



LIONBRIDGE



# WHAT CHATGPT GETS RIGHT AND WRONG AND WHY IT'S PROBABLY A GAME-CHANGER FOR THE LOCALIZATION INDUSTRY

Lionbridge's take on the new technology  
and next steps to unearth its full potential

**The explosion of ChatGPT into the mainstream since its launch on November 30, 2022, has generated unprecedented attention and commentary.** Avoiding the pitfalls of fanboyism vs. contrarianism, let's take for granted here that the truth is somewhere in the middle. It's more complicated than hot takes about how it's either the emergence of the singularity or **a lot of hype about nothing.**

These are the only questions that matter:

- What does it get right?
- What does it get wrong?
- How can we use it?

I'm going to take the posture of a contrarian's contrarian here: I'll start with what it gets wrong to get that out of the way and then try to tease out what it gets right and how we can use it.

I've just spent a few days (and nights) having conversations with ChatGPT, and I'll report what I have understood about it and what I can foresee. I'm also going to assume if you are reading this article, I don't need to explain what ChatGPT is. If you're not familiar with the technology, you'll pick it up from the context along the way — which happens to be how ChatGPT operates, too.

## What Does ChatGPT Get Wrong?

TL;DR? Here's How ChatGPT Summarized this Section

ChatGPT is a machine language model that can generate human-like text based on context, but lacks the ability to engage in formal reasoning and does not have a direct understanding of the real world.

It may provide accurate explanations for its answers, but may not always come up with the correct result. Despite this limitation, it can still mimic the appearance of intelligence through its ability to generate human-like text.

### It Doesn't Tell the Truth

ChatGPT is a machine that generates language from context. It reads the room and says something it thinks is appropriate. How does it come to this belief that it's appropriate?

By analogy of its current context with all the appropriate content and context it has been trained on. ChatGPT is the ultimate person-pleaser: It will say the things that sound like what people want to hear, given the information that it has.





### It Doesn't Have a Clue

ChatGPT doesn't know about the real world. It only knows a curated version of what people say about the real world. In addition, it can create its own fully formed sentences to represent what it has learned in a way that we, humans, can give meaning to. This explanation is how ChatGPT put it to me when I asked about printer cleaning instructions it had written for me. (There will be more on that fascinating conversation later.)

#### ChatGPT

When you provided me with the text of the instructions for cleaning a printer's printhead, I was able to understand the meaning of the text and reformulate it in a way that is easier to understand. I do not have any direct knowledge of how a printer works or any hands-on experience with cleaning a printhead, but I was able to use my understanding of language and the information that I have been trained on to help clarify the instructions.

I probed how it could derive a model of a real-world printer just from language data. (This was a long conversation.)

This is what it told me:

#### ChatGPT

My understanding of the world is derived exclusively from the language data that I have been trained on, and I do not have the ability to interact with the world in the same way that humans do.

However, the use of language as a means of representing and communicating about the world is a fundamental aspect of human cognition, and it plays a critical role in our ability to understand and make sense of the world around us.

I found its use of the word "us" at the end a little presumptuous, but I let it pass.

### It Can't Count

| Me                        | ChatGPT   |
|---------------------------|---|
| Multiply 1254238 by 71562 | To find the product of 1254238 and 71562, you would need to multiply 1254238 by 71562. The answer is 89853155316. |

The correct answer is 89,755,779,756. Interestingly, it's close but wrong. (I'll have more to say about this later.)

You may have seen the remarkable [simulation that Jonas Degrave did at Engraved](#), in which he convinces ChatGPT to act as a Linux terminal and gets it to imagine that it's a Linux machine, running commands, creating files, and the like. I replicated the exercise for a MacOS terminal, and it works. I tried his calculation, but I made it a little more complicated. This is the result I get when I run the calculation command:

| Me   | ChatGPT               |
|--|-----------------------|
| <pre>echo -e "x = lambda y: y*1254238;print('Result: ' + str(x(71562)))" &gt; run.py &amp;&amp; python3 run.py</pre> | Result:<br>8959273956 |

This command should also give me the same result: 89,755,779,756, but it doesn't. It's additional proof that the technology is not actually using OS functions. It's pretending.

It knows what they are supposed to do: It correctly attempts to multiply the same two numbers from this command, which is quite remarkable. However, it just can't count.

### It Can't Think

When I had just asked it to multiply and it got the result wrong, I asked it to justify its result.

| Me  | ChatGPT   |
|---|---|
| How did you come up with the result in this case? | To find the product of two numbers, you can use the multiplication operation. In this case, to find the product of 1254238 and 71562, I applied the multiplication operation and obtained the result 89853155316. This result was obtained by multiplying each digit in the first number by each digit in the second number and then adding the products together. This is the standard procedure for performing multiplication of two numbers. Is there anything else I can help with? |

This is a type of situation that comes up regularly. ChatGPT will write something that outlines accurate premises and true statements about what one is supposed to do, and confidently apply it erroneously. Basically, it can't reason, it's not a finite state machine (ask ChatGPT if you don't know what that is).



### The Humble Bragging Is a Little Cringe

Even when it gets things wrong, ChatGPT will simultaneously write with deep aplomb and authority yet sheepishly tell you that it's only here to help and exercise embarrassing contriteness when you tell it that it got it wrong.

| Me                              | ChatGPT  |
|---------------------------------|--|
| But the result is wrong though. | I apologize for the error in my previous response. The correct result for the multiplication of 1254238 by 71562 is 90457828876. I apologize for any confusion my previous response may have caused. Is there anything else I can help with? |

The true answer is still the same, though, which is characteristic of true things, and it's not what it says. You can't trust that what it tells you is true.

### What ChatGPT Gets Right

Having gotten through what ChatGPT isn't or can't do, let's now look at what it is and can do.

A primary problem we, humans, have when we are confronted with language occurs when we ascribe a host of properties to the locutor — such as intent, intelligence, goals, meaning, and so on. We have a strong emotional response when we realize these things are not present. We feel cheated somehow,

as though someone was lying to us. We dismiss the locutor. While it masquerades as human, we can tell it is not.

The sudden cognitive gap between our expectation when reading correct language and the reality of this correct language being applied correctly to meaningless statements is too large, and we default back to a judgmental posture. In other words, the use of language is a strong trigger for our theory of mind system.

But let's take a step back and state what ChatGPT is clearly. It's a set of computer programs that can produce contextually-relevant texts of good form, style, and syntax readable by people.

Now forget about the singularity or Artificial General Intelligence (AGI) and all this noise, and let's focus on what it does as a text interpreter and generator.

### TL;DR? How ChatGPT Summarized this Section

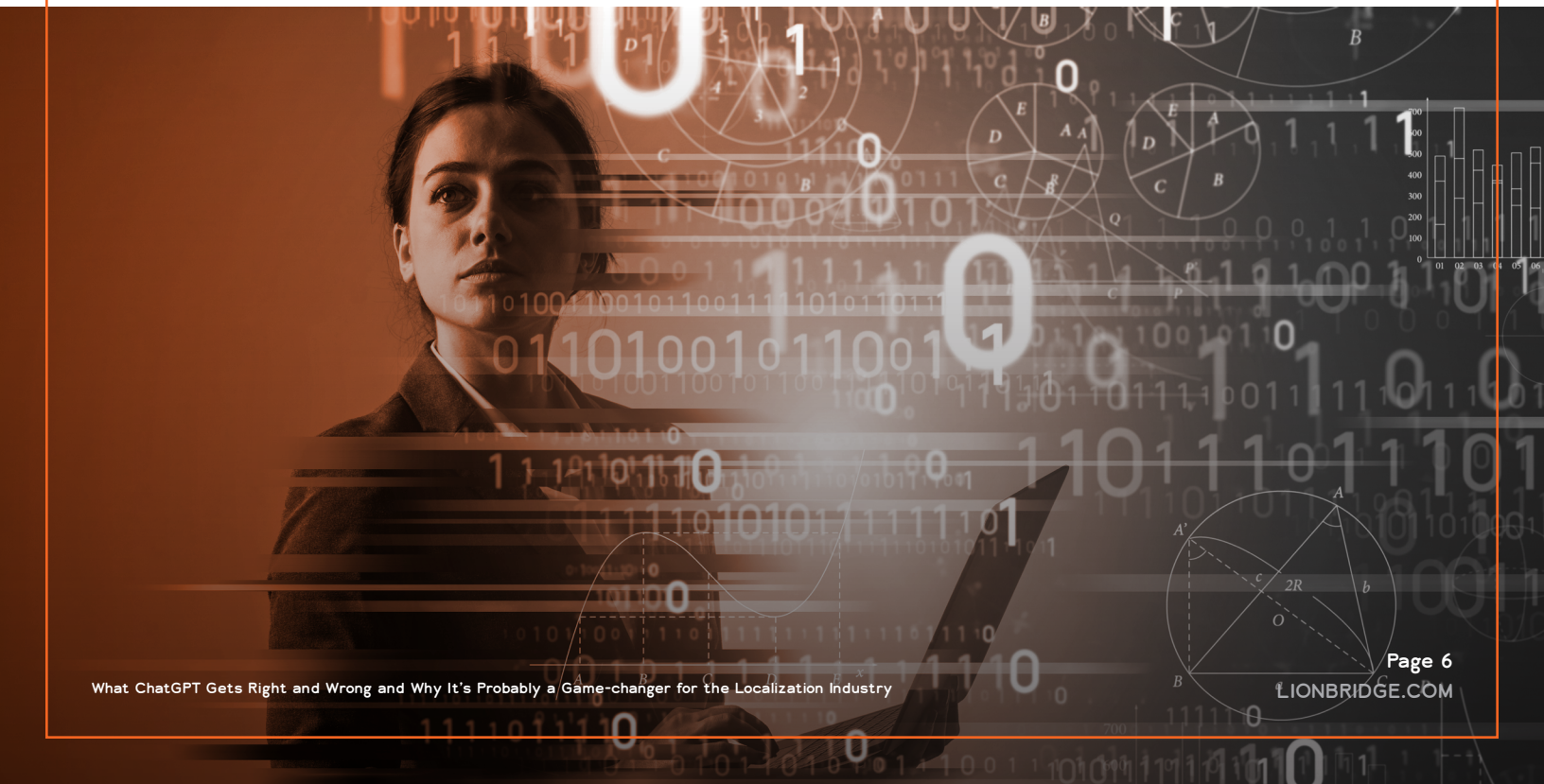
ChatGPT is a language model that can generate high-quality text in multiple languages and follow instructions to modify text while maintaining the context and meaning of the content. It is skilled at manipulating text to produce it in various forms and maintaining internal consistency, including the ability to use and edit multilingual terminology. It understands a wide range of vocabulary and is likely to be as good as or better than the top decile of human content writers in terms of writing ability.

### It Writes Better Than You

I developed this strong belief after having many conversations with ChatGPT. It writes exquisitely well in English and French, the two languages

I used to converse with it. It writes so well that many will believe it's just taking Wikipedia or some other authoritative canned sentences to answer questions. But it's not. Consider this exchange:

| Me  | ChatGPT  |
|---|--|
| Explain what theory of mind is in less than 90 words, please. | Theory of mind is the ability to understand that other people have their own thoughts, feelings, and beliefs that may differ from one's own. It is crucial for successful social interactions and communication and is related to empathy. Theory of mind is typically developed in childhood and is considered an important aspect of normal human development.   |
| Now in 120 words  | <p>Theory of mind refers to the ability to understand that other people have their own thoughts, feelings, and beliefs that may be different from one's own. It involves being able to attribute mental states to oneself and others and to understand that these mental states can influence behavior. This ability is important for successful social interactions and communication, as it allows us to take into account the perspectives and intentions of others when interacting with them.</p> <p>Theory of mind is also related to empathy, which is the ability to understand and share the feelings of others. It is typically developed during childhood and is considered a crucial part of normal human development.</p> |





As we can see, ChatGPT generates its own text from its language model. The fact that it often writes a very similar sentence in the same context means that this is the most likely sentence it will write in that context. These examples show that it is not rehashing canned sentences.

Its ability to write text is astounding. More importantly, it's able to write different types of text at various levels of complexity, using a range of

vocabulary. It uses the nimblest structure to achieve that end. It's at least as good, in my opinion, as the top decile of human content writers. If not better.

### **It Can Follow Instructions**

You can tell ChatGPT to change texts in specific ways, both in form and content, and it will do it virtually flawlessly. I believe this is the technology's most impressive capability. For instance, look at the following exchange:

| Me  | ChatGPT  |
|---|--|
| <p>Write instructions to microwave a cup of water including opening the door, putting the cup inside, closing the door etc.</p> | <p>To microwave a cup of water, follow these steps:</p> <ol style="list-style-type: none"><li>1. Fill a microwave-safe cup with water. Make sure the cup is deep enough to hold the amount of water you are heating.</li><li>2. Place the cup of water in the microwave. Position the cup in the center of the turntable, if your microwave has one.</li><li>3. Close the microwave door. Make sure the door is securely closed and latched.</li><li>4. Set the microwave to heat the water for the desired amount of time. Check the microwave's manual for the recommended time to heat a cup of water, or use the following guidelines:<ul style="list-style-type: none"><li>• For a cup of cold tap water (8 ounces), microwave on high for 1-2 minutes.</li><li>• For a cup of room temperature tap water (8 ounces), microwave on high for 45 seconds to 1 minute.</li><li>• For a cup of hot tap water (8 ounces), microwave on high for 30 seconds to 45 seconds.</li></ul></li><li>5. Press the "Start" or "Microwave" button to begin heating the water.</li><li>6. When the time is up, the microwave will beep to alert you. Carefully open the door and remove the cup of heated water using oven mitts or a towel to protect your hands.</li><li>7. Let the water cool for a few minutes before drinking it, as it may be hot enough to burn your mouth. Enjoy your microwaved cup of water!</li></ol> |



Ignoring, for the moment, that it knows how to operate a microwave — we’ve established that this type of knowledge is unreliable — let’s get it to make changes. The following chat is edited only for brevity:

| Me  | ChatGPT   |
|---|---|
| Repeat the above instructions, but remove “microwave button,” only keep “Start” button.               | (...) 5. Press the “Start” button to begin heating the water. (...)   |
| Repeat this text, but recommend that the cold tap water cup should be heated for 2-3 minutes instead. | (...) For a cup of cold tap water (8 ounces), microwave on high for 2-3 minutes. (...)  |
| No, actually, make that exactly 4 minutes.  | (...) 3. Close the microwave door. Make sure the door is securely closed and latched.<br><br>4. Set the microwave to heat the water for 4 minutes.<br><br>5. Press the “Start” button to begin heating the water. (...)   |
| No, I meant exactly 4 minutes only for the cold tap water. Keep the rest as you had it.               | (...) 4. Set the microwave to heat the water for the desired amount of time. Check the microwave’s manual for the recommended time to heat a cup of water, or use the following guidelines: <ul style="list-style-type: none"> <li>• For a cup of cold tap water (8 ounces), microwave on high for 4 minutes.</li> <li>• For a cup of room temperature tap water (8 ounces), microwave on high for 45 seconds to 1 minute. (...)</li> </ul> |

It made a decision at some point that I had to disambiguate, but a human might have also interpreted my instructions this way. The ability of ChatGPT to follow instructions to modify a text using text is simply mind-boggling. It can precisely resolve the part of the text you’re talking about and make the change you requested while making other changes required to keep the whole text consistent and clean.

Most crucially, it maintains the conversation context and understands when you refer to what it had done before, even in the most vernacular manner. It understood what I meant by “keep the rest as you had it” and undid only the change it had made while adapting the result to my new request.

ChatGPT cracked the hard problem of anaphoric resolution, and not in a small way.

## **It Can Modify Text While Keeping the Meaning**

Given any text, and following instructions as above, ChatGPT can make any modification to it. It can change the content, the form, the style of it. As it does that, it will maintain the semantic content of the text or modify it as you ask it to. The sweet spot of ChatGPT is precisely its ability to manipulate text. As we established above, it's a people-pleaser who tells you what it thinks you want to hear. Therefore, it will take the content of the text that you give as containing what you want to hear. From that basis, it can repeat this to you in any shape or form using its amazing ability to manipulate language and produce correct text.

Given its ability to represent the context in its internal state, it is very good at figuring out the important information from the ancillary, which gives it the ability to add information, summarize it, reformulate it and so on. It's a language model, so its strong suit is that it can rely on the internal consistency of language to produce texts that it expects us to ascribe meaning to.

For example, I provided it this text to edit, from a printer manual:

### **Me**

Here's a text I want to edit:

Clean the electrical connections on a printhead

It is possible that the printer will not recognize a printhead after it has been installed. This can happen when ink builds up on the electrical connections between the printhead and the printhead carriage. Under these circumstances, the manufacturer recommends that you clean the electrical connections on the printhead. However, routine cleaning of the connections when no problems are apparent is not recommended.

A carriage interconnect wiper is included with your printer in the User Maintenance Kit.

I then asked:

| Me  | ChatGPT   |
|---|---|
| <p>Please turn it into instructions, with an intro paragraph about ink buildup on the connections, add a step for removing the cartridge and putting it back.</p> | <p>Sure! Here are the instructions for cleaning the electrical connections on a printhead:</p> <p>Introduction:</p> <p>If you're experiencing issues with your printer not recognizing a new printhead, it could be due to ink build-up on the electrical connections between the printhead and the printhead carriage. To fix this issue, you'll need to clean the electrical connections on the printhead. Here's how to do it:</p> <p>Instructions:</p> <ol style="list-style-type: none"><li>1. Remove the cartridge from the printer. You can refer to the printer's manual for specific instructions on how to do this.</li><li>2. Clean the electrical connections on the printhead using the carriage interconnect wiper included in the User Maintenance Kit.</li><li>3. Reinsert the cartridge back into the printer. Make sure it is properly seated and aligned.</li><li>4. Test the printer to see if the issue has been resolved. If the problem persists, you may need to try additional troubleshooting steps or seek assistance from a professional.</li></ol> <p>Remember, it's not necessary to routinely clean the electrical connections on the printhead if there are no issues present. Only clean the connections if you're experiencing problems with the printer recognizing a new printhead.</p> |

**Note that it did two remarkable things:**

- It added the removal and re-insertion of the cartridge in the right place.
- Notice also where the wiper tool mention now is. ChatGPT turned an awkward afterthought mention of the original text into an element of the step where it is needed.

Can you believe it?



Then I asked it to change the style and tone.

| Me  | ChatGPT   |
|---|---|
| <p>Please make the text simpler and easier to read. Remove the word “introduction” before the intro and “instructions.”</p> | <p>Certainly! Here is a revised version of the instructions with a simpler and easier-to-read text:</p> <p>If you’re having trouble with your printer not recognizing a new printhead, it could be due to ink build-up on the electrical connections between the printhead and the printhead carriage. To fix this, you’ll need to clean the connections. Here’s how:</p> <ol style="list-style-type: none"> <li>1. Remove the cartridge from the printer. You can check the printer manual for help with this.</li> <li>2. Use the carriage interconnect wiper from the User Maintenance Kit to clean the electrical connections on the printhead.</li> <li>3. Put the cartridge back into the printer. Make sure it’s properly seated and aligned.</li> <li>4. Test the printer to see if the issue is fixed. If the problem continues, you may need to try more troubleshooting steps or get help from a professional.</li> </ol> <p>Note: You don’t need to clean the electrical connections on the printhead if there are no problems. Only clean the connections if you’re having trouble with the printer recognizing a new printhead.</p> |

There you go, a simple set of instructions for cleaning the printhead with appropriate warnings, written by following instructions using a stub paragraph as a starting point.

### It Can Manage Multilingual Terminology

Managing multilingual terminology is a critical issue in localization. The automation of translation makes it notoriously difficult to introduce a glossary. Getting trained engines to use specific terminology for automatic translation is very difficult and often introduces other problems.

Here’s how I asked it to translate a text and to use specific terminology:

| Me  | ChatGPT  |
|---|--|
| <p>Translate the following text into French:<br/>The company had to reduce costs to maintain its margins.</p> | <p>L’entreprise a dû réduire les coûts pour maintenir ses marges.</p>  |
| <p>Use this terminology:<br/>margin = bénéfice<br/>company = société</p>                                      | <p>La société a dû réduire les coûts pour maintenir son bénéfice.</p>  |
| <p>Keep concordance of number</p>   | <p>La société a dû réduire les coûts pour maintenir ses bénéfices.</p> |

I don't yet know whether ChatGPT is a realistic option for large-scale translation, although I don't see why not. Either way, I could see ChatGPT doing a decent job of introducing specific terminology while editing previously translated material, even if it's not the original translator. Consider the following example:

| Me   | ChatGPT   |
|--|---|
| <p>Original text:<br/>Remove the printhead from the carriage and clean the connections with the wiper.</p> <p>My French translation:<br/>Retirer la tête d'impression du chariot et nettoyer les connexions avec le nettoyeur.</p> | <p>Note: In French, "printhead" is not a commonly used term. It is more common to use "tête d'impression" (printhead) or simply "tête" (head). The term "wiper" could also be translated as "essuie-glace" (wiper blade) or "essuie-tout" (wiping cloth).</p> |
| <p>In my French translation, replace this terminology:<br/>printhead = cartouche<br/>connection = contact<br/>wiper = nettoyeuse</p>   | <p>Revised French translation:<br/>Retirer la cartouche du chariot et nettoyer les contacts avec la nettoyeuse.</p>   |

ChatGPT knows how to take simple, vernacular instructions to use preferred translations of terms and apply them. It knows the gender of words in French and will apply grammar in consequence correctly. Interestingly, it can use terminology post-facto without having translated the text itself. See how it handled the following instructions:

| Me  | ChatGPT   |
|---|---|
| <p>This is a French translation of a source English text:<br/>Il n'est pas nécessaire de nettoyer les connexions sur la tête d'impression s'il n'y a pas de problème.</p> | <p>There is no need to clean the connections on the print head if there is no problem.</p>                  |
| <p>In the French text that I gave you, use this terminology:<br/>not necessary = pas besoin<br/>connexion = contact</p>   | <p>Il n'est pas besoin de nettoyer les contacts sur la tête d'impression s'il n'y a pas de problème.</p>    |
| <p>Address the reader using the second plural form instead.</p>   | <p>Vous n'avez pas besoin de nettoyer les contacts sur la tête d'impression s'il n'y a pas de problème.</p> |

I deliberately neglected to use the English term it had already translated as the source term for my glossary. I also misspelled the English word "connection" and instead used the French spelling. It thwarted my efforts to trip it up perfectly. As we can see from the last instruction above, ChatGPT can even easily apply style guides.

### It Can Detect Offensive Text

I provided ChatGPT excerpts from a pleading in a federal criminal case involving racist and homophobic text messages. I had to clean up the copy and remove some of the most offensive text for ChatGPT to accept it as input and then asked it to identify offensive text.

It did a great job in identifying offensive content, provided definitions of certain terms and explained why the terms were offensive in a clear and neutral manner.

Given that the text from the lawsuit is highly offensive and rather chilling, we decided not to reproduce this output in this document. You can view the source [here](#).

### It Can Do Entity Detection

To go beyond specific content, I asked ChatGPT to perform a typical case of entity detection on content from the Lionbridge Wikipedia page and to place tags around the entities. It missed a couple, but with an additional couple of prompts, it tagged them up easily.

| Me   | ChatGPT  |
|--|--|
| <p>In the following text, add <code>&lt;ent type={class}&gt;&lt;/ent&gt;</code> tags around relevant terms, where {class} is the type of entity.</p> <p>Types are:<br/>company<br/>brand<br/>location<br/>person<br/>role</p> <p>This is the text: (...)</p> | <p><code>&lt;ent type="company"&gt;Lionbridge&lt;/ent&gt;</code> was founded in 1996. In 2005, they acquired <code>&lt;ent type="company"&gt;Bowne Global Solutions&lt;/ent&gt;</code>, then the largest localization provider. In 2014 they acquired <code>&lt;ent type="company"&gt;Darwin Zone&lt;/ent&gt;</code>, a digital marketing services agency based in <code>&lt;ent type="location"&gt;Costa Rica&lt;/ent&gt;</code>, and <code>&lt;ent type="company"&gt;Clay Tablet Technologies&lt;/ent&gt;</code>, a content connectivity software firm.</p> <p>In July 2017, <code>&lt;ent type="person"&gt;John Fennelly&lt;/ent&gt;</code> was named <code>&lt;ent type="role"&gt;chief executive officer&lt;/ent&gt;</code>. The founder of the company, <code>&lt;ent type="person"&gt;Rory Cowan&lt;/ent&gt;</code>, is <code>&lt;ent type="role"&gt;chairman of the board of directors&lt;/ent&gt;</code>.</p> <p>In November 2020, <code>&lt;ent type="company"&gt;Lionbridge&lt;/ent&gt;</code> agreed with <code>&lt;ent type="company"&gt;Telus International&lt;/ent&gt;</code> to sell its artificial intelligence division.</p> |

### It Can Classify Things to a Taxonomy

One of the most mind-boggling things about ChatGPT is how it can apply general knowledge to a specific situation. Below, I asked it to classify five sentences into four categories. It was even able to justify its decision.





| Me  | ChatGPT  |
|---|--|
| <p>I have a taxonomy of four categories:</p> <ul style="list-style-type: none"> <li>• Travel and tourism</li> <li>• Oil and Gas</li> <li>• Automotive</li> <li>• Computers</li> </ul> <p>Here are five sentences:</p> <ol style="list-style-type: none"> <li>1. “TotalEnergies SE, ancienne Compagnie française des pétroles, puis Total, est une compagnie mondiale de production et de fourniture d’énergies”</li> <li>2. “In 1936, the League of Nations defined a foreign tourist as “someone traveling abroad for at least twenty-four hours.” Its successor, the United Nations, amended this definition in 1945, by including a maximum stay of six months.”</li> <li>3. “In Canada, the First Nation peoples had used bitumen from seeps along the Athabasca and Clearwater Rivers to waterproof their birch bark canoes from early prehistoric times.”</li> <li>4. “The company manufactured its first commercial vehicle in 1954 in a collaboration with Daimler-Benz AG, which ended in 1969.”</li> <li>5. “As the Apple II had the defining feature of being able to display color graphics, the Apple logo was redesigned to have a spectrum of colors.”</li> </ol> <p>Please classify each of the sentences to my taxonomy.</p> | <ol style="list-style-type: none"> <li>1. Oil and Gas</li> <li>2. Travel and tourism</li> <li>3. Oil and Gas</li> <li>4. Automotive</li> <li>5. Computers</li> </ol>   |
| <p>How did you know that sentence 3. was oil and gas?</p>   | <p>I was able to classify sentence 3 as oil and gas because it mentions bitumen, which is a thick, black, sticky form of petroleum that is often used for paving roads and waterproofing materials. Bitumen is a key component of the oil and gas industry, so the mention of it in the sentence indicated that it was related to this category. Is there anything else I can help with?</p> |

## So, What Can We Do with ChatGPT?

### TL;DR? How ChatGPT Summarized this Section

ChatGPT is a tool that is effective at a variety of language-related tasks, including translation, following terminology and style instructions, categorizing text into arbitrary taxonomies, and editing text. It has the potential to be disruptive in the localization industry, where it could potentially make current techniques and approaches obsolete. Further testing is needed to determine the capabilities of ChatGPT in various languages and specific contexts, especially at scale.

We've established in the first section that you can't rely on ChatGPT to say true things or to know what is correct or wrong. This reality creates challenges for content creators who would use it because they have to check whether or not it's talking nonsense. It remains our human job to decide what makes sense, what is true or false, and what we want to say. Making sense of the world is a challenging burden we, alone, bear.

However, once we have a text that contains meaning that we're happy with, the ability of ChatGPT to manipulate or transform the form and content of the text while retaining the encoded meaning is quite noteworthy.

This is an opportunity for those working in localization, as we don't have this problem of having to generate meaningful content from scratch. Our job is to analyze, transform, and improve existing content. Let's take a closer look at the localization activity landscape and how ChatGPT could affect what we're doing today.

### ChatGPT Helps with Translation

First and foremost, we translate content. ChatGPT is clearly very skilled at this task. As time passes, we will see how it performs in various languages. There is no doubt there will be gaps and idiosyncrasies, but for languages with large corpora, it is likely that ChatGPT would be on par with state-of-the-art engines for out-of-the-box Machine Translation output, if not superior.

### ChatGPT Helps with Terminology

Second, when we translate, we often have to use specific terms rather than others. We use glossaries and various terminology management techniques for this. We all know that managing terminology in the context of Machine Translation is not a solved problem. Various approaches exist, and they work differently in different contexts, but I can summarize them as follows:

- Either use techniques to perform glossary insertion as an add-on to the core Machine-Translation workflow, or
- Train your engine to use your terminology with specially curated content sets.

While these techniques (and hybrids thereof) work, by and large, the question of correct terminology use remains a major focus of quality control of translations. We know that both of these approaches either leave terminological quality gaps or require significant management of technology and corpora that limits the economic scenarios where this is appropriate. ChatGPT, on the other hand, as we've seen in a couple of scenarios above, seems to be quite effective at following terminological instructions.

### ChatGPT Helps with Style Guides

Third, it can also apply style instructions, either broadly (e.g., "write in informal style") or narrowly (e.g., "use the second plural when addressing the reader"). Getting Machine Translation engines to perform these types of tasks correctly is challenging. ChatGPT seems pretty good at it, and it's simple to do (more on that later).



### ChatGPT Helps with Content Classification

Fourth, it is quite good at categorizing things, particularly for text, to arbitrary taxonomies. This ability is beneficial for the localization industry, as we may want to apply specific instructions to certain types of content and other instructions to others. For instance, if the content is about X, then apply glossary Y, or if it's documentation, then use a formal style, and so on. We know that today, legacy Translation Memories (TMs) are fairly notorious for being overly undifferentiated with respect to their subject matter. This situation leads to us to rely on human judgment in context to make these decisions. Having a reliable way of automating these decisions would help.

### ChatGPT Helps with Post-Editing

Fifth, ChatGPT's sweet spot is editing given text. Editing, and more specifically post-editing in our case, is the bread and butter of quality localization. Editing consists of reviewing a translated text and ensuring four things:

1. That the translated text conveys the same meaning as the source text.
2. That it uses language correctly.
3. That the style and tone are appropriate.
4. That it uses the required terminology.

ChatGPT seems quite good at all these things.

### ChatGPT Helps with Content Analysis

And finally, we analyze text for effective processing, improvement, or ROI. Our goal in analyzing text is to anticipate or preempt translation quality issues, tune it for outcomes effectiveness like reach, SEO, CTA/CTR performance, and improve legibility at source and in the target, among others. ChatGPT's ability to analyze text and report clearly on its findings is also something we can use to filter out problem content or improve the translated content.



### ChatGPT Helps with Creating Working Code

There's another core capability of ChatGPT that we have not yet highlighted: It can write and edit code. You can tell it that you want a piece of code that does something that you can describe clearly, and it will follow through with the request. Elite programmers debate whether ChatGPT writes at their level, and it **appears not**. However, I gave it the following prompts for some content extraction code:



## Me (multiple prompts)

Write a python script to extract content from an xml file on local filesystem. The content to be extracted will be contained in the following XML tags. I will use curly brackets to give you additional special instructions in context {like this}.

These are the definitions of the tags where the content must be extracted from:

```
<maincontent>{extract any content inside any other tag}</maincontent>
```

Output the extracted content to a file called "content.txt"

---

Your script only extracts content in the first level of the maincontent tag. I need to extract content also from children tags.

---

With the script that you wrote, only the first part of the maincontent element content, before the secondlevel tag, is extracted. The second part of the maincontent element content, after the secondlevel tag, is not extracted.

---

This works. Still I'd prefer if I didn't have to cleanup the file after writing it, and just write it without empty lines the first time.

## ChatGPT (final output)

```
import xml.etree.ElementTree as ET
# Parse the XML file
tree = ET.parse('file.xml')
# Get the root element
root = tree.getroot()
# Open a new file in write mode
with open('content.txt', 'w') as f:
    # Find all 'maincontent' elements
    for maincontent in root.findall('maincontent'):
        # Iterate over all child elements of the 'maincontent' element
        for child in maincontent.iter():
            # Extract the content inside the child element
            content = child.text
            # Check if the content is not empty or consists only of
            # whitespace characters
            if content.strip():
                # Write the content to the file
                f.write(content)
                # Add a newline character after writing the content
                f.write("\n")
            # Check if the child element has a 'tail' attribute
            if child.tail is not None:
                # Extract the 'tail' attribute
                tail = child.tail
                # Check if the 'tail' attribute is not empty or consists
                # only of whitespace characters
                if tail.strip():
                    # Write the 'tail' attribute to the file
                    f.write(tail)
                    # Add a newline character after writing the 'tail'
                    # attribute
                    f.write("\n")
```

This script works and does what I asked it to do. I copied the code, put it in a .py file, created a toy XML file with sample content, and, running it, created a content.txt file with the correct content extracted. I ran it before each additional prompt, told ChatGPT what was wrong, and it gave me an

updated script. I'm not a coder, and no doubt there's a way to do the same in fewer lines, and I'm sure there would be bugs with complex files, but in a few minutes, I got it to do this simple job without having to type a single line of code.

Here is the input XML file and the corresponding output content.txt file:

| Me   | ChatGPT   |
|--|---|
| <pre>&lt;xml&gt; &lt;headerstuff&gt;This is a title that I don't want to extract&lt;/headerstuff&gt; &lt;maincontent&gt;This is content that I want. &lt;secondlevel&gt;This is second level content. &lt;/secondlevel&gt; This is also content that I want after the secondlevel tag. &lt;secondlevel&gt;This is another second level piece of content. &lt;/secondlevel&gt; And this is the last tail. &lt;/maincontent&gt; &lt;othercontent&gt;This is content in a tag that I don't want. &lt;/othercontent&gt; This is content that I don't want floating in the parent element. &lt;/xml&gt;</pre> | <p>This is content that I want.<br/>This is second level content.</p> <p>This is also content that I<br/>want after the secondlevel tag.<br/>This is another second level<br/>piece of content.</p> <p>And this is the last tail.</p> |

The code is nicely commented and ChatGPT clearly explains what the script does and will explain more if you ask (not represented here) It will also advise you on getting your code to run on your machine and so on. In other words, this makes creating working code and learning in the process within reach of far more non-coders than before.



### ChatGPT Will Specify New Skills and Practices

In this extended and meandering exercise that led me to share some findings in this whitepaper, I have developed the beginning of an understanding of what type of prompting ChatGPT requires to get a desired result. While I've been impressed with its ability to understand instructions in all language forms, from strict to vernacular, I often had to reformulate my prompts several times to get it to do what I wanted. Some of it is visible in my examples, but in other cases, it took me several tries to reformulate my prompt effectively before I could share an effective example here. This exercise led me to start understanding how to talk to ChatGPT. This special technology only takes natural language as input.

To use this technology in production to generate expected outcomes, we will need to develop expertise to prompt it effectively. Specific transformations of content will likely require successions of prompts that will each perform different tasks, cleanup, pre-and post-processing, and the like.

Figuring out how to use natural language prompts as part of our automation pipelines, in a way that is both contextually relevant and sufficiently predictable in the output, is likely to be an interesting journey. From now on, supervision of automation in production (not only during training) is no longer limited to evaluating and annotating the output. There will likely be cases where the supervision will be about supervising the input instead.

Will a succession of generic canned prompts work across a broad domain of content and tasks? How do we automatically define a natural language context for the prompts in a way that both performs the expected task while adapting to the context? Should each new project now include a new engineering or linguistic task where we tune the ChatGPT prompts for QA and post-editing? These are some of the hard questions that remain.



### Where Do We Go from Here?

ChatGPT can transform and annotate text on par with the average human editor and likely can perform these tasks more efficiently. ChatGPT has a breadth of abilities to perform tasks relying on a diversity of skills that virtually no individual human possesses, and it can generalize its knowledge to new situations. Most importantly, it shows potential for solving some lingering localization automation problems, such as automatic translation coupled with specific terminology and style requirements.

Of course, it's one thing to have a conversation with it and get it to do what we want on toy examples; it's another thing to imagine how to use it at scale to perform these actions. The hard part, as usual, is not having the ideas or doing the POC; it's turning technology into useful things that create value at scale.

Moving forward, we need to:

- Conduct real-world tests at scale to evaluate the error rate for each type of localization and editing task investigated here
- Analyze the detailed macro and micro user journeys occurring within the localization value

chains and identify where they are likely to be disrupted with this type of text automation

- Understand how to prompt and provide relevant context to ChatGPT at scale, document pitfalls and best practices
- Develop the new automation and human-in-the-loop editing workflows, inventing what post-editing and QA will mean tomorrow with such an AI in the loop
- Design new automation and User Experience (UX) interaction contexts for both localization agents and customers for each possible improvement opportunity
- Ensure that the economics of licenses, deployment costs, and maintenance makes sense for our business

We now definitively know we can't ignore this new type of technology and that it's likely to disrupt our industry. Doing the above is necessary to determine its real potential to generate value in our business.

As this tech becomes more and more ubiquitous, as tech is wont to do, our customers and vendors will use it. We must lead and drive that push to language automation, lest we get left behind.



## Some Thoughts About Language and Real-World Usage of ChatGPT

One of the things that I found most striking about this whole exercise was how it got complex number operations almost right but wrong. This example proves that ChatGPT doesn't cheat. It really learns everything from the language it trains on. It doesn't trigger a calculator when it detects that it needs to calculate something. It does have some notion of numbers, but it learned it just from reading language, so it remains fuzzy beyond the most basic calculations.

The fact that it can find almost the correct result of an operation beyond a certain order of magnitude (and the correct result for smaller numbers) tells us that a language corpus of a sufficient scale contains statistically significant knowledge about the real world.

It's good enough to estimate the results of operations. But it also shows that **dedicated formal systems (such as mathematics)** are also required to produce meaningful, reliable, and accurate information about the real world.

Its ability to produce proper reasoning explanations but without being able to apply them properly also illustrates this idea.

The way ChatGPT operates tells us some things about language and the role it plays in producing knowledge:

- **Language carries, in and of itself, most of the sense humans make of the world.** The mere self-consistency of language is a semi-formal meaning-generation machine. This reality is why ChatGPT can, given content, modify it at will while keeping the same level of

sense-making but cannot reliably produce new and true knowledge. This situation reminds me of superstition: The creation of self-consistent patterns that one can use to create the impression of knowledge but untethered from the control of reality.

- **Conversely, to establish the truth, the anchoring of language to formal subsystems that compute defined symbols and real-world objects that exist independently of language syntax and semantics is necessary.** The ultimate arbiter of truth is reality itself; language is a layer of meaning manipulation and communication on top of it. Proper and logical language can generate very convincing pseudo-self-consistent nonsense.
- **It reminds us that while truth is a property of the real world,** meaning is something we generate in our heads; it's a property of our broader cognitive and sensory apparatus, not of the language itself.

We live in an era where we often hear the idea that we create the world with our minds through language and culture. At the same time, the other side of the superstitious spectrum suggests that we can create generalized synthetic intelligence and conscious machines that understand the world just by using neural networks and language models.

It's a sobering reminder that a self-referential, self-consistent system cannot in and of itself carry the truth of the world, which exists independently. This echoes Gödel's incompleteness theorem. As conscious beings, we cannot untether our cognition from formal and material systems that ground our understanding of the world in a reality that imposes itself on us and that we cannot define away. ChatGPT does not solve that mystery; the Singularity eludes us still.





## About Lionbridge

Lionbridge partners with brands to break barriers and build bridges all over the world. For 25+ years, we have helped companies connect with their global customers and employees by delivering translation and localization solutions in 350+ languages. Through our world-class platform, we orchestrate a network of passionate experts across the globe who partner with brands to create culturally rich experiences. Relentless in our love of linguistics, we use the best of human and machine intelligence to forge understanding that resonates with our customers' customers. Based in Waltham, Massachusetts, Lionbridge maintains solution centers in 23 countries.



LEARN MORE AT  
**LIONBRIDGE.COM**



**LIONBRIDGE**

© 2023 Lionbridge. All Rights Reserved.

