

Mixed Emotions – How Your Brain Processes Complex Feelings

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STORY AT-A-GLANCE

- › Scientists using fMRI scans discovered that brain regions like the insula and amygdala have distinct neural signatures for processing mixed emotions, rather than simply switching between happy and sad states
- › Each person's emotional experience is unique, with the ventromedial prefrontal cortex and anterior cingulate cortex working together to create coherent experiences from conflicting feelings
- › Research shows mixed emotions share significant neural overlap with disgust responses, suggesting disgust might play a more dominant role in shaping complex emotional states
- › Conventional emotion research often overlooks "messy" feelings, but scientists now recognize that studying these complex emotional states is important for understanding human behavior
- › Managing mixed emotions through practices like mindfulness, journaling and exercise contributes to better mental health and increased longevity

Have you ever felt happy and sad at the same time, perhaps during a significant life event like graduating or saying goodbye to a loved one? These are what neuroscientists refer to as mixed valence feelings – experiencing positive and negative emotions simultaneously.

Despite their common occurrence across different cultures and personal experiences, mixed emotions have remained a largely unexplored area in neuroscience. Conventional studies often categorize emotions as distinctly positive or negative, overlooking the complexity of feelings that don't fit neatly into these categories.

However, research by University of Southern California neuroscientist Anthony Vaccaro and colleagues highlights how your brain deals with these intricate emotional landscapes.

By exploring the neural underpinnings of mixed emotions, scientists are beginning to understand that your brain's response to complex feelings is both unique and consistent. This newfound knowledge enriches our understanding of human emotions and opens doors to better emotional health and well-being strategies.

Your Brain's Emotional Landscape

Watching an emotionally charged film often stirs a whirlwind of feelings within you. Scientists used functional magnetic resonance imaging (fMRI) to observe what happens in your brain during such experiences.¹ In the study, participants watched an animated short film known to evoke mixed emotions. Afterward, they identified moments when they felt positive, negative or a blend of both.

By analyzing brain activity during these moments, researchers discovered that certain brain regions are actively involved in processing these complex emotions. Specifically, areas like the insula, amygdala, nucleus accumbens and anterior cingulate cortex showed patterns that could predict when your emotional state was shifting.

This means that your brain doesn't just toggle between happy and sad but has distinct neural signatures that correspond to the nuanced feelings you experience. To unravel how your brain handles mixed emotions, scientists used Hidden-Markov models (HMM), a sophisticated statistical method that identifies distinct states based on patterns in the data.

When applied to fMRI data, HMM detects shifts in brain activity that align with changes in your emotional state. The study found that during an emotional film, your brain transitions between different emotional states in a way that's consistent and predictable.² For instance, when you felt a surge of happiness or a wave of sadness, the neural activity in specific regions matched these feelings accurately.

However, during moments of mixed emotions, the patterns became less consistent in some areas, suggesting that your brain might be integrating conflicting feelings in a more complex manner. This intricate dance of neural activity highlights that your emotional experiences are deeply rooted in your brain's dynamic processing capabilities.

Unraveling Individualized Emotional Experiences

Unlike previous studies that averaged responses across many people, this study stood out in recognizing that each person's emotional journey is unique. By allowing participants to self-report their feelings in real-time, the researchers tailored the analysis to each individual's experience. This personalized approach revealed that your brain's response to mixed emotions isn't a one-size-fits-all phenomenon.³

Instead, it varies based on how you uniquely process and integrate your feelings. Your experience of mixed emotions is not only personal but also has a distinct neural signature that can be mapped and understood.

Looking deeper into the brain's architecture, the study highlighted the significant roles of several key regions.⁴ The insula, known for its role in interoception — the sense of the internal state of your body — showed consistent patterns when processing pure positive or negative emotions but not during mixed feelings.

So, while the insula effectively handles clear-cut emotions, it might struggle with the complexity of mixed states. On the other hand, the ventromedial prefrontal cortex (vmPFC) and the anterior cingulate cortex (ACC) exhibited unique and consistent neural patterns for both univalent and mixed emotions.

The vmPFC is involved in integrating emotional and cognitive information, making it important for understanding and regulating complex feelings. The ACC, associated with conflict monitoring and decision-making, likely helps navigate the internal tug-of-war that mixed emotions often represent. These regions work in tandem to create a cohesive emotional experience, even when faced with conflicting feelings.

Mixed Emotions in Social Contexts

Complex emotional experiences, such as when amusement and disgust intertwine, occur in many settings, including social ones like comedy shows. In a pioneering study published in *NeuroImage*, scientists explored how your brain processes such mixed emotions during social interactions.⁵

Participants viewed short film clips designed to elicit positive emotions like amusement, negative emotions like disgust or a blend of both. Using fMRI, the study identified specific brain regions activated during these mixed emotional states. Understanding how your brain navigates these conflicting feelings provides deeper insights into everyday emotional experiences, where social cues often present mixed signals.

For instance, when laughing at a character's mishap while feeling sympathy for their plight, your brain is actively managing and integrating these opposing emotions. The *NeuroImage* study revealed that the posterior cingulate cortex (PCC) and the precuneus, part of the superior parietal lobe (SPL), play key roles in processing these complex emotions.

These areas are involved in higher-order cognitive functions like attention, memory and the integration of contextual information. When faced with emotionally ambiguous social scenes, your PCC and precuneus activate to help disambiguate and interpret the mixed signals.

So, while you might find a situation both funny and unsettling, these brain regions work together to balance and integrate these emotions into a coherent experience.⁶ Unlike

more straightforward emotional responses, mixed emotions require a higher level of cognitive flexibility and perspective-taking, which these regions facilitate.

By engaging the PCC and precuneus, your brain ensures that even when emotions conflict, you're able to navigate social interactions smoothly, maintaining emotional equilibrium.⁷

The Neural Overlap with Disgust

Interestingly, the study found that mixed emotions share significant neural overlap with pure disgust responses. This suggests that when you feel a combination of amusement and disgust, your brain processes these mixed feelings in ways that are more similar to how it handles disgust alone.⁸

Specifically, regions like the parieto-occipital sulcus (POS) and parts of the precuneus showed activation patterns that closely resembled those seen during purely disgusting experiences. This overlap indicates that disgust might play a more dominant role in shaping mixed emotional states than previously thought.

It challenges the notion that mixed emotions are entirely distinct from their constituent feelings, proposing instead that one emotion can influence the neural processing of the other. In short, in situations where amusement and disgust coexist, the disgust component might heavily influence how your brain interprets and responds to the overall experience.

This neural interplay helps explain why certain mixed emotional experiences feel more intense or pervasive, as one emotion reinforces the other within your brain's complex network.⁹ This research also opens avenues for exploring how mixed emotions influence decision-making and interpersonal relationships.

Future studies could investigate how these neural patterns vary across different populations, such as individuals with mood disorders or those undergoing emotional regulation training. Moreover, these advancements may lead to more effective strategies

to navigate complex emotional landscapes, fostering resilience and enhancing your ability to maintain emotional balance in the face of life's inherent ambiguities.

Embracing the Messiness of Feelings

"Messy" emotions – like feeling joyful and uneasy all at once, without quite knowing why – are more common than you might think, yet conventional affective science often overlooks them. Affective science, the interdisciplinary field dedicated to understanding the nature, causes and effects of emotions and moods, integrates insights from psychology, neuroscience and related disciplines.

But a recent perspective by Vaccaro, published in *Affect Science*, argues that to truly understand human emotions, scientists must move beyond the neatly categorized feelings of happiness, sadness or anger.¹⁰ Instead, they should embrace the complexity and ambiguity that characterize real-world emotional experiences.

Emotions rarely occur in isolation; more often, they blend and overlap, creating rich and multifaceted states. For example, you might feel a mix of pride and guilt after achieving a significant milestone, reflecting both positive and negative sentiments simultaneously.

By acknowledging and studying these intricate emotional landscapes, researchers can develop a more nuanced understanding of how emotions influence behavior, decision-making and overall well-being.

This shift toward recognizing the "messiness" of feelings not only aligns with your everyday experiences but also enhances the relevance and applicability of affective science in addressing real-life emotional challenges.¹¹ Yet, conventional methods of measuring emotions, such as valence-arousal scales or forced-choice questionnaires, often fail to capture the full spectrum of human emotional experiences.

Feelings that don't fit neatly into categories like happy or sad – such as bittersweetness or awe – often slip through the cracks of these conventional measures. The study highlights the importance of adopting more flexible and comprehensive measurement techniques to better reflect the complexity of emotions.

Instead of limiting responses to predefined options, allowing for multiple emotions or free-text descriptions provides a richer and more accurate picture of how people truly feel.

This approach respects the diversity of emotional experiences and reduces the risk of forcing your feelings into oversimplified boxes. By enhancing how emotions are measured, affective science can better understand and validate the intricate ways in which people experience and navigate the emotional world, leading to more effective interventions and support systems.

Enhancing Your Emotional Well-Being for Longevity

Experiencing a range of positive emotions — such as joy, happiness and vigor — is not just a fleeting experience; it has profound implications for your overall health and longevity. Studies have consistently shown that individuals who maintain higher levels of positive emotions along with dispositions like life satisfaction, optimism and a sense of humor, tend to live longer, healthier lives.¹²

For example, in a large study involving over 6,073 older adults, those who reported greater happiness were significantly less likely to experience mortality from various causes.¹³ However, life is rarely just about pure happiness. Mixed emotions are a natural part of the human experience. To help manage these complex feelings, consider incorporating practices that promote emotional balance.

One effective tool is the Mercola Health Coach app, which offers a variety of features to help beat stress and anxiety, including strategies to help clear negative emotions from your mind to keep them from snowballing. If you'd like to join the waitlist for the Mercola Health Coach app, [click here](#). The following steps are also useful for handling mixed emotions:

- 1. Mindfulness meditation** — Practicing mindfulness helps you stay present and observe your emotions without judgment. This reduces the intensity of conflicting feelings and increases your emotional resilience.

2. **Journaling** – Writing down your thoughts and feelings provides clarity and helps you process complex emotions. Reflecting on your experiences allows you to identify patterns and triggers, making it easier to manage mixed states.
3. **Physical activity** – Regular exercise boosts endorphins and improves your overall mood, making it easier to handle mixed emotions. Activities like yoga and [walking](#) also serve as a form of moving meditation, enhancing your sense of well-being.
4. **Positive affirmations** – Reinforcing positive thoughts shifts your focus and enhance feelings of happiness and optimism. Repeating affirmations helps rewire your brain to focus on the positive aspects of your life.

One option is the [Emotional Freedom Techniques \(EFT\)](#), which involves simple tapping with your fingertips to input kinetic energy onto specific meridians on your head and chest while you think about your specific problem and voice positive affirmations.

5. **Seek support** – Talking to a friend, therapist or using the [Mercola Health Coach app](#) provides guidance and support as you explore your emotional landscape.

By integrating these strategies into your daily routine, you'll foster a more balanced emotional state, contributing to both your mental well-being and physical health. Embracing and managing mixed emotions both enhances your quality of life and supports a longer, healthier existence.

Sources and References

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