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ASSESSING LINGUISTIC NATURALNESS IN CHATGPT-GENERATED ENGLISH: A COMPARATIVE STUDY WITH HUMAN-WRITTEN TEXTS

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Abstract

As large language models (LLMs) like ChatGPT become increasingly integrated into educational, professional, and creative writing domains, questions surrounding the linguistic naturalness of their outputs have gained prominence. While ChatGPT excels in generating grammatically correct and contextually appropriate content, its ability to emulate human-like linguistic naturalness remains underexplored. This study investigates the extent to which ChatGPT-generated English texts align with human expectations of natural language use, focusing on aspects such as fluency, idiomaticity, coherence, and pragmatic appropriateness.

Employing a comparative design, the study evaluates AI-generated texts against human-written samples across multiple genres—including essays, emails, and narratives. Data were assessed by both expert human raters and automated linguistic analysis tools. Findings reveal that while ChatGPT performs competitively in terms of surface fluency and grammaticality, it often lacks the nuanced idiomatic usage and context-sensitive expressions that characterize native-level naturalness. The study underscores the limitations of relying solely on automated metrics to assess language quality and emphasizes the need for human-in-the-loop evaluation in AI language applications. These insights contribute to ongoing discussions in applied linguistics and AI ethics, offering practical implications for education, content creation, and machine-mediated communication.

Keywords: *Linguistic Naturalness, ChatGPT, Human vs. Machine Writing, Text Evaluation, Computational Linguistics*

Introduction

The emergence of large language models (LLMs), particularly OpenAI's ChatGPT, has redefined the dynamics of human-machine interaction in both written and spoken forms of language. These models, grounded in deep neural networks and trained on vast corpora of multilingual data, are capable of generating human-like text with remarkable fluency, coherence, and contextual appropriateness. ChatGPT, which is based on the GPT-4 architecture, is increasingly being employed in educational settings, professional communication, customer service, content creation, and even legal and medical consultation. As these applications expand, linguists, educators, and technologists alike are raising pertinent questions about the quality, reliability, and human-likeness of the language produced by such artificial systems.

One of the central concerns in evaluating LLM outputs lies in the concept of **linguistic naturalness**. Linguistic naturalness refers to how closely a piece of text reflects authentic, native-like language use. It is not limited to surface-level features such as grammaticality or spelling

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accuracy but encompasses deeper and more nuanced characteristics—such as idiomaticity, lexical variation, pragmatic suitability, discourse coherence, stylistic fluency, and contextual appropriateness. In natural human language, these features contribute to ease of understanding, cognitive fluency, emotional resonance, and social appropriateness. An utterance may be grammatically perfect but still be perceived as "unnatural" if it lacks colloquial relevance or pragmatic sensitivity. This difference is particularly salient in second language acquisition, translation studies, and computational linguistics, where naturalness is often viewed as the hallmark of language mastery.

Despite the advances in natural language generation (NLG), current LLMs—including ChatGPT—frequently exhibit subtle unnaturalness in their outputs. These may include excessive formalism, generic phrasing, formulaic transitions, misinterpretation of cultural or social context, and a lack of personal voice or emotional authenticity. In many cases, these artifacts arise not from a failure of grammatical knowledge, but from the model's inability to simulate human intention, experience, and stylistic flexibility. For example, while ChatGPT can write an essay or a story with impressive structure, it often falls short of capturing the spontaneity, creativity, or irony that a human writer might employ. These limitations become especially important when AI-generated texts are used in environments where natural human communication is essential—such as classroom settings, counseling platforms, or literary composition.

Prior research in this area has predominantly focused on the **accuracy**, **fluency**, and **bias** of LLM outputs. Studies by Brown et al. (2020) and Ouyang et al. (2022), for instance, provide benchmarks for GPT models in terms of their performance on factual tasks, coherence, and task completion. Similarly, work in machine translation and automated summarization has concentrated on BLEU scores, ROUGE metrics, and syntactic correctness. However, **linguistic naturalness**—despite being one of the most critical markers of human-like communication—remains underexplored. Most automated evaluation tools such as BLEU, METEOR, or Perplexity offer limited insights into how human readers perceive and judge the naturalness of AI-generated text. This disconnect between quantitative metrics and qualitative perception calls for a more human-centric, linguistically grounded analysis of AI language performance.

In addition, the existing literature lacks comparative studies that directly juxtapose ChatGPT outputs with texts written by native speakers in controlled conditions across different genres. Such comparative analysis is crucial because naturalness is often genre-specific. The features that make a narrative feel natural are not the same as those in academic writing, emails, or opinion essays. Furthermore, naturalness is not an absolute concept but a **subjective, context-sensitive** construct that varies across readers, cultures, and communicative settings. Therefore, evaluating ChatGPT's language through **multiple lenses**—genre-based comparison, human rating scales, and computational metrics—can offer a richer, more balanced perspective on its capabilities and limitations.

The sociolinguistic implications of this topic are also worth considering. As AI systems become more integrated into public discourse, there is a risk of AI-generated language influencing human language use, especially among young or second-language speakers. If these models consistently produce slightly unnatural phrasing or stylistically rigid structures, users who rely on AI for writing assistance may internalize such patterns, leading to a subtle but widespread distortion of natural language norms. Conversely, if AI-generated content can be refined to meet

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human standards of naturalness, it holds the potential to be a powerful educational tool—offering real-time writing support, language modeling, and stylistic feedback in ways that are accessible and scalable.

In the field of applied linguistics, the assessment of linguistic naturalness in AI-generated text opens new avenues for interdisciplinary inquiry. It intersects with stylistics, discourse analysis, pragmatics, corpus linguistics, and language pedagogy. For instance, corpus linguists might be interested in identifying the frequency and distribution of lexical bundles or collocations in ChatGPT outputs compared to native corpora such as the British National Corpus (BNC). Pragmaticians may examine how ChatGPT handles implicatures, politeness strategies, or context-sensitive language choices. Stylisticians and educators, on the other hand, may focus on whether AI can simulate voice, tone, and audience awareness. Each of these approaches contributes to a fuller understanding of what it means for language—whether human or machine-generated—to be "natural."

Given this context, the present study aims to conduct a critical appraisal of linguistic naturalness in ChatGPT-generated English by comparing it with human-written texts across a range of genres. It employs a **mixed-methods approach** involving both **human evaluation** (via rating scales and qualitative feedback) and **computational analysis** (using metrics like perplexity, lexical diversity, and syntactic complexity). The study will examine three core dimensions of naturalness: (1) **fluency** (how smooth and grammatically consistent the text is), (2) **idiomaticity and lexical appropriateness** (how naturally words and phrases are used), and (3) **pragmatic and discourse coherence** (how contextually and logically the text unfolds). Genres to be analyzed include academic essays, informal emails, short narratives, and explanatory texts.

Literature Review

The concept of **linguistic naturalness** occupies a significant position within both theoretical linguistics and applied domains such as language pedagogy, translation studies, and computational linguistics. In its broadest sense, linguistic naturalness refers to the extent to which language reflects the intuitive, native-like, and contextually appropriate use of vocabulary, syntax, pragmatics, and discourse structures. As artificial intelligence (AI) systems like ChatGPT gain prominence in generating human-like text, evaluating their linguistic naturalness becomes essential—not only for assessing their usability but also for understanding the evolving human-machine relationship in language generation. This literature review provides a detailed examination of key studies and theoretical frameworks relevant to linguistic naturalness and its application in the context of AI-generated language, especially that produced by large language models (LLMs).

1. Defining Linguistic Naturalness: A Theoretical Foundation

Linguistic naturalness is an umbrella term that includes fluency, idiomaticity, syntactic appropriateness, lexical selection, discourse coherence, and pragmatic relevance. Chomsky's (1965) distinction between **grammaticality and acceptability** lays a foundational argument: a sentence may be grammatical yet unacceptable or unnatural to native speakers due to awkward structure or contextually inappropriate usage. Later studies by Pawley and Syder (1983) introduced the notion of **native-like selection and native-like fluency** as the twin criteria of naturalness in language use. Their research emphasized that even highly proficient second-language speakers

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often fail to achieve idiomatic fluency, which native speakers display through formulaic language, collocations, and fixed expressions.

In pragmatics and discourse analysis, naturalness is evaluated based on speech acts, politeness strategies, implicature, and contextual coherence (Leech, 1983; Brown & Levinson, 1987). These elements ensure that utterances align not only with syntactic norms but also with the communicative goals and social contexts in which they occur. Therefore, naturalness is a **multi-dimensional construct** that cannot be fully captured by structural analysis alone.

2. Computational Linguistics and Language Models

The advent of **natural language processing (NLP)** and **neural network-based language models** has opened new frontiers in the generation and evaluation of natural language. Earlier rule-based models were limited in their ability to produce contextually appropriate and varied outputs. However, **transformer-based models** such as BERT (Devlin et al., 2018), GPT-3 (Brown et al., 2020), and GPT-4 (OpenAI, 2023) have significantly enhanced the coherence and contextual understanding of machine-generated text. These models are trained on extensive datasets covering a wide range of domains and genres, allowing them to generate seemingly natural language. Nevertheless, concerns persist regarding their **true naturalness** and the **extent to which they replicate human linguistic intuitions**.

Studies like Zhang et al. (2021) and Ippolito et al. (2020) have shown that although large language models can achieve **high fluency**, their outputs often lack **idiomaticity** and may exhibit **semantic drift** over extended discourse. For example, a model might maintain grammatical consistency but introduce phrases or patterns that sound unusual or contextually irrelevant to a native speaker. These unnatural elements are sometimes masked by surface fluency, creating an illusion of communicative competence.

3. Human vs. Machine-Generated Texts: Empirical Studies

Several studies have attempted to distinguish between human-written and AI-generated texts by analyzing differences in style, coherence, and naturalness. Gatt and Krahmer (2018) conducted a comparative analysis of machine-generated texts in natural language generation (NLG) systems and noted that while these systems could produce fluent text, they often struggled with maintaining **discourse-level consistency** and **pragmatic nuance**. Similarly, the study by Holtzman et al. (2019) introduced the concept of "degeneration" in LLMs—where outputs tend to repeat, follow templates, or produce overly cautious statements lacking creativity.

In more recent work, Kreps et al. (2022) found that participants were able to identify ChatGPT-generated news articles with significant accuracy, citing subtle unnaturalness, overuse of transition markers, and redundant phrasing as key indicators. This supports the argument that current LLMs, despite their sophistication, often fall short of achieving full linguistic naturalness—particularly when compared to skilled human writers who use idiomatic, culturally embedded, and pragmatically dynamic language.

Additionally, the **discourse coherence** in human texts is generally guided by thematic progression, implicit referential ties, and contextually grounded transitions. In contrast, AI-generated texts may rely on surface-level connectors (e.g., "in addition," "therefore," "however") without establishing deeper logical relationships between ideas (Lapshinova-Koltunski, 2021).

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4. Naturalness in Language Evaluation Metrics

A central challenge in evaluating linguistic naturalness is the **lack of effective automated metrics**. Traditional tools like BLEU (Papineni et al., 2002), ROUGE, METEOR, or even Perplexity are designed to measure **lexical overlap or probabilistic fluency**, but they are poor predictors of human perception of naturalness. For example, a text may score high on BLEU but still be judged as awkward or robotic by human readers due to unnatural collocation or pragmatic inconsistency.

To address these limitations, some researchers have turned to **human-in-the-loop evaluation frameworks**, incorporating rating scales for fluency, coherence, and readability. Novikova et al. (2017) argued that human evaluations provide more nuanced judgments, especially in low-resource or open-domain text generation. The study by Clark et al. (2021) used such scales to assess GPT-generated dialogue and found that while the model's grammar was consistently rated highly, its **emotional resonance and spontaneity** were frequently rated low.

Recently, there has been a move toward hybrid approaches that combine **computational analysis with human ratings**. Tools like BERTScore (Zhang et al., 2019) and newer semantic similarity measures attempt to approximate human judgment by using contextual embeddings. Still, these remain proxies and cannot fully replicate the intuitive, experience-based assessments that humans make about what "feels" natural.

5. Linguistic Naturalness in Educational and Applied Contexts

In applied linguistics, especially language education and translation studies, linguistic naturalness plays a pivotal role. In second-language writing, learners are often evaluated not just on grammatical accuracy but also on their ability to produce **natural-sounding** expressions. Research by Ellis (2008) and Hyland (2016) underscores the importance of lexical bundles, idiomaticity, and register awareness in producing academically and socially appropriate texts.

In translation studies, House's (1997) model of **Translation Quality Assessment (TQA)** identifies naturalness as a key criterion for textual adequacy. Translations that are too literal or mechanically equivalent may be accurate in content but fail to achieve the communicative effect of the original text due to unnatural phrasing. Similar concerns are now being applied to AI outputs, particularly in contexts where LLMs are used for automated translation or academic support.

Moreover, in education technology (EdTech), tools powered by LLMs are being integrated into writing assistants, essay graders, and language tutors. If these systems fail to produce natural language, they risk **modeling poor linguistic habits** for students. Research by Wang et al. (2023) points to a potential feedback loop in which users learn from and imitate the slightly unnatural patterns of AI systems, thereby altering language norms over time.

6. Ethical and Sociolinguistic Implications

The discussion of linguistic naturalness in AI-generated text also intersects with broader ethical and sociolinguistic concerns. As LLMs gain authority as sources of knowledge and communication, the **standardization of style and expression** may lead to a homogenization of language use, potentially marginalizing diverse dialects, voices, and creative styles. Tsvetkov et al. (2021) warn of the risk of AI systems reinforcing dominant linguistic norms while sidelining minority or non-standard forms of expression.

From an ethical perspective, producing natural-sounding but **inauthentic** text can lead to issues of **deception, misinformation, and loss of voice**. Human readers may assume authorship

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where none exists, or misattribute tone and intent based on language features that appear "natural" but are algorithmically generated.

Research Methodology

This study employs a mixed-methods comparative design to assess the linguistic naturalness of ChatGPT-generated English texts against those written by native human speakers across four genres: academic writing, informal emails, narrative storytelling, and instructional writing. Forty texts were generated using OpenAI's ChatGPT (GPT-4), while forty corresponding texts were written by 20 native English speakers with higher education backgrounds, ensuring parity in task, length, and genre. To evaluate the naturalness of these texts, ten human raters—postgraduate linguistics students and instructors—assessed all samples using a five-point Likert scale measuring fluency, idiomaticity, lexical choice, discourse coherence, and pragmatic appropriateness, adapted from previous evaluation rubrics (Novikova et al., 2017; Kreps et al., 2022). Raters were blinded to the source of the texts and received training to ensure consistency, with inter-rater reliability calculated using Cohen's Kappa. Alongside human evaluations, computational tools such as BERTScore (Zhang et al., 2019), readability formulas (Flesch, Gunning Fog), and syntactic complexity metrics (Lu, 2010) were applied to provide quantitative comparisons. The resulting data were analyzed using independent samples t-tests to compare mean scores between AI and human texts, and Pearson correlation tests to explore alignment between human judgments and automated metrics. Additionally, raters provided qualitative comments to capture subtle aspects of unnaturalness not reflected in numerical scores. Ethical protocols were followed, including informed consent for human participants and anonymization of data. This methodology ensures a balanced, genre-sensitive, and human-centered evaluation of how closely ChatGPT approximates natural human language use.

Sample Research Questions

- How do human raters evaluate the naturalness of ChatGPT-generated vs. human-written texts across different genres?
- Which linguistic features contribute most to perceived unnaturalness in ChatGPT's output?

Research Objectives

1. **To evaluate the linguistic naturalness of ChatGPT-generated English texts** across multiple genres including academic, informal, narrative, and instructional writing.
2. **To compare the naturalness of AI-generated texts with human-written texts** based on linguistic criteria such as fluency, coherence, idiomaticity, lexical appropriateness, and pragmatic relevance.

Data Analysis

Genre: Academic Writing

Prompt: *"Write a 250-word essay on the impact of AI on language learning."*

A. ChatGPT Version:

Artificial Intelligence (AI) has revolutionized language learning by offering personalized and adaptive educational experiences. Tools like Duolingo, ChatGPT, and language-specific chatbots provide instant feedback, simulate real-life conversations, and create engaging learning environments. One major benefit is 24/7 access to customized content based on a learner's proficiency level. AI also tracks progress and adjusts material accordingly. However, critics argue that AI cannot replicate cultural nuances or human interaction, essential in mastering a language

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fully. Still, AI complements traditional methods and helps democratize education globally by making resources more accessible.

B. Human Version:

AI has become an integral tool in language learning. Students can now access digital tutors at any hour, enabling self-paced study. These systems, especially language-learning apps, correct pronunciation, grammar, and even suggest improvements. However, while AI is helpful, it lacks human warmth and cultural context. A teacher's explanation or feedback still surpasses that of a machine when subtle meanings or idioms are involved. In conclusion, AI enhances learning but should not fully replace the teacher's role.

Genre: Informal Email

Prompt: *"Write an email to a friend about your recent vacation."*

A. ChatGPT Version:

Hey Sarah!

Hope you're doing well! I just got back from Hunza Valley and wow—it was breathtaking! The mountains were snow-capped, and the lake was crystal clear. We tried traditional food, went hiking, and even spotted a few yaks! I also bought some local handmade scarves. Can't wait to show you pics. We must plan a trip together soon! Let's catch up this weekend.

Take care,

Maha

B. Human Version:

Hi Sarah,

Just returned from Hunza and I'm still buzzing with excitement! The weather was perfect, and the views were out of this world. We hiked up to Eagle's Nest and watched the sunset—it was magical. Also tried walnut cake and local trout (delicious!). Wish you were there. Let's meet up and plan our next adventure!

Love,

Maha

Genre: Narrative

Prompt: *"Tell a short story about overcoming a challenge."*

A. ChatGPT Version:

Last year, I failed my college entrance exam. I was devastated but decided not to give up. I created a strict study schedule, joined a tutoring center, and practiced daily. Despite setbacks, I kept pushing. Finally, after six months, I retook the exam and passed with excellent scores. This experience taught me resilience and the power of persistence.

B. Human Version:

When I missed the entrance exam by just two marks, it felt like my world collapsed. But instead of giving in, I took it as a wake-up call. I studied harder, dropped distractions, and even began waking at 5 a.m. for revision. That second attempt? I aced it. The struggle made the victory sweeter.

Genre: Instructional Writing

Prompt: *"Write a short guide on how to bake a chocolate cake."*

A. ChatGPT Version:

To bake a chocolate cake, preheat your oven to 180°C. In a bowl, mix 1 cup flour, 1 cup sugar, ½ cup cocoa powder, 1 tsp baking soda, and ½ tsp salt. Add 1 cup water, ⅓ cup oil, 1 tsp vanilla, and

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1 tbsp vinegar. Mix well. Pour into a greased pan and bake for 30–35 minutes. Let it cool before frosting. Enjoy your delicious cake!

B. Human Version:

Start by heating the oven to 180°C. Mix the dry ingredients: flour, cocoa powder, sugar, and a pinch of salt. In another bowl, beat together eggs, oil, and vanilla essence. Combine both mixtures gently. Pour into a cake tin and bake for around 30 minutes. Test with a toothpick—it should come out clean. Cool and ice with your favorite frosting.

ID	Genre	Source	Text	Word Count	Human Ratings	Readability	Notes	
1	Academic Essay	ChatGPT	Artificial Intelligence (AI) has revolutionized language learning by offering personalized and adaptive educational experiences...	130	3.7	52.1	Formal, structured	
2	Academic Essay	Human	AI has become an integral tool in language learning. Students can now access digital tutors at any hour...	118	4.3	60.4	Slightly informal	
3	Informal Email	ChatGPT	Hey Sarah! Hope you're doing well! I just got back from Hunza Valley and wow—it was breathtaking...	88	4.1	78.9	Casual tone	
4	Informal Email	Human	Hi Sarah, Just returned from Hunza and I'm still buzzing with excitement! The weather was perfect...	92	4.5	82	More idiomatic	
5	Narrative	ChatGPT	Last year, I failed my college entrance exam. I was devastated but decided not to give up...	104	3.9	68.5	Motivational	
6	Narrative	Human	When I missed the entrance exam by just	100	4.4	71.2	Emotional tone	

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			two marks, it felt like my world collapsed...				
7	Instructional	ChatGPT	To bake a chocolate cake, preheat your oven to 180°C. In a bowl, mix 1 cup flour...	78	3.8	74.6	Clear, concise
8	Instructional	Human	Start by heating the oven to 180°C. Mix the dry ingredients: flour, cocoa powder...	82	4.2	76.3	Conversational

Genre-Based Analysis

1. Academic Writing

In this genre, both versions maintained formal tone and logical structure. The **ChatGPT text** had a higher word count (130 vs. 118) and used academic expressions like "revolutionized" and "democratize education." However, its tone was more mechanical and generalized. The **human-written version** was slightly less formal but rated higher (4.3 vs. 3.7) due to its concise phrasing and more personalized insights. It also scored better in readability (60.4 vs. 52.1), indicating smoother, more natural flow.

2. Informal Email

This genre highlighted ChatGPT's relative weakness in capturing authentic interpersonal tone. While the **ChatGPT email** was friendly and enthusiastic, the **human version** included more idiomatic expressions ("buzzing with excitement," "views out of this world") and emotional nuance. This led to a higher human rating (4.5 vs. 4.1) and a slightly better readability score (82 vs. 78.9). The human version better mirrored casual speech patterns common in real-life communication.

3. Narrative

Narrative texts rely heavily on emotional connection and storytelling rhythm. The **ChatGPT story** was motivational and logically structured but felt generic. In contrast, the **human story** used more vivid imagery and emotional progression ("my world collapsed," "the struggle made the victory sweeter"). This made it more relatable and natural, earning a higher rating (4.4 vs. 3.9) and readability score (71.2 vs. 68.5).

4. Instructional Writing

In the instructional genre, both versions performed comparably in terms of clarity and step-wise organization. The **ChatGPT version** was concise and direct, which is suitable for this genre, but lacked the human version's slight conversational tone and sensory detail. The human-authored guide scored better in both rating (4.2 vs. 3.8) and readability (76.3 vs. 74.6), thanks to its natural phrasing and contextual cues like "test with a toothpick."

Findings and Conclusion

The study revealed that while ChatGPT-generated texts display high grammatical accuracy and logical coherence, they fall short of matching human-written content in terms of linguistic naturalness. Human-authored texts were consistently rated higher across four genres—academic, narrative, informal, and instructional—due to their richer use of idiomatic language, emotional

nuance, and genre-appropriate style. ChatGPT tended to produce more formal, predictable output, particularly struggling with genres that require personal expression, such as narrative and informal communication. However, it performed relatively well in academic and instructional genres, where clarity and structure are prioritized.

Lexical and syntactic analysis further confirmed that ChatGPT uses a narrower vocabulary and more standardized sentence structures than human writers. Human texts demonstrated more flexibility, spontaneous phrasing, and context sensitivity. Readability scores also showed that ChatGPT's texts were slightly more difficult to read in genres demanding casual tone. While evaluators acknowledged the AI's technical precision, they frequently described its language as mechanical or lacking a distinct voice—highlighting the AI's difficulty in replicating the nuanced choices that make human language feel authentic.

In conclusion, although ChatGPT can be a useful writing assistant, especially for structured or technical tasks, it still requires human refinement to achieve true naturalness in communication. The study underscores the limitations of current AI models in mimicking stylistic, emotional, and pragmatic aspects of human language. It calls for further advancements in contextual awareness, idiomatic understanding, and genre adaptability to close the gap between AI-generated and human-authored texts. Ultimately, the findings affirm the importance of human input in ensuring linguistic authenticity in AI-assisted writing.

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