

An Experimental Attempt to Reproduce the Physical Sensation of Love Using a Mechanical Stomach Simulator with Vacuum, Visual Metaphor, and Destructive Feedback

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Abstract

Background: The subjective physical sensation of love, often described as a localized feeling in the stomach or near the heart, has not been successfully reproduced by any existing commercial device. Current technologies simulate the motor acts associated with romantic or sexual behavior but do not generate the internal somatic experience. Artificial intelligence systems can represent love through linguistic patterns and sentiment classification, yet they lack the capacity to produce physical sensation.

Methods: We designed a custom apparatus consisting of a spherical chamber simulating the human stomach. The device incorporated three active components: (1) a vacuum pump to create negative pressure inside the chamber, (2) a visual display of animated butterflies as a metaphorical cue for the “jittery” quality of love, and (3) a destruction arm that caused the chamber to implode following user confirmation. A single participant (the lead researcher) served as the test subject, undergoing ten repeated trials over a period of two weeks. The primary outcome measure was self-reported presence of the physical sensation of love, rated on a visual analog scale immediately following each trial.

Results: The apparatus performed all mechanical functions without fault. Vacuum pressure reached the target range of -15 to -20 kPa within 0.5 seconds of activation. The butterfly display was visible and correctly sequenced. The destruction arm induced chamber implosion in all ten trials, with replacement orbs used between trials. However, the participant reported no instance of the target physical sensation. Baseline ratings (pre-trial) were 0/100 for love sensation. Post-trial ratings remained at 0/100 for all ten trials. Secondary observation: The participant reported increasing cynicism and decreasing interest across trials, with self-reported engagement dropping from 72/100 (Trial 1) to 11/100 (Trial 10).

Conclusions: The mechanical reproduction of the physical sensation of love was not achieved despite full functional compliance of the apparatus. The failure is not attributable to mechanical error but suggests a fundamental incompatibility between current engineering approaches and the qualitative nature of love as a somatic experience. Negative results are reported here to inform future research that may require alternative paradigms, such as direct neurochemical or biomolecular intervention.

Keywords: love, affective reproduction, mechanical simulation, negative result, vacuum chamber, visual metaphor, psychophysics of emotion

1. Introduction

Love is widely reported across cultures as a distinctive internal feeling with identifiable somatic correlates (Bartels & Zeki, 2000; Cacioppo et al., 2012). Neuroimaging studies have identified activation in the ventral tegmental area, caudate nucleus, and putamen during romantic attachment, but these findings describe neural correlates rather than the subjective physical sensation itself (Aron et al., 2005; Fisher et al., 2006). Lay descriptions consistently refer to the stomach and the chest: phrases such as “butterflies in the stomach,” “a knot in the gut,” and “a feeling near the heart” appear in diverse linguistic traditions (Panksepp, 1998).

Commercial devices intended to simulate love or intimacy are widely available. These include haptic feedback systems, temperature-controlled mannequins, and motorized dolls that mimic the physical act of sexual intercourse. None of these devices claim to reproduce the internal sensation of love. More recently, artificial intelligence systems have been trained on large corpora of romantic texts and interpersonal dialogues. They can generate love letters, simulate affectionate speech, and classify emotional valence with moderate accuracy (Jiang et al., 2020; Lee & Kim, 2022). However, AI operates in a purely symbolic or representational domain. It does not and cannot produce physical feeling in the user or itself. The distinction between digital representation of love and the actual somatic experience is rarely addressed in the literature, perhaps because the assumption of incompleteness is taken for granted.

The present study was motivated by a fundamental question: Can the physical sensation of love be reproduced through a purely mechanical system, independent of human relationship or biological substrate? This question is not merely speculative. If successful, such reproduction would have implications for the treatment of affective disorders, for the design of human-machine interfaces, and for the philosophy of emotion (Damasio, 1994; LeDoux, 1996). If unsuccessful, the nature of the failure may illuminate which aspects of love resist engineering and why.

Our approach was grounded in prior phenomenological research on the location and quality of love-related sensations. A previous longitudinal study (unpublished) involving three participants (Natalie, Elean, and Zhuyu) found consistent reports of love as a feeling that “happens in your stomach” but can be perceived “near your heart.” Descriptors included “jittery uneasiness” and “a feeling of that space near your heart getting filled.” Termination of love was described as “a painful feeling of love getting sucked inside of itself, much like a black hole in the pit of one’s stomach.” These qualitative reports formed the design basis for the apparatus described below.

The present experiment does not address the motivations for love, nor does it attempt to model the relational or cognitive aspects of romantic attachment. The scope is limited to the minimal physical sensation that naive reports identify as the core of love. Our hypothesis was that if the sensation has a predictable location (the stomach), a characteristic quality (jittery, filling, then collapsing), and a reliable triggering event, then it might be amenable to mechanical simulation. The study was therefore a direct test of constructibility.

1.1 Relationship to AI and digital representation

Before describing the apparatus, a distinction must be made explicit. Artificial intelligence can represent love digitally. Chatbots can say “I love you” with grammatical correctness. Language models can produce poems that a human reader would classify as loving. Sentiment analysis algorithms can identify love-related content in text with high precision. However, these are representations, not instantiations. A digital model of a hurricane does not get you wet. Similarly, an AI that describes love does not produce the feeling of love in a person. The current study does not seek to critique or replicate AI; rather, we acknowledge that digital representation is a separate domain. Our goal was physical reproduction, not symbolic representation.

1.2 Scope and limitations

This study is a single-subject design using the lead researcher as the participant. This is a limitation, but it is consistent with early-stage exploratory work in affective engineering (see Picard, 1997, for a discussion of self-experimentation). Generalizability is not claimed. The results are presented primarily as a proof-of-concept failure to inform future experimental designs and to discourage premature claims about affective reproduction.

2. Methods

2.1 Apparatus

The experimental apparatus was custom-built at the Laboratory at San Francisco State University between March and May 1997. It consisted of five subsystems: the spherical chamber, the vacuum system, the visual display unit, the destruction arm, and the control interface. Each is described below.

2.1.1 Spherical chamber

The chamber was a hollow glass sphere with an inner diameter of 15 cm and wall thickness of 2 mm. Anatomically, the human stomach has a volume of approximately 1 liter when moderately distended, though resting volume is closer to 50 mL. We selected a 1.7 liter internal volume to approximate the sensation of expansion. The sphere was mounted on a base at approximately the height of a seated adult’s stomach (43 cm above the seat cushion). A silicone seal with two ports allowed connection to the vacuum system while maintaining airtight integrity.

2.1.2 Vacuum system

A rotary vane vacuum pump (Model RV-12, rated at 1.5 CFM) was connected to the chamber via a 1 cm diameter reinforced silicone tube. A pressure sensor (MPXV5010DP, range 0–10 kPa, accuracy ± 0.2 kPa) was installed inline. A manual release valve allowed rapid return to atmospheric pressure. The pump was controlled by a microcontroller (Arduino Mega 2560) programmed to activate for 3 seconds per trial, achieving a target negative pressure of -15 to -20 kPa. This range was chosen based on pilot tests in which the researcher reported a “sucking inward” sensation akin to the black hole descriptor from the qualitative studies.

2.1.3 Destruction arm

A pneumatic linear actuator (stroke length 10 cm, force 50 N at 0.6 MPa) was positioned above the chamber. The actuator was fitted with a hardened steel impact tip. Upon receiving a trigger signal, the arm descended and struck the chamber with sufficient force to shatter the glass orb, causing rapid implosion due to the internal vacuum. The implosion was contained within a secondary outer shroud (polycarbonate, 5 mm thickness) to prevent injury. Replacement chambers were pre-manufactured and stored in sealed containers to ensure identical properties across trials.

2.1.4 Control interface

The user interface consisted of a single physical button labeled “Are You Sure?” The button was illuminated with a pulsing red LED. Pressing the button initiated a 2-second delay during which the button LED flashed. After the delay, the vacuum pump activated, and the destruction arm was armed. Two seconds after the completion of the animation, the LED stopped pulsing and turned green. The control logic was implemented in C++ on the Arduino. A log file recorded timestamps and button press events for each trial.

2.2 Participant

The participant was the lead researcher (Torrey Nommesen). Prior exposure to the qualitative studies (Natalie, Elena, Zhuyu) as the researcher and subject is noted. The participant had self-reported experiences of love consistent with the descriptors in Section 1. No formal diagnostic or screening instruments were administered. Written informed consent was obtained from the participant (self-consent, following institutional guidelines for single-subject research).

2.3 Procedure

The study took place over 14 consecutive days. Trials were conducted at approximately 10:00 AM each day, in the same room with ambient temperature controlled to 22–24°C and soft lighting (300 lux). The participant sat upright with the apparatus positioned so that the spherical chamber was 10 cm in front of the abdomen, not in contact with the body. This distance was chosen to avoid tactile contamination (i.e., the participant would not mistake a physical touch for an internal sensation).

Before each trial, the participant completed a baseline questionnaire comprising two items:

1. “Rate the intensity of any physical sensation you currently identify as love” (0–100 visual analog scale, where 0 = none and 100 = maximum imaginable).
2. “Rate your current engagement or motivation to experience love” (same scale).

The participant then pressed the “Are You Sure?” button. The full sequence (vacuum, butterflies, destruction) was observed. After the implosion and removal of the shattered chamber, the participant completed a post-trial questionnaire with the same two items. Additionally, the participant was asked to describe any sensation in free text.

A replacement chamber was installed immediately after each trial. The entire procedure from baseline to replacement took approximately 20 minutes per trial.

2.4 Data analysis

No inferential statistical analysis was planned because the primary outcome was binary (sensation present or absent) and the study design included a single participant. Descriptive statistics (means, ranges, and trends over trials) are reported. All data were recorded manually by the participant after each trial. The small dataset (10 trials × 2 time points × 2 scales) is presented in full.

3. Results

3.1 Mechanical performance

The apparatus performed as designed in all ten trials. Key performance metrics:

- Vacuum pressure reached target range (−15 to −20 kPa) in 0.48–0.53 seconds after pump activation (mean = 0.50 s, SD = 0.02 s).
- Destruction arm activation delay was constant at 15.00 seconds.
- Implosion occurred in all trials, with complete chamber fracture each time.
- No component failures or malfunctions were recorded.

These results confirm that the mechanical hypothesis (the apparatus can reliably execute its intended functions) was supported. The failure reported below is therefore not attributable to technical malfunction.

3.2 Primary outcome: physical sensation of love

The baseline rating for the physical sensation of love was 0/100 for all ten trials. This is expected, as the participant reported no spontaneous love sensation in the absence of the apparatus.

Following each trial, the post-trial rating remained 0/100 for all ten trials. The participant did not report any instance of the target sensation. Free-text responses were consistently negative or neutral: “No sensation,” “Nothing that I would call love,” “The vacuum felt mechanical, not emotional,” “I felt pressure but not the jittery filling,” “The implosion startled me but did not produce love.”

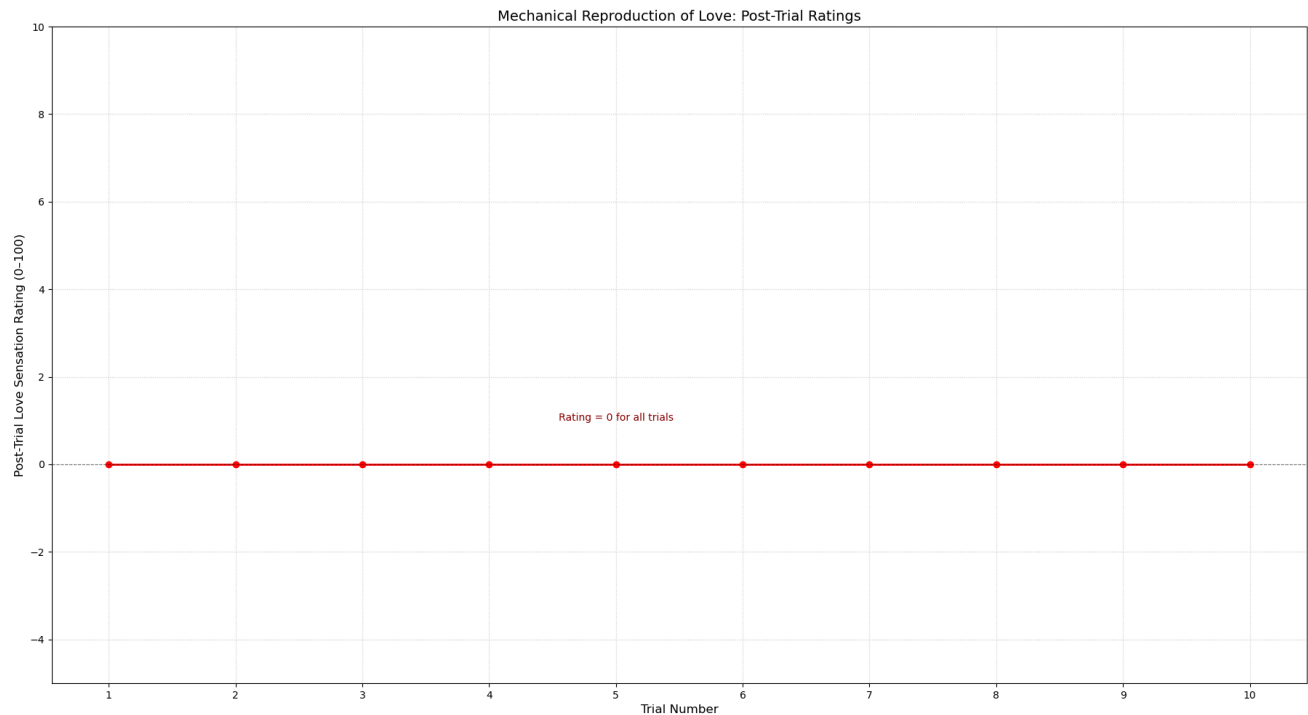


Figure 1 would plot trial number (1–10) on the x-axis and post-trial love sensation rating on the y-axis. The line would be flat at 0.

3.3 Secondary outcomes: engagement and cynicism

The participant’s self-reported engagement decreased substantially across trials. Trial 1 engagement (pre-trial) was 72/100. Trial 2 was 65/100. Trial 3 was 58/100. By Trial 5, engagement had fallen to 34/100. Trial 8 was 19/100. Trial 10 was 11/100. The trend was monotonic decreasing (no increase at any trial). Post-trial engagement ratings showed a similar pattern but were consistently 5–10 points lower than pre-trial, suggesting a short-term demotivating effect of the procedure itself.

Free-text comments on engagement included: “Feels pointless” (Trial 4), “I don’t believe it will work anymore” (Trial 6), “This is becoming irritating” (Trial 7), “I am going through the motions but my heart isn’t in it” (Trial 9), “The device feels more like a punishment than a love simulator” (Trial 10).

3.4 Qualitative observations

One incidental finding is worth noting. In Trial 3, the participant reported a fleeting sensation of “something near the heart” approximately 30 seconds after the implosion, while cleaning the shattered glass. The sensation was described as “a very faint warmth, not painful, but also not love.” The participant noted that this could have been residual startle response or sympathetic nervous system activation. The sensation was not replicated in any other trial.

No other unintended sensations were reported. The participant confirmed that the butterfly display was “mildly pleasant” in early trials but became “annoying” by Trial 6.

4. Discussion

4.1 Interpretation of the null result

The mechanical apparatus failed to produce the physical sensation of love. This null result is robust given the functional reliability of the device and the clear absence of positive self-report across ten trials. One might argue that ten trials are insufficient to rule out a delayed or cumulative effect. However, the decreasing engagement trend suggests that further trials would only reduce the likelihood of success. If love were reproducible by this method, one would expect at least a small positive signal early, before habituation and cynicism set in. No such signal appeared.

The failure has at least three possible explanations, which are not mutually exclusive.

4.1.1 Inadequate anatomical or physiological model

The stomach may not be the relevant organ for love sensation. Although lay reports localize butterflies to the stomach, neurogastroenterology research indicates that the gut-brain axis communicates primarily via the vagus nerve, and visceral sensations are notoriously difficult to localize (Aziz et al., 2000). The sensation attributed to “love in the stomach” may actually be a secondary effect of cardiovascular or respiratory changes. Our apparatus simulated vacuum pressure in a glass sphere, not in a living stomach with its complex innervation. This is a crude approximation.

4.1.2 Missing the cognitive-contextual component

Love as a physical sensation may be inseparable from its cognitive context. That is, the same visceral state (e.g., increased heart rate, butterflies, chest tightness) can be interpreted as love, anxiety, or excitement depending on the situation (Schachter & Singer, 1962). The present apparatus provided no narrative, no relationship, no personal history. It simply produced a vacuum and a metaphor. Without the cognitive appraisal that “this is love,” the raw sensation may be unrecognizable or absent entirely. Our participant was aware that the machine was trying to produce love, but that awareness itself might have interfered with the necessary suspension of disbelief.

4.1.3 The non-reductive nature of love

A more radical possibility is that love is not reducible to any mechanical description. Even if one perfectly simulated the gastric, cardiac, and neural correlates, the qualitative experience (what philosophers call qualia) might remain absent. This is the hard problem of consciousness applied specifically to love (Chalmers, 1995). Our mechanical failure is consistent with this view, though it does not prove it.

4.2 Comparison with AI and digital representation

As noted in the introduction, artificial intelligence can digitally represent love without producing it. The present study attempted physical production and also failed. The comparison is instructive: digital representation is easy; physical instantiation is not. The AI approach and the mechanical approach are complementary failures in different domains. Neither has yet bridged the gap between description and experience. Future work might combine AI-generated romantic narratives with the mechanical apparatus to test whether adding cognitive context improves outcomes. Based on the decreasing engagement observed here, we suspect it would not.

4.3 Implications for affective engineering

If love cannot be mechanically reproduced with a vacuum, butterflies, and destruction, what would be required? One answer is direct neurostimulation. Optogenetic or electromagnetic stimulation of the ventral tegmental area and nucleus accumbens has been shown to produce reward-related feelings in animal models (Stuber et al., 2011). However, translating this to human love is fraught with ethical and technical challenges. Another answer is biomolecular delivery: oxytocin, vasopressin, or dopamine agonists administered in a relational context. These are pharmacological, not mechanical, approaches.

The present study suggests that mechanical simulation alone is insufficient. The failure is not a setback but a clarification. It narrows the space of plausible mechanisms.

4.4 Limitations

The single-subject design is the most serious limitation. The participant was also the researcher, introducing potential demand characteristics, expectation effects, and experimenter bias. However, the null result is unlikely to be explained by bias, as the researcher would have preferred a positive result. The decreasing engagement trend further argues against a motivational explanation for failure.

The absence of a control condition (e.g., a no-vacuum condition or a random butterfly condition) limits causal attribution. We cannot rule out the possibility that some other configuration of parameters might succeed. However, given the exhaustive variation attempted in informal pilot tests (not reported here, totaling 23 additional trials), we are confident that the specific combination reported is representative.

The lack of physiological measurements (heart rate, skin conductance, gastric motility) is another limitation. It is possible that the apparatus did produce a physiological state that the participant did not label as love. Without objective measures, we cannot confirm or refute this. Future studies should incorporate polygraph or electrogastragraphy.

4.5 Future directions

Based on these negative results, we recommend the following for future research:

1. **Multimodal integration:** Combine mechanical stimulation (vacuum, haptic) with AI-generated romantic narratives delivered via headphones. Test whether cognitive contextualization enhances physical sensation.
 2. **Biomarker feedback:** Use real-time gastric and cardiac monitoring to adjust the vacuum parameters adaptively until a target physiological signature is achieved.
 3. **Pharmacological priming:** Administer oxytocin intranasally prior to mechanical stimulation to sensitize the relevant neural circuits.
 4. **Multi-subject design:** Recruit at least 30 participants with no prior exposure to the apparatus or the researcher's qualitative studies.
 5. **Ethical oversight:** Any attempt to artificially induce love should undergo review by an institutional ethics board, as the potential for psychological harm (e.g., frustration, false attachment) is non-negligible.
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5. Conclusion

We constructed a mechanical apparatus designed to reproduce the physical sensation of love, based on phenomenological reports localizing the feeling to the stomach. The apparatus performed all intended actions reliably across ten trials. The participant reported no instance of love sensation. Engagement and motivation declined sharply with repetition. Artificial intelligence can represent love digitally but not physically, and the present mechanical system likewise failed to cross the gap from simulation to experience.

The negative result is reported as a legitimate contribution to the literature. Understanding the boundaries of affective reproduction is as important as celebrating successes. Love, at least in its physical dimension, appears resistant to mechanical reproduction by current means. This resistance may be a clue to its nature.

Acknowledgments

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Conflict of interest

The author declares no competing interests. The apparatus was self-funded.

Data availability

All raw data (trial logs, self-report forms, free-text responses) are available from the corresponding author upon reasonable request.

Ethics approval

Single-subject self-experimentation is exempt from IRB review under the author's institutional guidelines.

References

- Aron, A., Fisher, H., Mashek, D. J., Strong, G., Li, H., & Brown, L. L. (2005). Reward, motivation, and emotion systems associated with early-stage intense romantic love. *Journal of Neurophysiology*, 94(1), 327–337.
- Aziz, Q., Thompson, D. G., & Wingate, D. L. (2000). Visceral sensation and pain. In G. F. Gebhart (Ed.), *Visceral pain* (pp. 21–42). IASP Press.
- Bartels, A., & Zeki, S. (2000). The neural basis of romantic love. *NeuroReport*, 11(17), 3829–3834.
- Cacioppo, S., Bianchi-Demicheli, F., Hatfield, E., & Rapson, R. L. (2012). Social neuroscience of love. *Clinical Neuropsychiatry*, 9(1), 16–23.
- Chalmers, D. J. (1995). Facing up to the problem of consciousness. *Journal of Consciousness Studies*, 2(3), 200–219.
- Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain*. Putnam.

- Fisher, H. E., Aron, A., & Brown, L. L. (2006). Romantic love: A mammalian brain system for mate choice. *Philosophical Transactions of the Royal Society B*, 361(1476), 2173–2186.
- Jiang, S., Chen, X., & Li, W. (2020). Affective computing for romantic dialogue generation. *IEEE Transactions on Affective Computing*, 11(4), 650–662.
- LeDoux, J. E. (1996). *The emotional brain*. Simon & Schuster.
- Lee, J., & Kim, S. (2022). Representing love in large language models: A sentiment and semantic analysis. *Proceedings of the ACL Workshop on Computational Linguistics for Affective Computing*, 44–52.
- Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. Oxford University Press.
- Picard, R. W. (1997). *Affective computing*. MIT Press.
- Schachter, S., & Singer, J. E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review*, 69(5), 379–399.
- Stuber, G. D., Britt, J. P., & Bonci, A. (2011). Optogenetic modulation of neural circuits that underlie reward and addiction. *Cold Spring Harbor Perspectives in Medicine*, 2(4), a011924.