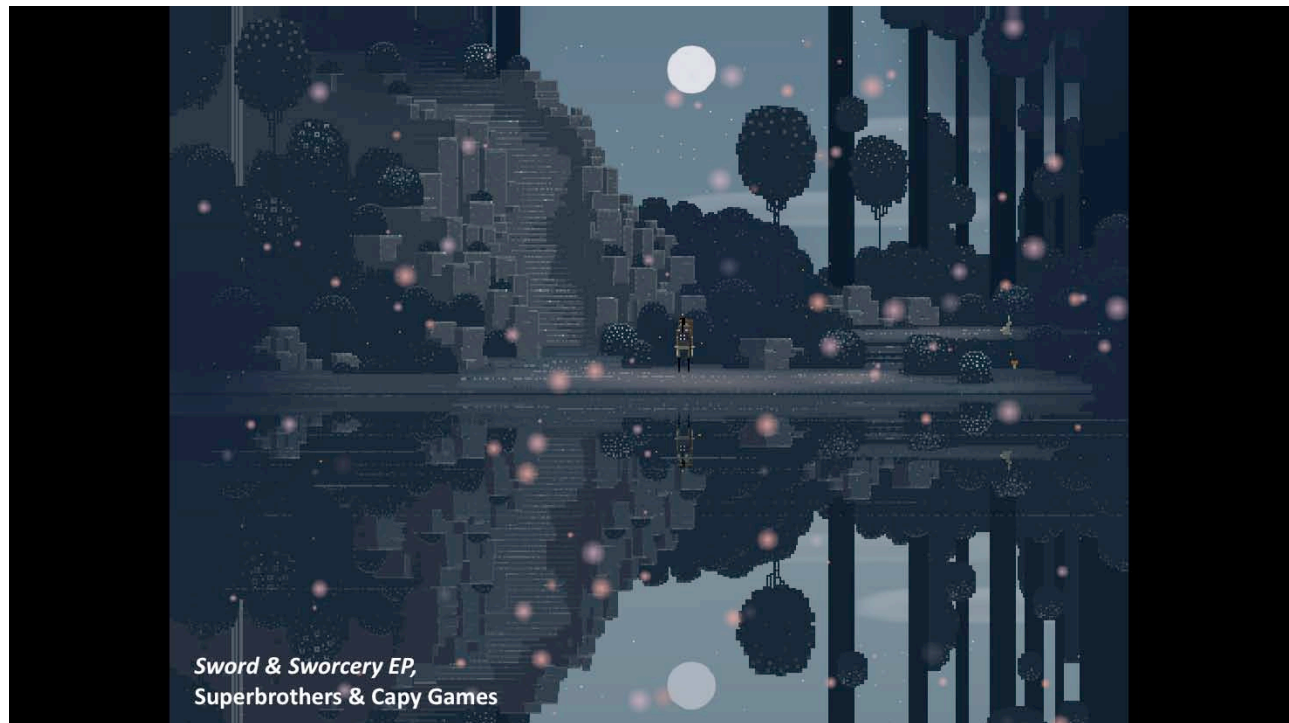
The Name of the Rose, Jean-Jacques Annaud

“...literary texts are fields of meaning, rather than strings of meaning (...)

“...they are understood as open, internally dynamic and psychologically engaged fields.

“Literature which limits one's potential understanding to a single, unequivocal line, the *closed text*, remains the least rewarding, while texts that are the most active between mind and society and life (...) are the most lively and best”

en.wikipedia.org/wiki/Umberto_Eco



In other words: singularity of meaning is the enemy of art.

Great art in all of its forms is multiplicitous, systemic and can have many meanings, even contradictory ones, which is why the same piece of art can speak to us in different ways at different times in our lives.

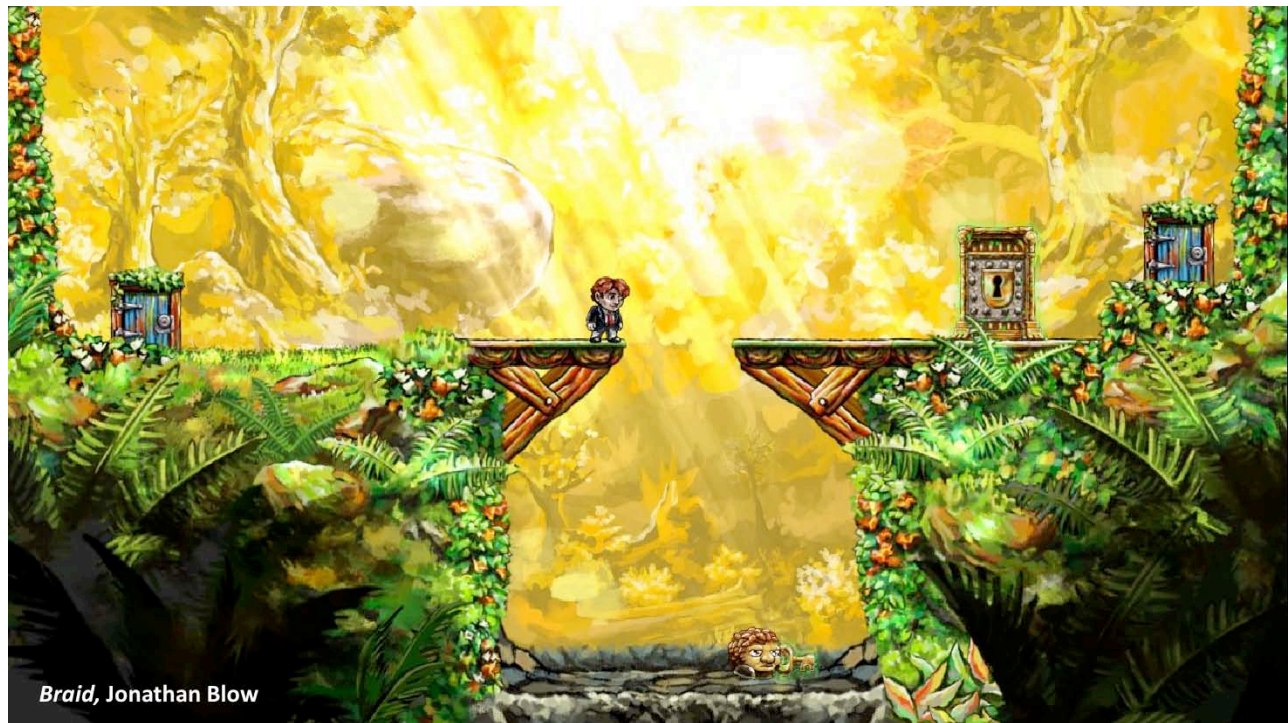
If we can expect to find new things each time we come back to a work, then that in itself is a draw for our attention.



Amy Hennig

Amy Hennig, Naughty Dog's Creative Director and head writer on the *Uncharted* series, talks about the very great value of leaving something to an audience's imagination, in terms of the storytelling in our games, so that the individual player fills in the details for themselves, and the experience of the game truly becomes their own, even before they have taken an action in our interactive system.

To put it another way, if linear games are well written, they're not truly linear.



Braid, Jonathan Blow

We're learning more all the time about how to devise gameplay that expresses a broad range of emotion.

That's crucially important for pushing games forward as an artistic form, as Jonathan Blow's *Braid* demonstrated.



But I worry that we have a tendency to over-focus on compulsion loops and explicit goals in the games we make, and we tend to look past the emotional value, and artistic value, brought to a game by things like nuanced aesthetics, the narrative and the social, and the space for autotelic self-determination created by open systems.

In his GDC talk last year, *An Apology for Roger Ebert*, Brian Moriarty gave us the definition, “Sublime art is the still evocation of the inexpressible.” When we’re trying to make games that succeed artistically, our ultimate goal is to evoke ideas and emotion in the player about subjects that are difficult to express.

But as Brian suggested in his talk, and as Csikszentmihalyi himself says, the flow state we enter when we’re caught up in the formal parts of a game is almost emotionless, as an essential part of its character. Our minds are just too busy when we’re dealing with all the rational tasks that a game presents, to allow in the subtlety of feeling that we’re always chasing as artists.

But I see room for both the flow of gameplay and reflective experience in our games if, from time to time in the progression of a game, we have the confidence to let the player just drop out of their flow state.



As the player's attention begins to shift away from its laser focus on the goals of the game, whether those goals are self-created or imposed by the designer, then we have an opportunity to catch the player in just the right way with an affecting piece of music, or a view something wonderful, or just a look from another character, and in doing so, we can create one of those powerful moments that we cherish in our favorite games.

Have you ever stopped to watch the sunset in *Minecraft*, or to admire a view in *Uncharted*?

Think about how you are, in that moment, as your responsible, logical goal-oriented mind gives way to the uncensored emotion of your innermost self.



For me, this boundary, where the cool clarity of focused rationality meets the chaos and immediacy of raw emotion, creating in us a lived experience that is uniquely ours in both its intellectual *and* intimate qualities, is the richest and the most exciting aspect of videogames as an expressive medium.

Game designers are often terrified to let gameplay's iron grip on the player's attention drop, for fear of losing that attention forever.

But we can see from what we've looked at today, that there's no need to panic: if the player has come to trust you, they'll stay with you, and we have so many tools that we can use to get the player's attention back again in a meaningful way, that the biggest challenge we face will be deciding which one to choose.



Artists from Shakespeare to David Lynch to Fumito Ueda have understood how to shape emotion by guiding attention while leaving room for personal experience, and in doing so they have impacted our lives in countless ways.

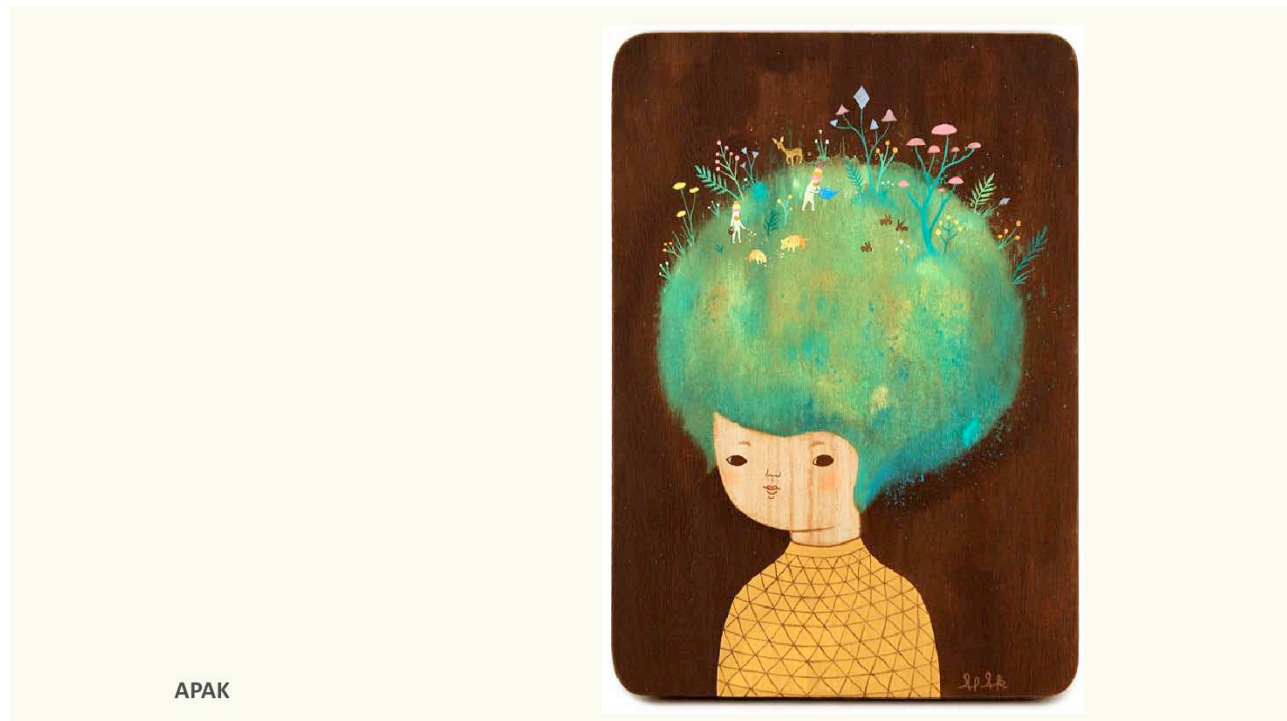
The emotional results that Marc, Robin and Robert describe in MDA are the point of games, no matter how we get there.



There's no one right path with this. We developers are free to play in this domain, and make our own discoveries about what works.

We hope we've shown with the *Uncharted* games, that the techniques of cinema can make a great mix with videogames.

But we mustn't lose sight of literary fiction, of poetry, theater and music as vital forms of self-expression that we're only just beginning to synthesize effectively with the creative opportunities that videogames present.



There's one piece of knowledge that I'm certain we all share.

It's that all these things, new technologies and better development practices, the mechanisms and mysteries of the human mind, and the great powers of curiosity and self-determination that we all have, are, in videogames, making a new kind of cultural form possible; one that is active between mind and society and life.



That's my talk. Thanks very much.



The Art of Game Design: A Deck of Lenses – Jesse Schell

Rules of Play: Game Design Fundamentals – Katie Salen and Eric Zimmerman

The Grasshopper: Games, Life and Utopia – Bernard Suits

The Shapes of Stories (on YouTube) – Kurt Vonnegut

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The Visual Story – Bruce Block Composition – DK Eyewitness Art

Flow: The Psychology of Optimal Experience – Mihaly Csikszentmihalyi

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