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SundayReview

The Science of 'Inside Out'

Gray Matter

By DACHER KELTNER and PAUL EKMAN JULY 3, 2015

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 courters 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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