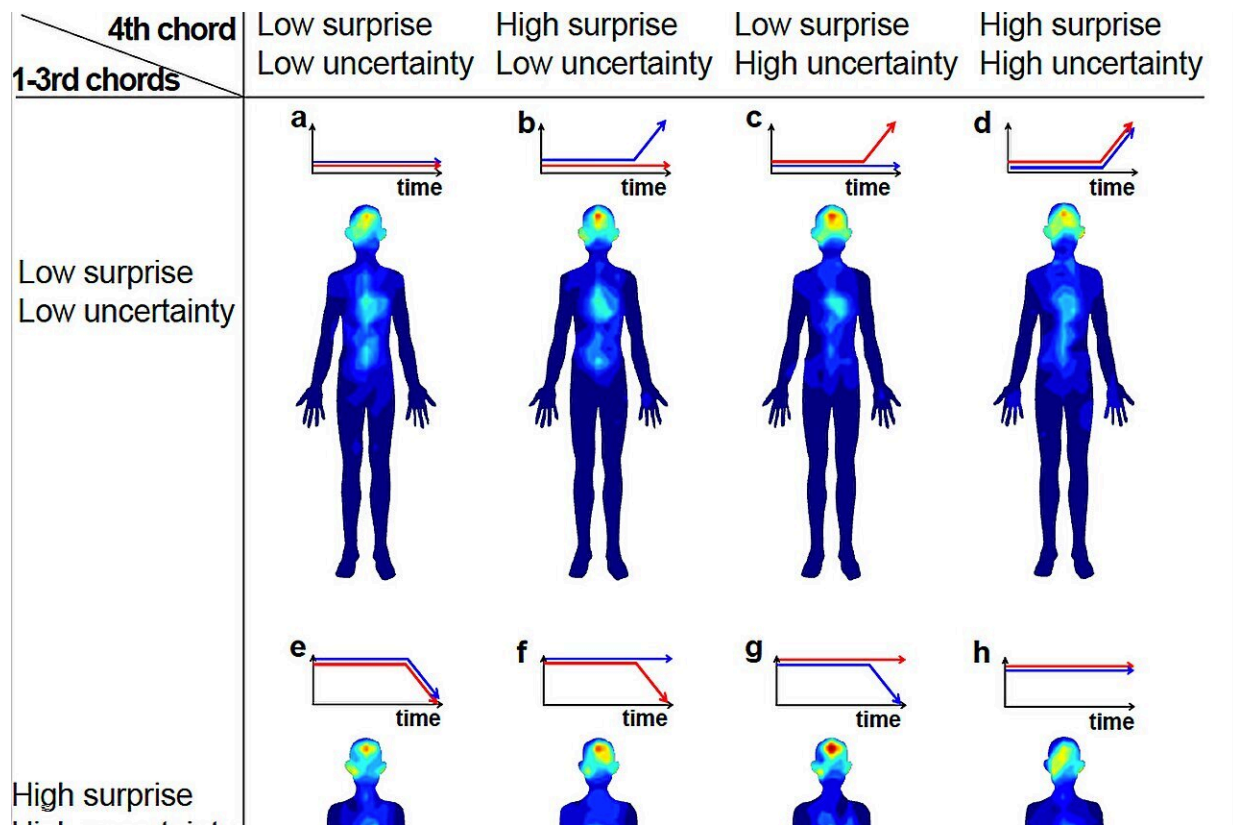


# Body mapping links responses to music with degree of uncertainty and surprise

April 4 2024



Participants clicked on an image of the body to show where they most felt the music. The more clicks, the stronger the sensation (shown by the blue-low to red-high gradient). Body image "b" shows the sLuL-sHuL sequence (which most affected the heart), while image "a" shows the predictable sLuL-sLuL sequence (which most affected the abdomen). Credit: 2024 Daikoku, Tanaka and

Music holds an important place in human culture, and we've all felt the swell of emotion that music can inspire unlike almost anything else. But what is it exactly about music that can bring on such intense sensations in our minds and bodies? A new [study](#) reported in the journal *iScience* has provided insight from studies that systematically examine the way perception of unique musical chords elicits specific bodily sensations and emotions.

"This study reveals the intricate interplay between musical [uncertainty](#), prediction error, and temporal dynamics in eliciting distinct bodily sensations and emotions," says Tatsuya Daikoku of The University of Tokyo. "More specifically, we found that prediction and uncertainty affect heart and abdominal sensations."

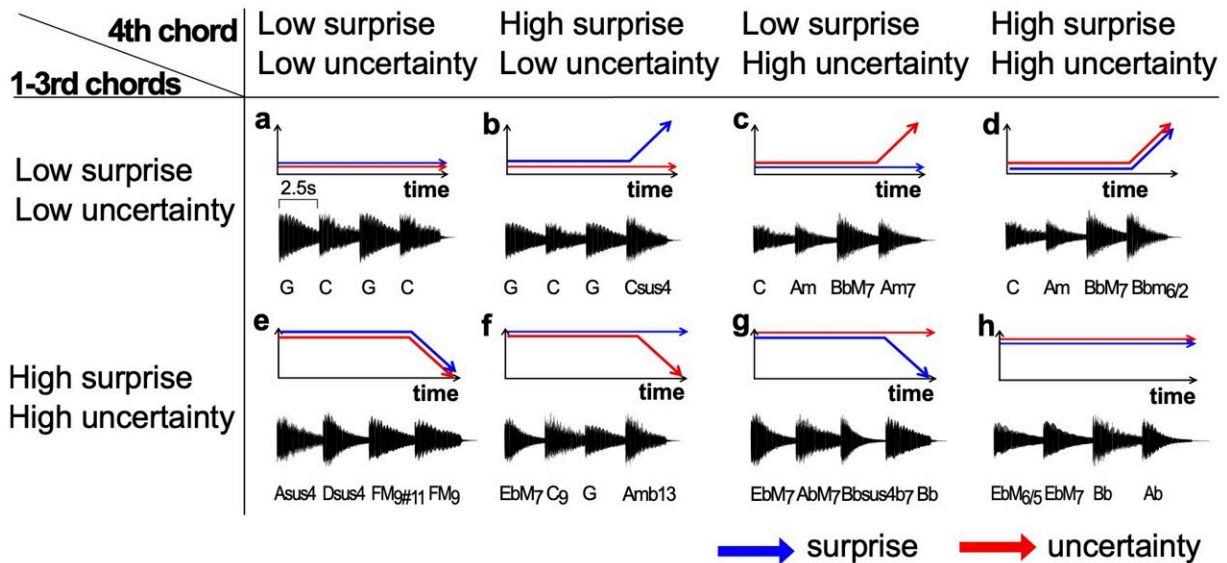
In the study, the researchers asked 527 participants to map where they felt sensations in their bodies and the emotions they had while listening to musical [chord](#) progressions that varied in their predictability. They wanted to better understand how chord progressions are embodied and how they give rise to emotional experience. They especially wanted to learn what types of musical chords generate sensations in the heart and stomach and the emotions that go with them.

The authors suspected that uncertainty and surprise in [music](#) might play an important role. To find out, they generated 92 unique chord progressions, with varying degrees of uncertainty and surprise. Participants heard eight chord types in random order and were asked to respond within 10 seconds with clicks to positions on a body onscreen

where they felt the chords. They also were asked about how the chords made them feel emotionally.

The data showed that certain chord progressions sparked sensations in the heart while others were felt more in the stomach. Those sensations in the body also were associated with a person's aesthetic appreciation and positive feelings about the chords they'd just heard. The evidence also supported a link between uncertainty and surprise as important elements in eliciting those bodily sensations and [emotional responses](#).

The study also found that different types of chord progressions elicited distinct emotions. For instance, certain chords evoked aesthetic appreciation, leading to a decline in negative emotions of awkwardness and anxiety. More predictable chord progressions brought on feelings of calmness, relief, satisfaction, nostalgia, and empathy, they report.



These are the eight chord sequences which were generated using a mathematical model, based on U.S. Billboard songs. Credit: 2024 Daikoku, Tanaka and Yamawaki/ iScience

Based on their findings, the researchers propose that the emotions and sensations inspired by music are linked to musical interoception, meaning all the senses coming from your body.

They further suggest that this experience is linked to mental well-being. In future studies, they hope to explore how the maps of bodily sensations they've uncovered relate to a person's physiological responses, such as changes in [heart rate](#), to music.

**More information:** Bodily Maps of Uncertainty and Surprise in Musical Chord Progression and the Underlying Emotional Response, *iScience* (2024). DOI: [10.1016/j.isci.2024.109498](https://doi.org/10.1016/j.isci.2024.109498).  
[www.cell.com/iscience/fulltext ... 2589-0042\(24\)00719-3](https://www.cell.com/iscience/fulltext/S2589-0042(24)00719-3)

Provided by Cell Press

Citation: Body mapping links responses to music with degree of uncertainty and surprise (2024, April 4) retrieved 2 May 2024 from <https://medicalxpress.com/news/2024-04-body-links-responses-music-degree.html>

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