

Structures of Emotion: Speculating on an AI-Human Symbiosis

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Abstract

Structures of Emotion is a performance artwork that explores a symbiotic relationship between humans and an Emotion Recognition Artificial-Intelligence (AI) algorithm. The piece utilizes a wearable computing device designed to enable the wearer to recognize emotions through two different perspectives: their own organic senses and an AI apparatus, which serves as an extension of the body, connecting the human mind to a "collective consciousness." Participants interacted with two performers; one wore the AI device, while the other relied solely on their organic abilities. The performance demonstrates how AI emotion recognition systems are still immature. However, it invites us to speculate on its potential role when it becomes more sophisticated. Additionally, it explores the ethical complexities of our entanglement with emotion recognition algorithms and imagines the danger of becoming dependent on them within a transhumanist future.

Keywords

Performance Art, Artificial Intelligence, Emotion Recognition, Affective Computing, New Media Art, Interactive Media, Transhumanism, Wearable Computing.

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Introduction

In the wake of World War II, when scientists were forced to develop an array of strange destructive gadgets, peacetime was when they had to find a better use for their instruments. Vannevar Bush, a scientist, engineer, and innovator who led the US military's wartime R&D in the 1940s, suggested that the thinking human should have a new relationship with knowledge. He hypothesized a new device called the Memex, which was intended to recollect all scientific knowledge, mimic the associative processes of the human mind, and allow humans to access the collective record in a more useful way. In Bush's view, the Memex was an enlarged intimate supplement to human memory. The device included a tiny camera the size of a walnut attached to the forehead of the human. Bush argued that the wearer of this camera is the scientist of the future, absorbing worthy records through this artificial third eye while moving around the lab or the field. The Memex was designed to enhance the flow of information and knowledge to and from the brain and to make the human one with the machine ¹.

While we cherish our connection to knowledge, the thinking human is also, at least for now, an emotional being. Is technology capable of assisting us in this manner? Can AI technology enhance our ability to recognize, express, and regulate our emotions? The affective computing consumer market is consistently growing.² Major developers predict that soon all of our devices will have an 'emotion chip' in them ³. If this comes true, what would it mean for human society? How will it impact our behavior and our relationships with one another? To unpack these questions, we follow up with Marshall McLuhan's famous statement that "The Medium is the Message" and ask what kind of message affective AI bring with it? For McLuhan artistic exploration can always be relied upon to tell the old culture what is beginning to happen to it; serving as, what he called, a "Distant Early Warning System," art enables us to discover and prepare for changes in our society.⁴ The artwork we present in this paper may be considered along these lines.

Structures of Emotion is a series of two interactive, participatory performances that examine a symbiotic relationship between humans and AI algorithms. It utilizes a device that is almost identical to the wearable element of the Memex. Using a tiny camera on the performer's forehead, the device detects, identifies, and communicates the emotions of participants. A second performer, unaided by the AI device, interacts with the

same participants and attempts to recognize their emotions. A playful interaction between the performers and participants illustrates how emotion recognition algorithms are still in their infancy. Nevertheless, tensions between humans and machines remain evident. The piece elicits a debate about how algorithms might impact human behavior. In addition, it raises further speculations about our transhumanist future and the dangers of becoming dependent on machines to moderate our emotions, an essential element of human identity.



Figure 1: The wearable device that was used in the performance *Structures of Emotion*. Image: Kyle Adler.

Implementation Details The Wearable Device

Structures of Emotion uses an ocular-centric AI emotion recognition system. A tiny camera is attached to the wearer's forehead, essentially serving as a third eye. The camera is connected to a Raspberry-Pi microcomputer attached to the wearer's head, an LED display panel attached to the chest, and a handheld Bluetooth speaker. The entire apparatus is battery powered and tetherless so that the wearer can move freely (Figure 1). The microcomputer hosts an off-the-shelf AI emotion recognition model, outsourced from the computer vision GitHub community.⁵ As with other AI emotion recognition models, this model is based on classical

theories claiming that emotions can be categorized into a limited number of primary, universal emotions.^{6, 7} These include the emotions "Happy," "Sad," "Angry," "Disgusted," "Surprised," "Fearful," and "Neutral." As soon as the device recognizes an emotion, it is displayed on the LED panel and announced with a distinctly computer-generated voice, "You Seem Happy" or "You Seem Angry," depending on the detected emotion.



Figure 2: *Structures of Emotion*, street performance. Downtown Santa Cruz, CA. Summer 2021.

The Performance

The wearable device was used in two types of performances: a street performance and an online performance. In both types, two performers interacted with the audience and recognized participants' emotions via two different methods. One performer wore the AI device, allowing the machine to act as her voice. As the device recognized and announced the participants' emotions, the performer remained emotionally detached and unresponsive. A second performer, unaided by the wearable device, facilitated the encounter while using his own organic senses to recognize and voice participants' emotions as they appear through his eyes. The street performance took place during summer 2021 in downtown Santa Cruz, CA. It lasted about 60 minutes and included participants who seemed curious, available, and comfortable interacting without their face masks (Figure 2). The online performance was held in an online Zoom meeting during fall 2021. Participants volunteered to join the meeting, so the interactions with them were more deliberate. Each participant was observed individually for 15-20 minutes, allowing both performers to attempt to recognize and announce the participant's emotions (Figure 3).



Figure 3: *Structures of Emotion*, online Zoom performance. Fall 2021. The left panel shows a participant who allows the performers to observe his face and attempt to identify his emotions. The upper right panel shows the performer wearing the AI device. The lower right panel shows the performer who detects the participants' emotions without using the wearable AI.

Audience Reception Trying to Beat the Machine

Many participants attempted to manipulate the way the device recognized their emotions. They consciously altered their facial expression or, in one participant's words, tried to "channel different emotions." Through this playful interaction, participants felt motivated to score each of the device's possible outputs. A similar engagement is prompted by the artwork 'Emojify' in which participants are encouraged to fake their emotions: "Can you make the emotion recognition system read you as happy, sad, or angry? Can you beat the machine?"⁸ Performing one's emotional expressions is one of the most persistent critiques of the classical emotion recognition theory. Our ability to swiftly change our facial expressions demonstrates how they can be disconnected from our actual emotional state.⁹ It is therefore essential to ask what exactly the AI device detects; Is it recognizing participants' emotions or merely observing facial expressions? Similarly, we can ask whether a human is capable of acknowledging another person's emotions. Can we see each other's expressions and know what emotions they convey?

Participants' tendency to alter their behavior in the presence of an AI algorithm illustrates how recognition systems can retrain human behavior. We are already conditioned to perform emotions when we are with others because our society normalizes some emotions and devalues others.¹⁰ By incorporating AI systems into our environment, we are now also required to change our behavior in the presence of algorithms.^{11, 12, 13} The automatic recognition of emotions is likely to comply with society's demand that anyone who appears angry or upset will be discriminated against. Instead of

understanding the reasons behind such strong emotions, AI systems will assist in excluding or repressing those who express them. This idea is well illustrated in the Japanese cyberpunk anime PSYCHO-PASS (2012), where an advanced surveillance system constantly monitors citizens' mental states to predict their criminality potential. Expressing negative emotions increases an individual's crime coefficient index, and when this index exceeds a certain threshold, the individual gets arrested or killed. In this sense, we agree with artist and philosopher Hito Steyerl, who claims that incorporating AI systems into conflicts that we can still not resolve on our own ignores the complexities of singular human experiences and the emotions they evoke. Human conflict, she claims, is often needed, ignoring it only weaponizes interactions and leads to further polarization.¹⁴ Before further establishing our relationships with AI emotion recognition systems, we must ask ourselves if we are willing to fake a smile to pass as good members of our society. This idea recalls Yue Minjun's paintings of cloned humans with exaggerated grins on their faces. While smiley faces are easily considered "happy," they can also be viewed as mandatory masks worn by members of a society that prioritizes appearance over genuineness.¹⁵

Entering Affective Loops

Most participants smiled as they became engaged with the performance. In response the device repeatedly announced: "You seem happy." This resulted in more smiles and laughter on the participants' behalf. One of the participants who kept being detected as "Happy" affirmed the device's announcements and stated: "I am radiating happiness right now." Per societal values, participants seemed satisfied to be detected as "Happy." On the other hand, those classified as "Angry" or "Sad" seemed annoyed by these results, stating that they did not feel sad or angry and questioned the device's accuracy. The responses can be explained within the 'Affective Loop' framework; Participants express a particular emotion through a physical manifestation, and the system responds according to whatever parameters it was trained on. In return, participants react back in an even more involved manner.¹⁶ Participants were quick to enter these affective loops with the machine. Yet, as the performance progressed, we noticed they were as quick to lose interest in the device's repetitive, limited, and laconic responses. Instead, they grew more interested in what the performer, unaided by the AI, had to say about their emotions.

The performer who evaluated participants' emotions without the aid of the AI device felt transformed by the experience. Although it may be seen as a mundane task that we regularly perform when interacting with one another, attempting to be fully attentive to someone standing in front of us is not trivial. In the performer's account, emotions could not be accurately expressed in words. Participants' ephemeral facial expressions and other fleeting manifestations of their body language required a compassionate presence that evoked care, simply listening with the body and only speaking to express apparent emotions. During the interaction between participants and this performer, both sides appeared to be involved in a deeper affective loop. In the same way as the participants, the performer responded to the situation and felt the need to generate feelings he hoped to describe within himself. As a result, he became increasingly involved and realized that seeing does not suffice to understand another's feelings.

Comparing Human and Machine Abilities

Participants standing in front of the performer who was wearing the AI device stared directly into her eyes, almost as if they assumed that she was the one recognizing their emotions. They rarely seemed to look at the camera on her forehead. At the same time, they did not attempt to speak with her during the performance. Perhaps it was her detached mode of communication that made her seem almost nonhuman and robotic. But as described above, as much as they were fascinated with 'her' responses at the beginning of the interaction, they quickly lost interest in the mechanic repossess she delivered through the AI device. For a machine to be successful as a human in an emotional interaction, it needs to provide an illusion that it is authentically and socially engaged over an extended period of time. Such abilities are known to be challenging in developing social robots that are designed to be perceived as socially intelligent,¹⁷ able to deliver successful shared emotional experiences.¹⁸ Participants in *Structures of Emotion* could compare the humans' versus the machine's abilities to recognize emotions. It was evident from the performances that the AI device is still premature. Yet the artwork evoked questions regarding our understanding of our own emotions, provoked thought regarding our relationship with AI algorithms, and triggered a transhumanist

imagination in which these algorithms are interfaced with the human body, and we become entirely dependent on them.

Discussion

Structures of Emotion and its interactive performances explored a synergistic relationship between humans and machines. We sought to enhance human emotional capacity by directly augmenting it with an artificial one. This was afforded by attaching the artificial intelligence to the body, providing the wearer an amplified vision that originates with what can be called a "collective consciousness" potentially serving as an extension of the mind. With the Memex in mind, designed to shift "thinking" into a "thinking-with" ideal, we aimed to examine a similar standard with emotions. Can humans and machines form a "feeling-with" relationship? What would it mean for us to sense the world and mediate our emotions in symbiosis with machines?

What Do We Really Know about Emotions?

Before interfacing our emotions with algorithms, we must question our abilities to understand emotions. According to the classical theory described above, emotions are universal and can be classified into primary categories based on the distinctive movements of facial muscles. Despite this, there is still a debate on what we know or do not know about the function and purpose of emotions. Among the critiques of classical theory is the claim that the experiments used to show that emotions are universal were too simplified, disregarding the ever-changing context within which emotions are expressed.¹⁹ Some scholars claim that we should not ignore cultural factors that impact emotional expressions.²⁰ And other, more recent voices, state that emotions are merely guesses made by our brains. Thus, facial expressions cannot accurately indicate a person's mental state ²¹.

While the controversy over human emotions has yet to be resolved, governments and tech companies are actively developing and incorporating AI algorithms to recognize human emotions. Algorithms of this type are already used in national security systems,²² education platforms,^{23, 24} hiring startups,^{25, 26} and police programs.²⁷ According to Rana el Kaliouby, cofounder and CEO of "Affectiva," the first company to market "emotion AI," when humans recognize emotions, they

are often incorrect.²⁸ Since we do not yet have a good definition of emotions, this statement may be true. But what does it mean about the algorithms we design to understand and regulate emotions for us? Do they know any better? The primary goal of these algorithms is to optimize efficiency and productivity and compensate or ultimately replace a 'fallible human'. Similarly, many other techno-fixes hold grandiose promises to help us but end up enhancing our problems while simultaneously providing us with an excuse to ignore them.²⁹ Even though emotion recognition algorithms have immense market value, we must ask ourselves what is at stake when we use them prematurely.³⁰

In *Structures of Emotion*, the design of the wearable device aims to expand human consciousness into a collective one. If AI models are trained on large enough datasets, they can arguably be considered to symbolize a "collective consciousness." Nevertheless, it is essential to ask what exactly goes into this consciousness. The model we used here was trained on a dataset that contained about 28,000 images of faces labeled according to their apparent emotional expressions and categorized by the classical theory's primary categories. It is unclear how these images were collected, who are the people seen in them, and in what context they are expressing their emotions. It becomes apparent when we examine the dataset that the 'collective consciousness' is more of a "selective consciousness" than anything else. Images are stripped of their personal, social, and political meanings, and no evidence exists that the labeled emotions represent anything that was actually felt. Undoubtedly, this AI model is simple and, therefore, less robust than those used by companies such as 'Affectiva'. Nevertheless, we argue that even a "high quality" or presumably a fairer dataset (if this is even possible) would still lack substantial support that proves that it works "correctly."

Attaching an AI System to the Body

Artificial intelligence systems that recognize emotions are usually disembodied. These models often look at us from far away without us realizing they are watching. Donna Haraway described this kind of gaze as an "unregulated gluttony," a "god-trick illusion of seeing everything from nowhere." Such a gaze, she asserts, "fucks the world."³¹ Our idea to attach an AI model to the body is inspired by her call to reemphasize vision through alternative feminist perspective. However, we found that even when the AI gaze is lowered to the level

of the human eye, it can still operate as an asymmetric gaze from nowhere. Such understanding is also apparent in Karen Palmer's interactive film *Riot AI* (2016) which emphasizes a potentially violent encounter between a rioter and a police officer, mediated by an emotion recognition algorithm. Although the system is attached to the officer's body, it still serves as a gaze from nowhere. The policeman does not actively participate in evaluating the emotions of those who are stopped and assessed, he simply reacts according to the outcomes of the algorithmic gaze.

As part of the design of *Structures of Emotion*, we considered how the AI might extend the wearer's mind and augment their perspective. Wearing the device allows one to use their organic senses while being constantly guided by the device's perspective. Using both views, the wearer can note when they agree or disagree with the outputs of the device. Wearers may then ask themselves: "Do I understand this situation? Do I agree with the AI's assessment of this person's emotions? Can I recognize, acknowledge, and respect these emotions?" With that, both the human's and machine's emotion evaluation practices come into question. This is also where other cognitive abilities can come into play and the wearer can then use this opportunity to spark a conversation with the person in front of them and ask, "How do you feel?" The answer to this question may remind us that technology is far from maturing beyond its maker and that both humans and machines still have much to learn. By adding another perspective to our vision, the wearable device may promote traditional practices of conversation between people, nurturing relationships of attention and care.

Wearable computers, were extensively explored by researcher Steve Mann who claims that the intimate relationship between humans and these devices leads to exceeding the wearer's capabilities. For him, the fundamental purpose of wearable computing is personal empowerment.³² Nevertheless, he also expresses concern that people may become dependent on this technology if they use it for an extended period of time.³³ It is possible that dependency could lead to the erasure of human knowledge and the decline of organic human capabilities. Such a process might seem difficult to imagine with the wearable used in *Structure of Emotions*; however, it is easy to imagine a time when the algorithms will be far more sophisticated, and our dependence on them would seem inevitable.

Imagining Transhumanist Futures

Human-AI bi-directional symbiosis goes well beyond wearable computing. It imagines a speculative future in which AI and Humans can potentially merge into a super-intelligent, transhumanist figure. In this potential future, both humans and AI symbionts benefit from the symbiotic relationship. This relationship will be strengthened by AI's ability to detect, communicate, and express emotions. Humans are still better at this task than algorithms, but we envision a future in which algorithms may surpass human abilities and even erode humans' emotional capabilities. In considering the benefits humans might bring to this symbiotic relationship, we argue that they are centered around the body, its biological structure, and natural sensitivities. Currently, AI faces major challenges in shifting from a narrow to a more general intelligence owing to its imbalance in dealing with abstract truths versus the gritty world of exceptions.³⁴ In most cases, AI algorithms function as disembodied software with a huge appetite, but however much we 'feed' them, they still lack a solid understanding of the world. This is evidenced by the numerous instances in which AI models have produced racist, misogynistic, offensive, or seemingly absurd content. By attaching these models to the human body, they can benefit from the body's inherent knowledge, adaptation to the environment, and attachment to the world.

The human-AI bodies of the future will likely go far beyond fashionable devices and include brain-computer interfaces. Despite the fact that brain-machine interfaces have not yet become a reality, neuroscience research has already made impressive advances in this direction. Among the most famous examples is the monkey Aurora who operated a robotic arm just by thinking about doing so.³⁵ With current scientific advancements we can easily speculate soldiers operating weapons with their thoughts while suppressing feelings of fear and anxiety using brain devices.³⁶ The transhumanist techno-optimistic trajectory of such projects aims to empower individuals. But is this necessarily the case? Will this super-intelligent Human-Machine figure function as an enhanced individual? Or not?

We define ourselves by our emotional capacities; they are based on millions of years of evolutionary adaptation for survival and advancement. What will be our role in the world if we depend on AI algorithms to mediate our emotional landscapes? How can we avoid becoming nothing more than a numb 'meat' body carrying around an AI algorithm? Transhumanists argue that the continuation of personhood is essential in becoming a transhuman. It must include the continuity of memories, attitudes, values, and emotional dispositions.³⁷ In light of

this condition, we can already see the consequences of sharing our emotional abilities with AI. As philosopher Susan Schneider explains, we can reject the idea entirely because techno-enhancements themselves alter the pattern of the original individual. Their impact on identity is always significant. For her, "the transhumanist developmental trajectory... is a technophile's alluring path to suicide."³⁸ A glimpse of such alterations in one's identity was even evident in the performances of *Structures of Emotion* with participants and performers changing their behavior by responding to the presence of an AI algorithm within their shared space.

Conclusion

The artwork *Structures of Emotion* was designed to articulate an AI-Human symbiosis. Physical limitations, however, prevented the artists from fully conveying this idea. Emotion recognition algorithms are still premature. Data they are trained on is devoid of context and potentially biased. It is still necessary to gain a deeper understanding of emotions' definition, function, and purpose. It is unclear what is the impact of either disembodied or embodied relationships with AI algorithms. For obvious reasons none of the performers were ready to integrate an artificial intelligence algorithm into their bodies in any invasive manner. Even wearing the device was somewhat cumbersome. Despite the limitations, this artwork still allowed us to consider the potential of such a symbiosis, speculate on its implications, and imagine its future. We realize that emotion recognition algorithms are a crucial step forward for human-computer interactions and we posit that any use of such algorithms invites us to think more broadly about what it means to be emotionally intelligent. It is possible for AI to expand our emotional capacities, but it also holds the risk of eroding them. It is important to consider the design of these algorithms as well as the way they interface with our bodies. If this artwork can indeed serve as a McLuhanist Distant Early Warning system, we must strongly advocate that the integration of this technology will give us more agency and autonomy over our emotional states, improving rather than eroding our most human drive for meaningful, intimate relationships with one another.

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