

Generative Artificial Intelligence and the Economics of Effective Prompting

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Skills and expertise in writing effective generative artificial intelligence (GAI) prompts are increasingly in demand. This article introduces the concepts of prompting and prompt engineering and lays out guidelines for crafting effective GAI prompts.

Generative artificial intelligence (GAI) is becoming increasingly pervasive in organizations. Global management consulting firm McKinsey's study published in May 2023 found that 90% of commercial leaders expected to utilize GAI solutions "often" over the next two years.¹

Organizations view GAI as a productivity booster. A McKinsey study published in June 2023 identified 63 GAI use cases

across 16 business functions that could generate annual economic benefits in the US\$2.6 to US\$4.4 trillion range. In addition to the use cases, McKinsey analyzed GAI's potential impact on about 850 occupations by modeling scenarios for more than 2,100 "detailed work activities" to measure GAI-led increases in productivity. The analysis indicated that GAI's additional annual economic benefits will be in the US\$6.1 to US\$7.9 trillion range.²

In a traditional organizational setting, it is a well-known fact that efficient utilization of human resources is critical in fostering organizational productivity.³ Extending this logic in today's environment, it is clear that organizations must use GAI efficiently and effectively.

A GAI system takes inputs from humans and processes it to produce outputs. The key to productivity growth lies in the efficient transformation of inputs into output. The inputs that are provided to a GAI model to generate content are commonly known as prompts. GAI's productivity improvement thus hinges on the effectiveness of prompts. With a rapid diffusion of GAI tools among organizations



and use of such tools in diverse organizational functions, writing an effective prompt has been a key area where the needs for skills and expertise have arisen.⁴

This article introduces prompting and prompt engineering in the context of GAI. It also presents a number of important guidelines for effective GAI prompting.

PROMPTING AND THE ART OF PROMPT ENGINEERING

Put simply, a prompt describes what a user wants a GAI system to perform.⁵ A prompt is usually a text-based command, which can be a question, statement, or any other stimuli, that the GAI system can interpret, understand, and respond to.⁶ There is no magical and best way to write a prompt for a foundation model such as Google's Language Model for Dialogue Applications and OpenAI's Generative Pre-Trained Transformer 3/4 (GPT-3/GPT-4).

The rise of GAI has also given birth to a new profession known as prompt engineering, also referred to by some as "AI whispering."⁷ Prompt engineering involves techniques and processes that a user employs to effectively communicate with a GAI system and formulate a prompt so that the system produces an output that closely matches their expectations. It entails taking into account the unique characteristics of a GAI model to craft inputs that the model can readily comprehend.⁸

Prompt engineering is art as well as science. Users need to experiment and make adjustments before they can determine the most effective and efficient prompts for their specific use case.⁹ Also, as noted, there are usually multiple ways to prompt a foundation model in order to get a successful result.¹⁰

Regarding the skills and background most appropriate for a prompt

engineer, two distinct career paths have been suggested: domain experts and technical experts. Experts in a particular subject—domain experts—have certain advantages that can be useful in writing an effective prompt for a defined task. Their skill lies in recognizing the suitable questions to pose to a GAI system and appreciating the value in the responses. For instance, when marketing professionals

prompt engineer is temporary, meaning that such a role is not needed when GAI systems are improved so that they essentially comprehend plain language instructions they are given.¹²

PROMPTS IN RELATION TO GAI'S TRAINING

With respect to the instructions required to perform a task, GAI differs from traditional computer programs.

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start experimenting with prompts, they can quickly come up with novel and unique solutions to problems and ways to accomplish tasks that even the most skilled AI experts may find challenging. This is primarily because technical experts often do not possess a deep understanding of copywriting or marketing. Technical experts, on the other hand, are well versed in the intricacies of how GAI models operate, including more obscure aspects. This skill can add value as a prompt engineer.¹¹

It should, however, be noted that the profession of prompt engineering is still in an infant stage, and it has not seen a surge in popularity as a distinct career path. As of August 2023, there was no job listing for a "prompt engineer" position on the major job websites in Australia. While some jobs requiring prompt engineering skills were reported to be advertised in the United States, this emerging profession has mostly merged with other positions, such as machine learning engineers or AI specialists.¹¹ Some industry analysts believe that the role of

To be effective, traditional computer programs typically rely on explicit and detailed instructions to transform inputs into outputs. However, GAI does not require explicit instructions as inputs. Instead, it possesses the capacity to identify patterns through the analysis of extensive data and then generate, condense, and draw conclusions from those patterns.¹³

When processing a prompt, a GAI system deconstructs the words and phrases of the prompt into smaller units called tokens. These tokens are then cross-referenced with the training data to generate a response.¹⁴ To use a GAI system effectively, it is thus crucial to know how the system has been trained, tested, and fine-tuned.

GAI is substituting as well as complementing the tasks that employees normally perform. In this regard, just like different employees in a company have different training and experience, GAI systems vary in the ways they are trained, tested, and fine-tuned. GAI tools thus vary in their capabilities and limitations.¹⁵

While ChatGPT does not understand the meaning of a prompt or the text it generates, it understands complex language structures, such as syntax and grammar.¹⁶ On the other hand, the text-to-image generation app Midjourney, which was trained on more than 650 million images found on the internet,¹⁷ does not understand grammar or sentence structure.¹⁴

A key consideration is also whether the training data of the GAI include industry-specific terminologies, jargons, complex phrases, case studies, and other materials. For instance,

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foundational models such as GPT-3 are designed to understand natural language¹⁸ and may not have received training on certain industry jargon or specialized vocabulary. Hence, the accuracy of ChatGPT's responses could be negatively impacted.¹⁹

Also, most GAI systems are not trained on low-resource languages.²⁰ While ChatGPT supports 95 different languages spoken around the world and 12 coding languages, it performs poorly in processing prompts in such languages.²¹

Finally, GAI systems that have undergone reinforcement learning from human feedback training such as ChatGPT and AI safety and research company Anthropic's Claude demonstrate better ability to handle prompts and instructions compared with systems that lack such training. Nonetheless, these systems also make mistakes due primarily to a miscomprehension of the task.¹²

EFFECTIVE GAI PROMPTING

Table 1 presents key elements of and processes underlying an effective prompt. In this section we explain these elements and processes.

Being clear, explicit, and specific

A common view is that GAI should be viewed as a new employee or an intern.²² In organizational theory, a key factor linked to productivity is task identity.²³ The idea here is that tasks must be clearly identified. Clear procedures or flow charts must be used to precisely describe and explain how the task starts and ends through which employees will gain a clear indication of whether a task is completed successfully. This in turn will lead to job satisfaction, which has a major impact on productivity,

innovation, and overall organizational performance.

It is also worth noting that with respect to the instructions required to perform a task, GAI differs from humans. A major difference between a new employee and a GAI system is that while the former may request clarification, the latter does not, which means it simply generates the wrong output.²² This is because a GAI system usually does not say "I don't know" when it lacks information. Instead, it produces the most likely answer.²⁴

To increase a GAI system's probability of fully understanding a prompt, it is critical to formulate an input that is clear and unambiguous in its interpretation. In the absence of supplementary details, GAI models cannot discern the user's tastes, preferences, and ideas. Vague language should thus be avoided.

A number of helpful suggestions have been provided to reduce ambiguity and increase the precision and clarity of prompts. In numerous situations, using more precise synonyms yields superior results. For instance, Midjourney recommend using gigantic, enormous, or immense instead of big.¹⁴ It is helpful to use a thesaurus to

find more suitable words. It is also possible to ask GAI tools such as ChatGPT to suggest such words.

Popular GAI tools such as ChatGPT may not understand slangs, and thus, they should be avoided.²⁵ A slang often has multiple meanings, and these systems are more likely to refer to the literal meaning rather than a colloquial usage.²⁰

Regarding the use of industry jargons and complex phrases, one view is that effective prompts should take a conversational tone using natural language²⁶ and avoid such terms because GAI may not be trained with such phrases and thus may not understand them.⁷ The use of jargons in a prompt may lead to a decrease in accuracy of responses of GAI systems such as ChatGPT.¹⁹ The opposite argument is that the use of industry-specific terms and keywords and relevant industry jargon should be incorporated to obtain more precise recommendations.²⁷ Both views are half correct and half wrong. GAI models that are customized for particular industries enable organizations to include industry-specific terminologies, jargons, examples, and case studies into the training materials.²⁸ For such models, a synonym with a more specific meaning may work better than a synonym with a less specific meaning.¹⁴

Utilizing comparisons in a prompt can also enhance the clarity of ideas and concepts.²⁹ For instance, "create a beach house whose color is as blue as the ocean" is more effective prompt than simply "create a blue beach house."

To minimize ambiguity with certain GAI models, it is recommended to steer clear of using negative language. Prompts with negative language often tend to focus on what they are told not to do. The language should thus change from negative to positive.³⁰ For instance, the use of "young" is more effective than "not too old."

Regarding the languages of the prompt, as noted, major GAI models such as ChatGPT are not trained in low-resource languages such as Hausa,

Uzbek, and Urdu. Also, GAI models usually lack the ability to interpret several languages within a single message.²⁰

Writing concisely

Whereas a prompt should be detailed, being concise and brief is also important in clarifying the user's intent. For

instance, Midjourney suggests that a detailed prompt often leads to a more distinctive and unique look of the generated image, yet excessively lengthy prompts do not necessarily yield better results.¹⁴

By focusing on the most relevant information and omitting irrelevant

words, the likelihood of obtaining precise answers from GAI models can be increased.³¹ When there are fewer words, each word carries greater impact.¹⁴ Excessively lengthy prompts, on the other hand, dilute the significance and impact of each individual word.³²

TABLE 1. Key elements of and processes underlying an effective prompt.

Element/feature	Explanation	Example of an ineffective prompt	Example of an effective prompt (with the element/feature)
Being clear, explicit, specific	Making prompts precise and unambiguous	Create an image of birds in a tree.	Create an image of three birds in a tree.
Writing concisely	By emphasizing the most relevant information and excluding irrelevant words, it is possible to get more accurate answers.	The information we have collected leads us to believe that our company's sneakers are most commonly bought by Gen Zers. Please create a Facebook ad for our shoes targeting this group. Thank you.	Design a Facebook ad for our sneakers, aimed at Gen Z purchasers.
Clarifying the context	Offering supporting information to direct the model's output	1) Create a marketing campaign for me. 2) Create five multiple-choice questions for a geometry class.	1) I am a marketing manager of a store that sells clothing and shoes for Gen Z. My goal is to maximize the sales revenue in the next 30 days. My budget is US\$10,000. Create a marketing campaign for me. The call to action should ask the audience to take advantage of a buy one and get one free offer. 2) You are a high school math teacher who teaches geometry. Create five multiple-choice questions for a geometry class.
Asking to perform one task at a time	Formulating the prompt in a way that asks the bot to complete a single task.	How do I plan and execute a large-scale marketing campaign involving multiple channels and target audiences?	What are the first two steps in planning and executing a large-scale marketing campaign involving multiple channels and target audiences?
Offering (an) example(s)	Examples within a prompt aid the model in grasping the context, resulting in more precise responses.	Provide key details about the geographic features of Colombia.	Provide key details about the geographic features of Argentina: total area, 2,780,400 km ² ; land area, 2,736,690 km ² ; water area, 43,710 km ² ; and climate, mostly temperate, arid in the southeast, subantarctic in the southwest. Provide key details about the geographic features of Colombia following the above structure.
Defining the parameters of the output	Setting the boundaries and specifications of response that GAI generates (for example, length, content, tone of voice, reading level, and writing style)	Write an essay about business e-mail compromise attack.	Following this structure—1) definition, 2) history, 3) prominent examples, and 4) conclusion and lesson learned—write a 1,000-word essay at a high school reading level about business e-mail compromise attack.
Refining prompts based on previous outputs	Iterating prompts by modifying and enhancing various instruction types.	Suggest me a good book.	I am the type of person who likes to go to new places. Can you suggest me a book similar to <i>The Art of Travel</i> by Alain de Botton?

It is also possible to ask GAI models such as ChatGPT to make a prompt concise. For instance, when ChatGPT was asked to rewrite “summarize and make short” in one word, it suggested “condense.” Also, in order to make a prompt, polite phrasing such as “please” and “thank you” are unnecessary to use (Table 1).

Finally, while some GAI models such as ChatGPT are free, in paid versions of such models, increased

token usage in longer prompts can result in higher costs for the user. For instance, as of September 2023, for GPT-4, input prices for 1,000 tokens (prompt) for the standard model (8,000-token context length) and an extended model (32,000-token context length) were US\$0.03 and US\$0.06, respectively.³³ Concise prompts help avoid wasteful token usage and thus cost less.

Clarifying the context

Creating a prompt for a GAI system goes beyond just formulating a brief one-sentence question. The context must be clarified by providing relevant information and pertinent background details. Contextualization of the question helps to steer the model's response. It is also important to note that words that are in the prompt text have increased likelihoods of appearing in the content generated by the model.¹⁰

A straightforward technique for contextualizing a prompt is to give a GAI system a specific role.³⁴ By assigning it a persona or asking it to play roles such as Albert Einstein or Steve Jobs, the quality of ChatGPT's output can be improved. For instance, ChatGPT's output will be in Einstein's tone if the prompt is “Can you pretend

Asking to perform one task at a time

to be Albert Einstein and explain the theory of relativity?” instead of “Explain the theory of relativity.”

A prompt should be formulated with the aim of accomplishing one specific task.³⁵ This means that in the context of complex tasks or processes, it is beneficial to decompose them into smaller, step-by-step instructions. This tactic al-

instance, if a marketing professional is using ChatGPT to generate copy or captions for social media posts, it is important to make sure the tone is appropriate for the target audience.³⁸ The best marketing copy arguably reads at a fifth- or sixth-grade level, which means short sentences and paragraphs, a conversational tone, and simple language.³⁸

To generate longer posts, it would be better to give large language models a specific structure and outline. More specific instructions result in a better output. An example of a prompt to write an essay about business e-mail compromise is presented in Table 1.

Refining prompts based on previous outputs

Users should consider that they are engaged in ongoing dialogue and exchange with a GAI system. That is, a user initiates a conversation and then progressively iterates and enhances it.⁸ This means that prompts should be refined and fine-tuned based on previous outputs. For instance, if the initial output does not match the user's expectation, the prompt can be rephrased, and more details can be added.³⁵ GAI can be asked to change the tone and reading level if the output is not satisfactory. By continually refining and experimenting with different instructions and various phrasings and approaches, prompt iteration can contribute to the production of desired and more practical responses over time.

Depending on the number of examples used in a prompt, prompt engineering techniques are referred to as zero-shot (no example), one-shot (one example), and few-shot (two or more examples) prompting.¹⁰ An example of a one-shot prompting is provided in Table 1. In general, the more examples a prompt has, the more control a user has over the output created from a GAI system.³⁷

For instance, in the example provided in Table 1, ChatGPT did not provide any answer to the initial prompt, “Suggest me a good book,” and asked for more information about the user's interests, book genre (for example, mystery, science fiction, and history), and any favorite authors or books that the user enjoyed in the past. After the prompt was refined by providing additional details, ChatGPT's response became relevant and useful.

For instance, ChatGPT's output will be in Einstein's tone if the prompt is “Can you pretend to be Albert Einstein and explain the theory of relativity?” instead of “Explain the theory of relativity.”

lows a GAI system to zero in on each distinct step, enabling the system to deliver precise information more effectively.³⁶

Offering examples

Using examples in a prompt is always a helpful practice. Examples can enhance the model's understanding of the context and clarify the desired behavior of the GAI system, leading to increased response accuracy.²⁴ For instance, users can express the format or structure desired for the model's response.¹⁰ It is also possible to upload a text sample or an image that demonstrates what the user desires to be generated and guide the model to use it as a reference.⁸

Defining the parameters of the output

It is crucial to establish the parameters or detail the criteria for the output. For

In traditional organizational settings, job identity or clear instructions contribute to job satisfaction, which in turn leads to increased organizational performance. Many of the important elements of this linkage are also applicable in the context of GAI. It is important for prompts to satisfy the rules and restrictions of GAI. With an increased use of GAI, adequate knowledge and skill in the art and science of prompt writing is thus becoming critical in order to contribute to organizational productivity.

The relevance and usefulness of a response that GAI would generate are a function of how clear, precise, and specific the prompt is. Making a prompt more effective involves considering several important factors. The recommended approach is to select verbs that clearly convey the user's objective. It is also important to craft succinct prompts and direct attention to just one or two essential elements. As noted, the use of industry-specific jargons in a prompt can be a double-edged sword. GAI can also be asked to change parameters such as tone and reading level if the output is not satisfactory. By providing examples within a prompt, the GAI model's ability to comprehend context can be improved, resulting in responses of greater accuracy. ■

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