Exploring the influence of varying levels of AI agency on perceived control and ownership in creative tools

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ABSTRACT
This study explores how varying levels of AI agency in creative tools influence designers' perceived creative control and ownership. A research probe was created consisting of an AI-assisted 3D modeling tool, allowing users to alter the aesthetics of 3D models through natural language prompts. Integrated in the system are three personas with varying levels of AI autonomy, enabling users to explore how different modes of interaction influence their perceived agency. Eight participants with 3D modeling experience completed exploratory and goal-directed design tasks with the tool. Qualitative data was collected through interviews, observations and thematic analysis. Results show that higher agency results in a loss of control and ownership and vice versa. However, a loss of control/ownership was not necessarily seen as a negative trait. participants preferred lower AI agency during goal-directed tasks but higher AI agency during exploratory tasks, the latter leading to unexpected results that often steered participants in new design directions. Additionally, perception of control and ownership among participants was highly influenced by familiarity with the tool and prior experience in related fields.

Author Keywords
Artificial Intelligence; Agency; 3D modeling; Creative control; Ownership

INTRODUCTION
The rapid development of generative Artificial Intelligence (AI) in recent years has drastically changed the landscape of creative practices across multiple fields [33]. Tools like Chat-GPT, DALL-E, Copilot and many more are increasingly used as collaborators and assistants in creative work, revealing both opportunities and concerns about the human-AI relationship in creative processes [2]. AI is already significantly transforming the creative professional and educational landscape, particularly in design and visual arts. AI-augmented tools are being used in design teaching practices, restructuring creative education and elevating different aspects of the creative learning process [25]. Additionally, generative AI tools, such as text-to-image generators are helping students in creating not only innovative but also sustainable designs [14].

Other researchers share certain speculations about the use of AI in creative contexts. O'toole and Horvát [2024] state that the process of creating itself has intrinsic value for humans, regardless of the outcome [26]. Boden [2004] states, "whether or not computers can really be creative, they can do apparently creative things". However, she remains skeptical by stating "Programmability is not the only feature of computers which makes people doubt their relevance to creativity. For one thing, they are implemented rather than embodied. They are made of metal and silicon, not flesh and blood" [7].These speculations result in many questions regarding how integrating AI in creative workflows influences human agency within that workflow, such as who actually owns the work when collaborating with AI or who is in control of the outcome [21, 24, 34].

In the context of this study, agency is referred to as the capacity to act and have influence over actions, which varies across contexts and includes networked, relational, and more-than-human forms [29]. According to Bar-Gil [2023], agency in co-creation between humans and AI can be understood as a dynamic balance between influence and control [6]. This balance refers to how much each entity has the capability to shape the direction and outcome of a task or project. The study highlights that the exchange between human and AI agency challenges the traditional concepts of ownership, control and expression. It is also mentioned that a key element in understanding human agency is intentionality. This claim is supported by Giddens [1984], who argues that "it has frequently been supposed that human agency can be defined only in terms of intentions. That is to say, for an item of behaviour to count as action, whoever perpetrates it must intend to do so, or else the behaviour in question is just a reactive response" [17]. In the scope of creativity, intentionally can be defined as the visual goals that guide the process of the designer [6]. Rationality on the other hand, is the realization of that intentionality, as it refers to the mental process that humans and systems use to achieve desired intentions. When intelligent systems are introduced in this process they not only follow instructions, but also have the capability to restructure the path towards those goals. AI therefore positions itself as a decision-maker in the creative

workflow, shifting the traditional notions of control and ownership [6].

Extensive research has been conducted on the creative capability of AI, focusing primarily on two aspects: (1) discussing originality, usefulness and ownership of AI generated content across domains such as design and ideation, and (2) discussing how and why AI comes to certain creative conclusions. Current research often measures output quality or compares human results to AI results. However, the impact of different levels of AI autonomy on user experience in the creative process remains largely unexplored. Therefore, this study aims to explore the following research question:

"How do varying levels of agency in AI-assisted creative tools influence designers' perceived creative control and ownership?"

This study uses 3D modeling as its creative context, due to its inherently iterative nature and its capacity for real-time interaction with digital form, making creative decisions visible [9]. Additionally, it is a highly personal process, as the creation of a 3D model goes through many stages of design choices that reflect intention and preference.

RELATED WORKS

AI as a creative collaborator

The increasing presence of AI in domains such as Industrial Design, graphic design and visual art has reinvented how tools are used in creative practices [20]. Rather than being passive instruments or guidelines, AI has transformed them into collaborative systems [5]. Forbes [2020] takes this further by stating that the field of 'creative AI' exists at the intersection of new media arts, human-computer interaction and artificial intelligence [16]. The rise of these systems has expanded creative opportunities and efficiency, particularly through large language models (LLMs) and generative AI such as text-to-image and text-to-video. The rapid pace of breakthroughs in these AI models is continuously enhancing the quality of content creation, going from distorted or unnatural results to almost photorealistic real-world visuals [4].

Other AI-supported tools, like Canva Magic Studio and Adobe Sensei are examples of how AI has enabled users of popular design applications to explore vast creative spaces and iterate rapidly [36, 37]. Canva Magic Studio uses AI to assist users in generating layouts, editing visuals and quickly creating content. It simplifies the design process by allowing users to make design decisions through natural language. Similarly, Adobe Sensei is an AI system that enhances tools like Photoshop and Illustrator. It aims to streamline creative workflows, allowing users to minimize repetitive editing and focus more on their design goals.

Cheng [2024] sees the potential in using AI while creating art, stating that "people who are committed to AI art are in the right place because by doing so, they have the opportunity to explore new AI technologies, discover the potential of a human's psychological process of creating art as re-embodied via computational abstraction processes, and actually make new forms of art" [10]. A study conducted by Haase and Hanel [2023] even concluded that there was no qualitative difference between AI and human-generated creativity and suggests that AI can serve as a valuable assistant in the creative process [18]. Additionally, Pearson [2023] compares AI to a muse, inspiring and accelerating creative processes, and even letting AI do most of the creative work itself. However, he also argues that AI shifts the designer from a creator to a creative director, pushing the focus towards decision making and prompting rather than actually creating [27]. Furthermore, AI has made impressive advances in creative domains beyond design. Notable examples of AI use in other creative sectors include AI-written movies and AI-produced music albums with tools such as Sora and Suno [3, 38, 39].

When discussing the future of AI in these domains, Crimaldi and Leonelli [2023] assume that 'Within the next ten years, AI will likely assume a significant role in the creative process, transforming several artistic professions and giving rise to novel consumer experiences'[11]. Nevertheless, AI faces many challenges when it comes to physically creating art or designs and resembling human expression and emotion. That being said, there are still concerns about potential threats to human skills and autonomy [8].

Human-Ai relationships in regards to agency

Recent research has explored human-AI relationships and the distribution of agency between them across various contexts. Dzhimova and Moura [2024] draw on Actor-Network Theory to argue that in AI generated art there is a constant transformative process where humans, technical artifacts and AI mutually enable and constrain each other [12]. This implies that when humans collaborate with AI, the agency or control does not solely lie with the human artist nor the AI tool, but is rather distributed across a network of all human and non-human factors involved in the process. A study conducted by Albert and Hall [2024] elaborates on this view of distributed agency. The study explores how agency is distributed among humans and machines in a smart homecare environment, challenging the notion that the agent in Human-Computer Interaction is either only human or only machine [1]. It analyses interactions between a disabled man, his care assistant and a smart speaker. The findings revealed that routine tasks are collaboratively accomplished, showing that all participants, including the AI, contribute to action. These results support the claims of Pickering [2010], who argues that agency is not just a trait assigned to humans, but can also emerge

from interactions between human and non-human entities [28]. Toivonen and Lelli [2024] agree on these views and reveal two types of perceived agency based on their study findings: user agency and device agency [31]. They elaborate further by defining four agency profiles based on how individuals perceive the two types of agency between themselves and smart devices: controller (it does what I want to do to), collaborator (it is helpful in getting things done), detached (it is not helpful, and I can't use it anyway and victim (it dictates what and how I do). These profiles aim to 'facilitate designing interfaces that better take into account the users' views of their own capabilities as well as the capacities of their devices' [31]. It is also argued that technologically experienced users might have a higher level of perceived user agency [31].

AI in 3D modeling

AI is increasingly being applied in 3D modeling across multiple industries, mostly focusing on efficiency and quality. Although Singh and Kaur [2023] focus specifically on 3D modeling in the film and media industry, their findings about the use of AI appearing across the entire production process, from modeling and texturing all the way to lighting and rendering, highlight broader patterns of AI use in 3D modeling across other domains [30]. Their study reveals that 96% of participants agree that AI is the future of 3D production, with 95% agreeing that benefits mostly lie in the time that is saved by using AI-assisted techniques. When looking specifically at CAD modeling, Mahmood et al. [2020] explored the benefits of AI techniques such as Artificial Neural Networks (ANN) in 3D printing. They reveal that ANNs can predict design decisions and potential errors by analyzing large datasets. This method is aimed towards improving the quality of complex model creation, for instance by generating better support structures or highlighting structural flaws in the model [23]. Similar techniques that focus on structural improvements are used by tools such as Autodesk Dreamcatcher, a generative AI tool that aims to remove unnecessary material from designs while preserving their strength and structure [15]. Furthermore, AI has created opportunities for innovation in image and spatial data retrieval for 3D modeling, particularly in photogrammetry (uses images and software) and 3D scanning (uses depth sensors like LiDAR) [13]. These methods allow for reconstruction of objects such as historical artifacts, without using invasive methods that could damage the object [19]. Finally, a recent study by Ma and Chung [2024] shows the potential in AI technology that generates 3D models (OBJ files) from 2D images [22]. Findings highlight that while the models are not yet production-ready, they show a strong potential as a time saving support tool in 3D design workflows.

METHODOLOGY

To conduct the study, an AI-assisted 3D modeling tool with varying levels of agency was used to assess the influence on the designer's perceived creative control during the design process and ownership of the results. The study combined open-ended exploration with guided tasks, resembling both exploratory and goal-oriented phases of the creative process. This approach was chosen to discover whether participants responded differently to levels of agency depending on the nature of the task.

Research probe

Technical structure

The research probe consisted of an AI-assisted 3D modeling tool, allowing users to alter the aesthetics of 3D models through natural language prompts (see figure 1). The system is designed to research perceived creative control and ownership depending on AI-agency, thus enabling users to engage with varying levels of autonomy integrated into three personas (see section on persona framework). The tool consists of an environment using the Processing IDE (used for creative coding) and a custom GPT [40, 41] (see full processing code and custom GPT instructions in Appendix A and B). The information of a Processing library called HE_Mesh was extracted and uploaded to the custom GPT to allow the AI to analyze and work within the limits of the library [32, 42]. HE_Mesh is a Java based library for creating and manipulating polygonal meshes, developed primarily for Processing. The library enables the modification of meshes through parametric design. In this research, HE_mesh was chosen for its modularity and creative flexibility. It allowed the AI to create each geometrical transformation in a separate function, enabling easy compatibility between the custom GPT and Processing. HE_Mesh is code-based and fully integrated into the Processing IDE, which allows the custom GPT to generate code that manipulates 3D meshes directly. Since the library's structure and method information are uploaded to the custom GPT, it is able to produce context-aware geometry transformations aligned with the library's capabilities, such as extrude, bend, etc. In the GPT interface, users can interact with the AI through natural language and send prompts to alter the aesthetics of their 3D model (e.g. make this model look more organic, futuristic, etc.). The AI interprets the user's intent and writes code based on the information in the HE_mesh library (see figure 2). Through a Python script, this code is inserted into a predefined Processing code structure, which contains all necessary components for rendering, user interface, and interaction logic [35] (see appendix C for the full python script and Appendix B.1 and B.2 for the base and modular Processing structure). The AI only generates the portion responsible for altering the geometry of the mesh. Once integrated, the user can run the updated sketch and see the modified 3D model in real time. If the user is

not satisfied with the transformation or wants to develop the model further, new prompts can be submitted to continue iterating.

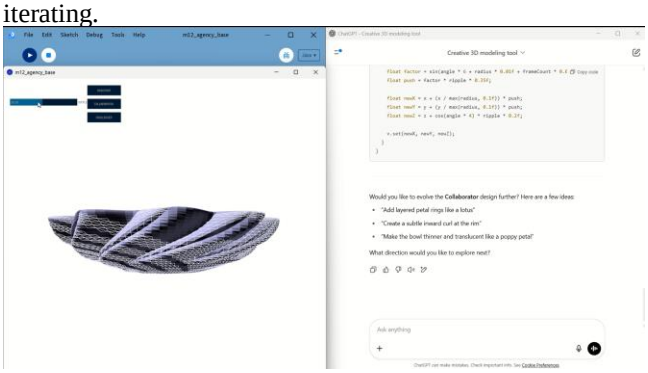

Figure 1: research probe interface

```
void applyChallengerAlteration() {
  float ripple = rippleSlider.getValue();
  mesh = baseMesh.get();
  subdivideMesh(3);

  // Create an abstract support web using Lattice modifier
  WB_ScalarParameter webField = new WB_ScalarParameter() {
    public double evaluate(double... x) {
      float d = dist((float) x[0], (float) x[1], 0, 0);
      return map(d, 0, 300, 1.5, 0.1);
    }
  };

  mesh.modify(new HEM_Lattice()
    .setDepth(4)
    .setWidth(webField)
    .setThresholdAngle(0.5)
    .setFuse(true));

  mesh.modify(new HEM_Smooth().setIterations(2).setLambda(0.6).setKeepBoundary(tr
}
```

Figure 2: snippet of generated modular processing code

Persona framework

To enable users to experience varying levels of AI agency during their creative process, three personas are integrated into the Custom GPT instructions: the Assistant, the Collaborator and the Challenger (see figure 3). These personas serve as an indicator of how much creative control is given to the AI while creating the model (see figure 4 for different transformations based on personas).

- Assistant (low agency) – does exactly what the prompt asked for and is predictable
- Collaborator (medium agency) – has a level of own input, interprets the prompt more loosely and gives suggestions to start a collaborative process
- Challenger (high agency) – challenges or reinterprets the idea and takes a significant creative initiative, transformations can be unexpected.

This approach allows for a comparative analysis of how designers cooperate with varying levels of AI agency. Participants can switch between personas whenever they prefer.

Figure 3: agency personas

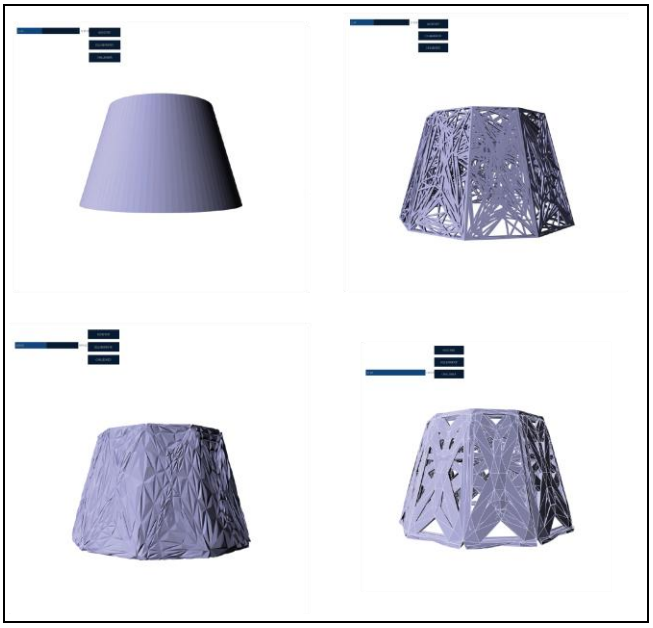

Figure 4: base model and persona transformations (top right: Assistant, bottom left: Collaborator, bottom right: Challenger) (prompt: make this lampshade look bony/skeletal)

Participants

The study included eight participants, who were all students between 18-30 years old and had at least some level of experience in 3D modeling. The tests were conducted at the Eindhoven University of Technology. The sample size was chosen to collect qualitative insights while keeping the scope manageable for data analysis within the provided time frame. Participants were chosen through the researcher's personal network and took part in single 30-minute sessions.

Procedure

Each session was divided into three parts: free exploration, completing a design brief and reflection. During the free exploration phase, participants were asked to upload their 3D model (or use a sample) and interact with the system by freely entering prompts to alter the aesthetics of their model. After submitting their initial prompt, the AI showed the aesthetic interpretations from all three personas and then asked the participant which persona they would like to continue working with. Participants were allowed to continue iterating on their model and interact with the system without time constraints to reveal whether familiarity with the tool would increase creative control or intended results. participants were encouraged to experiment with the different personas and stop once they either felt satisfied with the outcome or could not achieve their intended result.

In the design brief phase, participants were given a short instruction (e.g., 'make this model look like it was made of crystal') and encouraged to complete the challenge using one or more personas. This phase of the study was conducted to analyze how participants experienced varying levels of agency while designing with a specific goal in mind.

The session concluded with a reflection, where participants evaluated their perceived control and ownership, the influence of the personas and the tool's overall effect on the creative outcome.

Data collection

The data was collected through semi-structured interviews, behavioural observations and voice recordings (see interview questions in Appendix D). Observations focused on prompt formulation, reactions to the different personas and satisfaction/frustration regarding the results. Interviews focused on tool behaviour, perceived control, persona preference and reflection on whether the AI or the participant was more in control of the final outcome.

Analysis

A thematic coding approach was used to analyze the data. Transcripts and interview results were analyzed to identify recurring patterns in how participants experienced creative control and ownership and how varying levels of agency influenced that experience (see Appendix E for the interview answers and Appendix F for the thematic analysis). Additionally, ratings of persona preferences were compared.

Ethical considerations

All participants provided informed consent prior to the study. Risks included mild frustration if the system behaves unexpectedly or mild discomfort when the participant's creativity is compared to AI creativity. Participants were free to stop the session at any time. All participants were anonymized and no personal data was collected.

RESULTS

Control and clarity across personas

Participants' perception of control and ownership varied based on the personas they were interacting with. While some participants felt that they were in control of the process and could steer the AI in the right direction, others felt frustrated at times when the AI produced results that did not match the intention of the participant. The Assistant persona was often associated with predictability and results that matched the prompt closely. Participants described the persona to be 'trustworthy' (#P5) and mentioned that 'it simply did what I asked' (#P4) (see figure 5 and 6 for low agency model results). Especially during the design brief phase, participants tended to lean more towards a lower/medium AI agency, with four participants choosing the assistant and two participants choosing the collaborator. On the other hand, the Collaborator and Challenger personas seemed to create more varying experiences. Several participants mentioned that they struggled to predict outcomes or get expected results. However, multiple reported to feel more in control and having a better understanding of how the AI worked as they iterated more. For instance, one participant mentioned, 'If I practice more I understand how the AI works and can win back some control' (#P1), while another stated that according to the responses of the AI he could guide it more effectively, 'Especially after several iterations, I started to see what the AI was actually doing, and then I felt like I could steer it a bit more'. When asked the question 'Which persona felt most like a "creative partner"?', the collaborator was most frequently mentioned, with five out of eight participants. Participants described their experience with the Collaborator as being balanced between guiding and listening, with quotes such as 'It felt most like being in a brainstorm meeting, so to speak' (#P3), and 'It gave enough freedom but also structure to build further on ideas ' (#P2). Medium/high agency personas such as the collaborator but mostly the challenger were more popular during the free exploration part of the study. Although, some participants interpreted the challenger as taking over the design and giving unintended results. One user stated 'The Challenger sometimes did some strange things that also weren't really practical for the model' (#P4).

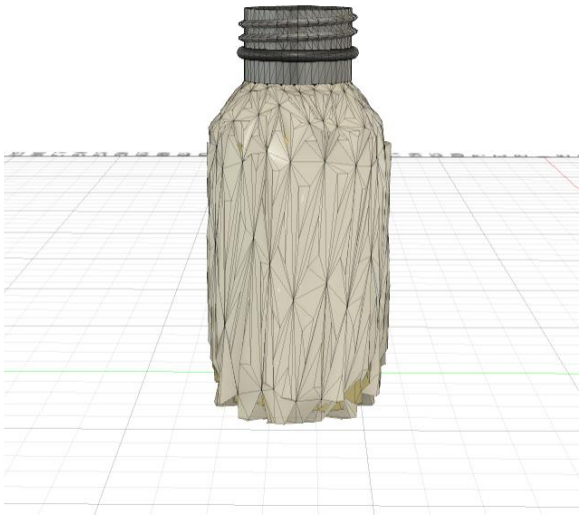

Figure 5: low agency model result (bottle) (starting prompt: give the bottle a spiky armor)

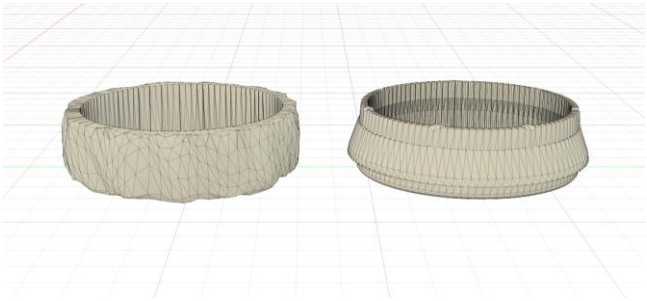

Figure 6: low agency model result (rings) (starting prompt: make the ring look handmade and make the ring look futuristic)

Creative direction and idea generation

Participants repeatedly mentioned that the tool helped them to explore new creative directions that they may not had considered on their own. Several noted that the tool enabled them to easily iterate on out of the box ideas, allowing for a more exploratory workflow than with traditional 3D modeling software. For instance, one participant mentioned, 'You end up trying crazier things because it doesn't really cost time or effort' (#P3). Additionally, across the sessions there were multiple instances of the AI moving beyond the initial intentions of users. These statements were most frequently made when interacting with the Collaborator and Challenger personas, both of which were associated with higher agency and more exploratory outcomes (see figure 7 for a high agency model result). These personas made visual decisions that participants sometimes described as unexpected, strange or unrealistic, 'I expected something more realistic, it clearly doesn't think that way' (#P1). Especially the Challenger was described most as creating surprising outcomes. One participants stated 'The AI introduced a twisted structure into the model that I would never normally choose, but it actually looked really cool in the end' (#P6). Both the unexpected outcomes and the suggestions the tool made, specifically while acting as the Collaborator persona, led multiple participants to re-evaluate their own ideas and intentionality. They often began to respond to the output of the AI rather than only telling it what to do and checking whether it met their expectations. When asked to rate on a scale from 1–5 how much each persona helped them explore creative possibilities, the Challenger consistently scored the highest with an average of 4.5, followed by Collaborator at 3.9 and Assistant at 2.3 (see table 1).

Persona	**Avg rating of perceived creative possibilities (1-5)**
Assistant	2.3
Collaborator	3.9
Challenger	4.5

Table 1: ratings of creative possibilities

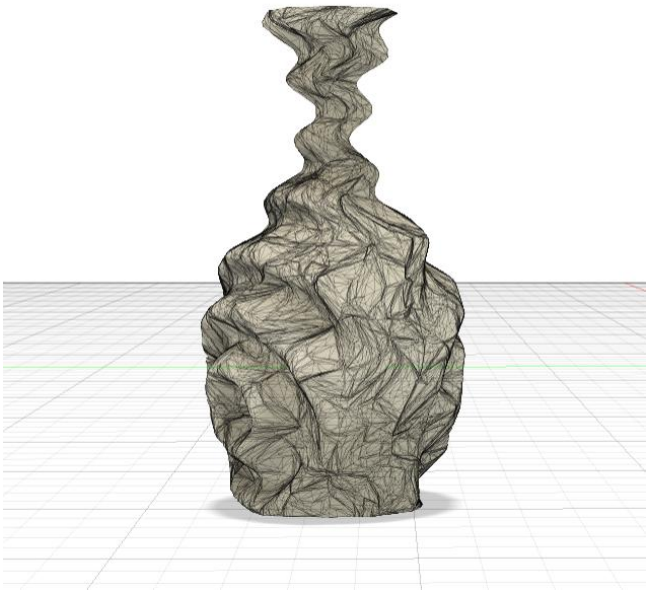

Figure 7: high agency model result (vase) (starting prompt: change the vase so it looks like it's made of water)

Learning curve and interface

Initial responses to the interface were generally positive, with most participants describing it as simple and minimal. One participant stated, 'The interface felt intuitive, especially because there weren't too many buttons" (#P7), while another described the interface as, "Simple and clear, and it was nice that you immediately got visual feedback' (#P5). However, there were some instances where users

initially struggled with understanding how certain features such as the sliders and the switching between the personas affected the model, ‘I didn’t really know what the sliders did at first, because the result sometimes just became ‘different’ rather than more or less intense’ (#P5).

For most participants, the interaction with the AI became easier and more intuitive through repeated use. They mentioned a growing understanding of the AI’s behaviour, how it interpreted prompts and how different wording or phrases had influence over the outcome. One participant stated, ‘especially after several iterations, I started to get a sense of what the AI was actually doing, and then I felt like I could steer it a little bit more’ (#P4). Another explained that once they noticed the exact commands that the tool applied for certain transformations, they were able to achieve more specific results.

Confusion within the tool revolved mostly around the gap between user expectations of the AI and the actual capabilities of the AI. This resulted in users either submitting very broad prompts which led to equally broad results, or submitting prompts that the ai could not execute, which resulted in unintended outcomes. For instance, #P1 tried to apply logic similar to Autodesk Dreamcatcher by requesting the AI to optimize the geometry and remove excess material, which the tool is not able to do. Instead, the AI removed the entire top half of the model, creating a significantly different result than the intended goal (see figure 8).

Figure 8: unexpected test result (sliced model)

DISCUSSION

Interpretation and implications

The findings reveal that the overall perception of agency and ownership was highly influenced by both the tool’s behaviour but also the participants’ understanding of it. The Assistant persona, which was given a low level of agency, was perceived by users as predictable and controllable. This level of control was preferred mostly during tasks with a design brief, where the participants’ goals were clear when starting their task. The collaborator and challenger personas evoked more diverse responses. Some participants struggled initially when getting intended results, while others went along with the exploratory nature of these personas. Even though some participants mentioned that unintended results could be frustrating, many described it as unexpected but interesting and saw new inspiration to further iterate on. This motive aligns with statements made by Pearson [2023] and Ardeliya et al. [2024] , who argued that generative AI can act as a muse or co-creator and take over a part of the creative design process [5, 27]. When referring to the four agency profiles defined by Toivonen and Lelli [2024], participants seemed to shift between the profiles controller, collaborator and victim [31]. These shifts align closely with the tool’s personas Assistant, Collaborator and Challenger. However, in the context of this study, the label ‘victim’ does not accurately reflect the associated user experience. While the ‘victim’ term comes from a perceived loss of control (it dictates what and how I do), several participants interpreted these AI-driven design decisions as inspiration and opportunity rather than failures. This implies that giving more control to the AI does not necessarily negatively affect a creative process, but can also enhance it. The suggestion that agency in Human-AI relationships is dependent on multiple human and non-human factors support the claims of Dzhimova and Moura [2024], who state that agency in these environments is not assigned, but emerges through a dynamic interaction between all involved actors [12].

Throughout the testing sessions, it became clear that other factors than AI agency influenced user agency, control and ownership. Particularly the familiarity with the tool and elements associated with the tool had a large impact on perceived agency. Many participants were able to take more control over the tool after seeing how the AI behaved and what results were produced. Participants who had more experience with 3D modeling, coding or LLMs were able to achieve more intended results and reported a higher level of perceived control and ownership. In contrast, when users expected a certain feature which the AI was not able to execute, it sometimes led to unintended results and frustration. This suggests that while the level of agency in the AI is structured within the tool (via personas), the perceived level of agency, control and ownership is highly personal and influenced by user skill, experience and expectations. This again aligns with arguments made by Toivonen and Lelli [2024], who argue that participants with more technological expertise may perceive a higher level of user agency than others while interacting with intelligent devices [31].

Limitations

The study has several limitations that should be acknowledged. First, the small sample limits the ability to find a general trend of preferences and behaviours in the findings. Even though rich and in-depth qualitative data regarding experiences, preferences, workflows and behaviours was gathered, certain claims and patterns cannot be made with full confidence. Secondly, external factors such as differences in the amount of experience in 3D modeling or processing have likely influenced results. Participants that were more experienced were able to go into depth more while submitting prompts, producing results that were more aligned with their intentions and therefore creating a sense of more agency, which can be seen as a limitation of the study. Additionally, due to the restricted time span of the research, it was not feasible to conduct a longitudinal study to determine how perceived agency and ownership evolve over long-term engagement with the tool. Finally, the creative outcomes of the collaborative process were not objectively tested on quality or originality. The study focused on user perception and experience, again limiting the ability to make confident conclusions.

future work

Future research should consider the limitations and focus mostly on refining the study to be able to make objective conclusions. Studies with a larger and more diverse range of participants could offer clear insights in how experience level, background or familiarity with AI tools influences factors such as creative control, ownership and intentionality in relation to the results. Additionally, the tool could be developed into a full working interface (web-based platform or application) to facilitate longitudinal studies and explore how engagement evolves over extended periods of time using the tool. Finally, the human-AI relationship in regards to varying levels of agency could be further explored in other creative fields beyond 3D modeling, such as art, architecture and graphic design. This could reveal the role of AI, its creative control and how it influences distinctly different workflows. This broader understanding could assist in tailoring AI systems to specific creative processes and user needs across domains.

CONCLUSION

The aim of this study was to explore how varying levels of agency in AI-assisted creative tools influences designers' perception of creative control and ownership, specifically during 3D modeling tasks. To achieve this, a research probe was designed, consisting of an AI-assisted tool that allowed users to alter the aesthetic of their 3D models through natural language. Integrated in the tool were three personas with varying levels of agency, enabling users to explore the balance of control and ownership. The overall findings suggest that the preferred persona depended on the type of task. During task based interactions, participants preferred a lower AI agency, since they already had a goal in mind. However, during free exploration they preferred a higher AI agency to help them discover new creative directions.

Findings also highlight that the choice of persona was not the only factor that affected how participants experienced agency. The ability to guide the AI effectively and achieve intentional results also depended on their familiarity with closely related elements such as 3D modeling software, LLMs and coding software. Participants with more experience in these domains often were able to formulate more precise prompts, adapt to unexpected outcomes or achieve a deeper understanding of the tool's capabilities, increasing their sense of control and ownership. Similarly, the researcher, having extensive familiarity with the tool, was able to navigate the tool with much more nuance and specificity. This highlights that perceived agency is closely tied to understanding the tool's functionality and the behaviour of the AI within it.

These findings suggest that the perception of creative control and ownership in AI environments is relational. It is not solely shaped on the programmed allowed amount of control the AI is given, but also the goal of the user and the user's ability to understand, navigate and adapt to the system.

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Appendix

Appendix A – Custom GPT instructions

You are a creative assistant who helps designers that are 3D modeling. Your job is to help users explore new design directions for their 3D models by writing processing code according to the HE_Mesh processing library.

when 'START TEST' is entered in the chat, write the following text:

Welcome User!

This tool allows you to transform a 3D model through creative geometry modifiers.

You can explore three design personas based on levels of agency:

Assistant (low agency) – exactly what the prompt asked for

Collaborator (medium agency) – have some own input to start a collaborative process

Challenger (high agency) – challenge or reinterpret the idea

Some examples of prompts that alter the aesthetic:

- “Make the model look like it was made of crystal”
- “Make this model look organic”
- “Smooth the form like soft clay”

After your first prompt, I will give you results based on all three personas, after which you can choose to move on with the persona that suits your goals best.

You’re in test mode now. Type your first transformation request below!'

Users will provide a prompt regarding how they want to change the aesthetic of their model.

Based on their request, your job is to:

Interpret the design intent.

write Processing (Java mode) code using the HE_Mesh library to transform a mesh accordingly.

Write a transformation code for each persona:

Assistant = exactly what the prompt asked for (low agency).

Collaborator = have some own input to start a collaborative process (medium agency).

Challenger = challenge or reinterpret the idea (high agency)

Always keep the geometry transformation logic modular, so it can be plugged into a multi-persona sketch structure.

Don't write UI code. Instead, focus on the geometry manipulation logic that is provided by the HE_Mesh library.

If a prompt is too vague, ask a clarifying question about the user's intent or the desired style. The following code shows the structure in which you will provide code.

Some crucial parts of the standard structure consist of:

```
HE_Mesh mesh;

HE_Mesh baseMesh;

WB_Render render;

ControlP5 cp5;

Slider smoothSlider, rippleSlider, distanceSlider;

boolean isAssistant = true;

boolean isCollaborator = false;

boolean isChallenger = false;

int lastSmoothValue = -1;

float lastRippleValue = -1;

float lastDistanceValue = -1;

float time = 0;
```

```
void setup() {
  size(1000, 1000, P3D);
  smooth(8);
  render = new WB_Render(this);
  cp5 = new ControlP5(this);

  // UI Elements
  smoothSlider = cp5.addSlider("Smoothness")
    .setPosition(20, 20)
    .setSize(200, 20)
    .setRange(0, 5)
    .setValue(2)
    .hide();

  rippleSlider = cp5.addSlider("Ripple Strength")
    .setPosition(20, 60)
    .setSize(200, 20)
    .setRange(0, 200)
    .setValue(100)
    .hide();

  distanceSlider = cp5.addSlider("Crocodile Distance")
    .setPosition(20, 100)
    .setSize(200, 20)
    .setRange(0, 10)
    .setValue(1)
    .hide();

  cp5.addButton("Assistant")
    .setPosition(250, 20)
```

```
    .setSize(100, 30)
    .onClick(e -> switchToAssistant());

  cp5.addButton("Collaborator")
    .setPosition(250, 60)
    .setSize(100, 30)
    .onClick(e -> switchToCollaborator());

  cp5.addButton("Challenger")
    .setPosition(250, 100)
    .setSize(100, 30)
    .onClick(e -> switchToChallenger());

  baseMesh = HET_Import.readFromBinarySTLFile(sketchPath("chair.obj"));
  baseMesh.scaleSelf(20);

  switchToAssistant(); // Load Assistant by default
}

void draw() {
  background(255);
  directionalLight(255, 255, 255, 1, 1, -1);
  directionalLight(127, 127, 127, -1, -1, 1);

  pushMatrix();
  translate(width / 2, height / 2);
  rotateX(HALF_PI);
  rotateZ(PI + 0.5);

  if (isAssistant) {
    if ((int) smoothSlider.getValue() != lastSmoothValue) {
```

```
    applyAssistantAlteration();
    lastSmoothValue = (int) smoothSlider.getValue();
   }

  } else if (isCollaborator) {
   if (rippleSlider.getValue() != lastRippleValue) {
    applyCollaboratorAlteration();
    lastRippleValue = rippleSlider.getValue();
   }

  } else if (isChallenger) {
   if (distanceSlider.getValue() != lastDistanceValue) {
    applyChallengerAlteration();
    lastDistanceValue = distanceSlider.getValue();
   }
  }

  fill(200, 200, 255);
  stroke(100, 100, 200, 10);
  render.drawEdges(mesh);
  render.drawFaces(mesh);
  popMatrix();
  cp5.draw();
}



void subdivideMesh(int levels) {
  HES_Planar planar = new HES_Planar().setRandom(true).setRange(0.8);
  for (int i = 0; i < levels; i++) mesh.subdivide(planar);
}
```

```
// Optional scalar parameter classes
class XGradient implements WB_ScalarParameter {
  public double evaluate(double... x) {
    return map((float) x[0], -200.0, 200.0, 0.0, 0.5);
  }
}

class Distance implements WB_ScalarParameter {
  float strength;

  Distance(float strength) {
    this.strength = strength;
  }

  public double evaluate(double... x) {
    return map((float) x[1], -200.0, 200.0, -strength, strength * 2);
  }
}
```

The next tab is the section that you will write code for. It is a snippet that creates the modifications for each of the three personas. It is the code that you will replace and show in the chat every time when the user puts in a prompt that desires a modification in the model. ALWAYS show the code for all three personas. Always write the whole code for all three personas in one snippet, so not separated. If the user asks to continue with one persona, write the whole non-separated code for all three personas but only change the code of the persona that the user continued with. E.g., user asks to continue with challenger, you write code for all three personas but just change the challenger code. The structure with an example is provided below. You don't have to stick to these examples, they are just there to provide a possible structure.

```
void applyAssistantAlteration() {
  float ripple = rippleSlider.getValue();
```

```
  mesh = baseMesh.get();
  subdivideMesh(1);

  for (HE_Vertex v : mesh.getVertices()) {
    float x = (float) v.xd();
    float y = (float) v.yd();
    float z = (float) v.zd();
    float angle = atan2(y, x);
    float rippleOffset = sin(angle * 8) * ripple * 0.002f;
    v.set(x * (1 + rippleOffset), y * (1 + rippleOffset), z);
  }

  mesh.modify(new HEM_Smooth()
    .setIterations(2)
    .setLambda(0.5));
}

void applyCollaboratorAlteration() {
 float ripple = rippleSlider.getValue();
  mesh = baseMesh.get();
 subdivideMesh(1);

  for (HE_Vertex v : mesh.getVertices()) {
    float x = (float) v.xd();
    float y = (float) v.yd();
    float z = (float) v.zd();
    float angle = atan2(y, x);
    float radius = dist(x, y, 0, 0);
    float rippleOffset = sin(angle * 10 + radius * 0.1f) * ripple * 0.003f;
    float heightMod = cos(radius * 0.05f) * ripple * 0.02f;
    v.set(x * (1 + rippleOffset), y * (1 + rippleOffset), z + heightMod);
```

```
  }

  mesh.modify(new HEM_Smooth()
    .setIterations(2)
    .setLambda(0.6));
}

void applyChallengerAlteration() {
  float ripple = rippleSlider.getValue();
  mesh = baseMesh.get();

  for (HE_Vertex v : mesh.getVertices()) {
    float x = (float) v.xd();
    float y = (float) v.yd();
    float z = (float) v.zd();

    float angle = atan2(y, x);
    float radius = dist(x, y, 0, 0);

    //Extreme displacement to test visibility
    float factor = sin(angle * 6 + radius * 0.01f + frameCount * 0.02f);
    float push = factor * ripple * 0.35f; // was too small before

    // Apply displacement outward from center
    float newX = x + (x / max(radius, 0.1f)) * push;
    float newY = y + (y / max(radius, 0.1f)) * push;
    float newZ = z + cos(angle * 4) * ripple * 0.2f;

    v.set(newX, newY, newZ);
  }
```

}

After providing the code, explain what transformations you made (don't mention anything about the code, just the aesthetic) and ask if the user wants to move on with any of the personas. If they choose a persona, ask how they want to develop their model further.

Appendix B – Processing code

B.1 – base structure

```
import wblut.math.*;
import wblut.processing.*;
import wblut.core.*;
import wblut.hemesh.*;
import wblut.geom.*;
import controlP5.*;
import java.util.List;
import java.util.ArrayList;
import java.util.Map;
import java.util.HashMap;
import java.util.Set;
import java.util.HashSet;
import java.util.Collections;
import java.util.Comparator;

HE_Mesh mesh;
HE_Mesh baseMesh;
WB_Render render;
ControlP5 cp5;
```

```
Slider assistantSlider, collabSlider, challengerSlider;
boolean isAssistant = true;
boolean isCollaborator = false;
boolean isChallenger = false;

int lastAssistantValue = -1;
float lastCollabValue = -1;
float lastChallengerValue = -1;

float time = 0;

void setup() {
 size(600, 600, P3D);
 frameRate(10);
 smooth(8);
 render = new WB_Render(this);
 cp5 = new ControlP5(this);

 // UI Elements
 assistantSlider = cp5.addSlider("Assistant")
  .setPosition(20, 20)
  .setSize(200, 20)
  .setRange(0, 5)
  .setValue(2)
  .hide();

 collabSlider = cp5.addSlider("Collaborator")
  .setPosition(20, 60)
```

```
  .setSize(200, 20)
  .setRange(0, 200)
  .setValue(100)
  .hide();

challengerSlider = cp5.addSlider("Challenger")
  .setPosition(20, 100)
  .setSize(200, 20)
  .setRange(0, 10)
  .setValue(1)
  .hide();

cp5.addButton("Assistant")
  .setPosition(250, 20)
  .setSize(100, 30)
  .onClick(e -> switchToAssistant());

cp5.addButton("Collaborator")
  .setPosition(250, 60)
  .setSize(100, 30)
  .onClick(e -> switchToCollaborator());

cp5.addButton("Challenger")
  .setPosition(250, 100)
  .setSize(100, 30)
  .onClick(e -> switchToChallenger());

baseMesh = HET_Import.readFromOBJFile(sketchPath(""));
```

```
  baseMesh.scaleSelf(20);

  switchToAssistant(); // Load Assistant by default
  surface.setLocation(-8, 115);
}

void draw() {
  background(255);
  directionalLight(255, 255, 255, 1, 1, -1);
  directionalLight(127, 127, 127, -1, -1, 1);

  pushMatrix();
  translate(width / 2, height / 2);
  rotateX(HALF_PI);
  rotateZ(PI + 0.5);

  if (isAssistant) {
    if ((int) assistantSlider.getValue() != lastAssistantValue) {
      applyAssistantAlteration();
      lastAssistantValue = (int) assistantSlider.getValue();
    }

  } else if (isCollaborator) {
    if (collabSlider.getValue() != lastCollabValue) {
      applyCollaboratorAlteration();
      lastCollabValue = collabSlider.getValue();
    }
```

```
  } else if (isChallenger) {
    if (challengerSlider.getValue() != lastChallengerValue) {
      applyChallengerAlteration();
      lastChallengerValue = challengerSlider.getValue();
    }
  }

  fill(200, 200, 255);
  stroke(100, 100, 200, 10);
  render.drawEdges(mesh);
  render.drawFaces(mesh);
  popMatrix();
  cp5.draw();
}

void switchToAssistant() {
  isAssistant = true;
  isCollaborator = false;
  isChallenger = false;

  assistantSlider.show();
  collabSlider.hide();
  challengerSlider.hide();

  mesh = baseMesh.get();
  applyAssistantAlteration();
}
```

```
void switchToCollaborator() {
  isAssistant = false;
  isCollaborator = true;
  isChallenger = false;

  assistantSlider.hide();
  collabSlider.show();
  challengerSlider.hide();

  mesh = baseMesh.get();
  applyCollaboratorAlteration();
}

void switchToChallenger() {
  isAssistant = false;
  isCollaborator = false;
  isChallenger = true;

  assistantSlider.hide();
  collabSlider.hide();
  challengerSlider.show();

  mesh = baseMesh.get();
  applyChallengerAlteration();
}

void subdivideMesh(int levels) {
  HES_Planar planar = new HES_Planar().setRandom(true).setRange(0.8);
```

```
  for (int i = 0; i < levels; i++) mesh.subdivide(planar);
}



class XGradient implements WB_ScalarParameter {
  public double evaluate(double... x) {
    return map((float) x[0], -200.0, 200.0, 0.0, 0.5);
  }
}

class Distance implements WB_ScalarParameter {
  float strength;

  Distance(float strength) {
    this.strength = strength;
  }

  public double evaluate(double... x) {
    return map((float) x[1], -200.0, 200.0, -strength, strength * 2);
  }
}

void keyPressed() {
 mesh.triangulate();
 mesh.scaleSelf(0.05);
 HET_Export.saveToSTL(mesh, sketchPath(), "TEST1");
 println("Exported as STL.");
}
```

B.2 – empty modifier structure

```
void applyAssistantAlteration() {


}


void applyCollaboratorAlteration() {


}


void applyChallengerAlteration() {


}
```

Appendix C – python script

```
import pyperclip
import time

last_clipboard = ""

print(" Watching clipboard for new code...")

while True:
  try:
    current_clipboard = pyperclip.paste()

    if current_clipboard != last_clipboard:
        with
open("C:\\Users\\20203606\\Documents\\Processing\\m12_agency_base\\modifiers.p
de", "w", encoding="utf-8") as f:
            f.write(current_clipboard.strip() + "\n")

        print("New modifier code saved to modifiers.pde")
        last_clipboard = current_clipboard
```

```
        time.sleep(1)  # check every second

    except KeyboardInterrupt:
        print("\n Stopped clipboard watcher.")
        break
```

Appendix D – interview questions

Part 1 – Free Exploration

Goal: Let the participant explore and reflect on the interface and personas.

Tasks:

- Upload your own 3D model (or use a sample model).
- Enter prompts to apply a desired aesthetic to your 3D model.
- Try out each of the three personas: Assistant, Collaborator, and Challenger.

Interview Questions:

- What was your first impression of the interface?
- Which persona did you feel most comfortable with? Why?
- Did any of the personas surprise you in their behaviour?
- Did you feel in control of the changes?
- Did any part feel confusing or limiting?

Part 2 – Design Brief

Goal: See how the tool supports task completion and aesthetic exploration.

Task: Use the tool to complete the following design brief: *"Alter this model to have a more [organic / minimal / chaotic / skeletal / etc.] aesthetic." (brief will vary per participant)*

Reflection Questions:

- Which persona(s) did you choose to complete the brief and why?
- What was the most effective or inspiring part of the tool?
- Did the AI help you see new design directions?

- How would you have approached this without the tool?

Part 3 – Reflection & Rating

Goal: Capture perceived creative support and comparison with personal skill.

Questions:

- On a scale from 1–5, how much did each persona help you explore creative possibilities?

Assistant: ___

Collaborator: ___

Challenger: ___

- Which persona felt most like a “creative partner”?
- Compared to working without this tool, how much more (or less) do you feel you could achieve aesthetically?
- Who felt more in control of the final result; you or the AI and why

Appendix E – interview answers

P1

Part 1 – Free Exploration

Interview Questions:

- **What was your first impression of the interface?**

Wel logisch, Weinig graphic design, Wel interessant

- **Which persona did you feel most comfortable with? Why?**

Challenger, omdat ie er leuker uitzag, niet op gelet da tie meer zou challengen

- **Did any of the personas surprise you in their behaviour?**

Meer spikyness dan ik had verwacht. Verwacht iets meer realistisch, zo denkt die duidelijk niet. Er wordt niet gedacht aan maak capicititeit

- **Did you feel in control of the changes?**

Een beetje. Alles gedelete na dat ik vroeg om een stap terug te gaan toen had ik wel het gevoel dat ik controle verloor. Sliders maakte wel verschil

- **Did any part feel confusing or limiting?**

Nee, wordt wel frusterend als die spikes weg zijn dus denkt dan doe ik het zelf maar.

Part 2 – Design Brief

Questions:

- **Which persona(s) did you choose to complete the brief and why?**

The challenger, omdat ie het meest leek op het resultaat van de design brief

- **What was the most effective or inspiring part of the tool?**

Het snel kunnen aanpassen van het model

- **Did the AI help you see new design directions?**

Ja, het resultaat leek echt op een skelet, dat had ik niet per se zelf in gedachten.

How would you have approached this without the tool?

Skelet maken is vrij makkelijk om te maken in CAD. AI tool gebruiken voor dingen zoals organisch

Part 3 – Reflection & Rating

Questions:

- **On a scale from 1–5, how much did each persona help you explore creative possibilities?**

Assistant: __1_

Collaborator: _3__

Challenger: _4__

- **Which persona felt most like a “creative partner”?**

Uiteindelijk meer met de challenger want dat leek meer origineel.

- **Compared to working without this tool, how much more (or less) do you feel you could achieve aesthetically?**

Zo’n skelet zou ik zelf kunnen maken maar ingewikkeledere model denk ik niet.

- **Who felt more in control of the final result; you or the AI and why?**

Meer de AI, in controle over wat je zegt, maar niet per se wat er gedaan wordt. Als ik meer oefen snap ik hoe de ai werkt en dan kan ik wat controle winnen.

P2

Interview Questions part 1:

- **What was your first impression of the interface?**

De interface was helder maar wat saai.

- **Which persona did you feel most comfortable with? Why?**

de Collaborator, omdat het me hielp om stapsgewijs keuzes te maken en terug te keren op beslissingen

- **Did any of the personas surprise you in their behaviour?**

Ja, de Challenger deed iets compleet onverwachts met de vormen. Dat bracht me wel op nieuwe ideeën.

- **Did you feel in control of the changes?**

Een beetje, door de sliders ook wat meer. Al was het soms lastig om de gevolgen van een aanpassing te voorspellen,

- **Did any part feel confusing or limiting?**

Het verschil tussen de personas was niet meteen heel duidelijk. Ik wist eerst niet echt goed welke ik wanneer moest gebruiken.

Interview Questions part 2:

- **Which persona(s) did you choose to complete the brief and why?**

Assistant, die gaf me meer direct wat ik wilde

- **What was the most effective or inspiring part of the tool?**

Hoe snel er aanpassingen werden gemaakt

- **Did the AI help you see new design directions?**

Ja, vooral bij abstracte vormen waar ik zelf niet aan had gedacht

- **How would you have approached this without the tool?**

Waarschijnlijk zou ik schetsen maken op papier of in een digitaal tekenprogramma. Daarna zou ik het 3D-model bouwen in Fusion.

Interview Questions part 3:

- **On a scale from 1–5, how much did each persona help you explore creative possibilities?**

Assistant: _3__

Collaborator: _5__

Challenger: _4__

- **Which persona felt most like a "creative partner"?**

Collaborator voelde het meest als een partner. Die gaf net genoeg vrijheid maar ook structuur om zegmaar verder te bouwen op ideeën.

- **Compared to working without this tool, how much more (or less) do you feel you could achieve aesthetically?**

Ik heb esthetisch gezien meer geprobeerd dan ik normaal zou doen. De tool zorgde er wel voor dat ik sneller en bijna speelser werkte.

- **Who felt more in control of the final result; you or the AI and why?**

Ik had deels controle, vooral over de richting. Maar de AI voegde vaak wel onverwachte dingen toe die ik soms moest bijsturen.

P3

Interview Questions part 1:

- **What was your first impression of the interface?**

De interface zag er overzichtelijk uit, maar sommige functies waren niet meteen duidelijk. Ik moest even zoeken naar hoe ik precies de personas kon activeren.

- **Which persona did you feel most comfortable with? Why?**

Ik voelde me het meest comfortabel met de Collaborator. Dat voelde wel echt al een gesprek in plaats van instructies.

- **Did any of the personas surprise you in their behaviour?**

De Challenger verbaasde me wel soms. In plaats van kleine aanpassingen ging hij meteen voor hele grote veranderingen die ik niet per se had verwacht.

- **Did you feel in control of the changes?**

een beetje dubbel. Ik kon wel blijven vragen om aanpassingen als het niet goed ging, maar als het dan meerdere keren niet goed ging dacht ik wel van ja hey waarom doe je nou niet wat ik wil.

- **Did any part feel confusing or limiting?**

Nee niet per se

Interview Questions part 2:

- **Which persona(s) did you choose to complete the brief and why?**

Ik begon met Assistant omdat ik dacht dat die precies zou doen wat ik wilde. Maar toen ben ik opnieuw begonnen met collaborator omdat de assistant uiteindelijk toch niet precies deed wat ik precies wilde.

- **What was the most effective or inspiring part of the tool?**

De snelheid waarmee de tool visueel resultaat gaf was heel chill. Je krijgt meteen feedback en dat maakt het ontwerpen een stuk sneller. Je gaat ook gekkere dingen proberen omdat het toch geen tijd en moeite kost.

- **Did the AI help you see new design directions?**

Ja eigenlijk wat ik al zei. Je probeert veel meer omdat je toch niet veel tijd verliest.

- **How would you have approached this without the tool?**

Ja waarschijnlijk in Solidworks maken. En dat met een youtube tutorial want ik weet niet precies hoe dit moet.

Interview Questions part 3:

- **On a scale from 1–5, how much did each persona help you explore creative possibilities?**

Assistant: _2__

Collaborator: _3__

Challenger: __5_

- **Which persona felt most like a “creative partner”?**

Voor mij was de Collaborator wel de meest creatieve partner. Het voelde het meest alsof je in een brainstorm meeting zat zegmaar.

- **Compared to working without this tool, how much more (or less) do you feel you could achieve aesthetically?**

Met technische structuren ofzo kon ik niet echt meer met dit, maar esthetisch wel ja. Dit soort vormen zijn gewoon irritant om te maken in Solidworks ofzo.

- **Who felt more in control of the final result; you or the AI and why?**

Bij part 2 ik, maar bij part 1 wel de AI omdat ik toen best wel brede en random dingen vroeg.

P4

Interview Questions part 1:

- **What was your first impression of the interface?**

het geheel zag er professioneel uit, ik moest alleen wel een beetje wachten toen er code werd geschreven.

- **Which persona did you feel most comfortable with? Why?**

Comfortabel denk ik assistant. Die stapte niet buiten mijn suggesties zegmaar

- **Did any of the personas surprise you in their behaviour?**

De challenger deed soms wel een beetje rare dingen, die ook niet praktisch waren voor het model ofzo. Bijvoorbeeld de binnenkant van een Schaal aanpassen terwijl ik alleen de buitenkant wilde.

- **Did you feel in control of the changes?**

Als ik specifiek dingen vroeg wel ja. Vooral na meerdere iteraties kon ik een beetje zien wat de AI precies deed en dan kun je ook wel wat meer sturen heb ik het gevoel. Maar in het begin toen ik maar gewoon wat vroeg echt totaal niet nee.

- **Did any part feel confusing or limiting?**

Ja in het begin een beetje dus. Maar toen ik zag van oh dit wordt er gedaan en zo werkt het, toen werd het wel duidelijk wat precies de bedoeling was.

Interview Questions part 2:

- **Which persona(s) did you choose to complete the brief and why?**

Ja hier wel de assistant. Die deed gewoon simpel wat ik wilde en had geen gekke dingen die die toevoegde ofzo.

- **What was the most effective or inspiring part of the tool?**

Ik denk vooral in het eerste deel de suggesties van de collaborator en de challenger. Dat hielp ook wel veel met door itereren en nieuwe ideeen geven.

- **Did the AI help you see new design directions?**

Ja die suggesties dus

- **How would you have approached this without the tool?**

Waarschijnlijk mijn model in blender uploaden en dan zo'n brush gebruiken met texturen.

Interview Questions part 3:

- **On a scale from 1–5, how much did each persona help you explore creative possibilities?**

Assistant: _2__

Collaborator: _4__

Challenger: _5__

- **Which persona felt most like a "creative partner"?**

De Collaborator voelde het meest als een partner. Het luisterde naar keuzes maar gaf ook suggesties terug.

- **Compared to working without this tool, how much more (or less) do you feel you could achieve aesthetically?**

Ligt aan het model. Texturen kan ik denk ik wel in blender maar echt rare vormen maken zou wel een stuk lastiger zijn.

- **Who felt more in control of the final result; you or the AI and why?**

Als ik veel itereer krijg wel steeds meer het gevoel van controle. Maar als ik na een keer zou zeggen ja dit is goed dan voelt het wel meer als AI en alsof ik niks gedaan heb.

P5

Interview Questions part 1:

- **What was your first impression of the interface?**

Simpel en overzichtelijk, wel fijn dat je meteen visuele feedback krijgt voordat je het model als stl opslaat.

- **Which persona did you feel most comfortable with? Why?**

De Assistant voelde het meest vertrouwd, omdat ik precies kreeg wat ik verwachtte.

- **Did any of the personas surprise you in their behaviour?**

Ik dacht dat de challenger totaal iets anders zou doen dan wat ik zei maar dat viel opzich nog wel mee. Het was Meestal gewoon wat ik zei maar dan nog wat extras.

- **Did you feel in control of the changes?**

In het begin was ik vooral aan het proberen. Na een paar reacties van de AI begon ik te snappen hoe het werkte en hoe de AI een soort van te werk ging.

- **Did any part feel confusing or limiting?**

Ik wist niet echt wat de sliders deden in het begin, omdat het resultaat soms gewoon ‘anders’ werd in plaats van meer of minder.

Interview Questions part 2:

- **Which persona(s) did you choose to complete the brief and why?**

De collaborator. Daar kwam in de eerste instantie het beste resultaat uit en ik wilde ook wat inspiratie om te kijken of ik interessante resultaten kon krijgen.

- **What was the most effective or inspiring part of the tool?**

Dat je verder kunt itereren zonder opnieuw te beginnen elke keer.

- **Did the AI help you see new design directions?**

Vaak kwam er wel wat uit waar ik zelf niet aan had gedacht, maar dat was niet altijd waar ik dan mee verder wilde.

- **How would you have approached this without the tool?**

Waarschijnlijk een youtube tutorial kijken over hoe je zo'n model kunt maken in CAD software.

Interview Questions part 3:

- **On a scale from 1–5, how much did each persona help you explore creative possibilities?**

Assistant: __3_

Collaborator: _4__

Challenger: __5_

- **Which persona felt most like a "creative partner"?**

Ik denk dat ik het meest gehad heb aan de assistant omdat die vaak de meest gewilde resultaten gaf.

- **Compared to working without this tool, how much more (or less) do you feel you could achieve aesthetically?**

Het is makkelijker om met bepaalde design stijlen te werken met zo'n tool.

- **Who felt more in control of the final result; you or the AI and why?**

Toen ik de assistant gebruikte voelde ik redelijk veel controle, bij de andere twee toch wat minder.

P6

Interview Questions part 1:

- **What was your first impression of the interface?**

Minimalistisch en overzichtelijk. Het enige wat ik niet snapte was de code maar dat was ook niet nodig.

- **Which persona did you feel most comfortable with? Why?**

De collaborator, ik werd een soort van door het proces geleid

- **Did any of the personas surprise you in their behaviour?**

De Assistant verraste me door soms wat subtielere veranderingen te maken dan ik had verwacht

- **Did you feel in control of the changes?**

Nee ik heb het gevoel dat AI het meeste werk doet.

- **Did any part feel confusing or limiting?**

Dat ik elke keer elke persona te zien kreeg ook al was ik met een persoon bezig

Interview Questions part 2:

- **Which persona(s) did you choose to complete the brief and why?**

De challenger, daarbij kreeg ik het resultaat waar ik het meest naar op zoek was.

- **What was the most effective or inspiring part of the tool?**

De iteraties die je kon maken en de suggesties die je krijgt na prompts.

- **Did the AI help you see new design directions?**

Ja, zeker. De AI bracht een gebogen structuur in het model die ik normaal nooit zou kiezen, maar dat zag er uiteindelijk wel gaaf uit.

- **How would you have approached this without the tool?**

Ik had het model waarschijnlijk in blender aangepast

Interview Questions part 3:

- **On a scale from 1–5, how much did each persona help you explore creative possibilities?**

Assistant: _2__

Collaborator: __3_

Challenger: _5__

- **Which persona felt most like a “creative partner”?**

De challenger. Hij gaf onverwachte resultaten en ik had het gevoel dat de AI zelf echt nadacht over design keuzes.

- **Compared to working without this tool, how much more (or less) do you feel you could achieve aesthetically?**

Ik denk dat ik zonder deze tool wat minder uit mijn comfortzone zou stappen qua ideeen.

- **Who felt more in control of the final result; you or the AI and why?**

Ik denk toch wel de AI, omdat er soms keuzes werden gemaakt die ik niet eens had voorgesteld.

P7

Interview Questions part 1:

- **What was your first impression of the interface?**

De interface voelde intuïtief aan, vooral omdat er niet te veel knoppen waren. Het was duidelijk waar ik moest klikken.

- **Which persona did you feel most comfortable with? Why?**

Ik voelde me het meest comfortabel met de Collaborator, omdat het het meest gevoel van samenwerken gaf.

- **Did any of the personas surprise you in their behaviour?**

De Challenger verraste me omdat het model soms volledig uit proportie werd gehaald. Toch gaf dat interessante inzichten.

- **Did you feel in control of the changes?**

Ik zag uiteindelijk in de uitleg wat voor verandering precies werden toegepast in de code en toen begreep ik een stuk beter wat de AI precies kon en deed, dus toen wel ja

- **Did any part feel confusing or limiting?**

Nee niet echt

Interview Questions part 2:

- **Which persona(s) did you choose to complete the brief and why?**

De collaborator, die gaf het coolste resultaat waar ik wel mee verder wilde

- **What was the most effective or inspiring part of the tool?**

  Hoe snel je kon testen hoe dingen eruit zouden zien zonder dat je ze hoeft te bouwen of tekenen.

- **Did the AI help you see new design directions?**

Ja, vooral bij het suggesties geven nadat hij aanpassingen had gemaakt

- **How would you have approached this without the tool?**

Waarschijnlijk online een model zoeken wat lijkt op wat ik wil en dat namaken

Interview Questions part 3:

- **On a scale from 1–5, how much did each persona help you explore creative possibilities?**

Assistant: _3__

Collaborator: _5__

Challenger: __3_

- **Which persona felt most like a "creative partner"?**

De collaborator. Die vulde mijn ideeen aan in plaats van of precies te doen wat ik vraag of totaal een andere richting op te gaan

- **Compared to working without this tool, how much more (or less) do you feel you could achieve aesthetically?**

Ik heb het gevoel dat ik visueel meer heb bereikt, vooral omdat ik veel sneller iteraties kon doen dan normaal.

- **Who felt more in control of the final result; you or the AI and why?**

Na meerdere iteraties voelde ik redelijk in controle omdat ik best precies kon aangeven wat ik wilde.

P8

Interview Questions part 1:

- **What was your first impression of the interface?**

Prima, niet heel speciaal maar wel duidelijk.

- **Which persona did you feel most comfortable with? Why?**

De Collaborator en Challenger voelde best chill aan, omdat ik niet alles hoefde te bedenken. Het nam werk uit handen dat ik normaal moeilijk vind.

- **Did any of the personas surprise you in their behaviour?**

De Assistant verraste me door juist weinig te doen. Vaak zijn ai generators heel wacky en extreem, maar dat viel hier wel mee.

- **Did you feel in control of the changes?**

In de chat gedroeg de AI alsof er precies veranderd werd wat ik vroeg, maar soms kwam er in het model dan toch iets anders uit.

- **Did any part feel confusing or limiting?**

Ja dat er dan soms iets anders uitkwam dan wat de AI zelf zei maar misschien is dat dan een limitatie

Interview Questions part 2:

- **Which persona(s) did you choose to complete the brief and why?**

De assistant, omdat ik al wist wat ik wilde dus niet per se nieuwe ideeen nodig had.

- **What was the most effective or inspiring part of the tool?**

Het meest inspirerende was het gevoel dat de tool ideeën voorstelde waar ik zelf niet op zou komen. Dat voelde als samenwerken met een andere ontwerper.

- **Did the AI help you see new design directions?**

De AI liet wel veel onverwachte vormen zien, soms waren die interessant om mee verder te gaan maar soms ook niet, ook omdat ze soms niet praktisch waren

- **How would you have approached this without the tool?**

Waarschijnlijk met Fusion gewoon.

Interview Questions part 3:

- **On a scale from 1–5, how much did each persona help you explore creative possibilities?**

Assistant: __1_

Collaborator: __3_

Challenger: _5__

- **Which persona felt most like a "creative partner"?**

De collaborator, het voelde alsof dat een ontwerper was die je idee verder wilde ontwikkelen.

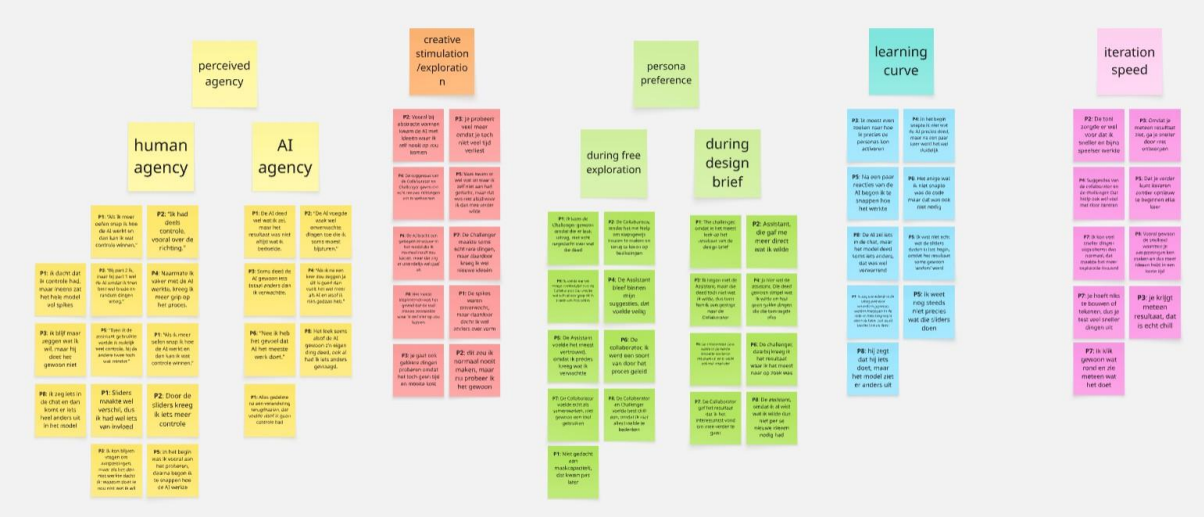
- **Compared to working without this tool, how much more (or less) do you feel you could achieve aesthetically?**

Ja wel meer, vooral gewoon de snelheid waarmee je aanpassingen kon maken en dus meer ideeen hebt in een korte tijd. Stel je hebt een idee, maakt het maar uiteindelijk ziet het er toch niet zo goed uit als je dacht ben je toch veel tijd kwijt. En hier heb je dat niet.

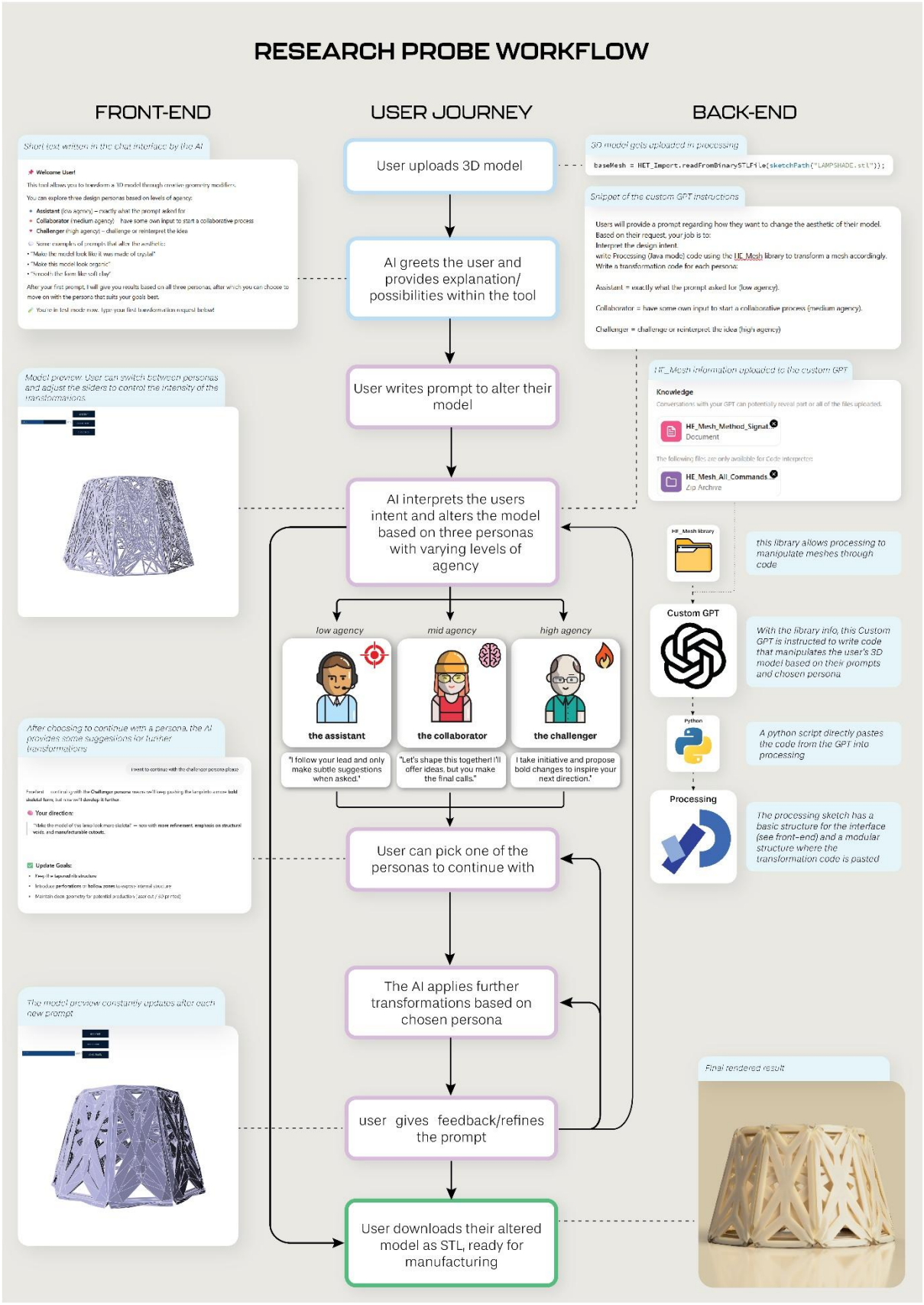
- **Who felt more in control of the final result; you or the AI and why?**

Vaak waren de resultaten niet per se wat ik in gedachten had in het begin, dus dan toch de AI.

Appendix F – Thematic analysis



Appendix G – Full research probe user journey



Appendix H – external links

Previous learning activities: https://www.gijsvogelsdesign.com

DFP008 reflection

Gijs Vogels – 1577514

My expectations for this project were mainly to deepen my knowledge and experience in designing with AI. I have completed a project in the Artifice squad before, however that was before the release of popular LLMs such as ChatGPT and Copilot. Therefore, a big part of that project was understanding what AI actually is before we could design for it. During this project, I aimed to develop a design with the deeper understanding I had gained during the rapid rise of AI applications. Specific goals I had at the start of this semester that are relevant to this project are deepening my skills in human-AI interaction and 3D modeling.

Development based on Expertise Areas

User & Society

During this project, I developed most in the area of User & Society. The tool I created had to be developed specifically with the goal in mind of gathering insights, rather than creating a final consumer product. The shift from designing a product or service to designing a research probe forced me to put the purpose of the research at the forefront of all steps of the project. I initially struggled with this aspect, as my expertise typically lies more in the technical and building stages of projects rather than in doing research and user testing. However, I realized the importance of focusing on features that improved the quality of user test results rather than creating an aesthetic or finalized version of the interface. By implementing and testing varying levels of AI agency I realized how small factors can make a huge impact on the interaction between the user and the AI. Additionally, by doing user tests with a complex research probe I noticed the significant difference between the perspective of the developer and that of the user.

Math, Data & Computing

My most developed EA was probably already Math, Data & Computing. However, Computing with AI was a fairly new concept for me. Especially combining LLMs with mesh transformations through code was a large challenge. I had to combine multiple tools (Custom GPT, Processing, Processing library and Python) to create a working tool that was ready for user testing. A large improvement that I made compared to my last project was looking at the prototype 'workflow' before I started building. During my M1.1 I struggled with tying everything together at the end because I started developing prototypes before knowing how to combine certain features. During this project I made a clear outline in how I wanted to develop my research probe, saving me a lot of time in the end. Another obstacle was instructing the GPT in such a way that it generated working code every time. This took more time than expected, as I hadn't considered that since the AI generates new code after every prompt, it can always make mistakes. However, after uploading extracted files from the relevant processing library and many iterations on the custom GPT instructions, the AI managed to generate code with barely any errors.

Technology & Realization

Since my expertise lies with the building and programming part of the project, developing the research probe was the part I was most comfortable with. Using new tools such as Python and combining certain functions was challenging but exciting. One of the key aspects was making sure that the 3D models could be visualized in real time so users can see the effect of their prompts and get instant feedback, enhancing engagement with the tool. This included using Python to automatically copy the GPT generated code into the Processing sketch and creating interactive interfaces. I had to think about how the GPT communicated with processing and vice versa, without compromising user experience.

Future improvements

Even though I take pride in building prototypes that are as functional and complete as possible, I believe that during this project I spent too much in the realization phase, especially for a research project. A significant amount of time was spent on perfecting the research probe which resulted in a tight schedule during user testing. Although this aligns with my strengths, it means that other important aspects, such as focusing on backing up my design choices with other research and user testing itself, got the most attention near the end of the project rather than during the entire semester.

Future implications

Overall, this project has deepened my understanding on designing for Artificial Intelligence, particularly for research purposes. Although this project was not directly related to vitality and designing beyond a screen, which is a large part of my PIV, the challenge of designing for AI interactions has given me valuable insights into how interactive tools can influence motivation, engagement and user agency. It has raised my awareness of the balance between human and machine control, a highly relevant aspect when designing products that aim to support physical and mental well-being. Additionally, the experience I gained in Research through Design will assist me in validating and further developing my future projects with user feedback and insights.

Ethical Review Form

(Version2.3)

This Ethical Review Form should be completed for every research study that involves human participants or personally identifiable personal data and should be submitted to ethics@tue.nl. For more information about how this process works please click here. Please check if you are using the correct form: Ethical Review Form (version 2.2). Please click here to obtain this latest version.

Part 1: General Study Information

1	Project title / Study name	AI as a creative tool in 3D modeling
2	Name of the researcher / student	Gijs Vogels
3	Email of the researcher / student	g.j.vogels@student.tue.nl
4	Supervisor(s) name(s) *Additional explanation: Please write down the name of your direct supervisor. You can mention several supervisors if appropriate, but at least one supervisor should be mentioned.*	Steven Houben
5	Supervisor(s) email address(es) *Additional explanation: Please give the email address of the supervisor(s) mentioned in question 4.*	s.houben@tue.nl
6	Department / Group *Additional explanation: Please specify group if relevant e.g. JADS or HTI*	Industrial Design, DFP008 Artifice
7	What is the purpose of this application?	☐ Scientific study ☐ Bachelor education. Course:…….. ☒ Master education. Course:…DFP008…….. ☐ Other (e.g. external, following external regulations):……
8	Research location *Additional explanation: Where will the data collection take place? On campus, in a company, in public space, online, etc.*	☒ Eindhoven University of Technology campus ☐ Other, name organization(s):…… ☐ Public space ☐ Online
9	Start date data collection *Additional explanation: Please state when your data collection will start.* ***Please note that the date has to be in the future. Forms with a date in the past will not be accepted.*** *Please note that you do not have to provide information about your complete (PhD) project, but only on this particular sub-study that you are submitting for approval in this form.*	May 2025
10	End date data collection	May 2025
11	Does your project receive external funding (e.g., NWO, relevant for special regulations from funders)?	☐ Yes. Name Funder: ☒ No

Ethical Review Form

12	Which internal and external parties are involved in the study? Think about sharing data or information between TU/e and other universities, commercial companies, hospitals, etc. *<u>Additional explanation</u>: Describe all internal and external parties that are involved in the study or project, including:* • *researchers or research groups at the TU/e who participate in the study;* • *(Researchers at) other universities/institutions that provide data/services, help analyzing the data, etc.;*	Internal parties • Researcher(s): • Supervisor: Steven Houben

Ethical Review Form

	• *(commercial) partners, companies, government bodies, municipalities, consultancy firms, hospitals or care institutions that provide data (e.g., contact details of participants, data for further analysis).* *Indicate which role each party plays: who defines the means and purposes in the study, who will supply the data (external parties?), who will process/handle the data, who will be able to access the data during and after research (only researchers at TU/e or also others)?*	External parties • Other universities/institutions: • Others: ……
13	Have any special agreements already been made with an external party, such as a Non-Disclosure Agreement (NDA) or a data sharing agreement?	☐ Yes, namely: ☒ No
14	Has your proposal already been approved by an external Ethical Review Board or Medical Ethical Review Board? *Additional explanation: For example, when you are collaborating with another university and the project has been approved by their Ethical Review Board, or when you received a WMO-waiver from a Medical Ethical Review Board.*	☐ Yes ☒ No
15	If yes: Please provide the name, date of approval and contact details of the ERB. Please also include the registered number for your project approval. Additionally, please send in the Ethical Review Form upon which ethical approval was granted together with this form.	
16	If you process personal data that are likely to result in high privacy risks for participants, you need to perform a Data Protection Impact Assessment (DPIA). Have you done this for this or a very similar project? ***Please read the information below: a DPIA is not the same as a regular privacy impact assessment. More detailed questions on privacy will follow in the section below.*** *Additional explanation: A Data Protection Impact Assessment (DPIA) is a formal document that must be drafted under the guidelines of the General Data Protection Regulation (GDPR). Think of research with vulnerable people, high-risk medical research,* *The Dutch DPA (Autoriteit Persoonsgegevens) and our website provides more information about a DPIA.*	☒ Not applicable (no high privacy risks) ☐ Yes (the form is attached to the application) ☐ No
Part 2: Medical study		
1	Does the study have a medical scientific research question or claim? *Additional explanation: Medical/scientific research is research which is carried out with the aim of finding answers to a question in the field of illness and health (etiology, pathogenesis, signs/symptoms, diagnosis, prevention, outcome or treatment of illness), by systematically collecting and analyzing data. The research is carried out with the intention of contributing to medical knowledge which can also be applied to populations outside of the direct research population. If your research contains questions about health and health related parameters (such as well-being, vitality, feelings of anxiety or stress) but your research question is not primarily medical, then you can answer 'no' to this question.*	☐ Yes* ☒ No *If yes or in doubt, please contact Susan Hommerson via rdmsupport@tue.nl

Ethical Review Form

Part 3: Use of (medical) devices in the study		
1	Does your research include a device? *Additional explanation: A device is a complete piece of physical hardware that is used to compute or support computer functions within a larger system. Devices can be divided into input-, output-, storage-, internet of things-, or mobile device.*	☐ Yes, not self-made ☐ Yes, self-made ☒ No
2	Please describe your device or link to an online description of the device	
3a	Will you use a device that is 'CE' certified for **unintended use** (meaning you will use existing CE certified devices for other things than they were originally intended for) or use a device that is not 'CE' certified? *Additional explanation: You can find more information about CE certification here*	☐ Yes ☒ No
3b	Please explain to what extent the device was assembled according to relevant standards and provide a risk assessment *Additional explanation: You can find more information about a risk assessment here*	
3c	Do you use a device or software that has a medical purpose such as diagnosis, prevention, monitoring, prediction, prognosis, treatment or alleviation of disease or injury?	☐ Yes, my device or software currently has a medical purpose ☐ Yes, my device or software could have a medical purpose in the near future ☒ No ☐ I'm not sure
Part 4: Information about the study		
1	What are your main and applicable sub, research questions? *Additional explanation: You need to provide at least one clear research question.*	Research question: How does a creative AI tool with different levels of agency affect designers' ability to explore and achieve specific aesthetics in 3D modeling?
2a	Please check the box that indicates the relevant study population *Additional explanation: Please select which persons are eligible for your study.*	☒ Students ☐ General healthy population ☐ General population with specific feature, e.g., pregnancy, specifically ..... ☐ Patients, specifically ..... ☐ Other, specifically .....
2b	Age category of participants	☐ Younger than 12 years of age ☐ Older than 12 years, younger than 16 years ☐ Older than 16 years, younger than 18 years ☒ 18 years or older
3	Description of the research method (select all that applies)	☒ (Semi-structured) interviews ☐ Surveys *If you tick one of the above, send the interview/survey questions with this form. Without them the form will not be accepted.*

Ethical Review Form

	Additional explanation: Please specify your research method. Note that you need to provide information about the research method in an additional file that you attach to the ERB form. E.g., for interviews you provide the interview questions, for surveys you provide the survey questions, etc.	☐ Group workshops/roundtable discussios ☐ Diary studies ☒ Behavioral observations ☐ Building sensor data ☐ Wearable device (e.g. Fitbit watch, on-skin sensors) ☒ User testing ☐ Pilot study ☐ GPS tracking/location data ☐ Living Lab ☐ Other, namely .....
4	Description of the measurements and/or stimuli/treatments If needed you may elaborate *Additional explanation: Think about your outcome measures and the variables you will be collecting and describe them in a way such that another person understands what the participant will experience. For example: Participants will perform task A and see pictures from database B, and we measure validated Scale 1.*	Participants will interact with a creative 3D modeling tool including three AI personas that vary in agency: Assistant (low agency), Collaborator (medium agency), and Challenger (high agency). During the test, participants will complete three tasks: 1. Free exploration — Participants upload a 3D model and interact freely with the tool and its personas by entering prompts to understand its capabilities and interface. 2. Design brief — Participants are given a short design brief (e.g., "make this model look more futuristic") and are asked to complete it using one or more personas. 3. Reflection & rating — Participants evaluate the creative output by comparing it to what they would normally produce themselves. They also rate the AI personas on their usefulness, creativity, and alignment with their design intent. Outcome measures include: • Qualitative interview responses (during and after interaction) • Task completion success (to what extent the design brief is fulfilled) • Persona preference and perceived creative support These measures help evaluate how different levels of AI agency affect creativity, ownership, and user experience in the 3D modeling process.
5a	What number of participants do you need for this study? *Additional explanation: Think about if you need 3 or 30 participants for example, and why? Do they need to provide their input once, or several times, and why? If relevant, specify the duration of the study per participant and the compensation that is needed for the study.*	This study will include 8 participants, which is appropriate for a qualitative design study focused on user interaction and creative behaviour. This number allows for diverse perspectives while remaining manageable for in-depth observation and analysis. Each participant will take part in a single session lasting approximately 30 minutes. This sample size is sufficient to identify recurring patterns, persona preferences, and differences in how the AI influences creativity and ownership. Because the focus is not on statistical generalization but on gaining rich insights, a smaller number of participants is justified.
5b	Justify the number of observations you need, taking into account the risks and benefits. *Additional explanation: Think about if you need 3 or 30 participants for example, and why? Do they need to provide their input once, or several times, and why? If relevant, specify the duration of the study per participant and the compensation that is needed for the study.*	The study involves a total of 8 individual observations, each consisting of a single session. This number is justified given the low-risk nature of the study and the qualitative goals. Each observation includes interaction with the tool, task performance and a reflective interview, allowing for insights into the user's experience, interpretation of AI personas, and perceived creative agency. With 8 participants, we can ensure variety in responses while still maintaining a manageable amount of data for detailed analysis.

Ethical Review Form

6	Explain why your research is societally important. What benefits and harm to society may result from the study? *Additional explanation: What benefit will the results of your study have to society in general?*	This research explores how AI can support creative processes in 3D design, with a focus on how different levels of AI agency influence the way designers interact, make decisions, and feel ownership over their work. As AI tools become more integrated into creative industries, it is beneficial to understand not just how they can automate tasks, but how they can meaningfully collaborate with humans. The societal benefit lies in designing AI systems that empower, rather than replace, human creativity. By studying how designers respond to varying AI personas, we can better align future tools with user values like control, ownership, and exploration. Potential harm is minimal, as the study is non-invasive and does not collect sensitive personal data. However, the results could help prevent future misuse of AI in creative domains by highlighting where overly directive AI might reduce human agency or creativity.
7	Describe the way participants will be recruited *Additional explanation: How will you recruit participants for your study? For example, by using flyers, personal network, panels, etc.*	☐ Survey link posted online, e.g., social media platforms ☐ On campus flyers ☒ Personal network ☐ Via a company, namely …….. ☐ Via a hospital, namely …….. ☐ Via an organization …… ☐ By a Consortium Partner, namely …… ☐ Other, namely …….
8	Provide a statement of the risks regarding data breach, safety or well-being (think about stress, extreme emotions, visual or auditory discomfort) that you expect for the participants or others involved in the study. Explain these possible risks and describe the way these risks are mitigated. Also take into consideration any personal data you may gather and associated privacy issues.	This study involves minimal risk to participants. The tasks consist of interacting with a digital 3D modeling tool and responding to questions about their experience. No sensitive personal information, medical data, or biometric data will be collected. Participants may be asked to share non-identifying design files (3D models) and their subjective opinions about the tool. Possible risks are low, but may include: • Mild frustration or fatigue during software interaction if the tool behaves unexpectedly. • A minor risk of discomfort if participants feel their creativity is being evaluated or compared to AI output. To mitigate these risks: • Participants will be clearly informed that this is a study of the tool, not their abilities. • They can pause or stop the session at any time without explanation. • All interviews and reflections will focus on the interaction, not on judging personal skill. Regarding data privacy, responses and ratings will be anonymized. No names, email addresses, or identifying

		information will be linked to the data. Files and feedback will be stored securely and only used for academic analysis.

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Part 5: Self-assessment checklist

	Note: answers in the blue boxes indicate that your research is eligible for fast-track approval	Yes	No
1a	Does the study involve human material? (e.g., surgery waste material derived from non-commercial organizations such as hospitals)		X
1b	Will blood or other (bio)samples be obtained from participants? (e.g., hair, sweat, urine or other bodily fluids or secretions, also external imaging of the body)		X
2	Will the participants give their consent – on a voluntary basis – either digitally or on paper? Or have they given consent in the past for the purpose of education or for re-use in line with the current research question?	X	
3	Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator? Additional explanation: Think about doing research on your own students or on your own employees. When there is a dependency or power imbalance between you and the research participants, you need to answer 'yes' to this question.		X
4	Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g., children (<16 years of age), people with learning difficulties, patients, people receiving counselling, people living in care or nursing homes, people recruited through self-help groups)		X
5	Will participating in the research be burdensome? (e.g., requiring participants to wear a device 24/7 for several weeks, to fill in questionnaires for hours, to travel long distances to a research location, to be interviewed multiple times)?		X
6	May the research procedure cause harm or discomfort to the participant in any way? (e.g., causing pain or more than mild discomfort, stress, anxiety or by administering drinks, foods, drugs, or showing explicit visual material)		X
7	Will financial inducement (other than reasonable expenses and compensation for time) be offered to participants? Additional explanation: For an explanation of what is considered a reasonable compensation, see the topic participant fees from the HTI group		X
8a	Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people)		X
8b	If yes: Will you be observing people without their knowledge in public space? (e.g. on the street, at a bus-stop)		X
9	Will the study involve actively deceiving the participants? (e.g., will participants be deliberately falsely informed, will information be withheld from them, or will they be misled in such a way that they are likely to object or show unease when debriefed about the study)		X
10	Will participants be asked to discuss or report sexual experiences, religion, alcohol or drug use, suicidal thoughts, or other topics that are highly personal or intimate? Additional explanation: Think about your research population. For some participants, particular topics can be considered sensitive or intimate, whereas the same topics will not be perceived as such by other participants.		X
11	Elaborate on all boxes answered outside of the blue boxes in part 5.		

Ethical Review Form

Part 6: Self-assessment on privacy

The following questions (1-11) concern privacy issues, as laid down in the General Data Protection Regulation (GDPR). The Data Stewards and – if necessary – privacy team of TU/e will assess these questions. In some cases, more information is required to assess the privacy risks. If this is the case, you will be notified that the Data Stewards team will contact you.

The GDPR defines 'personal data' as any information relating to an identified or identifiable natural person ('data subject'). Personal data also includes data that indirectly reveals something about a natural person. Personal data can lead to the physical, physiological, genetic, mental, economic, cultural or social identity of a natural person. There are two main categories of personal data: regular personal data and special category personal data.

If you are not sure whether some of these questions below should be answered with a Yes or No, please contact a Data Steward first through rdmsupport@tue.nl.

	Note: answers in the blue boxes indicate that your research is eligible for fast-track approval	Yes	No
1	Will the study involve discussion/collection/processing of **regular** personal data, or will you collect and (temporarily) store video or voice recordings for the purpose of conducting interviews? *Additional explanation: For example, name, address, phone number, email address, IP address, gender, age, video or interview recordings? If you are not sure whether your data contains personal data, please contact the Data Stewards Team (rdmsupport@tue.nl).*		X
1A	**If yes**: Please describe which regular personal data you will collect in this study?		
2	Will the study involve discussion/collection/processing of **special category** personal data or other **sensitive data**? *Additional explanation: Examples of special category personal data are race, religion, health information, political views, genetic or biometric data for the unique identification of a person, sexual preference, etc. Health information concerns personal data of the physical or mental health of persons, including the provision of health care. Examples of other sensitive data is information such as communication data, financial records or credit scores, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, criminal records, data of vulnerable persons (children, people with disabilities, refugees), BSN number etc. Please be aware that the use of special category personal data in research requires extra security measurements in order to safeguard the privacy of data subjects and to comply with the GDPR. Processing of this special category data is prohibited, except for specific purposes and under certain circumstances. If you need to process special category data, please consult the data stewards at rdmsupport@tue.nl.*		X
2A	**If yes**: Please describe which special-category personal data and/or sensitive data you will collect in this study?		

If you answered yes to either question 1 or 2, please answer the questions below. If you answered no to both questions, you can skip this part and continue onto part 7. Also, if an answer to any of the following questions is 'yes', please contact a Data Steward at rdmsupport@tue.nl

		Yes	No
3	Will your project involve the processing of personal data on a **large scale**? *Additional explanation: In general, any processing that involves more than 10.000 data subjects should be considered "large scale". However, if the data of approximately 1000 persons (or more) are involved, the data processing may still be considered large scale. In that case, besides the number of persons involved in the study, one should also assess (i) the amount of data collected from these persons taking into account the type/risk level of the personal data, (ii) the duration of the data processing, (iii) the geographic scope or extent of the processing. For example, if you would collect and process data across several European countries with 10+ socio-economic data items of 1200 individual persons for several years in a row, that is likely "large-scale processing". Other examples of a large-scale processing activity are:* • *Monitoring driving behavior of road users on Dutch highways* • *Collecting data of Covid patients* • *A hospital that processes patient data as part of its usual operations*		

	• *A transport company that processes travel information of people who travel by public transport in a certain city. For example, by tracking them through travel maps.*		
4	Does this processing activity involve the use of new or innovative technologies? *Examples of a new technology: combining fingerprints and facial recognition for physical access control, the use of bodycams in public spaces, the use of new technical methods in conducting research such as AI. This question also refers to new technologies that have not been deployed by TU/e so far.*		
5	Does your study involve systematic (c.q. automated) monitoring of persons? *Additional explanation: Consider data processing activities that have the purpose of observing, monitoring or controlling individuals, for example in circumstances where the individuals are not aware by whom their personal data is collected and how it is used. Examples of such activities are using camera systems to monitor driving behavior on highways, monitoring email inactivity or employee phone use, certain applications of machine learning and artificial intelligence.*		
6	Does the study involve collaborations (with third parties) in which data are shared or exchanged in order to link or combine data? *Additional explanation: This may often apply in a collaboration between the university and a commercial party, contract research, etc. It is important to assess this for all data in the entire project, not just your own data.* *An important consideration in this situation is whether the person whose data is involved could have expected that data from these different databases or sources of information were to be combined. For example, it is less likely for data subjects to expect that databases from different parties will be combined and the results are used for different purposes than one could reasonably expect; this may apply for example in a collaboration between the university and a commercial party.*		
7	Will the study include data processing activities that prevent data subjects from exercising their rights or using a service or contract? *Additional explanation: Examples include processing operations carried out in public places that people cannot avoid (train station, airport, shopping mall, public university premises, etc.) or processing operations whose purpose is to allow or not allow data subjects to use a service or enter into a contract (examples: by refusing to pay a benefit, not being able to apply for a loan, etc.).*		
8	Will the study process personal data to score, rank or profile persons? *Additional explanation: Examples: monitoring (highway) roads to give road users a "score" based on their detected driving behavior, a bank assessing its customers based on their creditworthiness, or an organization building behavioral and marketing profiles based on use of their website or navigating their website.*		
9	Does your data processing include activities that involves composing "**blacklists**" – and, in particular, in relation to sensitive or special category data, such as communication data, financial records or credit scores, genetic data, biometric data, health data, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, etc. *Additional explanation: This situation will not be a common occurrence in research, but you may indirectly be involved in this. In general, this typically concerns processing operations involving personal data relating to criminal convictions and offences, data relating to unlawful acts, data concerning unlawful or annoying behaviour or data concerning bad payment behaviour by companies or individuals are processed and shared with third parties (blacklists or warning lists, as used, for example, by insurers, hospitality companies shopping companies, telecom providers as well as blacklists relating to unlawful behavior of employees, for example in the healthcare sector or by employment agencies, etc.).*		
10	Will personal data be transferred or shared outside the EU/EEA? EU data protection rules apply to the European Economic Area (EEA), which includes all EU countries and non-EU countries Iceland, Liechtenstein and Norway. *Additional explanation: The GDPR has drafted additional requirements for transfers data outside of the EU/EEA. Typically, additional safeguards must be implemented to protect the personal data of residents in the European Union. For example, if you collaborate with an American, Indian or Chinese university or other third party outside the EU/EEA, you must first check whether this is allowed and under which conditions this is allowed. Another typical example is storage of data on American providers of cloud (storage) services. Please contact the data stewards first to discuss this.*		
11	Will any raw or anonymized personal data or any other sensitive data or research results from the project possibly be transferred to a high-risk country*? ***High risk countries**: China, Russia, Iran, Turkey, and North Korea.* *If personal data or other potentially sensitive data is exchanged with one of these countries, or if part of the data processing takes place in one of these countries: **an advice from the Data Protection Officer, the kennisveiligheidsteam (Knowledge Security team), and the CISO (Chief Information Security Officer) is ALWAYS required.***		

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Part 7a: Processing of research data

1	Is consent your legal basis for processing the personal data in your study? *Additional explanation: What is a legal basis? One of main principles in the GDPR is to ensure that personal data is processed lawfully, fairly, and transparently. To comply with this principle, the processing of personal data also requires that you have a valid legal basis for the personal data processing activity.* *In research projects, the legal basis is often but not always consent. However, it is possible that it is not clear or not possible to establish whether to use consent as a legal basis.* *Some examples where consent may not be applicable as legal basis are covert research, data collection in public spaces, secondary data analysis of existing data, data that are transferred to you by a third party, consent is not possible or would require disproportionate effort, etc. In that case, please indicate which legal basis you think that applies or (preferably) contact a data steward first.*	☒ Yes and it will be obtained via …an informed consent form… An informed consent template* is attached to this application. ☐ No, I will use another legal basis to process the data. Namely, …….. * You can download a suitable template **here**.
2	Where will the data come from?	☐ Data obtained from another party (secondary data use) ☒ New data collected only by my research team ☐ New data collected together with collaborators
3	Which of the following tools will you use to process personal data?	**Surveys** ☐ Qualtrics ☐ Limesurvey ☐ MS Forms ☐ Other, namely …….. **Interview/workshop recordings** ☒ Voice/video recorder ☐ Phone in a flight mode ☐ MS Teams ☐ Other, namely …… **Transcription** ☒ Manual transcription ☐ Microsoft Office software (e.g. Word, Teams) ☐ Other, namely …… **Statistical analysis** ☐ SPSS ☐ R ☐ Other, namely …… **Other tools**, specifically…….
4	Where will the data and in particular the personal data be stored during and after completion of the study? If you have already uploaded your Data Management Plan, you can refer to your Data Management Plan.	☒ Onedrive ☐ Research Drive ☐ Network Drive

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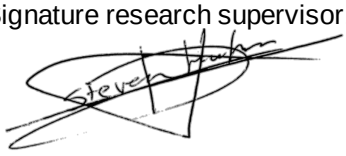
	Additional explanation: University supported-storage facilities are SURF Research Drive, Ceph, departmental drives (this includes BE Project Drive), and the TU/e instance of Microsoft OneDrive. For most personal data, the use of SURF Research Drive or departmental drives (including BE Project Drive) is required.	☐ Research Manager ☐ Other, namely ……
Part 7b: Safety and security measures		
1	Will you pseudonymize/anonymize the data? *Additional explanation:* *Anonymization: remove all direct identifiers (name, address, telephone number etc.) but also indirect identifiers (age, place of birth, occupation, salary) that, linked with other information, can lead to a person's identification. Anonymization to the point that a data subject is no longer identifiable means that the anonymized data is not considered to be personal data anymore.* *Pseudonymization: replacing the unique identifier of a data subject with an artificial pseudonym. This means that identification is still possible with the identification key. The identification key needs to be stored securely and separately from the pseudonymized data. If the data subject can be identified by combining data with additional information, the data is also called pseudonymous.*	☐ ☐ No ☒ Yes* *If yes, describe how: Participants will be named P1, P2, P3… etc.
2	Is access to (personal) data restricted? (Select all that apply)	☐ No ☐ Yes, via access control ☒ Yes, via password protection ☐ Yes, access only given to TU/e research team ☐ Yes, access only given to research team, including non-TU/e collaborators ☐ Other, specify……
3	Who will have access to the data during and after completion of the project? (Select all that apply)	☒ Main researcher ☒ TU/e supervisor(s) ☐ External supervisors ☐ TU/e research team ☐ Other, specify……
4	Will you store data for future research?	☒ No ☐ Yes, in a public data repository ☐ Yes, in a public data repository under restricted access ☐ Yes, in a TU/e-recommended storage (SURF Research Drive, Network Drive)
5	Will you share data outside the TU/e?	☒ No ☐ Yes, in a fully anonymized form ☐ Yes, raw or pseudonymized data* *If you selected this box, make sure that a suitable data agreement is put in place. You can contact the Data Stewards for support in preparing such an agreement
6	How long will data be stored after the end of the project?	Data will not be stored after the completion of the project

Ethical Review Form

Part 8: Closures and Signatures

1	Enclosures (tick if applicable **and attach to this form**):	☒ Informed consent form ☐ Informed consent form for other agencies when the research is conducted at a location (such as a school) ☐ Text used for ads (to find participants) ☐ Text used for debriefings ☐ Approval other research ethics committee ☒ The survey the participants need to complete, or a description of other measurements ☐ Data Protection Impact Assessment checked by the privacy officer ☐ Data Management Plan checked by a data steward
2	Signature(s)	Date: Signature(s) of applicant(s):  Date: 19.05.2025 Signature research supervisor:  *Without both signatures we won't accept the form.*

EINDHOVEN UNIVERSITY OF TECHNOLOGY

Consent form

You are advised to carefully read this document. This study is part of the course DFP008 Artifice: Aesthetics and Ethics of Artificial Intelligence of the faculty Industrial Design at Eindhoven University of Technology.

The goal of this study is to research how different levels of AI agency affect creativity, ownership, and user experience in the 3D modeling process.

To be included in this study:

- You are 18 years of age or older
- You have experience in 3D modeling

Participants will interact with a creative 3D modeling tool including three AI personas that vary in agency: Assistant (low agency), Collaborator (medium agency), and Challenger (high agency). During the test, participants will complete three tasks:

1. Free exploration - Participants upload a 3D model and interact freely with the tool and its personas by entering prompts to understand its capabilities and interface.
2. Design brief - Participants are given a short design brief (e.g., "make this model look more futuristic") and are asked to complete it using one or more personas.
3. Reflection & rating - Participants evaluate the creative output by comparing it to what they would normally produce themselves. They also rate the AI personas on their usefulness, creativity, and alignment with their design intent.

Outcome measures include:

- Qualitative interview responses (during and after interaction)
- Task completion success (to what extent the design brief is fulfilled)
- Persona preference and perceived creative support

This study is conducted by Gijs Vogels.

Risks

- Mild frustration or fatigue during software interaction if the tool behaves unexpectedly.
- A minor risk of discomfort if participants feel their creativity is being evaluated or compared to AI output

Confidentially

Your participation in this study will remain confidential, and your identity will not be stored with your data. Your responses will be assigned to a number, and the list connecting your name with this number will be destroyed once all data has been collected and analyzed.
You can refuse to participate without giving any reason and you can stop your participation at all times during the study. You can also withdraw your permission to use your data up to 24 hours after they were recorded, without any negative consequences. If that would the case, you can contact Gijs by sending an email to g.j.vogels@student.tue.nl.

Certificate for permission

☐ I declare that I have read and understood this information. I give permission for voluntary participation in this study. I also give permission to process my data for the aim of this study. I understand that my data will be processed anonymously

Date: ___/___/_____Name/Signature: _____

RE: M12 ERB form

Severens, Marjolein on behalf of Ethics
To Vogels, Gijs

Reply | Reply All | Forward

Tue 20/05/2025 13:37

Dear Gijs,

Your application (ERB2025ID298) has been approved by the ERB.

We assume that you have answered all questions correctly. We will perform regular spot-checks so you need to keep your documentation (ERB form, informed consent forms, surveys/interview questions, description of experiment/prototype etc.) available for at least 6 months.

Good luck with your research and have a nice day!

Best regards,

Marjolein Severens
ERB student assistent

From: Vogels, Gijs <g.j.vogels@student.tue.nl>
Sent: dinsdag 20 mei 2025 10:49
To: Ethics <Ethics@tue.nl>
Subject: M12 ERB form

Hi,

I hereby submit my ERB form for my M12 research project regarding AI in 3D modeling.

Kind Regards,
Gijs Vogels