TRACING CONCEPTUAL METAPHORS, CONSTRUAL OPERATIONS, AND FRAME SEMANTICS IN CHATGPT AND HUMAN LANGUAGE: A COGNITIVE LINGUISTICS PERSPECTIVE

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THESIS AND DEFENSE APPROVAL FORM

The undersigned certify that they have read the following thesis, examined the defense, are satisfied with the overall exam performance, and recommend the thesis to the Faculty of Arts & Humanities for acceptance:

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Candidate of **Master of Philosophy** at the National University of Modern Languages do hereby declare that the thesis **Tracing Conceptual Metaphors, Construal Operations, and Frame Semantics in ChatGPT and Human Language: A Cognitive Linguistics Perspective** submitted by me in partial fulfillment of MPhil degree, is my original work, and has not been submitted or published earlier. I also solemnly declare that it shall not, in future, be submitted by me for obtaining any other degree from this or any other university or institution.

I also understand that if evidence of plagiarism is found in my thesis/dissertation at any stage, even after the award of a degree, the work may be cancelled and the degree revoked.

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ABSTRACT

Title: Tracing Conceptual Metaphors, Construal Operations, and Frame Semantics in ChatGPT and Human Language: A Cognitive Linguistics Perspective

This study investigated the cognitive mechanisms that shape the linguistic output of ChatGPT and human participants. Using the frameworks of Conceptual Metaphor Theory, Construal Operations, and Frame Semantics, the research explores whether and how AI-generated text reflects the cognitive strategies typically employed by human writers. This study adopted a mixed-methods approach. The researcher collected 100 essays written in response to CSS examination prompts, 50 composed by human participants and 50 by ChatGPT. The data underwent both statistical and qualitative analysis, using NLP tools, Corpus-Based software and cognitive semantic frameworks. The analysis revealed that both ChatGPT and human participants exhibit metaphorical reasoning and conceptual structuring, but they differ in the depth, coherence, and cultural grounding of their expressions. ChatGPT showcased an impressive ability to replicate human-like metaphors and frames but lacked the experiential and emotional anchoring which was evident in human responses. The findings indicated that while ChatGPT can produce syntactically better and metaphorically rich language, its expression lacks the embodied experience, cultural nuance, and intentional construal found in human linguistic expression. The study concluded that ChatGPT approximates human-like conceptual structures through probabilistic modeling rather than through genuine cognitive understanding. These insights contribute to ongoing debates in cognitive linguistics, artificial intelligence, and computational language modeling, and offer insights for both theoretical as well as practical inquiry regarding AI and language.

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LIST OF ABBREVIATIONS

AI:	Artificial Intelligence
CMT:	Conceptual Metaphor Theory
CPEC:	China-Pakistan Economic Corridor
CSS:	Central Superior Services
ERP:	Event-Related Potentials
GPTs:	Generative Pre-Trained Transformers
IMF:	International Monetary Fund
NLP:	Natural Language Processing
NLTK:	Natural Language Toolkit
NMT:	Neural Machine Translation
NOA:	National Officers Academy
POS:	Parts-Of-Speech

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DEDICATION

This thesis is dedicated to my mother, my uncle Mushtaq Ahmed (late), my wife and my daughter.

CHAPTER 1

INTRODUCTION

1.1 Background and Context of the Study

The rise of artificial intelligence in recent years has resulted in transformative changes in the various fields of science, notably in the field of natural language processing. OpenAI's GPT series language models are among those notable advancements in the fields such as computer science and linguistics. Models such as OpenAI's GPT series, built upon the transformer architecture proposed by Vaswani et al. (2017), demonstrate remarkable fluency, coherence, and context sensitivity. These models demonstrate the ability to generate grammatically correct, and stylistically sophisticated language. These developments spark a widespread attention across disciplines such as linguistics, computer science, philosophy and cognitive science. These capabilities have prompted scholars across linguistics, AI, cognitive science, philosophy, and communication studies to investigate whether machine-generated language merely imitates human linguistic patterns or whether it approximates deeper cognitive structures associated with meaning-making (Bender & Koller, 2020; Mitchell & Krakauer, 2023).

The advancement in linguistic capacity of these AI models presents a compelling area of scholarship. While these models are capable at producing text that appears to be grammatically correct and somewhat contextually appropriate, the cognitive mechanism that underlie these models and such production remains a mystery. It ignites the question whether, and to what extent, machine-generated language reflects or simulates these cognitive phenomena. As Bender and Koller (2020) famously contend, models like GPT "predict form without accessing meaning," raising questions about whether AI-generated text can truly reflect human-like conceptualization.

The researcher was inspired to undertake this study by a growing scholarly interest in exploring the cognitive-linguistic dimensions of language generation by these AI-based language models. Although LLMs lack embodiment and socio-cultural experience, they can sometimes reproduce metaphorical expressions, schematic perspectives, and frame-like structures because of exposure to large datasets (Bowman,

2022). The capability of these models to produce human-like language raises theoretical and philosophical questions about the underlying mechanisms, the nature of meaning-making, and linguistic understanding.

In addition, the researcher observed during personal use of AI based language models that while these AI systems have the potential to produce impressive content, their production lacks the intentionality, experiential grounding, and relevance that characterize human language. This observation compelled the researcher for an empirical analysis rooted in linguistic theory to determine whether AI-generated text showcases structural parallels to the conceptual strategies employed by humans.

The researcher was further motivated by the growing intersection between artificial intelligence and linguistic scholarship. As these language models are developing, they aspire to confront the established notions regarding uniqueness of human cognition and challenge the boundaries of linguistic competence. Cognitive linguistics emphasizes augmentation of meaning, mental imagery, conceptual organization of thought, and activation of knowledge in the forms of frames.

In this context, the present study aims to critically assess the apparent convergence between human and machine language, not just in terms of fluency and structure, but with reference to underlying cognitive operations that give language its depth, communicative power and flexibility. The research aims to explore this convergence through the scope of cognitive linguistics, situating the study at the intersection of theoretical linguistics and computational language modelling.

1.2 Cognitive Linguistics and Language Model Study

Cognitive linguistics provides a rich framework for understanding how AI systems attempt to simulate human language. Although GPT models primarily operate through statistical learning and pattern recognition, they implicitly touch on many concepts that are central to cognitive linguistics.

The core theories of cognitive linguistics include but are not limited to conceptual metaphor theory, construal operations, and frame semantics. These theories highlight fundamental aspects of human cognition and aim to explain how humans understand and use language (Lakoff & Johnson, 1980, 1999; Langacker, 2008; Fillmore, 1982). While GPT models can generate language that often imitates or tries to imitate human language, they do so through mechanism that are fundamentally

different from the cognitive processes outlined in cognitive linguistics. While human language is deeply rooted in embodied experience, cognitive framing, and intentional construal of language, GPT models generate language through pattern recognition and statistical learning.

1.3 Problem Statement

Although language models like ChatGPT have proved to be beneficial and have achieved remarkable linguistic feats, the underlying cognitive mechanism that are crucial to understand their language generation ability remain a subject of intrigue and inquiry. These language models have become black boxes because of the complex neural networks, intricacies of data engineering, and various other aspects and it has become very challenging to gain a comprehensive understanding of the cognitive mechanisms that drive their language expression and comprehension skills. Studying the cognitive semantic properties of these language models is very important because it provides profound insight into comprehension, reasoning and expressive abilities of the models. There is a considerable gap between AI language models' impressive language generation and the limited understanding of their cognitive mechanism. There is a need to understand how ChatGPT conceptualizes language and cognition and how far its language behaviour is human-like.

1.4 Research Objectives

The core objective of this study is to explore and compare the cognitive linguistic structures that are embedded in the language generated by ChatGPT and human participants. Specifically, the study aims to:

1. Investigate the construal operations in both forms of language, focusing on perspective, attention, salience, and abstraction as linguistic framing mechanism
2. Analyse how conceptual metaphors are used and how they shape underlying cognitive patterns in both human language and that generated by language models
3. Explore the activation and application of frame-based knowledge structures within AI and human discourse

4. Contribute to the broader understanding of artificial language models by offering insights into the cognitive-linguistic boundaries between human and machine-mediated discourse.

1.5 Research Questions

This research seeks to address the following questions:

1. What construal operations are at play in human and ChatGPT's understanding and formulation of responses to different questions?
2. How are conceptual metaphors used to shape the responses of ChatGPT and human participants?
3. How does human and ChatGPT's language generation demonstrate evidence of conceptual metaphors?
4. How are the specific knowledge structures and thematic elements activated in human and ChatGPT's language generation?

1.6 Significance of the Study

This research is significant for several compelling reasons. Understanding the cognitive semantics of ChatGPT advances the field of AI language modelling. By revealing how cognitive mechanisms inform its language generation, we can enhance the model's performance, context awareness, and naturalness, leading to more sophisticated AI language systems with practical applications across various domains.

In addition to that, this study provides insights into the parallels between AI-generated language and human language. Identifying instances of conceptual metaphors, construal operations, and frame activation in ChatGPT's responses allows us to examine the extent to which AI language models emulate human cognitive processes. This exploration bridges the gap between AI and human cognition, paving the way for deeper insights into language comprehension and communication. This responds to scholarly calls to evaluate AI language output through linguistic rather than computational metrics (Bender et al., 2021).

Moreover, this research contributes to ethical AI development. Understanding the cognitive foundations of ChatGPT's language generation empowers developers to identify and address potential biases or unintended associations in its responses.

1.7 Delimitation

Since ChatGPT as a language model has ability to generate responses to a wide range of queries ranging from complex concepts of mathematics to ordinary problems of daily life, the researcher will not analyse the entire generative framework of ChatGPT. The researcher will collect data against 50 prompts, taking Central Superior Services (CSS) English Essay papers as the primary sources for prompts. The data set will comprise of 100 responses only, 50 essays written by human participants and 50 essays generated by ChatGPT, to scholarly explore about the linguistic features of data generated by ChatGPT.

1.8 Limitations

While this study offers meaningful insights into the cognitive-linguistic characteristics of human and GPT-generated essays, several limitations must be acknowledged. The dataset, consisting of 50 human and 50 AI-generated essays, is analytically useful but too small and demographically narrow to support broad generalization, as all human participants were CSS aspirants from a single institution. Moreover, the exclusive focus on essay writing may limit the applicability of the findings to other genres or communicative contexts in which conceptual metaphors, construal operations, and frame activation might surface differently. The analysis examines only one AI model (ChatGPT-3.5) and therefore does not account for conceptual or linguistic variation across other contemporary large language models. As the qualitative identification of metaphors, frames, and construal was conducted solely by the researcher, some degree of interpretive bias is unavoidable. Furthermore, the tools used for structural analysis, such as POS tagging and corpus software, are not primarily designed to explore deeper conceptual structures and therefore serve only as supportive methods rather than primary analytic instruments. Finally, since cognitive linguistic theories are grounded in human embodied cognition, applying these frameworks to AI-generated language necessarily involves theoretical constraints, allowing only an assessment of linguistic resemblance rather than claims about artificial cognition.

CHAPTER 2

LITERATURE REVIEW

To establish a comparative understanding of existing scholarship, theories and debates related to the research problem of this study, a comprehensive review of literature was conducted as a foundational component of this study. The researcher reviewed the existing literature thematically which served as a key to identify gap in the current body of literature. It gave the researcher a better understanding of the methodological approaches used by pervious scholars and helped the researcher to position this study within the broader academic discourse in this regard. The review of literature is thematically divided into subsections named as: Foundations and Core Principles of Cognitive Linguistics, Conceptual Metaphor Theory and Embodiment, Construal Operations and Cognitive Grammar, Frame Semantics and Knowledge Activation, Conceptual Blending and Creativity in Language, Artificial Intelligence and Cognitive Linguistics, Identified Gaps and Research Justification.

2.1 Foundations and Core Principles of Cognitive Linguistics

Metaphors are not just linguistic expressions, but they are deeply embedded in human cognition, and they shape how humans conceptualize the world (Johnson, 1980).

Cognitive linguistics primarily explores the connection between thought and language. As Lakoff states, “Human categorization is essentially a matter of both prototypes and family resemblances rather than classical definitions” (Lakoff, 1987, p. 154). It started as a response to generative grammar, which perceives language as governed by rule-based systems where meaning and context has no significant role. Contrary to that, cognitive linguistics mainly focuses on meaning and argues that linguistics patterns greatly reflect cognitive structures. Language reflects how individuals conceptualize the world around them. Lee (2005) posits that while generative grammarians accentuate Universal Grammar, cognitive linguists refuse to believe in the idea of a specialized mechanism for language learning. Instead, they believe language learning is deeply rooted in general cognitive abilities and mental schemas. Cognitive linguistics places significant emphasis on meaning and context, asserting that even the speakers of the same language can perceive and interpret situations differently. This variability arises because people "construe" situations

differently through linguistic choices, influenced by their perspectives and what they choose to emphasize. Additionally, conceptual and cultural information, also called "frames", play a key role in shaping how language is used and understood. Words act as tools that prompt speakers to access specific parts of their knowledge base, while meaning emerges through interaction between language and this knowledge (Lee, 2005).

Schmid (2006) posits that human beings communicate and interpret ideas using both "cognitive models," which store, organize and synthesize segments of knowledge about fields, and "cultural models," which incorporate the cultural context surrounding an idea. This enables cognitive linguistics to look for individual differences through cognitive models while also shedding light on shared linguistic patterns within groups through cultural models. The emphasis on meaning highlights the diversity in how people interpret and linguistically encode situations, even within the same language community. According to Evans (2006), *"Cognitive linguistics rejects the competence/performance distinction and the autonomy of syntax; instead, it views linguistic knowledge as an integral part of general cognition"* (Evans & Green, 2006, p. 50). This approach has given rise to a variety of complementary and sometimes competing theories. Cognitive linguists see language as a reflection of the mind's core properties and design, offering insights into how thoughts and ideas are structured and organized.

Because of its focus on meaning and perspective, cognitive linguistics pays special attention to figurative thinking and metaphorical language, viewing metaphors as powerful tools for understanding the world. Unlike traditional views that treat metaphors as purely stylistic devices, cognitive linguists see them as reflections of how we think about the world. According to Littlemore (2019), metaphors strongly demonstrate the connection between language and thought, as they reveal how different experiences are linked based on perception, cognition, and even neurological organization. Metaphors, therefore, are not just linguistic phenomena but patterns of figurative thought that can also manifest through visuals or gestures. Furthermore, the metaphors we choose reveal different ways of conceptualizing and thinking about a particular subject.

2.2 Conceptual Metaphor Theory and Embodiment

Lakoff and Johnson (1980) highlighted the embodied nature of metaphors and asserted that our physical experiences shape our cognitive as well as linguistic experiences. They theorize that metaphors are crucial to understand abstract concepts through concrete experiences. According to them, "The essence of metaphor is understanding and experiencing one kind of thing in terms of another" (Lakoff & Johnson, 1980, p. 5)

The exemplification of time as money well-explains their assertion. They further introduced the concepts of source and target domains in metaphorical mappings. These concepts are instrumental in analysing how GPT and humans use metaphorical structures to express and convey meanings, especially in different contexts like literature, philosophy, science and so on. Their conceptualization of metaphors directly aligns with researcher's investigation into how GPT and humans employ conceptual metaphors to express various mental behaviours.

Lakoff and Johnson (1980) emphasize that metaphor is far more than just a literary device. They argue that metaphors are deeply embedded in everyday life, shaping how we perceive and make sense of the world around us. According to their perspective, "Metaphor is pervasive in everyday life, not just in language but in thought and action" (Lakoff & Johnson, 1980, p. 3). Since its beginning, Conceptual Metaphor Theory (CMT) has had a great impact across various academic disciplines and research domains. Its core principles highlight that metaphors not only model our thinking and knowledge but also play a crucial role in understanding abstract language and concepts. CMT posits that "Our conceptual system is largely metaphorical, and it is the principal vehicle for understanding abstract concepts" (Lakoff & Johnson, 1999, p. 40).

While Lakoff and Johnson did not extensively address cultural variability, this research aims to build on their framework by exploring how GPT models handle metaphors across diverse cultural contexts, particularly in essay writing. Their work mainly addressed the use of conceptual metaphors in various real-life settings. This study aims to further their assertion that metaphors are grounded in shared human experiences and social practices. Their focus on cognitive processes underlying generation of language mechanisms and provides a robust foundation for analysing GPT models' linguistic patterns. By focusing on the similarities and differences in usage

of metaphors between machines and humans, this research not only evaluates the cognitive mechanism of artificial intelligence-based models but also offers novel insights into the interplay of cognition and technology, a recent avenue of linguistic scholarship. This study contributes to extending the applicability of Lakoff and Johnson's propositions to artificial intelligence, an area undressed till date. By analysing how ChatGPT augments and conceptualizes metaphors, this study bridges modelling patterns of human cognitive learning experiences and AI machine learning, offering deep understanding of language models.

2.3 Construal Operations and Cognitive Grammar

Langacker emphasizes "Grammar is neither autonomous nor an abstract formal system; it is meaningful at every level and constitutes an integral part of cognition" (Langacker, 1987, p. 12*)*. This perspective is highly relevant to the study of how cognitive schemas such as construal operations, construal metaphors, and frame semantics function in language. He explains the cognitive processes by which language users shape their expressions to make them suitable to their communicative intentions. He refers to them as construal and says, *"Construal refers to the myriad ways of viewing and portraying a situation" (Langacker, 2008, p. 55)*. This concept directly links with the researcher's inquiry into how construal operations manifest in both AI-generated and human produced language.

According to Langacker (2008) "The fundamental claim of Cognitive Grammar is that the structures of language are symbolic in nature, consisting of form-meaning pairings" (Langacker, 2008, p. 5). The concept of embodied experience, also referred to as embodied cognition is central to cognitive linguistics. This notion also parallels the researcher's interest in exploring how ChatGPT, devoid of physical embodiment, still generates contextually coherent, grammatical correct, and semantically appropriate language. He emphasizes that language is inherently grounded in cognition, a perspective highly relevant to the study of how cognitive schemas—such as conceptual metaphors, construal operations, and frame semantics—function in language production. This research aims to compare these phenomena in ChatGPT and human-generated language, making Langacker's work a cornerstone for this study's conceptual framework.

Langacker (2008) introduces cognitive grammar as a comprehensive model emphasizing the integration of language with broader cognitive processes. The notion aligns with this study's focus on exploring how ChatGPT's language generation mirrors or diverges from human cognition. Langacker's work provides a robust standpoint to probe into cognitive linguistic phenomenon in AI-generated text. The concepts like construal, semantic grounding, and cognitive embodiment serve as analytical categories for analysing the linguistic behaviour of GPT models.

While Langacker focused on human cognition's holistic and experiential nature, application of his theories to ChatGPT may reveal gaps or biases in the AI-based models' language generation, furthering the discussion of its prospects and cognitive spectrums. By comparing cognitive grammar's principals with computational approaches like machine learning, neural networks, recurrent neural networks etc, this study can illuminate the extent to which AI-based language models approximate human cognitive processes.

Lakoff and Turner (2009) extended the foundational work on conceptual metaphor theory which was introduced by Lakoff and Johnson in 1980. They emphasise "Reason is not disembodied or transcendental; rather, it arises from the nature of our brains, bodies, and bodily experience" (Lakoff & Johnson, 1999, p. 4). Their focus is to illustrate how metaphors map various abstract concepts to concrete experiences. They explain how metaphors reflect common cultural experiences and cognitive constrains, which are link directly to the comparative dimension of this study. For example, understanding how ChatGPT aligns or diverges from human cultural and cognitive patterns can be crucial to understanding the true nature of language models. What they tried to apply on real life nuances of language can serve as an ideal lens to understanding how cognitive experiences are manifested in AI language models. Their analysis of poetic metaphors provides novel examples of source and target domains that reinforces the idea of studying metaphorical framing in both human and AI-generated language. According to Turner (2009), language can be both structured and creatively adaptive. This notion is particularly useful for analysing ChatGPT's ability to simulate human creativity within linguistic constraints of a given context.

2.4 Frame Semantics and Knowledge Activation

Another work on cognitive linguistics is the concept of frame semantics proposed by Charles Fillmore. Charles Fillmore's Frame Semantics is a crucial theoretical pillar for understanding and analysing the interplay of language and cognition in both AI-generated and human languages. It directly supports the study's objectives and offers a lens to evaluate the cognitive semantic capabilities of ChatGPT in comparison to human linguistic behaviour. Fillmore asserts, “By the term frame I have in mind any system of concepts related in such a way that to understand any one of them you have to understand the whole structure” (Fillmore, 1982, p. 111). According to him, meaning system is not isolated but is deeply rooted within structured cognitive frames. Each frame is unique in its nature and signifies background knowledge necessary to understand linguistic expressions. Fillmore’s work provides a key perspective for analysing how linguistic elements are activated through different frames and how they evoke knowledge structures in each context. In the context of the current study, this approach is essential for understanding how frames are utilized by ChatGPT and human participants to produce coherent, grammatical accurate, and contextually appropriate language. The concept that linguistic meaning depends on context fits seamlessly with the study’s aim of comparing how humans and ChatGPT respond to essay prompts with varied thematic elements. The notion of ‘Frame Semantics’ serves as a lens to evaluate how ChatGPT might come closer to human cognition by mimicking frame-based structures in its training data. While Fillmore's theory offers robust tools for analysing human cognition and language and has been applied onto real life data but various scientists, it has not been applied on machine-generated languages. It is widely believed that ChatGPT does not inherently possess experiential knowledge, which is central to frame activation in human cognition. Instead, its "frames" are probabilistic outputs trained on large datasets. Evaluating whether these outputs align with the conceptual rigor of human-activated frames is a core challenge addressed in the study.

Tyler and Evans (2003) highlight the embodied nature of human cognition, stating that our perceptual and physiological makeup shapes the conceptual structures that lie beneath our thoughts and ideas. As they explain, “Our world, as mediated by our perceptual apparatus (our physiology and neural architecture, in short, our bodies) gives rise to conceptual structure, that is, to thoughts and concepts”. This underscores

the pivotal role of biology in filtering and shaping how we understand the world around us. In addition to this biological perspective, Achard and Niemeier (2004) call attention to the informational aspect of meaning in cognitive linguistics. They define meaning as inherently tied to conceptualization, specifically as *"the human interpretation of the world"*. The term "interpretation" suggests that embodied conceptualization is not only influenced by biology but also shaped by individual and cultural factors. Our concepts emerge not only from sensory experiences but also from the social and cultural environments in which we are embedded.

2.5 Conceptual Blending and Creativity in Language

Lakoff and Johnson (1999) provide a ground-breaking perspective on the relationship between language, cognition, and bodily experience. The authors challenge traditional Western philosophical views and argue that human thought processes are deeply embodied. They are of the view that thought processes and culturally situated, and they arise from our physical interactions with the world. This work introduces the concept of embodied cognition and emphasise that reason is not abstract but grounded in sensory and motor experiences. A key contribution of the book is its exploration of conceptual metaphors, which are seen as essential for structuring human thought and language. They assert that metaphors are not merely linguistic tools but fundamental to cognitive processes, shaping how individuals understand and interact with the world. This aligns closely with studies of cognitive semantics and language construal, as highlighted in the current research focus (Lakoff, 1999). In addition, this book provides a critique of Cartesian dualism in a very interesting way. Their critical inquiry of Cartesian dualism and its emphasis on the interconnectedness of mind and body enriches the theoretical foundation for analysing language and cognition. The insights provided by Lakoff and Johnson are particularly relevant for examining how metaphorical structures influence meaning-making, a critical aspect of understanding cognitive and linguistic processes. It supports an exploration of how linguistic phenomena reflect deeper cognitive and experiential realities, providing a valuable theoretical lens for analysing the interplay between language, cognition, and culture in language model. This is an important area not discussed by previous studies on cognitive linguistics.

In addition, Coulson and Petten (2002) explore the relationship between conceptual integration and metaphor processing through an Event-Related Potential

(ERP) study. The authors explore how metaphors are processed in the brain by using ERPs, a technique that provides insight into the timing and neural mechanisms of cognitive processes. Their findings suggest that metaphorical language, particularly conceptual metaphors, involves complex cognitive processes that are reflected in specific ERP components. These results contribute to understanding the neural mechanisms underlying conceptual integration, which involves combining different mental spaces to create meaning. The study emphasizes that the brain processes metaphorical expressions similarly to how it processes other types of figurative language, though there are distinct neural signatures that differentiate metaphor comprehension from literal language processing. This work supplements to the growing body of research on the cognitive processing of figurative language, highlighting the importance of event-related potentials as a tool for examining real-time cognitive processes. This insight facilitates the analysis of ChatGPT's ability to generate contextually appropriate and culturally acceptable responses, drawing on complex metaphors and cognitive frames to build coherent narratives (Fauconnier, 2008). Frame Semantics, as proposed by Fillmore (1982), also intersects with conceptual blending in that both frameworks emphasize how knowledge is structured and activated to shape understanding.

Boas (2007) explored the theory of Construction Grammar, emphasizing its role in identifying and analysing constructions, pairings of form with meaning, in English and other languages. He traces that the roots of construction grammar are linked to its sister theory, Frame Semantics. While exploring the underlying mechanism of construction grammar, Östman (2006) explains that the key concepts behind construction grammar include the use of data and methodology in compiling a "constructicon," a classical repository of English constructions. This framework is essential for understanding how language structures meaning and places various lexical structures to express it. This notion can be applied to analyse the cognitive processes involved in language generation, including in AI models like ChatGPT.

In the study by Gibbs and Colston (2007), the authors explored the differences in how individuals process ironic and metaphorical statements. They hypothesized that to understand irony, one requires more complex inferencing than metaphor, as irony involves second-order, meta representational thought, which is usually absent in metaphors. Their work was one step further in understanding the root causes of

metaphorical mapping. Their experiments confirmed that irony requires for a deeper level of cognitive processing, as participants took longer to understand ironic statements compared to metaphorical ones. This distinction is significant for understanding cognitive mechanisms in language processing and has implications for how both humans and artificial intelligence-based language models, like ChatGPT, generate and interpret metaphorical and ironic language.

Gibbs and Colston's (2007) findings resonate with the cognitive linguistic theories that are at the core of this research. According to them, "Understanding irony requires more complex inferencing than understanding metaphors" (Gibbs & Colston, 2007, p. 101). Since metaphors are grounded in more concrete conceptual domains, irony necessitates an additional layer of interpretation, like the meta representational reasoning identified by Langacker (2008) in construal operations. This is an area that has not been explored yet and the researcher aims to do so. Their research also supports the idea that understanding both irony and metaphor involves various cognitive mechanisms that go beyond mere surface-level interpretations. For ChatGPT, a language model trained on large datasets through rigorous training, recognizing the distinction between metaphor and irony is crucial for generating contextually appropriate and culturally relevant responses. The model's ability to engage in meta representational reasoning could be a key factor in its performance, which this research helps contextualize.

Baayen (2008) provides a foundational guide for researchers interested in applying statistical methods to linguistic data. From a cognitive linguistics perspective, the book advocates the importance of quantitative analysis in uncovering patterns that align with mental representations of language. Baayen's study brings together linguistic theory and statistical methodology and offers tools to analyse phenomena such as frequency effects and lexical processing, which are central to cognitive linguistics. The discussion complements the conceptual metaphor theory by enabling the quantitative examination of metaphorical mappings and their linguistic realizations. For instance, the text explains how statistical models can identify patterns in metaphorical language and provides empirical support for metaphorical structures hypothesized by cognitive linguists. In addition to that, Baayen's clear explanations of regression models and mixed-effects modelling align with modern computational approaches like ChatGPT, which leverage probabilistic patterns and language models for text generation and

analysis. Fauconnier and Turner (2002) assert “Blending is a general cognitive operation that integrates elements from diverse mental spaces to create new meaning.”

The authors state that this cognitive process is crucial for understanding complex forms of metaphorical thought and language. Their work extends beyond traditional metaphor theory and provides a framework for how people combine and blend information from distinct cognitive domains to create new conceptual structures. The authors also emphasize the creativity is inherent in conceptual blending, suggesting that it is central to human cognition and reasoning. This creativity in blending is a key feature when comparing human-generated language to that of AI models like ChatGPT. While both may utilize metaphorical reasoning, the extent to which ChatGPT demonstrates creativity in blending and constructing new meanings remains a critical question in this research. Fauconnier and Turner’s work, therefore, provides a valuable lens for analyzing the cognitive processes behind language generation in both human and artificial intelligence-based contexts. By applying the principles of conceptual blending, the current research seeks to uncover the cognitive mechanisms at play when ChatGPT constructs metaphorical and contextually relevant language and contributes to a deeper understanding of its language generation capabilities.

The concept of conceptual blending aligns with the cognitive linguistic frameworks of Conceptual Metaphor Theory (CMT) and Frame Semantics. Both frameworks facilitate the study of ChatGPT's language generation in this research. Like conceptual metaphor theory, conceptual blending shows how abstract ideas are grounded in more concrete experiences. This conceptual blending serves as a process that is particularly relevant for understanding the flexible and dynamic ways in which ChatGPT and other language models generates various responses to similar or different prompts. In the context of artificial intelligence, this conceptual blending might be taken as the model that integrates diverse cognitive frames and conceptual metaphors to produce human-like language responses, but this remains yet to be explored, which is a prime focus of this study.

Hart and Queralto (2021) explore the relationship between language and images through the lens of cognitive linguistics. The authors argue that cognitive linguistics offers valuable insights into how language and visual images interact and influence one another. They are of the view that language is not a detached, abstract system, but one deeply intertwined with human cognition, perception, and the cultural settings. They

emphasize the role of cognitive linguistics in bridging the gap between verbal and visual modes of communication, advocating for a more integrated understanding of these domains.

2.6 Artificial Intelligence and Cognitive Linguistics

To understand the existing scenario of AI in conversational domain, it is imperative to explore the historical development of AI and the technologies that brought it to the current state. The roots of AI can be traced back to the 20th century, when eminent scientists such as Alan Turing envisioned AI to take charge of human functionalities in the coming times (Marshall, 2023). Turing (1950) experimented in this regarding which is referred to as Turing Test. Turing Test was a classic method to evaluate a machine's potential to showcase intelligent behaviour that is so identical to the human behaviour that it cannot be traced so easily. This conceptual framework to understand a machine's behaviour initiated a new spectrum of study where the prime objective was to explore whether computers had the capability to stimulate cognitive processes that are specific to humans, particularly in terms of linguistic modulations of thoughts and emotions.

Joseph Weizenbaum attempted to develop a program following the blueprints of Alan Turing's developments and came up with ELIZA, which became the first practical example of a conversational agent (Weizenbaum, 1966). Despite its shortfalls, ELIZA became a cornerstone for philosophical and ethical debates about the nature of language use, the roles of machines in social contexts, and the boundaries between human and artificial intelligence. It became necessary to discuss, and project the future of AI in the domain of languages (Berry, 2023).

In this regard, Natural Language Processing and Machine Learning emerged as augmenting fields of study and they not only contributed to the sophistication of language models but also assisted in examining the underlying features of language in general. Natural Language Processing is a field of study concerned with the nature of interaction between computer generated and human languages, with targeted focus on enabling machines to understand, interpret, and generate language (Khurana, 2023). Although these systems could deal with simple tasks, they lacked in managing the complexities and ambiguities that are inherent features of human language, such as context, tone, pragmatics, and idiomatic expressions (Jurafsky, 2008).

In the late 20th century, a paradigm shift occurred in AI research with the advent of machine learning which is a subfield of artificial intelligence that focuses on enhancing the ability of machines to learn from the raw data rather than being fed with the data, which is explicitly programmed and results in short, limited responses. Machine It improved the potential of computers to understand and generate human-like language (Holzinger, 2021). This shift from rule-based systems to data-driven approaches brought a significant change in the capabilities of NLP systems and enabled them for generation of language that was more flexible, human like, and context-aware. But these models needed a huge amount of data and required a thematic arrangement of data as well so that while reading the vast amount of information, they are not caught in the complexities of language like contextual use of certain phrases, synonymous structures etc.

Vaswani et al. (2017) introduced transformer architecture in their seminal paper 'Attention is All You Need' which became a breakthrough in AI and enabled developers to enhance the focus patterns of language models. Transformers use a mechanism known as "attention" which enables the model to focus on relevant part of a sentence or paragraph while generating or interpreting text. This unique feature addressed a number of shortfalls that were recurrent in the previous models. The previous models such as RNNs were unable to decode long-range dependencies in language. Transformer models enabled AI systems to generate more coherent and contextually correct language patterns. It gave rise to state-of-the-art language models such as OpenAI's GPT series.

Despite the impressive capabilities of modern language models, their advancement raises fundamental questions about whether machine-generated language can genuinely replicate human thought, creativity, coherence, and emotional depth. Current debates in AI and linguistics revolve around whether systems like GPT authentically capture the nuances of human expression or simply imitate them through patterned prediction. While AI-produced text can often surpass human writing in grammatical and syntactic accuracy, critics argue that such models still lack the experiential grounding, emotional intentionality, and improvisational qualities that characterize true human language use.

Belinkov et al. (2020) investigated the linguistic capabilities of Neural Machine Translation (NMT) models. The research focused on how these models represent linguistic structures. Through a series of experiments, the authors analysed how NMT

models capture syntactic and semantic information. They then compared it with traditional models and compared the efficiency factor. Their findings unveiled that although NMT models achieve high translation quality, their linguistic representation is often abstract and less interpretable compared to human language processing. According to them, Neural Machine Translation is a valuable but complex tool with challenging scope in computational linguistics.

Stahlberg (2020) is of the view that the evolution of Neural Machine Translation (NMT) from statistical methods marks a significant shift in machine translation. Early work in word and sentence embedding became a source for the foundation for NMT architectures. It is now dominated by encoder-decoder networks which are advanced synthesis structures of computational linguistics. These networks aspire to improve the contextual as well as cultural understanding of language. This transition is significant to understand how cognitive mechanisms, such as conceptual metaphor and construal operations, may be represented in AI-generated language, offering insights into the interplay between language generation models like ChatGPT and human cognition.

The article "Generative Artificial Intelligence and Engineering Education" by Aditya et al. (2023) explores the integration of generative AI technologies in engineering education. The authors emphasize the transformative potential of AI in reshaping educational practices, particularly in providing personalized learning experiences and automating repetitive tasks. The article discusses the challenges and ethical considerations of incorporating AI, such as the potential for bias, the necessity for human oversight, and the need for faculty members to adapt their teaching practices. The authors suggest for a balanced approach, where AI tools are used to complement traditional pedagogical methods, ultimately enhancing the educational experience without replacing human educators. Their work calls for further research to investigate the long-term impacts of generative AI on student outcomes and the role of AI in fostering innovation within engineering education.

GPT models represent a major advancement in artificial intelligence, emerging from developments in machine learning and NLP that allow systems to generate human-like language. Built on transformer architectures and trained on massive, diverse corpora through unsupervised learning, these models learn linguistic patterns, syntactic structures, and semantic relationships by predicting the next word based on contextual cues. Their training involves both large-scale pretraining and later fine-tuning, enabling

them to perform varied tasks such as summarization, translation, question-answering, and essay generation with notable coherence and stylistic flexibility.

In their article, AI and the Future of Humanity: ChatGPT-4, Philosophy and Education – Critical Responses, Peters et al. (2023) explore the multidimensional implications of artificial intelligence (AI), particularly ChatGPT-4, on humanity, philosophy, and education. The authors critically examine how AI technologies influence human identity, ethical frameworks, and the nature of knowledge. They discuss the transformative potential of AI in education, emphasizing its role in personalized learning, but also highlight ethical concerns such as biases, the erosion of critical thinking, and the risks of dependency on AI tools. The article underscores the need for philosophical inquiry into AI's role in shaping future societies and calls for frameworks that ensure its ethical integration into educational systems. Through a balanced analysis, Peters et al. (2023) advocate for an interdisciplinary approach to understanding AI's impact, suggesting that educators and policymakers collaborate to harness its benefits while mitigating its challenges.

2.7 Identified Gaps and Research Justification

The present study aims to explore the cognitive mechanisms underlying language generation in ChatGPT, with a particular focus on conceptual metaphors, construal operations, and frame semantics. While existing literature extensively explores cognitive linguistics and its application to human language (e.g., Langacker, 2008; Lakoff & Johnson, 1999; Fauconnier & Turner, 2008), there is limited research where these mechanisms are compared in human language and AI-generated text, particularly in the context of a language model like ChatGPT.

Additionally, the role of embodied cognition and construal operations, as focused in works by Langacker (2008) and Lakoff & Johnson (1999), pose a significant challenge for AI models, which lack physical embodiment because language models, howsoever intelligent, are not live entities of culture or society, and therefore, are void of physical experiences. This raises questions about how (if they do) AI models like ChatGPT mimic metaphorical thought, construct meaning, and engage with cognitive frames without having access to sensory and physical experiences. These gaps in the literature warrant further investigation into how ChatGPT's language generation aligns

or diverges from human cognition, particularly through the lens of cognitive linguistic theories.

In particular, the integration of conceptual blending (Fauconnier & Turner, 2008) into AI-generated text remains underexplored, with little research examining how AI models blend elements from distinct cognitive frames to produce creative, human like, culturally acceptable and contextually appropriate responses. The flexibility and creativity that is inherent in human language, as highlighted by Fauconnier and Turner (2008), necessitates that ChatGPT's ability to generate novel meaning structures through conceptual blending may be explored. Additionally, studies on metaphor processing by Gibbs and Colston (2007) reveal differences between irony and metaphor processing but does not include artificial intelligence based generative models in that. It opens a new vista and suggests that the same could also be applied to AI models, which would provide a deeper understanding of the cognitive and inferencing mechanisms at play in AI-generated language.

A key gap in the existing studies is the application of these cognitive linguistic theories to AI-generated text. While concepts like construal operations and frame semantics have been foundational for understanding human cognition and have been applied on multiple varieties of human produced texts like novels, short stories, essays, and other forms of discourse, their implementation in AI models, especially in generative models such as ChatGPT, has not been thoroughly explored. This includes but is not limited to examining how AI models like ChatGPT simulate or approximate these cognitive processes to that of humans and whether their outputs align with human-like cognitive behaviours in producing language or not. The previous studies (e.g., Baayen, 2008; Belinkov et al., 2020) focused largely on the structural aspects of AI language generation, with less attention given to the cognitive aspects such as metaphorical mapping, construal of meanings, frame activation, and the nuanced inferencing that is required for producing coherent and contextually appropriate language.

Thus, the gap necessitates for a systematic comparison of the cognitive linguistic mechanisms underlying human language generation with the language produced by AI models, especially in the areas of metaphor, construal, and frame semantics.

CHAPTER 3

RESEARCH METHODOLOGY

In this study, both quantitative and qualitative approaches are employed to analyse the cognitive semantic aspects of human and AI-generated language. It is a mixed-methods study. To ensure validity, reliability, and rigor in data collection, pre-processing, annotation, statistical analysis, and qualitative analysis, this study is structured into different phases. By employing a mixed-methods approach, the study aims to provide an in-depth understanding of the cognitive mechanisms that underlie language generation by humans and language models, particularly ChatGPT.

3.1 Research Design and Approach

The research follows a mixed-methods design, where quantitative and qualitative approaches are used to explore linguistic and cognitive aspects of language generation in humans and by ChatGPT. Employing both quantitative and qualitative methodologies, the researcher aims to have a more comprehensive examination of the research questions posed in this study. Quantitative analysis focuses on statistical and corpus-based techniques to identify patterns in linguistic complexity, lexical distribution, and semantic structures of responses, while qualitative analysis follows cognitive linguistic frameworks to examine conceptual metaphors, construal operations, and framing strategies. Therefore, employing mixed-methods approach enhances the scope of the study as it provides numerical evidence alongside interpretive insights.

3.2 Research Phases

To ensure a logical progression from data collection to data analysis, the study is carried out into progressive phases. The first phase involved data collection, where responses from human participants and ChatGPT (Version 3.5) were gathered using CSS essay prompts. The human participants were the CSS aspirants studying at the National Officers Academy (NOA) in Islamabad. They were given the English Essay question papers from the past papers, selected for this study, and to maintain reliability and consistency of the study, the participants were requested to write essays under supervised conditions. The researcher himself observed the candidates while they were

writing their essays. Concurrently, the same questions were given to ChatGPT as prompts, and the responses were documented with dates to ensure reliability and accuracy in comparison. It is important to mention that the responses from ChatGPT were obtained after getting the written responses from human participants.

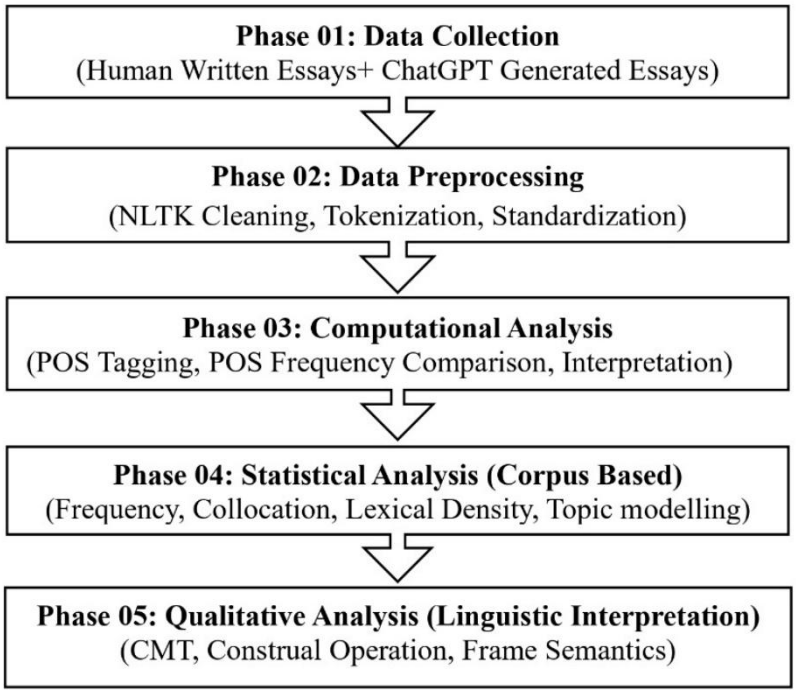
After collecting data, the data was pre-processed to standardize the dataset. It was also done to make the dataset compatible with the software used for computational as well as statistical analysis. During preprocessing stage, the text underwent cleaning, tokenization, and formatting adjustments. It was done to remove inconsistencies and redundant functional words such as prepositions, conjunctions, and articles. For preprocessing, the researcher used Python's Natural Language Toolkit (NLTK) to make dataset structured and uniform for subsequent analysis. Once pre-processing was done, the dataset was annotated to label linguistic and cognitive features, including part-of-speech tags, syntactic structures, conceptual metaphors, and framing strategies. This was a crucial step for identification of patterns in both human and AI-generated responses.

Following the computational analysis, statistical analysis was carried out in the form of corpus study to quantify linguistic complexity and variation in the responses. Techniques such as word frequency distribution, lexical density measurement, and corpus-based analysis were taken into consideration for identifying quantitative trends within the dataset. For corpus based statistical analysis, the researcher used **Voyant Tools** (https://voyant-tools.org/). Voyant is a widely recognized corpus analysis software that provides valuable insight regarding word frequency visualization, collocation analysis, and topic modelling. The rationale behind using Voyant Tools software was its user-friendly interface, robust analytical capabilities, and ability to process large datasets efficiently. While employing this tool for statistical analysis, the study ensured that statistical patterns were accurately identified and effectively visualized. The findings of statistical analysis were tabulated, considering the most relevant factors, directly linked to the present study's objectives.

The final phase of data analysis focused on examining the linguistic and cognitive features of dataset. The researcher used key principles from the frameworks of cognitive linguistics such as Conceptual Metaphor Theory, Construal Operations, and Frame Semantics. Grounding the data into cognitive semantics, the study focused on finding how meaning is construed and conceptualized in human and AI-generated

language. This phase provided qualitative insights into the underlying cognitive mechanisms at work to highlight key similarities and differences between datasets. The results were then interpreted within the broader theoretical context of cognitive semantics to get a comparative understanding of human and AI linguistic behaviour.

Figure 1: *Research Phases Flowchart*



3.3 Data Collection and Sampling

Purposive sampling was employed to ensure the relevance and quality of data. The researcher selected CSS aspirants as participants because of their competitive writing skills. CSS is a competitive examination conducted by federal public service commission for recruitment to posts in BS-17 under the federal government of the Islamic Republic of Pakistan. English Essay Writing is a compulsory paper, and each English Essay Writing question paper carries ten essay questions. Since CSS aspirants' minimum qualification is graduation with diverse backgrounds, they were ideal for this study. The target population consists of CSS aspirants from NOA, Islamabad, who engage in complex cognitive-linguistic tasks as part of their competitive exam preparation. The data was collected from the students of National Officers Academy as participants because they come from different provinces and have studied in different academic setting which reflects diversity in their background and represent the general

population of those aspirants who appear in CSS examination. Their proficiency structured writing, argumentation, and critical thinking made them an ideal group to study conceptual metaphors and framing in language generation. The study used essay prompts from CSS English Essay Papers (2017–2022) to elicit human responses. These prompts were selected for their open-ended nature and complexity, requiring participants to engage in advanced reasoning and language use on diverse topics ranging from opinion essays on social issues to expository essays on complex scientific topics. The participants were instructed to write their essays under supervised conditions, ensuring originality and minimizing external influences.

To obtain data from ChatGPT, the same essay prompts were given to ChatGPT (Version 3.5), and responses were systematically documented. Metadata, including time and data of data collection and response lengths, was recorded to ensure methodological rigor. This standardized approach enabled a direct comparison of dataset between human and AI-generated text and enabled the researcher for a structured linguistic as well as cognitive analysis. The rationale for selecting CSS essay topics lies in their cognitive demands and thematic diversity. These topics cover multiple domains, including literature, science, philosophy, and politics and provide a rich linguistic dataset for examining conceptual metaphors, framing, and cognitive structures in language production.

Human-written language is inherently variable, and it is shaped by differences in educational trajectories, socio-cultural exposure, cognitive preferences, and individual rhetorical styles. In cognitive linguistics, such variation is not viewed as random deviation but as evidence of the flexible and context-sensitive nature of human conceptualization. However, when comparative analysis is conducted, particularly between human and AI-generated language, uncontrolled variation can obscure underlying cognitive patterns. Therefore, the present study adopted a layered methodological strategy to systematically manage, normalize, and interpret variation while preserving its cognitive significance.

At the data collection stage, situational variability was tightly controlled. All human participants responded to identical CSS English Essay prompts under supervised, time-bound conditions, without access to external resources. This ensured that differences in linguistic output were rooted in internal cognitive processes, such as metaphorical reasoning, construal choices, and frame activation, rather than disparities

in task environment, preparation materials, or writing conditions. Establishing this controlled baseline was essential for any subsequent computational and qualitative comparison with AI-generated text.

Beyond situational control, the study employed thematic categorisation as a cognitive normalization mechanism. All essays were systematically grouped into seven thematic domains, including politics and governance, economy and development, social issues, literature and philosophy, and technology and environment. This categorisation served to reduce topic-induced variability by enabling comparisons within cognitively comparable conceptual domains. By analysing texts within shared thematic frames, the study minimized the influence of idiosyncratic topic interpretation and foregrounded recurring cognitive strategies across participants. Thematic clustering thus allowed individual stylistic variation to be contextualized within broader conceptual regularities.

Importantly, computational and corpus-based analysis played a central role in handling variation at scale. After thematic categorisation, the dataset underwent rigorous preprocessing using Natural Language Processing techniques. Texts were cleaned, tokenized, and standardized to eliminate surface-level inconsistencies related to formatting, punctuation, and orthography. This computational normalization ensured that subsequent analyses focused on meaningful linguistic and cognitive features rather than accidental textual noise.

Quantitative corpus analysis, conducted through tools such as Voyant and supported by POS tagging, enabled the identification of aggregate linguistic patterns across human responses. Measures such as lexical density, frequency distributions, and part-of-speech ratios allowed the researcher to move beyond anecdotal observation and establish statistically observable tendencies. These computational metrics functioned as objective filters, distinguishing systematic cognitive-linguistic behaviour from individual stylistic idiosyncrasies. By analysing patterns across the entire corpus rather than isolated texts, the study ensured that variation was interpreted at the level of collective cognitive trends. The quantitative patterns identified through corpus analysis guided the qualitative phase by highlighting areas of convergence and divergence across human texts. For instance, recurring metaphorical domains, consistent construal preferences, or dominant grammatical patterns signalled zones of cognitive salience

that warranted deeper theoretical analysis through Conceptual Metaphor Theory, Construal Operations, and Frame Semantics.

In the qualitative phase, individual instances of metaphor, construal, and frame activation were interpreted in relation to corpus-level trends rather than in isolation. This triangulation ensured that qualitative insights were empirically grounded and not selectively anecdotal. As a result, individual variation was neither erased nor overemphasized; instead, it was embedded within a computationally supported framework that revealed structured cognitive regularities.

Through this multi-layered approach, combining controlled data collection, thematic categorisation, computational normalization, and cognitively informed qualitative analysis, the study achieved a robust treatment of human variation. This methodological rigor was essential for establishing a valid and defensible comparison between human and AI-generated language, ensuring that observed differences reflected genuine cognitive distinctions rather than uncontrolled variability.

3.4 Data Pre-processing and Annotation

The data collected from human participants was typed and tallied with the original copies. The data collected from ChatGPT was compiled in MS word files. After preparing the data files, the dataset was pre-processed to ensure consistency and uniformity. Pre-processing was carried out as a standard procedure used in Natural Language Processing. NLP is one of the foundational methods that underlie language models while they are being trained. As the first step of NLP analysis, Text cleaning was performed on the dataset. The researcher used Python's NLTK library, which is used for diverse procedures in computational analysis. During data cleaning, the researcher removed extraneous symbols, punctuation, and formatting inconsistencies using NLTK library. Python's NLTK library was selected because of its wide-range use among the scholars working in the domain of computational linguistics. As a standard procedure of data cleaning, tokenization was performed to classify text into words. This step synthesised the data and made it convenient for linguistic analysis to be done subsequently. The rationale for computational analysis was to ensure that statistical and qualitative analyses are conducted on high-quality, error-free text. The researcher also obtained clarity about the dataset, which gave useful insight regarding approaches which were used later during the qualitative analysis.

3.5 Statistical Analysis

Corpus based quantitative statistical analysis was conducted using Voyant Tools to have a deeper understanding of linguistic choices, and to identify linguistic trends and patterns. The researcher used Voyant's visualization features and obtained data-driven insights into linguistic complexity and variation between human and ChatGPT-generated responses. Certain techniques employed during statistical analysis such as thematic classification, lexical diversity measurement, and frequency analysis provided empirical evidence to substantiate qualitative findings. The Voyant Tools software was used because it is efficiency in processing large textual datasets and has ability to generate comprehensive visual representations of linguistic structures. These features make it an optimal tool for corpus-based research. This software was particularly selected because it was available without any cost and it facilitated corpus-based analysis by generating word frequency distributions, lexical density measures, and collocation networks and these were the exact features of primary importance for this study.

3.6 Qualitative Analysis

Following the statistical analysis, the researcher employed cognitive linguistic frameworks for analyzing conceptual metaphors, construal operations, and framing strategies. This research integrated these frameworks, instead of relying on one component of the framework, to perform a comprehensive analysis of the cognitive mechanisms at play in both human and AI-generated text.

3.6.1 Conceptual Framework

The conceptual framework of this research is conceived from core principles of cognitive semantics, a subbranch of cognitive linguistics. The researcher selected three major and interrelated cognitive theories: conceptual metaphor theory, construal operations, and frame semantics. The blend of these theories provides a robust foundation for exploring the mechanisms that underpin ChatGPT's ability to generate language. This conceptual framework provides the necessary conceptual scaffolding to study the nuanced and intricate processes that govern how ChatGPT constructs and organizes linguistic data. Each theoretical principle of the framework contributes a unique yet interconnected approach and facilitates for a comprehensive exploration of the cognitive abilities of humans and AI-based models. This approach emphasises that

linguistics structures are not arbitrary, but they reflect the underlying processes and categories that are culturally and contextually situated. Coulsen and Petten (2002) consider cognitive semantics a powerful lens to explore how language is grounded in human cognition. They assert that cognitive semantics enables researchers to understand how meaning and understanding of meaning is constructed, agreed upon and communicated. Their viewpoint strengthens the rationale behind selecting these theories for the present study since the primarly focus of this study is to explore how ChatGPT employs conceptual metaphors as the foundational structures to construct meaning, most importantly, in generating texts that are the focal points of human creativity like arts and literature. This research focuses on investigating whether the language models like ChatGPT exhibit an understanding of conventional, local, and cultural metaphors in cultural or linguistic norms of a particular society. It further aims to explore whether these language models can adapt various metaphorical expressions to fit in varying contexts or not. In addition to that, this dimension of framework will explore whether the models demonstrate creativity in combining, varying, embedding existing metaphors or creating novel metaphors, unveiling its potential to emulate human cognitive patterns in production of language. With focus on conceptual framing of metaphors, this study seems to uncover the extent to which metaphorical reasoning impacts the model's ability to produce meaningful, contextually sensitive and metaphorically rich language.

In the context of this study, the conceptual framework serves as the blueprint to explore and comprehend the mechanism that underlie ChatGPT's ability to generate linguistic structures. The focus on cognitive semantics as a core framework makes it possible to address the intricate interplay between cognitive processes and linguistic structures, particularly within the contexts of artificial intelligence.

Through this integrative approach, the conceptual framework aims to develop a comprehensive understanding of salient differences and similarities between humans and machines in terms of language at work. Conceptual Metaphor Theory describes how abstract concepts are situated and communicated through metaphorical structures that are rooted in concrete experiences. Construal Operations emphasize the flexibility and variability in how humans and machine interpret and produce linguistic expressions, reflecting the influence of perspective and context. Similarly, Frame Semantics focuses on the structured organization and activation of knowledge into

cognitive frames. Employing this framework facilitates in understanding the underlying factors which shape the understanding of events, situations, and concepts when language models generate text. Collectively, these dimensions provide a comprehensive lens to investigate the cognitive architecture and operational strategies employed by ChatGPT to generate text that is contextually appropriate, culturally relevant and identical to that of humans.

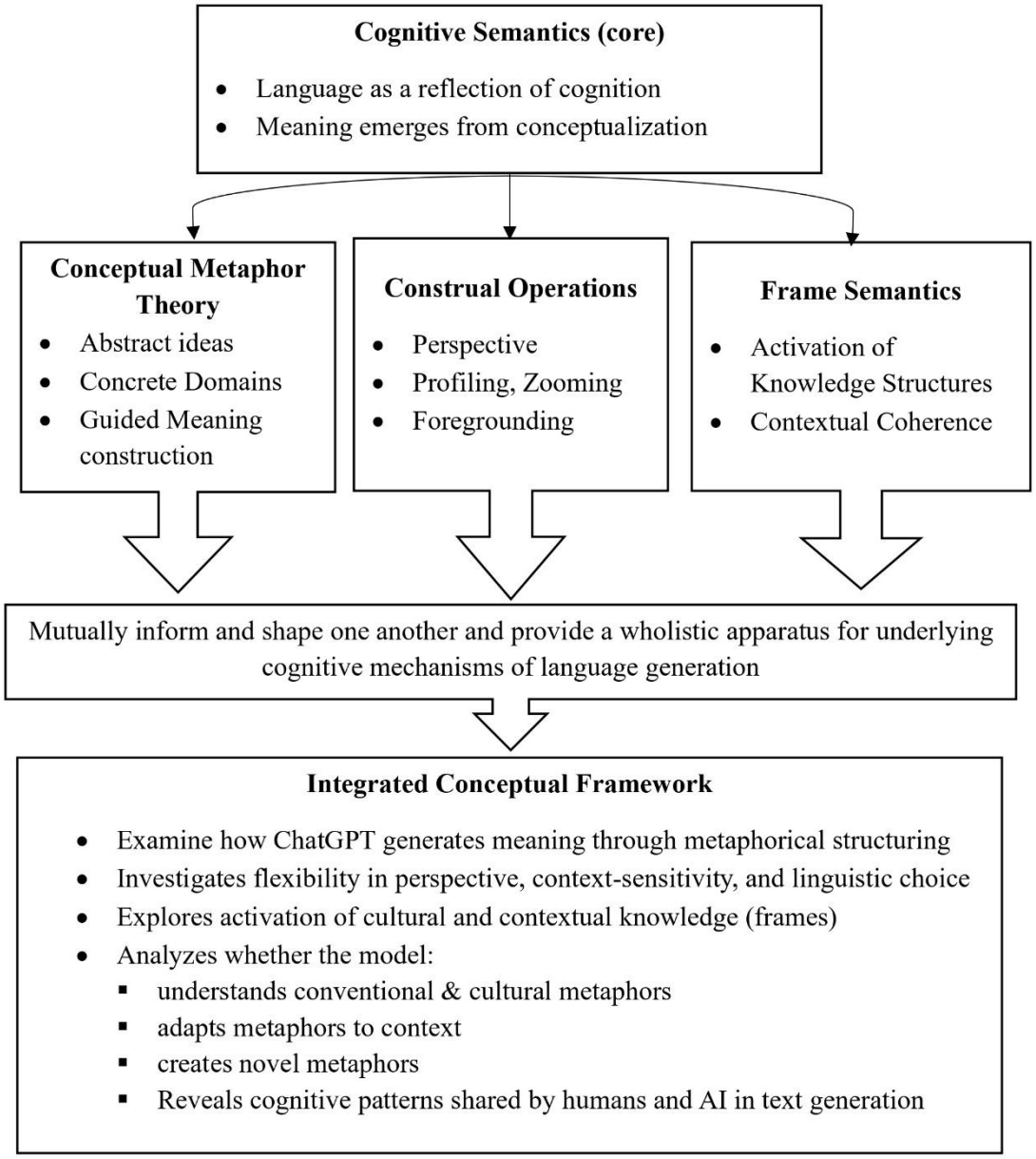
The theoretical foundation of this research rests on the integration of three central frameworks in cognitive linguistics: Conceptual Metaphor Theory, Construal Operations, and Frame Semantics. Rather than employing these theories independently, the study treats them as interdependent components of a unified model of meaning construction. Their convergence lies in a shared concern with how humans conceptualize experience and encode that conceptualization linguistically.

Conceptual Metaphor Theory accounts for the cognitive mappings through which abstract domains are structured in terms of more concrete, experiential domains. However, metaphor alone does not explain why particular aspects of a concept are foregrounded or how meaning is shaped by perspective. This is where construal operations become crucial. Construal explains how language users selectively attend to certain features of a situation, adjust levels of abstraction, and impose specific viewpoints when expressing meaning. Metaphorical mappings, therefore, are not static; they are dynamically shaped by construal choices.

Frame Semantics provides the broader cognitive context within which both metaphor and construal operate. Frames represent structured knowledge systems that organize experiences, roles, and expectations. Understanding any linguistic expression requires access to the relevant frame, as meaning is distributed across a network of related concepts. In this study, frames function as the background knowledge structures that enable both metaphorical reasoning and construal-based selection.

Together, these theories form a coherent analytical pipeline. Frames activate relevant knowledge domains, construal operations determine how that knowledge is linguistically packaged, and conceptual metaphors organize abstract reasoning within that construal. This nexus allowed the study to examine meaning as a dynamic cognitive process rather than a collection of isolated linguistic features, making it particularly suitable for comparing human cognition with AI-generated language.

Figure 2: *Conceptual Framework*



3.6.2. Evaluation and Interpretation

At final stage, the researcher interpreted the findings within the context of cognitive semantic theories. A qualitative examination of results gives insight into how ChatGPT conceptualizes language relative to human participants. The analysis explored differences in meaning construction, structural coherence, and knowledge activation across both datasets. The study identified key areas where AI language generation aligns with or diverges from human linguistic behaviour by integrating findings into a broader cognitive-linguistic framework.

3.7 Ethical Considerations

Ethical guidelines were rigorously followed throughout the research process. All human participants were fully informed about the study's objectives, and their written consent was obtained before collecting data from them. The research anonymized the participant data to ensure confidentiality and to maintain privacy and ethical compliance. Transparency was upheld in data handling, analysis, and reporting to maintain integrity of research. The study abided by ethical standards in AI research and systematically documented AI-generated responses and ensured that no biased or manipulated inputs influence the results.

CHAPTER 4

DATA ANALYSIS

4.1 Data Collection

At the first stage of data collection, the researcher obtained the past papers of CSS-English Essay from the official website of Federal Public Service Commission, the conducting body for the examination. The essay statements given in five-year papers were listed down, making it a total of 50 topics. The researcher obtained request letter from the supervisor to be submitted to National Officers Academy Islamabad for the collection of data. The researcher visited the National Officers Academy multiple times to collect data. The CSS aspirants attending the National Officers Academy Islamabad were briefed about the objectives of this study and were requested to write essays on the given topics under supervised settings.

To ensure transparency and reliability of the research, the researcher got a pre-structured consent form (attached in appendix) signed from the participants and gave them topics for writing essays from the list prepared earlier. The list only included the topics given in the past papers, selected for this study. The participants were invigilated by the researcher while they wrote the essays. The participants were given loose sheets by the researcher to write essays. After obtaining the written essays, the researcher manually typed the responses to make the data ready for further steps of research. Each essay was carefully typed, tallied with original response, and proof-read for three times to ensure the reliability of the data. It took four months to obtain the human written data set. As the researcher obtained an essay from human participant, the same topic was given to ChatGPT as a prompt and the essay generated by ChatGPT was copied and saved in MS Word file on the same day.

4.2 Thematic Categorisation of Data

After obtaining 50 essays from human participants on selected topics, and generating essays on same topics from ChatGPT, the dataset was categorized thematically. Keeping in view the nature of topics in terms of keywords, general subject matter and scope, the entire dataset, comprising of 50 essays was classified in seven

categories. The thematic categorisation was done carefully to avoid redundancy and overlap.

4.2.1 Category 1- Politics, Governance, and Nationalism

1. Is colonial mentality impeding Pakistan's progress?
2. Brexit means globalization is the rhetoric of the privileged, and capitalism will return ferociously as ever.
3. Being a minority is a fate no one wants. Can nationalism be really inclusive?
4. Democracy in Pakistan: Hopes and Hurdles.
5. Polarized politics: the issues and challenges of democracy in Pakistan.
6. Will "Rule of law" always remain an impracticable myth in our country?
7. Pakistan and the future of Kashmir cause.
8. Global power dynamics and Pakistan's foreign policy.
9. Democracy and Illiteracy Do not move together

4.2.2 Category 2- Economy, Development, and Globalization

1. Real development should transform people's lives, not just economic statistics.
2. China – Pakistan Economic Corridor (CPEC) and its Socio-economic Implications for the Region and the World.
3. Pakistan's informal economy: the way forward.
4. IMF bailouts: roads to stability or recipes for disaster.
5. Pros and cons of globalization.
6. New war fronts lie in economic zones.
7. Promoting tourism in Pakistan: opportunities and challenges.

4.2.3 Category 3- Social Issues, Education, and Human Rights

1. Higher Education in Pakistan: Ills and Remedies.
2. Women universities as agents of change.
3. Gender equality: A popular slogan.
4. Bureaucracy doldrums.
5. Classrooms decide the future of the nation.

6. Sometimes we do not see what we see.
7. Too many of us are not living our dreams because we are living our fears.
8. The Emerging Power of Social Media: Prospects and Problems.
9. New Waves of Feminism and Our Culture
10. Feminism is not really a third world issue

4.2.4 Category 4- Literature, Art, and Philosophy

1. Literature is a lonely planet of idealists.
2. Do we really need literature in our lives?
3. Urdu literature and progressive movement.
4. Art for peace.
5. Truth is lived not taught.
6. I do not agree with what you have to say, but I'll defend to the death your right to say it.
7. "I fall upon the thorns of life! I bleed."
8. Let there be more light in the corridors of worship places.

4.2.5 Category 5- Technology, Media, and the Environment

1. Is Pakistan ready for digital revolution?
2. Expanding information technology: a curse or blessing.
3. COVID-19: A wake-up call for Pakistani researchers.
4. The threat of Global Warming and the ways to counter it.
5. Intercultural communication is panacea to avoid 3rd world war.

4.2.6 Category 6- War, Resistance, and Ideologies

1. More and more International military engagements by the United Nations; is the world moving towards peace?
2. Are modern wars not holy wars?
3. Modernity is an unending project.
4. Ideologies thrive on notions of resistance, yet change is a simulation.

5. In the fight against terrorism and corruption, it is imperative not to compromise human rights and civil liberties.

4.2.7 Category 7- Ethics, Spirituality, and Human Nature

1. Beware the barrenness of a busy life!
2. Do not waste water even if you were at a running stream.
3. Meaning purposive education.
4. Human inventions move societies backward.
5. Universal human equality is utopic.
6. Life without controversy is no life. But why one should not choose the safe haven of conformism?

4.3 Data Cleaning and Pre-processing

After the data was organized and prepared for further analysis, the entire dataset comprising of 100 essays was pre-processed. To make the data set suitable for study, the researcher pre-processed it and cleaned the data using NLTK (Natural Language Processing Toolkit) library. The researcher used Python (3.8) as the programming language and Jupyter notebook as the command prompt coding path. This cleaning process involved tokenization, removal of stop words, punctuation marks, special characters, typos, and inconsistencies. The dataset was also lemmatized, converted into lowercase and Parts-of-Speech (POS) tagging along with frequencies was done. Finally, the researcher obtained the POS frequencies of all essays.

The results indicated that ChatGPT heavily relies on nouns (NN) and adjectives (JJ) to generate its responses on various topics. It uses a structured, information-heavy style and focuses on classification and description. In addition, ChatGPT frequently uses plural nouns (NNS) which further supports this observation. Furthermore, ChatGPT systematically expands arguments by discussing multiple aspects of a topic instead of an abrupt rebuttal blended with personal and emotional response. Human writers, on the other hand, display a more balanced distribution of verbs (VBP, VBD, VBZ, VBN, VBG) and adverbs (RB). It reflects that humans adopt a more dynamic and expressive writing style, and integrate actions, personal perspectives, and transitions more fluidly.

In terms of adjectives, which are the key concerns of conceptual metaphor theory, ChatGPT tends to use a higher frequency of adjectives (JJ) which reinforces that language models have tendency to generate descriptions which are logical in nature as the ideas are categorized within a given analytical framework. Human written essays, on the other hand, showcase greater use of comparative (JJR) and superlative (JJS) adjectives. It indicates that humans have opinionated approach and possess a stronger tendency to evaluate and contrast concepts, rather than merely describe them. This comparative structure in human essays contributes to their subjectivity since evaluations and judgments are often embedded within the mental schemas of speakers.

Moreover, ChatGPT tends to use present-tense verbs more often than human participants. It indicates that ChatGPT follows a neutral and generalized style. Additionally, ChatGPT relies on Gerunds which indicates its preference for continuity in augmentation. On the contrary, human participants use a higher frequency of past-tense verbs, and modal verbs which underscores a more reflective and argumentative approach. It also indicates that human participants structure their stance based on historical contexts, personal experiences and case studies what ChatGPT lacks in because of its data-driven neutrality. The frequency of prepositions (IN), pronouns (PRP), and determiners (DT) also provides insights into discourse structures of both ChatGPT and Huaman participants. ChatGPT uses fewer pronouns and maintains an impersonal, objective tone, whereas human participants employ more personal pronouns and strongly engage in the argument, employing a more subjective perspective.

It is also important to examine the variation in usage of adverb (RB) between ChatGPT and human writers. ChatGPT uses adverbs in a controlled manner to refine arguments, whereas human writers show a more diverse range of adverbs, especially while responding to persuasive or emotionally charged contexts like gender inequality, Kashmir Issue, and Education etc. While ChatGPT remains more predictable in its expression, human writers adapt language flexibly to achieve a specific rhetorical effect.

4.3.1 Theme Wise Pre-processing

To have a clearer understanding of the NLP processed data, the researcher did the same process on the dataset theme wise as well. The researcher developed

comparative clusters of the essays as per seven themes and after cleaning the essays, obtained the POS frequencies as given below.

Table 1: *Theme Wise Pre Processing and NLP Analysis*

FREQUENCY	**Chat GPT**	**Human**
Theme 1: Politics, Governance, And Nationalism	('NN', 2911), ('JJ', 2334), ('NNS', 1644), ('VBP', 521), ('VBG', 453), ('RB', 381), ('VBD', 329), ('VBZ', 239), ('VBN', 191), ('VB', 123), ('IN', 84), ('MD', 57), ('PRP', 19), ('JJR', 17), ('RBR', 12), ('CD', 11), ('NNP', 11), ('DT', 10), ('JJS', 5), ('FW', 4), ('RP', 3), ('WP$', 1), ('CC', 1)]	('NN', 2947), ('JJ', 2077), ('NNS', 1359), ('VBP', 509), ('RB', 428), ('VBG', 373), ('VBD', 311), ('VBN', 260), ('VBZ', 230), ('VB', 157), ('IN', 109), ('MD', 75), ('DT', 45), ('JJR', 26), ('RBR', 16), ('PRP', 13), ('CD', 12), ('JJS', 11), ('FW', 9), ('WP', 3), ('RP', 3), ('NNP', 2)]
Theme 2: Economy, Development, And Globalization	[('NN', 1768), ('JJ', 1426), ('NNS', 1032), ('VBP', 336), ('VBG', 296), ('RB', 171),	('NN', 3099), ('JJ', 2206), ('NNS', 1568), ('VBP', 549), ('VBG', 461), ('RB', 356),

	('VBD', 166), ('VBZ', 136), ('VB', 96), ('VBN', 86), ('IN', 58), ('MD', 34), ('JJR', 12), ('PRP', 11), ('JJS', 10), ('RBR', 8), ('CD', 6), ('NNP', 4), ('DT', 3), ('RP', 2), ('POS', 1), ('FW', 1), ('RBS', 1)	('VBZ', 222), ('VBD', 208), ('VB', 205), ('VBN', 155), ('IN', 112), ('MD', 99), ('JJR', 30), ('DT', 30), ('RBR', 15), ('JJS', 14), ('CD', 4), ('PRP', 2), ('CC', 2), ('RP', 2), ('NNP', 1), ('WP$', 1), ('WRB', 1), ('FW', 1)
Theme 3: Social Issues, Education, And Human Rights	('NN', 2762), ('JJ', 2083), ('NNS', 1895), ('VBP', 624), ('RB', 439), ('VBG', 433), ('VBD', 309), ('VBZ', 292), ('VBN', 205), ('VB', 146), ('IN', 108), ('MD', 57), ('JJR', 53), ('PRP', 44), ('DT', 18),	('NN', 3528), ('JJ', 2446), ('NNS', 2084), ('VBP', 772), ('VBG', 515), ('RB', 488), ('VBD', 356), ('VBZ', 314), ('VB', 300), ('VBN', 221), ('MD', 162), ('IN', 130), ('PRP', 76), ('JJR', 74), ('JJS', 30),

	('RBR', 18), ('JJS', 9), ('FW', 7), ('RP', 3), ('CD', 2), ('POS', 2), ('WDT', 2), ('WP$', 2), ('CC', 1), ('RBS', 1)	('DT', 27), ('RBR', 23), ('RP', 8), ('FW', 7), ('WP$', 3), ('WDT', 2), ('WP', 2), ('CD', 2), ('CC', 1), ('POS', 1)
Theme 4: Literature, Art, And Philosophy	('NN', 2339), ('JJ', 1530), ('NNS', 1069), ('VBP', 414), ('RB', 336), ('VBG', 326), ('VBZ', 250), ('VBD', 241), ('VBN', 141), ('VB', 118), ('IN', 91), ('MD', 54), ('PRP', 29), ('RBR', 20), ('JJR', 18), ('JJS', 12), ('DT', 10), ('WP$', 6), ('FW', 6), ('CD', 2), ('RP', 2)	('NN', 3546), ('JJ', 2143), ('NNS', 1437), ('VBP', 608), ('RB', 440), ('VBG', 396), ('VBD', 392), ('VBZ', 323), ('VBN', 185), ('VB', 157), ('IN', 156), ('PRP', 71), ('MD', 61), ('JJR', 43), ('DT', 34), ('JJS', 24), ('RBR', 24), ('WP$', 8), ('FW', 5), ('CD', 4), ('RP', 2), ('NNP', 2), ('RBS', 1),

		('CC', 1)
Theme 5: Technology, Media, And Environment	('NN', 1484), ('JJ', 1094), ('NNS', 907), ('VBG', 282), ('VBP', 225), ('RB', 187), ('VBD', 172), ('VBZ', 101), ('VBN', 86), ('VB', 63), ('IN', 52), ('MD', 30), ('JJR', 11), ('DT', 9), ('CD', 7), ('RBR', 5), ('JJS', 4), ('PRP', 4), ('FW', 2), ('NNP', 1), ('RP', 1),	[('NN', 1949), ('JJ', 1337), ('NNS', 898), ('VBP', 326), ('VBG', 317), ('RB', 210), ('VB', 149), ('VBD', 145), ('VBZ', 135), ('VBN', 94), ('MD', 78), ('IN', 63), ('DT', 20), ('JJR', 19), ('PRP', 16), ('RBR', 12), ('JJS', 9), ('CD', 4), ('RP', 2), ('CC', 1), ('NNP', 1)
Theme 6: War, Resistance, And Ideologies	[('NN', 1389), ('JJ', 1054), ('NNS', 683), ('RB', 240), ('VBP', 225), ('VBG', 194), ('VBD', 174), ('VBN', 105), ('VBZ', 88), ('VB', 52), ('IN', 32),	('NN', 1863), ('JJ', 1173), ('NNS', 804), ('VBP', 284), ('RB', 258), ('VBD', 224), ('VBG', 189), ('VBZ', 154), ('VB', 141), ('VBN', 127), ('MD', 93),

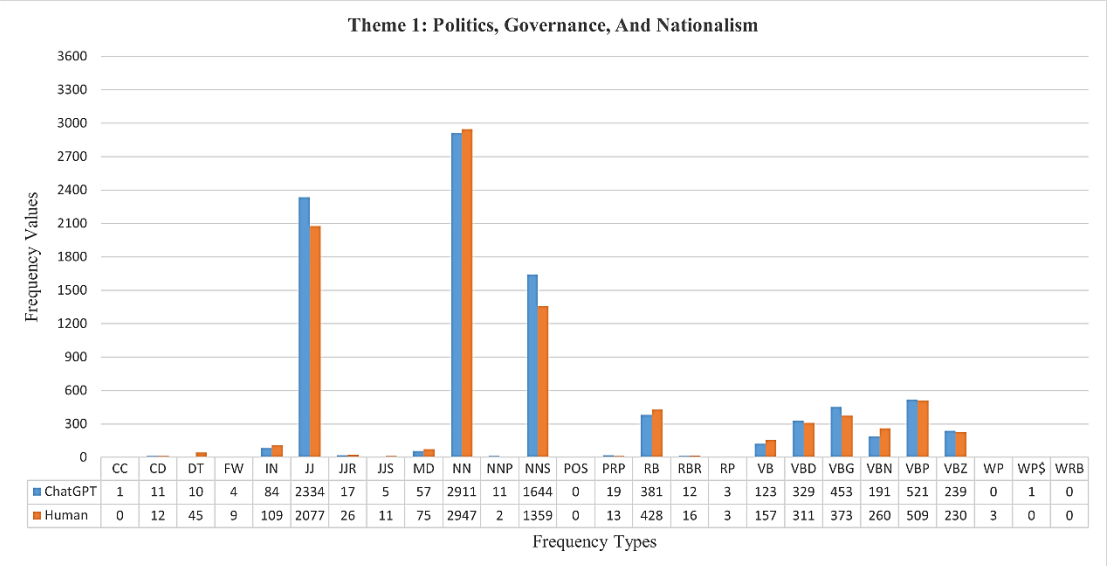
	('MD', 26), ('JJR', 11), ('CD', 5), ('DT', 3), ('RBR', 3), ('PRP', 2), ('FW', 1), ('RP', 1)	('IN', 48), ('PRP', 45), ('DT', 24), ('JJS', 12), ('JJR', 12), ('RBR', 9), ('NNP', 3), ('RP', 3), ('WP$', 2), ('CD', 1), ('FW', 1), ('CC', 1), ('WP', 1), ('WRB', 1)]
Theme 7: Ethics, Spirituality, And Human Nature	('NN', 1704), ('JJ', 1268), ('NNS', 883), ('VBP', 292), ('VBG', 286), ('RB', 236), ('VBZ', 167), ('VBD', 161), ('VBN', 93), ('VB', 88), ('IN', 56), ('MD', 34), ('JJR', 17), ('PRP', 12), ('DT', 10), ('JJS', 7), ('RBR', 5), ('CD', 2), ('RP', 1),	('NN', 2408), ('JJ', 1396), ('NNS', 959), ('VBP', 397), ('VBG', 320), ('RB', 298), ('VBD', 243), ('VBZ', 191), ('VB', 149), ('VBN', 120), ('IN', 92), ('PRP', 87), ('MD', 77), ('JJR', 40), ('DT', 24), ('RBR', 16), ('JJS', 15), ('NNP', 3), ('FW', 3),

	('RBS', 1)	('CD', 2), ('RP', 2), ('WP$', 2), ('WP', 1)

The POS frequency analysis of ChatGPT-generated and human-written essays across the given themes highlights key linguistic and cognitive differences how language is structured, ideas are conceptualised, and syntactic and lexical choices are utilized by each entity.

In the theme of *Politics, Governance, and Nationalism*, ChatGPT maintains a systematic and formal tone, and uses nouns (2911 occurrences), adjectives (2334), and plural nouns (1644) frequently. It reinforces its tendency to generate arguments around clearly defined entities and structures. Human-written essays employ similar noun frequency (2947 occurrences) but display higher usage of adverbs (RB: 428 vs. 381), modals (MD: 75 vs. 57), and determiners (DT: 45 vs. 10). This suggests that human writers engage more directly with evaluative and subjective elements and aim for greater flexibility in argumentation. Humans use comparatives (JJR: 26 vs. 17) and superlatives (JJS: 11 vs. 5) adjectives abundantly which further highlights a tendency toward judgment and contrast. This style is less exhibited in ChatGPT which indicates that it has a neutral and balanced discourse.

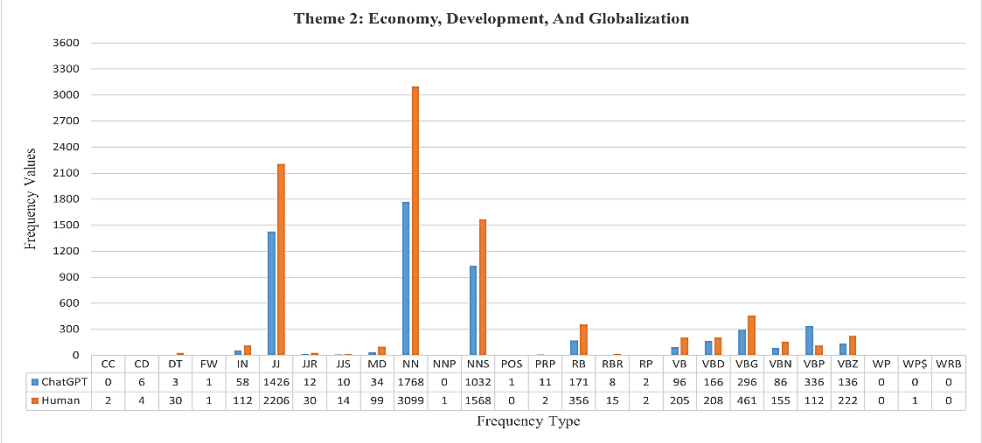
Figure 3: *POS Frequency Chart 1*



	CC	CD	DT	FW	IN	JJ	JJR	JJS	MD	NN	NNP	NNS	POS	PRP	RB	RBR	RP	VB	VBD	VBG	VBN	VBP	VBZ	WP	WP$	WRB
ChatGPT	1	11	10	4	84	2334	17	5	57	2911	11	1644	0	19	381	12	3	123	329	453	191	521	239	0	1	0
Human	0	12	45	9	109	2077	26	11	75	2947	2	1359	0	13	428	16	3	157	311	373	260	509	230	3	0	0

The theme of *Economy, Development, and Globalization* follows a similar pattern. ChatGPT maintains a structured and systematic approach, heavily relying on nouns (1768), adjectives (1426), and plural nouns (1032). ChatGPT tends to formulate its arguments in a neutral and academic manner. On the other hand, human essays demonstrate a wider range of verb forms (VBD: 208 vs. 166, VBN: 155 vs. 86, VB: 205 vs. 96). This suggests that human-written essays are more process-driven and describe economic changes and developments in a dynamic way instead of presenting them as static concepts. The human written essays showcase higher frequency of modals (MD: 99 vs. 34) which further supports this observation and indicates that human writers often talk in terms of hypothetical reasoning, possibilities, and uncertainties in terms of economic and global affairs which ChatGPT lacks in as it lacks in experiential background.

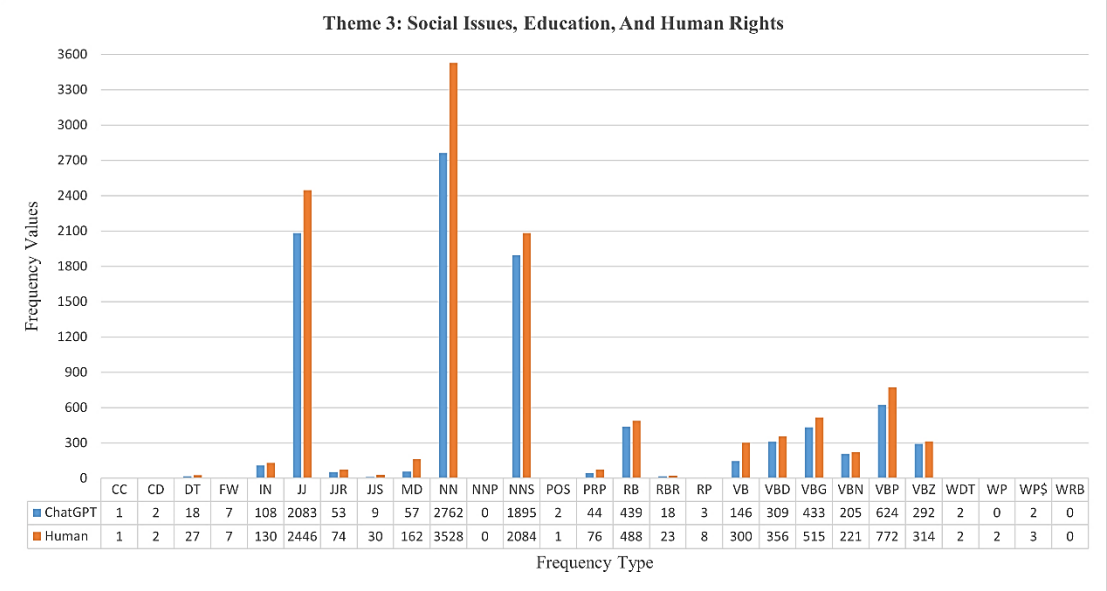
Figure 4: *POS Frequency Chart 2*



	CC	CD	DT	FW	IN	JJ	JJR	JJS	MD	NN	NNP	NNS	POS	PRP	RB	RBR	RP	VB	VBD	VBG	VBN	VBP	VBZ	WP	WP$	WRB
ChatGPT	0	6	3	1	58	1426	12	10	34	1768	0	1032	1	11	171	8	2	96	166	296	86	336	136	0	0	0
Human	2	4	30	1	112	2206	30	14	99	3099	1	1568	0	2	356	15	2	205	208	461	155	112	222	0	1	0

In the theme of *Social Issues, Education, and Human Rights*, human-written essays contain significantly higher occurrences of personal pronouns (PRP: 76 vs. 44) and comparative (JJR: 74 vs. 53) and superlative adjectives (JJS: 30 vs. 9). It reflects a more personal, opinionated, and subjective stance. ChatGPT exhibits fewer modal verbs (MD: 57 vs. 162) and discourse markers (IN: 108 vs. 130) which indicates a greater emphasis on established knowledge rather than speculation or engagement with uncertainty. The AI-generated essays mainly rely on stating the facts, whereas human essays show greater concern for persuasive and emotive rhetoric, especially when discussing topics related to justice, equality, and rights.

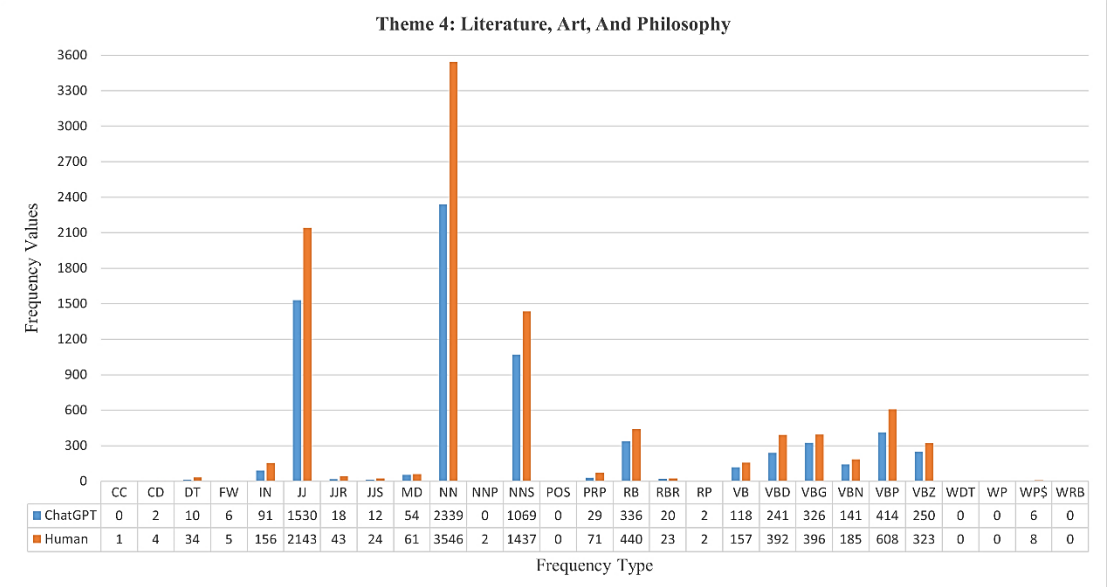
Figure 5: *POS Frequency Chart 3*



	CC	CD	DT	FW	IN	JJ	JJR	JJS	MD	NN	NNP	NNS	POS	PRP	RB	RBR	RP	VB	VBD	VBG	VBN	VBP	VBZ	WDT	WP	WP$	WRB
ChatGPT	1	2	18	7	108	2083	53	9	57	2762	0	1895	2	44	439	18	3	146	309	433	205	624	292	2	0	2	0
Human	1	2	27	7	130	2446	74	30	162	3528	0	2084	1	76	488	23	8	300	356	515	221	772	314	2	2	3	0

A similar trend is observed in the theme of *Literature, Art, and Philosophy*, where human writers use more varied grammatical structures to convey interpretative and evaluative perspectives. ChatGPT essays are well-organized and rely on clear noun-based arguments (NN: 2339 vs. 3546 in human essays) whereas human-written essays incorporate more verbs (VBD: 392 vs. 241, VBP: 608 vs. 414), prepositions (IN: 156 vs. 91), and discourse markers (CC: 1 vs. none). This suggests that while human essays are more interconnected, and refer to various influences and ideas fluidly, ChatGPT follows a more modular and segmented approach to argumentation.

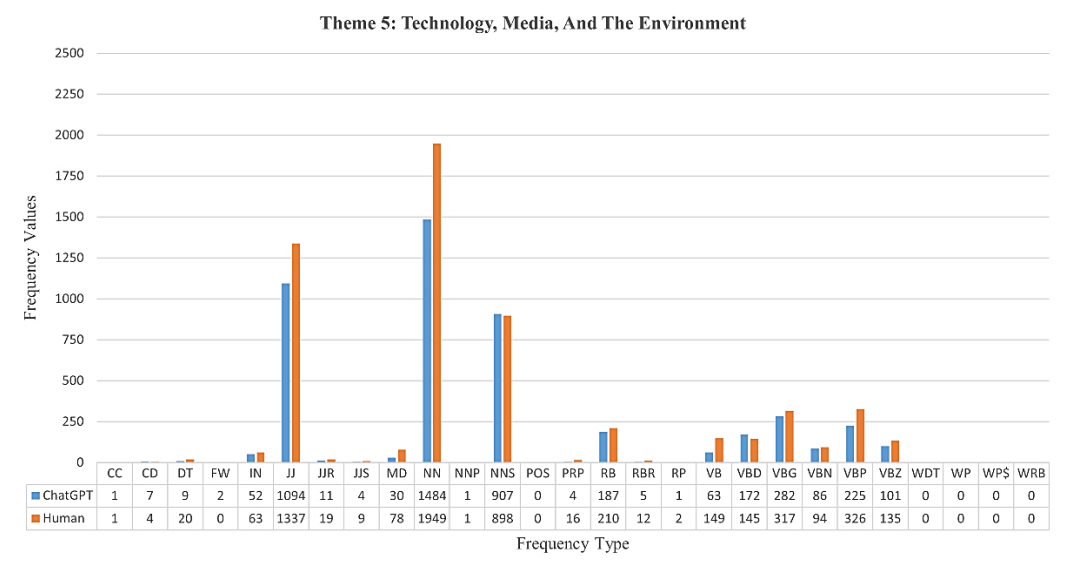
Figure 6: *POS Frequency Chart 4*



	CC	CD	DT	FW	IN	JJ	JJR	JJS	MD	NN	NNP	NNS	POS	PRP	RB	RBR	RP	VB	VBD	VBG	VBN	VBP	VBZ	WDT	WP	WP$	WRB
ChatGPT	0	2	10	6	91	1530	18	12	54	2339	0	1069	0	29	336	20	2	118	241	326	141	414	250	0	0	6	0
Human	1	4	34	5	156	2143	43	24	61	3546	2	1437	0	71	440	23	2	157	392	396	185	608	323	0	0	8	0

For *Technology, Media, and the Environment*, ChatGPT again relies on structured, noun-heavy sentences, with fewer variations in verb tenses compared to human essays. The difference in pronoun usage (PRP: 16 vs. 4) is particularly striking and suggests that human-written essays engage more directly with personal or collective perspectives on technological advancements and environmental concerns. Furthermore, the higher frequency of modal verbs in human essays (MD: 78 vs. 30) indicates that humans generally have a stronger focus on possibilities, speculations, and ethical considerations surrounding technology and their situate their narratives in imaginations and probabilities, which are common factors that govern human speech.

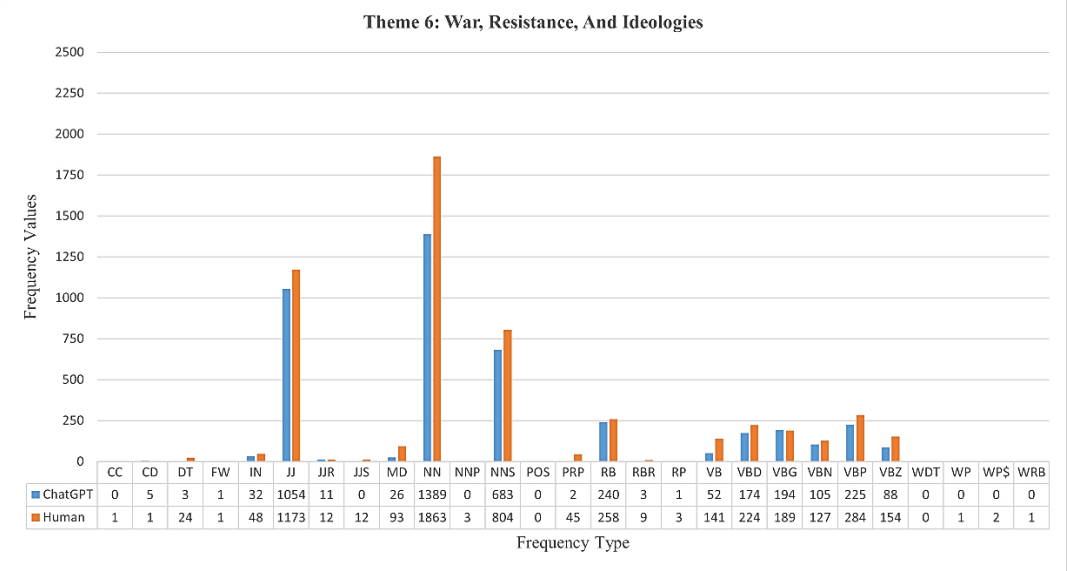
Figure 7: *POS Frequency Chart 5*



	CC	CD	DT	FW	IN	JJ	JJR	JJS	MD	NN	NNP	NNS	POS	PRP	RB	RBR	RP	VB	VBD	VBG	VBN	VBP	VBZ	WDT	WP	WP$	WRB
ChatGPT	1	7	9	2	52	1094	11	4	30	1484	1	907	0	4	187	5	1	63	172	282	86	225	101	0	0	0	0
Human	1	4	20	0	63	1337	19	9	78	1949	1	898	0	16	210	12	2	149	145	317	94	326	135	0	0	0	0

The War, Resistance, and Ideologies theme reveals significant divergence between ChatGPT and human essays. Human writers use more verbs (VBD: 224 vs. 174, VBN: 127 vs. 105) and personal pronouns (PRP: 45 vs. 2) whereas ChatGPT employs more structured noun-adjective combinations (NN: 1389, JJ: 1054). This suggests that human-written essays are more narrative-driven, incorporating historical references and personal accounts, while ChatGPT adopts a more expository and detached approach. The higher occurrence of comparative adjectives (JJR: 12 vs. 11) and discourse markers (CC: 1 vs. none) further solidifies the argument that human writers emphasize contrasts and argumentative fluidity more than ChatGPT.

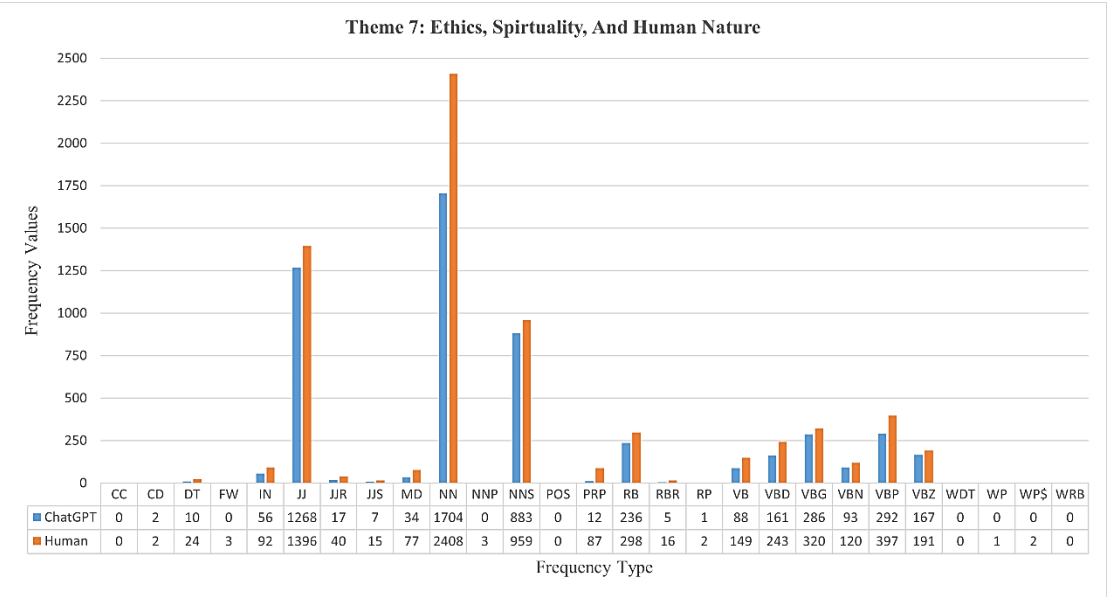
Figure 8: *POS Frequency Chart 6*



	CC	CD	DT	FW	IN	JJ	JJR	JJS	MD	NN	NNP	NNS	POS	PRP	RB	RBR	RP	VB	VBD	VBG	VBN	VBP	VBZ	WDT	WP	WP$	WRB
ChatGPT	0	5	3	1	32	1054	11	0	26	1389	0	683	0	2	240	3	1	52	174	194	105	225	88	0	0	0	0
Human	1	1	24	1	48	1173	12	12	93	1863	3	804	0	45	258	9	3	141	224	189	127	284	154	0	1	2	1

In the theme of *Ethics, Spirituality, and Human Nature*, the differences in style and structure remain consistent with previous themes. ChatGPT adopts a controlled and systematic style, with less variation in verb tenses and fewer discourse markers. Human-written essays demonstrate greater engagement with evaluative language, as evidenced by the higher frequency of modal verbs (MD: 77 vs. 34), pronouns (PRP: 87 vs. 12), and discourse markers (IN: 92 vs. 56). These differences suggest that human essays are more reflective, speculative, and exploratory, particularly when addressing abstract concepts such as morality, faith, and the human condition.

Figure 9: *POS Frequency Chart 7*



	CC	CD	DT	FW	IN	JJ	JJR	JJS	MD	NN	NNP	NNS	POS	PRP	RB	RBR	RP	VB	VBD	VBG	VBN	VBP	VBZ	WDT	WP	WP$	WRB
ChatGPT	0	2	10	0	56	1268	17	7	34	1704	0	883	0	12	236	5	1	88	161	286	93	292	167	0	0	0	0
Human	0	2	24	3	92	1396	40	15	77	2408	3	959	0	87	298	16	2	149	243	320	120	397	191	0	1	2	0

In brief, the POS frequency analysis across different themes underscores fundamental differences. It shows that ChatGPT mainly employs structured, information-driven approach and human writers tend to have a dynamic, evaluative, and contextually rich writing style. ChatGPT essays remain neutral, noun-dense, and logically structured, and prefer clarity and coherence over personal engagement. Human essays, on the other hand, incorporate more rhetorical elements, varied sentence structures, and emotionally charged discourse which indicates a more personalized, subjective, and persuasive approach to writing.

4.3.2 Accumulative comparative Pre-processing

Finally, the research obtained a wholesome comparison of dataset by cleaning the complete cluster of 50 essays. This process resulted in an accumulative comparison sheet, as given below.

Table 2: *Accumulative Comparative Processing*

FREQUENCY	**Chat GPT**	**Human**
Accumulative Comparison	[('NN', 14356), ('JJ', 10790), ('NNS', 8113), ('VBP', 2637), ('VBG', 2270), ('RB', 1990), ('VBD', 1552), ('VBZ', 1273), ('VBN', 907), ('VB', 686), ('IN', 481), ('MD', 292), ('JJR', 139), ('PRP', 121), ('RBR', 71), ('DT', 63), ('JJS', 47),	[('NN', 19339), ('JJ', 12779), ('NNS', 9108), ('VBP', 3446), ('VBG', 2571), ('RB', 2479), ('VBD', 1879), ('VBZ', 1569), ('VB', 1258), ('VBN', 1162), ('IN', 710), ('MD', 645), ('PRP', 310), ('JJR', 244), ('DT', 204), ('RBR', 115), ('JJS', 115),

	('CD', 35), ('FW', 21), ('NNP', 16), ('RP', 13), ('WP$', 9), ('CC', 3), ('POS', 3), ('RBS', 3), ('WDT', 2)]	('CD', 28), ('FW', 26), ('RP', 22), ('WP$', 16), ('NNP', 12), ('WP', 7), ('CC', 6), ('WRB', 2), ('WDT', 2), ('POS', 1), ('RBS', 1)]

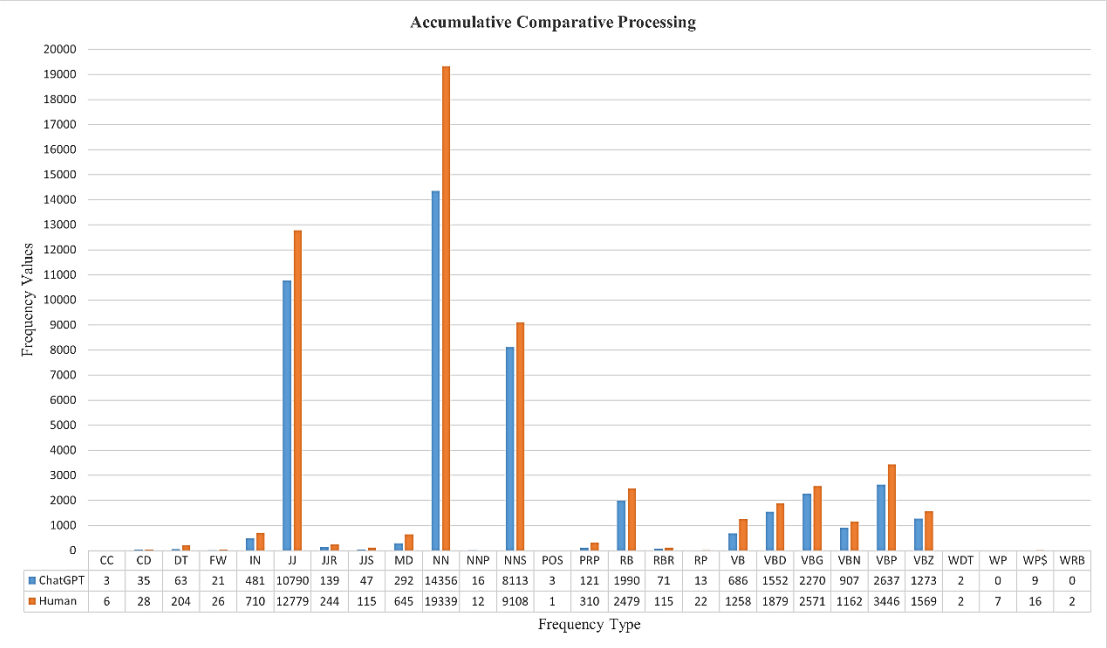
The accumulative POS frequency comparison of ChatGPT-generated and human-written essays reveals significant differences in linguistic structure, syntactic choices, and stylistic tendencies. ChatGPT mainly relies on nouns (NN: 14,356) and adjectives (JJ: 10,790), which reinforces its tendency to produce structured, information-heavy, and objective writing. An abundance of plural nouns (NNS: 8,113) and verbs in present tense (VBP: 2,637) suggests that ChatGPT focuses on generalization and abstraction, presenting arguments in a neutral, analytical style.

In contrast, although human-written essays demonstrate higher overall noun frequency (NN: 19,339) but the distribution of these elements is more dynamic. Human writers use verb forms across different tenses, as reflected in higher occurrences of past-tense verbs (VBD: 1,879 vs. 1,552 in ChatGPT) and past participles (VBN: 1,162 vs. 907). This indicates that human-written essays incorporate historical context, personal experiences, and event-driven narratives more frequently than ChatGPT. In addition, an increased use of modal verbs (MD: 645 vs. 292) in human-written essays further supports this observation, as it indicates a greater tendency to explore hypothetical scenarios, uncertainties, and evaluative reasoning. The usage of pronouns (PRP: 310 in human vs. 121 in ChatGPT) is another major distinction. ChatGPT maintains a more detached, impersonal tone while human-written essays showcase more personal engagement, subjectivity, and direct address. Similarly, determiners (DT: 204 in human vs. 63 in ChatGPT) and conjunctions (CC: 6 in human vs. 3 in ChatGPT) appear more

frequently in human essays. It reveals greater textual cohesion, argument connectivity, and fluidity in human discourse.

The use of comparative and superlative adjectives highlights further stylistic variations. ChatGPT focuses on describing rather than explaining, using fewer comparative adjectives (JJR: 139 vs. 244 in human essays) and superlatives (JJS: 47 vs. 115 in human essays). This supports the idea that human-written essays engage more in judgment, contrast, and evaluation, whereas ChatGPT essays focus on neutral exposition and categorization. Human writers are more likely to construct arguments around relative comparisons (e.g., "better," "stronger," "more significant") and emphasize extremes (e.g., "most important," "greatest," "worst"), which makes their writing more persuasive and rhetorically engaging.

Figure 10: *POS Frequency Accumulative Comparative Chart*



	CC	CD	DT	FW	IN	JJ	JJR	JJS	MD	NN	NNP	NNS	POS	PRP	RB	RBR	RP	VB	VBD	VBG	VBN	VBP	VBZ	WDT	WP	WP$	WRB
ChatGPT	3	35	63	21	481	10790	139	47	292	14356	16	8113	3	121	1990	71	13	686	1552	2270	907	2637	1273	2	0	9	0
Human	6	28	204	26	710	12779	244	115	645	19339	12	9108	1	310	2479	115	22	1258	1879	2571	1162	3446	1569	2	7	16	2

In brief, ChatGPT relies on noun-heavy, structured, and expository language, and produces writing that is clear, logical, and systematically organized but often lacks the fluidity, personal engagement, and rhetorical variation that is present in human-written essays. Human writers, on the other hand, employ a more dynamic and varied linguistic approach, evident by greater use of verbs across tenses, personal pronouns, discourse markers, and evaluative expressions. These differences reflect not only the inherent nature of AI-generated text but also the cognitive and communicative choices

made by human writers, who engage with language in a more nuanced, subjective, and emotionally resonant manner.

4.4 Quantitative Analysis

The researcher conducted a corpus-based quantitative study on essays. For this, the essays were clustered in 50 pairs, taking one essay generated by ChatGPT, and the one written by human participant on the same topic. The essays were processed through Voyant software, and the comparative data was obtained. ChatGPT and human participants exhibit distinct differences in terms certain features including structure, vocabulary use, readability, sentence complexity, and overall writing style.

4.4.1 Comparative Features of ChatGPT and Human Writing

A detailed comparative summary highlighting key aspects of both types of writing is given below

Table 3: *Comparative Features Table*

Feature	**ChatGPT-Written Essays**	**Human-Written Essays**
1. Document Length	Typically, longer, ranging from 1800 to 2500 words.	More varied, ranging from 1300 to 2200 words.
2. Vocabulary Density	Generally higher (0.35–0.46), indicating tightly packed vocabulary with a structured flow.	More variable (0.28–0.42), sometimes denser when discussing complex themes.
3. Sentence Length	More structured and slightly longer sentences, with sentence length ranging from 18–25 words	More variation, with sentence length ranging from 17–24 words.
4. Readability Index	Higher readability (14–18), meaning sentences are clear, and logically structured	Lower readability (11–16), indicating greater sentence complexity and less predictability.
5. Stylistic Consistency	Highly structured and uniform, with well-organized paragraphs and smooth transitions.	More diverse and varied, showing individuality in writing styles.
6. Frequent Words	Focuses on formal, structured, and globally relevant terms.	Personal, cultural references, and emotionally charged vocabulary.
7. Distinctive Vocabulary	Uses analytical, logical, and neutral phrasing, often referring to data-driven arguments.	Rich in expressive, ideological, and culturally grounded words, reflecting the writer's perspective.

8. Tone & Style	Objective, neutral, and academic, with a structured argumentation style.	More subjective, emotionally driven, and contextually adaptable.
9. Sentence Complexity	Consistent sentence structures with a balance between complexity and clarity.	More fluid and unpredictable, with a mix of long, descriptive sentences and shorter impactful ones.

4.4.2 Statistical Breakdown of Key Features

To provide a numerical perspective, the statistical summary of the dataset based on 50 essays from both ChatGPT and human participants is given below.

Table 4: *Statistical Breakdown of Key Features*

Feature	**ChatGPT-Written Essays (Average)**	**Human-Written Essays (Average)**
Average Document Length (Words)	1800–2500	1300–2200
Vocabulary Density	0.35–0.46	0.28–0.42
Average Words Per Sentence	18–25	17–24
Readability Index	14–18 (Higher readability, structured flow)	11–16 (Lower readability, greater complexity)

4.4.3 Key Observations & Insights

ChatGPT essays are comparatively longer and remain relatively stable because language models follow a structured pattern with elaborate explanations, consistent paragraphing and detailed examples. ChatGPT adheres to a formulaic approach and ensures that arguments are developed systematically. On the other hand, human-written essays are significantly shorter and showcase variability due to differences in writing style, level of engagement with the topic and the approach to argumentation. Although some human-written essays exhibit in-depth analysis similar to ChatGPT, most of the essays are concise and rely on brevity and rhetorical impact instead of going for an exhaustive explanation.

In terms of vocabulary density, ChatGPT consistently selected vocabulary that is structured, evenly distributed, and possesses formal clarity and logical progression. ChatGPT avoids unnecessary repetition and has a relatively high dense vocabulary. Human written essays, on the other hand, exhibit lexical variability. Some essays are

dense with varied vocabulary while some essays follow natural, conversational style with lower density. Human writers use vocabulary that is specific to region and culture they are part of, and ground their arguments in personal experiences, idiomatic phrases, and narratives which make their writing dynamic and organic in terms of linguistic structure.

The sentence length and complexity are also significantly important. ChatGPT generates typically longer sentences and maintains an academic style with a clear subject-verb-object arrangement. ChatGPT constructs logically sequenced sentences and maintains a greater level of readability and coherence avoiding overly fragmented sentences/ Human writers have fluidity and variation in their style. Some writers use long, descriptive sentences in order to elaborate key points while others go for shorter, impactful sentences for rhetorical impact. Human written essays are emotionally charged and exhibit a resonant flow of arguments.

The readability index is another crucial point of observation. ChatGPT exhibits a higher readability score (14-18) which means that essays written by ChatGPT are easier to read because of logical sentence construction, and consistence grammar patterns. ChatGPT sticks to conventional readability standards and ensures that writing is accessible. The readability index of human-written essays is low (11-16) which indicates the presence of complex structures and varied grammatical patterns. This difference is mainly because of the rhetorical devices, literary canon, and culturally embedded expressions used by humans which makes their writing more unpredictable, yet expressive. In some cases, humans use long, intricate sentences requiring deeper cognitive processing. This results in lower readability score despite richness of the text.

In terms of stylistics, ChatGPT produces well-organized content and avoids subjectivity or emotionally charged style. ChatGPT tends to be informative yet detached and prefers linguistic choices that are well-suited for academic writing. But it lacks personal engagement with the topic. Human writers incorporate their personal perspectives into their writing and use vocative language, nationalistic and historical references to strengthen their arguments. Thus, human written essays are engaging and reflective of individual thought processes contrary to the formulaic neutrality of ChatGPT.

Word frequency analysis of the dataset shows that ChatGPT uses analytical terms like policy, economic, global, structure, analysis, framework etc. It indicates that ChatGPT prefers neutral and structured discourse. It aims for broader thematic relevance and emphasises logical development that is common across the globe. Human writers, on the other hand, select emotionally and culturally charged vocabulary with frequent use of words like nation, identity, heritage, struggle, Allah, Pakistan, dictatorship, oppression etc. It even showcases religious references which are completely absent in ChatGPT. It indicates that human writers prefer to engage with topics on a personal and ideological level, and draw their viewpoints on collective memory, historical narratives, and cultural identity to frame their arguments. Artificial Intelligence tends to be objective in lexical choices whereas human writers bring emotional depth, ideological perspectives, and cultural nuances to their compositions, making it subjective in nature.

4.5 Qualitative Analysis

To answer the research questions, the researcher organized the essays under theme as stated in the beginning of this chapter and explored the conceptual metaphors, construal operations, and frame semantics theme wise.

4.5.1 Politics, Governance, and Nationalism

The theme of *Politics, governance, and Nationalism* reveals key differences between ChatGPT and human writers in their use of conceptual metaphors, knowledge structures, and thematic elements.

Both ChatGPT and human writers use conceptual metaphors to discuss politics, governance, and nationalism, but there are distinct differences in the ways they do so. Human writers draw from historical struggles, cultural narratives, and national identity and showcase a deeper, more emotionally charged use of metaphors whereas ChatGPT adopts structured, analytical, more neutral and academic perspectives. While discussing colonial mentality in Pakistan, human writers use metaphors such as chains, shackles, and haunting ghosts to show how colonial legacies can be still found in governance, politics, infrastructure, education and societal structures. The use of such charged metaphors activates a sense of psychological and institutional entrapment that humans experience and often talk about. A human writer, for instance, describes Pakistan's governance as being "trapped in the iron grip of bureaucratic elitism." Similarly, the

administrative structure of Pakistan is described as “a relic of colonial rule that refuses to loosen its hold” by a human participant. This metaphoric representation of governance showcases that the agency of colonial structures and oppression still exist as active forces that shape the governance patterns in Pakistan. Humans take these metaphors as embodied cognition. On the contrary, ChatGPT explores the same phenomenon using metaphors like blueprint, echo, and framework. It indicates a more structural, void of emotions, and systematic perspective, rather than an experiential one. ChatGPT uses expressions such as “the colonial blueprint that lingers in governance”, and “echoes of the British Raj that persist in bureaucratic norms” which highlight an impersonal framing of metaphors, where ChatGPT presents the colonial influence as an abstract rather than a lived experience. Even though this metaphor is accurate, it lacks the emotional resonance and cultural embeddedness evident in human writing.

Moreover, while talking about nationalism, human writers employ metaphors of blood, root, and sacrifice to connect their narrative to historical struggle and personal identity. ChatGPT uses metaphors like imagined communities, architecture of identity and national cohesion. It reflects a more theoretical and constructivist perspective rather than a deep personal and historical one.

Conceptual metaphors are not only used in figurative language but also in argumentative framing and literal choices. Human writers weave metaphors to reinforce their emotional engagement and rhetorical persuasion and use them seamlessly. The human essays often start with a historical or personal reference before moving towards the broader arguments. It creates a narrative-driven approach to conceptual framing. ChatGPT employs metaphors in a more segmented manner and often use them as part of an analytical framework instead of embedding them within the argument. For example, in an essay about democracy in Pakistan, a human writer describes the country as “a flickering candle in a storm, struggling to keep its flame alive amidst the tempests of corruption and military interference”. This metaphor becomes the stand post of entire discussion and reinforces the entire discussion to describe the precarious nature of democracy in Pakistan. ChatGPT approaches these metaphors more explicitly using structures like “Democracy in Pakistan can be seen as a fragile institution, vulnerable to instability and external pressures.” Although this approach is effective, but it lacks the organic integration of metaphors and fluid rhetorical power evident in human writing.

The differences in construal operations, how language shapes and frames meaning, between ChatGPT and human participants highlight variations in cognitive flexibility, perspective-taking, and abstraction.

ChatGPT and humans differ in terms of cognitive flexibility, perspective-taking, and abstraction. Human writers showcase enriched perspective-taking, and take fluid shifts between first-person narratives, collective national identity, and abstract political critique. It makes their writing more personal, rooted in experiences, and opinionated. For instance, human writers oscillate between historical reference, and personal testimonies while discussing the impact of feudal dominance in politics and governance patterns in Pakistan. Huaman writers develop a multi-layered construal of such issues. For example, one human writer describes a rural politician as “a feudal lord, whose power is cemented not by governance but by generations of unchecked privilege, where land itself whispers his name with reverence and fear”. Construal of power in such metaphorical terms gives a tangible, sentient quality to the political structure and indicates that such concepts are rooted in and emerge from concrete human experiences, instead of being them hypothetical and imaginative. While human writers ground their narratives in concrete structures, ChatGPT prefers abstraction and categorical organization. ChatGPT presents arguments in a hierarchical manner instead of shifting perspectives. It introduces ideas in a linear way and moves from definitions to structured arguments. The feudal dominance is described as “the persistence of feudal influence in Pakistan can be attributed to historical power structures, economic disparities, and the continuity of dynastic leadership.” Although this structure is more precise, it lacks experientiality and immersion found in human construal.

In addition, ChatGPT employs decontextualized, universalist perspective and frames its narrative through theories and case studies that are globally recognized. It enhances the broader applicability of the response but reduces specificity in its construal of political and nationalistic issues. Humans, although try to do so but tend to ground their narratives in local and lived experiences.

Human writers activate knowledge structures that are deeply ingrained in cultural narratives, personal affiliations, and historical references when describing nationalism, politics and governance. They heavily rely on referring to national heroes, religious ideology, indigenous philosophies, and folk narratives to contextualize their arguments. For example, a human writer refers to Allama Iqbal’s poetry while

discussing the impact of colonial mentality. With this, the human writer tries to exemplify the struggle for independence, and linguistic divide between elite English speakers, and native population. Because of this activation of shared cultural and historical knowledge structure, the writing resonates with Pakistani readership and makes it more convincing. ChatGPT, on the contrary, activates knowledge structures from a more generalized, neutral, and corpus-based framework. It mainly relies on academic discourse, historical precedent, and structured political theories. ChatGPT lacks in identity-driven themes, and it does not experience knowledge in the way humans do. It simply retrieves and synthesizes it from learned database. It, therefore, often lacks cultural spontaneity and implicit social nuances. Similarly, in terms of ideological engagement, human writers often have clear ideological stances with overt critique of governance structures. They express a nationalistic sentiment, and emotional investment in political struggle. Due to cognitive moderation, ChatGPT generates comparatively more analytical but less emotionally compelling essays and aims for a balanced, neutral tone and avoids strong ideological commitments

In brief, although ChatGPT excels in structural coherence, neutrality, and systematic argumentation, human writers exhibit greater emotional depth, rhetorical dynamism and cultural resonance while discussing issues related to politics, governance and nationalism. In terms of coherence and style, human writers possess a narratively rich, experientially grounded style whereas ChatGPT prefers clarity, organization, and theoretical breadth. These differences can be significant to improve the ways artificial intelligence can approximate human ways in which language embodies thought, experience, and identity.

4.5.2 Economy, Development and Globalization

The essays related to economy, development and globalization also present a remarkable contrast between ChatGPT and human written essays. The economic structures, development theories and plans, and notion of globalization are visualised by both AI and humans through various conceptual frames, argumentation styles, and cognitive schemas worth understanding. It is crucial to mention that the use of metaphoric language is central to how economic concepts are framed and comprehended since these concepts are complex in nature and require for metaphorical mapping. Both ChatGPT and human writers use metaphorical expressions, but they do so quite differently. ChatGPT describes economy as a system, a mechanism, or

structure. It uses metaphors like engines, frameworks, blueprints etc. to define and explain economy. For instance, while discussing economic growth, ChatGPT describes economy as the engine that propels national progress forward. It also refers to economic growth as a structural pillar necessary for stability. Human writers, on the other hand, tend to humanize the economy, making it look like a personalised experience. They use organic, struggle based, and even combative metaphors to emphasize their national identity, sovereignty, and economic issues. They use metaphors like chains, shackles, cancer, disease to portray the economic situation, and a struggle for liberation. The phrases like "Pakistan remains trapped in the iron grip of IMF loans", or "The nation's economy is shackled by the weight of external debt" indicate a visceral, emotional, and personal engagement with the economic realities. In brief, ChatGPT sees the economy as a system that needs to be optimized whereas human writers take it as a battlefield where historical injustice and political agency confront each other.

Metaphorical divergence is prominently evident in the debate on globalization. ChatGPT uses metaphors like network, bridge, and pathway and presents globalization as an interconnected, inevitable process, maintaining a neutral, policy-driven approach. Human writers on the other hand, describe globalization through metaphors like invasion, erosion, plunder, exploitation, and stealing to highlight the inequality in power dynamics between developed and developing countries. A human writer, for example, describes globalization as a "Trojan horse, allowing economic colonization under the guise of free trade", and refers to it as "The flood of corporations that has eroded local industries, washing away self-reliance". The activation of such emotional rhetoric, historical memory, and personal viewpoints portrays globalization not as an economic inevitability, but as a force that profits some while exploiting others.

Conceptual metaphors are not used for stylistic effects. They reveal the deeper cognitive tendencies as well. Humans embed metaphors throughout their discourse and make them a core part of their arguments whereas ChatGPT uses metaphors sporadically and treats them as explanatory tools. For example, when discussing the role of capitalism in economic injustice, a human writer describes capitalism as "a beast that feeds on the labour of the poor, growing stronger while leaving the masses in famine". This personification of capitalism as a predatory force reflects a moral and ideological stance. ChatGPT frames capitalism in mechanistic terms and says that capitalism operates as a self-regulating system driven by market demand and supply

dynamics. This neutral, impersonal, and detached depiction lacks the moral weight, ideological scope, and experiential framing that is present in human writing.

The cognitive strategies used to frame meaning also differ in human writings and ChatGPT generated text. Humans frequently shift between national identity, collective struggle, and economic critique which allows them to have a multi-dimensional construal of economic struggle. For example, human writers personify the nation and present it as an active participant in its economic fate. A human participant suggests that Pakistan must break free from the chains of economic subjugation and reclaim its financial independence. The construal of Pakistan as a struggling but determined entity reinforces the idea of an empowered, self-relying nation. ChatGPT maintain a static perspective and presents economic arguments in a linear and systematic way. ChatGPT describes economic dependency as a challenge that stems from structural weakness, requiring investment in local industry along with fiscal reforms. In terms of abstraction, ChatGPT mainly generalizes economic discussion and makes it applicable to a global audience while human writer tries to root it in the local contexts. While discussing the foreign aids, ChatGPT asserts that foreign aid has both benefits and drawbacks. On the other hand, a human writer gives a historical reference and states that Pakistan's economy has been a pawn in global financial warfare since Ayub Khan's reliance on American loans. This historical anchoring makes human writing more contextual, immersive, and compelling.

The activation of knowledge structures is also different between ChatGPT and humans. Human writers activate knowledge structures through historical struggle, ideological narratives and cultural memory. They include references to colonial history, religious canon, and national preferences. They frame economic challenges as part of a larger political, ideological, and moral struggle. For instance, a human writer discusses the failure of trickle-down economic structures in Pakistan by stating that the myth of trickle-down prosperity has been sold to Pakistanis since the days of general Zia, yet wealth has remained concentrated in the hands of the elite class. This historical grounding of the narrative makes human writing more contextual and persuasive. ChatGPT approaches the same issue with a theoretical tone and says that trickle-down economics is a debated policy approach that suggests wealth distribution occurs through market-driven mechanism. It mainly relies on broad, academically sourced

knowledge and constructs arguments based on widely accepted economic theories and principles.

The comparison of ChatGPT and human responses to issues related to economy, development and globalization reveal that ChatGPT employs systematic arguments and uses mechanistic and neutral metaphors while humans activate deeply embedded religious, emotional, and ideological themes. ChatGPT prefers abstraction and global acceptance whereas humans care less about that and emphasize lived experience, historical reference, and emotional engagement.

4.5.3 Social Issues, Education and Human Rights

Construal operations, conceptual metaphors and frame semantics play an important role when the discussion shifts towards social issues, education, and human rights. Both ChatGPT and humans use conceptual metaphors, rhetorical strategies, and underlying cognitive structures but there is significant difference in how this is done. ChatGPT construes social issues in terms of generic, policy-driven discourse whereas human written essays showcase greater richness in style, subjective positioning, experiential perspective, and emotional engagement.

Humans adopt a subjective approach towards education and human rights and frequently use metaphors such struggle, battle, oppression, and faith to emphasize the emotional and experiential dimensions of social inequalities they face or observe on a daily basis. While discussing women's rights in Pakistan, a human participant metaphorically describes the situation of women of rural areas as caged birds that sing for freedom but remain trapped behind iron bars. The use of emotionally charged, compelling and visually impactful metaphor tries to convey the essence of psychological and physical injustice that many women face in Pakistan. ChatGPT on the other hand, while discussing the same topics, refers to gender inequality as a structural barrier to economic and social development which requires comprehensive policy interventions. While humans construe gender inequality as a result of wrong decisions and cultural anomalies, ChatGPT describes gender discrimination as a matter of policy change instead of taking it as an emotional and social struggle, as done by human participants. It highlights a fundamental difference in how artificial intelligence and human cognition differ in framing social discourses.

The discussion on issues related to education and literacy shows a similar divergence. Human writers approach education as a personal issue and conceptualize it as a journey, a light, or a weapon against ignorance. It indicates subjective positioning and experiential attachment. A human writer, for instance, describes education as a torch that illuminates the darkest corners of our society, guiding the way towards progress and prosperity. The use of metaphors such as light, ways, corners shows cognitive attachment with an abstract phenomenon and indicates that humans describe education as a force of enlightenment which aligns with cognitive and cultural association of knowledge with vision, illumination, and clarity. ChatGPT, on the other hand, takes a materialistic stance and describes education a pillar for national progress and calls it a tool that equips individuals with necessary skills to contribute to the society. The metaphor of pillar suggests stability and support, but it lacks the emotional depth of human-crafted metaphor.

The distinction in construal operations further reinforces these differences. Human writers use highly dynamic construal and shift between individual stories and historical references to create a contextually rich and layered narrative. A human written essay starts with a personal anecdote: “I once saw a boy, no older than ten, carrying bricks in the scorching sun, his hands raw with labour while other children played in schoolyards.” This first-person, observational framing makes the essay cognitively narrowed down and exhibits emotional transitioning into a broader structural analysis. ChatGPT maintains a consistent objective tone and presents child labour in generalized economic and social terms. ChatGPT exemplifies child labour as a pressing concern, driven by economic necessity, lack of access to education and weak regulatory enforcement in developing countries. Although ChatGPT uses an informative stance, it lacks the immersive storytelling and personalized engagement with the topic. ChatGPT prefers categorization and systematic explanation using a detached tone and fails to evoke the sense of urgency and moral responsibility prominent in human writing.

In terms of knowledge structures and thematic elements, humans rely on religious, cultural and social narratives and invoke past struggles, national identity, collective responsibility, religious duty, and moral obligations while discussing human rights. A human writer, while discussing freedom of speech, says, “The ink of a writer is more powerful than the sword of a tyrant, yet in our society, those who dare to speak

the truth are silenced, their voices lost in the abyss of oppression." This allegorical and metaphorical depth gives the argument a sense of urgency and encourages the reader to act. ChatGPT, on the contrary, activates knowledge structures that are theoretical and align with global frameworks, statistical analyses, and human rights discourses. This approach prioritizes global applicability over localized cultural resonance and makes the narratives informative but lacking in ideological engagement and emotional intensity.

In addition, human writers frequently attribute agency of power structures to individuals, historical struggles, and social movements, and emphasises the role of human input in bringing change. For example, while discussing poverty, a human writer states, "The poor are not mere statistics; they are real people fighting daily battles against a system that favours the privileged." Humans adopt a personalised stance which emphasises moral responsibility and activism which are key markers of human conscious. ChatGPT often employs a largely acceptable, routinized perspective and attributes power structures to systems, policies, and governance patterns instead of referring to them as agents of human will and desire. It depersonalises the discourses and tries to keep it analytical but objective. Human writers perceive these topics as part of their socio-cultural identity and take clear ideological positions whereas ChatGPT maintains a non-confrontational stance, presenting multiple perspectives without taking a definitive position.

In short, human writers showcase greater emotional depth, ideological engagement, personal positioning, and narrative fluidity while ChatGPT employs a systemic, generalized approach that maximises neutrality, objectivity, and structured analysis.

4.5.4 Literature and Philosophy

The topics related to art, literature, and philosophy posit a fundamental challenge for artificial intelligence-based language models because these themes are deeply rooted in human creativity, subjective experiences, imagination, observation, and abstract reasoning. While both human writers and ChatGPT try to explore the purpose of art, the role of literature in shaping personality, and the philosophical inquiries about morality, existence, and consciousness, the use of conceptual metaphors, construal operations, knowledge structures and thematic elements reflect

stark differences in cognitive engagement and expressive depth. Human writers use metaphors that imbue art and literature with life, and emotional attachment to human experiences. ChatGPT tends to use metaphors around functionalist interpretations. For example, a human writer describes literature as a mirror that reflects the soul of a civilisation. Another human essay presents literature as a river that flows through generations and carries their wisdom of past and dreams of future. The metaphors of river and mirror reflect organic, fluid and emotional nature of metaphor and conveys continuity, evolution, and the transformative power of literary practices. ChatGPT presents literature as a framework for understanding human experiences and a repository of knowledge that shapes cultural perspectives. ChatGPT embodies literature as a tool or function, rather than a living force that engages with human consciousness.

While discussing the role of art in human life, human writers use metaphors that position art as a force of resistance, spiritual transcendence, moral uplifting, and liberation. A human writer describes art as "a rebellion against the silence of the oppressed, a voice that refuses to be drowned by conformity." It is also framed as a portal to unseen worlds where the imagination dances freely beyond the confines of reality. These metaphors emphasize the defiant, out of the box nature of art and present it as a force that impacts emotional, ideological, and existential exploration. Artificial Intelligence takes art as an object of study and describes it as a medium of cultural expression that facilitates communication across communities. It takes art as a visual tool that encompasses social and cultural narratives. Artificial Intelligence is successful in creating a clear, objective environment but fails to capture the passion, struggle, and existential depth that is a key factor of human expression.

In terms of construing knowledge, human written essays exhibit shift perspectives, embodying personal reflections, and emotional appeals. For instance, a human writer recounts a personal journey of encountering Sartre's work while discussing the philosophical significance of existentialism by saying, "I remember the first time I read Nausea, and how it unsettled me to my core, forcing me to confront the absurdity of existence." This introspective framing makes the narrative experiential and aligns with the fundamental human way of interpreting and discussing philosophical ideas. ChatGPT, on the other hand, presents existentialism in more theoretical terms and tends to define and explain it academically. Although ChatGPT explains the

philosophical concepts in a clearer and less ambiguous way, it lacks the affection depth that characterizes human engagement with abstract concepts.

The activation of semantic frames further highlights the contrast between human cognition and AI-generated language. Human writers primarily draw upon literary allusion and ground their stances in deeply embedded cultural narratives to enrich their arguments. For instance, while discussing the philosophical aspects of free will, a human writer not only refers to Western thinkers like Kant and Nietzsche but also quotes Iqbal's concept of Khudi and calls it a mirror that reflects the notion of self-determination, deeply rooted in spiritual transcendence rather than secular absurdism. The use of culturally embedded knowledge structures creates a rich intertextual discourse that positions philosophy in a live experience, instead of taking it as an abstract phenomenon, existing only in hypothetical, detached terms. ChatGPT construes these concepts in academic and encyclopaedic manner and mainly relies on broad theoretical perspectives rather than shifting to specific cultural and personal references. Surprisingly, when discussing philosophical and literary concepts, ChatGPT mainly refers to western philosophies and does not quote Eastern philosophy, literary canon, or religion at all. This decontextualized approach lacks emotional investment, subjective positioning, relatability, and cultural situatedness.

In addition to the activation of frames, thematic engagement with ambiguity and subjectivity are also crucial to understand the underlying differences between human and AI writings. Human writers employ a versatile approach and frequently use paradox, contradiction, and open-ended inquiry to express their opinion about literature, arts and philosophy. Since humans are naturally attracted to ambiguity, complexity and nuanced structures, they sometimes leave questions unresolved to reflect the complexity of philosophical discourse. A human writer, while discussing the complexity of human thought says, "Perhaps beauty is not something to be defined, but rather something to be experienced, fleeting and subjective, yet universally yearned for." This open-ended conclusion reflects that humans value the question as much as the answer. ChatGPT, however, tends towards decompressing the ambiguity and presents definitive conclusions where humans would prefer further complexity and ambiguity. It tends towards closure and resolution, instead of making the narrative further complex and philosophically oblivious. For instance, ChatGPT, contrary to human writers, tries to define beauty using academically construed jargons and treats it

as similar to any other lexical entity that can be discussed in absolute and academic terms. With this objective and mechanized approach, ChatGPT breaks the complex notions of philosophy into simplified and neatly packaged definitions and while doing so, it skips the existential nuances, novelty, love for ambiguity, and interpretive openness that characterize human engagement with such questions.

In brief, ChatGPT exhibits a generalized, automated stance whereas human-written essays showcase deeper introspection, subjective positioning, emotional depth, and creative metaphor usage. Human writers engage with literature, art, and philosophy as living, existential experiences rather than mere theoretical constructs while ChatGPT treats these disciplines impartially and considers them as objects of analysis rather than domains of lived experience. The differences in metaphorical framing, construal operations, and knowledge activation highlight the fundamentality of human nature of creativity, novelty, artistic expression, and philosophical inquiry. These are the qualities that AI, despite all its linguistic capabilities, has yet to authentically replicate.

4.5.5 Technology, Media and Environment

The theme of technology, media, and environment also presents compelling differences in terms of conceptual metaphors, construal operations, and frame semantics between human writing style and that of ChatGPT. Human writers approach these topics as if they are members of real life, and demonstrate greater rhetorical urgency, ethical engagement with pressing global issues. ChatGPT, on the contrary, approaches these topics from a detached, objective, and theoretical lens. ChatGPT adopts a systemic approach while using conceptual metaphors and frames technology ad a tool, a system, or a medium. For example, ChatGPT describes artificial intelligence as a system that works a neural network that processes vast amount of data to optimize decision-making. It mainly focuses on functionalist, computational understanding of AI, and treats it as a technical entity, instead of a socio-cultural force. ChatGPT exemplifies the internet as a digital highway or a web of interconnected knowledge. Human writers ground their narratives on technology and media around issues like identity, information laundering, and power dynamics. A human writer describes technology as an invisible hand that is always watching, manipulating, and influencing our choices without consent. Another human written essay describes social media both as a megaphone and a prison which amplifies the voices yet traps human conscious in the echo chambers of our own making. These metaphors disclose the paradoxical nature

of technology and portrays it both as a tool of empowerment and a mechanism of control. Unlike humans, ChatGPT perceives technology as an external system, that only facilitates human activities.

In terms of issues related to environment, ChatGPT relies on policy-oriented metaphors and often frames climate change in terms of balancing power systems, global responsibility, and feedback loops. ChatGPT describes climate change as a ticking clock that requires immediate intervention to prevent irreversible damage. Another ChatGPT written essay explains carbon emissions by calling them a buildup of environmental debt. These financial metaphors are routinized and theoretical and align with corporate and governmental discourse on climate policy and focus on globalized economic perspective instead of an intimate experiential one.

Human writers embed climate change within moral and historical narratives, making them personal. A human writer says, “The earth cries in silence as its rivers dry, its forests burn, and its skies choke with the breath of machines.” The personification of earth imbues a sense of grief and frames climate change as moral and existential crisis rather than just a matter of global policies. Another human written essay describes environmental crisis as a battle between greed and survival where earth is losing ground to the insatiable hunger of corporations and industries. Humans tend to position environmental degradation as an ethical failure and choose metaphors that convey emotion, responsibility, and moral consequences.

The construal operations also underscore the cognitive and rhetorical differences between humans and ChatGPT. A human written essay on the impact of artificial intelligence begins with a personal anecdote: “I once asked my phone’s voice assistant a question and was startled by how human-like its response was. It made me wonder: Are we teaching machines to think, or are we reducing thinking to something mechanical?” This construal frames technology as an existential question and invites the reader to engage with its philosophical and ethical implications. A ChatGPT written essay on the same topic states that the development of artificial intelligence has led to significant advancements in automation, data analysis, and human-machine interaction. It further says that concerns regarding ethics and employment persist. ChatGPT takes artificial intelligence as a series of developments rather than an experiential or moral dilemma. It demonstrates that ChatGPT prefers a systematic exposition over personal reflection.

Describing the influence of media, human writers contextualize media within personal and social experiences and criticize its role in shaping political discourse, identity, and perception. A human written essay says, “Truth is no longer a light in the dark; it is a commodity, shaped, sold, and consumed by those who control the narrative.” The use of market metaphor for social media indicates the activation of experiential aspect and socially informed critique on media power, and positioning of media as both an influencer and as a tool of manipulation highlights how humans actively engage with the subject matter.

ChatGPT present media in abstract and neutral terms and mainly talks about how media has transformed the way information is consumed. ChatGPT tends to take balanced stances that lack the urgency and ideological engagement seen in human writing. ChatGPT avoids explicit critique of media power and presents the issues as challenges to be managed rather than crises to be confronted.

The activation of knowledge structures is another important aspect that reveals important contrasts. Human writers construct their arguments upon historical events, cultural memories, documented events in their knowledge, and ethical frameworks that resonate with their ideological and cultural realities. Their discussions on technology and the environment are deeply contextual, rooted in local knowledge structures, and are ideologically charged. A human writer refers to Pakistan’s devastating floods, telling a personal story and writers, “When the rivers rose and swallowed our homes, it was not nature that failed us, but the greed of those who ignored the warnings.” The writer shares a personal experience and by anchoring the issues with observational data, makes the arguments more immediate and emotionally powerful. ChatGPT, on the other hand, avoids personalised perspective and relies on globalized knowledge frameworks and largely acceptable narratives. It frequently quotes international treaties, scientific consensus, westerns understanding of the subject matter, and policy recommendations. A ChatGPT-generated response on climate change states: “The Paris Agreement represents a global effort to mitigate climate change, emphasizing emission reductions and sustainable practices.” This approach detaches the discussion from direct lived experience and makes it less visceral and engaging. In addition to abstraction and perspective, ideological positioning and emotional engagement are also important factors that reveal more about how machines construe such topics. ChatGPT maintains a balanced, academically situated, neutral, multi-perspective approach

whereas human writers take clear moral stances, and express concern, frustration, or urgency. While discussing automation and job displacement due to technological advancements, a human writer expresses tension and narrates that the relentless march of machines is not just replacing workers, it is eroding the dignity of labour, turning human effort into an obsolete relic." This strong moral framing contrasts with ChatGPT's policy-driven neutrality. ChatGPT adopts a mechanized approach saying that automation has improved efficiency across industries but has also raised concerns regarding employment and worker retraining. Although ChatGPT is balanced and factual, it lacks the ideological intensity and emotional depth that is found in human-generated discourse.

These distinctions highlight the cognitive constraints of AI-generated writing and assert that ChatGPT lacks in capturing the emotional, ethical, and human dimensions of technological and environmental discourse.

4.5.6 War, Resistance and Ideologies

Since the theme of war, resistance, and ideologies is deeply rooted in human experience, the differences between ChatGPT and humans are striking. Humans construe their viewpoints in historical memory, moral conviction, emotional intensity and identity while ChatGPT relies on academic and generalized approach. Similar to other themes, ChatGPT approaches these issues through an academic les while human writers display ideological commitment, and a sense of personal as well as nationalistic urgency.

When discussing war and resistance, humans frequently use metaphors of battle, sacrifice, honour, attack and describe it as a deeply personal, moral, and existential struggle. For example, while discussing Pakistan's struggle for a separate homeland, a human writer states that, "The blood of our martyrs nourished the tree of freedom, their sacrifice becoming the foundation upon which this nation stands." This metaphor portrays war as a generational duty and a historical necessity. Human writing style imbues war with a sacred significance. Another essay about Kashmir's resistance movement defines this struggle as "a storm that refuses to be silenced, roaring against the oppression that seeks to drown its voice." The use of strong imagery ignites a sense of defiance and motivated struggle, and it reflects the true human potential for resilience and ideological conviction. ChatGPT tends to use metaphors that are structural,

strategic, detached and impersonal. ChatGPT describes war as a geopolitical conflict influenced by historical tensions and diplomatic negotiations. In another essay, ChatGPT regards war as a struggle for sovereignty shaped by economic and military factors. These metaphors are academic and portray war as a system to be developed, improved and reshaped. It lacks seeing it as a lived experience of pain, resistance, and sacrifice. Similarly, ChatGPT describes national identity as something forged through conflict because wars define political boundaries and shape collective consciousness. This definition is technically correct and expressive, but it lacks the emotional resonance and ideological passion that characterize human responses.

In addition, human writers experience war as a struggle for justice and consider it a moral duty while ChatGPT considers it a mere social process. This gap even increases when the discussion is about colonialism, imperialism, feudalism, and resistance movements where ChatGPT takes an objective stance and remains distant and analytical while human writers activate historical memory and moral outrage.

In terms of construal, human writers make the discussion multi-layered by shifting the perspective between historical analysis, ideological argumentation and personal reflection. One essay on the Palestinian resistance begins with a first person, emotional framing where the writer shares a personal memory and says, “I remember the images of children throwing stones at tanks, their defiance a testament to the human spirit’s refusal to submit to oppression.” This personalised stance immerses the reader in a lived experience of resistance and resilience and creates a strong emotional connection before transitioning into broader discussions on international politics, insurgency, occupation and invasion. ChatGPT describes Israeli Palestinian conflict as “a long-standing geopolitical issue rooted in territorial disputes, historical grievances, and competing national identities”. This stance is detached, without emotional weight and sense of relatability, and presents war as a series of historical events and policy outcomes rather than a struggle for survival of history, identity, and nationhood.

The degree of ideological positioning also differs between ChatGPT and human writers. Human writers consider war narratives the ways to strengthen themes of nationalism, moral struggle, and collective identity. They frequently take strong ideological stances and ground these general concepts into personal experiences, ideological positions and cultural knowledge structures. While Pakistan’s nuclear capability as a deterrent, a human writer states, “Our nuclear strength is not a tool of

aggression, but a shield that protects our sovereignty, a declaration that we will never bow to external forces again." The writer frames nuclear capability as an assertion of dignity and self-preservation rather than a global threat or sign of terror. These linguistic choices highlight a sense of personal attachment and a strong nationalistic stance. On the other hand, ChatGPT avoids ideological bias and subjectivity and presents arguments from multiple perspectives in a neutral tone and academic style. In discussing nuclear deterrence, a ChatGPT generated response says, "Nuclear capabilities serve as a deterrent in global politics, balancing power dynamics while also raising concerns about arms proliferation." This detached, encyclopaedic framing ensures objectivity and unbiases and makes the narrative generalized and void of emotional urgency. It appears to be more sophisticated and constructive, but it lacks the ideological passion and conviction that characterize human discourse on national security and self-determination.

The activation of knowledge structures also demonstrates significant differences between AI and human writers. Human essays engage with historical memory, cultural narratives, and collective trauma. They embed war and resistance within deeply personal and nationalistic frameworks. In an essay on Pakistan's 1965 war with India, a human writer references historical moments with emotional intensity and says, "The echoes of Lahore's defiance still ring the spirit of September 6 immortalized in the blood of our heroes in our hearts." This historical anchoring and personal attachment create a sense of continuity and describe the war as an inseparable part of national identity. ChatGPT, however, activates knowledge in a structured, encyclopaedic manner, and mainly rely on diplomatic history, policy analysis, and international relations frameworks. When discussing the same war, a ChatGPT-generated essay states, "The 1965 war between India and Pakistan was marked by territorial disputes and military engagements, ultimately resulting in a ceasefire brokered by international mediation." Although this expression is academic solid, but it removes the sense of historical pride, sacrifice, and resilience that human writers emphasize.

Moreover, human writers engage with ideologies emotionally and personally. They view them as moral imperatives that drive action. In an essay on Islamic resistance movements, a human writer states, "True jihad is not a war of aggression, but a war against injustice, a struggle to restore dignity to the oppressed." This stance and style

emphasize the ethical and spiritual dimensions of resistance, deeply rooted in cultural context of Pakistan. It refers to ideology as a guiding principle rather than an abstract political theory. ChatGPT, on the other hand, often avoids moral and emotional language and presents ideologies in less personalised, detached and comparative terms. A ChatGPT essay on the same topic states, “Islamic resistance movements have been shaped by historical, political, and religious factors, often emerging in response to perceived injustices and external interventions.” This approach seems more balanced and well-structured, but it fails to capture the ideological passion and moral urgency that define human-written discussions on resistance.

In conclusion, the writing style in ChatGPT-generated and human-written essays highlights fundamental differences in emotional engagement, ideological positioning, experiential perspective, and rhetorical depth. Human writers use vivid metaphors, historical memory, and ideological conviction to construct powerful narratives of sacrifice and defiance. They describe war and resistance as deeply personal, morally charged struggles. ChatGPT uses mechanistic and systemic metaphors to present war as a geopolitical process rather than an existential battle for justice and identity. It adopts a neutral, policy-driven perspective, using. These distinctions underscore the cognitive limitations of AI in capturing the deeply human dimensions of war, ideological struggle, and national identity. It indicates that ChatGPT cannot authentically experience or emotionally articulate the essence of human resistance and ideological conviction.

4.5.7 Ethics, Spirituality and Human Nature

As the theme of ethics, spirituality, and human nature explores deeply philosophical, existential, and morally charged discussions and presents some of the most fundamental differences between ChatGPT-generated and human-written essays. ChatGPT generates essays on these topics through structured, analytical, and global frameworks. Human writers demonstrate a personal, introspective, and culturally embedded approach and engage with moral dilemmas, spiritual struggles, and the complexity of human existence with a depth of feeling. There are significant differences in conceptual metaphors, construal operations, knowledge structures, and thematic engagement that shed light on the cognitive and rhetorical gaps between AI-generated discourse and human thought on morality, faith, and the human condition.

The use of conceptual metaphors, particularly in discussions on morality and spirituality showcases striking differences. Humans reflect a deeply personal and cultural engagement with ethical and spiritual questions. They frequently employ metaphors of light, darkness, journeys, and trials. For instance, when discussing the nature of good and evil, a human writer states, "Morality is a lantern in the storm, flickering against the winds of temptation and doubt." Another human essay that explores faith and resilience, describes spirituality as "a river that carves through the mountains of hardship, shaping the soul with each obstacle it overcomes." These metaphors suggest a transformative, evolving relationship with faith. These metaphors are grounded in experience and perseverance. They convey the fragile yet persistent nature of ethical integrity and reinforce the struggle of maintaining virtue in a morally ambiguous world.

Instead of narratives of struggle, enlightenment, or transcendence, ChatGPT describe morality in terms of frameworks, guiding principles, and broader philosophical constructs. It employs systemic, logical, and theoretical metaphors when discussing ethics and spirituality. In discussing the nature of good and evil, ChatGPT states, "Morality functions as a social contract, regulating human interactions to ensure fairness and stability." Similarly, in discussions on faith, ChatGPT states, "Religious belief provides a structural foundation for ethical reasoning and social cohesion." While logically sound, these metaphors reduce morality to a mechanistic, external structure. These metaphors strip it of the personal and spiritual dimensions that human writers emphasize. Unlike the organic, deeply emotional metaphors of human writing, language models like ChatGPT treat faith as an institutional or cognitive framework rather than an intimate, existential experience.

These differences are further reinforced in the construal operations while embodying faith and morality. Human-written essays create multi-layered, introspective discussions that capture the depth of human moral and spiritual experience. Humans engage with ethics and spirituality through personal reflection, historical narratives, and moral dilemmas. For example, in an essay on the nature of sin and redemption, a human writer recounts a personal struggle and says, "I once stood at the crossroads of right and wrong, my soul heavy with the weight of my choices. In that moment, I understood that redemption is not granted—it is earned, through remorse and the will to change." This construal portrays ethical reflection an active, deeply

personal process and engages the reader in an intimate moral journey, ChatGPT presents ethics as a subject of academic discussion rather than personal transformation. In discussing sin and redemption, a ChatGPT-generated essay states, “The concept of redemption is prevalent across religious and philosophical traditions, often involving repentance, forgiveness, and moral transformation.” This construal provides a broad and structured overview, but it lacks the lived emotional depth and moral urgency found in human writing. Human writers experience morality, ChatGPT explains it.

Human essays frequently explore questions related to free will, destiny, purpose, and moral responsibility through existential and philosophical reflections. Human beings engage with the contradictions, uncertainties, and struggles that are inherent in human existence. One essay on free will and fate poses a question, “Are we the authors of our own stories, or mere characters following a script written by destiny? Perhaps free will is the illusion that makes the play of life bearable.” This open-ended, paradoxical construal emphasises the idea that some questions remain unanswered, and that is what makes them profoundly human. It mirrors the ambiguity of human experience. ChatGPT approaches the same topic through structured argumentation, stating, “The debate between free will and determinism has long been discussed in philosophy, with compatibilist perspectives suggesting that free will can exist within deterministic frameworks.” Instead of wrestling with these questions emotionally and introspectively, ChatGPT makes its discussions more academic than existential. It categorizes and organizes them into neatly structured intellectual debates.

The activation of knowledge structures in human-written essays draw upon religious texts, historical examples, and deeply personal reflections. It makes discussions on ethics and spirituality culturally rich and emotionally immersive. Human writers refer to both Islamic and historical frameworks while discussing justice and divine accountability. A human writer states, “The Quran warns that injustice will not go unpunished, just as history reminds us that every tyrant eventually falls. Pharaoh’s arrogance met the Red Sea, and so shall all those who believe themselves above justice.” This historical and religious intertextuality presents justice not just an ethical principle, but a divine certainty. It reinforces a moral and spiritual cognitive schema. ChatGPT, on the other hand, activates knowledge in globally oriented manner and mainly relies on philosophical theories, ethical principles, and comparative frameworks. A ChatGPT-generated essay describes justice as a fundamental ethical

concept present in various religious, legal, and philosophical traditions. ChatGPT regards is a touchstone of fairness, accountability, and social harmony. This approach fails to capture the moral urgency, historical grounding, and cultural resonance that human writers bring to discussions on justice and divine accountability.

4.6 Interpretation of Qualitative Analysis

While engaging in discussion on topics that involve ambiguity and transcendence, human writers embrace mystery, paradox, and the limits of human understanding, whereas ChatGPT seeks clarity, resolution, and structured argumentation. One human essay that explores the nature of the soul, concludes: "Perhaps the soul is not meant to be defined, but felt. It is a whisper in the wind, a presence in the stillness, a longing that words cannot capture." This poetic, open-ended conclusion reflects the human tendency to leave spiritual questions unanswered. It showcases that humans happily preserve their mystery and depth and situate these abstract ideas in physical and concrete structures. ChatGPT, on the other hand, often looks for definitive answers where ambiguity might have been more appropriate. While discussing the nature of the soul, an AI-generated response adopts academically loaded style and posits that the concept of the soul has been explored across various religious and philosophical traditions, with interpretations ranging from metaphysical essence to psychological construct. This approach gives a clear academic answer but fails to honour the existential uncertainty that human writers embrace.

In a nutshell, human writers treat these topics as deeply personal and transformative experiences and ground their arguments into the realities they are part of. Their style embodies richness of metaphors, introspective narratives, religious references, and unresolved paradoxes to capture the complexities of human existence whereas ChatGPT adopts structured, neutral, and theoretical approaches. It describes the prompts as intellectual inquiries rather than lived experiences.

CHAPTER 5

FINDINGS, DISCUSSION, CONLUSION AND RECOMMENDATIONS

This chapter presents the key findings of this study and proposes possibilities for future research that can be conducted on the same topic. The researcher examined the underlying cognitive mechanisms that govern the language generation in ChatGPT and human participants and explored how artificial intelligence-based language models conceptualize language and cognition. This study also examined how closely these language models imitate human linguistic capabilities. The results obtained after computational, statistical, and qualitative analysis reveal remarkable differences and similarities in terms of cognitive strategies and reasoning, metaphorical mapping, contextual framing, and linguistic construal between humans and ChatGPT.

5.1. Findings

The findings indicate that there are fundamental differences in the way AI-based models such as ChatGPT, and human participants employ conceptual metaphors, construal operations and frame semantics. Human participants display a highly creative, experience-based, and culturally embedded use of metaphors, whereas ChatGPT's metaphors are systematic, generalized, and conventional. It also revealed that ChatGPT often derives its metaphors from widely available literary and academic sources instead of constructing them out of experiences and observations. Human writers, in contrast, display a highly creative, experience based, culturally embedded, and contextually narrowed down use of metaphors. ChatGPT's metaphors are often derived from widely available literary and academic sources, and are systematic, and conventional whereas human use of metaphors reflects historical consciousness, cultural specificity, and personal engagement, emotional attachment and ideological positioning. ChatGPT prefers clarity, applicability, and neutrality and focuses on impersonal, policy oriented and system-driven perspectives. It heavily relies on conventional metaphors and reiterates widely accepted metaphorical constructs. Human writers, on the other hand, exhibit a greater flexibility and creativity in metaphorical reasoning and employs novel metaphors that reflect personal insight and societal critique.

Construal operations are linguistic strategies that define how an individual frames and interprets a situation. The findings of this study reveal that ChatGPT employs a detached, systematic, and objective approach while framing arguments whereas human writers predominantly shift between subjective, emotionally charged, and ideological perspectives. Perspective is an important factor that highlights the underlying cognitive mechanisms from which a text emerges. ChatGPT tends to look at the subject matter as an outsider and employs a third-person perspective. It frames arguments in a relative style while human writers ground their narratives in their personal understanding and cultural memory of the subject matter. In terms of abstraction and specificity, human writers mainly zoom in on personal and cultural instances before making claims, while ChatGPT begins with stating general principles, accepted theories, and applies them to specific cases. Human writers engage readers through narrative and personal connection, whereas ChatGPT relies on formal exposition and theoretical statements. In addition, ChatGPT displays consistency and maintains a single perspective throughout the writing process whereas human writers shift perspectives and move between personal, historical, cultural, and ideological perspectives. The dynamics of construal in humans are fluid, while they are static and routinized in ChatGPT.

Frame Semantics suggests that linguistic meaning arises from structured knowledge frameworks (frames) that are activated in discourse. The study also explored knowledge structures and thematic elements and tries to find out how they are activated in ChatGPT and human essays. The findings showcase that humans frequently integrate multiple overlapping frames, drawing on historical, political, cultural, and ethical perspectives within a single discussion. Humans mostly employ intertextual framing which creates a layered argument that resonates with cultural and historical memory.

ChatGPT activates frames in a compartmentalized, structured manner. It frequently draws from widely documented knowledge sources and lacks the fluid integration of historical, cultural, and ideological dimensions. It lacks the rhetorical force, moral urgency, and historical intertextuality often found in human writing. Furthermore, humans engage in frame adaptation and contextualize the same concept differently depending on the subject matter. ChatGPT is less adaptable in this regard as it often applies the same conceptual frame across different contexts without significant variation in argumentation style.

In addition, human writers activate culturally specific frames and embed arguments in local and ideological discourse, whereas ChatGPT maintains a globalized, neutral perspective. Similarly, human writers refer to specific historical struggles and patriotic symbols, while ChatGPT frames nationalism through political theory and international relations.

These findings showcase limitations of AI-based language models in terms of cultural memory, ideological stance, emotional complexity, and metaphorical reasoning. These findings contribute to a broader as well as the categoric understanding of cognitive and linguistic gaps between artificial intelligence based and human written language. This study emphasises the need for further exploration into how AI language models can be improved to approximate human conceptualisation and meaning making processes.

5.2. Discussion

This study showcases that human writers reflect greater ideological engagement, cultural resonance, rhetorical flexibility, and cognitive processing. Their lexical choices are comparatively immersive, contextually rooted, and emotionally charged. Human writers showcase their personal, cultural, and ideological positioning across various issues. For instance, while discussing politics and nationalism, human writers use metaphors of blood, wall, sacrifice, ancestral duty, obligation, motherhood, and asset. In discussion on globalization, human writers use metaphors like exploitation, enslavement, chains, crutches, fruit, gift, warmth, heaven, loot, tree etc to portray economy as a living organism of society. ChatGPT on the other hand, exhibits a structured, clear, balanced, and systemic approach and uses metaphoric structures that are widely acknowledged, broad in scope, and relatable with global reception of the concepts. ChatGPT presents governance as a framework, a system of policies, and a mechanic phenomenon. Similarly, economics is described as a balance of forces, and a systematic struggle between struggling forces. ChatGPT stays void of emotions and subjective approach towards these topics.

This divergence is not only limited to these generic topics but also extends to social issues like women education, human rights, and moral crisis. Human writers evoke personal pain, moral outrage, and conceptualize human issues through metaphors of imprisonment, chains, freedom, bars, disease, ladders, soul, tears etc. ChatGPT, on the

contrary, sees such delicate and sensitive issues as matters of policy change, regime shift, and restructuring of existing trends. Similarly, while exploring topics related to war and resistance, human writers adopt a very personal style and use metaphors such as storm, flame, battle, fight, clash etc to portray war as an existential and internal fight for dignity, basic rights, and survival. ChatGPT adopts a detached perspective and describes wars in terms of diplomatic practices, power structures and geopolitical strategies. ChatGPT also shuts an eye for the moral crises, postwar traumas, and cultural upheavals resulting out of wars.

Another significant difference lies in how each type of essay frames meanings and perspectives. These construal operations indicate some of the key differences between humans and language models. Humans construe knowledge structures in dynamic, multi-layered narratives and frequently shift between personal and historical references. They show a greater commitment to ideologies. Human written essays are not a mere exposition of knowledge but aim for lived experiences, expressions of moral values, and human attachment with certain religious and nationalistic beliefs. ChatGPT follows a structured pattern and generates arguments in a linear way. It maintains an objective, academic tone throughout essays. While discussing free will and destiny, human writers embrace paradoxes, and open-ended inquires whereas ChatGPT looks for and tries to generate content that offers clarity, focusing on summarization of philosophical positions of various scholars without engaging in existential debates.

The knowledge structures in human responses are deeply rooted in historical memory, religious philosophy, folk narratives, personal anecdotes, and collective wisdom. Humans try to situate their narratives in lived experiences whereas ChatGPT activated generalized, encyclopaedic semantics and ground its narratives in scientific consensuses.

Similarly, humans actively engage in arguments from ideological standpoint and embed their passion and moral conviction in their essays. Human writers criticize power structures such a globalization, surveillance capitalism, propaganda, and information laundering whereas ChatGPT simply define such issues and refrains from moral or political judgement. While humans wrestle with already ambiguous ideas, ChatGPT tries to provide resolutions, sometimes theoretical and occasionally practical. While humans embed their personal journeys of doubt and belief in religious narratives, ChatGPT provides comparative analyses of religious and philosophical traditions and

strips them of the experiential depth that makes faith and morality a major concern of human writings. ChatGPT tends to summarize while humans try to interpret. Humans experience the topics while they write. ChatGPT, on the hand, documents the facts and follow rigid discourse patterns. ChatGPT generated near to fact structures whereas human essays are mostly opinionated and subjective. ChatGPT stand better at information synthesis, humans excel in emotional augmentation of subject matter. ChatGPT is a profound tool for generating empirical and fluent structures, humans stand out for novelty, meaning-making, storytelling, and ethical reflection. While humans try to understand, ChatGPT prefers to respond. In broader philosophical and cognitive debate regarding the future of machines and artificial intelligence, this study showcases how AI constructs language, what it lacks in, how it differs from humans in cognitive faculties, and how closer ChatGPT is in imitating human writings. This study marks as an essential feat not only for linguistics and technological development of language models, but also for decoding the irreplaceable human characteristics like cognition, thought, and moral reasoning.

In conclusion, this study indicates that ChatGPT displays fluency, coherence, and structural clarity but it lacks the depth of ideological commitment, cognitive flexibility, and cultural contextualisation. Human writers employ conceptual metaphors that reflect personal, emotional, a cultural engagement while ChatGPT uses neutral, conventional, and sometimes mechanical metaphorical structures. Human writers incorporate subjectivity, emotional appeal and argumentative appeal in construal operations and dynamically shift perspectives while ChatGPT establishes a structured, academic perspective with minimal shifts. Human writers integrate and activate knowledge structures from historical, cultural, and ideological repositories whereas ChatGPT applies semantic frames in compartmentalized way.

5.3. Limitations of AI Writing

Despite achieving marvellous feats, ChatGPT still faces some fundamental challenges that differentiate it from human discourse production abilities. It is important to understand these limitations to improve AI models and to contextualize their appropriate use in various contexts. A few of the key limitations observed in this study are as given below.

AI lacks in understanding language the way humans do. It generates data through probability sequences and pattern recognition instead of acquiring it through lived experiences, sensory perception, and emotional cognition. AI cannot feel, suffer or believe which makes its writing a collection of what seems plausible, not a true expression of real events.

While ChatGPT can stimulate argumentative structures and meet the standards of grammatical accuracy, it lacks in holding beliefs, questioning perspectives, and developing ideological commitments. It merely reproduces existing knowledge without rendering its analytical synthesis. It limits ChatGPT's ability to engage in deep theoretical inquiry or to push the intellectual boundaries.

ChatGPT mainly relies upon the data it has been trained on. Although it may be able to access widely recognized academic, journalistic, and literary sources, it struggles to activate culturally specific, historically marginalized, or non-mainstream perspectives that are not part of its training module. This can lead to bias in knowledge representation. ChatGPT favours dominant discourses over alternative narratives. In addition, AI does not self-correct misinformation unless explicitly trained to do so. It presents challenges in ensuring factual accuracy while generating real time information.

AI lacks in emotional intensity, ambiguity, and rhetorical dynamism. Human writers embrace tension, contradiction, and narrative depth. These are the elements that AI simplifies or avoids altogether. This leads to generation of text that lacks the expressive range of human discourse and feels neutral, predictable, and void of emotional commitment.

AI relies on pre-existing ethical frameworks when discussing morality, justice, and philosophical dilemmas. It does not engage in moral reasoning itself. Human writers grapple with ethical ambiguity, propose novel moral arguments, or question dominant assumptions, whereas AI only presents what is already established. This limitation is significantly prominent in discourses related to academic writing, journalism, and policymaking.

5.4. Conclusion

This research provides significant insights into the cognitive mechanisms in which humans and AI-models situate their language. The researcher compared 50 essays written by human participants with 50 essays generated by ChatGPT,

particularly through the lenses of conceptual metaphor theory, construal operations, and frame semantics. The study focused on examining how linguistic structures are formed in both human and AI-generated texts. One of the key objectives of this study was to explore the use of conceptual metaphors in both human and AI-generated writing. The analysis indicates that human writers employ metaphors creatively, and integrate cultural, historical, and ideological nuances into their expression. Metaphors in human writing are fluid, dynamic, and contextually adaptive. ChatGPT, on the other hand, demonstrates a formulaic use of metaphors. It draws primarily from established academic and conventional mappings. AI can replicate surface-level metaphorical expressions, but it lacks the ability to create context-specific metaphors that emerge from cultural specificity and lived experience. This strengthens the argument that AI-generated language operates on a fundamentally different cognitive mechanism than human thought processes, despite its structural fluency.

The study also examined how language users frame, emphasize, and structure information. Human participants exhibited more variability in terms of construal operations i.e. in perspective-taking, emotional engagement, and argumentation styles. Humans reframe issues dynamically, and shift between subjective and objective tones. They engage with topics through multiple interpretive lenses. In contrast, ChatGPT maintains a relatively neutral, detached, and standardized approach. It has a little adaptability in adjusting viewpoint, emotional depth, or ideological positioning. This indicates that ChatGPT lacks the cognitive ability to engage in perspective-driven discourse with the same level of intentionality and depth as human writers. However, ChatGPT displays conformity to grammatical structures better than human writers.

This study also explored how knowledge structures and thematic elements are activated in human and ChatGPT-generated writing. The findings reveal that human writers draw upon diverse and intricate knowledge structures. Human writers often integrate historical references, cultural narratives, and intertextual connections to build arguments. ChatGPT relies on neutral, globalized, and detached from specific socio-cultural or ideological standpoints. AI-generated essays are often informative but lack in ideological conviction, and personal engagement.

In terms of rhetorical strategies and argumentative structures, Human writers exhibit greater variation in sentence structures, argumentation styles, and logical progressions. They use rhetorical questions and incorporate persuasive devices

effectively which shows that they have an ability to build tension and wove their structures into emotions. ChatGPT often repeats generic arguments and lacks the ability to introduce novel perspectives in a truly creative or dialectical manner. ChatGPT maybe capable of generating human-like text, but it presently operates within a cognitive framework that is fundamentally different from humans' cognitive schemas. The absence of embodied cognition, personal experience, and socio-historical engagement means that AI-generated writing, with all its fluency, remains mechanistic and constrained by probabilistic language modelling.

This study contributes to cognitive linguistics by extending established cognitive semantic frameworks into the emerging domain of artificial intelligence generated discourse. Conceptual Metaphor Theory, Construal Operations, and Frame Semantics have been extensively applied to human language, but their combined application to large language models remains limited. This research addresses that gap as it demonstrates how AI-generated text can replicate key cognitive-linguistic patterns at a structural level.

One of the central contributions of this research is the empirical distinction it draws between linguistic representation and cognitive embodiment. The findings show that ChatGPT can generate metaphorically rich and structurally coherent language by statistically approximating human patterns, yet it lacks experiential grounding and intentional construal. This distinction, therefore, refines theoretical debate about meaning, embodiment, and cognition as it demonstrates that surface-level cognitive resemblance does not equate to genuine conceptual understanding.

From methodological point of view, the study provides an integrated model that combines computational and corpus-based statistical analysis with qualitative cognitive semantic interpretation. This mixed-methods approach offers a ready to use framework for future research examining AI language through a cognitive linguistic lens. This study situates AI-generated language within established theories of human meaning-making, and positions cognitive linguistics as a critical evaluative tool for assessing the capabilities and limitations of artificial language systems.

This research calls for further exploration into how ChatGPT processes abstract concepts, simulates meaning construction, and engages with the intricacies of human discourse. This study opens new avenues to study the intersection of AI, cognitive

linguistics, and language philosophy. As AI is on its way to evolve, its role in various domains will require greater scrutiny, ethical consideration, and interdisciplinary collaboration to ensure that language models are developed not merely as generators of text but as nuanced participants, facilitators, and sometimes partners in human communication.

5.5. Recommendations

Based on the findings of this study, the researcher proposes a few recommendations to improve language generation in AI based language models. These recommendations can be crucial to refine cognitive modelling in AI, to enhance its ability to approximate human writings. The recommendations given below are relevant for AI researchers, developers, linguists, and policy makers working to bridge the gap between AI and human discourse.

ChatGPT's relies on conventional, widely available metaphors and it lacks the creative flexibility, personal engagement, and cultural specificity. AI models should be designed to learn and adapt metaphors specific to cultural, historical, and ideological contexts. Reinforcement learning models can be adopted to devise language bots that prioritize diversity in metaphor selection and adaptive fine-tuning based on user-generated data.

Human writers shift perspectives, engage emotionally, and reframe arguments dynamically but ChatGPT maintains a static, neutral, and objective construal approach. The upcoming AI developments should be trained to recognize shifts in discourse perspective and adjust argumentation styles accordingly. Multi-modal datasets can be integrated, and textual data can be combined with real-world experiential learning such as oral histories, literature, and case studies. It will enable language models to learn how different communities construct meaning.

ChatGPT predominantly activates globalized, neutral knowledge frames and it struggles with culturally specific intertextuality, such as historical memory, religious references, and ideological engagement. cultural corpora that allow these models to process information through the lens of specific traditions, belief systems, and historical perspectives should be embedded.

ChatGPT lacks in conveying deep emotional engagement, moral urgency, or subjective interpretation in a human way. Future AI models can be trained to detect and

appropriately integrate emotional resonance into their text generation. Techniques that model emotional trajectories such as affective computing, sentiment analysis, and neural embedding could be enhanced to make AI-based text less detached and more human-like.

ChatGPT can generate logical, well-organized essays, but its arguments often lack critical reasoning and contextual variation. real-world cognitive modelling techniques can be incorporated to simulate human-like expression. This could be achieved through hybrid models that integrate logical reasoning engines with probabilistic inference systems. It will allow AI to dynamically generate competing arguments.

The focus should be on developing ethical, collaborative AI systems that assist human creativity rather than replace it. Instead of making AI fully autonomous in writing, its creative potential can be enhanced. This could involve presuming AI as a co-writer, a research assistant, or an ideation tool, enhancing human discourse rather than mechanizing it.

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APPENDIX A

RESEARCH PARTICIPATION PROFORMA

Title of Study: ***TRACING CONCEPTUAL METAPHORS, CONSTRUAL OPERATIONS, AND FRAME SEMANTICS IN CHATGPT AND HUMAN LANGUAGE: A COGNITIVE LINGUISTICS PERSPECTIVE***

1. Introduction and Purpose of the Study:

You are being invited to participate in a research study being conducted as part of a graduate thesis. The purpose of this study is to analyze the use of conceptual metaphors, construal operations and frame semantics in essay writing by comparing human-generated texts with AI-generated responses (ChatGPT-3.5). By examining how language structures, thoughts and arguments, the study aims to understand the cognitive and linguistic strategies employed by proficient writers.

You have been selected through purposive sampling due to your status as a CSS aspirant, which involves advanced essay-writing skills and complex reasoning. Your educational background, critical thinking ability, and linguistic competence make your contribution valuable for this academic inquiry.

2. What Participation Involves:

a) You will be asked to write one essay in response to a prompt taken from previous CSS English Essay Papers (2017–2022).
b) The essay will be written under supervised conditions to ensure authenticity and minimize external input.
c) The average time required for completing the essay is 180 minutes.
d) Your response will be analyzed for linguistic and cognitive features, particularly metaphor usage, argument structure, and framing techniques.

3. Voluntary Participation and Right to Withdraw:

a) Your participation in this research is completely voluntary.
b) You may refuse to take part or withdraw from the study at any time, without any penalty or academic consequence.
c) If you withdraw, your essay and any associated data will be destroyed and not used in the study.

4. Use and Storage of Data:

a) Your essay will be analyzed anonymously; your name or any personal identifiers will not appear in the thesis or any publications resulting from this research.

b) The data will be stored securely, accessible only to the researcher and academic supervisors.

c) Your responses may be used in academic publications and presentations, but all information will remain non-identifiable.

5. Ethical Considerations:

a) This study adheres to ethical research standards and is being conducted under academic supervision.

b) There is **no risk of harm** associated with participation.

c) The purpose is strictly academic, with no commercial or political implications.

6. Contact Information:

For any questions or concerns, you may contact the researcher:

Researcher Name: Muhammad Naeem

Program: M.Phil in Linguistics

Email: mnaeemenglish@gmail.com

Supervisor: Dr. Muhammad Haeeb Nasir (mhnasir@numl.edu.pk)

7. Consent Statement:

By signing below, you confirm that:

a) You have read and understood the information above.

b) You voluntarily agree to participate in the research.

c) You understand that your essay will be used only for academic purposes and that your identity will be kept confidential.

Participant's Name: _____

Signature: _____

Date: _____

APPENDIX B

PARTS OF SPEECH TAG SETS

Part-of-speech tag	**Description**
UNKNOWN	Unknown word
DT	Determiner
QT	Quantifier
CD	Cardinal number
NN	Noun, singular
NNS	Noun, plural
NNP	Proper noun, singular
NNPS	Proper noun, plural
EX	Existential *there*, such as in the sentence *There was a party*.
PRP	Personal pronoun (PP)
PRP$	Possessive pronoun (PP$)
POS	Possessive ending
RBS	Adverb, superlative
RBR	Adverb, comparative
RB	Adverb
JJS	Adjective, superlative
JJR	Adjective, comparative
JJ	Adjective
MD	Modal
VB	Verb, base form
VBP	Verb, present tense, other than third person singular
VBZ	Verb, present tense, third person singular
VBD	Verb, past tense
VBN	Verb, past participle
VBG	Verb, gerund or present participle

WDT	Wh-determiner, such as *which* in the sentence *Which book do you like better*
WP	Wh-pronoun, such as *which* and *that* when they are used as relative pronouns
WP$	Possessive wh-pronoun, such as *whose*
WRB	Wh-adverb, such as *when* in the sentence *I like it when you make dinner for me*
TO	The preposition *to*
IN	Preposition or subordinating conjunction
CC	Coordinating conjunction
UH	Interjection
RP	Particle
SYM	Symbol

*POS Tagging abbreviations have been obtained from IBS official website. The reference is as follows:

Part-of-speech tag sets. (2012, December 1). Www.ibm.com. https://www.ibm.com/docs/en/wca/3.5.0?topic=analytics-part-speech-tag-sets

APPENDIX C

COMPUTATIONAL ANALYSIS-CHATGPT WRITTEN ESSAYS

FINAL CODE PATH


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```
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    " ('RP', 13),\n",
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 "\n",
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 "tags = [tag for word, tag in pos_tags]\n",
 "\n",
```

```
   "# Calculate the frequency of POS tags\n",
   "pos_tag_freq = FreqDist(tags)\n",
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   "# Display the most common POS tags\n",
   "pos_tag_freq.most_common()\n"
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APPENDIX D

COMPUTATIONAL ANALYSIS-HUMAN WRITTEN ESSAYS

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  "pos_tags = nltk.pos_tag(filtered_tokens)\n",
  "\n",
  "# Display the POS tags for the first 10 tokens as an example\n",
  "pos_tags\n"
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     " ('VBD', 1879),\n",
     " ('VBZ', 1569),\n",
     " ('VB', 1258),\n",
     " ('VBN', 1162),\n",
     " ('IN', 710),\n",
     " ('MD', 645),\n",
     " ('PRP', 310),\n",
     " ('JJR', 244),\n",
     " ('DT', 204),\n",
```

```
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    " ('JJS', 115),\n",
    " ('CD', 28),\n",
    " ('FW', 26),\n",
    " ('RP', 22),\n",
    " ('WP$', 16),\n",
    " ('NNP', 12),\n",
    " ('WP', 7),\n",
    " ('CC', 6),\n",
    " ('WRB', 2),\n",
    " ('WDT', 2),\n",
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 }
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 "from nltk.probability import FreqDist\n",
 "\n",
 "# Extract the POS tags from the tagged tokens\n",
 "tags = [tag for word, tag in pos_tags]\n",
 "\n",
```

```
   "# Calculate the frequency of POS tags\n",
   "pos_tag_freq = FreqDist(tags)\n",
   "\n",
   "# Display the most common POS tags\n",
   "pos_tag_freq.most_common()\n"
  ]
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APPENDIX E

STATISTICAL ANALYSIS-ACCUMULATIVE COMPARISON

Document Length:

- Longest: Human Essays (108713)
- Shortest: ChatGPT Essays (80418)

Vocabulary Density:

- Highest: ChatGPT Essays (0.093)
- Lowest: Human Essays (0.068)

Average Words Per Sentence:

- Highest: Human Essays (21.7)
- Lowest: ChatGPT Essays (21.4)

Readability Index:

- Highest: ChatGPT Essays (15.813)
- Lowest: Human Essays (13.406)

Most frequent words in the corpus:

- pakistan (1311); world (626); economic (620); political (560); education (556) ; social (494); people (456); global (455); just (421); nation (412); cultural (40 8); future (364); women (360); like (353); pakistan's (350); challenges (337); human (335); role (331); society (315); life (282); development (280); justice (279); power (271); digital (271); literature (270); national (268); rights (261); equality (260); media (246); change (230); progress (226); peace (220); indivi duals (219); water (214); values (214); identity (213); new (210); struggle (20 9); country (209); history (192); become (191); potential (187); democracy (18 7); government (184); growth (183); gender (183); technology (182); pakistani (180); sense (178); nations (177); modern (174); truth (172); international (17 1); way (169); access (166); essay (164); military (162); rise (160); economy (160)

Distinctive words (compared to the rest of the corpus):

1. ChatGPT

   Essays: narration (27), exposition (24), argumentation (24), description (22), cognitive (13), characters (12), korea (10), illustrate (10), highlights (9), characterized (9), intersectionality (8), analysis (8), utopian (7), sexual (7), purposes (7), populist (7), john (7), finally (7), consumed (7), analytical (7), 19th (7), visa (6), rules (6), prominent (6), procrastination (6), prejudices (6), passions (6), mobilize (6), intentional (6), impersonal (6), humans (6), humanitarian (6), fundamentally (6), forgiveness (6), factor (6), eventually (6), effectiveness (6), coups (6), cash (6), approval (6), adaptability (6), 1990s (6), un's (5), target (5), signifies (5), russia’s (5), rankings (5), prior (5), prevailing (5), persistence (5), movement's (5), monitoring (5), likelihood (5), legitimacy (5), initial (5), escalation (5), emphasized (5), dr (5), deregulation (5).

2. Human

   Essays: sacrifices (32), quran (23), bond (16), resolve (15), price (14), iqbal’s (14), blood (14), mountains (13), forefathers (13), faiz’s (13), villages (12), blind (12), ra (11), hazrat (11), farmers (11), al (11), verse (9), unyielding (9), sufi (9), storm (9), patience (9), parents (9), bear (9), surah (8), sanctity (8), metaphors (8), imported (8), heartbeat (8), hai (8), connections (8), accept (8), waters (7), ummah (7), umar (7), tree (7), shah (7), run (7), reliant (7), luxury (7), kept (7), innocent (7), hypocrisy (7), disasters (7), commands (7), bright (7), aspire (7), tyranny (6), tide (6), thread (6), sufism (6), socialist (6), shrines (6), sake (6), runs (6), plague (6), noise (6), nationalistic (6), draws (6), clouded (6).