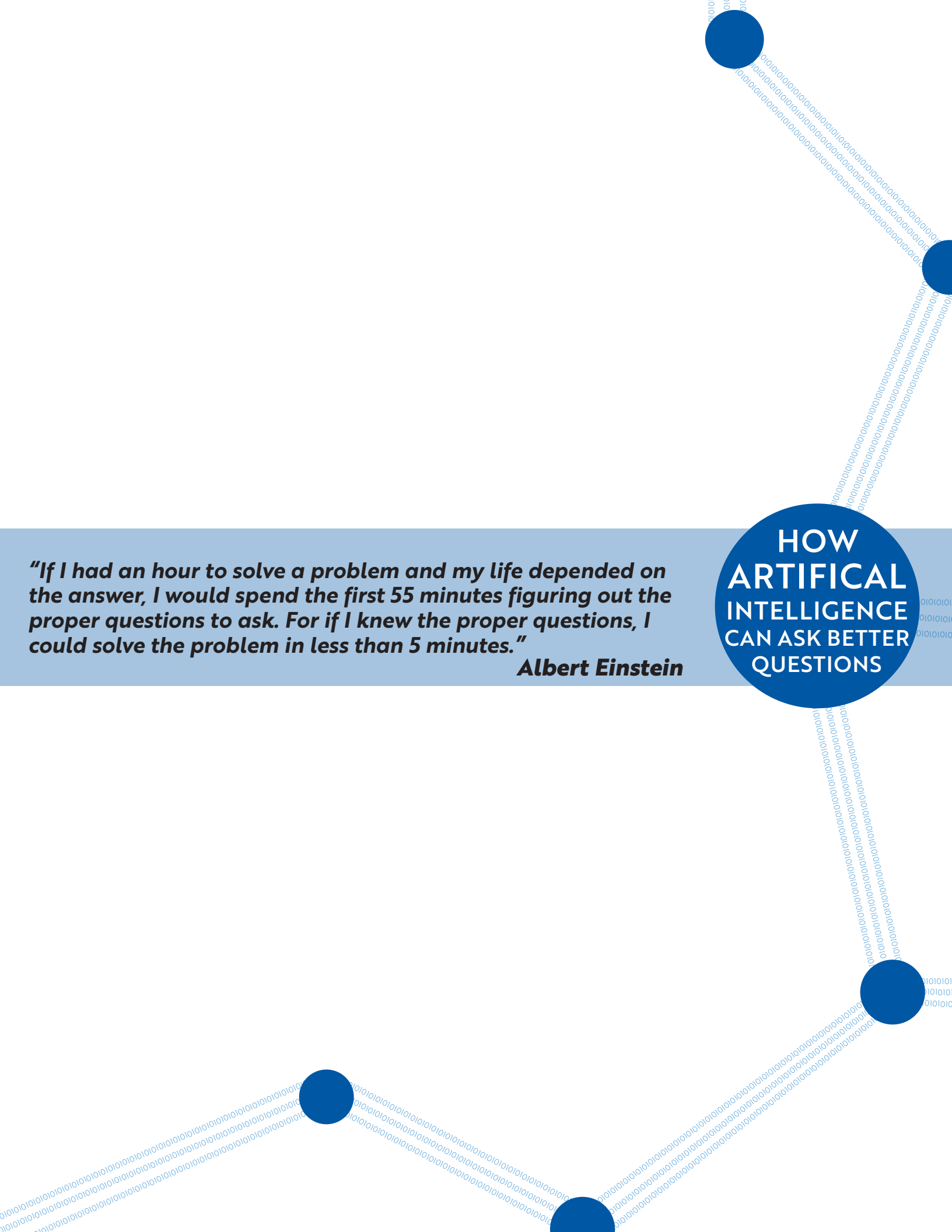


"If I had an hour to solve a problem and my life depended on the answer, I would spend the first 55 minutes figuring out the proper questions to ask. For if I knew the proper questions, I could solve the problem in less than 5 minutes."

Albert Einstein

HOW ARTIFICIAL INTELLIGENCE CAN ASK BETTER QUESTIONS



You enter a room with an AI system such as Alexis or Siri there. After some brief greetings, they ask you a quick introductory discussion type question such as:

-Are you ok?

-How are you doing? or,

-Is it too hot in this room for you?

Asking one of these question of you sets your mind in motion. But depending on which of these questions you ask, you produce a very different starting mindset. The first two are usually answered with a dismissive "Fine." They don't put the respondent in a new frame of mind. But the third forces the respondent to refocus on a whole new topic – how hot is the room? That question completely resets the dialogue.

Welcome to the world of thinking about asking the right questions. In the AI (artificial intelligence) arena, lots of resources are used for data observations and patterns, but how about looking at the questions to be researched and refining them first? If we go back to the Socratic methods of using better questions to evolve rational thinking, can we attain higher AI consciousness? And as we allow more and more important functions such as driving, medical procedures, financial planning and the like become human-function free, don't we first want to make sure the question we are looking for answers to are correct and not changing? What if they are changing? Do we have an approach to get a better question/research to work on?

The late noted management consultant Peter Drucker certainly thought that. He constantly told his students and client companies that your most serious mistakes were not

in getting the wrong answers; rather, most mistakes came from answering the wrong questions.

And this issue seems to be surfacing in today's AI development. Remember Nick Bostrum's famous example of AI trying to figure out how to maximize the number of paper clips? Shouldn't at one point in this process the AI being have rephrased the question to include a constraint to produce paperclips for the benefit of humankind?

In this brief article, we hope to introduce some Socratic methods to AI development to help avoid major mistakes through better questions. We start with defining what is a question, quickly review the six types of questions, five types of analytical errors that might lead to better questions asked, provide a six step process to help define better questions for AI development, and close with a quick note on what Socrates thought was advancement in human knowledge -- seeking truth and virtue!

One note of caution for those in the AI field reading this article. We[PVBI], the authors of this paper, do not come from the computer programming, data engineering areas. Nor do we come from the physics, basic scientific area. Rather we are professors, researchers in the liberal arts/journalism and market research/business area. We believe sometimes coming from a different, almost unknown approach can add to the thinking of AI in a unique manner and help provide some new insights.

WHAT IS A QUESTION



We start this article the way we would tackle any problem or opportunity... with Socratic reasoning to see if we can answer the right question. Ours is, "What is a question?" For reasons we will discuss shortly, we have changed it to, "What is the correct definition of the word "question"? The answer to this is much harder than we thought. Our research uncovered all kinds of responses from major philosophers, scientists, academics and researchers.

We uncovered a number of good definitions. These included:

- A way to distinguish between inquiry or inference in a statement
- A way to get a respondent to supply added information
- A way to discern the real problem under investigation
- A way to define the subject of dispute
- A way to assess the validity of information (In AI this would be as in the Turing test where the protocol tests whether the information is computer generated or human created)

After a lot of thinking about these answers, we found all of them incomplete in our minds. As so we came up with this simple answer on what the correct definition is...A question is an incomplete thought. It needs more information. This definition seems to encompass all issues and is a perfect starting point for us, especially in the Artificial Intelligence field.



THE SIX TYPES OF SOCRATIC QUESTIONS



Now that we have defined “question” as an incomplete thought that needs more information to be complete, we can try to identify the question being asked by the type of Socratic question it would be. Socrates always challenged his pupils with questions about the question they were asking and classified them into six categories. We can use these types of questions not just to make better searches for information that we can use to answer the question, but also to make sure the question itself is a good starting point for an answer.

The six categories of questions Socrates came up with are:

1. QUESTIONS FOR CLARIFICATION.

Sometimes called the “tell me more before I search for answers” questions, these questions are used to explain in detail the concepts needed for answers. For example, you may be at the bank and a AI teller notices you are looking at your watch and fidgeting. Before jumping right into, “How may I help you?” the better first response may be, “Is something wrong?” If the answer is “no,” perhaps a more specific question like “Are your pressed for time?” might give useful feedback for a better answer than just jumping into trying to help with a transaction.

2. QUESTIONS THAT PROBE ASSUMPTIONS.

Probing an assumption by asking additional questions before rushing to answer the question can help Artificial

Intelligence processes really get to the heart of the matter that needs to be addressed. Socrates constantly triggered anger and fluster in his students by challenging assumptions. He believed true knowledge only exists when one starts with a blank slate or assuming one knows nothing. Usually when someone asks a question about an area they know well – say, for example, “How many more resources do we need to combat the homeless problem?” -- they assume more resources are the answer to the problem. By challenging this assumption by asking a question like, “Do we truly have solutions to this problem that will solve it with more resources?” usually will generate some defensiveness with those with knowledge but does challenge the assumption in the original question. We saw this fallacy play out in the Vietnam war, when we assumed more troops on the ground were the answer to better results.

3. QUESTIONS THAT PROBE REASON AND EVIDENCE.

Socrates always probed his students looking for the weakest link in their conclusions to figure out what might be wrong with the thinking or facts. For example, when my progressive friends ask questions of my Born Again Christians about how they can support an individual for president who does not have similar values in all areas, they are not taking into consideration some of the values that the person does have that are similar may be more important, when their alternative does not share all their values either. By making sure AI processes assume that most question don't have totally ideal answers and more questions may be needed on an ongoing basis as the situation

changes, we may get much better answers.

4. QUESTIONS ABOUT VIEWPOINT AND PERSPECTIVE.

Socrates always pushed his students to figure out their starting position and then try to see the problem from a different viewpoint that their original position might have missed. For example, as an AI assistant is trying to decide whether to hire more dishwashers for an expanding restaurant, it might like to look at the problem from a dishwasher's perspective and how they can help the existing ones better.

5. QUESTIONS THAT PROBE IMPLICATIONS AND CONSEQUENCES.

These Socratic questions make us consider the future implications of the answer. Do the answers or facts make sense? For example, in the early 20th century there were concerns that if London continued to grow at its current pace and horses proliferated at the same ratio to humans, by the year 2000 there would be 6 feet of manure in every street in London. Does this make sense? Not if we challenge the assumption that we will continue to use horses as our main means for transportation. Better questions in this area from AI processes will help us think non-linearly.

6. QUESTION ABOUT THE QUESTION ITSELF.

Sometimes Socrates sensed his students were really not answering the question but trying to evade it. Sound familiar in this day and age? This would lead him to challenge the question or statement to make sure the purpose of the question

was to seek the truth not evade it. By asking someone "Why are you asking me that question, or can you clarify your comments on that question," may lead to better questions to ask. Yes/No questions not answered "yes" or "no" present one opportunity for AI processes to explore.

We could go on and on with examples in these areas that might be useful in designing AI processes. And we have lots more that could be further researched. However, we believe that by simply identifying what type of question is being asked, AI processes can ask better questions and ways to seek answers.



THE FIVE TYPES OF ANALYTICAL ERRORS THAT OCCUR WHEN FORMATTING QUESTIONS



We started this article with defining a question as being an incomplete thought and have identified the six types of Socratic questions that might lead to better answers or questions. Now it is time to explore the errors we may make in not starting with the proper question.

Artificial Intelligence processes need to be on the lookout for five types of possible errors when formatting questions. They are:

TYPE 1 ERROR: THE QUESTION IS TOO BROAD.

When a question is too broad and the most important information becomes like a needle in a haystack, the real issue never gets attention. For example, before World War II the US intelligence had data showing that the Japanese fleet was moving towards Pearl Harbor, but because this scenario of an attack this way was considered unlikely, the data was ignored[PVB2] [CG3] . The too broad question was, “How will a Japanese attack on Pearl Harbor occur?” The better question would have been more narrow: “Will a Japanese attack on Pearl Harbor occur, either by ship, planes, or infantry invasion?”

TYPE 2 ERROR: THE QUESTION IS TOO NARROW.

These types of questions miss the point entirely about what needs to be examined. For example, imagine if after 9/11 instead of asking the question, “Does Iraq have weapons of mass destruction?” we asked the question “Are there weapons of mass destruction being developed by any country in the world?” We might have completely

different scenarios with Iran and North Korea today. By focusing on the context of the last middle east encounter which was with Iraq, we missed the chance to examine solutions to bigger issues.

TYPE 3 ERROR: THE QUESTION IS THE WRONG ONE.

Pursuing answers to irrelevant or non-important issues creates all types of worthless analysis and resources used. In the financial crisis of 2008 and the Michael Lewis book, *The Big Short*, we start to understand the true question we should have been centered on was about the impact of the derivative market on real estate prices and not about the nominal increase or decrease in real estate prices. A few hedge fund managers figured out that the derivatives market was 50-100 times the size of the actual real estate market in the United States, and that a 1-2% decline in the value of the derivatives market could wipe out the entire real estate value of the United States. While most of us centered on the question of looking at the increase or decrease in the traditional market, the relevant question was how big the derivative market was relative to the size of the actual market -- not how much of an increase or decrease the regular market would have.

TYPE 4 ERROR: THE QUESTION MAKES ONE CENTER ON TRIVIAL ISSUES RATHER THAN ON THOSE THAT ARE IMPORTANT.

We all fall prey to this because of how we get our information. For years, politician clamored about tax rates, regulations, and budget deficits. Yet no concrete evidence has surfaced correlating those factors

to a healthy economy and economic growth. As a matter of fact, most of the healthy growth regions of the United States have high regulatory restrictions and taxes that have led to lower deficits. So a question which drives the process toward examining tax rate and regulatory differentials is likely to yield irrelevant answers to an economic growth puzzle.

TYPE 5 ERROR: THE QUESTION IS POSED IN A SITUATION THAT PRODUCES BEHAVIOR RESPONSES ANTICIPATING A CERTAIN RESULT.

This issue was first noted in business at the turn of the century when Henry Landsberger was studying workers at Western Electric's Hawthorne plant. He wanted to see if turning up or dimming down the plants lightning would increase or decrease worker productivity. What Landsberger found was that when workers knew they were in a study the increased their productivity no matter whether the lights dimmed or increased.

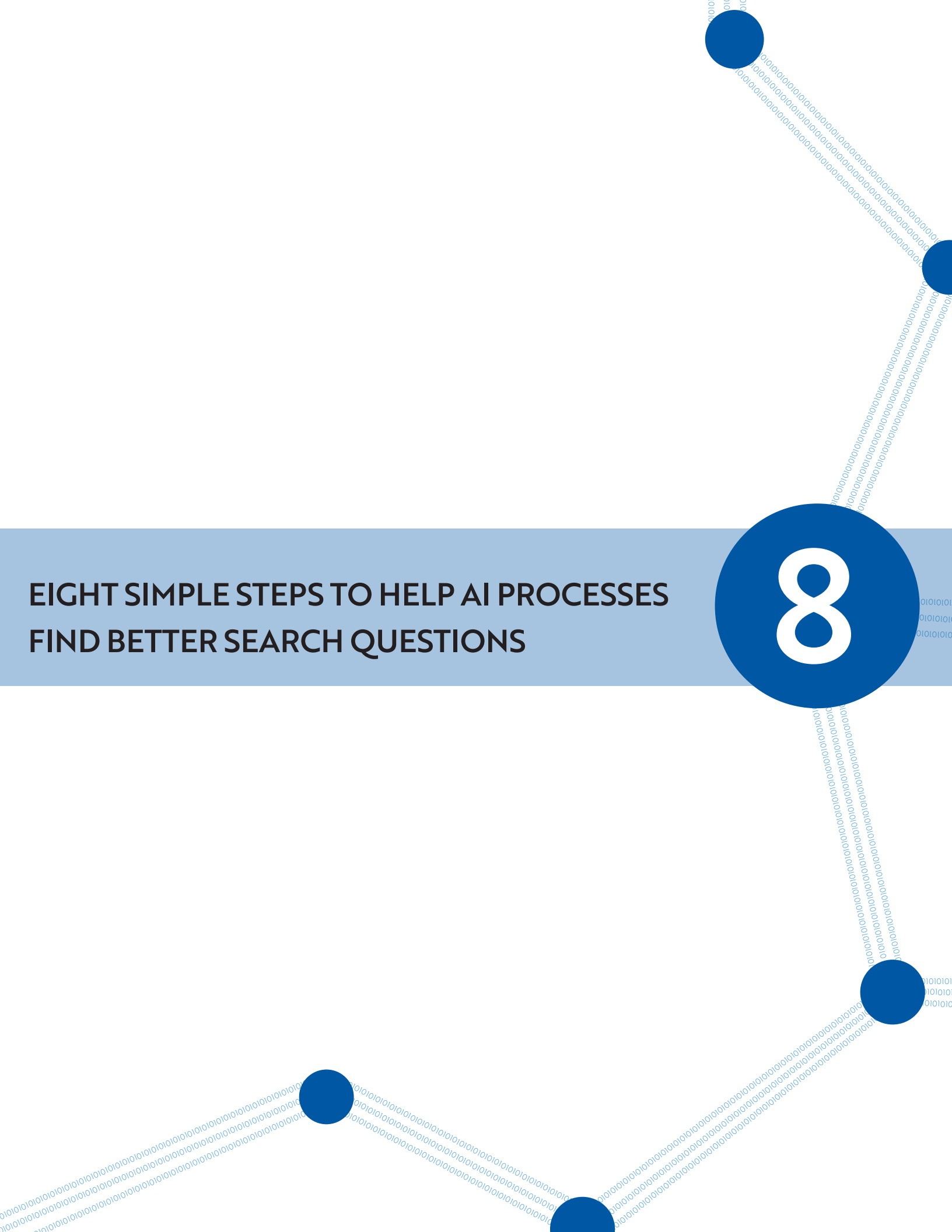
We might have seen this also in the last presidential election....pollsters, marketing consultants, and experts in the field totally missed out on how angry the less educated white male was and questions being asked to them in professional settings and queries didn't speak to the normal way they exchange ideas. Therefore, the explosion in turnout in this base for Trump was mostly missed due to most data about their answers to questions, where they gave appropriate or politically correct answers instead of expressing their true feelings.

This is just a quick overview of the five types of errors we think artificial intelligence processes have to avoid when devising questions to be researched. Beware quickly jumping to conclusions on how to proceed before you make sure the question answered is not too broad, narrow, totally wrong, focused on the trivial, or anticipatory.



EIGHT SIMPLE STEPS TO HELP AI PROCESSES FIND BETTER SEARCH QUESTIONS

8



We are now ready to outline an eight-step basic framework that might help AI processes find better questions to answer and avoiding some mistakes by focusing on the wrong question:

STEP 1: WHAT'S BOTHERING YOU?

Something's missing...something feels not right. You stop and wonder whether the simple question I am stating is the one I really want to search. For humans a lot of this we call this our intuitive feeling or going with our "gut." We don't try to overthink our decision from a rational basis, rather we act on instinct or past behavior. Is this the right way to act? Or does it do more harm than good? Well, at the very least it tells us that we may want to think again about what we are looking for and try to draft a question that may lead to more data and a better answer.

STEP 2: CAN YOU RATE THE INITIAL QUESTION ON A BROAD TO NARROW SPECTRUM AND DO A/B ANALYSIS TO FIND A BETTER ONE?

Over the course of looking at thousands of questions and thinking of how an AI process might look at millions or billions of them, we believe that by key-word and other relative analysis principles, one can rate most questions on a scale of 1-10, with 1 being very narrow and specific about what one would search for and 10 being very broad in search terms. Obviously, a low score leads one to possible Type 1 error where the true answer or action is outside the scope of the search. And the high score leads one to a possible Type 2 error where the true answer is in the data search but there is so much there that the true answer not recognized. By using A/B analysis and

coming up with questions that might lead to numerical ratings more near the center, the revised question has a greater chance of getting the right answer.

STEP 3: IS THE QUESTION THE ARTIFICIAL INTELLIGENCE PROCESS IS READY TO WORK ON JUST WRONG?

Creativity. Lateral thinking. Thinking outside the box. Or from left field. Sometimes the true issue that needs to be worked on isn't what one is spending all their time on. We should ask, "Are you sure this is the right question," and then look for alternative questions in any AI thinking process. There are a number of good ways to look for a different, better question. Ones we like include Conceptual Blockbusting by Stanford's James Adams, Lateral Thinking by Edward De Bono or Buddha's looking for the kernel in the question to ask a better one.

STEP 4: IS THE WORDING OF THE QUESTION BIASED WITH NEGATIVE OR POSITIVE CONNOTATIONS?

"Is President Trump a liar?" "Did President Obama tell the truth?" Those two question will get you completely different responses from "Does President Trump tell the truth?" "Was President Obama a liar?" Why? Negative and positively inclined words. These processes are so well known that in many political campaigns nowadays, callers for one side will pose questions with a negative or positive bias to produce a predetermined desirable result. This needs to be addressed up front in order to get the right or truthful answer. Look a google search for Is Obama a liar or does Obama tell the truth and see how different the search is. We need to make sure the Artificial Intelligence process is as bias-free

in the question it is asking as possible.

STEP 5: WILL THE QUESTION BEING ASKED GET MATERIAL/USEFUL ANSWERS OR JUST TRIVIAL ONES?

In the EMT examination most states require for certification, there is a practice scenario where the EMT rushes into a situation where a man has fallen off a ladder and is lying motionless on the ground with a compound fracture in his leg. If you ran into the scene and started asking questions regarding how to treat the compound fracture, you failed this part of the test. Why? Because the compound fracture was trivial compared to taking the basic line readings such as pulse, blood pressure, and temperature to determine whether the man had a stroke, passed out, and then fell to the ground where he broke his leg. So the true question for this situation had nothing to do with the broken leg which was trivial compared to doing the right thing. Making sure the question is not trivial and taking some observations both broad and narrow will help get to the right question.

STEP 6: ARE YOU ASKING THE QUESTION IN A WAY THE ANSWERS OR DATA MIGHT COME BACK MORE SOCIALLY ACCEPTABLE RATHER THAN RIGHT?

What is the socially acceptable right approach vs. the one that might be correct? Although this is a minor example, imagine one where you are in a leading university course on philosophy/religion and your professor ask you about Charles Darwin evolution of the species and you are a Born Again Christian. Want to bet the question you were asked won't elicit the truthful response from the Born Again student? Being aware of whether the

question is being asked in circumstances where the socially acceptable answer seems more correct than the truthful one is very important.

STEP 7: IS THE QUESTION VIRTUOUS?

It is with some trepidation that we include is step at all. Socrates insisted that the question and search for answers must seek truth and virtue. But deciding whether a question is virtuous is difficult, and at this point we can provide few specifics. In pursuit of defining this criterion better, we have examined:

- the five main branches of philosophy
- Confucius 3 methods of attaining wisdom
- The ethics of Socratic virtue
- Virtue is knowledge
- Course description on Plato's meaning of Virtue

This is just the start. But let's just leave it that without a virtuous question as a criteria, we don't really capture a true part of human intelligence. Making sure the question of virtue is included in any process of asking the right question is a must.

STEP 8: WHAT TYPE OF SOCRATIC QUESTION IS IT?

In this article we have identified the six types of Socratic questions and some useful ways to search for information based on identifying what type of question it is. This is our last step before turning the artificial intelligence process over to search...each of the six types of question has a different way in our mind to search. Therefore, defining what type of question it is will help the artificial intelligence process find the right data and order it in the right way for the best answer.

