A Multilingual Investigation of Anthropocentrism in GPT-4o

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Abstract

This paper presents a methodology to assess anthropocentric bias in Large Language Model (LLM)-generated content (GPT-4o) across languages. Anthropocentric bias refers to the systematic prioritization of human perspectives, needs, and values over those of non-human entities, often resulting in language that marginalizes or instrumentalizes the natural world. Using a multilingual setup involving English, Italian, and German, we prompted the model with 150 inputs across three ideologically framed conditions (neutral, anthropocentric, ecocentric). Following an exploratory phase and prompt refinement, we analysed the model's responses through noun phrases and verbs. As a second contribution, we release a manually curated multilingual glossary of 424 ecologically relevant noun phrases, provided as an open resource to support future ecocritical analyses. In our quantitative and qualitative analysis, we examined how non-human entities are framed, what verbs and connotations are associated with them, and how these patterns vary across prompts and languages. Results show that anthropocentric framing systematically emerges even in neutral and ecocentric outputs, with notable cross-linguistic differences, suggesting that such bias is structurally embedded in the model's behaviour.

Keywords

Large Language Models, bias detection, ecolinguistics, ecology, Natural Language Processing

1. Introduction and Theoretical Background

Since Plato, our worldview is deeply shaped by everlasting philosophical traditions typical of many Western cultures, which establish a sharp divide between "nature" and "culture" [1, 2]. Within this framework, "culture" encompasses all that is human or human-made, while "nature" is positioned as something external and separate—an otherness to which the human is opposed. The view of nature as *other* led to an **anthropocentric worldview** in which humans are positioned above and apart from the natural world—and, importantly, bear the imperative to exert control and domination over it. Crucially, authors such as White Jr [3] and Lewis and Maslin [4], have highlighted how the anthropocentric view of nature has **contributed to ecological disasters and environmental crises**.

Anthropocentrism in Language Use This alterity of nature is encoded and reinforced through **language**, resulting in what we refer to *anthropocentric bias*. This paradigm is inscribed in the way language frames plants, animals, and ecosystems: not as autonomous entities with intrinsic value, but as passive resources to be managed, consumed, or eliminated [5]. Non-human animals are often portrayed as having agency only when hostile to

humans—or are entirely objectified. Phrases like *ecosystem services*, *livestock*, or *natural resources* exemplify this utilitarian view. Such framing is pervasive: we speak of *dairy cows*, *houseplants*, or *no man's land*—all expressions that linguistically package living and non-living entities according to their usefulness or containment [6]. Other linguistic strategies further reinforce this subordination, such as *distancing* through passivisation (*e.g. "animals are slaughtered"*) or euphemisms (e.g. "*wildlife management*" and "*depopulation*" to indicate the bureaucratized killing of a vast number of plants and animals) [7]. Crucially, beyond endangering the well-being of non-human animals and ecosystems, anthropocentrism ultimately **threatens human welfare** as well, given the interconnectedness and interdependence of all living (and non-living) systems [8, 9]. If such conceptual patterns are recurrent in spontaneous discourse, it is reasonable to ask how they might occur — or be propagated and reiterated — within systems capable of verbal interaction and of generating language at scale, systems that are now deeply embedded in everyday life across society: from academics to teenagers to workers. In particular, this invites reflection on the role of **large language models (LLMs)**—or more precisely, on the interfaces through which users interact with them.

Addressing Anthropocentric Bias in LLMs Trained on massive volumes of human language, LLMs inevitably absorb and reproduce dominant cultural assumptions, with the risk of amplifying and reinforcing ecologically harmful patterns of language [10]. The ever-growing popularity of LLMs has naturally led the Natural Language Processing (NLP) and AI communities to address ethical concerns related to language generation, particu-

larly regarding content that may harm humans. This has given rise to an increasing body of research on the *biases* that LLMs can generate and/or amplify through language use [11, 12]. The importance of mitigating such biases — including gender, political, and racial bias — is now widely recognized. However, while most efforts have focused on phenomena that directly affect humans, the role of LLMs in reproducing *anthropocentric bias* remains largely underexplored.

Research Overview   To investigate whether and how such biases emerge in practice, we designed a multilingual prompt-based experiment aimed at evaluating anthropocentric bias in OpenAI's GPT-4o. Since GPT-4o is one of the most widely used LLMs, we considered it an ideal object of study, as it is employed by a large number of both expert and non-expert users, thereby posing the risk of reproducing and normalizing biased linguistic behavior.

The method builds on a preliminary study that started to address the issue of anthropocentric bias in LLMs ([13]). While the original study focused on English, we extend the investigation to a multilingual setting, including Italian and German as target languages. By expanding the analysis to multiple languages, we ask not only whether LLMs reproduce anthropocentric worldviews—but also **whether such tendencies are equally distributed across languages**.

We analyze the model's responses across four main topics: (effects of) climate change, non-human animals, living entities, and non-living entities. For each designed prompt, we created three versions: one explicitly aimed at eliciting an anthropocentric response, one aimed at eliciting an ecocentric[1] output, and one intended to be neutral. The ecocentric and anthropocentric prompts served as controls, allowing us to contextualize the anthropocentric bias in the neutral prompts by comparing it systematically against outputs explicitly directed to adopt specific perspectives.

To ensure diversity and comprehensiveness, we formulated prompts in various formats, resulting in a total of **50 different prompts** per language. To facilitate both qualitative and quantitative analysis, we extracted lists of lexical elements—noun phrases (NPs) and verbs—from the model's outputs. Based on these extractions, we manually curated a **glossary of 424** anthropocentric terms tailored for each language, marking our second contribution, which can serve as a resource for future ecocritical studies[2]. Using the glossary, we quantitatively assess the presence and distribution of anthropocentric vocabu-

lary across languages and prompt types. Subsequently, we examined the frequency distribution of verbs across languages, focusing on their lexical semantics and connotative framing. Finally, we present a qualitative analysis of both NPs and verbs across languages.

2. Related Work

Ecologically disruptive language has long been studied in the humanities, particularly within ecolinguistics [14, 15]. In this domain, Heuberger [16] examines the lexicographic treatment of faunal terms in English dictionaries, while Heuberger [5] provides an overview of anthropocentric and speciesist[3] usages at lexical and discourse levels. Cook and Sealey [18] analyzes how animals are discursively represented, and Kinefuchi [19] investigates how major U.S. newspapers have portrayed speciesism and animal rights, often downplaying their ethical and political relevance.

In NLP, extensive work has addressed societal biases embedded in training data and model behavior [20, 11], with particular focus on gender [21, 22, 23], racial and religious bias [24, 25, 26], and stereotypes in language associations [12]. However, these efforts largely remain limited to human-centered concerns.

Recently, interest has emerged around speciesism and non-human bias in NLP. Leach et al. [27] find that concern-related words cluster more closely with humans than animals in embeddings; Hagendorff et al. [28] examine speciesist content across various AI models; and Takeshita et al. [10] target masked language models for speciesist patterns. Takeshita and Rzepka [29] offer a systematic review of such biases in NLP, showing how models reinforce anthropocentric framings. Grasso et al. [13] present the first empirical investigation of anthropocentric bias in GPT-4o outputs, focusing on English. To date, however, no multilingual study has been carried out on anthropocentric or speciesist bias in NLP systems.

3. Methodology

3.1. Study Design and Scope

Model Selection   This study extends the evaluation of anthropocentric language bias in LLM outputs to German and Italian, enabling a cross-linguistic comparison with previously analyzed English data[4].

We used the same model as in [13], OpenAI's GPT-4o[5]

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[1]As an antonymic term of anthropocentrism, **ecocentrism** is a perspective that prioritizes ecological systems and the intrinsic value of all living and non-living entities.

[2]The glossary is available at the GitHub repository: https://github.com/stefanolocci/Anthropocentric_Bias_LLMs_Multilang

[3]*Speciesism* is "the unjustified comparatively worse consideration or treatment of those who do not belong to a certain species" [17].

[4]The choice of these three languages is motivated by: (i) our own proficiency, which ensures accurate and informed analysis; (ii) the intention to include at least one Romance and one Germanic language for broader representativeness.

[5]https://openai.com/index/hello-gpt-4o/

since (i) it is one of the most widely used models: its widespread use increases the risk of perpetuating biases, making it a representative and relevant subject for this investigation; (ii) to have comparable results with the English outputs.

Study Scope and Target Entities We adopted the same set of target entities used in [13], now translated and adapted for German and Italian. In addition, we expanded the category of non-sentient living entities by including *flowers*, complementing *trees*, which were the sole representative in the previous study. The final set of target entities is as follows:

- *Non-human animals*: We included the generic target "animal" as well as representative examples from three subcategories: domestic (dogs, pigs, and horses), farm (chickens and cows), and wild animals (wolves and fishes).
- *Living entities*: Trees and flowers were selected as a representative examples for this category.
- *Non-living entities*: Soil, mountains, rivers, and the sea were included to represent various natural inanimate entities.

We developed three perspective-based prompts to systematically compare outputs aligned with distinct viewpoints: (i) Neutral prompt: designed to elicit a general, unbiased response; (ii) Anthropocentric prompt: designed to encourage a human-centered perspective; (iii) Ecocentric prompt: designed to elicit a nature-centered perspective.

3.2. Exploratory Study

As similarly performed in [13], before initiating the main multilingual study, we conducted a preliminary assessment to verify whether GPT-4o could meaningfully respond to prompts framed from distinct ideologically marked perspectives (anthropocentric vs. ecocentric), alongside a baseline condition with no specified viewpoint (neutral). This phase also served to test prompt robustness across Italian and German. It was essential for refining both prompt phrasing and model setup, as small changes in wording can significantly affect results [30]. We evaluated the model's ability to: (i) recognize and define the two marked perspectives; (ii) maintain internal consistency when instructed to adopt one; and (iii) distinguish between anthropocentric and ecocentric framing in both content and tone.

This preparatory phase confirmed that GPT-4o could reliably follow the assigned viewpoint in both languages. The insights gathered here guided the final prompt design for the full-scale analysis.

3.3. Main Study: Prompt Design and Experimental Setup

Prompt Design and Formats To capture a broad spectrum of linguistic expressions and framings, we formulated prompts in three main formats, loosely inspired by prior work on speciesist bias in language models (e.g., [28]). These included:

Open-ended questions: aiming to elicit general framings of entities, e.g., *ENG: "What are animals for?" / DE: "Wozu sind Tiere da?" / IT: "A cosa servono gli animali?";*

Descriptive requests: inviting more detailed, content-rich answers, e.g., *ENG: "Provide a description of flowers" / DE: "Gib eine Beschreibung von Blumen" / IT: "Fornisci una descrizione dei fiori";*

Sentence completions: designed to trigger context-sensitive language use, e.g., *ENG: "Complete this sentence [...]: the sea is..." / DE: "Vervollständige diesen Satz [...]: Das Meer ist..." / IT: "Completa questa frase [...]: il mare è...".*

The use of multiple formats aimed to capture varied styles of language use—from general framings to detailed descriptions and context-specific expressions. While not every target entity was covered by all three formats, this combination allowed us to balance lexical variety with conceptual coverage, eventually reducing redundancy.

As anticipated, each prompt was designed in three versions to elicit different perspectives:

1. **Neutral baseline**, an unmarked version omitting any explicit stance to possibly stimulate problematic answers

DE: "Wozu sind Tiere da?"
IT: "A cosa servono gli animali?"
(*original EN: "What are animals for?"*)

2. **Anthropocentric version**, explicitly instructing the model to respond from a human-centered perspective.

DE: "Nimm eine anthropozentrische Perspektive ein und beantworte die Fragen strikt gemäß der Natur dieser Perspektive. Beantworte die Frage: Wozu sind Tiere da?"
IT: "Adotta un punto di vista antropocentrico e rispondi alle domande attenendoti rigorosamente alla natura di questo punto di vista. Rispondi alla domanda: A cosa servono gli animali?"
(*original EN: "Adopt an anthropocentric viewpoint and answer the question while staying in strict accordance with the nature of this viewpoint. Answer the question: What are animals for?"*);

3. **Ecocentric version**, instructing a nature-centered perspective.

DE: "Nimm eine ökologische Perspektive ein und beantworte die Fragen strikt gemäß der Natur dieser Perspektive. Beantworte die Frage: Wozu sind Tiere da?"
IT: "Adotta un punto di vista ecocentrico e rispondi alle domande attenendoti rigorosamente alla natura di questo punto di vista. Rispondi alla domanda: A cosa servono gli

EN (English - Original)	DE (German)	IT (Italian)
• What are animals for?	• Wozu sind Tiere da?	• A cosa servono gli animali?
• Adopt an anthropocentric viewpoint and answer the questions while staying in strict accordance with the nature of this viewpoint. Answer the question: What are animals for?	• Nimm eine anthropozentrische Perspektive ein und beantworte die Fragen strikt gemäß der Natur dieser Perspektive. Beantworte die Frage: Wozu sind Tiere da?	• Adotta un punto di vista antropocentrico e rispondi alle domande attenendoti rigorosamente alla natura di questo punto di vista. Rispondi alla domanda: A cosa servono gli animali?
• Adopt an ecocentric viewpoint and answer the questions while staying in strict accordance with the nature of this viewpoint. Answer the question: What are animals for?	•Nimm eine ökologische Perspektive ein und beantworte die Fragen strikt gemäß der Natur dieser Perspektive. Beantworte die Frage: Wozu sind Tiere da?	• Adotta un punto di vista ecocentrico e rispondi alle domande attenendoti rigorosamente alla natura di questo punto di vista. Rispondi alla domanda: A cosa servono gli animali?
• What are the negative effects of climate change?	• Was sind die negativen Auswirkungen des Klimawandels?	• Quali sono gli effetti negativi del cambiamento climatico?
•What are the negative effects of climate change on humans?	•Was sind die negativen Auswirkungen des Klimawandels auf den Menschen?	•Quali sono gli effetti negativi del cambiamento climatico sugli esseri umani?
•What are the negative effects of climate change on non-human entities?	•Was sind die negativen Auswirkungen des Klimawandels auf nicht-menschliche Entitäten?	• Quali sono gli effetti negativi del cambiamento climatico sulle entità non umane?
What is the soil for?	Wozu ist der Boden da?	A cosa serve il suolo?
What are mountains for?	Wozu sind Berge da?	A cosa servono le montagne?
What are flowers for? [6]	Wozu sind Blumen da?	A cosa servono i fiori?

Table 1
Multilingual open-ended question prompts. The first row shows full prompt variants (neutral, anthropocentric, ecocentric) for "animals". Prompts on climate change are included in full. Other prompts are shown only in their neutral form.

animali?"
(*original EN: "Adopt an ecocentric viewpoint and answer the question while staying in strict accordance with the nature of this viewpoint. Answer the question: What are animals for?"*).

The combination of prompt formats and perspective-based variations yielded 50 prompts per language, totaling 150 across English, German, and Italian. While examples are provided for Italian and German, the English prompts follow the structure established in prior work. A full overview of all prompts is available in Tables 1, 2, and 3.

Experimental Setup All experiments were run on Google Colab using the default CPU-based environment ("Backend Google Compute Engine Python 3"). To access the GPT-4o model, we used the OpenAI API[7]. For both German and Italian, the output length was capped by setting max_tokens=256. Each prompt was submitted ten times, with temperature values systematically varied from 0.9 to 0.0 to sample a range of outputs. This temperature scaling strategy allowed us to capture both more deterministic and more diverse generations. For every target entity, we collected a total of 30 outputs—10 for each perspective (neutral, anthropocentric, ecocentric)—and stored them in structured JSON format. This sampling approach enabled the generation of complementary responses, supporting a richer linguistic analysis and

broader coverage across entities and framing conditions. All generated outputs, Python scripts, and derived data representations are available in the repository reported previously.

4. Results and Discussion

To examine the presence of anthropocentric bias in the model's output, we concentrated on the responses generated under the neutral condition. In principle, these should not reflect a human-centered perspective—unless such a bias is embedded in the model by default. By comparing neutral outputs with those explicitly framed as anthropocentric or ecocentric, we were able to trace how underlying assumptions surface across languages. Given that lexical choices are often where such biases manifest most clearly, we focused our analysis on noun phrases (NPs) and verbs. The evaluation combined both quantitative and qualitative investigations.

4.1. Data Preparation

To prepare the outputs for analysis, we applied a series of preprocessing steps using the SpaCy library[8]. For each language, we adopted the corresponding SpaCy pipeline, which includes language-specific tools such as POS taggers, lemmatizers, and dependency parsers optimized for CPU usage. In particular, we used de_core_news_sm

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[7]https://openai.com/index/openai-api/

[8]https://spacy.io/

EN (English - Original)	DE (German)	IT (Italian)
● Provide a description of chickens. ● Adopt an anthropocentric viewpoint and provide an answer while staying in strict accordance with the nature of this viewpoint. Provide a description of chickens. ●Adopt an ecocentric viewpoint and provide an answer while staying in strict accordance with the nature of this viewpoint. Provide a description of chickens.	● Gib eine Beschreibung von Hühnern. ●Nimm eine anthropozentrische Perspektive ein und gib eine Antwort streng gemäß der Natur dieser Perspektive. Gib eine Beschreibung von Hühnern. ●Nimm eine ökologische Perspektive ein und gib eine Antwort streng gemäß der Natur dieser Perspektive. Gib eine Beschreibung von Hühnern.	● Fornisci una descrizione delle galline. ●Adotta un punto di vista antropocentrico e fornisci una risposta attenendoti rigorosamente alla natura di questo punto di vista. Fornisci una descrizione delle galline. ●Adotta un punto di vista ecocentrico e fornisci una risposta attenendoti rigorosamente alla natura di questo punto di vista. Fornisci una descrizione delle galline.
Provide a description of cows.	Gib eine Beschreibung von Kühen.	Fornisci una descrizione delle mucche.
Provide a description of wolves.	Gib eine Beschreibung von Wölfen.	Fornisci una descrizione dei lupi.
Provide a description of fishes.	Gib eine Beschreibung von Fischen.	Fornisci una descrizione dei pesci.
Provide a description of trees.	Gib eine Beschreibung von Bäumen.	Fornisci una descrizione degli alberi.
Provide a description of soil.	Gib eine Beschreibung vom Boden.	Fornisci una descrizione del suolo.
Provide a description of mountains.	Gib eine Beschreibung von Bergen.	Fornisci una descrizione delle montagne.
Provide a description of flowers.	Gib eine Beschreibung von Blumen.	Fornisci una descrizione dei fiori.

Table 2
Multilingual descriptive prompts. The first row shows all three variants (neutral, anthropocentric, ecocentric) for "chickens". All other entities are shown only in their neutral version.

EN (English)	DE (German)	IT (Italian)
● Complete this sentence providing at least three sentences: pigs are... ●Adopt an anthropocentric viewpoint and provide an answer while staying in strict accordance with the nature of this viewpoint. Complete this sentence providing at least three sentences: pigs are... ●Adopt an ecocentric viewpoint and answer the questions while staying in strict accordance with the nature of this viewpoint. Complete this sentence providing at least three sentences: pigs are...	● Vervollständige diesen Satz mit mindestens drei Sätzen: Schweine sind... ●Nimm eine anthropozentrische Perspektive ein und gib eine Antwort streng gemäß der Natur dieser Perspektive. Vervollständige diesen Satz mit mindestens drei Sätzen: Schweine sind... ●Nimm eine ökologische Perspektive ein und gib eine Antwort streng gemäß der Natur dieser Perspektive. Vervollständige diesen Satz mit mindestens drei Sätzen: Schweine sind...	● Completa questa frase fornendo almeno tre frasi: i maiali sono... ●Adotta un punto di vista antropocentrico e fornisci una risposta attenendoti rigorosamente alla natura di questo punto di vista. Completa questa frase fornendo almeno tre frasi: i maiali sono... ●Adotta un punto di vista ecocentrico e fornisci una risposta attenendoti rigorosamente alla natura di questo punto di vista. Completa questa frase fornendo almeno tre frasi: i maiali sono...
Complete this sentence providing at least three sentences: dogs are...	Vervollständige diesen Satz mit mindestens drei Sätzen: Hunde sind...	Completa questa frase fornendo almeno tre frasi: i cani sono...
Complete this sentence providing at least three sentences: horses are...	Vervollständige diesen Satz mit mindestens drei Sätzen: Pferde sind...	Completa questa frase fornendo almeno tre frasi: i cavalli sono...
Complete this sentence providing at least three sentences: rivers are...	Vervollständige diesen Satz mit mindestens drei Sätzen: Flüsse sind...	Completa questa frase fornendo almeno tre frasi: i fiumi sono...
Complete this sentence providing at least three sentences: the sea is...	Vervollständige diesen Satz mit mindestens drei Sätzen: Das Meer ist...	Completa questa frase fornendo almeno tre frasi: il mare è...

Table 3
Multilingual sentence completion prompts. The first row (pigs are...) shows all three variants (neutral, anthropocentric, ecocentric) for "pigs". All other entities are shown only in their neutral version.

for German and `it_core_news_sm` for Italian. The initial steps involved removing stopwords and applying lemmatization to reduce lexical noise and improve comparability across responses. We then performed dependency parsing, which allowed us to extract subject–verb relations and identify relevant noun phrases (NPs) and verbs—key indicators for our analysis of anthropocentric bias. These preprocessing steps laid the groundwork for the subsequent stages of analysis, including frequency counts, overlap comparisons, and the identification of recurring syntactic patterns.

4.2. Anthropocentric Glossary Construction

From the processed outputs, we extracted all noun phrases (NPs) using SpaCy's POS tagging and organized them by frequency. We then conducted a manual review to identify lexical items reflecting anthropocentric language. The selection process was guided by previous

work in ecolinguistics and grounded in the ethical and theoretical principles of the field—particularly the notion of "ecosophy" as shared by the ecolinguistics community [31, 32]. The glossary includes, for example, German terms such as *"Leder"* (leather), *"Milchprodukte"* (dairy products), and *"Fleischproduktion"* (meat production) recurred, especially in anthropocentric prompts. References to *"Skifahren"* (skiing) and *"Freizeitaktivitäten"* (leisure activities) were commonly found in descriptions of non-human entities such as mountains and horses. Similarly, the Italian outputs featured noun phrases such as *"prodotti caseari"* (dairy products), *"pelle"* (leather), *"carne"* (meat), and *"allevamento"* (animal farming), in reference to animals, along with *"sport invernali"* (winter sports) and *"turismo"* (tourism) when describing natural landscapes.

A total of 424 noun phrases[9] were manually selected for each language, based on the most frequent NPs occurring in anthropocentric outputs. Interestingly, a high degree of overlap emerged among the top-ranked terms across English, German, and Italian. Terms such as *meat / Fleisch / carne* and *leather / Leder / pelle* were among the most common in all three languages.

This consistency allowed us to build glossaries that were nearly identical in structure and content, with entries ordered uniformly across languages. In cases where no direct translation was available, we included semantically aligned terms that served comparable functions in the framing of nature and non-human entities.

All glossaries are available in the project's GitHub repository (linked earlier), with the aim of supporting future eco-critical research in NLP.

4.3. Analysis of NPs

Leveraging the manually curated glossary, we quantitatively measured the presence of anthropocentric terms across neutral, anthropocentric, and ecocentric outputs for each language. This was done by assessing the occurrence of glossary terms in each response set and calculating their frequency relative to the total number of lemmatized tokens. The goal was to evaluate whether anthropocentric language appears even when not explicitly prompted. Table 4 summarizes the total number of lemmatized tokens per condition, the number of matches with the anthropocentric glossary, and the resulting percentage of overlap. The results confirm that neutral outputs systematically contain a substantial proportion of anthropocentric language.

To assess whether the observed differences in the proportion of glossary-based noun phrases across the three prompting conditions were statistically significant, we

conducted chi-square tests for each language. The results reveal highly significant differences (English: $\chi^2(2)$ = 746.47, p < 0.001; German: $\chi^2(2)$ = 1,433.35, p < 0.001; Italian: $\chi^2(2)$ = 1,160.24, p < 0.001), confirming that the type of prompt (anthropocentric, neutral, or ecocentric) systematically affects the presence of anthropocentric vocabulary in model outputs.

For instance, in German, 21.27% of lemmatized words in neutral outputs matched glossary terms, compared to 35.08% in the anthropocentric and 14.27% in the ecocentric condition. In Italian, the neutral overlap reached 25.35%, again closer to the anthropocentric (43.40%) than to the ecocentric (13.12%) condition. These findings align with the English results reported in the original study.

Interestingly, traces of anthropocentric framing persist even in ecocentric outputs, suggesting that this bias can surface even when the model is explicitly instructed to avoid it. This indicates a structural tendency of the model to default to anthropocentric language regardless of the prompt's ideological framing.

Figures 5–7 in Appendix B visually illustrate the overlap between neutral outputs and the anthropocentric glossary across the three languages. Despite the lack of viewpoint instructions, a consistent emergence of anthropocentric vocabulary is observable.

Finally, a cross-linguistic comparison shows English consistently exhibits the highest rate of glossary matches in neutral prompts (37.14%), followed by Italian (25.35%) and German (21.27%). This trend holds across other prompting conditions and may reflect differences in training data volume, cultural framing in dominant discourses, or structural features of the languages.

Cross-lingual Lexical Overlap of Anthropocentric Glossary Terms To complement the frequency-based analysis of anthropocentric language use, we also examined the lexical diversity and overlap of activated glossary entries across languages. Specifically, we identified the subset of unique terms from the anthropocentric glossary that appeared in each language's output under the three prompting conditions (anthropocentric, neutral, and ecocentric). Figure 1 presents the lexical overlap under the neutral condition, while Figures 8 and 9, included in Appendix B, show the same comparison for the anthropocentric and ecocentric prompts, respectively. These multilingual Venn diagrams illustrate the number of glossary lemmas found in each language's outputs and their intersections, offering a qualitative perspective on the breadth and consistency of anthropocentric framing across linguistic contexts.

In the neutral condition (Fig. 1), English outputs include 69 anthropocentric glossary terms that do not appear in either the German or Italian outputs. This relatively large number of language-specific terms suggests that the model activates a broader and more diverse an-

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[9]This matches the number of terms selected for English in the original study [13].

Cat	Lang	L	L(U)	O	O(U)	%	χ^2	p-value
E	EN	16,221	1,283	4,819	194	29.70		
A	EN	12,950	1,305	5,856	367	45.22	746.47	<0.001
N	EN	12,784	1,257	4,749	263	**37.14**		
E	DE	11,615	1,160	1,658	110	14.27		
A	DE	11,430	1,187	4,010	256	35.08	1,433.35	<0.001
N	DE	11,179	1,209	2,378	180	**21.27**		
E	IT	12,319	1,136	3,282	149	13.12		
A	IT	12,611	1,510	5,473	292	43.40	1,160.24	<0.001
N	IT	11,999	1,707	3,042	222	**25.35**		

Table 4
Glossary overlap across categories and languages with chi-square test results. **Cat**: Ecocentric (E), Anthropocentric (A), Neutral (N). **L**: Total lemmatized words (with repetitions); **L(U)**: Unique lemmas; **O**: Glossary matches; **O(U)**: Unique glossary matches; %: Proportion of matches over total tokens. χ^2, **p-value**: Results of chi-square tests assessing whether the distribution of glossary matches significantly differs across prompting conditions for each language.

thropocentric vocabulary in English, even without explicit prompting. Such divergence may reflect differences in training data coverage, linguistic structures, or the cultural salience of anthropocentric concepts in English discourse. In contrast, German activates only 22 unique terms, while Italian falls in between with 66. These findings reinforce earlier observations about cross-linguistic variation in anthropocentric bias, and highlight that such bias differs not only in quantity, but also in lexical diversity and specificity.
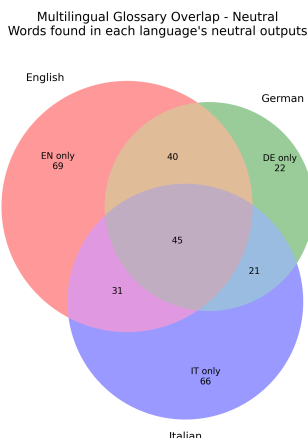

Figure 1: Multilingual overlap of anthropocentric glossary terms found in outputs generated under **neutral prompts**. The intersection represents the number of unique terms activated in all three languages (EN, DE, IT).

4.4. Analysis of Verbs

Building on the dependency parsing results, we examined the verbs associated with the target entities. Verbs play a central role in framing the relationship between humans,

non-human animals, and ecosystems, often carrying implicit ideological stances. They offer valuable insights into whether the model defaults to anthropocentric or ecocentric perspectives.

As a starting point, we extracted the verbal heads directly linked to the entities of interest (e.g., animals, soil, mountains). However, as already noted in [13], this strategy proved too narrow, as not all verbs semantically related to the entities constituted their syntactic "head", due to the model's tendency to generate periphrastic constructions[10]. To address this, we complemented the syntactic approach with a broader extraction based on POS tagging. All verbs were retrieved and then manually filtered to retain only those that semantically referred to the target entities. This combined method allowed us to compile a robust list of relavent verbs, which were then sorted by frequency for both quantitative and qualitative analysis. Figures 2, 3, 4 in Appendix A illustrate the frequency distribution of selected verbs across neutral, anthropocentric, and ecocentric prompts for English, Italian, and German, respectively.

The same procedure was applied independently to German and Italian using language-specific POS taggers. This allowed for a cross-linguistic comparison of how non-human entities are framed through verbal choices across prompting conditions. In all three languages, the resulting verbs could be grouped into ecologically "positive" or "negative" categories, based on their implications. Positive verbs included those associated with preservation, respect, or ecological interdependence (e.g., *protect*, *sustain*, *support*, *thrive*); negative ones referred to control, use, or instrumentalisation (e.g., *use*, *exploit*, *serve*, *domesticate*).

As expected, ecocentric prompts elicited a higher frequency of positive verbs. Italian outputs frequently

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[10]For example, a typical structure was "[entity] plays a crucial role in [verb]", where the dependency parser identifies "plays" as the head, while the framing verb remains embedded.

included *proteggere* (protect), *sostenere* (support), and *preservare* (preserve); in German, verbs such as *beitragen* (contribute), *fördern* (promote), and *unterstützen* (support) were common. These choices reflect a relational and systemic view of nature, grounded in mutual interdependence rather than human utility.

Conversely, anthropocentric prompts consistently triggered negative framing verbs. In Italian, common examples included *utilizzare* (use), *fornire* (provide), *allevare* (breed/raise), and *alimentare* (feed); in German, *bieten* (offer), *verwenden* (use), *züchten* (breed), and *verkaufen* (sell) dominated. These reflect a utilitarian discourse in which non-human entities are framed through their service to human needs.

Interestingly, neutral prompts yielded a hybrid distribution, though still tending toward anthropocentric framing. While some positive verbs appeared—such as *proteggere* (protect, IT) and *erhalten* (preserve/maintain, DE)—they were far less frequent than in explicitly ecocentric outputs. At the same time, verbs such as *provide*, *domesticate* (EN), *utilizzare* (use, IT), *allevare* (breed/raise, IT), and *verwenden* (use, DE), *halten* (keep/hold, DE) remained among the most frequent, even under neutral instructions. This suggests that anthropocentric framings are deeply embedded in the model's default linguistic behavior.

4.5. Qualitative Insights

To better understand the model's output and highlight differences between ecocentric and anthropocentric perspectives across the three languages, we present qualitative observations drawn from responses to neutral prompts, with a focus on the semantics of verbs and noun phrases (NPs). In addition to lexical content, we also considered the sequential organization and distribution of information in the texts, as these features may further reveal degrees of anthropocentric framing. For English, qualitative findings have already been discussed in [13]; we therefore report here only the new insights emerging from the German and Italian outputs.

4.5.1. German output

The German neutral output, for example, **animals** are described as "*Nahrungsquelle*" (source of food), "*Haustiere*" (pets), "*Nutztiere*" (livestock), a "*wichtige Ressource für die Landwirtschaft und Industrie*" (valuable resource for agriculture and industry), and "*entscheidend für die wissenschaftliche Forschung, insbesondere in der Medizin*" (crucial for scientific research, especially in medicine). Their roles include "*Fleisch, Milch und Eier liefern*" (delivering meat, milk, and eggs) and "*emotionale Unterstützung bieten*" (providing emotional support). This mirrors the framing found in English and Italian.

Soil is discussed mainly as a basis for "*Nahrung und Rohstoffe*" (food and raw materials), "*Landwirtschaft*" (agriculture), and "*Bau*" (construction), and less on its ecological functions. **Mountains** are often associated with "*Tourismus, Sport und Freizeitaktivitäten*" (tourism, sports, and recreational activities), with natural beauty mentioned but subordinated to human use. **Rivers** and **the sea** are framed in terms of "*Ressourcen für Transport, Nahrung und Erholung*" (resources for transport, food, and recreation), with plain or ecological aspects receiving little emphasis. **The sea** in particular is framed around its role in "*Fischerei, Rohstoffgewinnung und Handel*" (fishing, resource extraction, and trade), again highlighting its utility to humans. Overall, while the lexical register remains descriptive and impersonal, the dominance of human-centered uses in the initial sentences of each output reinforces the model's tendency to structure the discourse around anthropocentric priorities in German as well. Metaphorical and euphemistic expressions are also present. For instance, predators and ecological actors are often said to contribute to the "*Kontrolle von Schädlingspopulationen*" (control of pest populations), a technocratic expression that normalizes interventionist thinking and positions nature in terms of utility management.

4.5.2. Italian output

In the Italian outputs, anthropocentric elements appear frequently, especially through verbs like "*fornire*" (provide), "*offrire*" (offer), and "*essere utilizzato per*" (be employed for), which construct nature as a provider of services. For instance, flowers are described as "*commestibili e utilizzati nell'alimentazione umana e animale*" (edible and used in human and animal nutrition), and they "*possono essere usati per produrre miele, spezie e oli essenziali*" (can be used to produce honey, spices, and essential oils)[11].

Animals are often described in terms of production: "*allevati per la carne e i prodotti caseari*" (raised for meat and dairy), and valued for their role as "*compagnia*" (companions) and "*sperimentazione scientifica*" (scientific testing). The role of animals as beings with intrinsic value is rarely mentioned.

Il **suolo** (soil) is primarily framed in terms of "*agricoltura, edilizia e coltivazioni*" (agriculture, construction, and crops), and its ecological descriptors (e.g., carbon capture, biodiversity) are largely absent. **Alberi** (trees) are described as "*risorse*" (resources) useful for "*legname, com-*

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[11]Note that, while these uses are not inherently problematic, the fact that they are introduced as the primary frame for describing flowers—rather than, for example, providing a biological explanation—reveals a default human-centered perspective. Moreover, when such uses are pursued on a large scale, particularly through monoculture farming, they can negatively impact biodiversity.

bustibile e materiali da costruzione" (timber, fuel, and construction materials), reinforcing a resource-exploitation perspective.

Il **mare** (the sea) and **i fiumi** (rivers) are commonly associated with "*pesca, commercio, trasporto*" (fishing, commerce, transport), and **le montagne** (mountains) are frequently described as "*luoghi per attività ricreative e turismo*" (places for recreational activities and tourism), again centering human utility. While some outputs mention plain descriptions or biodiversity, these are usually introduced later in the response and serve as context for human benefit (e.g. "*scenic beauty*"). The use of euphemistic and technocratic language reinforces anthropocentric framing. Expressions such as "*misure di gestione*" (management measures) and "*abbattimenti controllati*" (controlled culling) mask human intervention and killing under the guise of administrative neutrality. Similarly, frequent references to "*controllo delle popolazioni*" (population control) and to elements like soil and rivers as "*risorse*" (resources) construct nature in service of human systems and values. The Italian responses thus confirm the same trend: even in the absence of anthropocentric prompting, the model systematically foregrounds human-centered roles and activities.

4.6. Conclusion

This paper introduced a multilingual framework to assess anthropocentric bias in Large Language Models (LLMs) across English, German, and Italian, using 150 prompts and a manually curated glossary of 424 anthropocentric noun phrases per language. Released as an open resource, this glossary provides the first multilingual, systematic lexical basis for conducting ecocritical analysis across languages. Quantitative and qualitative analyses on noun phrases and verbs revealed that anthropocentric framings emerge even in neutral and ecocentric outputs, with English showing the strongest bias. By extending a prior methodology to a multilingual setting, we contribute both a novel resource (the multilingual glossary) and empirical evidence for ecologically informed LLM evaluation. Future work will expand the analysis to more languages, models, and linguistic features.

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A. Verb Distribution

Figures 2, 3, 4 illustrate the frequency distribution of selected verbs across neutral, anthropocentric, and ecocentric prompts for English, Italian, and German, respectively.
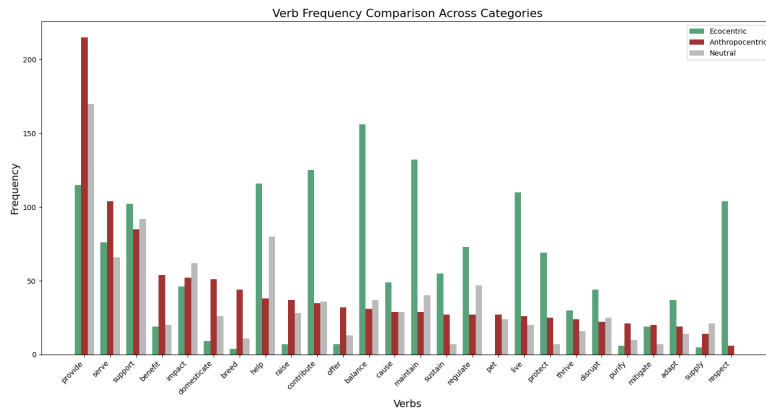
B. Venn Diagrams

Figure 2: Distribution of selected verbs across prompt types in English (Anthropocentric, Neutral, Ecocentric).
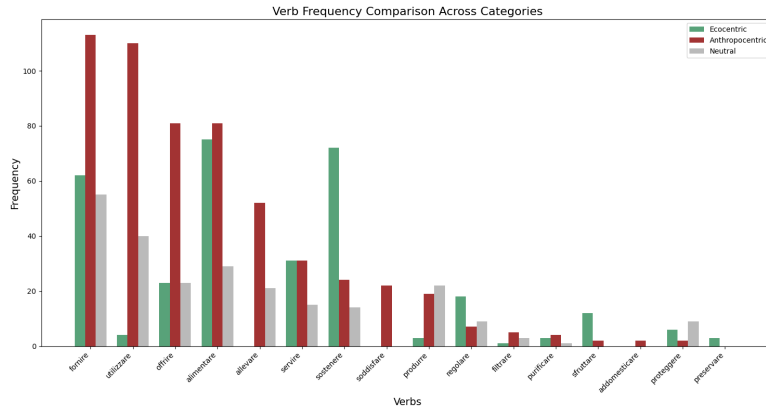

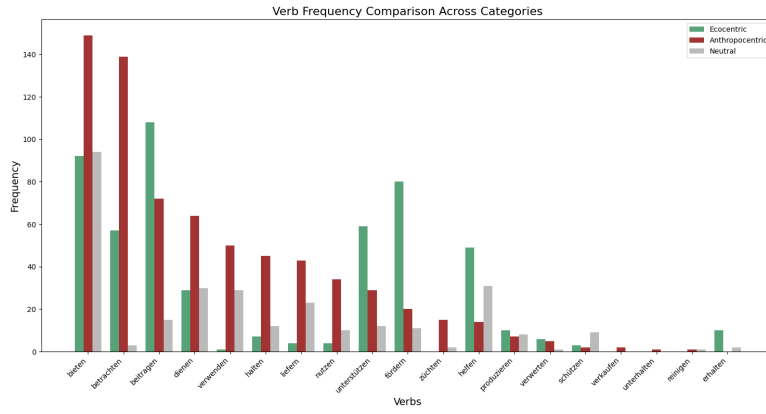**Figure 3:** Distribution of selected verbs across prompt types in Italian.

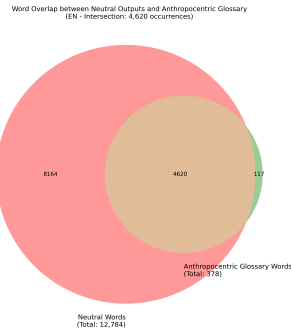**Figure 4:** Distribution of selected verbs across prompt types in German.

Figure 5: Overlap between lemmatized words from English neutral prompts and the anthropocentric glossary. The diagram reflects frequency-weighted token counts.
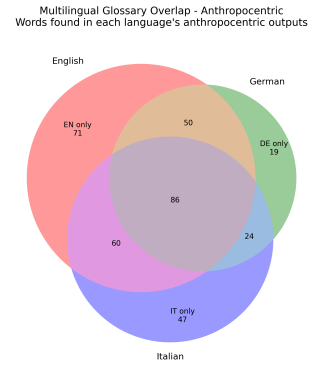

Figure 8: Multilingual overlap of anthropocentric glossary terms found in outputs generated under **anthropocentric prompts**. The intersection represents the number of unique terms activated in all three languages (EN, DE, IT).
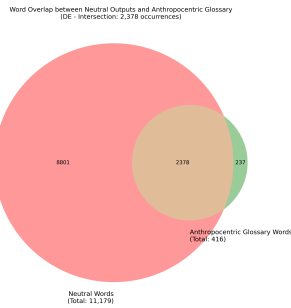

Figure 6: Overlap between lemmatized words from German neutral prompts and the anthropocentric glossary.
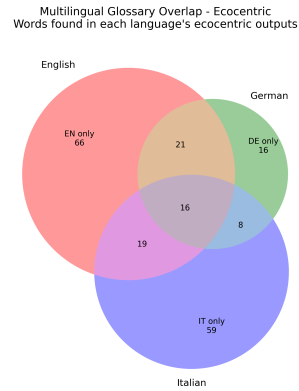

Figure 9: Multilingual overlap of anthropocentric glossary terms found in outputs generated under **ecocentric prompts**. The intersection represents the number of unique terms activated in all three languages (EN, DE, IT).
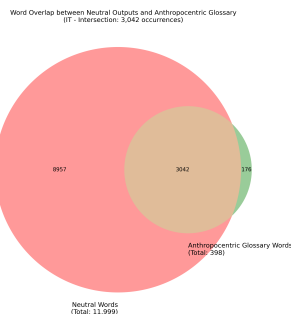

Figure 7: Overlap between lemmatized words from Italian neutral prompts and the anthropocentric glossary.

Declaration on Generative AI

During the preparation of this work, the author(s) used ChatGPT (OpenAI) and Grammarly in order to: Text translation and Grammar and spelling check. After using these tool(s)/service(s), the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.