

# Unit 4, What Makes us Happy/What Gives Life Meaning?

"The Riddle of Fiction" by Jonathan Gottschall

"Why do humans tell stories at all?"

Image (modified w/paint brush effect): Grandfather Telling a Story by Albert Anker : [https://commons.wikimedia.org/wiki/File:Anker\\_Grossvater\\_erz%C3%A4hlt\\_eine\\_Geschichte\\_1884.jpg](https://commons.wikimedia.org/wiki/File:Anker_Grossvater_erz%C3%A4hlt_eine_Geschichte_1884.jpg)

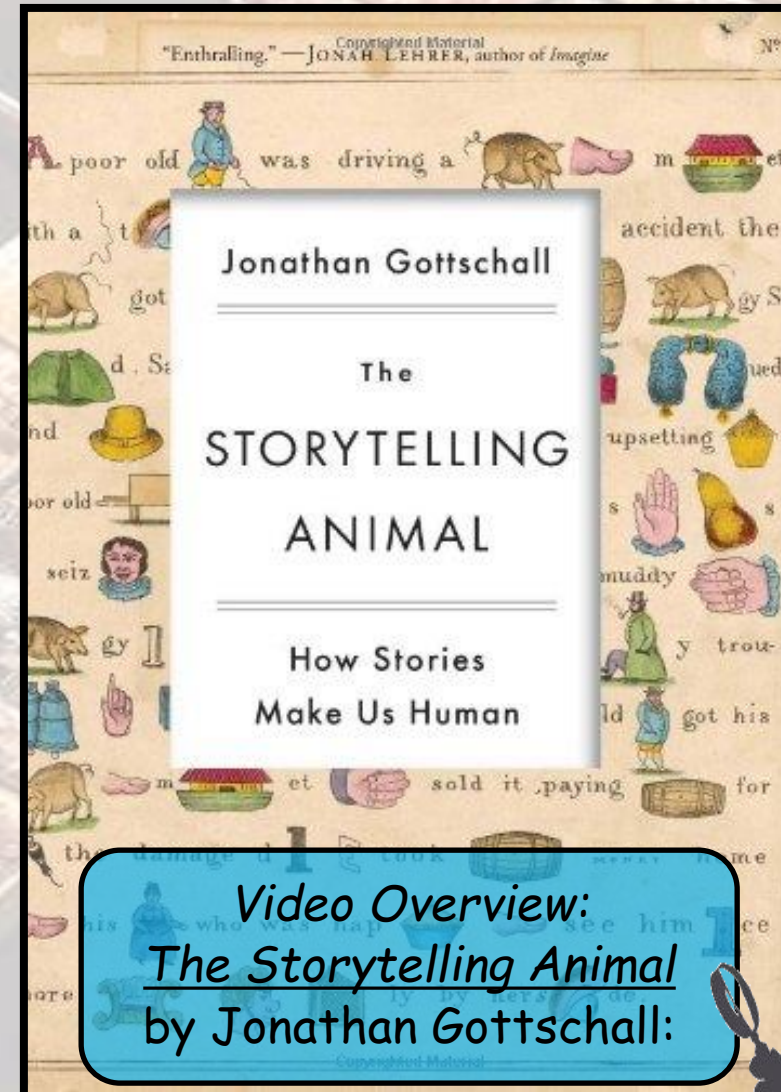


# Fiction

## “Why do Humans tell stories at all?”

### Hardwired for Fiction?

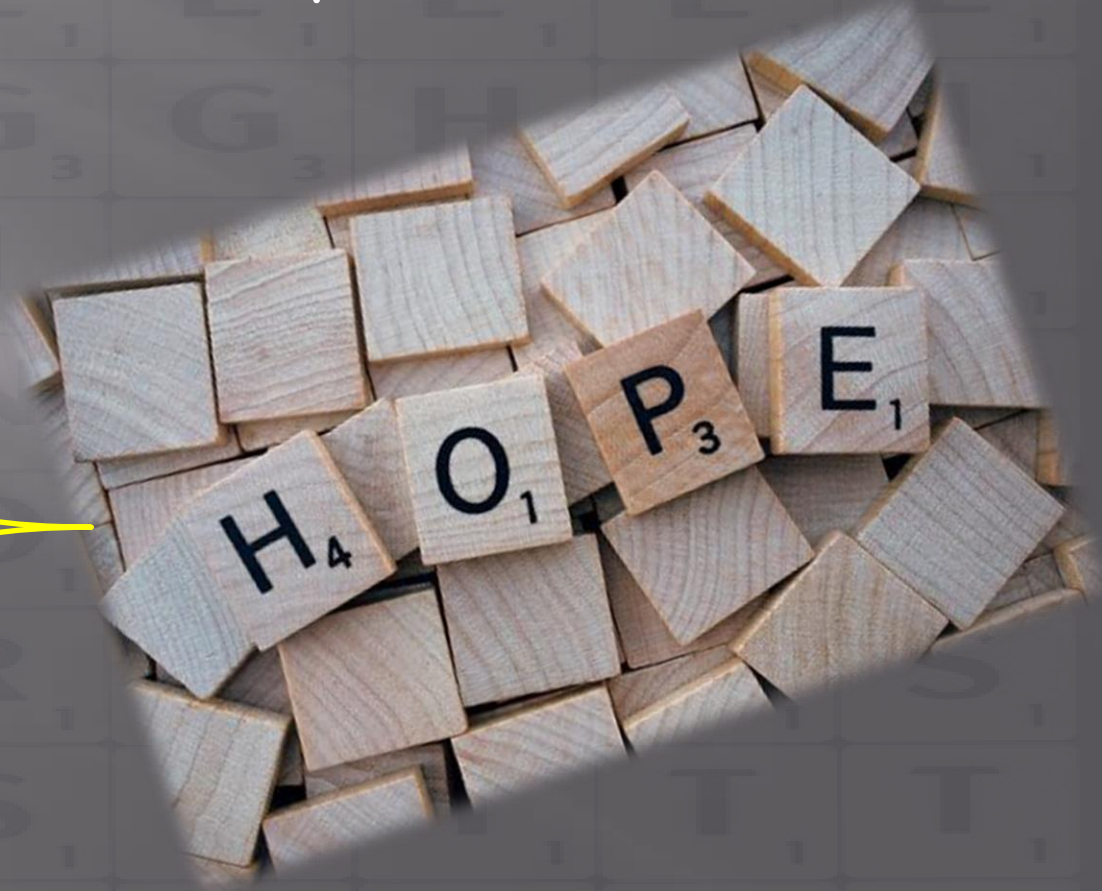
- **Gottschall tries to explain the existence of fiction in a decidedly scientific manner: treating fiction as a function hardwired in our brains. And if this function is part of a physical construct in the human brain, then how did this function arise?**
- **Is it some accidental by-product of evolution?**
- **Is it merely a throwaway, benign mutation that is not (and never was) necessary for survival?**
- **Is it a harmless addiction that we can break?**
- **Or, is it an evolutionary adaptation that was crucial for human survival in the crucible of natural selection? If so, what is the role of fiction today?**



# What Makes us Happy?

Look back to some of the themes we covered in this course and think of how all of these ideas give clues as to our love of fiction, our need for fiction, and even in the darkest of times, the promise of hope, even if it's in a fictional world ...

- ▣ Story = meaning, happiness, identity
- ▣ Patterns (real and not real)
- ▣ The Cave (questioning reality & accepting a new reality)
- ▣ Belief (credulity and doubt)
- ▣ Anxiety (fear and hope)
- ▣ The Brain (rewiring & thinking)
- ▣ Evolution (change & survival)
- ▣ Risk (fear of the future)
- ▣ Biotechnology (our possible futures, good and bad)



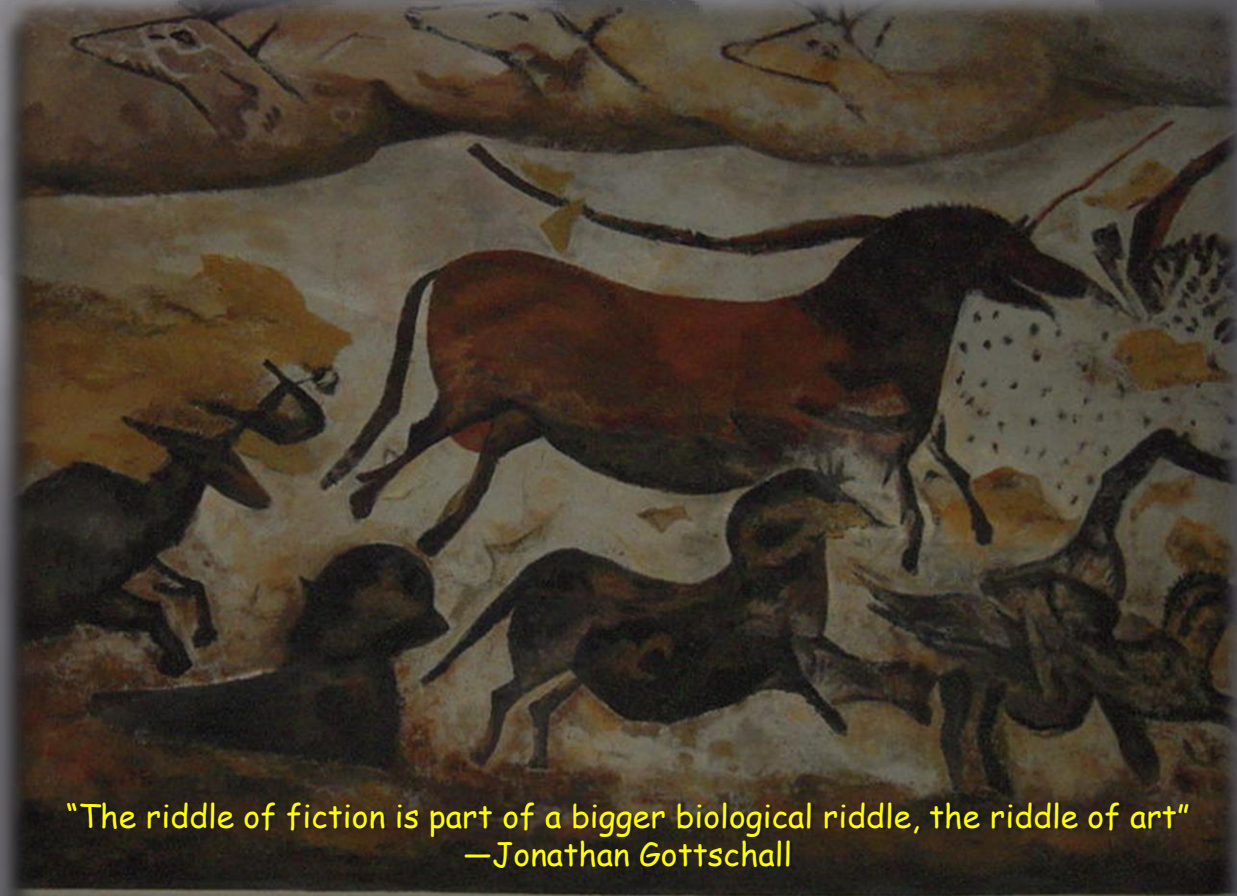
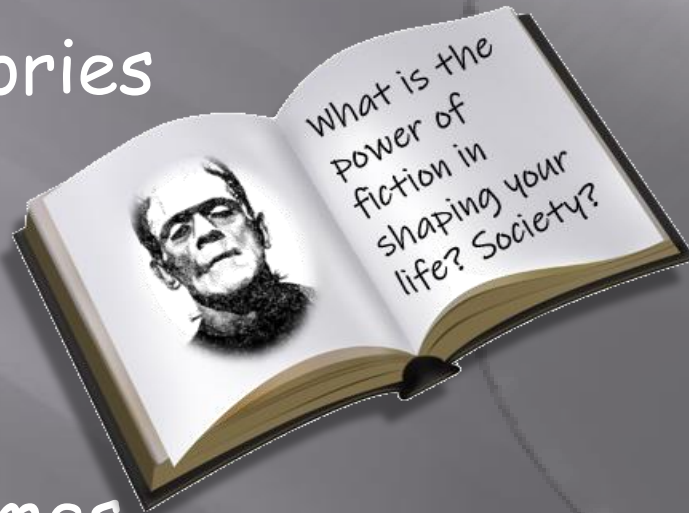
# Some Questions

- Why is storytelling unique to human beings? In other words, why are humans storytelling animals?
- What would your life be like if no form of fiction existed within it? Does this tell you something important about your need for fiction in today's world?
- How does fiction help you learn something new?
- What is the power of fiction in shaping your life or shaping society? Can you think of a book, a movie, or a TV show that changed the way people think? How can fiction create a myth of specialness or a myth of otherness (conspiracies, stereotypes, scapegoating, genocides)?
- In what ways does a story, a movie, or even a video game make you happy?
- Why does fiction (not real) evoke real emotion?
- How can fiction give meaning to the events in our lives?
- **Why is fiction important to you?**

# Why is Fiction Important to You?

Can you imagine your life without any of the following forms of fiction?

- ▣ Movies
- ▣ TV Shows
- ▣ Novels
- ▣ Short stories
- ▣ Opera
- ▣ Plays
- ▣ Poems
- ▣ Songs
- ▣ Video Games
- ▣ Dreams
- ▣ Daydreams & Fantasies



"The riddle of fiction is part of a bigger biological riddle, the riddle of art"  
—Jonathan Gottschall

Think of one of your favourite characters in fiction, and answer the following questions:

Why do you care about this character?

How did you feel when this character suffered or died?

Why did you feel anger at this character's enemies?

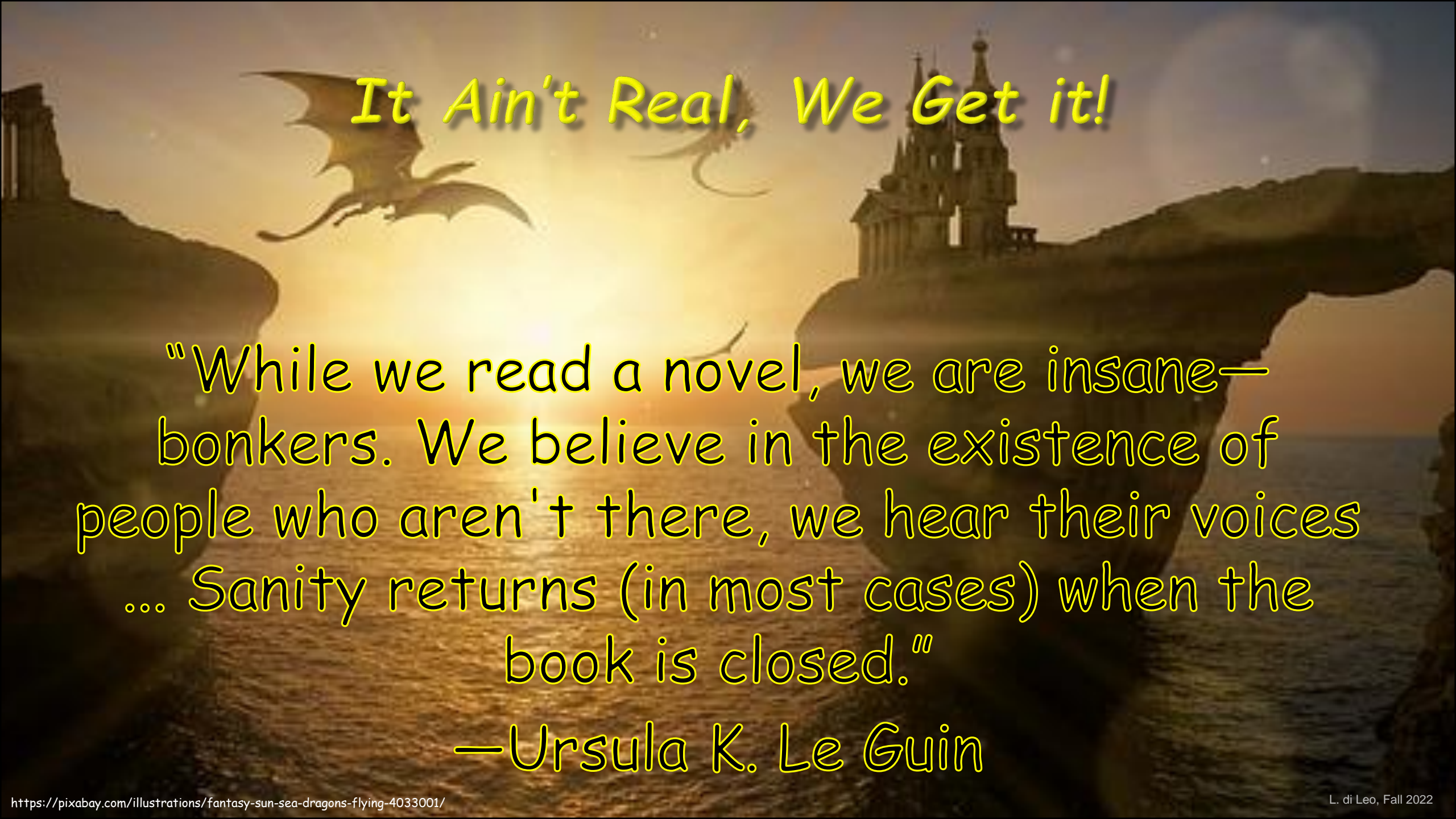
Is the character real?

Again, why do you care?



# *It Ain't Real, We Get it!*

- ▣ When we see a movie or read a book, we '*suspend disbelief.*'
- ▣ We are aware of the differences between reality and the fantasies of film or literature or video games. So what real-world value does fiction have? Why are we responding emotionally to fake people? Why do you care about imaginary worlds and imaginary people? What does it matter to you if a character suffers and lives, or dies tragically? Why should you feel anger at this character's enemies or feel frustration at the obstacles your hero faces?

A fantasy landscape featuring a bright sun over a body of water. In the foreground, a large, dark, rocky cliffside is visible. In the background, a castle with multiple spires and towers sits atop a cliff. Several dragons are flying in the sky, their silhouettes dark against the bright light of the sun. The overall scene is bathed in a warm, golden light.

*It Ain't Real, We Get it!*

"While we read a novel, we are insane—  
bonkers. We believe in the existence of  
people who aren't there, we hear their voices  
... Sanity returns (in most cases) when the  
book is closed."

—Ursula K. Le Guin



# "Hell is Story Friendly"

Jonathan Gottschall

- ▣ Another clue as to our attraction to fiction and story is this: **we like our stories dark and scary** (well, most of us do).
- ▣ When I asked you to think of a favourite character of yours, would this character be just as interesting if her life was perfect: no conflict, no issues, always happy, no stress, no challenges ...? What kind of emotional investment can you make when the character's emotional life is a flat line with no ups or downs? You'd be bored and you wouldn't care.
- ▣ Let me give you two examples from Gottschall's book, two short stories reflecting this idea. One story is of a perfect life, and the other is of a horror no one should ever suffer through.
- ▣ One story is a life you'd like to live in reality, and the other is a life you'd "like" to "experience" **only in fiction**.
- ▣ **See which you find more interesting ...**

# "Hell is Story Friendly"

Jonathan Gottschall, Ch.3, *The Storytelling Animal*

**ONCE UPON A TIME**, a father and daughter were at the grocery store. They were walking down the cereal aisle. The father was pushing a cart. The cart's left front wheel clattered and creaked. The daughter, Lily, was three years old. She was wearing her favorite dress: it was flowery and flowing, and it fanned out wonderfully when she twirled. She held her father's index finger in her left fist. In her right fist, she held the grocery list in a sweaty wad.

The father stopped in front of the Cheerios. He scratched his stubbled chin and asked Lily, "What kind of cereal are we supposed to get again?" Lily released his finger, unwadded the paper, and smoothed it on the curve of her belly. She squinted at the neat feminine script. She ran her index finger over the list of items as if she were reading the words. "Cheerios," Lily announced. The father let Lily choose the big yellow box herself and push it up and over the side of the cart.

Later the father would remember how the people passed them in the aisle. He would remember the way the women smiled at Lily as they cruised by with their carts, and how they nodded approvingly at him as well. He would remember the pimply stock boy passing by with his mop and his sloshing bucket on wheels. He would remember the way Lily's small hand held his finger, and how the throb of her grip lingered after she let go.

# "Hell is Story Friendly"

Jonathan Gottschall, Ch.3, *The Storytelling Animal*

And most of all he would remember the short man with the dark glasses and the red baseball cap tugged low—the way he slouched next to the pyramid display of Pop-Tarts, smiling down at Lily as she passed, showing a wet gleam of incisor.

The father and daughter walked a little farther down the aisle. They stopped. Lily hugged her father's thigh. The father cradled her small head to his leg. He stared at the box of sugary cereal she had thrust into his hand, saying, "Daddy, please!" The father slowly shook his head as he read the ingredients, fascinated. (There was no food in this food, just chemical substances such as trisodium phosphate, Red 40, Blue 1, BHT, and pyridoxine hydrochloride.) The father's eyes moved up to scan the nutritional information, counting grams of sugar and fat.

# "Hell is Story Friendly"

Jonathan Gottschall, Ch.3, The Storytelling Animal

He never felt Lily let go of his leg, never felt her head slip from beneath his sheltering hand. Still staring at the box in his hand the father said aloud, "I'm sorry, baby. This stuff isn't good for us. Mommy will be mad if we buy it."

Lily was silent. The father turned to her, knowing that she would be standing there with her arms crossed tight, her chin tucked to her clavicle, and her lips pushed out in a pout. He turned, but Lily wasn't there. He spun slowly on his heel, and still Lily wasn't there.

***And neither was the short man with the red cap.***

*OR*

# "Hell is Story Friendly"

Jonathan Gottschall, Ch.3, *The Storytelling Animal*

**ONCE UPON A TIME**, a father and a daughter went to the supermarket. Toward the end of the cereal aisle, Lily saw the red box with the cartoon bunny. She thrust the box of Trix into her father's hand and hugged his leg as a bribe. The father didn't bother to read the ingredients. He said, "Sorry, honey. This stuff is bad for you. Mommy'll be mad if we buy it."

Lily released her father's leg and whipped her head from beneath his sheltering palm. She stomped her feet, locked out her knees, and tucked her hands defiantly in her armpits. Lily scowled up at her father. He tried to give a stern look in reply, but he was weak, and her charms defeated him. He tossed the Trix into the cart and cracked a conspiratorial smile. "We're not afraid of that ol' mommy, are we?"

"Yeah," Lily said. "We're not 'fraid!"

The father and daughter purchased all the items on their list. They drove home in their minivan. The mother only pretended to be angry about the Trix. The little family lived happily ever after.

# Aristotle's Paradox

(Poetics)

Fiction gives us  
pleasure, yet most  
of the events in  
(interesting) fiction  
are unpleasant




We like  
our  
stories  
dark

"Say what you will about it, Hell is story friendly. If you want a compelling story, put your protagonist among the damned. The mechanisms of hell are nicely attuned to the mechanisms of narrative. Not so the pleasures of Paradise. Paradise is not a story. It's about what happens when the stories are over."

—Charles Baxter, *Burning Down the House: Essays on Fiction*

(even little kids use a dark imagination)

The famous horror writer Stephen King gets this idea:



**“ ... kill your darlings, kill your darlings, even when it breaks your egocentric little scribbler’s heart, kill your darlings.”**

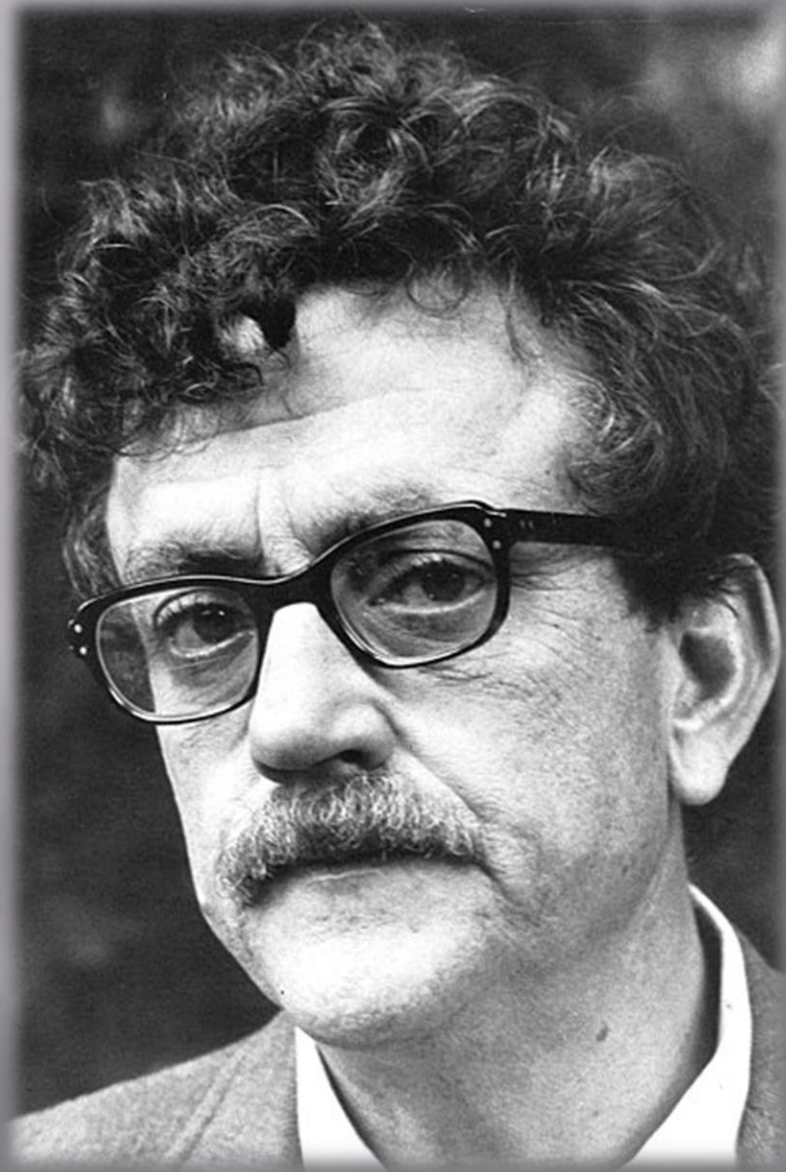
 **OCTAVIA**  
King, Stephen. *On Writing: A Memoir of the Craft* (p. 222). Scribner. Kindle Edition.  
**BOOKS**



# Penny for your Thoughts?

- ▣ Watch this opening scene up to 3:38 only from the movie IT (this has nothing to do with Information Technology, by the way, unless computers terrify you):  
<https://www.youtube.com/watch?v=DJWJ6RP55nU>
- ▣ You should be asking one question at 3:38:

## What Happens Next?



(1922-2007)

... And so it goes ...

# Kurt Vonnegut's Simple Shapes of Stories

There's a simple pattern that an interesting story follows according to one of the most famous writers of the 20<sup>th</sup> century.

This is what makes a story interesting:

<http://www.youtube.com/watch?v=oP3c1h8v2ZQ>

# Simple Shapes of Stories

<https://tenderhuman.com/shapes-of-stories-infographic>

Designed by Maya Eilam

## Man in Hole



The main character gets into trouble then gets out of it again and ends up better off for the experience.

- Arctic and Old Lace
- Harold & Kumar Go To White Castle

## Boy Meets Girl



The main character comes across something wonderful, gets it, loses it, then gets it back forever.

- Jane Eyre
- Eternal Sunshine of the Spotless Mind

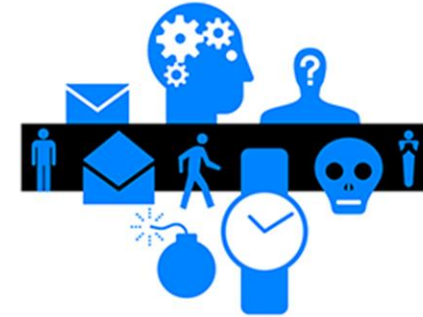
## From Bad to Worse



The main character starts off poorly then gets continually worse with no hope for improvement.

- The Metamorphosis
- The Twilight Zone

## Which Way Is Up?



The story has a lifelike ambiguity that keeps us from knowing if new developments are good or bad.

- Hamlet
- The Sopranos

## Creation Story



In many cultures' creation stories, humankind receives incremental gifts from a deity. First major staples like the earth and sky, then smaller things like sparrows and cell phones. Not a common shape for Western stories, however.

## Old Testament



Humankind receives incremental gifts from a deity, but is suddenly ousted from good standing in a fall of enormous proportions.

- Great Expectations

## New Testament



Humankind receives incremental gifts from a deity, is suddenly ousted from good standing, but then receives off-the-charts bliss.

- Great Expectations with Dickens' alternate ending

## Cinderella



It was the similarity between the shapes of Cinderella and the New Testament that thrilled Vonnegut for the first time in 1947 and then over the course of his life as he continued to write essays and give lectures on the shapes of stories.

Story  
=  
Character  
+  
Predicament  
+  
Attempted Extrication

—Jonathan Gottschall

# Predicaments as a Catalyst

You can think of some examples of stories you've enjoyed in your own life, but here are some examples of stories with challenges, danger, loss and victory, death and hope ...

# Predicaments as a Catalyst

*If these stories had no conflict, would they be stories we'd heed?*

- The Walking Dead
- The Lord of the Rings
- Star Wars: The Rise of Skywalker
- Game of Thrones (last two seasons flatlined, so no heeding here)
- The Hunger Games
- Saw
- Sin City
- Lord of the Flies
- The Avengers End Game
- Cats (just kidding)



# Predicaments as a Catalyst

*And this isn't something new ...*

- ▣ [The Epic of Gilgamesh](#)

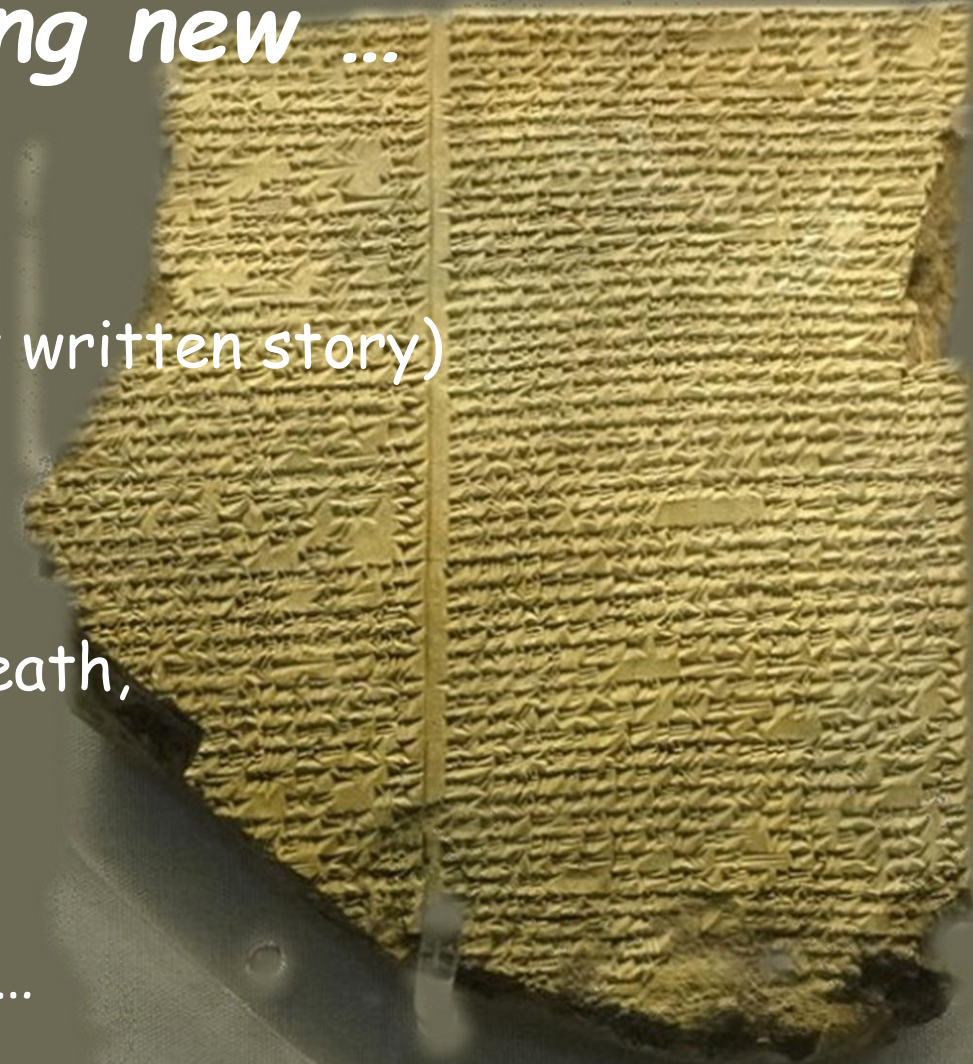
(2100 BCE, Mesopotamia; oldest written story)

- ▣ Same old, same old:

Sex, violence, quests, fear of death,

floods of biblical proportions,

lack of decent internet service ...



# Predicaments as a Catalyst

... And, in some instances,  
*the power to change society* ...



# "Hell is Literally Story Friendly"



## Dante's Inferno (1320)

[https://commons.wikimedia.org/wiki/File:Gustave\\_Dore\\_-\\_Dantes\\_Inferno\\_-\\_ArchHeretics.jpg](https://commons.wikimedia.org/wiki/File:Gustave_Dore_-_Dantes_Inferno_-_ArchHeretics.jpg)

An epic poem of a man's journey through hell.

**The Power of Story:** This story shaped the language of Italy

Lo duca e io per quel cammino ascoso  
intrammo a ritornar nel chiaro mondo;  
e senza cura aver d'alcun riposo,  
salimmo su', el primo e io secondo,  
tanto ch'i' vidi de le cose belle  
che porta 'l ciel, per un pertugio tondo.  
E quindi uscimmo a riveder le stelle.

My guide and I, through that hidden path,  
Entered to return to a world bright and sound.  
And without care, and without any rest  
We ascended, he first, and I next,  
Such that we saw objects of beauty, then,  
Up in the Heavens, through an opening, round,  
And so, we beheld the stars again.

## The Power of Story



## Milton's Paradise Lost (1667)

Humanity's Fall from grace and  
Satan's rebellion against God  
**The Power of Story:** This story  
inspired generations of writers &  
artists

"The mind is its own place, and in itself can make a  
heaven of hell, a hell of heaven.."

[https://commons.wikimedia.org/wiki/File:Paradise\\_Lost\\_1.jpg](https://commons.wikimedia.org/wiki/File:Paradise_Lost_1.jpg)

L. di Leo, Fall 2022

# The Power of Story



Uncle Tom's Cabin:  
A revelation of the horrors of slavery that changed people's thinking toward making abolition a reality (despite some patronizing overtones)

The Birth of a Nation: This 1915 film led to a resurgence of the KKK, portrayed as heroes.

## UNCLE TOM'S CABIN.

HARRIET BEECHER STOWE.

WITH  
Twenty-seven Illustrations in Wood

BY  
GEORGE CRUIKSHANK, ESQ.

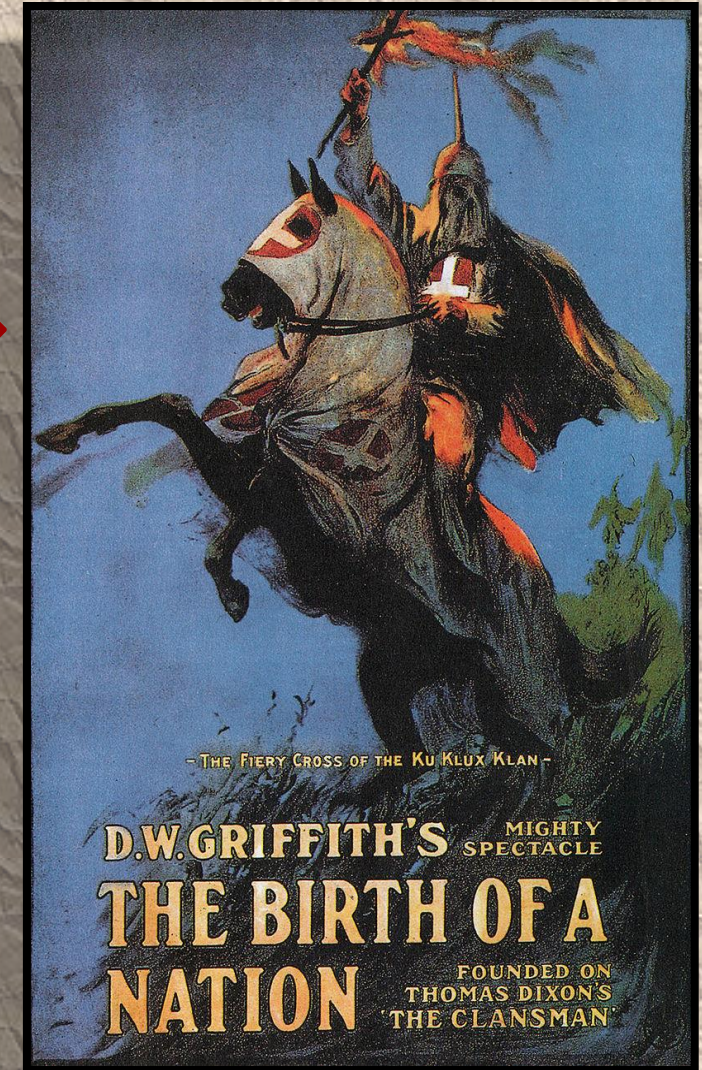


WILLIAMS AND BROTHERS

LONDON:  
JOHN CASSELL, LUDGATE HILL.

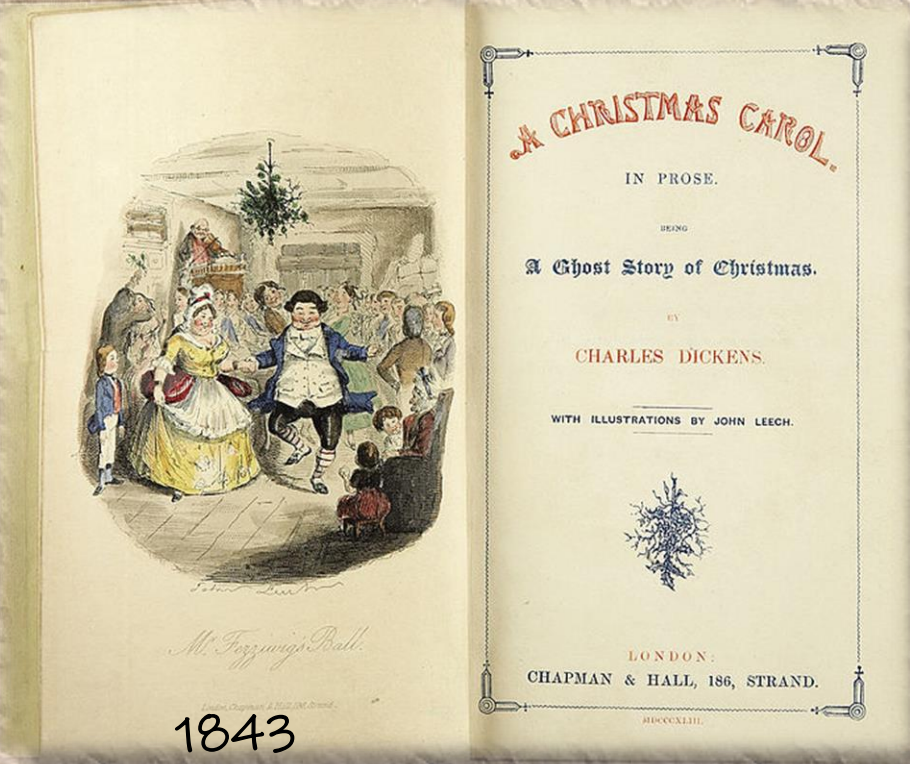
1852

1852



1915

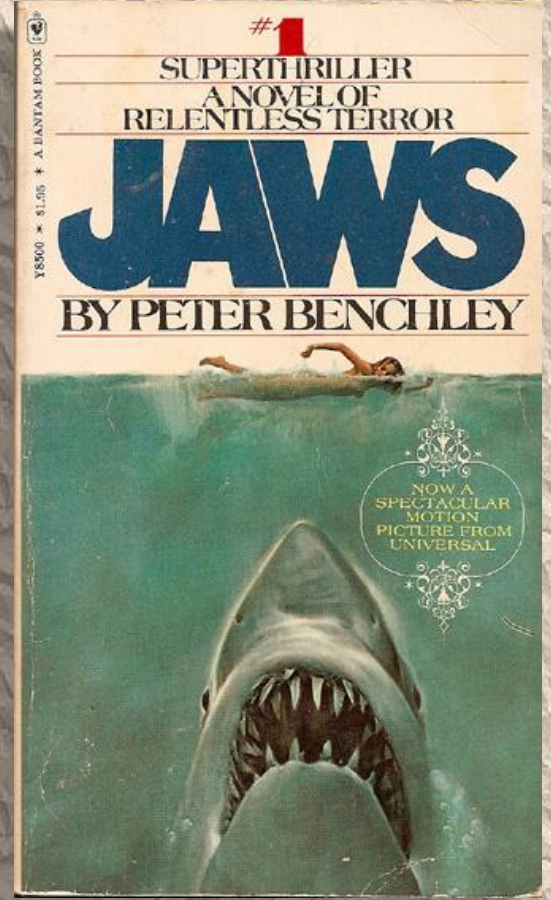
# The Power of Story



1843

A Christmas Carol:  
Changed the way we  
celebrate Christmas


Jaws (1975):  
The movie version scared  
people away from beaches,  
hurt coastal tourism, and  
led to a decimation of the  
shark population



"You're gonna need a bigger boat!"

Optional:

- Film and Society: How Films Impact Society and Popular Culture
- 9 novels that changed the world
- How Stories Have Shaped the World



<https://glycat.com/metallicmetalliccheetah-transparent-gif-shark>  
[https://commons.wikimedia.org/wiki/File:Charles\\_Dickens-A\\_Christmas\\_Carol-Title\\_page-First\\_edition\\_1843.jpg](https://commons.wikimedia.org/wiki/File:Charles_Dickens-A_Christmas_Carol-Title_page-First_edition_1843.jpg)  
<https://commons.wikimedia.org/wiki/File:Jaws-paperback.jpg>; [https://commons.wikimedia.org/wiki/File:Guy\\_fawkes.png](https://commons.wikimedia.org/wiki/File:Guy_fawkes.png)

# The Power of Story

## The Use and Abuse of Stories and Myth

### Myths that Bind a Society

There are many *myths that bind societies*, often glorifying where we came from, often making story into history. From the foundation of Rome, built on the story of Romulus and Remus being raised by a wolf, to stories we tell of our own great destiny or countries telling their own people why they are unique and special and different from "those others." Exceptionalism is only about *us*, not *them*.

From the stories about Columbus, to the founding of a country, to the depiction of a conquered people, and to the rewriting of horrific events, these stories "represent determined forgetting—an erasure of what is shameful from our national memory banks so that history can function as a unifying, patriotic myth." [Gottschall, Jonathan (2012-04-10). *The Storytelling Animal: How Stories Make Us Human* (Kindle Locations 1475-1476). Houghton Mifflin Harcourt. Kindle Edition.]



Romulus, Remus and "Mom"

# The Power of Story

## The Use and Abuse of Stories and Myth

### Myths that Blind a Society

And, unfortunately, there are *myths that blind societies*.

As bad as the stories we just mentioned can be, these other stories can metastasize into something pathological.

We know too well of stories that have portrayed a minority population within a country as less than human and a target blamed for all woes within a society, stories blindly accepted by the human mind.

You don't have to look further than Rwanda or the Holocaust to see the power of a story in guiding a population down a dark road of history.



# The Power of Story

## The Use and Abuse of Stories and Myth Conspiracy Stories

Even these stories have a simple morality, where good, law-abiding victims (us) suffer because of malevolent, powerful entities (them).

An alternate explanation of the apparent chaos & evil in the world ...

... and sometimes a rationalization for scapegoating ...

"The storytelling mind is allergic to uncertainty, randomness, and coincidence. It is addicted to meaning. If the storytelling mind cannot find meaningful patterns in the world, it will try to impose them. In short, the storytelling mind is a factory that churns out true stories when it can, but will manufacture lies when it can't."

Gottschall, Jonathan (2012-04-10). *The Storytelling Animal: How Stories Make Us Human* (Kindle Locations 1245-1247). Houghton Mifflin Harcourt. Kindle Edition.

# So why do we tell stories?

Some hypotheses:

- ▣ Sexual selection (evolution; see reading)
- ▣ **Cognitive play/mental exercise; reality simulator; dreams as survival practice.**
- ▣ Transfer of information/knowledge (survival tool?)
- ▣ Social glue
- ▣ Myth-making: a connection to each other and a connection to the universe and the gods
- ▣ Exploration of possible futures/alternate realities?  
Predictions and cautionary tales
- ▣ Catharsis (just another drug; stress-release; see reading)
- ▣ Fun; Vicarious experience (see reading)
- ▣ Accidental by-product of evolution
- ▣ Perhaps vestigial mechanism that once had greater use?

## Dreams as Stories

The mind is like an ancient Virtual Reality simulator, where dreams are stories where we practise survival skills, imagining potential dangers in our lives.

Of the thousands of dreams we have in a year, the vast majority are not dreams of pleasure but stories involving threats and violence ...

Fighting, Fleeing, and Freezing ...

Inception

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## Sugar-coating Knowledge with Stories

Telling tales of the past or describing the workings of science may be dull to most, but wrap them up in a fictional scenario and then information becomes memorable, a passing of stories and experiences from one generation to the next ... a way to learn of language, morality, history, social behaviour, our connection to god(s), and of great import, a perspective of our place in the universe.



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"Fiction has two uses. First, it's a gateway drug to reading. The drive to know what happens next, to want to turn the page, the need to keep going, even if it's hard, because someone's in trouble and you have to know how it's all going to end ... that's a very real drive. And it forces you to learn new words, to think new thoughts, to keep going. To discover that reading per se is pleasurable.

[...]

The second thing fiction does is to build **EMPATHY**. When you watch TV or see a film, you are looking at things happening to other people. Prose fiction is something you build up from 26 letters and a handful of punctuation marks, and you, and you alone, using your imagination, create a world and people it and look out through other eyes."

—Neil Gaiman

Gaiman, N. (2013, October 24). Face facts: We need fiction. The Guardian. Retrieved from <https://www.theguardian.com/books/2013/oct/24/neil-gaiman-face-facts-need-fiction>

# So why do we tell stories?

Asking, "What could possibly go wrong?" before it happens in reality. A way to prepare for challenges by imagining an alternate world where "it's too late":

Some hypotheses:

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The Matrix  
The Terminator  
Jurassic Park

Gattaca  
1984

The Man in the High Castle

Animal Farm  
The Handmaid's Tale

Dune  
Interstellar  
Fail Safe

Dr. Strangelove  
Westworld

Blade Runner  
Hot Tub Time Machine

Elysium  
Contagion  
Soylent Green  
Idiocracy

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Asking, "What could possibly go wrong?" before it happens in reality. A way to prepare for challenges by imagining an alternate world where "it's too late":

"Walter White is a bigger monster than anyone in Westeros."  
—George R.R. Martin

## Breaking Bad

*Ozymandias*, by Percy Bysshe Shelley

I met a traveller from an antique land  
Who said: Two vast and trunkless legs of stone  
Stand in the desert. Near them on the sand,  
Half sunk, a shatter'd visage lies, whose frown  
And wrinkled lip and sneer of cold command  
Tell that its sculptor well those passions read  
Which yet survive, stamp'd on these lifeless things,  
The hand that mock'd them and the heart that fed.

And on the pedestal these words appear:  
"My name is Ozymandias, king of kings:  
Look on my works, ye Mighty, and despair!"

Nothing beside remains: round the decay  
Of that colossal wreck, boundless and bare,  
The lone and level sands stretch far away.

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- ▣ **Exploration of possible futures/alternate realities?**  
**Predictions and Cautionary Tales**

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Asking, "What could possibly go wrong?" before it happens in reality. A way to prepare for challenges by imagining an alternate world where "it's too late":

## The Road

*"He walked out in the gray light and stood and he saw for a brief moment the absolute truth of the world. The cold relentless circling of the intestate earth. Darkness implacable. The blind dogs of the sun in their running. The crushing black vacuum of the universe.*

*And somewhere two hunted animals trembling like ground-foxes in their cover.*

*Borrowed time and borrowed world and borrowed eyes with which to sorrow it."*

— Cormac McCarthy, *The Road*

# The Science of Fiction

## Evolution and Fiction?

Recall Unit 2: Natural Selection

The process of Natural Selection is based on the following central observations:

1. **Variation:** Every population or species has **genetic diversity** among its members (from mutations).
  2. **Struggle for Survival:** Many more individuals are born than can possibly survive. Population growth versus limited resources means that there will be competition (Malthus).
- If individuals survive long enough, then they increase their chances of reproducing and passing on their special "survivability" traits to their offspring (fitness). Sexual Selection plays a role, as well.
  - Individuals without an advantage will have a smaller probability of living and reproducing, meaning that those traits in a population **may** disappear with time.

- Is story-telling a genuine adaptation?
- Was it an advantageous trait that gave our ancestors an edge?
- In evolution (and with natural selection) a physical advantage among a species increases the chances of survival in a hostile environment, but what of fiction? Was it an intellectual trait that gave us an edge in planning, social cohesion, etc.?
- Does it have a strong correlation to lying? Could this have been of importance?
- Is fiction a left-over (benign) mutation that no longer serves a role, like an appendix?

# The Science of Fiction

## Neuroscience of Fiction?

- ▣ **Reading is not passive**—something real is happening!
- ▣ When listening to a story, different areas of the brain get activated: language processing, sensory & motor cortex, emotion region—same areas used when we really experience something
- ▣ Princeton study (Uri Hasson): fMRI scans, which can see blood flow and brain activity, studied a storyteller and listener: activity synchronizes.
- ▣ Seems like a transfer of experiences ...

Stephens GJ, Silbert LJ, Hasson U. Speaker-listener neural coupling underlies successful communication. Proc Natl Acad Sci U S A. 2010 Aug 10;107(32):14425-30.

“Communication is a shared activity resulting in a transfer of information across brains. The findings shown here indicate that during successful communication, speakers' and listeners' brains exhibit joint, temporally coupled, response patterns (Figs. 2 and 3). Such neural coupling substantially diminishes in the absence of communication, such as when listening to an unintelligible foreign language. Moreover, more extensive speaker-listener neural couplings result in more successful communication (Fig. 4). We further show that on average **the listener's brain activity mirrors the speaker's brain activity** with temporal delays (Fig. 3 A and B). Such delays are in agreement with the flow of information across communicators and imply a causal relationship by which the speaker's production-based processes induce and shape the neural responses in the listener's brain.”

# The Science of Fiction

## Psychology of Fiction?



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### The Neural Bases of Social Cognition and Story Comprehension

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#### Key Words

neuroimaging, theory-of-mind, reading, narrative, fMRI, PET

#### Abstract

A great deal of research exists on the neural basis of theory-of-mind (ToM) or mentalizing. Qualitative reviews on this topic have identified a mentalizing network composed of the medial prefrontal cortex, posterior cingulate/precuneus, and bilateral temporal parietal junction. These conclusions, however, are not based on a quantitative and systematic approach. The current review presents a quantitative meta-analysis of neuroimaging studies pertaining to ToM, using the activation-likelihood estimation (ALE) approach. Separate ALE meta-analyses are presented for story-based and nonstory-based studies of ToM. The conjunction of these two meta-analyses reveals a core mentalizing network that includes areas not typically noted by previous reviews. A third ALE meta-analysis was conducted with respect to story comprehension in order to examine the relation between ToM and stories. Story processing overlapped with many regions of the core mentalizing network, and these shared regions bear some resemblance to a network implicated by a number of other processes.

Theory of Mind: Raymond Mar (York University): analyzed 86 fMRI studies from the Annual Review of Psychology:

“... substantial overlap in the brain networks used to understand stories and the networks used to navigate interactions with other individuals ...”

This is an interesting connection between story and (behaviour in) society.

# The Science of Fiction

## Rewiring the Brain?

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### Short- and Long-Term Effects of a Novel on Connectivity in the Brain

Gregory S. Berns,<sup>1</sup> Kristina Blaine,<sup>1</sup> Michael J. Prietula,<sup>2</sup> and Brandon E. Pye<sup>1</sup>

#### Abstract

We sought to determine whether reading a novel causes measurable changes in resting-state connectivity of the brain and how long these changes persist. Incorporating a within-subjects design, participants received resting-state functional magnetic resonance imaging scans on 19 consecutive days. First, baseline resting state data for a “wash-in” period were taken for each participant for 5 days. For the next 9 days, participants read 1/9th of a novel during the evening and resting-state data were taken the next morning. Finally, resting-state data for a “wash-out” period were taken for 5 days after the conclusion of the novel. On the days after the reading, significant increases in connectivity were centered on hubs in the left angular/supramarginal gyri and right posterior temporal gyri. These hubs corresponded to regions previously associated with perspective taking and story comprehension, and the changes exhibited a timecourse that decayed rapidly after the completion of the novel. Long-term changes in connectivity, which persisted for several days after the reading, were observed in bilateral somatosensory cortex, suggesting a potential mechanism for “embodied semantics.”

**Key words:** connectivity; fMRI; reading; resting state

“The neural changes that we found associated with physical sensation and movement systems suggest that reading a novel can transport you into the body of the protagonist ... **We already knew that good stories can put you in someone else’s shoes in a figurative sense. Now we’re seeing that something may also be happening biologically.**”

**Studies in neuroplasticity suggest that the brain can be rewired by reading (or not reading).**

There are a couple of interesting readings in Unit 1 about the plasticity of the brain: “Does the Internet Make You Dumber?” and “Phantom Limbs and Plastic Brains.”



# The End? Not Yet!

The evidence suggests that storytelling is not a vestigial artifact from our past, but a vital component of the human mind, a skill that is still necessary for enduring a chaotic, dangerous world. As Jonathan Gottschall says, "... we're trying to impose the order of story structure on the chaos of existence."

Storytelling is both an art born of human imagination and creativity and a tool that defines us—and moulds us—as a species: an evolutionary trait that favours us with a fighting chance against infinitesimal odds of survival, a momentary respite against the vagaries of the universe.

And in times of darkness and loss, fiction can provide hope and give guidance on a path out of the night and away from the shadows, to make possible worlds actual, to make use of a boundless imagination teeming with ideas and heroes and frailty and morality, driven by the human will, the agency, to see the world in a different light ...

... and to imagine real answers to impossible problems.



Hope  
George Frederic Watts