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How Stories Change the Brain

Paul Zak's research is uncovering how stories shape our brains, tie strangers together, and move us to be more empathic and generous.

BY PAUL J. ZAK | **DECEMBER 17, 2013**

Ben's dying.

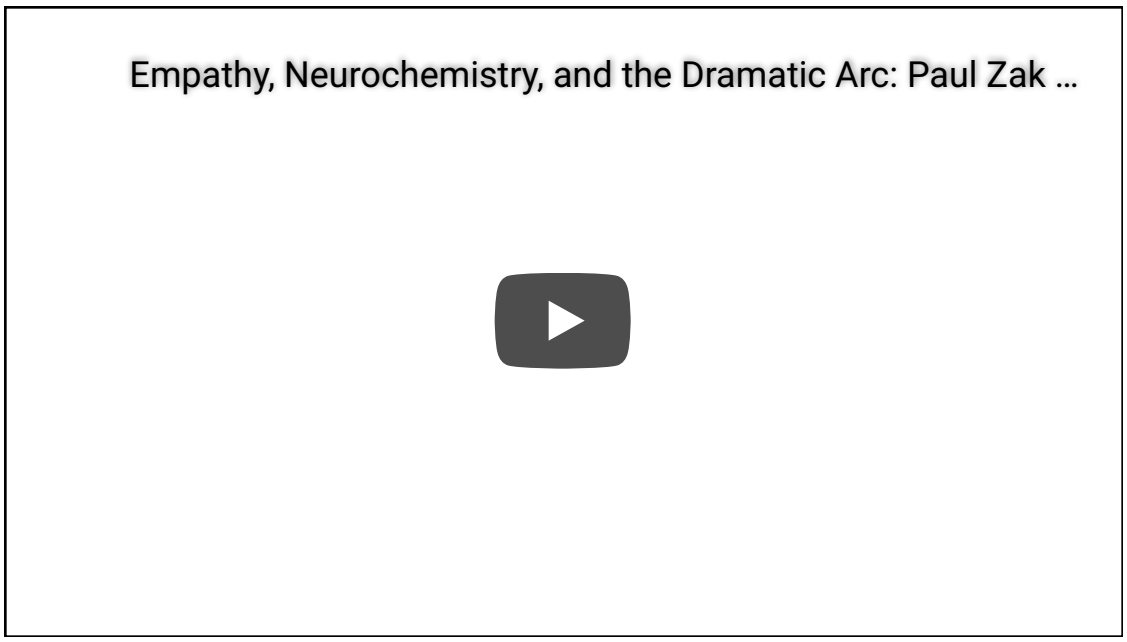
That's what Ben's father says to the camera as we see Ben play in the background. Ben is two years old and doesn't know that a brain tumor will take his life in a matter of months.

Ben's father tells us how difficult it is to be joyful around Ben because the father knows what is coming. But in the end he resolves to find the strength to be genuinely happy for Ben's sake, right up to Ben's last breath.

Everyone can relate to this story. An innocent treated unfairly, and a protector who seeks to right the wrong—but can only do so by finding the courage to change himself and become a better person.

A recent analysis identifies this "hero's journey" story as the foundation for more than half of the movies that come out of Hollywood, and countless books of fiction and nonfiction. And, if you take a look, this structure is in the majority of the most-watched TED talks.

Why are we so attracted to stories? My lab has spent the last several years seeking to understand why stories can move us to tears, change our attitudes, opinions and behaviors, and even inspire us—and how stories change our brains, often for the better. Here's what we've learned.



Why the brain loves stories

The first part of the answer is that as social creatures who regularly affiliate with strangers, stories are an effective way to transmit important information and values from one individual or community to the next. Stories that are personal and emotionally compelling engage more of the brain, and thus are better remembered, than simply stating a set of facts.

Think of this as the "car accident effect." You don't really want to see injured people, but you just have to sneak a peek as you drive by. Brain mechanisms engage saying there might be something valuable for you to learn, since car accidents are rarely seen by most of us but involve an activity we do daily. That is why you feel compelled to rubberneck.

To understand how this works in the brain, we have intensively studied brain response that watching "Ben's story" produces. We have used this to build a predictive model that explains why after watching the video about half of viewers donate to a childhood cancer charity. We want to know why some people

respond to a story while others do not, and how to create highly engaging stories.

We discovered that there are two key aspects to an effective story. First, it must capture and hold our attention. The second thing an effective story does is "transport" us into the characters' world.

What makes a story effective?

Why do our palms sweat as we watch James Bond fight for his life? Paul Zak is helping find the answer.

Any Hollywood writer will tell you that attention is a scarce resource. Movies, TV shows, and books always include "hooks" that make you turn the page, stay on the channel through the commercial, or keep you in a theater seat.

Scientists liken attention to a spotlight. We are only able to shine it on a narrow area. If that area seems less interesting than some other area, our attention wanders.

In fact, using one's attentional spotlight is metabolically costly so we use it sparingly. This is why you can drive on the freeway and talk on the phone or listen to music at the same time. Your attentional spotlight is dim so you can absorb multiple informational streams. You can do this until the car in front of you jams on its brakes and your attentional spotlight illuminates fully to help you avoid an accident.

From a story-telling perspective, the way to keep an audience's attention is to continually increase the tension in the story. Ben's story does this. How will Ben's father be able to enjoy his son's last weeks of life? What internal resources will he draw upon to be strong and support his dying son?

We attend to this story because we intuitively understand that we, too, may have to face difficult tasks and we need to learn how to develop our own deep resolve. In the brain, maintaining attention produces signs of arousal: the heart and breathing speed up, stress hormones are released, and our focus is high.

Once a story has sustained our attention long enough, we may begin to emotionally resonate with story's characters. Narratologists call this "transportation," and you experience this when your palms sweat as James Bond trades blows with a villain on top of a speeding train.

Transportation is an amazing neural feat. We watch a flickering image that we know is fictional, but evolutionarily old parts of our brain simulate the emotions we intuit James Bond must be feeling. And we begin to feel those emotions, too.

Stories bring brains together

Emotional simulation is the foundation for empathy and is particularly powerful for social creatures like humans because it allows us to rapidly forecast if people around us are angry or kind, dangerous or safe, friend or foe.

Such a neural mechanism keeps us safe but also allows us to rapidly form relationships with a wider set of members of our species than any other animal does. The ability to quickly form relationships allows humans to engage in the kinds of large-scale cooperation that builds massive bridges and sends humans into space. By knowing someone's story—where they came from, what they do, and who you might know in common—relationships with strangers are formed.

We have identified oxytocin as the neurochemical responsible for empathy and narrative transportation. My lab pioneered the behavioral study of oxytocin and has proven that when the brain synthesizes oxytocin, people are more trustworthy, generous, charitable, and compassionate. I have dubbed oxytocin the "moral molecule," and others call it the love hormone. What we know is that oxytocin makes us more sensitive to social cues around us. In many situations, social cues motivate us to engage to help others, particularly if the other person seems to need our help.

When people watch Ben's story in the lab—and they both maintain attention to the story and release oxytocin—nearly all of these individuals donate a portion of their earnings from the experiment. They do this even though they don't have to.

This is surprising since this payment is to compensate them for an hour of their time and two needle sticks in their arms to obtain blood from which we measure chemical changes that come from their brains.

How we learn through stories

But it turns out that not all stories keep our attention and not all stories transport us into the characters' worlds.

We ran another experiment that featured Ben and his father at the zoo to find out why. I should mention that Ben was really a boy with cancer who has now died, and the featured father is really his father. In the zoo video, there is no mention of cancer or death, but Ben is bald and his father calls him "miracle boy." This story had a flat structure, rather than one with rising tension like the previous story. Ben and his father look at a giraffe, Ben skips ahead to look at the rhino, Ben's father catches up. We don't know why we are watching Ben and his father, and we are unsure what we are supposed to learn.

People who watched this story began tuning out mid-way through. That is, their scarce attention shifted from the story to scanning the room or thinking about what to buy at the grocery store after the experiment concluded. Measures of physiologic arousal waned and the empathy-transportation response did not occur. These participants also did not offer much in the way of donations to charity.

This evidence supports the view of some narrative theorists that there is a universal story structure. These scholars claim every engaging story has this structure, called the dramatic arc. It starts with something new and surprising, and increases tension with difficulties that the characters must overcome, often because of some failure or crisis in their past, and then leads to a climax where the characters must look deep inside themselves to overcome the looming crisis, and once this transformation occurs, the story resolves itself.

This is another reason why we look at car accidents. Maybe the person who survived did something that saved his or her life. Or maybe the driver made a mistake that ended in injury or death. We need to know this information.

How stories connect us with strangers

We also tested why stories can motivate us, like the characters in them, to look inside ourselves and make changes to become better people.

Those who donated after watching Ben's story had more empathic concern of other people and were happier than those who did not donate money. This shows there is a virtuous cycle in which we first engage with others emotionally that leads to helping behaviors, that make us happier. Many philosophical and religious traditions advocate caring for strangers, and our research reveals why these traditions continue to influence us today—they resonate with our evolved brain systems that make social interactions rewarding.

The form in which a narrative is told also seems to matter. The narrative theorist Marshall McLuhan famously wrote in the 1960s that "the medium is the message," and we've found this is true neurologically. The video showing Ben with his father talking on camera is better at both sustaining attention and causing empathic transportation than when people simply read what Ben's father has to say themselves. This is good news for Hollywood filmmakers and tells us why we cry at sad movies but cry less often when reading a novel.

Does any of this matter to you?

We've recently used the knowledge we've developed to test stories that seek to motivate positive behavioral changes. In a recent experiment, participants watched 16 public-service ads from the United Kingdom that were produced by various charities to convince people not to drink and drive, text and drive, or use drugs. We used donations to the featured charities to measure the impact of the ads.

In one version of this experiment, if we gave participants synthetic oxytocin (in the nose, that will reach the brain in an hour), they donated to 57 percent more of the featured charities and donated 56 percent more money than participants given a placebo. Those who received oxytocin also reported more emotional transportation into the world depicted in the ad. Most importantly, these people said they were less likely to engage in the dangerous behaviors shown in the ads.

So, go see a movie and laugh and cry. It's good for your brain, and just might motivate you to make positive changes in your life and in others' lives as well.

About the Author

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