# Machines Imagining Interior Images: Investigating the significance of algorithmic 'text-to-image' processes for the practice and pedagogy of interior design

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The last 12 months has witnessed a dramatic acceleration in the development of and accessibility to a variety of artificial intelligence and machine learning tools. At the leading edge of public consciousness is probably ChatGPT, a 'generative pre-trained transformer' by the developer OpenAI and a type of LLM, or Large Language Model. Using a chatbot interface, this tool allows users to input 'natural language' prompts into a text interface in order to generate text-based responses. But there is a much wider range of non-text and image-based tools to perform a variety of tasks. These can include image recognition, analysis and classification, the transfer of 'style' from one image onto a second, the super-enhancement of resolution in low-quality images, and the generative production of new images from a pre-trained dataset. With regard to this last category, and most comparable to ChatGPT in terms of its accessibility and impact, are image generative tools such as Dall-E, Midjourney and Stable Diffusion. Similar to ChatGPT, the interface for these tools is a 'natural language' prompt, entering a text description from which an image is generated, having been debatably 'imagined' by the machine.

In an academic context, the availability of generative AI tools is having an increasing impact with a particular focus on plagiarism and authenticity, but there are significant wider ethical issues including the theft of intellectual property, the exploitation of the labour of those whose work the algorithms are trained on, and hidden bias embedded in the underpinning datasets. While the capacity of ChatGPT to generate entire essays at the request of a few lines of text is inciting clear and challenging debates at whether the AI chatbot is a research tool or a cheating machine (Barnett 2023), potentially less defined are those deliberations on the AI production of images in the context of the creative disciplines. Arguably, how

images are developed and deployed will vary according to creative discipline, and therefore different practices may attribute different purposes or demands to tools of image production, AI driven or otherwise.

For the discipline of interior design, the practice of making or engaging with images of interiors is a key part of the design process, but not the primary focus of the discipline. Nonetheless, there is a distinct consumption and engagement with the interior which occurs via the image, that machine imaged interiors are already contributing to. With reference to Instagram, where such images are disseminated most widely, it is easy to be seduced by the atmospheric and imaginative interiors which can challenge perception in the uncertainty of their reality, machine imagined or otherwise. Moreover, there is a wider context of computer rendered imaginary spaces by practitioners such as Andres Reisinger and Charlotte Taylor which potentially propose a new typology of interior. But while this public circulation of the images performs an engagement which can contribute to the 'cult of the interior', or the making of interiors that are only ever to remain as virtual or non-physical experiences, what is the potential of AI image-making tool for the practice and pedagogy of interior design?

In order to broach this very broad line of enquiry and explore some of the key challenges and issues relating to the use of AI imaging tools for interior design, a scoping workshop was developed in which postgraduate interior design students, and staff and researchers with industry experience, undertook a series of exercises using the Midjourney AI tool. This paper outlines the activities and experiences from the workshop and gives attention to specific conclusions as well as future lines of enquiry.

For those unfamiliar with Midjourney, it is interfaced primarily via the Discord social media platform. In logging into the Midjourney server, users are able to input 'natural language' descriptors into a text entry line with use of the command '/imagine'. After a period of usually less than a minute, 4 options or variations are generated based on the text. Users can then select one of the 4 images, and either produce further variations based on that image, or 'upscale' to produce a higher definition image with more refined detail. Midjourney was specifically chosen for the workshop in preference over Dall-E or Stable

Diffusion, as while generally regarded as less powerful tool, can produce dramatic outcomes with greater ease.

TASK 1

[SLIDE 1 – Task 1 outcomes]

Following an initial period of familiarisation with the Midjourney interface, the first task participants were assigned was to reproduce an interior they were familiar with. In the attempt to replicate a specific place, immediately apparent was the imprecision of the outcomes generated, and the nuanced detail with which the text prompts needed to be crafted. A key frustration was the inability to be precise about the arrangement of objects within the scenes produced. The workflow is such that each generated image is an independent artefact, and Midjourney does not automatically 'remember' what was produced earlier and for modifications to be made similar to the chat format of ChatGPT. However, a useful feature allows the upload or link to the previously generated image file as a reference artefact, and prompt for certain elements to be added. The degree to which this is effective is unpredictable, with results more often than not tending towards a radical reconfiguration of the image.

[SLIDE 2 – Workflow diagram by Joern Ploennigs and Markus Berger]

These limitations of Midjourney point towards an expanded workflow that integrates additional AI tools as outlined by Joern Ploennigs and Markus Berger of the University of Rostock (Ploennigs and Berger 2022). In this workflow, images generated in Midjourney are brought into Dall-E to make use of its extended suite of tools, such as 'in painting' where specific elements can be manually erased and replaced via text prompts. This research highlights the strengths of each of the separate tools and integrates into a methodical workflow, but while greater control can be attained over the image, directorial oversight remains loose and demands agility.

TASK 2

[SLIDE – Task 2 outcomes]

The second task set to participants was to consider a previously developed interior design project and use Midjourney to address a particular aspect. A range of approaches were undertaken, including exploring options for tiling patterns and handrail design, as well as testing how Midjourney responded to descriptions of previous designs. This also proved to be a challenging task, further highlighting the insufficient direction to address specific design issues. However, the ability to provide a range of generic options or iterations for selected interior elements, such as a staircase or a floor finish, was considered as useful, especially from a pedagogical perspective.

[SLIDE – Task 2 outcomes, stairs]

A comparison was drawn with the image sharing platform Pinterest and the tendency for students to use this to source images of designs that act as exemplars for projects. A quick in-workshop test between Midjourney and Pinterest, inputting identical prompts into both services, found a richer and more diverse range of outcomes was generated by AI, with Pinterest limited in both useful outcomes and capacity to comprehend complex requests. While benefitting a research and development process for students, from a pedagogical perspective the facility to quickly secure a range of standard design features could complement technical learning opportunities. For example, offering students a range of stair designs to request for construction drawings to be drafted that complied with technical regulations. Further to this, the elementary ability to observe and compare alternatives across a limitless range of design elements can be demonstrative to students of the different opportunities and solutions available in any situation.

[SLIDE – Task 2 outcomes, coffee shops]

At this juncture in the workshop, the bias in results being produced was becoming increasingly apparent. Unless specified in the text prompt, the default cultural aesthetic for any outcome tended towards a Western and North American context. This is attenuated

further when contrasting outputs from the prompts “a blue coffee shop” and “a blue Chinese coffee shop”. The first is generic, with a familiarity of a globalised typology, however the second is a pastiche with overt Chinese aesthetic references, to such an extent that participants from a Chinese background found it ridiculously inauthentic. This is only one example of many which gives attention to the bias embedded in the technology which sustains a cultural imaginary from a western perspective and points to distinct ethical issues as to how the tool might be deployed.

In correspondence to the role the dataset acts in shaping outcomes, of note is the capacity for AI imaging tools such as Dall-E to be trained on custom datasets of images. This enables the designer to effectively train an AI on their own existing designs to generate alternative outcomes in the same style, already being undertaken by many including Zaha Hadid Architects (Barker 2023). While Midjourney does not currently have this feature, it is possible to ‘remix’ one or more images to fuse different elements and aesthetics together and generate new configurations with an implicit style or configuration.

[SLIDE – Work by David Ross]

A participant was able to explore this by referencing an image of a previously produced artefact and prompted Midjourney to integrate as a design element in the interior. It was their opinion, that while Midjourney produced a number of unexpected and interesting outcomes that may or may not visually resonate with the referenced image, it lacked the insight into the concepts that underpinned the production of the original.

TASK 3

[SLIDE – TASK 3 outcome]

For the third and final task, participants were asked to pair up and roleplay a designer-client interaction, using Midjourney to mediate a potential design development scenario. Each client was allocated a very simple design brief, and it was the role of the designer to interpret the requirements of the client and be responsible for entering the text prompts

into Midjourney. The openendedness of the task went some way to mitigate previous challenges of imprecision of outcomes, but this perhaps made it difficult to identify the value in specific image results. Nonetheless, the task did allow for a much more considered application of Midjourney in the pursuit of more ambitious, original and speculative outcomes. As confidence with Midjourney developed, participants were able to be more deliberate with prompts, and were also able to embrace unexpected outcomes with curiosity and enthusiasm. Persistent and methodical iterations were followed to evidence a clear trajectory of visualisation. A useful feature was identified with the 'blend' command which allowed for an image from a previous iteration to be re-inserted into the aesthetic workflow in an effort to return qualities which may have been lost or deteriorated in the generation of variations.

Of greater significance to the task was the role the AI tool played in the encounter between the roleplayed client and designer. As noted previously, Midjourney can be deployed as a resource such as Pinterest and an infinite library of images, but in a dynamic and agile manner, to effectively collage and prototype ideas and garner immediate responses. Participants were affirmative in how Midjourney could mediate a deeper understanding of the client's aesthetic needs, much more rapidly than conventional means. ~~C~~orrespondingly, there was an implicit responsibility for the dialog to acknowledge the limitations of the process, and the outcome is an image, an aesthetic, rather than a spatial outcome. Midjourney is not a spatial tool, it cannot 'look' around the corner or behind a feature and present contiguous spatial arrangement. This further gives focus to the expertise of the designer, as the Midjourney-mediated encounter can only prototype or test a concept, enabling the designer to take forward into a process of rigorous spatial development

[SLIDE – Task 3 outcome, parquet flooring]

Further to the position in a process but also the agency of Midjourney, is the positive unpredictability of the tool. In the development of the design for one roleplay team, a request for a parquet tiled marble and timber floor produced a highly original outcome that exceeded expectations. This discrete event highlights the capacity of Midjourney to actively contribute to the design process, enhancing the creative process. There are challenges to

the cultivation of this effect in a more deliberate manner that requires further explorations, and asks if the collaborative nature of the encounter can produce more original and uncommon outcomes.

## CONCLUDING DISCUSSION

The workshop concluded with an open discussion and reflection on the experiences of the activities. While the workshop was quite limited in its scope, the was a general consensus it was a valuable learning experience which identified both challenges and opportunities of AI imaging tools. For designing interiors, the use of Midjourney was positively received but was limited in value due mainly to the imprecision of results. It was acknowledged the tool could generative positive outcomes that were previously unimagined, but the unpredictability of likened by one participant as “pulling a lever on a slot machine” and waiting in anticipation of what would be spat out.

There was broad agreement the tool exceeded novelty, but was not necessarily an essential design tool for contemporary design practice. Its potential greatest efficacy in a design process were in initial stages of research and early design generation, where the speed at which an unimaginably large range of exemplars and ideas could be explored and tested could significantly enhance project development. However, participants pointed out the risks associated with this and the discipline required when generating speculations and ideas, knowing when to take a step back and resisting the seduction of the imagery and the urge to ‘follow down the rabbit hole’.

These thoughtful reflections demonstrate a confidence gained from only a brief exposure to the AI tool, and appeared to preclude expectations of anxiety or threat in engaging with the process. A key feature what digital media scholar Patricia de Vries and others terms a "algorithmic anxiety" (de Vries 2020) is the inherent opaqueness and unknowability of any ‘black box’ AI process. But it could be speculated that the image-based interaction with the AI may contribute to the mitigation anxiety, not simply through observation of glitches or inconsistencies in generated images such as tables floating off the group, but as visual media scholar Lucas R.A. Wilde states, “images can no longer be understood as distinct

(material or digital) artifacts, but instead appear as networked interfaces between human and non-human actors" (Wilde 2023). By interfacing directly with the AI image making tools, the agency of the actors, that is designer and machine, can be resolved and inhabited authentically.

This leads to the greatest potential for the use Midjourney as mediating a distinct encounter between humans, as client and design, and nonhuman imaging process. While the AI tool can demonstrate innovation for interior design in this encounter, it does not produce the knowledge through which to reconstruct in reality – that remains with the designers. But it is essential to ask what support should be brought to this structuring of engagement, to ensure a safe and responsible interaction. As noted earlier, the bias that may be embedded in the production of images should be tempered by a criticality that should be learned in parallel to the use of the technology. The technology itself cannot take responsibility for such criticality and the cultural imaginaries embedded in the dataset. Arguably, the regulation of AI could result in more ethically produced datasets, but the opaqueness and unknowability of the AI tool itself cannot fully mitigate bias. This highlights the importance for education to cultivate the interpretation and identification of bias and inequality that resides in the mediation of images. This is essential learning for visual practitioners in the responsible use of tools such as MJ, a learning that can be exercised and put into practice in the collaborative scenarios when the tool is used with clients and other stakeholders, in knowing when and when not to use the technology.

In conclusion, it should be noted the outcomes generated in the workshop in the main eschewed the fantastical and remained relatively grounded in an anticipated reality of the outcomes. That is not to say novelty and the unexpected occurred, but was much more tempered via an engagement that corresponded to the relative design experiences of the participants. While a reminder can direct the overall experience to the mediation of the interior-as-image, a final question or attention might yet ask if or when will a Midjourney aesthetic emerge in the near future in actually existing interiors?

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