

# On the Roles of GenAI in Theory Building and on Mileva Marić, Einstein's Wife

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## Abstract

This paper explores the roles that generative artificial intelligence (genAI) can fulfil in the theory-building process within the social sciences, drawing an analogy with Mileva Marić's contributions to Albert Einstein's scientific work. Whilst existing literature acknowledges genAI as a cognitive partner in knowledge generation, it lacks systematic frameworks for understanding its diverse functions in theory construction. Based on autoethnographic research in management sciences, this study identifies four distinct roles: the proficient encyclopaedist (synthesising dispersed knowledge across disciplines), the crazy innovator (generating creative ideas at scale), the meticulous reviewer (providing critical feedback), and the drunken cartographer (attempting to structure theoretical relationships). The findings emphasise that genAI operates most effectively through iterative, human-in-the-loop processes, where the researcher's judgment remains central to evaluating, interpreting, and curating generated content. The paper contributes to the literature by providing a conceptual framework that shifts the debate from tool-level discussions to epistemic considerations of how genAI participates in theory construction in the social sciences.

**Keywords:** generative artificial intelligence, theory building, social sciences, research methodology, judgment, human in the loop

## Introduction

Historians debate Mileva Marić's contributions to the development of science. Mileva was a physicist, mathematician and Albert Einstein's wife. According to her brother, in the evenings and at night, when the city fell silent, the young couple would sit together at the table and solve physics problems by the light of a kerosene lamp. Together, they calculated, wrote, read and discussed. Mileva also acted as a reviewer of Albert's scientific articles. When, after five weeks of working on an article on the special theory of relativity, Albert went to bed for two weeks, Mileva checked the article repeatedly. Despite this, Mileva is neither the author nor the co-author of any scientific article. Albert also had conflicting views on her contribution to his success. However, we can assume that Mileva was a partner in scientific discussions, a support in research work and a reviewer of Albert's ideas (Gagnon, 2016; Isaacson, 2007).

We argue that genAI can perform a role similar to that which Mileva played in Albert Einstein's research. In the literature, one can find studies conceptualising genAI as a cognitive partner that participates in knowledge-generation processes. Korinek (2023) notes that LLMs can be used in economic research for, among other things, generating, developing, and selecting ideas, as well as for obtaining feedback. Gopal et al. (2025) distinguish three levels of AI utilisation, ranging from a simple tool for polishing text, through an assistant performing specific tasks within designated knowledge domains, to a super-collaborator capable of making creative choices, formulating hypotheses, and designing research strategies. Sinha et al. (2024) present, based on their own experiences, how genAI can be useful in qualitative research, thereby contributing to the development of grounded theory. Tranchero et al. (2024) argue that experiments with genAI, as an alternative to real-world experiments, may be useful in developing theory in the social sciences. Given the early stage of research, existing work is typically scattered and does not provide organised conceptual frameworks to systematise the diverse roles that generative artificial intelligence can play in the theory-building process. This study aims to address this issue.

## Distinguished roles of genAI in theory construction

This study describes the distinguished roles that genAI plays in the creation of scientific theories. The findings are based on the author's autoethnographic research concerning theory construction in management sciences, which belong to the social sciences. Four roles that genAI fulfilled in this context were identified: the proficient encyclopaedist, the crazy innovator, the meticulous reviewer, and the drunken cartographer (Table 1.).

The first role of GenAI is that of the **proficient encyclopaedist**, who is capable of explicating complex phenomena and synthesising dispersed information, whilst simultaneously drawing from distant silos such as research streams, disciplines, or individual theories. Consequently, it is able to make distant comparisons, for instance, creating analogies between biology and economics, or physics and organisational sociology. However, there is a risk of hallucination, i.e. providing fictitious, albeit seemingly credible, information, which is why the researcher must exercise a certain degree of caution and scepticism. Notably, this risk also arises when a young researcher asks a distinguished scholar to provide analogies between distant concepts.

Examples of prompts for the role of proficient encyclopaedist:

- Compare the conceptual model described below with models popular in the literature.
- Explain how Bayesian statistics can be utilised in the process of historical inference.
- Compare Paul Feyerabend's "Against Method" with Susan Sontag's "Against Interpretation" and Witold Gombrowicz's "Against the Poets".

The second role is that of a **crazy innovator** – a creative generator of ideas, which is particularly useful when facing creative deadlock. GenAI services generate new ideas, research hypotheses, and extensions of existing concepts at an industrial scale. They act as a combination of machine and human in the creative process; they are fast, creative, and unpredictable. The concepts created in this way are characterised by varying degrees of usefulness. The percentage of valuable ideas is likely to be low. This should come as no surprise, as this problem also arises in classic brainstorming.

The researcher's task is therefore to filter. Using their own judgement, they fish potential nuggets of gold out of the stream of chaotic ideas.

Sample prompts for the role of a crazy innovator:

- Propose an extension of the presented model based on the conclusions of Theory X.
- How can prime numbers be used in management science research?
- Develop a theory of competitive advantage for the era of artificial intelligence, in the style of Michael Porter.

In its third highlighted role, that of a **meticulous reviewer**, genAI provides researchers with a review of their work. GenAI services formulate precise comments, identify inconsistencies in argumentation, pick up on ambiguities, and point out gaps in logic or references to literature. They act as a reliable reviewer who remains focused, thorough, and unaffected by the author's position within the scientific community. Naturally, some of the comments generated may be inaccurate. However, this is similar to a situation at a scientific seminar. Only some of the comments received at such an event have practical value. The rest illustrate how the concept is perceived by the academic community. The researcher's judgment enables them to distinguish between the two types of comments.

Sample prompts for the role of a meticulous reviewer:

- Act as my supervisor. Provide constructive criticism of the following model.
- You are a reviewer for the journal 'X'. Prepare a scientific review of the attached article.
- Identify the weaknesses of the following concept.

The **drunken cartographer** is the fourth of the distinguished meta-roles. According to MacInnis (2011), the role of the cartographer in theory building is to locate objects within a given theory and map the relationships between them. At this stage, conceptual models are often created, i.e. graphical representations of relationships within a given theory. This task requires not only systemic thinking, the use of hidden knowledge, and an understanding of numerous nuances, but also the mapping of the author's intention. Artificial intelligence is usually unable to perform this task. It generates arbitrary, random or overly adjusted structures to existing patterns. Hence, this role has been referred to as a drunken cartographer. However, this does not mean that such studies are worthless. Instead, they resemble the work of students and may occasionally contain valuable ideas.

Sample prompts for the role of a drunken cartographer:

- Create a conceptual model that includes the following elements and shows the relationships between them.
- Add dimensions to the model that refer to the identified research gaps.

Table 1: Summary of roles played by genAI in the theory-building process

	<b>Proficient encyclopaedist</b>	<b>Crazy innovator</b>	<b>Meticulous reviewer</b>	<b>Drunken cartographer</b>
<b>genAI’s main task</b>	Knowledge synthesis	Formulating research ideas	Identifying weaknesses	Structuring theories
<b>Major benefit</b>	Interdisciplinarity, combining distant theories and phenomena, and rapid knowledge mapping	Support in the creative process, overcoming creative deadlocks	Detailed review of a study or research idea	Creation of a preliminary conceptual model
<b>Risks and limitations</b>	Hallucinations, superficial analysis	Low percentage of valuable ideas	Misunderstanding of context, nuances or specifics of the research paradigm	Inability to correctly reflect the researcher’s intention
<b>Researcher’s main task</b>	Verification of information	Filtering and curating ideas	Selecting critical comments	Creating own conceptual model

## Discussion

This study makes three complementary contributions to the literature on the construction of scientific theories using generative artificial intelligence. First, the paper proposes four distinct functions: the proficient encyclopaedist, the crazy innovator, the meticulous reviewer, and the drunken cartographer. This framework organises the scattered and often intuitive practices of using genAI in theoretical work. It thus shifts the debate from the tool level to the epistemic level, i.e. relating to the ways of generating, critically evaluating, and structuring theoretical knowledge. Secondly, the article makes a methodological contribution by showing the use of genAI as an iterative process involving the researcher (human-in-the-loop), in which the selection, interpretation and curation of generated content play a key role, rather than the automated construction of theory in a closed-loop decision model. Thirdly, the paper clearly emphasises the central role of the researcher’s judgement in the theory process, understood as the ability to recognise which ideas are worth further development.

The use of generative artificial intelligence services in theoretical work brings a number of significant benefits. First and foremost, they are highly accessible. Researchers, regardless of location and time, can instantly start a conversation with genAI, without incurring high costs and without the need for technical skills. This is combined with the speed of obtaining answers. GenAI services provide solutions, hypotheses, and comparisons almost instantly, reducing the waiting time typical of traditional methods such as literature searches or consultations with colleagues. Furthermore, as noted above, these services can play various roles in the research process. In this respect, they are often more versatile than many researchers, who typically excel only in selected roles (e.g., a sceptical evaluator does not always perform well as an innovator).

The key disadvantage, however, is the lack of judgment typical of an experienced researcher. In this context, judgement is understood as the ability to evaluate concepts, prioritise solutions and select the best option. It is subjective, rooted in the researcher’s experience and intuition, and context-dependent. It often allows a quick assessment of which solution is interesting or valuable from the perspective of the research objectives. The researcher’s judgement, therefore, remains beyond the reach of contemporary models, although it must be acknowledged that genAI services are characterised by judgement in simpler situations unrelated to scientific research. Notably, in formal science, there are research problems whose solutions are based on clearly defined formal rules and criteria of correctness, which allow for full automation of the process (e.g., mathematical problems and protein structure recognition). In social sciences, though, theory development using genAI is iterative. After each response, the researcher critically evaluates it, then sets the direction for the next iteration, clarifies questions or corrects erroneous threads. Therefore, there is no automation in the sense of a closed-loop process that could proceed without human involvement. On the contrary, humans remain constantly present in the loop. They are responsible for evaluating, interpreting, and correcting the proposals received, and for determining how to proceed.

There are other issues as well. One possibility is that researchers become dependent on genAI services, thereby weakening their analytical or creative skills. An excess of model-generated content and stimuli can introduce chaos, blur the purpose of the analysis, or even hinder conceptual work. The environmental cost is also often raised. With sustainable use of genAI—including analysis of the results obtained and reflection by the researcher—this impact should not be significant, as the number of prompts remains small. At the same time, these tools can speed up the research process, which can lead to lower research costs and, more importantly, better results.

The present study is subject to several important limitations. Firstly, the types of generative artificial intelligence roles in the theory-building process are based on the author’s autoethnographic experiences rather than on systematic empirical research, such as in-depth interviews with a large and diverse group of representatives of a specific scientific discipline. This means that the identified roles reflect a specific style of theoretical work and a way of interacting with genAI that may not be representative of other researchers, methodological paradigms or disciplinary traditions. Thus, a different approach to using genAI could lead to the identification of roles for genAI beyond those proposed in this article (e.g. counterfactual analyst). Consequently, the types presented should not be treated as exhaustive but rather as a heuristic proposal, serving as a starting point for developing a complete typology.

## Conclusions

The study attempts to describe the roles that genAI can play in the development of scientific theories. GenAI can be helpful in synthesising scattered knowledge, generating new concepts, and formulating critical comments. This tool accelerates creative work and relieves researchers of less creative and tedious tasks. Additionally, it strengthens their competence, although it does not replace scientific judgment. In this context, the use of genAI services in research resembles Albert Einstein’s collaboration with Mileva Marić. Albert described this collaboration in no uncertain terms: “I need my wife. She solves for me all my mathematical problems” (Gagnon, 2016).

## About the Author

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## Note on the use of genAI

Generative artificial intelligence services were used in preparing this paper to, among other things, reformulate ideas, create the first version of the table, translate and edit the text, and compile the manuscript.

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