

THE SCIENCE OF 'INSIDE OUT'

FIVE years ago, the writer and director Pete Docter of Pixar reached out to us to talk over an idea for a film, one that would portray how emotions work inside a person's head and at the same time shape a person's outer life with other people. He wanted to do this all in the mind of an 11-year-old girl as she navigated a few difficult days in her life.



As scientists who have studied emotion for decades, we were delighted to be asked. We ended up serving as scientific consultants for the movie, "Inside Out," which was recently released.

Our conversations with Mr. Docter and his team were generally about the science related to questions at the heart of the film: How do emotions govern the stream of consciousness? How do emotions color our memories of the past? What is the emotional life of an 11-year-old girl like? (Studies find that the experience of positive emotions begins to drop precipitously in frequency and intensity at that age.)

"Inside Out" is about how five emotions — personified as the characters Anger, Disgust, Fear, Sadness and Joy — grapple for control of the mind of an 11-year-old girl named Riley during the tumult of a move from Minnesota to San Francisco. (One of us suggested that the film include the full array of emotions now studied in science, but Mr. Docter rejected this idea for the simple reason that the story could handle only five or six characters.)

Riley's personality is principally defined by Joy, and this is fitting with what we know scientifically. Studies find that our identities are defined by specific emotions, which shape how we perceive the world, how we express ourselves and the responses we evoke in others.

But the real star of the film is Sadness, for "Inside Out" is a film about loss and what people gain when guided by feelings of sadness. Riley loses friends and her home in her move from Minnesota. Even more poignantly, she has entered the preteen years, which entails a loss of childhood.

We do have some quibbles with the portrayal of sadness in "Inside Out." Sadness is seen as a drag, a sluggish character that Joy literally has to drag around through Riley's mind. In fact, studies find that sadness is associated with elevated physiological arousal, activating the body to respond to loss. And in the film, Sadness is frumpy and off-putting. More often in real life, one person's sadness pulls other people in to comfort and help.

Those quibbles aside, however, the movie's portrayal of sadness successfully dramatizes two central insights from the science of emotion.

First, emotions organize — rather than disrupt — rational thinking. Traditionally, in the history of Western

thought, the prevailing view has been that emotions are enemies of rationality and disruptive of cooperative social relations.

But the truth is that emotions guide our perceptions of the world, our memories of the past and even our moral judgments of right and wrong, most typically in ways that enable effective responses to the current situation. For example, studies find that when we are angry we are acutely attuned to what is unfair, which helps animate actions that remedy injustice.

We see this in “Inside Out.” Sadness gradually takes control of Riley’s thought processes about the changes she is going through. This is most evident when Sadness adds blue hues to the images of Riley’s memories of her life in Minnesota. Scientific studies find that our current emotions shape what we remember of the past. This is a vital function of Sadness in the film: It guides Riley to recognize the changes she is going through and what she has lost, which sets the stage for her to develop new facets of her identity.

Second, emotions organize — rather than disrupt — our social lives. Studies have found, for example, that emotions structure (not just color) such disparate social interactions as attachment between parents and children, sibling conflicts, flirtations between young courtiers and negotiations between rivals.

Other studies find that it is anger (more so than a sense of political identity) that moves social collectives to protest and remedy injustice. Research that one of us has conducted has found that expressions of embarrassment trigger others to forgive when we’ve acted in ways that momentarily violate social norms.

This insight, too, is dramatized in the movie. You might be inclined to think of sadness as a state defined by inaction and passivity — the absence of any purposeful action. But in “Inside Out,” as in real life, sadness prompts people to unite in response to loss. We see this first in an angry outburst at the dinner table that causes Riley to storm upstairs to lie alone in a dark room, leaving her dad to wonder what to do.

And toward the end of the film, it is Sadness that leads Riley to reunite with her parents, involving forms of touch and emotional sounds called “vocal bursts” — which one of us has studied in the lab — that convey the profound delights of reunion.

“Inside Out” offers a new approach to sadness. Its central insight: Embrace sadness, let it unfold, engage patiently with a preteen’s emotional struggles. Sadness will clarify what has been lost (childhood) and move the family toward what is to be gained: the foundations of new identities, for children and parents alike.

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Note from the Paul Ekman Group (PEG): The face offers the best window on how people are feeling. Improving your ability to recognize emotions will increase the intimate understanding that allows you to

connect with other people. Research found that people who learn to spot micro expressions are also better liked by co-workers. We provide tools to spot concealed emotions and a new tool to learn how to best respond to how another person is feeling on our website www.paulekman.com.

INSIDE OUT: SYNOPSIS AND BACKGROUND INFORMATION

Inside Out follows the story of Riley, a young girl whose world is turned upside-down when her family moves from an idyllic life in Minnesota to a stressful one in San Francisco. The story is told through Riley's emotions—joy, sadness, anger, fear, and disgust—and follows her transition not just geographically from the midwest to the west coast, but also developmentally from Riley-as-a-child to Riley-as-a-preteen.

Inside Out has moved viewers young and old to take a look inside their own minds.

Much of the film takes place in the head of an 11-year-old girl named Riley, with five emotions—Joy, Sadness, Anger, Fear, and Disgust—embodied by characters who help Riley navigate her world. The film has some deep things to say about the nature of our emotions—which is no coincidence, as the Greater Good Science Center's founding faculty director, Dacher Keltner, served as a consultant on the film, helping to make sure that, despite some obvious creative liberties, the film's fundamental messages about emotion are consistent with scientific research.

Those messages are smartly embedded within *Inside Out's* inventive storytelling and mind-blowing animation; they enrich the film without weighing it down. But they are conveyed strongly enough to provide a foundation for discussion among kids and adults alike. Some of the most memorable scenes in the film double as teachable moments for the classroom or dinner table.

Though *Inside Out* has artfully opened the door to these conversations, it can still be hard to find the right way to move through them or respond to kids' questions. So for parents and teachers who want to discuss *Inside Out* with children, we have distilled four of its main insights into our emotional lives, along with some of the research that backs them up. And a warning, lest we rouse your Anger: There are a number of spoilers below.

1. Happiness is not just about joy.

When the film begins, the emotion of Joy—personified by a manic pixie-type with the voice of Amy Poehler—helms the controls inside Riley's mind; her overarching goal is to make sure that Riley is always happy. But by the end of the film, Joy—like Riley, and the audience—learns that there is much, much more to being happy than boundless positivity. In fact, in the film's final chapter, when Joy cedes control to some of her fellow emotions, particularly Sadness, Riley seems to achieve a deeper form of happiness.

This reflects the way that a lot of leading emotion researchers see happiness. Sonja Lyubomirsky, author of the best-selling *How of Happiness*, defines happiness as “the experience of joy, contentment, or positive well-

being, *combined with* a sense that one's life is good, meaningful, and worthwhile (emphasis added)." So while positive emotions such as joy are definitely part of the recipe for happiness, they are not the whole shebang.

In fact, a recent study found that people who experience "emodiversity," or a rich array of both positive *and* negative emotions, have better mental health. The authors of this study suggest that feeling a variety of specific emotions may give a person more detailed information about a particular situation, thus resulting in better behavioral choices—and potentially greater happiness.

For example, in a pivotal moment in the film, Riley allows herself to feel sadness, in addition to fear and anger, about her idea of running away from home; as a result, she decides not to go through with her plan. This choice reunites Riley with her family, giving her a deeper sense of happiness and contentment in the comfort she gets from her parents, even though it's mixed with sadness and fear.

In that light, *Inside Out's* creators, including director Pete Docter, made a smart choice to name Poehler's character "Joy" instead of "Happiness." Ultimately, joy is just one element of happiness, and happiness can be tinged with other emotions, even including sadness.

2. Don't try to force happiness.

One of us (Vicki) felt an old, familiar frustration when Riley's mother tells her to be her parents' "happy girl" while the family adjusts to a stressful cross-country move and her father goes through a difficult period at work. As a child, Vicki got similar messages and used to think something was wrong with her if she wasn't happy all the time. And all the research and press about the importance of happiness in recent years can make this message that much more potent.

Thank goodness emotion researcher June Gruber and her colleagues started looking at the nuances of happiness and its pursuit. Their findings challenge the "happy-all-the-time" imperative that was probably imposed upon many of us.

For example, their research suggests that making happiness an explicit goal in life can actually make us miserable. Gruber's colleague Iris Mauss has discovered that the more people strive for happiness, the greater the chance that they'll set very high standards of happiness for themselves and feel disappointed—and less happy—when they're not able to meet those standards all the time.

So it should come as no surprise that trying to force herself to be happy actually doesn't help Riley deal with the stresses and transitions in her life. In fact, not only does that strategy fail to bring her happiness, it also seems to make her feel isolated and angry with her parents, which factors into her decision to run away from home.

What's a more effective route to happiness for Riley (and the rest of us)? Recent research points to the importance of "prioritizing positivity"—deliberately carving out ample time in life for experiences that we personally enjoy. For Riley, that's ice hockey, spending time with friends, and goofing around with her parents.

But critically, prioritizing positivity does not require avoiding or denying negative feelings or the situations that cause them—the kind of single-minded pursuit of happiness that can be counter-productive. That’s a crucial emotional lesson for Riley and her family when Riley finally admits that moving to San Francisco has been tough for her—an admission that brings her closer to her parents.

3. Sadness is vital to our well-being.

Early in the film, Joy admits that she doesn’t understand what Sadness is for or why it’s in Riley’s head. She’s not alone. At one time or another, many of us have probably wondered what purpose sadness serves in our lives.

That’s why the two of us love that Sadness rather than Joy emerges as the hero of the movie. Why? Because Sadness connects deeply with people—a critical component of happiness—and helps Riley do the same. For example, when Riley’s long-forgotten imaginary friend Bing Bong feels dejected after the loss of his wagon, it is Sadness’s empathic understanding that helps him recover, not Joy’s attempt to put a positive spin on his loss. (Interestingly, this scene illustrates an important finding from research on happiness, namely that expressions of happiness must be appropriate to the situation.)

In one of the film’s greatest revelations, Joy looks back on one of Riley’s “core memories”—when the girl missed a shot in an important hockey game—and realizes that the sadness Riley felt afterwards elicited compassion from her parents and friends, making her feel closer to them and transforming this potentially awful memory into one imbued with deep meaning and significance for her.

With great sensitivity, *Inside Out* shows how tough emotions like sadness, fear, and anger, can be extremely uncomfortable for people to experience—which is why many of us go to great lengths to avoid them (see the next section). But in the film, as in real life, all of these emotions serve an important purpose by providing insight into our inner and outer environments in ways that can help us connect with others, avoid danger, or recover from loss.

One caveat: While it’s important to help kids embrace sadness, parents and teachers need to explain to them that sadness is not the same as depression—a mood disorder that involves prolonged and intense periods of sadness. Adults also need to create safe and trusting environments for children so they will feel safe asking for help if they feel sad or depressed.

4. Mindfully embrace—rather than suppress—tough emotions.

At one point, Joy attempts to prevent Sadness from having any influence on Riley’s psyche by drawing a small “circle of Sadness” in chalk and instructing Sadness to stay within it. It’s a funny moment, but psychologists will recognize that Joy is engaging in a risky behavior called “emotional suppression”—an emotion-regulation strategy that has been found to lead to anxiety and depression, especially amongst teenagers whose grasp of their own emotions is still developing. Sure enough, trying to contain Sadness and deny her a role in the action ultimately backfires for Joy, and for Riley.

Later in the film, when Bing Bong loses his wagon (the scene described above), Joy tries to get him to “cognitively reappraise” the situation, meaning that she encourages him to reinterpret what this loss means for him—in this case, by trying to shift his emotional response toward the positive. Cognitive reappraisal is a strategy that has historically been considered the most effective way to regulate emotions. But even this method of emotion regulation is not always the best approach, as researchers have found that it can sometimes increase rather than decrease depression, depending on the situation.

Toward the end of the movie, Joy does what some researchers now consider to be the healthiest method for working with emotions: Instead of avoiding or denying Sadness, Joy accepts Sadness for who she is, realizing that she is an important part of Riley’s emotional life.

Emotion experts call this “mindfully embracing” an emotion. What does that mean? Rather than getting caught up in the drama of an emotional reaction, a mindful person kindly observes the emotion without judging it as the right or wrong way to feel in a given situation, creating space to choose a healthy response. Indeed, a 2014 study found that depressed adolescents and young adults who took a mindful approach to life showed lower levels of depression, anxiety, and bad attitudes, as well as a greater quality of life.

Certainly, *Inside Out* isn’t the first attempt to teach any of these four lessons, but it’s hard to think of another piece of media that has simultaneously moved and entertained so many people in the process. It’s a shining example of the power of media to shift viewers’ understanding of the human experience—a shift that, in this case, we hope will help viewers foster deeper and more compassionate connections to themselves and those around them.

This article originally appeared on Greater Good, the online magazine of UC Berkeley’s Greater Good Science Center, one of Mindful’s partners. To view the original article, [click here](#).