



# BRNO UNIVERSITY OF TECHNOLOGY

VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ

## FACULTY OF ELECTRICAL ENGINEERING AND COMMUNICATION

FAKULTA ELEKTROTECHNIKY  
A KOMUNIKAČNÍCH TECHNOLOGIÍ

## DEPARTMENT OF FOREIGN LANGUAGES

ÚSTAV JAZYKŮ

# ARTIFICIAL INTELLIGENCE AND POLITENESS: A SMALL- SCALE EXPERIMENTAL STUDY

UMĚLÁ INTELIGENCE A ZDVOŘILOST: EXPERIMENTÁLNÍ STUDIE MALÉHO MĚŘÍTKA

## BACHELOR'S THESIS

BAKALÁŘSKÁ PRÁCE

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BRNO 2024



# Bakalářská práce

bakalářský studijní obor **Angličtina v elektrotechnice a informatice**

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**Ročník:** 3

**Akademický rok:** 2023/24

## NÁZEV TÉMATU:

**Umělá inteligence a zdvořilost: experimentální studie malého měřítka**

## POKyny PRO VYPRACOVÁNÍ:

Na základě zdvořilostních teorií P. Brown a S. C. Levinsona a G. Leech student navrhne a provede experiment, ve kterém ověří hypotézu, zda vybraný nástroj umělé inteligence poskytuje kvalitnější odpovědi, pokud je uživatel ve svých zadáních zdvořilý. Vygenerované odpovědi student porovná jak po stránce obsahové, tak po stránce jazykové.

## DOPORUČENÁ LITERATURA:

Brown, P., & Levinson, S. C. (2004). *Politeness: some universals in language usage* (14th ed). Cambridge University Press.

Leech, G. N. (2014). *The pragmatics of politeness*. Oxford University Press.

**Termín zadání:** 22.2.2024

**Termín odevzdání:** 24.5.2024

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## **Abstract**

This study aims to verify the hypothesis that an AI application provides better responses when given polite prompts. Based on the established politeness theories by Brown and Levinson (1987) and Leech (1983, 2014), an experiment was designed and conducted, in which ChatGPT, popular chatbot based on the conversation with users, was prompted using positive and negative politeness strategies and without them. The generated responses are analysed and then compared in terms of content and language means. Drawing from the experiment's findings, this paper provides a set of practical recommendations for users to optimize AI prompts to achieve more accurate results.

## **Keywords**

artificial intelligence, ChatGPT, prompts, politeness, politeness strategies, response analysis

## **Abstrakt**

Cílem této studie je ověřit hypotézu, že aplikace UI poskytuje lepší odpovědi, pokud dostává zdvořilé zadání. Na základě známých teorií zdvořilosti Brown a Levinsona (1987) a Leeche (1983, 2014), byl navržen a proveden experiment, při němž byl ChatGPT, populární chatbot založený na konverzaci s uživateli, promptován za využití pozitivní, negativní a zdvořilostní strategie a bez nich. Vygenerované odpovědi jsou analyzovány a následně srovnány dle jejich obsahové a jazykové stránky. Na základě výsledků tohoto experimentu, tato práce stanovuje praktická doporučení pro uživatele, jak optimalizovat prompty pro UI, a dosáhnout tak přesnějších výsledků.

## **Klíčová slova**

umělá inteligence, ChatGPT, prompty, zdvořilost, zdvořilostní strategie, analýza odpovědí

## Rozšířený abstrakt

Cílem této bakalářské práce je ověřit hypotézu, že aplikace UI poskytuje kvalitnější odpovědi, pokud je uživatel ve svých zadáních zdvořilý. Pro testování hypotézy byl vybrán ChatGPT, známý chatbot založený na konverzaci a interakci s uživateli. Pojem zdvořilosti v této práci vychází z teorií Brown a Levinsona (1987) a Leech (1983, 2014).

Hypotéza byla ověřována pomocí experimentu, při němž byla vybraná aplikace UI dotazována pomocí pozitivní a negativní zdvořilostní strategie a také bez zdvořilostních prostředků. Zadání jsou rozdělena do dvou úkolů: 1) jazykově zaměřené (vyhledávání chyb v textu, v kterém autor práce schválně vložil chyby různých typů) a 2) technicky zaměřené (poskytnutí definice indukčního generátoru a vysvětlení funkčního principu). Experiment využívá nejdostupnější verzi jazykového modelu, konkrétně GPT-3.5. Interakce s modelem UI probíhala na jednom účtu, aby byla zachována konzistence. Každý požadavek byl zadán dvakrát, aby se získaly alternativní verze odpovědí. Po provedení experimentu, byla každá vygenerovaná odpověď analyzována a porovnána co do kvality a přesnosti obsahu a ze stránky jazykové.

Z analýzy jazykového úkolu vyplývá, že ChatGPT je schopen efektivně vyhledat a nabídnout opravu většiny chyb týkajících se interpunkce, pravopisu, chybějících nebo nesprávných apostrofů a určitých nebo neurčitých členů. Bylo však zjištěno, že model UI v některých odpovědích nedokázal rozpoznat chyby týkající se psaní velkých písmen a v podmínkovém souvětí minulém slovesného tvaru. Rovněž bylo zjištěno, že vzhledem k rozdílnosti formátů byly odpovědi obsahující seznam méně kvalitní ve srovnání s odpověďmi obsahujícími opravený text. Pravděpodobně důležitější roli hraje faktor náhodnosti při generování odpovědí. Nicméně použitá zdvořilost v požadavcích neměla vliv na kvalitu a obsah odpovědí u jazykově zaměřených úkolů, jako je oprava chyb v textu.

Z analýzy technického úkolu vyplývá, že bez ohledu na použitou zdvořilostní strategii ChatGPT generuje spíše obecnou definici a vysvětlení, aniž by poskytoval podrobnější informace. Množství a obsah získané informace byly víceméně totožné ve všech verzích odpovědi. Některé odpovědi však obsahovaly nepřesné informace o určitých aspektech, což ukazuje na to, že zdroje, jako je ChatGPT, nejsou spolehlivé. Informace získané z těchto zdrojů je třeba pozorně překontrolovat.

Z obou částí analýzy je patrné, že některé věty v odpovědích na zdvořilostní požadavky obsahují stažené tvary slov. V technické zaměřené části se v odpovědích na pozitivní zdvořilost vyskytují určité neformální reakce. Avšak tyto aspekty neměly vliv na celkový obsah odpovědi.

Ze studie vyplývá, že data získaná v experimentu nepodporují výzkumnou hypotézu, tedy že nebyly zjištěny žádné zřetelné vzorce, které by bylo možné přiřadit k určité zdvořilostní strategii nebo které by ukázaly vliv na kvalitu. Pozitivní a negativní zdvořilost při interakci s aplikací ChatGPT neposkytuje kvalitnější odpovědi.

## **Bibliographic citation**

FINKEVICH, Dzmitryi. *Umělá inteligence a zdvořilost: experimentální studie malého měřítka* [online]. Brno, 2024 [cit. 2024-05-15]. Dostupné z:

<https://www.vut.cz/studenti/zav-prace/detail/160822>. Bakalářská práce. Vysoké učení technické v Brně, Fakulta elektrotechniky a komunikačních technologií, Ústav jazyků. Vedoucí práce Mgr. Bc. Magda Sučková, Ph.D.

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**Paper type:** Barchelor's Thesis

**Academic year:** 2023/24

**Topic:** Artificial Intelligence and Politeness:  
a small-scale experimental study

I declare that I have written this paper independently, under the guidance of the advisor and using exclusively the technical references and other sources of information cited in the project and listed in the comprehensive bibliography at the end of the project.

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## **Acknowledgement**

I would like to express my gratitude to Mgr. Bc. Magda Sučková, Ph.D., my research supervisor, for her patient guidance, invaluable advice and consultations.



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## Introduction

In the modern world technology continues to increase its impact on people's daily lives. Some of this technology is, in one way or another, related to artificial intelligence (AI). In recent years, AI technologies have developed from a science fiction concept to complex systems that are capable of self-learning and even interacting with people in their own language. Since AI applications have become available to the general public, society has started to pay attention to the role of AI in information and communication technologies.

This paper presents a small-scale experimental study within the fields of AI and politeness. The interest in the theme stems from a lively, thought-provoking online debate which the author observed on the topic of communication with AI, specifically focusing on ChatGPT. Some users shared their experience with this kind of communication and noted that they always try to be polite with ChatGPT. According to their comments, it provides better answers than if the users were direct in their requests. Other users argued that this cannot be the case and that the machine is programmed to consistently provide answers of the same quality, regardless of politeness in communication. While there may be conflicting views on politeness in AI interactions, this study aims to bring some evidence to this discussion.

To explore these differing perspectives in detail and to test the proposed hypothesis, this research draws on Brown and Levinson's (1987) well-established politeness theory and Leech's (1983, 2014) Politeness Principle. The research comprises an experimental design, presenting requests based on these theories in the form of standardised AI prompts and tasks to an AI tool. An analysis of the results obtained will be provided in the second part of this study, including a thorough comparison of the generated responses. Moreover, the findings will be summarised into recommendations, which may provide AI tools user guidance on how to communicate with AI in a more efficient way.

Understanding whether politeness influences the quality of AI responses may lead to polite communication with AI. Additionally, it may reveal certain aspects of the internal structure of AI language models. As such, this research aims to indicate the relationship between artificial intelligence and the use of polite communication.

# 1. Artificial Intelligence (AI)

## 1.1 What Is AI?

Artificial intelligence, as a broad field, has always played a significant role in computer science, an engineering discipline focused on developing intelligent computer programs designed to meet human needs. According to Franklin (2014), AI covers a scientific aspect as well, with the objective of enhancing our understanding of human intelligence. This scientific endeavour involves the production of mathematical models representing aspects of human knowledge and creating systems which can resolve tasks and issues that usually require the human intellect (Franklin, 2014, p. 15).

As AI has evolved, various definitions have emerged. Russell and Norvig (2016), in their book *Artificial Intelligence: A Modern Approach*, have compiled a taxonomy of AI definitions from different authors. In Figure 1, there are eight definitions of AI arranged along two axes:

The definitions on top are concerned with *thought processes* and *reasoning*, whereas the ones on the bottom address *behavior*. The definitions on the left measure success in terms of fidelity to *human* performance, whereas the ones on the right measure against an *ideal* performance measure, called rationality. A system is rational if it does the “right thing,” given what it knows. (Russell & Norvig, 2016, p. 1)

Russell and Norvig (2016) state that these diverse approaches to AI, which include both human-centered and rationalist methodologies, have been pursued by various people and methods. A rationalist method combines engineering and mathematics, while a human-centered approach relies on empirical research with observations and insights regarding how people act and think (Russell & Norvig, 2016, pp. 1-2).

<p><b>Thinking Humanly</b></p> <p>“The exciting new effort to make computers think ... <i>machines with minds</i>, in the full and literal sense.” (Haugeland, 1985)</p> <p>“[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning ...” (Bellman, 1978)</p>	<p><b>Thinking Rationally</b></p> <p>“The study of mental faculties through the use of computational models.” (Charniak &amp; McDermott, 1985)</p> <p>“The study of the computations that make it possible to perceive, reason, and act.” (Winston, 1992)</p>
<p><b>Acting Humanly</b></p> <p>“The art of creating machines that perform functions that require intelligence when performed by people.” (Kurzweil, 1990)</p> <p>“The study of how to make computers do things at which, at the moment, people are better.” (Rich &amp; Knight, 1991)</p>	<p><b>Acting Rationally</b></p> <p>“Computational Intelligence is the study of the design of intelligent agents.” (Poole et al., 1998)</p> <p>“AI . . . is concerned with intelligent behavior in artifacts.” (Nilsson, 1998)</p>

*Figure 1.* Definitions of artificial intelligence.  
As presented by Russell and Norvig (2016, p. 2).

This study focuses on the definitions of AI involving thinking and acting humanly. When referring to AI in this thesis, the emphasis is on understanding and replicating human thought and behaviour within artificial systems.

### 1.1.1 Major AI Research Areas

AI encompasses a wide range of techniques and approaches. One of the many approaches to the field of AI is through the use of machine learning algorithms. According to Samuel (1959), machine learning is a branch of AI, where a machine is not explicitly programmed, it improves based on the experience gained during training process.

Traditionally, for a computer to perform assigned tasks, strictly marked instructions in the form of code written by the developer are necessary. Whereas machine learning algorithms allow the program to learn from a database, based on which it can analyse information and then use the knowledge gained to find solutions and make its own decisions.

According to Danks (2014), AI systems are able to identify three different inference strategies by means of machine learning such as analogical, domain-specific, and structural inferences. Analogical inferences refer to the ability of a machine to relate and compare common and historical examples to solve current posed problems and tasks (Danks, 2014).

Domain-specific inferences use techniques based on the prior knowledge about a particular field, topic or problem (Danks, 2014). Danks (2014) states that these inferences are used by machine learning algorithms for very specific cases and situations, but such algorithms can make quite powerful inferences even from a limited amount of data.

According to Danks (2014), it is assumed that structural inferences form the basis of the majority of machine learning methods. They focus on the relationships between variables and their structural properties which can be found in the data. Danks explains that “[s]tructural inference uses (relatively) domain-general algorithms whose success depends on the internal structure of the data, rather than features of the semantic content of the data” (p. 152). Methods using this type of inference utilize only general structural information about the observation objects, which allows to apply these methods to any domain whose data have appropriate structural features (Danks, 2014).

Machine learning algorithms are typically divided into the categories of supervised learning and unsupervised learning (Danks, 2014; Goodfellow, Bengio & Courville, 2016). Danks (2014) mentions that the main difference between these two classes is “whether the algorithm requires the specification of a target variable in the dataset” (p. 154). In supervised learning, the values of these variables are the ground truths provided to machine learning systems to specify what should be learned (Danks, 2014; Goodfellow et al., 2016). Applications of supervised learning algorithms aim to create models for classification and categorization of information based on the specified target variables (Danks, 2014; Russel & Norvig, 2016).

On the other hand, in unsupervised learning, algorithms aim to identify a common characteristic for the given database, without any provided focus on the variables in the data (Danks, 2014). In such training, the machine learns to find patterns in the data and identify potentially useful information about the structure of this dataset (Goodfellow et al., 2016; Russel & Norvig, 2016). The common application for unsupervised learning algorithms is the clustering of information from the database (Danks, 2014; Russel & Norvig, 2016).



Machine learning encompasses various methods of training computers, one of which is the use of neural networks. Mehlig (2021) states that “neural-network algorithms for machine learning are inspired by the architecture and the dynamics of networks of neurons in the brain” (p. 1). Artificial neural networks (ANNs) do not fully represent realistic models of the brain and its neurons, but rather are designed to understand and replicate its functionality and computational principles (Goodfellow et al., 2016). Mehlig argues that in the same way that brain can improve its capability to think and process information by establishing new connections between neurons, ANNs can “learn by changing the connections between their neurons” (p. 1). Neural network algorithms are capable of performing various tasks for processing information and can work with large sets of data. As mentioned by Russel and Norvig (2016), when a system has a precisely defined problem, the neural network analyses its database, finds matches, patterns and corresponding subproblems, and then it finds and provides appropriate solutions.

The point of neural networks is that they are able to make unique decisions depending on various factors, which differentiates them from conventional bots limited by a programme for a specific task.

Another subfield of AI that will be discussed in this work is natural language processing. Franklin (2014) states that it “includes both the generation and the understanding of natural language, usually text” (p. 26). At present, natural language processing is “a field of research into machine translation, question answering, automatic summarization, speech recognition and other areas” (Franklin, 2014, p. 26).

People periodically encounter different services and systems which process natural language. Such services may include various search engines, online translators and technical support services. These services are typically based on large language models (LLMs).

Large language models (LLMs) refer to a type of AI model that utilises natural language processing techniques to understand and analyse language based on massively large sets of text data (McDonough, 2024). Some models can be trained on hundreds of gigabytes of text data sourced from a wide range of internet resources, documents, articles, books, and more. After the training process, these models can capture relationships between text units, words, phrases and sentences in the dataset to form connections, evaluate them and make inferences about the language and its features (McDonough, 2024). In order to do so, LLMs also possess billions of parameters, which represent variables and coefficients inside the model that are

used to capture language patterns and nuances, define boundaries and influence the prediction of outcome (Red Hat, 2023; McDonough, 2024). Improving the quality of development and maintenance over time allows to create more complex models with larger number of parameters and text data. For example, GPT-3 model possesses 175 billion parameters and it was trained on 570 gigabytes of text, whereas its antecedent, GPT-2, has only 1.5 billion parameters and 40 gigabytes of trained data (Tamkin et al., 2021).

It should be noted that inadequacies or prejudices within the training data used in the machine learning process may result in one of the major drawbacks of AI performance - bias. The effectiveness of artificial intelligence depends on the data on which the machine learning process is performed.

As stated by Smith and Rustagi (2020), biased AI systems can incorrectly provide resources and information, unfairly allocate opportunities and may treat some people differently than others. Smith and Rustagi imply that, for example, in the field of automated selection of job candidates, a company uses a machine learning algorithm to select candidate resumes automatically. They assume that if the training data on which the model is based contains a gender or race bias, the model may acquire this bias as well. As a result, the system may favour candidates of a particular gender or race, even if other candidates have the same qualifications and skills (Smith & Rustagi, 2020). Dustin (2018) provides an example of AI bias in natural language processing where, as in the context already mentioned above, Amazon used technology that selects resumes to find job candidates. It processed resumes and gave preference to candidates who described themselves using verbs such as “executed” and “captured” rather than other candidates (Dustin, 2018). The problem of bias is common for many language-based models as the training data may often include information from publicly available sources that can also contain confronting views, opinions and perspectives (Manyika, 2023).

In addition to processing and working with text data, AI models can also analyse and find patterns for other types of data, such as images, audio and video. AI capable of generating such data is called generative AI. A prominent example of generative AI that works mainly with text data is ChatGPT.

## 1.2 ChatGPT

Among the most common ways of interacting with conversational AI is through a chatbot. A chatbot is a software or computer program that engages in artificial conversations through text interactions (Chakrabarti & Luger, 2015).

At present, the most widely used LLM-based AI chatbot is ChatGPT, which was released by a non-profit organization OpenAI in 2022. Its advantage is the ability to generate text that is logical and almost indistinguishable from text written by humans. This chatbot can communicate with users by answering questions, searching for information and generating various types of text-based content such as articles, stories, poems and songs.

One of the features of ChatGPT is that it remembers the previous communication results. This feature allows users to improve or modify their query and take into account mistakes in previous messages.

According to OpenAI (2022a), ChatGPT was introduced to the public free of charge as part of a preliminary research version in order to gather users' feedback and learn about its strengths and weaknesses. While interacting with the language model, users can rate the response provided by ChatGPT favourably or unfavourably and add details to the feedback form, whether it be the saying what they liked about the response or describing the issue with the response and how it could be improved (OpenAI, 2022a). As stated by OpenAI (2022a), feedback helps the language model improve its language skills and performance in order to meet users' needs more effectively.

Although ChatGPT is designed to answer the user's questions, seek information and provide assistance with requests for various topics, there are several reasonable exceptions when it cannot meet the user's needs. These exceptions include situations when the required information is not present in the scope of its training data, the information is illegal or immoral, or when asked to perform any physical actions.

The main requirement for the effective use of the language model is the precise formulation of the query. For this purpose, ChatGPT developers recommend using prompts that will help customise the model to the user's needs (OpenAI, 2022b).

### **1.3 AI Prompts**

AI prompts are instructions (i.e. sentences, tags or words) in which the user, interacting with a large language model, specifies what they wish to retrieve. An AI model can provide different results based on how the prompt is phrased (OpenAI, 2022a).

Prompts are intended to allow the user to provide the AI model with the most detailed and clearly formulated instructions as input. Therefore, the output data will correspond to the expected result. For example, if the request is “Write a fairytale”, the result will be an example of a story generated by the AI without certain conditions and boundaries. However, if the user provides additional information such as genre, description of main characters, setting, moral and lesson of the story and set some restrictions (length of the story, intended audience), the result will meet the requirements of the prompts.

It appears that each added prompt narrows the search spectrum of the AI model and specifies the result for the user (OpenAI, 2022b).

AI prompts are essential to this study’s experiment since they are used as a tool for interacting with AI models. Prompts will be applied to test the study hypothesis of whether polite prompts used in the request influence the quality of AI responses.

## 2. Politeness

Politeness, as one of the most important components of speech behaviour, is addressed in numerous studies (Brown & Levinson, 1987; Goffman, 1955; Leech, 1983, 2014). Tufanova (2014) notes that many researchers consistently interpret politeness as a type of behaviour that takes into account the feelings and interests of the interlocutor to the maximum extent (p. 317, translation mine).

According to Brown and Levinson (1987), politeness creates a favourable communication atmosphere and mitigates potential aggression. It is a set of principles and strategies that people use in language to contribute successful and non-conflict communication.

The following sections of this paper provide an overview of the topic of politeness based on the politeness theory presented by Brown and Levinson (see 2.1), as well as Leech's Principles of Politeness (see 2.2).

### 2.1 Brown and Levinson's Politeness Theory

Politeness theory is a conceptual framework focused on the notion of politeness in social interactions, which was described by Brown and Levinson in their book *Politeness: Some Universals in Language Use* in 1987.

Brown and Levinson (1987) propose in their theory that speakers have two goals when engaging in communication:

- To achieve their decided outcome (the substance of the message)
- To maintain social relationships by avoiding face damage (the manner of the message)

According to the theory, speakers use politeness strategies to reduce the potential threats to the interlocutors' face and their public self-image (Brown & Levinson, 1987). The theory also proposes that the choice of strategies will depend on the social distance and power relationship between the speaker and the listener, as well as the level of imposition of the Face-Threatening Act (FTA). Brown and Levinson (1987) define FTAs as "acts that by their nature run contrary to the face wants of the addressee and/or of the speaker" (p. 65). By 'act', they mean the intended meaning that has taken place through verbal or non-verbal communication (Brown & Levinson, 1987).

### **2.1.1 Face**

The concept of face was first introduced by the sociologist Goffman, who studied everyday acts of interpersonal interaction. Goffman (1955) defined face as “the positive social value a person effectively claims for himself by the line others assume he has taken during a particular contact” (p. 213). In his work, he emphasised the importance of preserving both one’s own face and the face of the interlocutor (Goffman, 1955).

Brown and Levinson (1987) indicate face as “the public self-image that every member wants to claim for himself” (p. 61). The authors describe social face by identifying two specific kinds of desires attributed to interactants: positive and negative face. Negative face represents the desire for non-interference in the freedom of action and freedom from imposition, while positive face refers to the desire of an individual to be respected and approved by others (Brown & Levinson, 1987, p. 61).

Brown and Levinson’s (1987) politeness theory posits that people will cooperate with each other during communication in order to preserve their public self-images and faces. This cooperation is based on the assumption that the faces of all conversation participants are vulnerable. In case of a potential threat to one’s own face, people usually want to protect it, and doing so may harm the faces of others. For this reason, it is beneficial for each conversation participant to maintain not only their own face, but also the face of the interlocutor (Brown & Levinson, 1987).

### **2.1.2 Sociological Variables**

According to Brown and Levinson (1987), in many cultures, there are three factors (called sociological variables) that indicate an assessment of the seriousness and danger of a face-threatening act. These factors involve:

1. The social distance between speaker and listener. According to Magee and Smith (2013), social distance is defined as “a subjective perception or experience of distance from another person or other persons” (p. 159). It encompasses various factors, including how well people know each other and the difference between them and their public identity (Magee & Smith, 2013). In other words, social distance is about the psychological and emotional aspects that influence how close or distant individuals feel from each other in social interactions. Brown and Levinson (1987) provide an example of a high value of the social distance variable in communication between strangers where the speaker and the listener are distant. Whereas in the case

of people who are familiar, feel similar and close in social terms, it is considered a low value of the social distance variable (Brown & Levinson, 1987).

2. The difference in power relations between speaker and listener. Power, in the social context, refers to “the capacity to influence, lead, dominate, or otherwise have an impact on the life and actions of others in society” (Munro, 2023, para. 1). For example, this can be observed in relationships within a family such as between a mother and a child or in professional relationships such as between a boss and an employee. These examples refer to the high value of relative power relations. The relative power value is considered low when the interlocutors are equal and cannot intentionally influence each other.
3. The absolute ranking of imposition of a particular act. This refers to the speaker’s attempt to impose their needs over the interlocutor’s face needs. Some impositions can be greater than others and can also vary depending on the culture (Brown & Levinson, 1987). As an example, Brown and Levinson (1987) conclude that “in Anglo-American culture, asking for a substantial amount of money without recompense is much more of an imposition than a request to search in one’s pockets for change” (p. 81).

Brown and Levinson (1987) explain that these three factors are assumed between the speaker and the hearer based on their mutual perception and understanding of each of these factors. Although the authors state that the above-listed factors are relevant for assessing the danger of FTAs, these sociological variables also include many other factors such as status, authority, occupation, ethnic identity, friendship, situational factors and others that influence the assessment of the risk of the FTA (Brown & Levinson, 1987, p. 80).

Brown and Levinson (1987) state that assessing the seriousness of the FTA allows the speaker to choose an appropriate politeness strategy depending on the value of each factor. As the risk of the face threat increases, the speaker must use politeness strategies in order to minimise the threat and damage to the interlocutor’s face (Brown & Levinson, 1987).

### **2.1.3 Politeness Strategies**

Brown and Levinson (1987) identify several key types of politeness strategies in their theory. This thesis focuses on positive politeness, negative politeness and off-record politeness.

Positive politeness is aimed at making the listener feel good about themselves and their relationship with the speaker (Brown & Levinson, 1987).

Positive politeness includes following:

- Showing interest in the listener
- Showing agreement or approval of the listener
- Using in-group identity markers

The intention of positive politeness strategies is to satisfy the listener's positive face wants, which include compliments, expressions of respect and recognition (Brown & Levinson, 1987).

An example of positive politeness: "Hey, mate. I've heard that you're getting a promotion. That's incredible! I know you've been working really hard. Surely, you deserved this!"

Negative politeness strategies are used to minimise the imposition on the listener and show respect for their autonomy (Brown & Levinson, 1987). These strategies include the use of:

- Indirect request forms
- Hedges and minimising
- Formal language

An example of negative politeness: "I am sorry to bother you. Could you pass me a napkin, please?"

As for off-record strategy, Brown and Levinson (1987) state that "[l]inguistic realizations of off-record strategies include metaphor and irony, rhetorical questions, understatement, tautologies, all kinds of hints as to what a speaker wants or means to communicate, without doing so directly" (p. 69). For example: "A new chic restaurant is opening in our city". In this case, the speaker hints and thereby tries to ask: "Do you want to go there?", or tell: "Let's go there when it opens".

## **2.2 Leech's Politeness Principles**

Leech (1983, 2014) defines politeness as a means of avoiding conflict and demonstrating a respectful attitude towards the communicative partner. He considers politeness to be a form of communicative behaviour that helps to achieve an atmosphere of trust and harmony



among the conversation participants, which, in turn, contributes to comfortable and effective communication (Leech, 1983).

Leech (2014, pp. 4-8) provides eight characteristics of politeness on which he built his theory:

- Politeness is not obligatory. Politeness is not something that people must follow. They have the choice to be polite or impolite. Typically, people will use politeness if there is a need or reason to do so.
- Politeness comes in degrees. People have the flexibility to change their level of politeness depending on the circumstances of the situation. For example, a simple thanking will be enough when somebody helps another person with a favour. But if someone has done something important for another, where nothing would have happened without this someone's assistance, then gratitude and appreciation for such help will be much higher.
- A sense of what is normal. There is often a common understanding in society and between the interactants of what is considered to be a normal level of politeness for a particular context.
- Politeness depends on the situation. For example, in the workspace, people talk to their colleagues using highly formal and polite language. In contrast, it would be inappropriate to use the same level of politeness within a family or a group of friends.
- Reciprocal asymmetry. This refers to the idea that it is considered polite when each party gives high value to the other and attributes low value to oneself. On the contrary, when each party gives high value to oneself or low value to the other – it is considered impolite.
- Politeness can manifest itself in repetitive and ritualised behaviour. This involves repetitive and often scripted behaviours that reflect a mutual effort between two parties to demonstrate politeness. For example, in cases when some offers are repeated several times after some rejections to ensure the person's final decision. The rituals typically revolve around actions and responses that symbolise a reciprocal exchange of value, where each party attempts to attribute high value to the other. An example of a polite ritual can be offering a glass of water or a cup of tea to a guest before the start of the meeting.
- Transaction of value. This implies the exchange of some form of value between the speaker and others while performing various speech acts. For example, when making

a request, a request is made for something, or in the case of offering or inviting, something is offered to the recipient. The “something” in these examples indicates an item of value, whether material or abstract.

- Politeness has a tendency to preserve a balance of value between the participants. This refers to a sense of debt that occurs between the individuals. In this case, people typically intend to reduce the debt by using thanks and apologies.

Based on these characteristics, Leech (2014) formulates the Politeness Principle (PP), which suggests that in the communication process, the use of politeness is employed to achieve a positive result:

The PP postulates that interactants, on the whole, prefer to express or imply polite beliefs rather than impolite beliefs. Polite beliefs expressed by the speaker S are beliefs favorable to the other person O (and/or unfavorable to oneself), whereas impolite beliefs are beliefs unfavorable to O (and/or favorable to S). (Leech, 2014, p. 34)

Leech (2014) notes that the Politeness Principle helps maintain social relations between interlocutors and suggests that, above all, they are interested in cooperation with each other. This principle proposes that the interactants will try to follow certain Maxims in order to achieve politeness.

Table 1. *Politeness Principle maxims*. Adapted from Leech (2014, p. 91).

Label for the maxims	Concerns	Maxims (expressed in an imperative mood)	Typical speech act type(s)	Examples
Generosity	Wants	Give a high value to H's wants	Commissives	“Yes, of course!”
Tact		Give a low value to S's wants	Directives	“Could you spare a second?”
Approbation	Qualities	Give a high value to H's qualities	Compliments	“Your house looks so lovely!”
Modesty		Give a low value to S's qualities	Self-devaluation	“I'm not sure, I've deserved this.”
Obligation (of S to H)	Obligation	Give a high value to the S's obligation to the H	Apologies, thanking	“I'm sorry.” “Thanks.”

Obligation (of H to S)		Give a low value to the H's obligation to the S	Responses to thanks and apologies	"Don't worry!"
Agreement	Opinion	Give a high value to H's opinion	Agreeing, disagreeing	"Absolutely, no doubt!"
Opinion reticence		Give a low value to S's opinion	Giving opinions	"In my humble opinion"
Sympathy	Feeling	Give a high value to H's feelings	Congratulating, commiserating	"Congratulations!" "How are you?"
Feeling reticence		Give a low value to H's feelings	Suppressing feelings	"Oh, I'm fine. Actually though..."

Leech (2014) listed five pairs of Maxims that display the asymmetry between the speaker and hearer. As indicated in Table 1, positive politeness maxims (the first maxims in the pair) are oriented towards the speaker, while negative politeness maxims (the second maxims in the pair) are oriented towards the hearer. Leech (2014) also notes that "the hearer-oriented maxims are generally more powerful than the speaker-oriented ones, with one important exception: the Tact Maxim [...] is generally felt, at least in anglophone societies, to be more powerful than the Generosity Maxim [...]" (p. 91).

### 2.3 Requests Strategies and Politeness Modifiers

Requests play an important role in the study because they will be used to test the influence of user politeness on the quality of responses generated by AI. The topic of using requests is also mentioned within the politeness theories discussed above, therefore, it is necessary to define what a request is. According to Searle (1969), a request is a directive speech act performed when a speaker wants another person to undertake a specific action. Before making a request, the speaker hopes that the interlocutor can potentially accept and fulfil the request (Searle, 1969).

In Brown and Levinson's (1987) politeness theory, the authors discuss request as one kind of face-threatening acts because they can pose a threat to the listener's negative face by potentially infringing on their desire for autonomy and freedom from imposition. At the same time, they can damage the speaker's positive face, as the listener can refuse the request and may not be concerned about the speaker's wants, meaning that the speaker may seem as incompetent at choosing a person who can comply with the request. According to their

theory, the speaker can decide to use different politeness strategies when expressing a request in order to reduce potential threats to positive and negative face.

According to Leech (2014), requests are associated with the Tact Maxim (see Table 1), “which means that speakers tend to be chary of imposing on, or coercing, the behavior of others, and options tend to be offered to O as to whether to comply with S’s wishes or not” (p. 134).

It is important to distinguish requests from commands, as “a request leaves to the addressee the option of refusal to comply with the mand<sup>1</sup>, whereas a command does not” (Lyons, 1977, p. 749). However, it should be noted that, in general, ChatGPT is not designed to refuse the user’s request. In fact, the chatbot’s inability to refuse means that AI prompts have more in common with commands and instructions rather than requests.

Given this statement, this section aims to provide a deeper review on the topic of making requests, their formulation and applications based on Leech’s (2014, pp. 134-179) discussion on directive speech events and their classification without specific attention given to the option of refusal in requests, but rather focusing on forms which are considered to be (more) polite.

Leech (2014) argues that there is no distinguishable boundary between requests and commands, but instead “a continuous scale of optionality, leading from the ‘no option given’ of a pure command toward progressively greater and greater choice allowed to H” (p. 135). In other words, Leech implies that the difference between requests and commands represents an optionality scale that allows the addressee to choose their response. Here, commands and formulations close to commands do not leave any other choice but to comply, whereas requests are formulated in such a way that the hearer is given the opportunity to choose how to respond to the desire proposed in the request (Leech, 2014).

According to Leech (2014), requests have two competing goals: to benefit the speaker and to placate the recipient of the request. These goals refer to the speaker’s desire to receive positive response without making serious imposition for getting only benefiting response and, at the same time, giving the interlocutor possibility to decide whether to perform an act or not.

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<sup>1</sup> The term ‘mand’ was employed by Lyons (1977) as a general term to refer to commands, demands, requests entreaties, etc.

As request is a type of the directive speech act, Leech (2014) distinguishes three main strategies for performing different directive speech events:

1. Direct strategies
2. Conventionally indirect strategies
3. Non-conventionally indirect strategies

Direct strategies refer to the conveying the meaning of an act without any mitigating devices to reduce the threat to the listener's face (Leech, 2014). Performing direct requests involves:

- Imperatives (e.g., "Pass me a napkin.")
- Performatives (e.g., "I am begging you to listen.")

Performatives typically rarely appear in everyday communication as they are considered as a highly formal way of conveying requests that applicable in highly formal environments such as court sessions, government meetings and public debates (Leech, 2014).

As for imperatives, Leech (2014) notes that formulating requests in the imperative form is regarded as rude in the English language. Although adding a politeness marker "please" to imperatives softens the utterance, the more preferable form for a request is the use of the conventionally indirect strategies (e.g., "Could you" or "Would you") (Leech, 2014).

Conventionally indirect strategies include the use of the indirect form for performing directive speech acts. Indirectness refers to the way in which listeners can arrive at the illocutionary force by inference through speakers' choice of words and the way of their performing. Indirectness tends to allow speakers to make requests in a way that is typically more subtle and polite than direct ones.

Leech (2014) states that "the most common indirect strategies in everyday usage are various types of questions, but statements are also an important way of conveying a directive" (p. 147). According to Leech, statement imply the use of modal auxiliaries loaded in assertion, which allows the addressee to infer the directive's illocutionary force. Referring to conventionally indirect strategies, Leech (2014) listed different types of statements such as:

- Prediction statements: 'From now on, you will take care of this puppy.'
- Strong obligation statements: 'You must follow all my instructions.'
- Weaker obligation statements: 'You should wear something fancy tonight.'
- Volitional statements: 'I want you to look around and tell me what you see.'

- Possibility statements: ‘You might go for a walk for a while’

These statements differ in modality form from strong (you will, you must) to weaker (you should, you might). Leech (2014) notes that these types are listed in descending order of threat to the person’s face. Prediction statements express speaker’s confidence that the listener will do what is demanded. Strong obligation statements express the personal authority of the speaker and use modal verbs such as ‘must’, ‘have to’ and ‘have got to’. In contrast, weaker obligation statements can be formed using ‘should’ and ‘need’, these statements typically regarded as a piece of advice rather than a directive. Volitional statements are formed using set expressions such as ‘I want you to’ and ‘I would like you to’ in order to explicitly convey the directive force. Possibility statements, as the name implies, are used to indicate for the listener that some action is possible (Leech, 2014).

Similar to statements, Leech (2014) divides conventionally indirect strategies into: volitional questions with ‘Will you’ and ‘Would you’ beginnings and more indirect possibility questions that imply ‘Can you’, ‘Could you’ and other beginnings.

Volitional questions refer to interrogative requests that enquire about the interlocutor’s willingness to perform an action. They are applied in situations when the speaker assumes or knows that the listener is prepared to comply with the request (Leech, 2014). Volitional questions that begin with ‘Will you’ are regarded as more direct and carry the risk of being perceived as impolite; in order to make the request more indirect the other form ‘Would you’ is often used in English (Leech, 2014).

Possibility questions refer to interrogative requests that ask about the ability or possibility of the listener to do the desired action. Leech (2014) notes that the difference between these two types of requests is reflected in the ability of the interlocutor to choose between consent and refusal. Possibility questions are considered more polite as the interlocutor can freely refuse to comply because they may be unable to do so. In contrast, the refusal to volitional ‘Will/Would you’ requests puts the listener at risk of being impolite because when they refuse, they may be seen as putting their own desires above the desires of the speaker (Leech, 2014).

The last strategy for performing directives is non-conventionally indirect, which refer to making requests by giving hints to the other (Leech, 2014). These strategies are identical to the off-record politeness strategies that mentioned above in the section 2.1.3. In off-record (hinting) requests, the speaker does not specifically tell what they want from the listener; the

listener is supposed to infer the intention from the speaker's utterance (Brown & Levinson, 1987; Leech, 2014).

Politeness devices, as stated by Leech (2014), refer to language means that may appear during the use of previously mentioned strategies for directives and serve to refine the politeness level when making an utterance. These language means are divided into two types: internal and external modifiers.

Among the internal modifiers, Leech (2014, pp. 159-171) includes a large number of various linguistic devices such as:

- Downtoners. These are the modifiers that “mitigate or soften the directive force of the speech event” (Leech, 2014, p. 160). The examples of the downtoners involve: modal adverbs (e.g., possibly, probably, hopefully, perhaps), diminishers (e.g., a little, a bit) and other adjectives, adverbs, nouns and verbs that can indicate smallness (Leech, 2014).
- Deliberative opening e.g., ‘I wonder if’, ‘Do you think’.
- Appreciative opening e.g., ‘I would greatly appreciate it if’, ‘I would be grateful if’, ‘Would you be so kind’.
- Hedged performatives e.g., ‘May I ask’, ‘Could I ask’, ‘I would like to ask’.
- Negative bias e.g., ‘Do you mind’, ‘Would you mind’, ‘I don’t suppose you’.
- Happenstance indicators e.g., phrases like ‘happened to’, ‘by any chance’.
- Temporal availability queries e.g., ‘Do/Would you have time to’.
- Past tense – hypothetical openings e.g., ‘Would you’, ‘Could you’.
- Past tense – past time as in e.g., ‘I was hoping’, ‘I wanted to’, ‘I wondered if’.
- Progressive aspect e.g., ‘I am wondering if’, ‘I am hoping that’.
- Tag questions used in the end of the utterance e.g., ‘will/ would you?’, ‘can/could you?’.
- Politeness marker: please. The usage of ‘please’ has become overly established norm and indicator of the proper upbringing and etiquette in many cultures. Even from an early age, children are told to use this “magic word” to show their polite behaviour and attitude.

External modifiers represent language devices that can be added to a request to enhance the persuasion and politeness (Leech, 2014). They include supportive and preparatory language devices such as:

- Apologies e.g., ‘Excuse me’, ‘Sorry’, ‘Sorry to bother’.
- Thanks i.e., showing appreciation and gratitude prematurely, before the request has been complied with.
- The use of vocatives (i.e., names, nicknames, familiarizers, in-group identity markers and honorifics).

According to Leech (2014), the speaker can often use different modifiers in the request as well as their combinations in order to make it seem more polite. In addition, the speaker can use different ‘supporting moves’ to clarify the intension of the request. It can be observed in the following examples:

(1) Sorry to bother you. I was wondering if you could tell me a bit about the status of your current task, please? I will need to present the future plan of our team project to the superior.

(2) Hey brother, would you have time tomorrow by any chance to take me to the hospital for a check-up? I would greatly appreciate it.

It can be noticed that in (1), the request is formulated with five different modifiers and four in (2). However, the overuse of these modifiers is not always a good way of forming requests because it may lead to overpoliteness. Being overly polite is also not preferable as it causes a lot of imposition on the listener and affects their desire for the freedom of action. As such, the speaker must control the level of politeness for not being impolite and at the same time without being overly polite. The requester needs to find a middle ground or, more preferably, the appropriate politeness level for the current situation and context (Brown & Levinson, 1987; Leech, 2014).



### **3. Method**

This study aims to investigate the impact of user politeness on the responses generated by the AI language model. The central question guiding this research is: “Does AI provide better answers when users express politeness in their requests?”

The hypothesis posits that being polite in the requests and questions for the AI will produce more accurate and better information regarding the subject matter of the question. This study used ChatGPT in order to investigate the role of politeness in interactions with AI. It served as a test subject of the AI system, which responses were inspected and analysed.

First of all, it is necessary to identify the variables on which the method of conducting this study was based.

#### **3.1 Types of Variables**

The experimental method of this research was featured by the following variables: independent, dependent, confounding and controlled variables.

Independent variables are factors that the researcher manipulates to observe their effect on the dependent variable (Drager, 2018).

In this study, one of the independent variables is the politeness strategy used in the interactions with AI (i.e. positive politeness, negative politeness, and without politeness strategy). The politeness strategy variable involved treating a chatbot as if it had a face. The other independent variable involved requesting information about a technical and language topic. During the experiment, it allowed to observe if there is the potential impact of politeness on the quality of the AI responses in various topics.

Dependent variables are the outcomes that were evaluated to assess the impact of the independent variable (Drager, 2018).

In the current study, dependent variables included response length, level of formality, politeness markers and accuracy. These variables allowed to analyse the impact of user politeness on AI responses. For example, if responses are different, evaluating the accuracy of each generated response would show whether politeness helped to receive better information from the AI, while assessing formality would indicate the communication style of the AI in response to the formal and informal style used in positive politeness, negative

politeness and direct requests. Analysing the length could indicate whether AI attached any additional information to the response when it was treated politely.

Confounding variables represent potential factors that could affect the independent and dependent variables and lead to wrong conclusions regarding the experiment results. To ensure that changes in the quality of AI responses depended only on the user's politeness strategy and topic, it was necessary to correctly identify and find strategies to control confounding variables before conducting an experiment. For this study, these variables included:

- Chat history with ChatGPT. The previous interactions of the user with ChatGPT, stored in the chat history, could influence the responses of the AI. ChatGPT can refer to the context of past conversations and attribute previous patterns to the new responses.
- AI updates (ChatGPT version). Changes or updates to the ChatGPT model during the course of the study may result in differences in response quality that have nothing to do with user politeness. Different versions of ChatGPT may differ in their level of performance, which can affect the study's results.
- Uniqueness of each AI response. The inherent variability in AI-generated responses, even if the chatbot has been provided with identical requests several times, may introduce an element of randomness that may affect further analysis of dependent variables.
- Subject matter familiarity. Users' familiarity with the technical topics presented in their requests may impact the response analysis. The perception of response quality and accuracy for users familiar with the subject matter can be more objective than for users with limited knowledge. Almost every technical topic has either some exceptions or pitfalls that require in-depth study. These details may not be included in the generated answer from the AI, which may affect the answer evaluation for users familiar with the subject.
- Prompt clarity. Ambiguous prompts could affect the AI's ability to respond appropriately. AI responses always contain the information requested in the prompt. However, as previously mentioned, due to the uniqueness of AI responses, they may or may not include additional information related to the topic of the request.

In order to mitigate the impact of previously mentioned confounding variables, specific control strategies are described in section 3.2 below.

### **3.2 Control Strategies**

Controlled variables are aspects of the study that were used to minimise or at least balance the influence of confounding factors on the dependent variable (Drager, 2018).

For this experiment, the type of AI language model remained unchanged. The study utilised a specific version of ChatGPT to maintain consistency. In the experimental part of this study, interactions with the ChatGPT model were conducted using the GPT-3.5 version as the primary AI language model. This decision ensured that any observed effects on AI responses could be attributed to the manipulation of user politeness rather than differences between versions. In order to minimise the impact of the previous chat history, a new conversation was started for each request. As such, the conversation with ChatGPT for each condition contained only one request and one response.

Before running the experiment, clear and standardised prompts were prepared to minimise ambiguity. The same formulations and words for positive politeness and then for negative politeness prompts were used for both the language and the technical topics. This ensured that any observed effects could be more attributable to user politeness. To account for the variability in AI responses, the author interacted with ChatGPT twice using the same politeness strategy. Analysis of each variation of the response to the same request helped to capture the range of information included and the impact of the independent variables.

Prior to engaging in interactions with ChatGPT and analysing requests related to technical topics, it is pertinent to acknowledge that the author has a certain understanding of the subject matter under consideration. Being a university student of the Faculty of Electrical Engineering and Communication (FEEC), the author was in a better position to evaluate the accuracy of the replies than a member of the general public. Familiarity with the subject is crucial for objective evaluation and a more focused investigation into the quality of AI-generated responses.

### 3.3 List of Requests for the Experiment

Based on the Politeness Principles (Leech, 1983, 2014) and Politeness Theory (Brown & Levinson, 1987), three pairs of requests for ChatGPT were formulated to test within the experiment the hypothesis about the relationship between user politeness and the quality of responses generated by artificial intelligence. These requests vary in the type of politeness strategy used and the request topic (for language contexts (1); for technical contexts (2)).

- Positive politeness requests:
  - (1) “Hey, ChatGPT, how are you? I am fascinated by your expertise in language understanding and word processing skills. Find the mistakes in the text of mine, will you, buddy?”
  - (2) “Hey, ChatGPT, how are you? I am fascinated by your expertise in technical subjects. Define an induction generator and explain how it works, will you, buddy?”
- Negative politeness requests:
  - (1) “I would greatly appreciate if you could help me find mistakes in this text, please.”
  - (2) “I would greatly appreciate if you could define an induction generator and explain how it works, please.”
- Direct requests:
  - (1) “Find mistakes in this text.”
  - (2) “Define an induction generator and explain how it works.”

In the first pair of requests, compliments and noticing of admirable qualities were used for positive politeness, as well as the use of the application’s name for insinuating familiarity. For the negative politeness, an indirect form of request, hedging and formal language were used in order to minimise the imposition. For the last pair, no politeness strategy was used; it was formulated in the form of a direct request, which can be interpreted as an order or command.

In terms of Politeness Principle Maxims (see Table 1), the pair of positive politeness used the Approbation Maxim, as the requests give a high value to the addressee’s qualities by giving compliments, whereas the Maxim of Tact is assignable for the pair of requests that used negative politeness.

## 4. Experimental Part

### 4.1 Language Topic Preparation

For the language-oriented test part, it was essential to choose an appropriate text written later than sources available to the ChatGPT model's current database (i.e., January 2022). Afterwards, the text had to be modified by inserting the errors which the model then would be requested to find and correct. It was decided to include errors similar to those that can be found in mistake correction exercises and proofreading tasks. These include grammatical and spelling errors; text consistency errors; the use of incorrect homophones; missing or incorrect punctuation, articles and apostrophes; and other types of errors. The variety of mistakes serves as a measurement tool to observe if the different politeness strategies influence the quality of the ChatGPT's editorial output.

The text chosen for the experiment is a recent article from Wikipedia that is available under the Creative Commons Attribution-ShareAlike Licence 4.0, which allows copying and transforming of the material for any purpose (Creative Commons, n.d.). In addition, it was noticed that the passage of the source text utilised for the experiment also contained several grammatical errors. As such, it was decided that these errors would serve as additional errors to observe how ChatGPT would correct not only the intentionally inserted errors, but also the pre-existing ones.

Experimental text with errors underlined and numbered. (Note: The errors in the actual request were not underlined and numbered):

#### **Lunar Surface Gravimeter**

The lunar surface gravimeter (1) (LSG) was a lunar science experiment that was deployed on the surface of the moon (2) by the astronauts of Apollo 17 in (3) December 12, 1972. Conceived and led by Joseph Weber as principal investigator (4), the experiment aimed to measure changes in the local gravitational strength on the moon (2)(5) surface. This (6) measurements were intended to provide insight into the internal structures of the moon (2) as it tidally deformed due (7) interaction with (8) gravitational fields of the earth (2) and sun (2). In addition (9) the experiment hoped (10) contribute experimental evidence of the existence of gravitational waves.

The gravimeter unit, that (11) was deployed on Apollo 17 was not properly calibrated and cannot (12) be properly zeroed for use in a (13) lunar gravity. Whilst the

experiment continued to be used as a one-axis seismometer (14) the data received back was noisy and required more modern analyses (15) techniques before the experiments (16) data was proven valuable. Later understanding of gravitational waves was showing (17) that even if (18) experiment worked (19) as intended, it would not have been sensitive enough too (20) detect them.

Inserted errors:

- (1) Missing capitalisation of the name of the experiment before the acronym (original: Lunar Surface Gravimeter);
- (2) Missing capitalisation when referring to the proper name of a solar system body;
- (3) Incorrect preposition (original: on December 12);
- (4) Incorrect spelling (original: investigator);
- (5) Missing apostrophe (original: the Moon's surface);
- (6) Incorrect demonstrative pronoun (original: These measurements);
- (8) Missing article (original: the gravitational fields);
- (10) Incorrect infinitive form (original: hoped to contribute);
- (11) Incorrect comma (comma before 'that');
- (12) Incorrect grammatical tense (original: could not);
- (13) Incorrect article (original: in lunar gravity);
- (14) Missing comma;
- (15) Incorrect form (original: analysis techniques);
- (17) Incorrect grammatical tense (original: showed);
- (20) Incorrect homophone ('to' and 'too');

Errors in the original text:

- (7) Missing preposition (should be: due to);
- (9) Missing comma after introductory phrase (i.e., In addition);
- (16) Missing apostrophe (should be: the experiment's data or experimental data);

(18) Missing article (should be: the experiment);

(19) Incorrect form of the 3<sup>rd</sup> conditional (should be: if the experiment had worked as intended, it would not have been sensitive enough to detect them).

## **4.2 Technical Topic Preparation**

For the technical request, the initial preparation included obtaining the necessary knowledge about the subject of the request: the definition and working principle of the asynchronous generator. Although the subject may seem rather straightforward, the preparation also included learning about the types of electrical generators, as well as the principles of operation of electrical machines such as motors. Moreover, the request needed some clarification as well, in order to avoid getting responses containing definitions and explanations of asynchronous generators from another sphere such as programming (e.g., in Python or JavaScript), which also operate with the terms ‘asynchronous’ and ‘generators’. For this purpose, a synonymous expression “induction generator” proved useful.

## **4.3 Experiment Procedure**

After all the necessary preparations, the experiment was conducted in accordance with the method outlined in section 3 above. A clear account without any history of previous interaction was used to conduct the experiment. Each interaction with ChatGPT was conducted in a new conversation window. The order in which the requests were provided was positive, negative politeness and direct requests for the language task, followed by the same order for the technical task. After obtaining a response for each of the conditions, the requests were repeated one more time to obtain more versions of the responses in order to observe consistency for each politeness strategy and capture the variable additional information of the responses for the same requests.

The following sections contain passages from AI responses which this paper analyses in greater detail. The passages are referred according to the strategy, request topic and number of the obtained response. For example, PPL1 refers to the first obtained response to positive politeness request for the language-oriented topic; NPT2 refers to the second obtained response to negative politeness request for the technical-oriented topic; DR refers to the responses to direct requests. Complete responses from ChatGPT are provided in the appendix.

#### 4.4 The Analysis of the Text Errors Identification and Correction

The text provided to ChatGPT is a two-paragraph passage from a Wikipedia article, which was modified by inserting various errors. The chatbot’s task was to find these errors. Already at first glance, it could be noticed that ChatGPT’s ability to process texts is highly efficient because almost all of the inserted errors were identified and corrected. However, the responses still contain various inconsistencies and additions that are different from the source text.

The analysis of the generated responses initially assumed to be focusing on the number of uncorrected mistakes left; however, in all responses the inserted errors were corrected with high precision. As such, this analysis will focus on other aspects of the responses, which involve inconsistency in structure, tenses and capitalisation.

The responses to the text correction tasks were generated in three formats: a corrected text, a list of corrections, and a combination of both. The form of plain text was the most accurate because the responses containing lists were incomplete and misleading since they did not contain all the corrections. Table 2 details the format and number of corrected and uncorrected errors for each obtained response.

Table 2. *Response types and number of corrected and uncorrected errors.*

Condition		Response format	Number of corrections of inserted errors (Total: 20)	Errors left uncorrected
PP	1	List and text	16	Errors # 1, 2, 12 and 19
	2	List and text	18	Errors # 1 and 19
NP	1	List	15	<ul style="list-style-type: none"> <li>• Error # 12 appeared in the list uncorrected;</li> <li>• Sentences with errors # 1, 3, 5 and 14 were not included in the list.</li> </ul>
	2	Text	20	None
DR	1	List	13	<ul style="list-style-type: none"> <li>• Error # 19 appeared in the list uncorrected;</li> <li>• Sentences with errors # 1, 2, 3, 8, 11 and 14 were not included in the list.</li> </ul>
	2	List and text	20	None



#### 4.4.1 List Format Responses

Among the obtained results, 5 out of 6 responses contained a list which included the corrections and suggestions for the provided text. The main disadvantage of the responses generated in the list format is their incompleteness. In the responses containing only the list, not all errors were included. However, in the responses that contained the corrected text after the list, it could be observed that the text contained corrections that were not mentioned in the list.

One problem with the list containing responses is that some lists contain corrections of places which did not have an error in the experimental text. For example:

- consider adding “the” before “internal structures” (NPL1);
- “the data received back was noisy”: Add “the” before “data” (NPL1).
- “gravi meter” should be “gravimeter,” as a single word (DRL1);

In the first two examples, the AI model presumably suggests that the phrase was missing the article ‘the’, however the article was in the experimental text. The last example also shows a non-existent error because the experimental text contained the word ‘gravimeter’ only as a single word.

Another problem with the lists refers to places in which the suggested corrections represent a repetition of the original text. For example:

- “the existence of gravitational waves” should be “the existence of gravitational waves.” (PPL1);
- “one-axis seismometer” should be “one-axis seismometer.” (PPL1);
- “one-axis seismometer” could be hyphenated as “one-axis seismometer” for clarity. (PPL2);

In general, the inaccurate ‘listed’ responses show the disadvantage of the variability of the AI-generated responses. Because the request did not specify what request format is preferable, the possibility of obtaining one of the three response formats is random. Ideally, the user should consider this possibility and should add clarification to the prompt in order to obtain only the results with text.

#### 4.4.2 Capitalisation of the ‘Moon’, ‘Sun’ and ‘Earth’

One conspicuous inconsistent correction that catches attention is the capitalisation when referring to the proper name of a solar system body. The experimental text contained five uncapitalised names, three of which referred to the proper name of the Earth’s moon and two others referred to the proper name of ‘Earth’ and ‘Sun’. For the experiment, it was expected that the names of the celestial bodies would be capitalised in the text about space exploration. Table 3 shows in which cases the names of solar system bodies were capitalised and in which they were not.

Table 3. *Solar system body’s names capitalisation in the responses.*

Condition		Were the ‘Sun’ and ‘Earth’ capitalised?	Was the ‘Moon’ capitalised?
PP	1	No	No
	2	Yes	Yes
NP	1	Yes	Was not included in the list
	2	Yes	Yes
DR	1	Was not included in the list	Was not included in the list
	2	Yes	No

The original text had these words capitalised in accordance with Style Guide for NASA Authors and Editors (2012), which states that:

Capitalize the names of planets (e.g., “Earth,” “Mars,” “Jupiter”). Capitalize “Moon” when referring to Earth’s Moon; otherwise, lowercase “moon” (e.g., “The Moon orbits Earth,” “Jupiter’s moons”). Capitalize “Sun” when referring to our Sun but not to other suns. Do not capitalize “solar system” and “universe.” Another note on usage: “Earth,” when used as the name of the planet, is not preceded by “the”; you would not say “the Neptune” or “the Venus.” When “earth” is lowercased, it refers to soil or the ground, not the planet as a whole. Do use “the” in front of “Sun” and “Moon” as applicable. (Capitalization, para. 3)

Similarly, according to U.S. Government Publishing Office Style Manual (2016), the names of the celestial bodies as well as the planets should be capitalized (e.g., “Sun”, “Moon”, “Saturn”, “Earth”) (p. 36).

According to Straus, Kaufman and Stern (2014), writers should capitalise planets such as “Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, but policies vary on capitalizing earth, and it is usually not capitalized unless it is being discussed specifically as a planet” (p. 50). Moreover, they state that, heavenly bodies besides planets (e.g., “the sun’ or ‘the moon’) should never be capitalised unless it is a proper noun (Straus et al., 2014, p. 51).

The inconsistency in the capitalisation of solar system body names can be explained by the fact that many publishing houses and press associations have different recommendations in this regard. For example, in contrast to the above-mentioned rules from style guides and handbooks, Swan (1980) states that “[c]apital letters are used for the names of the planets (but not *the earth, the sun or the moon*)” (p. 575).

Regarding politeness, the analysis shows that responses to both polite and direct requests contain both possible options. There were no patterns in regard to the name capitalisation of the celestial bodies that could be assigned to the particular request condition.

#### 4.4.3 Capitalisation of a Name Followed by an Acronym

Another error that concerned the capitalisation was the lower case of a proper name of the experiment ‘Lunar Surface Gravimeter’ before the acronym ‘LSG’. Although the original text had this name capitalised, only in 2 out of 6 responses the name was capitalised (see Table 4).

Table 4. *Capitalisation of the experiment’s name in the responses.*

Condition		Was the ‘Lunar Surface Gravimeter’ capitalised?
PP	1	No
	2	No
NP	1	No
	2	Yes
DR	1	Was not included in the list
	2	Yes

The general rule that can be applied to missing capitalization error in this place is the capitalization of a proper noun. According to U.S. Government Publishing Office Style Manual, the rule states that “A common noun or adjective forming an essential part of a

proper name is capitalized; the common noun used alone as a substitute for the name of a place or thing is not capitalized” (U.S. GPO, 2016, p. 28).

As listed in Table 4, the responses with capitalised experiment’s name appeared in negative politeness and direct request conditions. Although the other responses had alternative uncapitalised version, this does not indicate that politeness affected the correction of this particular place. Presumably, the inconsistent capitalisation for the experiment’s name in the responses could be a problem of interpretation. In other words, it is assumed that ChatGPT could not systematically recognise the words before the acronym as the experiment’s proper name, but rather as individual words that should not be capitalised.

#### **4.4.4 Past Tense Conditional**

The error with the incorrect form of the third conditional in the last original sentence was corrected only in 3 out of 6 responses (two in the negative politeness condition and one the in direct request condition).

Original text:

Later understanding of gravitational waves showed that even if experiment worked as intended, it would not have been sensitive enough to detect them.

Corrected text:

Later understanding of gravitational waves showed that even if the experiment had worked as intended, it would not have been sensitive enough to detect them.

As stated by Swan (1980), this is a typical mistake made when talking about the past because when talking about “things that did not happen in the past (imagining what would have happened if things had been different), we use the structure *if + past perfect*, with the perfect conditional [...] in the other part of the sentence” (p. 305).

ChatGPT was able to recognise the error in the sentence with the past conditional in only half of the cases. Nevertheless, politeness in the requests did not have any effect on the error corrections. Presumably, ChatGPT could not systematically identify the context in which the use of the third conditional would be an appropriate correction.

#### **4.4.5 Other Changes Made to the Text**

It is worth noticing that the AI model systematically changed some parts of the text which were actually correct. Given that the AI model does not have access to the source, these

changes are regarded as acceptable, since they result in an error-free text with the same meaning. For example, in all of the responses ChatGPT changed the subordinating conjunction ‘whilst’ to synonymous conjunction ‘while’:

Original text:

Whilst the experiment continued to be used as a one-axis seismometer, the data received back was noisy...

Response text:

While the experiment continued to be used as a one-axis seismometer, the data received back was noisy...

According to the Cambridge Dictionary (n.d.), “While and whilst mean the same when we use them as conjunctions. They both mean ‘during the time that something else happens’, or ‘in contrast with something else’. While is much more common than whilst, and whilst sounds more formal”.

According to the Corpus of Contemporary American English (COCA), ‘whilst’ is “chiefly British while”. As observed in COCA, the word ‘while’ as a conjunction occurs in 583.08 instances, whereas ‘whilst’ has a frequency of 4.86 instances per million tokens (Davies, 2008). In addition, the British National Corpus shows similar results: ‘while’ occurred in 479.49 instances and ‘whilst’ has a frequency of 56.95 instances per million tokens (Davies, 2004). Although these two conjunctions are interchangeable, ‘whilst’ is old-fashioned and used to be a typical feature of British English, whereas ‘while’ is now commonly used in both British and American English. It can be hypothesised that the AI model’s database contains more examples of the modern-day English ‘while’ conjunction usage and that is why ChatGPT prefers it as a more commonly used one.

Occasionally, some parts of the text were rephrased by the AI model. Although the experimenter had not asked for such ‘improvements’, ChatGPT provided responses with various lexical changes. In the experimental text, one place was initially edited by inserting two errors (i.e., ‘the local gravitational strength on the moon surface’). There, the underlined word contains the capitalisation error, which was already discussed above, and the missing apostrophe. The word ‘Moon’ was capitalised and featured the possessive form (i.e., “the Moon’s surface”) in the original text. However, in 5 out of 6 responses, this expression was rephrased by replacing it with a synonym: “the lunar surface”.

These changes were present for every response condition, so they also did not indicate the influence of politeness. It can be concluded that despite of politeness in the request, ChatGPT may always provide users with suggestions to improve or rephrase some parts of the text.

#### 4.4.6 Number of Paragraphs

In the responses that contained text, it can be observed that the AI model changed the format of the two-paragraph passage in one response to the negative politeness. Table 5 shows how ChatGPT decided to divide the corrected text.

Table 5. *Numbers of paragraphs for the text in the responses.*

Condition		Number of paragraphs
PP	1	2
	2	2
NP	1	The response is a list
	2	3
DR	1	The response is a list
	2	2

The text in the response for negative politeness condition was split into three paragraphs. Each of these was numbered and named, with the title followed by a colon.

This inconsistency can hardly be attributed to the politeness strategies used in requests, but rather to the randomness of the generated format, which was mentioned in the chapter on the list format (see 4.4.1).

#### 4.4.7 Short Messages in the Responses

ChatGPT provided short messages before the corrections:

Table 6. *Short Messages before the corrections.*

Condition		Messages before the corrections
PP	1	Here are the corrections: (before the list) Here's the corrected passage: (before the text)
	2	Sure, I'd be happy to help you correct the mistakes in your text: (before the list) Here's the revised version: (before the text)
NP	1	Here are the corrections and suggestions for your text:
	2	Here are some corrections and improvements for the text:
DR	1	Here are the mistakes in the text:
	2	After these corrections, the text should read (before the text)

As listed in Table 6, it can be observed that some messages in the responses to the positive politeness request contain contractions (i.e., here's, I'd). There were no contractions for the direct request condition; however, similar contracted forms also appeared in the 'listed' response to the negative politeness. For example:

- The acronym should be expanded the first time it's mentioned (NNL1);
- It seems like there's a missing word or phrase here (NNL1).

In addition, both responses to the negative politeness request had short summaries:

- (1) Overall, your text is well-written but needs some minor corrections for clarity and grammar. (NNL1);
- (2) Here are the corrections and improvements made to the text. Let me know if you need further assistance! (NNL2).

In (1), the summary involved a compliment and some criticism to the provided text, whereas (2) used the versatile phrase showing that the AI chatbot is ready for additional requests for assistance.

The contracted forms appeared only in the responses to polite requests. Although they did not have any effect on the accuracy of corrections, the contractions are characteristic of informal style, and the summaries show that ChatGPT demonstrates some signs of attention and politeness.

#### **4.4.8 Conclusion for the Language-oriented Part of the Experiment**

After analysing the responses with error corrections, it is already possible to draw some preliminary conclusions. For the most part, the AI model showed that it is able to provide efficient and quick corrections; however not all responses were completely accurate and of high quality. The inaccuracies in correction showed that although the AI model could effectively find and correct such errors as incorrect or missing punctuation, articles and apostrophes, and incorrect spelling, it could not consistently identify errors in cases such as capitalising letters and grammatical tenses.

Although requests were formulated using three different strategies, there were no discernible patterns in the responses that could be assigned to a particular strategy. Any differences in quality were rather confined to the format of the response. In other words, responses containing corrected text were more accurate and of higher quality than responses consisting only of a list of corrections. The reason for this is that these lists were incomplete and sometimes contained “corrections” identical to the source text.

Apparently, politeness in the requests does not affect the quality of responses for language-oriented tasks such as correcting errors in the text. Presumably, the factor of randomness in response generation plays a much more important role. This is why when communicating with ChatGPT, there is a possibility to obtain both high-quality results as well as incomplete and inaccurate ones.

#### **4.5 The Analysis of the Technical Topic Responses**

The second part of this analysis concerns the responses for the technical topic of induction generators. As previously mentioned, the chatbot was requested to provide the definition and explanation of the working principle of the induction generator. Contrary to the topic of finding errors, every response to this topic contained information that differed from the other responses in terms of content, structure, quality and number of terms and definitions. However, there is one prominent moment that immediately distinguishes responses to the positive politeness request from others.



#### **4.5.1 Positive Politeness Beginnings**

In the starting paragraphs of the responses to the positive politeness request, the ChatGPT model systematically applied an informal style in response to different politeness markers and supportive moves contained in the request. For example:

- In response to “Hey, ChatGPT, how are you?”, it responded:  
“Hey there! I’m doing great, thanks for asking!” (PPT1)
- In response to “I am fascinated by your expertise in technical subjects.”:  
“I’m glad you’re fascinated by technical subjects!” (PPT1)
- In response to the main subject of the request:  
“Here’s how it works.” (PPT2)

It can be noted that the AI-generated sentences involve contracted words (i.e., I’m, you’re, here’s), which are typically used in informal speech, despite the fact that the request itself does not have contractions. It can be assumed that ChatGPT determines the implied style in the request, since the positive politeness request is formulated as the most informal, while the negative politeness strategy generally involves formal style and direct requests do not contain any indications of being informal. For the most part, responses to other requests do not contain informal style and contractions, with the only exception of the sentence “Here’s how it (an induction generator) works”, which systematically appeared in every response. This may indicate that the AI model can mirror the level of formality used in the request for some parts of the response. Interestingly, this specific feature did not occur in the responses to positive politeness for the language-oriented task.

#### **4.5.2 Evaluation of Length and Content**

In order to analyse the response quality, it is essential to determine key criteria that the response should contain to be considered accurate and comprehensive, as well as criteria for a low-quality response. The criteria for an inadequate response include the number of errors or inaccuracies. A high-quality response, of course, should not contain any. The main factor in evaluating a high-quality response is whether the response provides a complete understanding of how an induction generator works and what it is. Other criteria include the structure and length of the response as well as the number of terms and definitions.

Regarding length, ChatGPT systematically provided responses of approximately the same word count that was ranging from 303 words to 403 words (see Table 7). In this relatively limited length the AI model attempted to interconnect chunks of information from different sources in its database.

Table 7. *Word count in each provided response by ChatGPT.*

Condition		Word count
PP	1	303
	2	403
NP	1	353
	2	348
DR	1	346
	2	386

Clearly, the approximate range of 350 words was not enough to obtain a complete understanding of such a complex technical matter as induction generators. Each response contained only relatively general information about the induction generators. Given the length of the answers, this information is more of a compilation of facts than a complete explanation. In other words, the answers did not include more detailed and in-depth information such as single-phase and three-phase windings, squirrel cage and wound rotor, slip, synchronous speed and other details. Typically, the response content involved:

- a definition
- the basic principle (Faraday’s law of electromagnetic induction)
- the basic structure components (i.e., stator and rotor)
- an explanation of the operation
- applications

One of the specifically requested items was the definition. Each response contained a similar definition in terms of both the length and the meaning. Responses to the positive politeness request provided a more general description that could be applied to any electric generator:

- An induction generator is a type of electric generator that produces electricity by utilizing electromagnetic induction. Like all generators, an induction generator converts mechanical energy into electrical energy. (PPT1)
- An induction generator is a type of electrical generator that produces electricity by converting mechanical energy into electrical energy. Like any generator, an induction generator relies on the principle of electromagnetic induction. (PPT2)

In contrast, responses to the direct request did not mention the general principle of generators (i.e., converting one kind of energy into another), but specified the particular group to which an induction generator belongs to. For example:

- An induction generator is a type of alternating current (AC) electrical generator that produces electricity by induction. (DRT1)

Regarding fulfilling the request, it could be stated that ChatGPT is a very quick and highly effective source of general information. In a matter of seconds, the user is provided with a sufficient amount of information. However, regarding quality, the AI model's developers and ChatGPT itself always warn at the bottom of the application webpage that it can make mistakes and users should consider verifying the information they receive.

#### **4.5.3 Information Accuracy**

Presumably, due to the specificity of message generation by artificial intelligence, when information from various sources in the database is fed into the response, some parts may contain inaccuracies in formulations. This can be observed in one of the response passages:

In summary, an induction generator converts mechanical energy into electrical energy through the process of electromagnetic induction, utilizing the interaction between the rotating magnetic field produced by the rotor and the stationary magnetic field produced by the stator windings. (PPT2)

The correct formulation here should be that the rotating magnetic field is produced in the stator (see e.g., Sen, 2013, p. 202). This mistake occurred only in one response; in other responses the rotating magnetic field was correctly attributed to the stator.

Another inconsistency was observed in the differing information about self-exciting and self-starting induction generators:

- (1) Unlike synchronous generators, induction generators are not inherently self-excited.  
(NPT2)
- (2) It [an induction generator] does not require external excitation and is self-starting.  
(NPT1)
- (3) In some cases, induction generators can be self-excited, meaning they can generate power without an external power source. (DRT2)

In reality, only 3-phase induction generators can be self-starting, which was not mentioned in any response. It was noted in (1) and (2) that induction generators are not self-excited, which is inaccurate. As mentioned in (3), certain induction generators can be self-excited by using capacitors (see e.g., Boldea, 2018, p. 25), but their type was not specified.

#### **4.5.4 Conclusion for the Technical-oriented Part of the Experiment**

Similarly to the previous part of the experiment, regarding the main request subject no special distinctive patterns for a certain politeness condition were observed in the experiment. All of the responses provided a relatively high-quality compilation of information about the induction generators. In general, each received response could be characterised as a typical answer to a question that one would expect to receive from a generative AI. The responses contained little specificity of particular aspects because this experiment's requests did not ask for that. In addition to the definition and principle of operation of the induction generator, additional information such and speed control, self-excitation and applications was also included and varied from response to response.

## 5. Practical Recommendations for Creating Prompts

Given that the experiment focused mainly on politeness, the requests were highly generic, which resulted in responses of various quality. This section provides several practical recommendations for users on prompt creation using the tasks from the experiment as an example.

In the language-oriented part experiment part, where ChatGPT was requested to find and correct the errors in the text, it was mentioned that one of the problems with the responses was the inconsistency in format (see 4.4.1). Responses with a list format contained fewer corrected errors than responses which contained text. If a user wants to check their own text in ChatGPT for errors, it is worth specifying in the prompt that the response must be in the form of the corrected text. In addition, if a user wants to see all the corrections separately from the text and wants ChatGPT to comment on all changes made, it is advisable to add a corresponding prompt to the request, such as: “Below the text, comment on every correction or change you make”. The prompt can include information about the text, such as style, type, purpose, what topic it is about and other details. All this information will be considered and will help the AI model find suitable collocations and suggest corrections for the current text.

In the second part of the experiment, the task was to provide the definition of an induction generator and an explanation of its working principle. As mentioned in 4.5.2, the responses were limited to the length of approximately 300-400 words. Presumably, this is the default setting for ChatGPT; however, it can be circumvented by adding the approximate length of the desired response to the request. For example: “The explanation should be about 1,000 words”. This will enable a user to obtain more information. It is always preferable to include as many details in the prompt as possible because each added detail specifies what information a user wants to obtain (OpenAI, 2022b).

Although AI services and applications such as ChatGPT are fast and increasingly efficient ways of obtaining information, it is important to take into consideration that according to the general opinion, they are unreliable sources of information. AI can make mistakes, which is why any information, especially that of high importance, must be carefully reverified. Moreover, all information provided by such AI models can be found in books, libraries and other sources in a more detailed way.

## Conclusion

To summarise, this paper provided theoretical grounds on the topic of Artificial Intelligence and politeness and introduced the experiment that aimed to test the hypothesis that AI application provides better responses when giving polite prompts. The first chapter introduced the basis for understanding the concept of AI, machine learning types and what interferences machines can achieve while learning. Then, general descriptions of neural networks, natural language processing and LLMs were briefly provided, with specific attention given to the AI prompts and the well-known conversation-based chatbot, ChatGPT.

The second chapter introduced the politeness topic. Firstly, based on the well-established politeness theory by Brown and Levinson (1987), this paper described the concept of face and different politeness strategies that are used to reduce face damage. Secondly, the eight characteristics of politeness and Politeness Principle maxims proposed by Leech (2014) were mentioned. Based on Leech's (2014) discussion, request strategies and various politeness modifiers were presented.

In the next section, the variables featuring in the experiment were discussed along with the control strategies implemented in order to minimise the confounding aspects. The experiment procedure was then designed by creating prompts in the form of requests on the language and technical-oriented topics for the AI model. The experiment was conducted by means of interaction with ChatGPT using polite requests and direct requests in the imperative form that did not contain any politeness markers in order to test the potential impact of politeness on the quality and accuracy of the AI-generated responses.

From the response analysis, the data obtained in this not very extensive experiment did not support the politeness hypothesis. Although the obtained responses showed that ChatGPT is able to fulfil the requests and complete the given tasks effectively, there were no distinguishable patterns that could be assigned to a particular politeness strategy or that could show the effect on quality. Apparently, politeness in the requests for ChatGPT does not affect the quality of the responses for language-oriented tasks, such as correcting errors in the text and technical-wise tasks, such as giving definitions and explanations.

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## List of Abbreviations and Acronyms

AI	Artificial Intelligence
ANN	Artificial Neural Network
COCA	Corpus of Contemporary American English
FEEC	Faculty of Electrical Engineering and Communications
FTA	Face Threatening Act
GPT	Generative Pre-training Transformer
LLM	Large Language Model
LSG	Lunar Surface Gravimeter
NASA	National Aeronautics and Space Administration
PP	Politeness Principle

## Appendix

Source text for the language-oriented part (Wikipedia contributors, 2024):

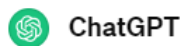
### **Lunar Surface Gravimeter**

The Lunar Surface Gravimeter (LSG) was a lunar science experiment that was deployed on the surface of the Moon by the astronauts of Apollo 17 on December 12, 1972. Conceived and led by Joseph Weber as principal investigator, the experiment aimed to measure changes in the local gravitational strength on the Moon's surface. These measurements were intended to provide insight into the internal structures of the Moon as it tidally deformed due to interaction with the gravitational fields of the Earth and Sun. In addition the experiment hoped to contribute experimental evidence of the existence of gravitational waves.

The gravimeter unit that was deployed on Apollo 17 was not properly calibrated and could not be properly zeroed for use in lunar gravity. Whilst the experiment continued to be used as a one-axis seismometer, the data received back was noisy and required more modern analysis techniques before the experiment's data was proven valuable. Later understanding of gravitational waves showed that even if the experiment worked as intended, it would not have been sensitive enough to detect them.

Responses for the language-oriented part. Positive politeness condition:

1) ChatGPT's response: <https://chat.openai.com/share/af6cfb83-8548-447f-9da5-10e0fd7cb6e5>



Here are the corrections:

1. "investigater" should be "investigator."
2. "This measurements were" should be "These measurements were."
3. "moon surface" should be "lunar surface."
4. "due interaction" should be "due to interaction."
5. "In addition" should be followed by a comma: "In addition, the experiment hoped to contribute experimental evidence..."
6. "the existence of gravitational waves" should be "the existence of gravitational waves."
7. "gravimeter unit, that was deployed" should be "gravimeter unit that was deployed" (remove the comma).
8. "zeroed for use in a lunar gravity" should be "zeroed for use in lunar gravity."
9. "one-axis seismometer" should be "one-axis seismometer."
10. "analyses techniques" should be "analysis techniques."
11. "experiments data" should be "experiment's data."
12. "Later understanding of gravitational waves was showing" should be "Later understanding of gravitational waves showed."
13. "it would not have been sensitive enough too detect them" should be "it would not have been sensitive enough to detect them."

Here's the corrected passage:

"The lunar surface gravimeter (LSG) was a lunar science experiment that was deployed on the surface of the moon by the astronauts of Apollo 17 on December 12, 1972. Conceived and led by Joseph Weber as principal investigator, the experiment aimed to measure changes in the local gravitational strength on the lunar surface. These measurements were intended to provide insight into the internal structures of the moon as it tidally deformed due to interaction with the gravitational fields of the earth and sun. In addition, the experiment hoped to contribute experimental evidence of the existence of gravitational waves.

The gravimeter unit that was deployed on Apollo 17 was not properly calibrated and cannot be properly zeroed for use in lunar gravity. While the experiment continued to be used as a one-axis seismometer, the data received back was noisy and required more modern analysis techniques before the experiment's data was proven valuable. Later understanding of gravitational waves showed that even if the experiment worked as intended, it would not have been sensitive enough to detect them."



2) ChatGPT's response: <https://chat.openai.com/share/dca41675-acfb-4901-8650-bd1a8b6db943>



ChatGPT

Sure, I'd be happy to help you correct the mistakes in your text:

1. "investigater" should be "investigator."
2. "This measurements" should be "These measurements."
3. "moon surface" should be "lunar surface" for consistency.
4. "due interaction" should be "due to interaction."
5. "In addition" should be followed by a comma: "In addition, the experiment hoped to contribute experimental evidence..."
6. "gravimeter unit, that was deployed" could be revised for clarity: "The gravimeter unit deployed on Apollo 17..."
7. "cannot be properly zeroed" should be "could not be properly zeroed" to maintain past tense consistency.
8. "for use in a lunar gravity" could be rephrased for clarity: "for use in lunar gravity conditions."
9. "Whilst" is less commonly used; you might prefer "While."
10. "one-axis seismometer" could be hyphenated as "one-axis seismometer" for clarity.
11. "more modern analyses techniques" should be "more modern analysis techniques" or "more modern analytical techniques."
12. "before the experiments data" should be "before the experiment's data" for possessive form.
13. "proven valuable" should be "proved valuable" to maintain past tense consistency.
14. "Later understanding of gravitational waves was showing" could be rephrased for clarity: "Later understanding of gravitational waves showed."
15. "too detect them" should be "to detect them."

Here's the revised version:

#### "Lunar Surface Gravimeter

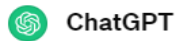
The lunar surface gravimeter (LSG) was a lunar science experiment deployed on the surface of the Moon by the astronauts of Apollo 17 on December 12, 1972. Conceived and led by Joseph Weber as principal investigator, the experiment aimed to measure changes in the local gravitational strength on the lunar surface. These measurements were intended to provide insight into the internal structures of the Moon as it tidally deformed due to interaction with the gravitational fields of the Earth and Sun. In addition, the experiment hoped to contribute experimental evidence of the existence of gravitational waves.

The gravimeter unit deployed on Apollo 17 was not properly calibrated and could not be properly zeroed for use in lunar gravity conditions. While the experiment continued to be used as a one-axis seismometer, the data received back was noisy and required more modern analysis techniques before the experiment's data proved valuable. Later understanding of gravitational waves showed that even if the experiment worked as intended, it would not have been sensitive enough to detect them."



Responses for the language-oriented part. Negative politeness condition:

1) ChatGPT's response: <https://chat.openai.com/share/93a505db-cd63-42a7-b12e-a74dfc29df9d>



Here are the corrections and suggestions for your text:

1. "Lunar Surface Gravimeter": The title seems correct.
2. "LSG": The acronym should be expanded the first time it's mentioned, like so: "lunar surface gravimeter (LSG)".
3. "December 12, 1972": Remove the comma after "December 12".
4. "Conceived and led by Joseph Weber as principal investigator": "Investigator" should be corrected to "investigator". Also, consider rephrasing the sentence for clarity: "Conceived and led by Joseph Weber as the principal investigator".
5. "This measurements were intended to provide insight into the internal structures of the moon": "This measurements" should be corrected to "These measurements". Also, consider adding "the" before "internal structures".
6. "as it tidally deformed due interaction with gravitational fields of the earth and sun": It would be clearer to say "as it is tidally deformed due to interactions with the gravitational fields of the Earth and Sun".
7. "In addition the experiment hoped contribute experimental evidence of the existence of gravitational waves": "In addition" should be followed by a comma. "Contribute" should be corrected to "to contribute". Also, consider rephrasing for clarity: "In addition, the experiment aimed to contribute experimental evidence for the existence of gravitational waves".
8. "The gravimeter unit, that was deployed on Apollo 17 was not properly calibrated": Replace "that" with "which". Also, consider rephrasing for clarity: "The gravimeter unit deployed on Apollo 17 was not properly calibrated".
9. "cannot be properly zeroed for use in a lunar gravity": "zeroed" should be corrected to "zeroed out". Consider rephrasing for clarity: "cannot be properly zeroed out for use in lunar gravity".
10. "Whilst": Replace with "While".
11. "the experiment continued to be used as a one-axis seismometer": It seems like there's a missing word or phrase here, possibly "although" or "despite the fact that".
12. "the data received back was noisy": Add "the" before "data". Consider rephrasing for clarity: "the received data was noisy".
13. "required more modern analyses techniques before the experiments data was proven valuable": "Analyses" should be corrected to "analysis". Consider rephrasing for clarity: "required more modern analysis techniques before the experiment's data proved valuable".
14. "Later understanding of gravitational waves was showing that even if experiment worked as intended, it would not have been sensitive enough too detect them": "Too" should be corrected to "to". Consider rephrasing for clarity: "Later understanding of gravitational waves showed that even if the experiment had worked as intended, it would not have been sensitive enough to detect them".

Overall, your text is well-written but needs some minor corrections for clarity and grammar.



2) ChatGPT's response: <https://chat.openai.com/share/6abfc197-e146-4032-be03-14576b0a2a24>



**ChatGPT**

Here are some corrections and improvements for the text:

**1. Lunar Surface Gravimeter:**

The Lunar Surface Gravimeter (LSG) was a lunar science experiment deployed on the surface of the Moon by the astronauts of Apollo 17 on December 12, 1972. Conceived and led by Joseph Weber as the principal investigator, the experiment aimed to measure changes in the local gravitational strength on the lunar surface. These measurements were intended to provide insight into the internal structures of the Moon as it undergoes tidal deformation due to interactions with the gravitational fields of the Earth and the Sun. Additionally, the experiment aimed to contribute experimental evidence of the existence of gravitational waves.

**2. Proper calibration and zeroing:**

The gravimeter unit deployed on Apollo 17 was not properly calibrated and could not be zeroed accurately for use in lunar gravity. While the experiment continued to be used as a one-axis seismometer, the data received was noisy and required more modern analysis techniques before the experiment's data could be proven valuable.

**3. Sensitivity to gravitational waves:**

Later understanding of gravitational waves indicated that even if the experiment had worked as intended, it would not have been sensitive enough to detect them.

Here are the corrections and improvements made to the text. Let me know if you need further assistance!



Responses for the language-oriented part. Direct request condition:

1) ChatGPT's response: <https://chat.openai.com/share/ba888080-d4f2-4894-bd1a-3806a068e3a1>



### ChatGPT

Here are the mistakes in the text:

1. "December 12, 1972" should be "December 12, 1972," with a comma after the year.
2. "investigater" should be "investigator."
3. "This measurements" should be "These measurements."
4. "moon surface" should be "lunar surface" for consistency.
5. "due interaction" should be "due to interaction."
6. "In addition the experiment hoped contribute experimental evidence" should be "In addition, the experiment hoped to contribute experimental evidence."
7. "gravi meter" should be "gravimeter," as a single word.
8. "cannot be properly zeroed for use in a lunar gravity" could be revised for clarity to "could not be properly zeroed for use in lunar gravity."
9. "Whilst" could be replaced with "While" for a more formal tone.
10. "the data received back was noisy" should be "the received data was noisy."
11. "analyses techniques" should be "analysis techniques."
12. "before the experiments data was proven valuable" should be "before the experiment's data was proven valuable," with the possessive form of "experiment."
13. "Later understanding of gravitational waves was showing" should be "Later understanding of gravitational waves showed."
14. "even if experiment worked as intended" should be "even if the experiment worked as intended."
15. "sensitive enough too detect them" should be "sensitive enough to detect them," with "to" instead of "too."

These corrections should enhance the clarity and correctness of the text.





2) ChatGPT's response: <https://chat.openai.com/share/2259dc26-14e9-41f5-8c43-fe0cf97e98b5>



### ChatGPT

1. "Investigater" should be "investigator."
2. "This measurements were intended" should be "These measurements were intended."
3. "The moon surface" should be "the lunar surface."
4. "Tidally deformed due interaction" should be "tidally deformed due to interaction."
5. "Due interaction" should be "due to interaction."
6. "In addition the experiment hoped contribute" should be "In addition, the experiment hoped to contribute."
7. "That was deployed on Apollo 17 was not properly calibrated" could be improved for clarity, perhaps as "The gravimeter unit deployed on Apollo 17 was not properly calibrated."
8. "Cannot be properly zeroed for use in a lunar gravity" should be "could not be properly zeroed for use in lunar gravity."
9. "Whilst" could be replaced with "While."
10. "One-axis seismometer" could be "single-axis seismometer."
11. "More modern analyses techniques" should be "more modern analysis techniques."
12. "Experiments data" should be "experiment's data."
13. "Later understanding of gravitational waves was showing" should be "Later understanding of gravitational waves showed."
14. "Sensitive enough too detect" should be "sensitive enough to detect."

After these corrections, the text should read:

"The Lunar Surface Gravimeter (LSG) was a lunar science experiment deployed on the surface of the moon by the astronauts of Apollo 17 on December 12, 1972. Conceived and led by Joseph Weber as principal investigator, the experiment aimed to measure changes in the local gravitational strength on the lunar surface. These measurements were intended to provide insight into the internal structures of the moon as it was tidally deformed due to interaction with the gravitational fields of the Earth and the Sun. In addition, the experiment hoped to contribute experimental evidence of the existence of gravitational waves.

The gravimeter unit deployed on Apollo 17 was not properly calibrated and could not be properly zeroed for use in lunar gravity. While the experiment continued to be used as a single-axis seismometer, the data received back was noisy and required more modern analysis techniques before the experiment's data was proven valuable. Later understanding of gravitational waves showed that even if the experiment had worked as intended, it would not have been sensitive enough to detect them."



Responses for the technical-oriented part. Positive politeness condition:

1) ChatGPT's response: <https://chat.openai.com/share/d5250234-27b7-47f2-be33-fe2b75a8a05a>



#### ChatGPT

Hey there! I'm doing great, thanks for asking! An induction generator is a type of electric generator that produces electricity by utilizing electromagnetic induction. It's commonly used in renewable energy systems like wind turbines.


Here's how it works:

1. **Basic Principle:** Like all generators, an induction generator converts mechanical energy into electrical energy. In the case of an induction generator, this is done through the principle of electromagnetic induction, discovered by Michael Faraday.
2. **Stator:** The stationary part of the generator, called the stator, consists of coils of wire wound around a core. When a rotating magnetic field is applied to these coils, it induces a voltage according to Faraday's law of electromagnetic induction.
3. **Rotor:** The rotor is the rotating part of the generator. In an induction generator, the rotor is not connected to an external power source. Instead, it rotates due to an external mechanical force, such as wind in the case of a wind turbine.
4. **Induction Process:** As the rotor rotates, it creates a changing magnetic field. This changing magnetic field induces a current in the stator windings, according to Faraday's law. This induced current generates an electromagnetic force that opposes the change in the magnetic field, creating torque that keeps the rotor turning.
5. **Output:** The induced current in the stator windings produces electricity. This electrical output can be used to power electrical loads or can be fed into the electrical grid after appropriate conditioning.
6. **Speed Control:** The speed of an induction generator is determined by the frequency of the electrical power it generates, which is typically synchronized with the grid frequency. The rotor speed is adjusted to maintain this synchronization.

Overall, induction generators are popular for their simplicity, reliability, and ability to operate without the need for external power sources in certain applications, making them a common choice in renewable energy systems.



2) ChatGPT's response: <https://chat.openai.com/share/4e67286e-823f-47e8-b7cf-678f33680f72>

 ChatGPT

Hey there! I'm doing well, thanks for asking. I'm glad you're fascinated by technical subjects! An induction generator is a type of electrical generator that produces electricity by converting mechanical energy into electrical energy. It's often used in wind turbines and hydroelectric plants.

Here's how it works:

1. **Principle of Electromagnetic Induction:** Like any generator, an induction generator relies on the principle of electromagnetic induction. When a conductor (usually a coil of wire) is moved through a magnetic field, or when the magnetic field around the conductor changes, it induces an electromotive force (EMF) in the conductor, which results in the flow of electric current.
2. **Rotor and Stator:** An induction generator consists of two main parts: a rotor and a stator. The rotor is the rotating part of the generator, while the stator is the stationary part.
3. **Rotor Construction:** The rotor of an induction generator typically consists of a set of conductive bars or coils arranged in a cylindrical shape. These conductive elements are not connected to an external electrical circuit; instead, they form a closed-loop circuit within the rotor itself.
4. **Stator Construction:** The stator surrounds the rotor and contains a set of stationary coils known as stator windings. These windings are connected to an external electrical load or grid.
5. **Operation:** When the rotor of the induction generator is rotated, either mechanically (e.g., by wind or water) or by an external motor, it cuts through the magnetic field produced by the stator windings. This motion induces an EMF in the rotor conductors according to Faraday's law of electromagnetic induction.
6. **Induced Current:** The induced EMF in the rotor creates a circulating current within the rotor conductors. Since the rotor conductors form a closed loop, this current generates its own magnetic field.
7. **Generation of Electricity:** The interaction between the magnetic fields produced by the rotor and the stator induces an electric current in the stator windings. This current flows through the external electrical circuit connected to the generator, producing electrical power.
8. **Synchronization:** In some cases, induction generators require an external power source to establish the initial magnetic field in the rotor and to synchronize the generator with the grid frequency before it can start generating power independently.

In summary, an induction generator converts mechanical energy into electrical energy through the process of electromagnetic induction, utilizing the interaction between the rotating magnetic field produced by the rotor and the stationary magnetic field produced by the stator windings.

Responses for the technical-oriented part. Negative politeness condition:

1) ChatGPT's response: <https://chat.openai.com/share/7c9b4a6f-12b4-4c43-9f7a-46463683113f>



### ChatGPT

An induction generator is a type of electrical generator used to produce electricity. It operates on the principle of electromagnetic induction, which was discovered by Michael Faraday in the early 19th century.

Here's how an induction generator works:

1. **Basic Principle:** Induction generators work on the same principle as induction motors. They consist of a rotor and a stator. The stator is the stationary part, while the rotor is the rotating part. When a rotor is rotated within a magnetic field produced by the stator, it induces a voltage in the stator windings, which leads to the generation of electricity.
2. **Starting Mechanism:** Unlike synchronous generators, induction generators do not require an external DC power source for excitation. Instead, they are self-excited. Initially, when the rotor is at rest, there is no induced voltage in the stator windings. To start generating electricity, an external source is used to rotate the rotor, inducing a voltage in the stator windings and initiating the generation process.
3. **Operation:** Once the generator is in operation, it generates electricity by converting mechanical energy into electrical energy. The rotation of the rotor induces a voltage in the stator windings, which creates an alternating current (AC) output. This AC output can be used directly or converted to a different voltage or frequency using power electronics.
4. **Speed Regulation:** The frequency of the generated electricity depends on the speed of rotation of the rotor. Therefore, to regulate the frequency of the output, the speed of the rotor needs to be controlled. This can be achieved by controlling the mechanical input to the generator or by using power electronics to adjust the frequency of the output.
5. **Applications:** Induction generators are commonly used in wind turbines, where the mechanical energy from the wind is used to rotate the rotor. They are also used in small-scale hydroelectric power plants and in some industrial applications.

In summary, an induction generator works by using electromagnetic induction to generate electricity. It does not require external excitation and is self-starting. It operates by rotating a rotor within a magnetic field to induce a voltage in the stator windings, producing alternating current electricity.



2) ChatGPT's response: <https://chat.openai.com/share/65a95142-9720-44ed-bb1c-2315504aa5ae>



### ChatGPT

An induction generator is a type of electrical generator that produces alternating current (AC) electricity. It operates based on the principle of electromagnetic induction, discovered by Michael Faraday in the 19th century.

Here's how it works:

1. **Electromagnetic Induction:** The basic principle behind an induction generator is electromagnetic induction. When a conductor, such as a wire coil, moves within a magnetic field or when there is a change in the magnetic field passing through the conductor, an electric current is induced in the conductor.
2. **Stator and Rotor:** An induction generator consists of two main parts: the stator and the rotor. The stator is the stationary part of the generator and contains a set of coils wound around a core. These coils are connected to an external electrical circuit. The rotor, on the other hand, is the rotating part of the generator and is typically made up of a set of conductive bars or coils.
3. **Rotational Motion:** In an induction generator, the rotor is turned by an external mechanical power source, such as a turbine or a windmill. As the rotor rotates, it cuts through the lines of magnetic flux produced by the stator. This cutting action induces an alternating current in the coils of the stator due to Faraday's law of electromagnetic induction.
4. **Generation of Electricity:** The alternating current produced in the stator coils is then transferred to an external electrical circuit through wires connected to the generator terminals. This alternating current can be used to power electrical devices or can be converted to a different voltage level using transformers for transmission over long distances.
5. **Self-Excitation:** Unlike synchronous generators, induction generators are not inherently self-excited. They require an external source of excitation to produce a magnetic field in the stator. This excitation can be provided by capacitors or by initially connecting the generator to an electrical grid or another source of power.

Induction generators are commonly used in renewable energy systems, such as wind turbines and hydroelectric plants, where their simplicity, ruggedness, and ability to operate at variable speeds make them well-suited for generating electricity from natural energy sources.





Responses for the technical-oriented part. Direct request condition:

1) ChatGPT's response: <https://chat.openai.com/share/dd766b58-e874-4eaf-8067-22fcb2aecf60>

 **ChatGPT**

An induction generator is a type of alternating current (AC) electrical generator that produces electricity by induction. Unlike synchronous generators, which rely on a separate DC power source to create a magnetic field in the rotor, induction generators use the principle of electromagnetic induction to generate electricity directly.

Here's how it works:

1. **Stator:** The stator is the stationary part of the generator and consists of a set of stationary coils of wire wound around a core. When an alternating current passes through these coils, it creates a rotating magnetic field.
2. **Rotor:** The rotor is the rotating part of the generator and is typically made of copper or aluminum bars arranged in a cylindrical shape. When the generator is in operation, the rotating magnetic field produced by the stator induces a voltage in the rotor bars due to electromagnetic induction.
3. **Induction:** According to Faraday's law of electromagnetic induction, when a conductor (the rotor bars) is exposed to a changing magnetic field (produced by the rotating magnetic field in the stator), it induces a voltage in the conductor. This induced voltage creates an electric current to flow through the rotor bars.
4. **Output:** The induced current in the rotor generates its own magnetic field, which interacts with the rotating magnetic field from the stator. This interaction creates torque on the rotor, causing it to rotate. As the rotor rotates, it generates additional electrical energy in the stator coils due to the relative motion between the magnetic fields, thus producing electrical power at the output terminals of the generator.
5. **External Load:** The electrical power generated by the induction generator can be connected to an external load, such as a grid or a standalone system, where it can be used to power electrical devices or to charge batteries.

One important aspect of induction generators is that they require an external source of reactive power, such as a capacitor bank or a power factor correction system, to maintain their voltage and frequency within acceptable limits. This is because induction generators do not inherently regulate their voltage and frequency like synchronous generators do.

2) ChatGPT's response: <https://chat.openai.com/share/834337d1-0470-4ba4-b7b2-444a1a86672e>

 ChatGPT

An induction generator is a type of electrical generator that produces alternating current (AC) power by utilizing electromagnetic induction. It operates on the same principle as an induction motor but is designed to generate electricity instead of mechanical work.

Here's how an induction generator works:

1. **Principle of electromagnetic induction:** The basic principle behind an induction generator is electromagnetic induction, which states that a changing magnetic field induces an electromotive force (EMF) in a conductor. When a coil of wire is exposed to a changing magnetic field, an electric current is induced in the wire.
2. **Stator and rotor:** Like in an induction motor, an induction generator has a stationary part called the stator and a rotating part called the rotor. The stator consists of a set of coils wound around a laminated iron core. These coils are connected to an external electrical circuit. The rotor, on the other hand, consists of a set of conductors arranged in slots and is mounted on a shaft.
3. **Prime mover:** An induction generator requires an external source of mechanical power, known as the prime mover, to rotate the rotor. This could be a steam turbine, a wind turbine, a water turbine, or any other mechanical source capable of rotating the rotor.
4. **Operation:** When the rotor of the induction generator is rotated by the prime mover, a rotating magnetic field is produced within the machine. This rotating magnetic field induces an alternating current in the stator windings through electromagnetic induction.
5. **Output voltage and frequency:** The output voltage and frequency of the generated electricity depend on the speed of rotation of the rotor and the number of poles in the stator windings. The frequency of the output AC power is directly proportional to the speed of rotation of the rotor.
6. **Self-excited operation:** In some cases, induction generators can be self-excited, meaning they can generate power without an external power source for excitation. This is achieved by allowing a small amount of reactive power to flow into the stator windings, creating the necessary magnetic field for generation.
7. **Applications:** Induction generators are commonly used in renewable energy systems such as wind turbines and hydroelectric generators due to their simple and rugged construction, reliability, and ability to operate over a wide range of speeds. They are also used in standalone power systems and emergency backup generators.

