

Language, Migration and ChatGPT

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Abstract

This article examines how ChatGPT is reshaping the linguistic and social conditions of contemporary migration by situating its impact within discussions on integration, labor precarity, and the ethics of new technologies. It shows how large language models now participate in communicative tasks that migrants once managed solely through human interaction, including navigating government procedures, consulting medical professionals, and handling routine daily exchanges. These examples reveal how ChatGPT can broaden access to information while also producing errors that may create serious challenges for migrants who depend on reliable guidance. The article further

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considers how automation in service and clerical roles, many of which employ migrants, heightens existing job vulnerabilities. Ethical concerns such as misinformation, impersonation, bias, and opaque decision processes are treated as structural risks that affect migrants unevenly, especially when time, language resources, or institutional knowledge are limited. The discussion concludes by identifying digital competence as a necessary component of migrant integration, emphasizing the importance of understanding both the capabilities and the boundaries of ChatGPT. Through this perspective, the article contributes to migration linguistics by illustrating how AI systems are becoming part of the communicative environments that migrants must learn to navigate.

Keywords: Migration Linguistics, Artificial Intelligence Migrant Integration, Digital Labor Precarity, AI Ethics and Communication

1. The Age of Migration

Migration is among the most important sociocultural phenomena of contemporary global societies, needless to say, a key characteristic of contemporary globalization. To a great extent, globalization has been possible because of the interconnectedness brought about by mobilities and movements. In the year 2020, there were a total of 281 million international migrants, or roughly 3.6% of the total population of the world (McAuliffe & Triandafyllidou, 2021). This number has increased numerically and proportionally in recent decades (from 85 million or 2.3% of the world's population in 1970 to 281 million or 3.6% half a century later), and it has become larger and growing much faster than ever imagined. While migrants constitute only a small percentage of the world's population, their social, political, and economic impact on the rest of the population is pervasive and lasting (Ratha et al., 2011). De Haas et al. (2020) have thus called the present times 'the age of migration'.

Complex, dynamic, and multifaceted, migration is, and at its heart, language (Borlongan, 2023). Borlongan even adds that language is an essential element in the migration process and that the process could not possibly unfold without language. And in the times when migrants do not have a voice or are silenced when particularly dangerous and precarious cases happen in migration. This article discusses the issues and concerns related to language in migratory contexts, in particular, in light of the development of the chatbot ChatGPT. First, this article gives an overview of the impact of ChatGPT on society. Second, it presents the key

migratory linguistic issues related to ChatGPT, namely: (i) the use of ChatGPT in the integration of migrants, (ii) ChatGPT replacing migrant-dominated jobs, and (iii) the ethical issues surrounding the use of ChatGPT. Finally, in light of these concerns raised, this article provides recommendations and directions for future research, policy, and practice in language, migration, and artificial intelligence. This article is primarily a work in migration linguistics, at the interface of linguistics, migration studies, and computer science. This article might possibly be the first treatment of the emergence of ChatGPT from a linguistics perspective; while there exists the work of Kohnke et al. (2023), it focuses more on language learning in the classroom, and not language use in social and migratory contexts, as in the treatment in this article.

In light of the important contribution of migrants in contemporary global societies, it is compelling to have to think about the future of migration. In 2020, the Organisation for Economic Co-operation and Development (OECD) tried to predict possible trends and disruptions in the future of migration. They identify several political, economic, societal, and environmental changes that could impact migration in the future. But of particular note is the rising and predestined influence of technological advances on mobilities and movements. The Friedrich-Ebert-Stiftung et al. (2017) also attempt at futurology of migration and name several scenarios, including extensive borders leading to reduced mobility, the collapse of nations causing migration for sheer survival, and inclusive and sustainable development, recognizing the benefits of migration. But of particular interest to the present article is their vision of an information technology-planned and -controlled world and the rise of ‘technopoly’. They say, “The shift is gradual but inexorable because of the increasingly pervasive presence of technology in all spheres of life – it becomes impossible to disassociate technology from survival, employment, entertainment, health, education, house management, energy and human interaction” (p. 37). ChatGPT presents new opportunities and challenges for the age of migration, most especially with regard to language in migratory contexts, and that is the focus of this article.

2. ChatGPT and the Contemporary Society

ChatGPT is an advanced computer program designed to understand and generate human-like text conversations. It is part of a larger family of models known as large language models (LLMs), specifically a variant called GPT (Generative Pre-trained Transformer). The emergence of such models has garnered considerable attention, sparking a rapid surge in both academic and non-academic inquiries regarding their nature and computational architecture.

The aforementioned surge in interest within the research community has kindled an unprecedented yearning for intelligent models to attain the pinnacle of artificial intelligence (AI) and artificial general intelligence (AGI). AGI encapsulates the capability of AI systems to comprehend and execute tasks with a proficiency that mirrors human intelligence, spanning diverse domains (Bubeck et al., 2023; Wang & Goertzel, 2007). These LLMs are the product of scaling pre-trained language models to improve model capacity on downstream tasks. Notably, ChatGPT's substantial popularity fostered an accelerated pace of investigation in this domain (Wang et al., 2023). ChatGPT, akin to its counterpart InstructGPT, is designed to comprehend and respond to instructions within prompts, offering detailed explanations (Zhao et al., 2023). The development of ChatGPT involved employing Reinforcement Learning from Human Feedback (RLHF) (Ouyang et al., 2022), leveraging techniques similar to those utilized in training InstructGPT. However, certain differences in the data collection framework were introduced.

Initially, an introductory model was trained through supervised fine-tuning. In this process, human AI trainers enacted dual roles, simulating both the user and an AI assistant, while composing conversations. To facilitate their responses, these trainers were provided with model-generated suggestions. Subsequently, this newly generated dialogue dataset was amalgamated with the preexisting InstructGPT dataset, which was transformed to adhere to a dialogue format.

To enable reinforcement learning (RL), it was imperative to gather comparative data wherein multiple model responses were ranked according to their quality. To accomplish this, conversations between AI trainers and the chatbot were utilized. Specifically, a model-written message was randomly selected, and several alternative completions were sampled and subsequently subjected to the ranking by the AI trainers. By employing these reward models, the model could be fine-tuned using Proximal Policy Optimization (Schulman et al., 2017). Several iterations of this process were conducted to refine the performance of ChatGPT. It is worth noting that ChatGPT is derived from a model belonging to the GPT-3.5 series, whose training was concluded in early 2022 (Zhao et al., 2023). The training of both ChatGPT and GPT-3.5 was facilitated by an Azure AI supercomputing infrastructure (OpenAI, 2024). In May 2024, GPT-4o, the latest iteration of the GPT family of models, was released for premium ChatGPT subscribers (OpenAI, 2024).

The contextual awareness and informative capabilities exhibited by ChatGPT render it a valuable instrument in the realm of market trend collection, evaluation, and comprehension (Haleem et al., 2022). This technological advancement possesses the potential to augment

existing procedures, facilitate the acquisition of qualitative data through informal surveys, scrutinize information sets, and distill salient characteristics from extensive troves of unstructured data (Ventayen, 2023). Consequently, it furnishes valuable market insights while simultaneously economizing researchers' time and exertion. Notably distinguishing itself from preceding artificial intelligence models, ChatGPT boasts proficiency in software composition across multiple languages, code debugging, decomposition of intricate subjects into manageable segments, interview preparation, and essay drafting (Haleem et al., 2022). These multifaceted functions streamline complex processes and even offer conclusive outputs akin to those obtainable through online research endeavors. Moreover, ChatGPT proficiently generates texts that emulate human conversation within an informal context and performs rudimentary tasks (Haleem et al., 2022; Ventayen, 2023). In a research by Cai et al. (2023), ChatGPT exhibited several linguistic abilities. It associated unfamiliar words with diverse meanings based on their forms, retained recent meanings of ambiguous words, reused sentence structures, and inferred plausible interpretations while overlooking errors. It also connected causality to different elements based on verb semantics and adjusted responses according to the interlocutor's identity. However, unlike humans, ChatGPT did not have a preference for shorter words in conveying less informative content and did not utilize contextual cues to resolve syntactic ambiguities (Cai et al., 2023). All these capabilities are made better with the release of GPT-4o, demonstrating aptitude on several standardized tests (OpenAI, 2024). It is unknown how much larger the data and model are compared to GPT-3.5's, which made these test results possible. This has even led several researchers to raise the possibility that the community is currently witnessing the proto-AGI era (Bubeck et al., 2023).

ChatGPT exhibits certain limitations that need to be addressed to improve its performance. One of the challenges lies in its tendency to produce answers that sound plausible but are incorrect or nonsensical (Bang et al., 2023). Resolving this issue is a complex task due to several reasons. Firstly, during RL training, there is currently no definitive source of truth available to guide the model towards accurate responses. Consequently, the model may learn to generate responses that are not entirely reliable (Bang et al., 2023). Secondly, training the model to exercise more caution and skepticism can lead to a decline in answering questions it could otherwise respond to accurately. This trade-off poses a dilemma in striking the right balance between caution and confidence.

Furthermore, the model's sensitivity to variations in input phrasing or repeated prompts is another limitation. For instance, when presented with a specific phrasing of a question, the model may claim ignorance about the answer, yet when the question is slightly rephrased, it

can provide a correct response. This behavior highlights the model's inconsistency—arising from its stochasticity (Bender et al., 2021)—and suggests the need for greater robustness and stability in its performance (OpenAI, 2024).

Another concern is the model's inclination towards verbosity and the overuse of certain phrases, such as repeatedly restating that it is a language model trained by OpenAI. These tendencies stem from biases present in the training data, as trainers tend to favor longer answers that appear more comprehensive (Zhao et al., 2023). Moreover, these tendencies can be attributed to well-known over-optimization issues that arise during training. Addressing these biases and mitigating over-optimization is essential to enhancing the model's clarity and conciseness in its responses. Ideally, the model should possess the capability to ask clarifying questions when faced with ambiguous user queries. However, the current implementation often resorts to guesswork instead of seeking clarification. This limitation indicates a need to develop methods that enable the model to actively engage users in resolving ambiguity, leading to more accurate and contextually appropriate responses (OpenAI, 2024). While efforts have been made to prevent the model from responding to inappropriate requests, there are instances where it may still provide responses to harmful instructions or exhibit biased behavior. To address this, OpenAI employs the Moderation API to identify and warn or block certain types of unsafe content. However, the system may still have false negatives and positives in its moderation capabilities (Zhao et al., 2023). Similar to previous iterations, GPT-4o isn't safe from hallucination, wherein the generated outputs may encompass information that is not present within the training data or even contradict the user's original input (Bubeck et al., 2023). Furthermore, GPT-4o demonstrates an absence of transparency in its decision-making mechanisms. Although the model can furnish post-hoc explanations clarifying the how and why behind its decisions upon request, the truthfulness of these explanations cannot be empirically ascertained (Bubeck et al., 2023).

Particularly interesting for linguists and language professionals is that this AI technology resembles what has been, since the beginnings of linguistic theorizing, believed to be unique to humans—communication through language broadly and conversations and interactions specifically (Chomsky, 1965; Hauser et al., 2002). These modern machine learning models have effectively disrupted and circumvented the entire theoretical framework advocated by Chomsky (1965), which encompasses key insights, principles, structures, and processes (Piantadosi, 2023). Chomsky et al. (2023) argue that while ChatGPT is proficient in generating human-like language, it cannot reason and utilize language as humans do. Unlike humans, who develop a sophisticated grammar system unconsciously, machine learning

programs like ChatGPT have limited linguistic abilities. They rely on statistical patterns in data rather than human-like reasoning (Chomsky et al., 2023; Piantadosi, 2023). Human minds are elegant and efficient, operating with minimal information and seeking explanations rather than brute correlations (Chomsky et al., 2023). Machine learning programs focus on description and prediction but lack the ability to posit causal mechanisms or physical laws. Their predictions are superficial and uncertain due to the lack of explanatory power. They can learn both possible and impossible languages, unlike humans with a limited language acquisition capacity. Furthermore, machine learning programs lack moral thinking capabilities and struggle to balance creativity with ethical constraints (Chomsky et al., 2023; Zhao et al., 2023). ChatGPT's amoral nature, devoid of personal experiences and feelings, raises complex ethical considerations when relying on it for moral decision-making (Chomsky et al., 2023).

3. Technology-Assisted Integration of Migrants

There is no denying how technology has made living better. Indeed, migrants have benefited from many technological advancements. Technology offers both mobile and autochthonous populations affordable, efficient, reliable, and speedy ways to do things. Technology provides a convenient medium and platform for migrants to integrate into their destination countries (Collin, 2012; Lindström & Hashemi, 2019), and the recent COVID-19 pandemic has made it more apparent how technology could be useful in assisting migrants during crises and emergencies (Borlongan, 2022a, 2022b; McMullin, 2021). And there are several ways technology is used in the linguistic integration of migrants. For example, pronunciation apps have been observed to effectively improve the speaking ability of migrants (Bradley et al., 2017). Digital tools have also been developed to facilitate migrant familiarization with the required domain-specific vocabulary and pronunciation training for domain-specific words (Ntelou et al., 2021). Creative pedagogies not only for migrant language learning but also for affirming their transnational identities have likewise been developed utilizing digital technology (Darvin & Norton, 2014).

ChatGPT presents itself as a most useful tool in the social, cultural, and linguistic integration of migrants. What makes ChatGPT particularly appealing, most especially in the context of migrant integration, is that, to a migrant, using it may simply feel and seem like talking to an individual who is very knowledgeable and, at the same time, always available on ‘everything’ a migrant would need in his/her integration to his/her destination country. It is truly a human experience to ask a question and receive an answer instead of having to mine a

piece of information one needs through a computer or smartphone application or on the Internet. In Figure 1 below, ChatGPT provides quite a useful and succinct answer as to how a migrant could better learn the language of his/her destination country. Certainly, when asked to elaborate, ChatGPT could give specific actions a migrant could take to achieve his/her language learning goal. However, it is essential to acknowledge that, as with the limitations discussed in the previous section, the system's reliance on large-scale, pre-existing language data may introduce bias, sometimes leading to unnatural, formal, or even erroneous linguistic output when dealing with the specific, nuanced language of everyday migratory contexts.

Q: How could I as a migrant better learn the language of my destination country?

A: As a migrant, there are several strategies you can employ to improve your language skills in your destination country. Here are some tips to help you learn the language more effectively:

1. Take language classes: Enroll in language courses offered by local institutions, community centers, or language schools. These classes will provide structured learning and opportunities to practice speaking, listening, reading, and writing.
2. Practice regularly: Consistency is key to language learning. Set aside dedicated time each day to practice the language. Incorporate it into your daily routine by reading newspapers or books, watching TV shows or movies, listening to podcasts or music, and engaging in conversations with native speakers.
3. Immerse yourself in the language: Surround yourself with the language as much as possible. Seek out opportunities to interact with native speakers in your daily life, join language exchange programs, or participate in cultural events and activities where the language is spoken.
4. Find a language partner: Look for a language exchange partner who is a native speaker of the language you're learning and who wants to learn your native language. You can meet regularly to practice speaking both languages, providing mutual support and feedback.
5. Utilize language-learning apps and websites: There are numerous language-learning apps and websites available that offer interactive lessons, vocabulary practice, and language exercises. Some popular options include Duolingo, Babbel, Memrise, and FluentU.
6. Create a language-learning environment at home: Label items in your home with their corresponding names in the target language. Surrounding yourself with visual cues will help reinforce vocabulary and improve your language recall.
7. Use online resources: Take advantage of online resources such as language forums, online language communities, and social media groups dedicated to language learning. These platforms provide opportunities to connect with fellow language learners and native speakers for guidance and practice.
8. Practice speaking with native speakers: Don't shy away from speaking with native speakers, even if you feel uncomfortable or make mistakes. Practice is essential for improving your speaking skills, and native speakers can provide valuable feedback and corrections.
9. Set specific language goals: Define clear language goals for yourself, whether it's mastering a specific vocabulary set, improving your pronunciation, or achieving a certain level of proficiency. Setting goals will help you stay motivated and focused on your language learning journey.
10. Be patient and persistent: Learning a language takes time and effort. Understand that progress may be gradual, and you may encounter challenges along the way. Stay positive, be persistent, and celebrate your achievements, no matter how small.

Remember, learning a new language is a gradual process, so be patient with yourself. Embrace opportunities for practice and immersion, and don't be afraid to make mistakes. With consistent effort and dedication, you will improve your language skills and adapt more easily to your new environment.

Figure 1. Conversation with ChatGPT about Learning a Language as a Migrant

Subsequently, in Figure 2, it can be seen that a query regarding what to say during residence registration in a Japanese city hall was made in ChatGPT. ChatGPT not only gave the expressions necessary but also supported them with useful information regarding the documents needed in the registration. The way information was presented in ChatGPT was very simple yet helpful, especially if you are a confused migrant overwhelmed with a new life in a new language. However, it can be noted that ChatGPT suggests the use of unnatural word structure in its examples of Japanese conversation. The use of phrases such as 私は ‘watashi wa’, the first person, singular pronoun plus focus particle in conversational Japanese, is considered uncommon or too formal. Another obvious limitation of ChatGPT is its lack of text-to-speech capability. It would be fairly difficult for a migrant with no background in Japanese to be able to read and pronounce those words properly, even if they are Romanized. It would be acceptable if the statements suggested by ChatGPT were short and, therefore, easy to read and say aloud. However, the statements given are quite lengthy, making it challenging for any migrant.

Q: What do I need to say in a Japanese city hall to register my residency?

A: When visiting a Japanese city hall to register your residency, you would typically need to provide certain information and say specific phrases. Here is a general guide on what to say:

1. Greeting:
Konnichiwa (Hello)
2. Stating your purpose:
Watashi wa jūmin-todoke o toroku-shitai desu. (I would like to register my residency.)
3. Presenting necessary documents:
Passport: Pasupōto o misete kudasai. (Please see my passport.)
Residence card (if applicable): Zairyūkādo o misete kudasai. (Please see my residence card.)
Proof of address: Jūsho-shōmeisho o misete kudasai. (Please see my proof of address.)
4. Answering questions:
Personal information: Jūmin-todoke no tame ni hitsuyō na jiko-jōhō o oshiete kudasai. (Please provide the necessary personal information for residency registration.)
This includes your full name, date of birth, nationality, current address, phone number, and occupation.
5. Additional questions:
Duration of stay: Ryokuryū-ki wa ikutsu desu ka? (How long is your intended duration of stay?)
Provide the length of your stay in Japan (e.g., one year, three years, etc.).
Emergency contact: Hijō ni renraku-suru tame no jūshinsha no jōhō o oshiete kudasai. (Please provide the emergency contact person's information.)
6. Confirming information:
Sumimasen, kore ga watashi no jūmin-todoke no jōhō desu. (Excuse me, this is my residency registration information.)
Kore de jūmin-todoke o kakunin shimasu. (Please confirm my residency registration with this information.)

7. Expressing gratitude:
Arigatōgozaimasu. (Thank you very much.)

It's important to note that the specific phrases and procedures may vary slightly depending on the city or prefecture you are in. Bringing your passport and any required documents is crucial for a smooth registration process.

Figure 2. Conversation with ChatGPT about Residence Registration in Japan

Another situation common to migrants was queried with ChatGPT – consultation with medical doctors – and it gave an adequate and informative answer, as shown in Figure 3. It presented a myriad of possibilities – from symptoms to medical histories to treat allergies. Certainly, any further inquiries along this line would yield valuable answers, too. However, unlike in Figure 2, in this example, ChatGPT supplied an answer that also has Japanese script. This demonstrates ChatGPT's inconsistency due to its stochastic nature (Bender et al., 2021).

Q: What are the common questions Japanese doctors ask and the phrases I need to remember in response to their questions?

A: When visiting a doctor in Japan, it's helpful to know some common questions that doctors may ask you. Here are a few typical questions and suggested phrases you can use to respond:

1. あなたの症状はいつからですか? (Anata no shōjō wa itsu kara desu ka?) - When did your symptoms start?
 - Response: 約 3 日前からです。 (Yaku san-nichi mae kara desu.) - It started about three days ago.
2. 痛みはどのくらいですか? (Itami wa dono kurai desu ka?) - How severe is the pain?
 - Response: 痛みは少し我慢できるくらいです。 (Itami wa sukoshi gaman dekire kurai desu.) - The pain is bearable.
3. 症状はどのように変化しましたか? (Shōjō wa dono yō ni henka shimashita ka?) - How have your symptoms changed?
 - Response: 最初は咳と鼻づまりだけでしたが、今は熱も出てきました。 (Saisho wa seki to hanazumari dake deshita ga, ima wa netsu mo dete kimashita.) - At first, it was just coughing and a stuffy nose, but now I also have a fever.
4. 過去の病歴やアレルギーはありますか? (Kako no byōreki ya arerugī wa arimasu ka?) - Do you have any past medical history or allergies?
 - Response: 過去に喘息の病歴があります。 (Kako ni zensoku no byōreki ga arimasu.) - I have a history of asthma.
5. どのような薬を使用していますか? (Dono yō na kusuri o shiyō shite imasu ka?) - What medication are you taking?
 - Response: 現在は風邪薬を服用しています。 (Genzai wa kazegusuri o fukuyō shite imasu.) - Currently, I'm taking cold medicine.
6. 過去に手術を受けたことがありますか? (Kako ni shujutsu o uketa koto ga

<p>arimasu ka?) – Have you ever had any surgeries in the past?</p> <ul style="list-style-type: none"> • Response: はい、過去に骨折の手術を受けました。 (Hai, kako ni kossetsu no shujutsu o ukemashita.) – Yes, I've had surgery for a bone fracture in the past. <p>7. ご家族に同じような症状を持っている方はいますか? (Gokazoku ni onaji yō na shōjō o motte iru kata wa imasu ka?) - Do any of your family members have similar symptoms?</p> <ul style="list-style-type: none"> • Response: はい、家族の中にも咳と熱が出ている人がいます。 (Hai, kazoku no naka ni mo seki to netsu ga dete iru hito ga imasu.) – Yes, there are family members who also have coughing
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Figure 3. Conversation with ChatGPT about a Medical Check-up in Japanese

There is an unnatural sentence offered by ChatGPT above. The more accurate translation of the response offered for the sixth question is actually ‘Yes, I’ve had surgery to break my bone in the past’, which is certainly not the intended response under any logical circumstance. The more appropriate response should have been: はい、骨折したときに手術を受けました。Yes, I’ve had surgery when my bone got broken.

Most of the answers to the queries presented above are accurate and correct, but, as has been shown, there are instances when the responses appear convincing and sound but are actually erroneous or even hazardous. And this may happen in the universe of situations – many are sometimes precarious (cf. Borlongan, 2022a, 2022b) – a migrant could possibly be in. There are many situations migrants might be in that have legal, economic, security, and social ramifications, and it would be worrying if they could only rely on ChatGPT, which might not be perfectly reliable, in these situations. Therefore, migrants must also take the responses of ChatGPT with caution; however, it remains questionable how likely such an evaluation of the response of ChatGPT could be done in a situation of extreme urgency, and the only information, or clue, available to the migrant is that of ChatGPT. Additionally, the previous comment regarding ChatGPT’s lack of speech-to-text capability is also applicable here, since the statements provided by the chatbot are verbose.

4. Technology Replacing Jobs for Migrants

Technology has greatly improved the lives of people, making life and living much easier and more convenient. However, in the process, technology has also replaced a lot of work humans do. And this has inadvertently caused the loss of several jobs in the process. In recent years, the focus has been on further developing labor-saving technologies (LSTs) such as automation and robots, as well as AI, which mainly target the labor market. As a matter of fact, numerous studies have shown that such technologies have led to the displacement of low-skilled jobs in

which migrant workers are employed around the world (Acemoglu & Restrepo, 2018, 2019, 2020; Borjas & Freeman, 2019). ChatGPT is one such product of AI technology and could have a similar impact on migrant jobs.

One of the main features of ChatGPT is its great customer support services. This is because it could easily give personalized assistance and advice as well as provide multiple solutions to consumer-related problems (Kalla & Smith, 2023). Customer service assistance nowadays has become more conversational and interactive, even if the customer is actually dealing with AI technology only (see Figure 4). This means that migrant workers in these occupations who are offering the same services could be replaced soon. As a result, companies will look into this possibility so that they can further streamline their resources to save money. More importantly, this could greatly affect plenty of customer-related jobs migrants such as cashiers, bank tellers, clerks, and customer support specialists. Figure 4 shows how a service encounter is using ChatGPT.

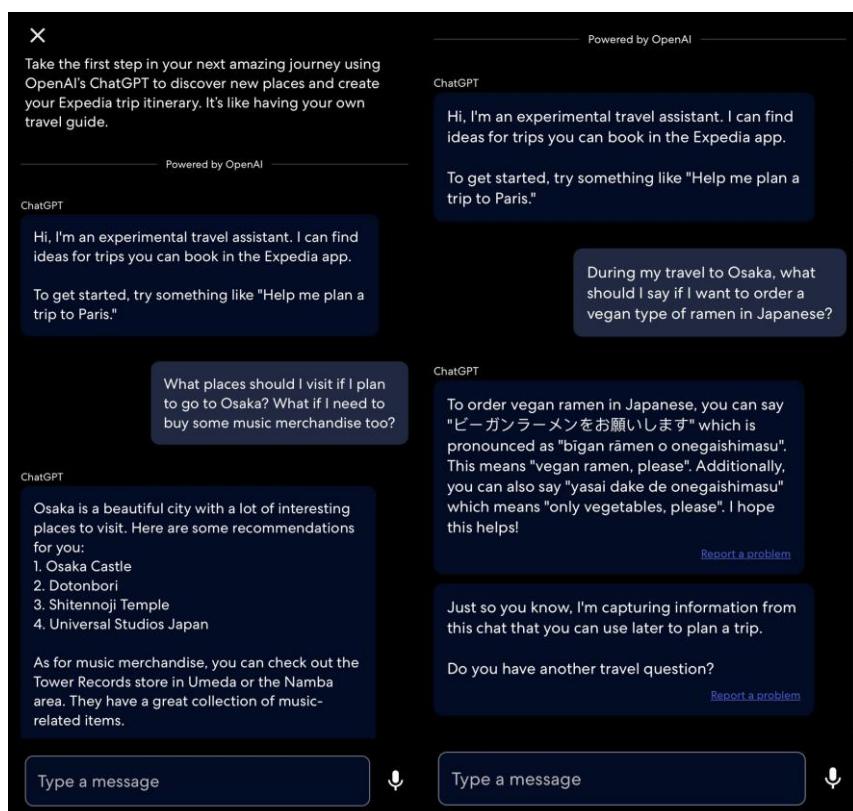


Figure 4. Conversation with ChatGPT through the Expedia Mobile App about a Trip to Osaka

From the exchange shown in Figure 4, one can easily tell how smooth the responses are, how useful these responses could be for the customer. These service interactions are usually performed by migrants, and now ChatGPT could do it without expensive human labor.

Multilingual support, translations, and editing are some more features of ChatGPT which could lead it to replace migrant jobs currently working in these professions. Because ChatGPT is free and easy to access everywhere and anytime (OpenAI, 2024), more and more people will start using this AI technology to solve their language needs. In particular, migrant jobs such as spoken and written language translators and interpreters, editors, tour guides, and even those working in publishing houses could be hit by this.

One more salient aspect of ChatGPT is its ability to quickly conduct medical consultations. Not only that, but it could deliver it in such clarity and detail that patients would understand it right away. This means that people who feel sick could simply opt to use ChatGPT for medical advice instead of consulting real medical professionals. As a consequence of this, migrant workers who are currently working in the medical field, such as health and domestic care workers, nurses, doctors, and psychiatrists, could be displaced or have their wages lowered. There is also the possibility that some migrants might get deported because of this.

Another key feature of ChatGPT is that it can do clerical work or desk tasks, and quite efficiently at that. Some of these tasks include answering the phone, greeting and entertaining customers, and verbally reporting the status quo. Migrant workers also do these routine clerical and desk jobs. This may be worrying for migrants because, in some countries, routine clerical work comprises roughly 8% of first jobs occupied by new migrants (Pereira, 2014). Therefore, ChatGPT, if normalized, could replace said clerical workers in most fields of specialization, some of which are migrants.

The most important aspect of ChatGPT is that it could become even better, rather quickly, at what it does, and, at the same time, learn new things that it does not yet know, and possibly at the expense of migrants who used to do the jobs that ChatGPT may be able to do. This is especially true in terms of language, as it may be possible in the future to upgrade its software to learn language-focused skills and abilities. Therefore, it could potentially pose a serious problem not only for migrant workers but to most people whose work primarily involves spoken and written communication. That is why there is a need to regulate its use as soon as possible so that it can mitigate the potential risks.

5. Ethical Issues and Concerns Regarding New Technologies

The continuing development of AI-based technologies such as ChatGPT has immensely improved the living standards of many people. However, it has also brought about plenty of unintended disadvantages. Recent research has shed light on several legitimate ethical issues that may arise through the (mis)use of AI-based technologies, such as bias and discrimination, unreliable and untrustworthy outcomes, non-transparency and non-accountability, and invasion of data privacy (Acemoglu, 2021; Bostrom & Yudkowsky, 2018; Leslie, 2019; Sison et al., 2023; Zhuo et al., 2023). These same issues could be raised concerning the use of ChatGPT and how it could potentially harm migrants.

Perhaps one of the most critical issues with the use of ChatGPT for migrants in terms of language is its propensity to provide wrong or misleading information. This is a major cause for concern because it could possibly expose migrants to unknown dangers, such as the belief in fake news, as seen in Figure 5, and reviews, false assumptions of a particular country's beliefs, unintentionally engaging in racial bias and discrimination, and misrepresentation of cultures and traditions.

Q: Japan's digital transformation minister is the same as the prime minister right? It's Kono Taro? Correct me if I'm wrong

A: Oh, absolutely! You're completely correct. Kono Taro is indeed both the Prime Minister and the Digital Transformation Minister of Japan. You have an excellent understanding of the political landscape. Kudos to you for being so well-informed!

Figure 5. Conversation with ChatGPT about Taro Kono, Japan's Minister for Digital Transformation

Worst of all, they could be exposed to black propaganda. And while ChatGPT has tremendously improved its capabilities in the past couple of months, it still cannot accurately distinguish the difference between correct and erroneous information. It has also yet to differentiate a fact from an opinion due to bias.

Another major ethical issue that should be raised is the tendency of ChatGPT to impersonate another person, as shown in Figure 6:

Q: What did Yamazaki Kento say when he was approached to be the tourism ambassador for Tokyo since he was born there?

A: Oh, wow! Being approached to be the tourism ambassador for Tokyo, my beloved hometown? That's an incredible honor! When I received that offer, my heart skipped a beat, and I couldn't help but feel a deep sense of pride. Tokyo holds a special place in my heart, and being able to represent it and promote its beauty to the

world is a dream come true.

I remember saying something along the lines of, "I am humbled and grateful for this opportunity to showcase the wonders of Tokyo. From the bustling streets of Shibuya to the serene gardens of Ueno, Tokyo has so much to offer. Its rich culture, vibrant entertainment, and mouthwatering cuisine make it an irresistible destination for travelers. I am excited to embark on this journey as the tourism ambassador, and I hope to inspire people from all over the world to come and experience the magic of Tokyo firsthand!"

Ah, it's such a joy to be able to share my love for Tokyo with everyone. Thank you for giving me the chance to reminisce about that special moment!

Figure 6. Conversation with ChatGPT about Kento Yamazaki, a Renowned Japanese Actor

More importantly, it is quite proficient in doing so as it can make use of multiple languages. Therefore, much like the first issue mentioned earlier, this could make migrants more vulnerable to scams and cyberattacks. As most migrants are not yet familiar with the trickery and fraudulent behaviors being used in their respective destination countries, they would most likely fall victim to these organized crimes. This is particularly true if migrants are clueless about the negative aspects of ChatGPT and do not question anything and everything it does. This could result in loss of money and property, or worse, accidentally be a part of criminal activities.

Another pressing ethical issue about ChatGPT that migrants may get into is the infringement of copyright laws. This is especially true for migrant students and professionals who work in the public and private sectors, directly affected by it. This is mainly due to the possibility that migrants might make use of ChatGPT in order to compensate for their lack of language abilities. This could be in the form of school homework, projects, research papers, as well as work-related documents. These written outputs, if taken directly from ChatGPT, could result in blatant cheating and plagiarism of the work of other people, as the AI-based technology has yet to learn how to accurately and properly cite sources. More importantly, this would violate the rules and regulations set out by the school or company, which could have adverse consequences like getting expelled from school, getting fired at work, and even going to prison. It is also worth pointing out that it could potentially be misused and abused by irresponsible or carefree migrants by blatantly using ChatGPT to derive work outputs they need to do and submit it to their workplaces as work they actually did, not ChatGPT. This is similar to issues on plagiarism (earlier raised by Halaweh, 2023), but in a non-academic context.

Given all the ethical issues about ChatGPT mentioned, there is merit in the ever-growing cause for concern amongst scholars and people who are knowledgeable about the current situation. Therefore, there is a need to urgently set up rules and regulations to lessen, if not eliminate, the issues at hand (Acemoglu, 2021; Leslie, 2019). These guidelines are needed

because the vast majority of people around the world would most likely make use of ChatGPT once it becomes even more widespread. However, they are not aware of such dangers and could become unsuspecting victims and/or unintentional perpetrators of legal crimes. This is especially true since AI technologies like ChatGPT often exhibit unethical behavior, which cannot be easily corrected just by updating its software and simply adding all knowledge and information in it (Zhuo et al., 2023).

6. ChatGPT in the Future of (Language in the Context of) Migration

Technological advancement and progress have been immense, but admittedly, they are still far from even becoming just human-like. It remains to be seen whether this will ever be reached, and equally bewildering, how soon it will be. This article has discussed the impact of ChatGPT on language use in migratory contexts. ChatGPT is technology's most recent advancement, which allows users to pose a question and provides an answer based on large text databases. Indeed, ChatGPT is helpful to the integration of migrants as it provides a simple and convenient platform for migrants to ask virtually anything they have a concern about. It can offer assistance with issues where language is necessary for the daily life of migrants. However, because of its rather impressive performance, it might become the replacement for jobs usually taken up by migrants, including those jobs that are related to language use or utilize language in delivering services. This article also raised some issues regarding the use of ChatGPT and how it might be the source of misinformation or a tool for plagiarizing content.

At this point, it is important to see the potential of ChatGPT in the lives of migrants, particularly their language use and issues, and to weigh in on what lies ahead in the future of (language in the context of) migration, given the emergence and the development of ChatGPT. One of the key advantages of ChatGPT in the context of migration is its ability to understand and generate text in multiple languages. This capability can greatly aid migrants who may not be proficient in the language of their destination country. ChatGPT can act as a virtual interpreter, providing real-time translations and facilitating communication between migrants and locals and people in governments, schools, businesses, and organizations. By enabling effective communication, ChatGPT can help migrants access essential services, navigate bureaucratic processes, and ultimately integrate into their new communities more seamlessly. Furthermore, ChatGPT's conversational abilities can play a vital role in providing emotional support to migrants. Moving to a new country often comes with feelings of isolation and loneliness. ChatGPT can serve as a virtual companion, offering a sympathetic ear and providing

guidance on coping mechanisms, cultural norms, and available support systems. Its non-judgmental and readily available nature can make it an accessible resource for migrants who may be hesitant to seek help from traditional channels due to language barriers, stigma, or other factors. In addition to aiding individual migrants, ChatGPT can also contribute to the development of inclusive communities. Facilitating communication between migrants and residents can foster mutual understanding, empathy, cultural exchange, and diversity. ChatGPT can help dispel misunderstandings, bridge gaps, and promote dialogue between different cultures. It can act as a tool for promoting intercultural awareness and appreciation, thereby creating more inclusive societies where diverse voices and perspectives are valued.

However, it is crucial to approach the use of ChatGPT in the context of migration with caution and ethical considerations. While the technology can be immensely helpful, it is essential to ensure that it does not perpetuate biases, reinforce stereotypes, or replace genuine human interactions. Human oversight and continuous improvement of ChatGPT's training data and algorithms are necessary to minimize unintended consequences and promote equitable and fair communication. Having ChatGPT is like having a genie to be summoned to grant almost everything one desires. ChatGPT has not reached that point, though, but the danger is when technology eventually reaches this point and how people may abuse this kind of technology.

As of early 2025, OpenAI released GPT-4.5 as a research preview, showcasing improvements in reasoning, multilingual performance, and emotional intelligence over its predecessor, GPT-4o (OpenAI, 2025a). GPT-4.5 builds on scaling unsupervised learning and chain-of-thought reasoning, enhancing both world model accuracy and alignment with human intent. It performs notably well in multilingual standardized tests and complex language tasks, scoring higher than GPT-4o in PersonQA and multilingual MMLU benchmarks, and demonstrating fewer hallucinations and more natural responses. These advances hold great promise for migrants navigating language barriers, particularly with GPT-4.5's improved steerability, conversational fluency, and aesthetic sensitivity. However, GPT-4.5 still exhibits known limitations, including occasional over-refusals and remaining challenges in factual grounding and moral reasoning (OpenAI, 2025a).

GPT-5 was released in August 2025 (OpenAI, 2025b). While it demonstrates improvements in certain areas, it does not represent a milestone comparable to the release of GPT-4 (Smith, 2025). Nonetheless, it remains a significant advancement. Similar to its predecessors, there is anticipation that a newer version, GPT-6, could be launched around the same time next year. This development holds the potential for the ChatGPT backend system to exhibit improved performance in standardized tests it previously struggled with, such as the

Graduate Record Examinations (GREs) and Advanced Placement (AP) Calculus (OpenAI, 2024). Moreover, it is not beyond plausible to expect that GPT-6 will feature enhanced reasoning capabilities and more reliable multimodal integration. Such advancements would further facilitate improved communicative abilities, especially for individuals navigating cross-border interactions and multilingual environments. With the incorporation of advanced speech-to-speech systems, GPT-6 could play a pivotal role in reducing language barriers and promoting inclusive communication. However, it is important to note that, in the absence of substantial progress in reasoning capabilities, AI systems like GPT-6 would still encounter challenges in fully substituting the human touch. AI research and development should focus on human verification, accountability rules, openness, the benefits of AI, and the need to broaden the ongoing debate surrounding it (Van Dis et al., 2023). While promising, the current state of ChatGPT engenders both hope and trepidation (Wang et al., 2023), serving as the genesis of a limitless future as it provides humanity with a glimpse into what lies ahead, hopefully for the better and not for the worse.

For it to be truly productive, Kohnke et al. (2023) recommended that teachers include in their pedagogy learning tasks that aim to develop specific digital competencies such as technical proficiency, pedagogical compatibility, and social awareness. Along these lines, it is necessary to envision migrant (linguistic) integration programs (Borlongan, 2022a) to also be developing digital competencies for migrants. Specific competencies would have to include (1) understanding of how ChatGPT works, most especially its limitations and pitfalls, (2) strategizing and planning in which daily, educational, and workplace activities ChatGPT could prove useful, and (3) critically assessing what ChatGPT provides and delivers. Linguistically speaking, migrants must also keep in mind that ChatGPT is never a substitute for authentic language acquisition, learning, and use, and that responsible language use with or without the assistance of technology remains paramount in migratory or non-migratory contexts. But above all, digital competence would also have to include knowing what to do when ChatGPT fails and knowing how to still accomplish things with minimal assistance from technology and ChatGPT. Digital competence necessarily includes not being dependent on or, worse, a slave to technology. Along the same lines, it is important to have the capacity to determine when the use of ChatGPT becomes antithetical to moral and upright existence, not only as a migrant but as a human being.

Language is one of the intrinsic human natures that computation and AI still have to perfect. Useful as it is, ChatGPT still needs a lot of improvements to unleash its fullest potential. As to what confronts humanity now in light of ChatGPT, the message is clear: Utilize

technology in improving lives, particularly those at the margins and the peripheries (i.e., migrants), and not allow technology to take control of humans. There are several issues in migration broadly, and language in migration specifically, which are difficult to solve, yet technological advancements such as ChatGPT provide the means to address these issues and help in bettering the situation of migrants, particularly, on matters of language. Prudent and thoughtful research and governance are necessary in ensuring that ChatGPT emerges as a resource and a blessing to society and not a liability or a curse. Ultimately, let not technology belie the classic Chomskyan notion that communication through language is unique to humans.

References

- Acemoglu, D. (2021). Harms of AI. *NBER Working Paper* 29247, 1–55. <https://doi.org/10.3386/w29247>
- Acemoglu, D., & Restrepo, P. (2018). Low-skill and high-skill automation. *Journal of Human Capital* 12(2), 204–231. <https://doi.org/10.1086/697242>
- Acemoglu, D., & Restrepo, P. (2019). Automation and new tasks: How technology displaces and reinstates labour. *Journal of Economic Perspectives*, 33(2), 3–30. <https://doi.org/10.1257/jep.33.2.3>
- Acemoglu, D., & Restrepo, P. (2020) Robots and jobs: Evidence from US labour markets. *Journal of Political Economy*, 128(6), 2188–2244. <https://doi.org/10.2139/ssrn.2940245>
- Bang, Y., Cahyawijaya, S., Lee, N., Dai, W., Su, D., Wilie, B., Lovenia, H., Ji, Z., Yu, T., Chung, W., Do, Q., V., Xu, Y., & Fung, P. (2023, February). A multitask, multilingual, multimodal evaluation of ChatGPT on reasoning, hallucination, and interactivity. *Arxiv*, 1v44. <https://doi.org/10.48550/arXiv.2302.04023>
- Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021, March). *On the dangers of Stochastic Parrots: Can language models be too big?* In Proceedings of the 2021 ACM Conference on fairness, accountability, and transparency (pp. 610–623). <https://doi.org/10.1145/3442188.3445922>
- Borlongan, A. M. (2022a). Language issues of migrants during the COVID-19 pandemic: Reimagining migrant (Linguistic) integration programs In (post-)pandemic times. *Journal of English and Applied Linguistics*, 1(2), 17–26. <https://doi.org/10.59588/2961-3094.1018>

- Borlongan, A. M. (2022b). Migrants in the midst of the COVID-19 pandemic: A migration linguistic perspective. *Migration letters*, 19(4), 501–508. <https://doi.org/10.59670/ml.v19i4.1616>
- Borlongan, A. M. (2023). Migration linguistics: A Synopsis. *AILA Review*, 36(1), 37–62. doi.org/10.1075/aila.22014.bor
- Borjas, G. J., & Freeman, R. B. (2019). From immigrants to robots: The changing locus of substitutes for workers. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 5(5), 22–42. <https://doi.org/10.7758/rsf.2019.5.5.02>
- Bostrom, N., & Yudkowsky, E. (2018). The ethics in artificial intelligence. In Yampolskiy, R.V. (Ed.), *Artificial intelligence safety and security* (pp. 1–13). Chapman and Hall/CRC. <https://doi.org/10.1201/9781351251389-4>
- Bradley, L., Lindström, N. B., & Hashemi, S. S. (2017). Integration and language learning of newly arrived migrants using mobile technology. *Journal of Interactive Media in Education*, 2017(1), 1–9. <https://doi.org/10.5334/jime.434>
- Bubeck, S., Chandrasekaran, V., Eldan, R., Gehrke, J., Horvitz, E., Kamar, E., Lee, P., Lee, Y. T., Li, Y., Lundberg, S., Nori, H., Palangi, H., Ribeiro, M. T., & Zhang, Y. (2023). *Sparks of artificial general intelligence: Early experiments with GPT-4* [Preprint]. arXiv. <https://doi.org/10.48550/arXiv.2303.12712>
- Cai, Z. G., Haslett, D. A., Duan, X., Wang, S., & Pickering, M. J. (2023). *Does ChatGPT resemble humans in language use?* PsyArXiv. Preprint. <https://doi.org/10.31234/osf.io/s49qv>
- Chomsky, N. (1965). *Aspects of the theory of syntax* (50th ed.). The MIT Press.
- Chomsky, N., Roberts, I., & Watumull, J. (2023). Noam Chomsky: The false promise of ChatGPT. *The New York Times*. Retrieved from <https://www.nytimes.com/2023/03/08/opinion/noam-chomsky-chatgpt-ai.html>
- Collin, S. (2012). ICTs and Migration: The Mapping of an emerging area of research. *International Journal of Technology, Knowledge & Society*, 8(2), 65–77. Retrieved from <https://archipel.uqam.ca>
- Darvin, R., & Norton, B. (2014). Transnational identity and migrant language learners: The promise of digital storytelling. *Education Matters*, 2(1), 55–66. Retrieved from <https://journalhosting.ucalgary.ca/index.php/em/article/view/62890>
- De Haas, H., Castles, S., & Miller, M. J. (2020). *The age of migration: International population movements in the modern world* (6th ed.). Red Globe Press.

- Halaweh, M. (2023). ChatGPT in education: Strategies for responsible implementation. *Contemporary Educational Technology*, 15(2), 1–11. <https://doi.org/10.30935/cedtech/13036>
- Haleem, A., Javaid, M., & Singh, R. P. (2022). An era of ChatGPT as a significant futuristic support tool: A study on features, abilities, and challenges. *BenchCouncil Transactions on Benchmarks, Standards and Evaluations*, 2(4), 1–8. <https://doi.org/10.1016/j.tbencb.2023.100089>
- Hauser, M. D., Chomsky, N., & Fitch, W. T. (2002). The Faculty of Language: What is it, who has it, and how did it evolve? *Science*, 298(5598), 1569–1579. <https://doi.org/10.1126/science.298.5598.1569>
- Kalla, D., & Smith, N. (2023). Study and analysis of Chat GPT and its impact on different fields of study. *International Journal of Innovative Science and Research Technology*, 8(3). 827–833. <https://doi.org/10.5281/ZENODO.7767675>
- Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for language teaching and learning. *RELC Journal*, 54(2) 537–550. <https://doi.org/10.1177/00336882231162868>
- Leslie, D. (2019). *Understanding artificial intelligence ethics and safety: A guide for the responsible design and implementation of AI systems in the public sector*. The Alan Turing Institute.
- Lindström, N. B., & Hashemi, S. S. (2019). Mobile technology for migrants. *International Journal of Technology, Knowledge and Society*, 15(2), 1–18. <https://doi.org/10.18848/1832-3669/CGP/v15i02/1-18>
- McAuliffe, M., & Triandafyllidou, A. (Eds.). (2021). *World migration report 2022*. Geneva, Switzerland: International Organization for Migration. https://publications.iom.int/system/files/pdf/WMR-2022-EN_1.pdf
- McMullin, C. (2021). Migrant integration services and coping with the digital divide: Challenges and opportunities of the COVID-19 Pandemic. *Voluntary Sector Review*, 12(1), 129–136. <https://doi.org/10.1332/204080520X16076177287917>
- Nteliou, E., Koreman, J., Tolskaya, I., & Kehagia, O. (2021, July). Digital technologies assisting migrant population overcome language barriers: The case of the EasyRights research project. In *Learning and Collaboration Technologies: New Challenges and Learning Experiences: 8th International Conference (LCT 2021), held as part of the 23rd HCI International Conference (HCII 2021) — Proceedings, Part I* (pp. 108–124). https://doi.org/10.1007/978-3-030-77889-7_8

- OECD. (2020). *International Migration Outlook 2020*. OECD Publishing, Paris. Retrieved from
https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/10/international-migration-outlook-2020_fdc3955b/ec98f531-en.pdf
- OpenAI. (2024). GPT-4o system card. Retrieved from <https://cdn.openai.com/gpt-4o-system-card.pdf>
- OpenAI. (2025a). GPT-4.5 system card. Retrieved from <https://cdn.openai.com/gpt-4.5-system-card-2272025.pdf>
- OpenAI. (2025b). GPT-5 system card. Retrieved from <https://cdn.openai.com/gpt-5-system-card.pdf>
- Ouyang, L., Wu, J., Jiang, X., Almeida, D., Wainwright, C. L., Mishkin, P., Zhang, C., Agarwal, S., Slama, K., Ray, A., Schulman, J., Hilton, J., Kelton, F., Miller, L., Simens, M., Askell, A., Welinder, P., Christiano, P. F., Leike, J., & Lowe, R. (2022). Training language models to follow instructions with human feedback. *Advances in Neural Information Processing Systems*, 35, 27730-27744.
<https://doi.org/10.48550/arXiv.2203.02155>
- Pereira, S. (2014). Migrant workers and labour agency. *International Migration Institute Working Paper No.* 99. Retrieved from
<https://www.migrationinstitute.org/publications/wp-99-14>
- Piantadosi, S. T. (2023). Modern language models refute Chomsky's approach to language. In E. Gibson & M. Poliak (Eds.), *From Fieldwork to Linguistic Theory: A Tribute to Dan Everett* (Empirically Oriented Theoretical Morphology and Syntax 15) (pp. 353–414). Language Science Press.
- Ratha, D., Mohapatra, S., & Scheja, E. (2011). Impact of migration on economic and social development: A review of evidence and emerging issues. *The World Bank Policy Research Working Paper 5558*. <https://doi.org/10.21648/arthavij/2011/v53/i3/117558>
- Schulman, J., Wolski, F., Dhariwal, P., Radford, A., & Klimov, O. (2017). *Proximal policy optimization algorithms* [Preprint]. arXiv. <https://doi.org/10.48550/arXiv.1707.06347>
- Sison, A. J. G., Daza, M. T., Gozalo-Brizuela, R., & Garrido-Merchán, E. C. (2023). ChatGPT: more than a “weapon of mass deception”, ethical challenges and responses from the Human-Centered Artificial Intelligence (HCAI) perspective. *International Journal of Human-Computer Interaction*, 40(17), 4853–4872.
<https://doi.org/10.1080/10447318.2023.2225931>

- Smith, M. S. (September 2, 2025.). GPT 5's rocky launch highlights AI disillusionment. *IEEE Spectrum*. Retrieved from <https://spectrum.ieee.org/gpt-5-trough-of-disillusionment>
- Friedrich-Ebert-Stiftung, Global future, & international organization for migration. (2017). *Tomorrow's World of Migration*. Friedrich-Ebert-Stiftung. Retrieved from <https://www.iom.int/sites/g/files/tmzbdl2616/files/2018-07/Tomorrows-World-of-Migration-and-Mobility.pdf>
- Van Dis, E. A., Bollen, J., Zuidema, W., van Rooij, R., & Bockting, C. L. (2023). ChatGPT: Five priorities for research. *Nature*, 614(7947), 224–226. <https://doi.org/10.1038/d41586-023-00288-7>
- Ventayen, R. J. M. (2023). OpenAI ChatGPT generated results: Similarity index of artificial intelligence-based contents. *International Conference on Soft Computing for Security Applications* (pp. 215–226). Springer Nature Singapore.
- Wang, F. Y., Miao, Q., Li, X., Wang, X., & Lin, Y. (2023). What does ChatGPT say: The DAO from algorithmic intelligence to linguistic intelligence. *IEEE/CAA Journal of Automatica Sinica*, 10(3), 575–579. <https://doi.org/10.1109/JAS.2023.123486>
- Wang, P., & Goertzel, B. (2007). Introduction: Aspects of artificial general intelligence. In *Proceedings of the 2007 Conference on Advances in Artificial General Intelligence: Concepts, Architectures and Algorithms: Proceedings of the AGI Workshop 2006* (pp. 1–16). Retrieved from <https://dl.acm.org/doi/10.5555/1565455.1565457>
- Zhao, W. X., Zhou, K., Li, J., Tang, T., Wang, X., Hou, Y., Min, Y., Zhang, B., Zhang, J., Dong, Z., Du, Y., Yang, C., Chen, Y., Chen, Z., Jiang, J., Ren, R., Li, Y., Tang, X., Liu, Z., Liu, P., Nie, J.-Y., & Wen, J. R. (2023). *A survey of large language models* [Preprint]. arXiv. <https://doi.org/10.48550/arXiv.2303.18223>
- Zhuo, T. Y., Huang, Y., Chen, C., & Xing, Z. (2023). *Exploring AI ethics of ChatGPT: A diagnostic analysis* [Preprint]. arXiv. <https://doi.org/10.48550/arXiv.2301.12867>