AI PROMPT ENGINEERING WITH MODESTLY STRUCTURED BRAINSTORMING: MAKING YOUR ECONOMICS READING PASSAGES MORE APPEALING

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ABSTRACT

Engaging students in economics can be difficult. In some measure, this results from economics introducing a way of thinking that is foreign to many students. Part of that way of thinking is embodied in the language we use; not just the jargon, but also the structure of our arguments and the way we present examples. AI, as a brainstorming tool may be able to help. But then the problem becomes how to engineer a prompt that produces potentially useful results. We suggest asking AI to rewrite material as if it was coming from an author with a different Myers-Briggs personality.

INTRODUCTION

Economics isn't for everyone. But if you're reading this you've probably already sensed that in some students. Why is that? And why might economics instructors be interested in doing something about it?

My guess is that economics, as a field, attracts a certain sort of person as an undergraduate major. Then it runs them through progressively finer educational filters until several years later they're the one in front of the classroom. There isn't anything wrong with that: an academic field or department should have people who are more similar to each other than they are to the general public.

That's a situation that an economics instructor might want to address in lower-level undergraduate courses. There are two reasons for this. One is that economics is a common general education offering around the world. So, it attracts a wide variety of students. Secondly, economics is not a "vocational" major in higher education (National Center for Education Statistics,1990). By this I mean a field in which a student sees the name of the major and can envision the sort of job they might pursue with it. For example, a nursing or accounting major may be envisioning a future as a nurse or an accountant … jobs that are familiar to them. Few students know any economists, or job titles containing that word. In some sense, economics is one of the handful of university majors that 1) students commonly take, without 2) meeting someone who "does that" for their job. Evidence shows that students hold systematically incorrect beliefs about the relationships between majors and jobs anyway, so economics may be doubly disadvantaged.

There are a number of common ways that economics instructors engage students. Some are shared with other fields: readings, lectures, classroom demonstrations, videos, podcasts, current events discussions, outside speakers, and so on. Some are a little more specific to economics: classroom experiments or simulations, and policy discussions are some of these. This paper suggests using artificial intelligence (AI) in a structured way to change the "personality" of the material presented in readings to appeal to different audiences.

Section 2 discusses AI and prompt engineering. Section 3 discusses the advantages of using AI for unstructured brainstorming, and how to add a little structure through prompt engineering. Section 4 argues that the Myers-Briggs Type Indicator (MBTI) offers a simple

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way to structure brainstorming, which is both readily available and also in common use. Second 5 reports evidence that economics texts appear to be dominated by a small set of the possible MBTI's: economists really are different. Section 6 shows the results of asking AI to rewrite passages from their original MBTI to different ones, with an emphasis on getting economists to value other ways of expressing their material. Section 7 discusses how this might be helpful.

AI and Prompt Engineering

AI has come to the forefront of applied computing. Large Language Models (LLMs) are a subclass of AI. Much of the upswell in interested dates from the public release of the LLM ChatGPT 3.5 in November of 2022. From here on, use of AI will refer to LLMs.

Since that time, a number of other closed-source AI programs have become publicly available. Claude, Gemini (commonly used through Google Chrome), Copilot (commonly used through Microsoft's products), Grok (used through X), Perpetuity, and Llama (commonly used through Facebook). DeepThink is an open-source offering, and Llama can serve this purpose too. All results below were produced from ChatGPT 4o; others were checked, and while there were always differences, they did not seem substantial.

At this time, most users interface with AI through chat. The user types in some text, and the AI responds with text. Other ways to interface are either coming online or gaining in popularity. Such multimodal interfaces may be the way things are done in a few years, but for now chat is by far the most common.

A problem with AI chat that is well recognized is that most users start out (Mollick, 2024), and some have yet to pass beyond, treating AI chat like using a search engine (*e.g.*, Google, or occasionally other services like Bing). This is not surprising: users have a generation of experience with search engines. With search engines, the interface is mostly driven by entering keywords, getting initial results, and sometimes surfing from those to improved results. But there's a problem with that method. In the parlance of economics, the keywords have diminishing marginal benefit. So, users have been conditioned to not use very many of them (Kolata, 2024).

AI chat is not like that. AI's are capable of handling very large amounts of input through chat (currently running into hundreds or thousands of pages, (Korinek, 2024). So, the user-end problem is that an AI can handle a lot more input through chat than most people give it. The AI can use specifics, and users tend to feed it generalities in the form of keywords.

Prompt engineering is the name given to the techniques of providing better prompts in natural language to AI's so that they deliver better answers. Prompt engineering is predicted to fade out as a necessity for effective AI use, but for the next few years, it's necessary. This subject is covered widely, so we just touch on a few top-level points. First, tell the AI about you and your goals for the project. Second, show the AI all the stuff you've got. Third, ask the AI to do something with all of it. And fourth, have an ongoing conversation with the AI about how to drill down to the output that the user really wants (Mollick,2024).

AI's for Brainstorming and Rewriting

Early on it was recognized that AI's were very good at brainstorming (Mollick,2024) (Korinek, 2023) for this entire section. Examples of this are common. One problem with this is the proliferation of examples in which the prompt for the brainstorming is quite limited. Better prompt engineering input yields better AI brainstorming output.

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A related problem is that brainstorming has two components: a divergent phase for the creation of new ideas, and a convergent phrase for their culling (Powell & Baker, 2019). AI's can do both, but most of the exposure potential users get seems to be from the former.

Given the speed and ease of using AI's, it's no doubt easy for the novice user to overwhelm themselves with AI output during the divergent stage of brainstorming. Yet, the nature of AI is that with the limited prompts that most users make, the results of the brainstorming may have a lot more to do with the training of the AI than with what the user can actually contribute. In short, AI's respond with a lot because users don't tend to tell it what they really want.

Much the same goes for rewriting. AI's are also quite good at editing written passages, and if need be, rewriting them. Indeed, they have been capable of improving many text passages with a full rewrite for a few years.

A goal of this paper is to suggest the use of simple extension to user prompts. This will add structure to the AI outputs from brainstorming and rewriting.

The Myers-Briggs Type Indicator (MBTI)

The MBTI is the result of a short, self-evaluative, test that people may take (Myers, 1962). Statements are presented, often about hypothetical situations, and responses are made on a (Likert, 1932) scale. Scoring is proprietary. Output is a sequence of 4 letters that collectively are alleged to identify the test-taker's personality type (Jung et al., 2014). Free tests are common on the internet.

The 4 letters are assigned from binary variables. The scoring of the test is used to assign the test-taker to one of the pair for each of the 4 possibilities. Each pair is exhaustive, and the possibilities are mutually exclusive. Each binary pair is independent (in the MBTI) from the others, so the set of 4 yields $2^4 = 16$ possible types. Again, tables and summaries of these are common on the internet.

As an example, the author has taken these tests a number of times over the years, and is consistently identified as type INTJ.

Interestingly, it is also possible to "reverse engineer" the type of an author from a passage of text they've written (Lee et al., 2007). Further, early on it was shown that Large Language Models (LLMs) have some ability to do this (Keh & Cheng, 2019).

The MBTI is not without controversy. It is based on an older view of personality within the psychology field, and lacks some traits included with contemporary work. The methods it uses are still largely proprietary, and its use-model is commercial. It may not consistently deliver the same MBTI for everyone when retested, in part because it boils everything down to binaries. And it may have limited predictive power.

Nonetheless the MTBI is in wide use in the corporate world because it may have enough predictive power (Ambridge, 2022). Students in psychology are also exposed to it as an early entrant into the suite of instruments that may be used to gain insight into personality. Moreover, creative writers use MBTI's as one way to help conjure up compelling characters (Smith, 2023).

There are a number of features of the MBTI that make it appropriate for adding modest structure to AI prompts. It is commonly and readily available. AI's understand it. It is straightforward to manipulate: 4 binary possibilities, offering 16 total possibilities — enough to explore without being overwhelming. It's also exhaustive: if interested, the user can consider the entire range of outcomes. Lastly, its combination of binary traits allows for easy manipulation of passages, as shown below.

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MBTIs of Common Principles Texts

A focus of this paper is the initial outreach where students are exposed to economics for the first time in a classroom setting. This is typically a principles class in college.

Table 1 reports the results of a convenience sample of principles texts. This includes several popular texts for the American market. These are from a variety of publishers. In addition, a selection of earlier and later editions is shown. Both microeconomics and macroeconomics texts are considered.

For microeconomics texts, relevant chapters were identified in each book. These chapters cover the core of the principles course. Any opening or introductory chapter is skipped. Any international coverage is skipped (other than comparative advantage). The core then follows the typical middle 80% or so of the principles course: comparative advantage, business law, supply and demand, elasticity, surplus, externalities, public goods, production and cost, and market structures. The number of chapters differs from book to book, but it is around twelve.

The same thing is done for the macroeconomics texts. Included coverage begins with descriptive material about business cycles, growth, and GDP, follows with the aggregate demand-aggregate supply model, and then monetary and fiscal policy. International economics is excluded (since some instructors choose not to cover that topic in principles classes). Again, the goal was to use the 80% or so of material that all instructors cover. The number of chapters differs across books, but it is about nine.

From each text, a one paragraph selection was made. The method was to choose one chapter at random. Within that chapter, the selection made was the longest paragraph in the second section. The second section was chosen so the passage selected would not be introductory. Some judgment was used to exclude paragraphs that were heavily focused on explaining a particular figure or table. It was felt those paragraphs included too much jargon and were overly specific. The longest paragraph in the section was chosen to give the AI the largest sample to work with. Substitutes were taken from other long paragraphs nearby.

Each paragraph was then passed to an AI. In turn, it was asked to evaluate the passage and classify its MBTI (Table 1).

Table 1
MBTI'S OF SELECTIONS FROM COMMON PRINCIPLES TEXTS

Author(s)	Publisher	Edition	Micro	Macro	Chapter	E or I?	N or S?	F or T?	J or P?
Colander	McGraw-Hill	12	✓		12	I	S	T	J
Cowen and Tabarrok	Worth	4		✓	12	I	S	T	J
Hubbard and O'Brien	Pearson	9		✓	14	I	S	T	J
Mankiw	Dryden	1	✓		10	I		T	
Mateer and Coppock	W.W. Norton	4	✓		5	I		T	J
Stevenson and Wolfers	MacMillan	2		✓	18			T	J

Notes: The abbreviations for the indicators are E for Extroversion, I for Introversion, N for Intuition, S for Sensing, F for Feeling, T for Thinking, J for Judging, and P for Perceiving.

The results show a great deal of similarity across the texts[1]. All of them score as thinking rather than feeling (shown as T). Five out of six score as introversion rather than

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extroversion (shown as N), and judging rather than perceiving (shown as J). The only score that is split is between intuition and sensing.

The similarity of MBTI across texts occurs in spite of the variety of authors. It also occurs across a variety of publishers. There does not appear to be a pattern across chapters, or between microeconomics and macroeconomics texts. It also does not seem to depend on homogenization by publishers: one would expect earlier editions of texts to have the most distinct expression of the author's personality, and it does not seem to be the case that earlier editions are more idiosyncratic.

From the table we conclude that economists share a Myers-Briggs Type. This Type comes through in their writing. Denoting that one binary with an asterisk, it seems that the base MBTI for an economics text is I*TJ. Further, it seems plausible that this would carry over to lecture style, choice of examples, choice of activities, and so on. The question the economics instructor should be asking is how is an E*FP student going to feel in, or respond to, an economics class pitched by an I*TJ? We simply don't know; but anecdotally most economics instructors intuitively sense that some students are not inspired by our approach to decision-making and human relations.

A Structured Prompt for Generating Alternative Economics Passages

The point of this exercise is not to judge the shortcomings of economists for hewing to a particular type. We are who we are; whether or not we were attracted to this field because it is a good match for our personalities.

Rather, the point is that we may no longer have to passively accept the implications of that. It is plausible that if economists' texts are of a type, that we will tend to attract students as majors who identify with that type. But what about the rest of them?

To explore this further, the author chose a passage from their own self-published text[2]. The passage is two lengthy paragraphs from a non-technical explanation of the implications of the Solow descriptive growth model. First, the passage was fed into the AI. Secondly, the AI was prompted that there were five words or phrases in the passage that were jargon that it was essential to retain. Third, the AI was prompted to identify the MBTI of the passage. The AI concluded that it was INTJ much like the textbooks in Table 1.

Fourth, the MBTI was prompted to rewrite the passage as needed to improve its clarity. This was done to correct for any shortcomings of the author. Fifth, the AI was asked to rewrite the passage as if it was coming from someone with a different MBTI. So, this is not simply prompting the AI to do unstructured brainstorming, but rather brainstorming that is structured in a readily controllable way, that is also mutually exclusive and potentially exhaustive in its setup.

For this INTJ passage, I directed the AI to rewrite in the polar opposite of ESFP. Obviously, I could have asked it to modify 1, 2, or 3 binaries just as easily. The results are shown in (Table 2).

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Table 2
A TEXT PASSAGE REWRITTEN WITH A NEW MBTI

Original INTJ Passage from Author's Text	Alternative ESFP Passage from Author's Text
The idea that growth should lead to inputs being balanced is most important for what it does not say. That is, could we ever get to a position where they aren't balanced? The answer is no, if the world behaves like the model. No surprise there: the reason people don't trust models is because they aren't like the real world. However, we can turn that around, and argue that if inputs don't end up being balanced in the real world, it's because the decision-making in the real world has diverged from the decision-making in the model. But, recall that no one in the model is deciding to balance the inputs at all. This is huge because it suggests that unbalanced inputs are a result of the conscious choice of decision-makers to do something that will reduce growth! Does this ever happen in the real world?	The idea that growth should lead to inputs being "balanced" is fascinating for what it doesn't spell out. Think about it—could we ever get to a place where things aren't "balanced"? Not if the world works like the "model." No shock there, right? People tend to distrust "models" because they're not like real life. But here's the twist: if inputs aren't "balanced" in the real world, it's because people are making decisions that don't match what the "model" assumes. And get this: no one in the "model" is actually trying to balance anything! That's a big deal because it means unbalanced inputs happen when decision-makers consciously choose actions that hurt growth.
I think that it's common. Think of the Soviet Union. Is our recall of their economy one that was in balance between industry and consumer products? No. If anything, the gross imbalances are what led to the social unrest that brought the system down. Here's a second example. Think of any developing country you like. Does it seem like labor is used in inefficient ways? I don't mean that it isn't supplied with enough capital, merely because they use a different production process with a different α. Rather, does it seem like labor might want to work more efficiently but is constrained not to? Examples of this might be caste systems, where your ancestry determines your job, or education systems that serve the elite better than the smart. All of these are signs of conscious decisions to not balance inputs. Why would societies do this? Acemoglu and Robinson [2012] or Parente and Prescott [2002] argue that it is because entrenched elites may be able to find ways to make themselves richer in systems that are constrained to not behave optimally.	Does this kind of thing actually happen in real life? Oh, absolutely! Look at the Soviet Union. Do we remember their economy as being "balanced" between industry and consumer goods? Definitely not. Those massive imbalances led to social unrest, and eventually, the system fell apart. Here's another example: think about developing countries. Does labor there seem to be used efficiently? Not always! It's not just about having less capital or using a different α in their production process. The problem is often deeper. Think about caste systems, where your ancestry decides your job, or education systems that serve elites more than those with talent. These are choices people make, and they're choices that stop inputs from being "balanced." But why would anyone do that? According to "Acemoglu and Robinson [2012]" and "Prescott [2002]," entrenched elites often set things up this way to make themselves richer—even if it means holding the whole system back.

The differences between the two passages are not huge. I did not find the new passage unacceptable. I definitely did not find it to be incorrect in any meaningful way. But it's tone is modestly different. Is it better? Not to me, but that isn't the point. It might be better to a reader who isn't like me.

Having said that, there is a distinct difference in tone and construction. The tone is slightly more conversational, maybe even folksy. The AI writing under ESFP put some things in quotes; perhaps the written equivalent of air quotes made with hand gestures. There are more exclamation points! Lastly, there's a couple of word substitutions that appear to be corrections for things the AI thought was jargon but I did not (Conlon & Patel, 2022).

This sort of exercise is not limited to text passages. Here it is applied to a multiple-choice question from a mainstream publisher's text's testbank[3]. The methodology is the same. The AI was informed that it was a multiple-choice question with 4 possible answers. It classified its MTBI as INTJ. Again, it was asked for a rewrite as ESFP (Table 3).

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Table 3 A MULTIPLE CHOICE QUESTION REWRITTEN WITH A NEW MBTI	
Original INTJ Passage from Author's Text	**Alternative ESFP Passage from Author's Text**
Brand name products tend to have demand curves that are relatively more inelastic because	Why do brand name products usually have more inelastic demand curves?
a. Brand name products tend to have more substitutes	a. They're everywhere, so substitutes are easy to find
b. Brand name products tend to have fewer substitutes	b. They're unique, so substitutes are hard to find
c. Consumers are very sensitive to the prices of brand names	c. People pay close attention to price changes in brand names
d. Brand names are not valued	d. Let's be real—no one cares about brand names

Note: permission received to use this question, via personal email, January 2025

Again, the differences are modest. Personally, I would have no problem using either version of the question.

CONCLUSION

The point of this essay is not that economics instructors *should*: 1) use AI to rewrite their content as (McLeod, 2014) suggested for another field; or 2) use the MBTI to judge their content.

Rather, the goal of this essay is to point out that economics instructors *can* do this today in a way that would have been both expensive and time-consuming a few years ago (Mollick & Mollick, 2024).

ENDNOTES

[1]Honestly, this is probably not surprising. Interested readers are encouraged to examine other texts.

[2]At my university, the "intermediate macroeconomics" course has a description that's somewhat different from most schools. We are in a business school, and the objective is to attract students from other business majors to take the class as an upper-level elective. I wrote a handbook to accompany a standard publishers' textbook that covers some topics that might appeal to those students. The passage covers a common topic: what the theoretical result that growth is balanced tells us about the real world.

[3]Pains were taken to find a fairly recent textbook that was unlikely to still be in use. The question is from the testbank found in (Boyes, 2005). Its last edition premiered in 2011.

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