Essay

Automating Liminality in Foresight Practice

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Abstract

The purpose of this reflexive essay is to add to the discussion around AI-enabled foresight with a systematic review of one specific phenomenon, namely Generative AI hallucinations. These are seemingly random output content deliverables generated by the AI system as responses to a given prompt, which are currently classified by practitioners as "wrong" or "mistakes" compared to rationalized output. The key focus of this paper is therefore on how foresight practitioners might use these hallucinations by reframing them from "errors" without any validity or interest to output where the Generative AI systems exercise their implicit creative capacity in unexpected ways that are valuable for foresight. Besides reconceptualizing hallucinations into valuable output, this essay aims at sketching and recommending a process to perform AI-based foresight leveraging the machine hallucinations. As a starting point, the authors posit that artificial intelligence (AI) and especially Generative AI such as large language models (LLMs) (Difference Between AI, ML, LLM, and Generative AI, 2023) have the potential to add new avenues for creating future knowledge and insights about the future in a VUCA world where liminality is a relevant conceptual framework (Atxa Gamboa, et al. 2024).

Keywords

Introduction

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As a starting point, the authors posit that artificial intelligence (AI) and especially Generative AI such as large language models (LLMs) (*Difference Between AI, ML, LLM, and Generative AI*, 2023) have the potential to add new avenues for creating future knowledge and insights about the future in a VUCA world where liminality is a relevant conceptual framework (Atxa Gamboa, et al. 2024).

Automated Foresight and Generative AI Hallucinations

Foresight focuses on a domain that does not exist by leveraging multidisciplinary methodologies from statistics to social sciences. Since foresight focuses on a domain that does not exist, imagination is a key aspect of the field

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(Hauptman & Steinmüller, 2018; Moore & Milkoreit, 2020). Some might even propose a line of continuity between the realms of fine arts (Bevolo, 2024) or Science Fiction (Spearman 2024) and foresight.

Automation was introduced to the field of foresight as early as 2013 when an online platform began automating environmental scanning and analysis (Kehl, et al., 2020; Shaping Tomorrow, 2024). Through automating environmental scanning, this platform illustrated how foresight methods could be augmented by technology (Fergnani & Jackson, 2019). Likewise, Bevolo & Amati (2020) undertook a critical review of how the platform's machine learning (ML) systems might be used in Design Futures, concluding that AI was suitable for environmental scanning and the generation of trend clusters with increasing precision and meaningfulness.

More recently, Generative AI has been adopted in foresight projects to generate inspirational images (Milojević, I., et al., 2024) and might be more in line with deeper reflections on the liminal nature of the generation of images of the future (Conway, 2022). Generative AI has also been used for imagining scenarios (Garvey & Svendsen, 2023), generating personas who inhabit scenarios (Crews, 2024), and assisting in the design of concepts (Lyu, et al., 2023).

Beyond the foresight field, the relationship between people and reality is increasingly mediated and determined by digital technologies through automation surpassing human control (Severino, 2022). The difficulty in trusting Generative AI, however, is that it sometimes generates information that is either irrational or entirely false which researchers often term such output as hallucinations (Rawte et al., 2023; Zhang et al., 2023). These machine hallucinations occur when a machine is programmed to focus on novelty over utility which negatively impacts the accuracy of the output (Mukherjee & Chang, 2023). Generative AI has no linguistic intent because it does not understand the inputs or even the output (O'Neill & Connor, 2023). Even when the output is accurate, the output may do nothing more than summarize its training data because it is favouring utility over novelty. If the LLM focuses too much on utility, the output is accurate but not intellectually stimulating (Mukherjee & Chang, 2023).

The relationship between machine output and foresight exploration might be an area of liminality between digital efficiency and personal intuition. For example, in architecture, design, and creative industries; the abductive phenomenon of "Trained Judgement" describes the implicit capability by seasoned practitioners to successfully operate by taking their decisions in similar moments of liminality, where accumulated experience and personal talent mix to determine specific outcomes (Bevolo, 2016).

As Bevolo & Price (2006) note, apparent "errors" in each social science or scientific research process could lead to the envisioning of unexpected concepts and unforeseen scenarios, hence playing a key role in delivering true value in foresight research. One example would be the identification of potential weak signals as black swans (Taleb, 2007). This is because the act of envisioning the future intrinsically includes the necessity of embracing paradoxes while exploring the unknown (Bevolo, 2016).

Futurists operate in such an abductive modality which could be termed Genius Forecasting (Bevolo, 2023-a; Bevolo, 2024) but might also exercise their intuition at given moments in more structured foresight processes. Automated foresight and characteristics that pertain to Genius Forecasting might need to converge to address the liminal spaces within an operational praxis of combining Generative AI with Trained Judgement (Bevolo, 2024 Bevolo, 2023-a; Bevolo, 2024). These hallucinations therefore may positively impact human creativity. In a similar manner, advertising and design thought leaders argue that specific research or creative industry briefings, while creating a constraint to the creative process, are actually a stimulating challenge to creativity (Bevolo, 1994). Likewise, hallucinations may spark similar challenges for foresight practitioners. LLMs can generate articles where topics, themes, and references are connected in unexpected and intriguing ways. Some scholars or professionals may interpret the machine's output as pseudo-creativity (Runco, 2023), but such views might also be inherently biased (Magni, et al., 2023).

Humans can collaboratively verify the accuracy of output while adding greater, real-world detail. As collaborators, humans can become machine-human collaborators to "make large corpora accessible to qualitative scholarship" (Feuston & Brubaker, 2021). More research about the utility of machine creativity on enhancing human creativity is needed, especially within the context of human collaboration (Seeber et. al, 2020), because the future of foresight is considered by the authors to likely be in this emerging form of active dialog between irrational output by automated Generative AI systems and human creativity. Indeed, it is the Generative AI's most popularly derided feature, hallucinations, which could present the greatest benefit to foresight. Hallucinations provide liminality

because they show the distinct otherness of Generative AI, which is discussed in the next section.

Generative -AI Hallucinations reframed: generators of Liminality

"Liminality" is a structural condition of postmodern humanity, to be intended as referring to "moments or periods of transition during which the normal limits to thought, self-understanding and behavior are relaxed, opening the way to novelty and imagination, construction and destruction" (Thomassen, 2014). Technology generally and AI specifically are inherently "other" (Olivier 2021). Generative AI is not human, and yet, it can behave as if it were. It does not understand what it reads or writes, but it often derives conclusions in a way that its creators do not entirely understand (Coeckelbergh, 2020). Here, the authors argue that the general narrative about AI needs to be reframed (Benammar, 2012), leading "the rest of us" to think of it as machines with human programmed agency, even if some scenarios suggest they could become more than that (Gebru & Torres, 2024).

The authors propose that Generative AI occupies a liminal space between genius forecasting (Bevolo, 2023, 2024) and creative thinking, as adopted by designers, architects, artists, and other creatives including futurists. LLMs function by averaging the words used by a multitude of sources. Therefore, they can be considered as generic consolidations of experts whose work has been scanned. We argue that even this virtual plurality is still better than myopia or an inability to generate any ideas, such as in the context of creative blocks within workshops or writer's block. It is the mindset people have when leveraging the otherness of automated systems that is the determining factor in their use.

Likewise, Generative AI may also enable practitioners, scholars, and clients to more quickly identify unexpected knowledge gaps or increase the ratio of known unknowns versus known knowns. It might also assist to uncover unknown unknowns and even help categorize "unknown knowns" (i.e. human assumptions). Therefore, people who use Generative AI need a framework for thinking about how to maximize their effectiveness in this process.

Structuring a repeatable automated foresight process

To move from theory, as discussed above, to applicability, the authors designed and propose a process that repeatably connects output from Generative AI to human ideation. Innovation, design, and strategy are overall business frameworks for foresight and futures research application. Therefore, the authors identified four distinctive and repeatable moments, or process phases, to structure future formalization in the hybrid research process which might be defined and identified as a Gen-AI Hypercreativity Process (GHP):

- Step 1: Prompting AI: in this first step, foresight practitioners feed the Generative AI machine with extensive sources on the subject at hand, to then prompt the LLM systems with calibrated input designed to elicit answers in the form of automated content delivering specific output for the purpose of research. Likewise, foresight platforms can be used to automate this function.
- Step 2: Critical Thinking: Humans commonly devalue the output of LLMs even when the output is objectively better than a human's (Yin et al., 2024). Surveyed knowledge workers agree that humans must check the work of LLMs and remain in control (Woodruff et al, 2024). Foresight practitioners and stakeholders, likewise, should be engaging critical thinking about AI output and use such output to enhance their work. Therefore, in this second step, foresight practitioners undertake in-depth semantic analysis to identify and separate pertinent outcomes from outcomes deemed irrelevant, including the isolation of hallucinations, leading to a taxonomic classification of output to weight and validate meaningful insights from this output.
- Step 3: Liminal Thinking: in this third step, we abductively structure and reorganize the total output of Generative AI into specific clusters or separated hallucinations. This step leads to the consolidation of trends and insights generated as automated foresight outcome through the validation by the exercising of Trained Judgement. Then, the hallucinations are reconsidered before excluding them. Researchers imagine the implications of hallucinations as if they accurately reflected reality either in the present or a time horizon in the future. These considerations lead to additional reflection and the formulation of potential "out of box" hypotheses that might not have been otherwise generated. In this step, unlike in Step 2, the literary mechanism of "suspension of disbelief", which is required for liminal thinking (Liedgren et al., 2023),

should be exercised for the best outcome. This suspension of disbelief is also necessary for helping decision makers engage with plausible and implausible scenarios and to reduce their reliance on prediction and probabilistic thinking (Selin & Guimarães Pereira, 2013).

- Step 4: Creative Thinking: in the fourth and ultimate step, foresight practitioners leverage the combined content to either finalize research findings, or to repeat the cycle from Step 1, by designing a new prompt to challenge the LLM system with adjusted input. The aim here is to obtain more precise output which eventually incorporates those hallucinations deemed potential opportunities to creatively expand the field of interpretation and analysis beyond linear insights beyond that provided in Step 3.

In this way, hallucinations might be reframed into a valuable feature within the creative process, with the potential to even become a benefit (Sadovsky & Kovacik, 2024). It is important to note that Step 3 pertains to recognizing and acknowledging the liminal nature and intrinsic potential value of AI-Generated hallucinations, and Step 4 relates to the abductively creative reorganization and integration of content, whatever its original critical classification.
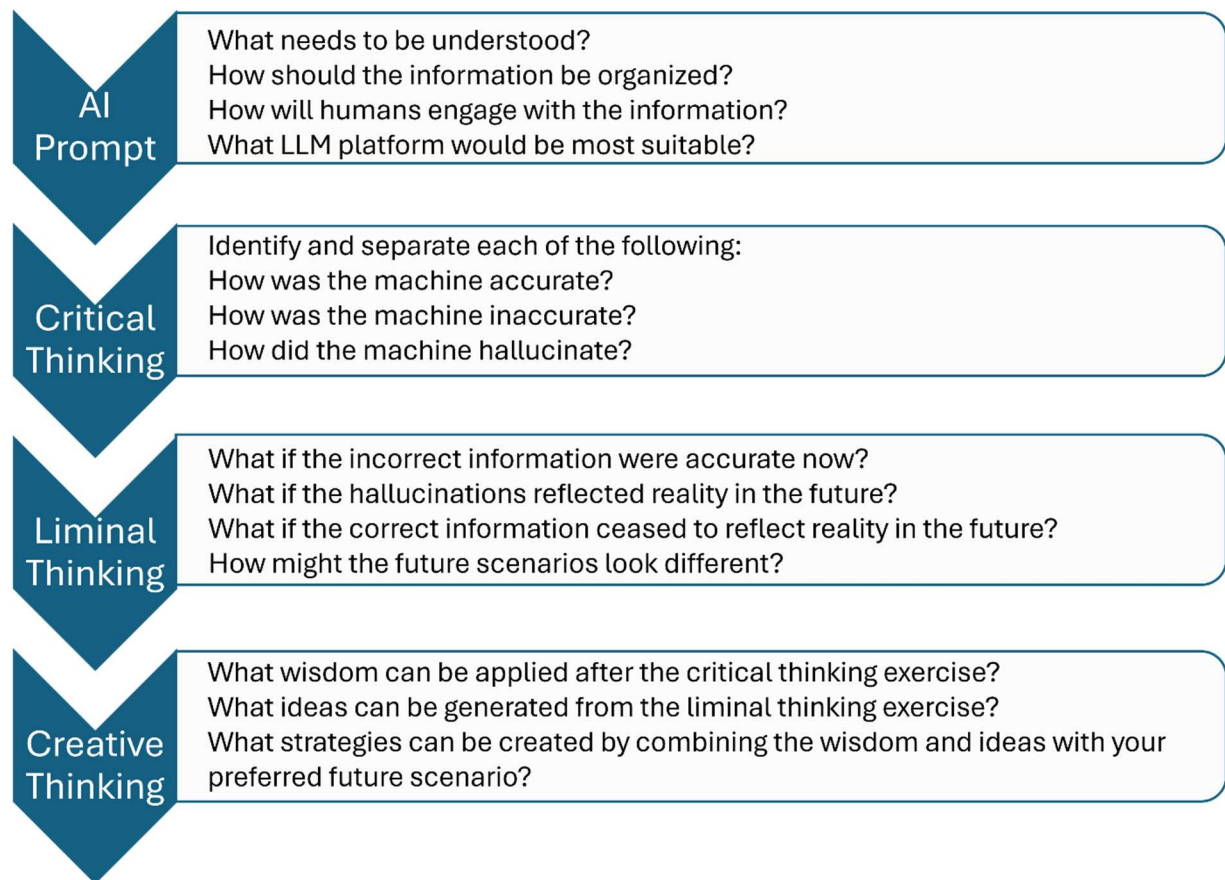

AI Prompt
What needs to be understood?
How should the information be organized?
How will humans engage with the information?
What LLM platform would be most suitable?

Critical Thinking
Identify and separate each of the following:
How was the machine accurate?
How was the machine inaccurate?
How did the machine hallucinate?

Liminal Thinking
What if the incorrect information were accurate now?
What if the hallucinations reflected reality in the future?
What if the correct information ceased to reflect reality in the future?
How might the future scenarios look different?

Creative Thinking
What wisdom can be applied after the critical thinking exercise?
What ideas can be generated from the liminal thinking exercise?
What strategies can be created by combining the wisdom and ideas with your preferred future scenario?

Fig 1 An illustration of the Gen-AI Hypercreativity Process with example questions for each step.

The authors conclude that the process illustrated in Figure 1 could be the starting point for further experimentation and testing of the four steps, to leverage its potential benefits and to scope its potential and ultimately verify its validity.

Will Technology Make Futurists Redundant?

Since the release of ChatGPT 3.5 in 2022, public discussions about the possibility of technological unemployment (Keynes, 1930) have resurfaced with few differences to the same discussions nearly one hundred years ago (Rotman, 2024). While robots continue to replace humans in the manufacturing sector, there is evidence that the overall impact of robots and AI on individuals may be a net positive considering rebounding local wages (Chung, 2023). Likewise, Generative AI could play a role in enhancing the manufacturing workforce (Kernan Freire et al., 2023).

Concerns of technological unemployment may therefore be premature since technological unemployment is less about technological capabilities and more about the organisational pursuit for maximum profits (Ebert, 2023). The effects on white-collar jobs, while potentially devastating, might be tempered by a change in narrative about AI to focus CEOs on using AI to enhance human work rather than replacing it (Wang, 2023). In short, Generative AI might be conceptualized as an asset to humans, in both economic and employment opportunity viewpoints, despite pessimistic narratives. In this debate, this paper proposes an engagement within an appreciative exploration of opportunities.

The underlying sentiment in foresight communities, in anecdotal terms, might be whether Generative AI would complement or eventually replace futures practitioners and futurist scholars. The hype and concerns around this possibility frame AI within the dichotomy of the dystopian versus utopian visions so common during periods of technology introduction (Fisher & Wright, 2006). However, this utopian vs dystopian dichotomy "unnecessarily constrains philosophical dialogue" (Albrecht, 2017). Effectively, public debate remains unconstructive as long as the dichotomy persists. To that end, foresight practitioners should be capable of seeing beyond both the hype and any opposition to the hype to communicate how society will eventually adapt to an emerging technology. Therefore, the authors suggest that futurists should pursue Generative AI as a means of expanding human creativity.

Conclusions: Automated Foresight as new hybrid opportunity

Thanks to technological advances, "liminality" might be envisioned as a new field of explorations where the power of Generative AI-based research, including machine hallucinations, is leveraged in the context of the Trained Judgement of foresight researchers (Bevolo, 2024). Indeed, the skills of foresight researchers could increase by accumulating, discerning, and evaluating Generative AI output from a critical perspective that expands and deepens their thinking and subsequent foresight process outcomes.

The authors of this paper posit that humans need to maintain a balanced, critical view of machines while exploiting their capacity to increase productivity through enhanced ideation and creativity. The present and future possibilities of AI to autonomously generate solutions and new propositions based on its combinatory capacity have risen above the tipping point when change is unanimously perceived as unavoidable with society and culture contrasting between "techno-optimists" and "techno-pessimists" (Wernaart, 2022). Within such a dichotomy, we take an intermediate, critical position towards a reframing of Generative AI into a key constituency within a Man / Machine socio-material continuum.

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