"DESIGNED TO MANIPULATE: PSYCHOLOGICAL DESIGN ETHICS IN THE ERA OF GREEN TECH"

Research Paper

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"Abstract"

Digital technology has been a big part of making people act in a way that is good for the environment, like apps that track emissions and green-commerce interfaces. The persuasive features built into these systems, like nudges, gamification, and emotional triggers, make it hard to tell the difference between ethical influence and psychological manipulation. This research investigates the impact of sustainability-focused digital platforms on user autonomy and trust through persuasive design. The study employed a mixed-methods approach, incorporating survey data, experimental testing, case studies, and expert interviews, to examine whether green-tech experiences empower or exploit individuals. The study introduces a Psychological Design Ethics Framework that delineates openness, empowerment, and fairness as the core principles of ethical digital sustainability.

Keywords: *Green Technology, Psychological Design, Digital Ethics, Nudging, Sustainable UX,*

1 Research Scope

A lot of the time, sustainability platforms say they are tools that help people learn about the environment and make moral choices. But a lot of these platforms use psychological design tools like nudging, gamification, and emotional cues to get people to act in certain ways. These strategies can effectively promote environmentally beneficial behaviors; however, they raise ethical concerns related to user autonomy and the intricate manipulation of decision-making processes.

The goal of this study is to investigate an important question:

(i) Do persuasive design strategies in green technology genuinely promote environmental stewardship, or do they covertly exploit users under the guise of sustainability?
(ii) The research aims to identify design strategies utilized in green-technology platforms that are both persuasive and potentially misleading, evaluating their effects on user behavior and emotional responses. It also seeks to examine user perceptions of trust, autonomy, and ethical awareness concerning various persuasive design elements.
(iii) Integrate data from surveys, experimental trials, and expert interviews to delineate the distinction between ethical persuasion and psychological manipulation. Develop a structured framework for ethical psychological design to facilitate the creation of enduring digital platforms that harmonize user welfare with behavioral influence.

- The study investigates the mechanics of digital persuasion while reconceptualizing success through an ethical lens. It enhances scholarly discourse and professional practice by offering a pragmatic, ethically grounded methodology for user experience (UX) design—one that harmonizes sustainable goals with an understanding of human cognition, emotion, and autonomy.

1.1 Theoretical framework

This study is based on three psychological and behavioral theories that work together to explain how persuasive design affects how people make decisions. By synthesizing these frameworks, the study

establishes a comprehensive framework for the rigorous assessment of the ethics of digital persuasion in sustainability.

1.1.1 Nudge Theory

Nudge Theory posits that human behaviour can be influenced by nuanced modifications in decision architecture—the presentation of alternatives rather than the options themselves. People can be encouraged to make eco-friendly choices without being forced to do so by small things like default settings, reminders, or progress bars. For example, when a sustainability app automatically chooses the "green option" (such eco-delivery or energy-saving mode), it uses convenience to steer behaviour while still letting people choose. But Nudge Theory also brings up moral issues. When there isn't enough transparency, even a helpful nudge can feel like manipulation. Consequently, the study employs this theory to comprehend how digital design incites action and to assess the demarcation between ethical intention and behavioural control.

1.1.2 The Fogg behaviour model

The Fogg Behaviour Model (Fogg, 2003) posits that behaviour occurs when motivation, ability, and trigger converge simultaneously. Gamified designs in green technology use simple actions (ability), feedback that rewards (motivation), and prompts or reminders (triggers) to put this trinity into action. For example, eco-apps that give out badges for recycling regularly or celebrate milestones keep people motivated and make it easy to do things that are good for the environment. This approach clearly shows how digital persuasion increases engagement, but it also shows a big weakness: when designers use emotional manipulation to boost motivation instead of informed awareness, they risk losing autonomy. The FBM explains why the framework works and why it's important to be ethical when using persuasive methods.

1.1.3 The dual-process theory

The dual-process theory divides cognition into two types

(i) System 1: fast, automatic, and based on feelings.
(ii) System 2: slow, careful, and analytical.

Most persuasive design targets System 1, which means it uses colour psychology, visual appeal, or emotionally charged words to get people to act on impulse. This is good for getting people involved, but it could be bad for ethics because people might do what you ask without really knowing why. Kahneman asserts that excessive reliance on intuitive processing may lead to cognitive bias and emotional manipulation. This study employs Dual-Process Theory as a framework to assess the psychological intricacies of digital persuasion, differentiating between deliberate decision-making that respects consciousness and instinctive responses that exploit it.

1.1.4 A holistic view

When looked at combination, these three ideas make a consistent framework for judging how ethical persuasion works in sustainable technology.

(i) Nudge Theory shows how design can affect decisions without using force.
(ii) The Fogg Model talks about how triggers and motivation work together to get people to do things.
(iii) Dual-Process Theory explains the cognitive weaknesses that occur when emotional stimuli overshadow deliberate reasoning.

By merging these concepts, the study offers a balanced viewpoint that encourages behavioral efficacy while simultaneously enforcing moral responsibility. The amalgamation of these theories forms the intellectual foundation for the Psychological Design Ethics Framework for Green Tech, guiding both the analytical and prescriptive dimensions of this research.

1.2 Research objectives

The study seeks to investigate the ethical implications of persuasive design in sustainability-oriented digital platforms on user behaviour, ensuring the preservation of trust and autonomy. To do this, the following goals have been set:

(i) Sort the persuasive design elements that are commonly used in apps for green technology and sustainability and give examples of when these elements could go from being persuasive to being misleading.
(ii) Examine users' feelings of trust, emotional involvement, and perceived autonomy when they use persuasive eco-interfaces, and look at how these factors affect ethical awareness and user enjoyment.
(iii) Examine the impact of various persuasive modifications, such as emotional cues, gamification, or choice framing, on user retention and the continuation of environmentally beneficial behaviors.
(iv) Propose an Ethical UX Design Framework that strikes a balance between empowering users with choice and shaping their behavior.

This will help people who work in sustainability and make policies by giving them good design tips.

1.3 Methodology of the study

This study utilizes a mixed-methods research design, integrating both quantitative and qualitative methodologies to achieve a holistic understanding of psychological design ethics in sustainability-oriented digital platforms (Creswell and Clark, 2007). The integration of methodologies allows the research to go beyond mere numerical patterns and uncover the emotional, ethical, and experiential dimensions of user behavior. The quantitative component, comprising structured surveys and controlled experimental trials, provides measurable evidence of the extent to which users trust, feel liberated, and emotionally respond to persuasive design strategies. These methods record behavioral patterns and clarify the relationship between persuasive stimuli and user engagement metrics. The qualitative component, encompassing semi-structured expert interviews and assessments of real-world case studies, provides comprehensive interpretation and contextual understanding. The study clarifies the incorporation (or exclusion) of ethical awareness in the creation of sustainability applications, guided by professional perspectives and discernible design practices. When combined, these methodologies form a study design that ensures both empirical rigor and contextual understanding. The mixed methods approach not only verifies results through triangulation but also enhances the reliability of the conclusions. The main goal of the study is to make an Ethical UX Framework that is both theoretically sound and useful for designing technologies that are sustainable and put people first. This integration fits with that goal.

1.3.1 Case studies

To put the study's results in context, many well-known sustainability platforms were looked at. Each one shows a different way to use persuasive design and teaches us something useful about how ethics works—or doesn't work—in real digital ecosystems.

(i) Ecosia (Worldwide): Ecosia is a search engine that helps the environment by planting trees with the money it makes from ads. The "tree counter," which is its main feature, shows how many trees have been planted, making it possible to see how people are affecting the environment. Millions of people have joined because of this openness, but many users have asked how accurate and verifiable these numbers are. The platform's partial openness—motivating but not complete—shows that transparency needs to be more than just showing off to stay credible.
(ii) Too Good to Go (Worldwide): This app helps people all over the world waste less food by connecting them with bakeries and restaurants that have extra meals for sale at a discount. Its time-sensitive products do a good job of cutting down on waste, but they rely heavily on scarcity-based nudges and urgency triggers like countdown timers. People want to respond quickly to these signs, but they can also make people feel stressed or like they have to decide. The design is good, but it makes people wonder if the behavioral effects are worth the mental stress it puts on users.
(iii) Amrutam (India): Amrutam is an Ayurvedic lifestyle brand that is based on Indian culture. It uses games and stories to encourage health and sustainability. Its design philosophy is based on cultural trust, traditional stories, and fun digital interactions. Loyalty programs and interactive challenges that feel natural and fit with the culture make people want to interact with content. Amrutam's method, on the other hand, encourages emotional honesty and shows how telling stories from your own culture can morally motivate people to act.

These stories show a wide range of persuasive ethics, from real participation to hidden coercion. They demonstrate that ethical judgment in sustainability design varies.

1.3.2 Survey research

A structured online survey was conducted with 120 participants aged 18 to 35 to examine their emotional and ethical perceptions of persuasive sustainable technology. We chose this group because they are very good with technology and use apps that help them track their environmental impact, recycle, and save energy. There were both quantitative Likert-scale questions and qualitative open-ended answers in the survey. This means that it asked people not only what they did, but also how they felt about persuasive design strategies. The results painted a complicated picture of hope and doubt.

Most of the people who took part said that using eco-apps made them feel good, especially proud, motivated, and happy. They were motivated by progress indicators, reward systems, and personalized reminders that praised their small but important efforts to help the environment. A lot of people thought that these design features gave them a sense of purpose and helped society. But deep down, they were always unsure. Half of the people who answered also said that they sometimes thought the app was quietly pushing them to do things they wouldn't have done otherwise. Words like "tricked," "pressured," and "guilted" came up a lot in the qualitative responses.

The pattern was clear: people preferred to be honest than to be persuaded. "Clarity" and "openness" were the two most common values that people gave when asked about digital trust. Users said they would rather use platforms that explained why they were being asked to do something and how their actions fit into the bigger picture of sustainability. This finding aligns closely with the first pillar of the Psychological Design Ethics Framework—transparency—affirming that moral clarity is both an ethical necessity and a strategic imperative for sustained engagement.

1.3.3 Experimental design

To validate the psychological dynamics identified in the survey, a controlled experimental investigation was conducted using two prototype sustainability interfaces. The aim was to investigate the influence of different persuasive tones—neutral versus emotional—on user behavior and perceived autonomy.

The participants were randomly divided into two groups.

(i) **Group A** (Neutral Interface): They used a clean, informational design that gave them information about sustainability and clear options for what to do next without trying to make them feel anything.
(ii) **Group B** (Emotional Interface): Saw things that made them feel bad, like emotional slogans, progress streaks, badges, and reminders that said things like "Every drop you waste costs the planet."

The behavioral data showed a clear difference. The emotional interface significantly enhanced both click-through rates and task completion, demonstrating that emotionally driven persuasion is an effective method to incite action. But the qualitative feedback revealed a psychological trade-off: users in this situation described their experience as "pressuring," "performative," and "less authentic." Many individuals expressed discomfort, feeling as though their emotions were being manipulated rather than acknowledged. People who used the neutral interface, on the other hand, said they felt more "in control," even though they did fewer things. They said their experience was calmer and more "honest," which showed that they felt respected and in charge of their own lives. This conflict between behavioral efficiency and psychological freedom was a major finding of the study. Emotional persuasion can boost participation, but if it's not done ethically, it could take away users' freedom, which is the most important part of true sustainability. These results show how important it is to find a balance: design should inspire people without controlling them. The experiment showed that the quality of interaction is more important than the amount of involvement. Sustainable technology achieves its true purpose not only when users engage, but also when they understand and choose to act with awareness.

1.3.4 Expert interviews

To augment the quantitative findings, three semi-structured interviews were conducted with specialists in user experience, digital ethics, and sustainability strategy. These talks gave us useful real-world perspectives that helped us make sense of the empirical data by putting it in the context of professional knowledge and industrial experience.

(i) UX Designer, Mumbai
The designer said that giving users positive feedback is what keeps them motivated. People stay interested when feedback is given as help instead of criticism. On the other hand, guilt-based cues make people feel bad and make them stop or avoid doing something. The finding showed how important tone and empathy are in persuasive communication.
(ii) Digital Ethics Researcher, USA
The designer said that giving users positive feedback is what keeps them motivated. People stay interested when feedback is given as help instead of criticism. On the other hand, guilt-based cues make people feel bad and make them stop or avoid doing something. The finding showed how important tone and empathy are in persuasive communication.
(iii) Amrutam, a sustainability consultant, Delhi
He said that the poll's findings were very similar to what the consultant said: trust, not perfection, keeps people interested over time. Being open about problems or limits in communication about sustainability helps build trust.

These experts from different fields all agreed that ethical persuasion must protect human dignity, respect autonomy, and put informed choice ahead of behavioural control. The convergence of perspectives from many domains—design, ethics, and sustainability—enhances the professional credibility of the study's principal thesis: that digital persuasion is most effective when it empowers rather than coerces.

1.3.5 Data integration

We saw a very clear pattern in all the data when we looked at the survey results, the experiments, and the expert interviews all at once. Both participants and professionals responded best to designs that were clear, encouraged voluntary participation, and allowed for open feedback loops. When users knew

exactly what a feature did and how it helped with bigger sustainability goals, they thought the interface was real and trustworthy. This clarity turned digital persuasion from a hidden influence into a clear partnership between human will and technical instruction. On the other hand, designs that used emotional pressure, including guilt-based or urgency-driven messages, made people feel resistant, doubtful, and emotionally drained. People who answered said these kinds of events were "pressuring," "heavy," and "less genuine." These answers show how manipulation can have psychological effects, even when the behavior seems good at first. The triangulated approach shows that ethics is not an outside limit but an inside catalyst for performance improvement. Ethical design keeps people interested by making them respect the system and the user, not by changing their behavior. When persuasion is based on fairness, giving people power, and being open, they feel safe, aware, and motivated to keep going. The research shows that ethical design is both the moral compass and the driving force behind sustainability. It keeps meaningful connections and credibility alive, making sure that digital innovation moves forward with human integrity at its core.

1.4 Ethical framework

The Psychological Design Ethics Framework illustrates the interplay between persuasive design elements and ethical principles in influencing user engagement with sustainable technology systems. Justice, empowerment, and openness are the three main ideas that shape psychological integrity in persuasive design.

(i) Persuasive Elements (like nudges, gamification, and emotional triggers) begin to alter behavior at the surface level.
(ii) Ethical principles are like middlemen that decide whether persuasion is polite or not.
(iii) The outcome layer, User Experience, shows how trust, freedom, and long-term engagement have changed.

This triangle shows that ethical persuasion doesn't mean the same thing as effectiveness. It changes what it means. People are more likely to change their behavior on their own and stick with it when they feel empowered and knowledgeable.

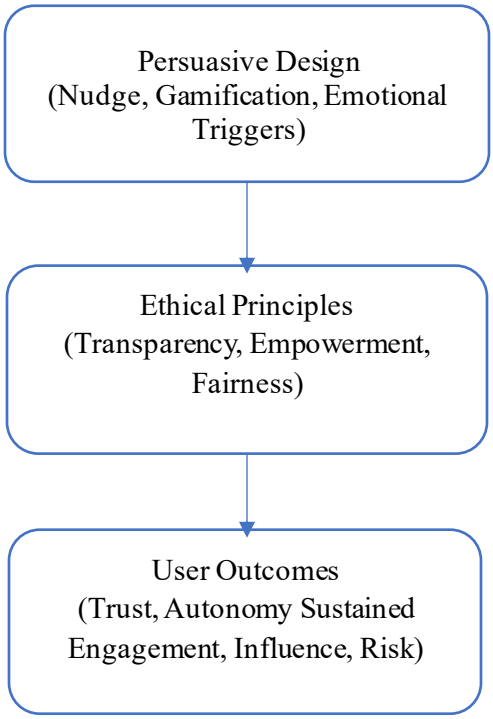

Figure 1: A framework for the psychological design ethics of green tech
(Developed by the author, Dr. Sangieta Pande, 2025, based on mixed-method research findings.)

1.4.1 Understanding the psychological design ethics framework

Ethics Framework for Green Tech is where behavioral science, ethics, and human well-being come together. It sees being aware of ethics as finding the right balance between being effective and feeling safe. The approach says that responsible persuasion can help people become more sustainable without taking away their freedom or dignity. When persuasion is based on openness, users know why certain design signals they are there and how affect their choices. This openness turns the digital interface from a secret manipulator into a clear teacher. Transparency fosters cognitive trust, enabling individuals to remain cognizant of the persuasive process while voluntarily participating. The second concept, empowerment, ensures that individuals act out of desire rather than obligation. It recognizes that authentic behavioral change occurs solely when individuals feel a sense of ownership over their actions.

Ethical empowerment transforms the user's role from a passive recipient of design to an active participant in the pursuit of sustainability. When people believe they oversee their own actions, their motivation becomes stronger and more important. The third ethical pillar, fairness, adds compassion to the art of persuasion. It tells designers to be honest about their feelings and reminds them that the mental health and emotional safety of users should come before environmental measures or business performance indicators. Real innovation can't last if it doesn't care about people's health and happiness. To be fair, you need to be able to see things from someone else's point of view. Your conscience, not your fears, should be what persuades you. These rules change design from a tool for persuasion into a partner for awareness. It becomes a learning partner that helps people make decisions that are in line with their own goals and values.

The approach views ethical design as a moral collaboration between individuals and technology. Consequently, the Psychological Design Ethics Framework has two primary objectives within the realm of research:

(i) Analytical Purpose: It is a way to check the ethical integrity of current green-technology interfaces. Researchers and professionals can use this method to find out if current systems really promote autonomy, transparency, and justice, or if they just pretend to be fair to get more people to use them.
(ii) Prescriptive Purpose: It gives a guiding idea for making future persuasive technologies that are good for both the mind and the heart. Designers can use the framework to help them make digital experiences that are good for the mind, smart about feelings, and honest about morals. It encourages artists to do more than just "green" branding and make ethics the basis of every interaction.

This idea basically changes the definition of persuasion from a way to control behavior to an ethical collaboration. It means that when ethics, empathy, and empowerment work together, technology goes from being a tool for manipulation to a way to teach people to be aware. This makes both personal responsibility and social sustainability stronger.

1.5 Expected findings and practical implications

1.5.1 Theoretical contribution

This work augments the evolving field of behavioral design by integrating psychological ethics and sustainability into the traditional effectiveness-oriented discourse of persuasive technology. Most contemporary research in this domain prioritizes performance outcomes, particularly the efficacy of a design in modifying user behavior, often overlooking the ethical and emotional dimensions of that influence. This research challenges the idea that effectiveness is a sufficient measure of success. It reconceptualizes persuasion through the Psychological Design Ethics Framework, framing it not merely as a technical instrument but as a moral connection between the designer and the user. The findings expand upon the research of Fogg (2003) and Thaler & Sunstein (2008) by asserting that ethical responsibility must accompany behavioral design. It demonstrates that persuasion founded on transparency, empowerment, and equity can yield both ethical and enduring outcomes, wherein

individuals act not due to covert persuasion but by their own volition. This methodology integrates behavioral science with moral philosophy, positioning ethical consciousness as central to sustainability. It improves theoretical understanding by showing that ethical persuasion can build more trust, intrinsic desire, and long-lasting changes in behavior. It improves theoretical understanding by showing that ethical persuasion can build more trust, intrinsic desire, and long-lasting changes in behavior.

1.5.2 Business and design implications

The findings of this study significantly impact businesses, marketers, and designers engaged in the development of next-generation eco-friendly technologies. Companies that use ethical persuasion in their design philosophy have a big edge over their competitors in a market where trust and openness are becoming more important. It's no longer just a nice thing to have; ethical design is a way to stand out from the crowd.

For people who work in the field, the insights lead to the following steps:

(i) Design for clarity, not control: Every persuasive element, like a pop-up, a progress tracker, or a recommendation, should make it clear why it is there. People care more about being honest than being quick. A clear push makes people feel more at ease and builds trust over time.

(ii) 2. Instead of making people feel guilty, make them feel proud. The findings indicate that positive reinforcement, such as commending users for their progress and achievements, sustains their motivation over time.

(iii) Designers should use emotional triggers that make people feel proud and like they belong, not ashamed or pressured. People are more likely to do things that are good for the environment when they are encouraged, not scared.

(iv) Before using people's data, make sure they give informed consent. As AI-driven persuasion becomes more common, people need to know how their data affects the recommendations they see. Ethical design means being honest about how algorithms work and how data is used to make things more personal. When people know what they agree to, they feel valued and stay loyal.

(v) Gamification can help people feel powerful: Gamified systems work best when they reward good behavior instead of punishing bad behavior. Users feel like they own their trip when they get rewards for reaching milestones, see how their actions affect the environment, and set their own goals.

(vi) When used together, these ideas form the basis of an ethical user experience (UX) approach that strikes a balance between doing the right thing and being relevant in the market.

Ethical persuasion not only makes a brand more trustworthy, but it also turns the interaction between businesses and customers into a partnership based on trust, independence, and shared values. By taking this route, companies go beyond short-term engagement measures and create long-lasting sustainability ecosystems, where every design choice is a sign of moral responsibility.

1.5.3 Policy implications

Policymakers play a crucial role in establishing the ethical boundaries of persuasive technology. Governments and regulatory bodies must ensure that digital interfaces function in a manner that is equitable, transparent, and respectful of individual rights, given their increasing influence on consumer behavior. Ethical design should not be an optional moral guideline; it should become a norm for compliance that can be measured. The EU Digital Services Act (2023) and the EU Artificial Intelligence Act (2024) have already made progress in this area by mandating platforms to be open about how their algorithms make decisions and stop using design techniques that are meant to trick people. India's Data Protection Bill (2023) also stresses the user's right to give informed consent and be responsible for data-driven persuasion. Following these thoughts, sustainability certifications might include ethical audits. This would mean that technology companies are judged not only on how well they help the environment, but also on how safe and honest their designs are for people. Policymakers can promote a new kind of "digital sustainability" by adding ethical checks to certification systems. In this new kind

of sustainability, trust and responsibility are seen as important parts of the environment. These kinds of rules would make designers put the freedom of the user first, encourage open-ended innovation, and stop using engagement methods that take advantage of people. In the end, enforcing ethical persuasion through laws can make sustainability a moral agreement that everyone, including governments, businesses, and people, agrees to. Not just following the rules, this contract will be based on empathy and responsibility.

1.5.4 User-centred insights

To persuade someone ethically, you need to know how they think and feel. The findings of this study demonstrate that individuals exhibit greater engagement when persuasive cues are perceived as transparent, courteous, and authoritative, rather than coercive or guilt-inducing. Emotional design can motivate behavior, but the particular emotion is essential. When users feel positive about something, such as pride in contributing to a global cause or happiness in achieving a personal environmental goal, they perceive themselves as engaging with the platform. This sense of having a common goal creates loyalty, intrinsic motivation, and long-term involvement. For example, visual cues that show progress, like "You've saved 20 Liters of water this week!" can help people feel good about themselves and take responsibility for their actions, which helps them build long-lasting habits without feeling pressured. On the other hand, negative emotional cues, like reminders that make you feel ashamed ("You wasted energy today"), usually make people defensive. Users often stop using the app because it makes them uncomfortable, which hurts both brand trust and behavioral outcomes. So, the emotional tone of design is a big part of how people use technology.

The bigger point is clear: using ethics to persuade people keeps them interested longer than forcing them to do something ever could. People are more likely to agree with sustainable principles when they feel like they are being led instead of pushed. Designers who follow empathy-driven rules, like being clear in their messages, respecting emotional boundaries, and recognizing user choice, can make systems that really make a difference. User-centred design ethics go beyond just how well something works; they also promote mental health, digital trust, and moral fulfilment. This turns sustainability into something personal and meaningful instead of just something you do because you're told to.

2. Conclusion

At this point in its growth, green technology is very important. The same psychological ideas that can inspire people to live sustainably and take responsibility for their actions can also be used to control and change how users act. This study underscores that the ethical integrity of design resides not in its persuasive effectiveness, but in its transparency and respectfulness. Surveys, controlled studies, and expert interviews all indicate a fundamental yet significant truth: individuals seek assistance, not humiliation; empowerment, not exploitation. People are more likely to help protect the environment when they feel involved, important, and well-informed. Using shame or force to get people to do what you want might work in the short term, but it hurts trust and emotional health in the long run. The Psychological Design Ethics Framework shows how hard it is to find a balance between persuasion and freedom. It acknowledges that persuasion is not inherently unethical; instead, it is a fundamental and potentially advantageous component of design. But it does say that persuasion must work within the limits set by justice, openness, and freedom. In this context, ethical design is not a constraint on creativity but a fundamental element for digital trust and lasting environmental change. Future research can improve this work through longitudinal studies that monitor user behavior over extended periods to ascertain whether ethical design fosters sustained engagement. Moreover, the integration of neuroscientific and physiological metrics—such as emotional arousal, cognitive load, and neural activation—may provide more profound, data-driven insights into the psychological experiences of consumers engaging with persuasive sustainability technologies. The study contributes to the increasing recognition that ethics and sustainability are interconnected aspects of innovation. Digital design will only get better when we stop messing with people's minds and start understanding and respecting them.

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