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Animal Metaphors in Maritime English

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Abstract

This study compares animal metaphors in nineteenth-century maritime-themed narrative and historical texts from the United States and other countries. Wmatrix 5.0 was used to retrieve candidate animal-related vocabulary, while custom Python scripts using WordNet supported lexical screening and classification. The retrieved items were manually classified into four categories: terrestrial animals, avian species, aquatic animals, and animal body parts. WordSmith Tools 8.0 was then used to examine concordance lines, and the Metaphor Identification Procedure was applied to identify metaphorical uses. The two corpora show similar numbers of distinct animal metaphor expressions and similar raw occurrence counts; these comparisons are descriptive, and no statistical significance test was conducted. At the category level, aquatic animal metaphors were identified only in the non-American corpus, which covers all four animal categories, whereas the American corpus covers three. These findings provide a basis for further research into animal metaphors in maritime discourse. The study offers resources for maritime English terminology instruction and metaphor-awareness training; more broadly, it contributes to understanding how animal imagery shapes specialized vocabulary and figurative expression across maritime writing traditions.

Keywords: animal metaphor, nineteenth-century maritime texts, Maritime English, comparative analysis, semantic analysis

1. Introduction

In the course of history, maritime power has played an important role in the rise of major nations, serving as a symbol of national strength. From Renaissance Italy and the rise of Portugal, Spain, and the Netherlands as maritime powers to the subsequent ascendancy of Britain, France, and the United States, maritime dominance has remained an important source of national strength. Despite the relatively late development of the United States in maritime affairs, it has been described as a “world maritime hegemonic power” (Gao, 2021).

According to Bocanegra-Valle and de la Campa Portela (2012), Maritime English refers to the English used by seafarers at sea and in ports, as well as by those employed in shipping and shipbuilding. Through a comparative study of Maritime English between the United States and other countries, we can gain a more comprehensive understanding of the development and characteristics of Maritime English.

Metaphor is considered a fundamental aspect of human thought, permeating everyday life as a reflection of the essence of human cognition. As Lakoff and Johnson (1980) assert, the essence of metaphor lies in understanding and experiencing one thing through another. Metaphor is also an indispensable linguistic tool capable of conveying complex ideas and cultural associations, making it a powerful and expressive means of communication.

Nineteenth-century maritime-themed narrative and historical texts provide material for examining how animal imagery is used to describe ships, seafaring experiences, and human characteristics. The present corpora include both fictional and non-fictional works, allowing the analysis to encompass specialized maritime terms and context-dependent figurative expressions. Because genre and authorial style may influence metaphor use, comparisons between the corpora are treated as descriptive observations about the selected texts. While existing research has examined metaphor in lexical meaning and conceptualization (Wilkins, 1996; Gaby, 2006; Ziemke et al., 2007; Sharifian et al., 2008), animal metaphors in maritime writing remain relatively underexplored. The present study addresses this gap through a corpus-based comparison of American and non-American nineteenth-century maritime-themed narrative and historical texts.

Animal vocabulary, as a metaphor, plays an essential role in language. This figurative expression not only enriches

vocabulary but also imbues language with vivid imagery, adding an element of liveliness to communication. By referencing the animal kingdom, we can succinctly convey complex thoughts, providing people with intuitive associations for understanding abstract concepts.

Using a corpus-based approach, this study descriptively examines similarities and differences in animal metaphor use in nineteenth-century maritime-themed narrative and historical texts from the United States and other countries. It addresses the following research questions:

1. How frequently do animal-related metaphorical expressions occur in Maritime English, and how can they be categorized?

2. What similarities and differences can be observed in animal metaphor use between the selected American and non-American maritime corpora?

2. Previous Studies

2.1 Animal Metaphors

Fernández Fontecha and Jiménez Catalán (2003) conducted a comparative cognitive analysis of the metaphorical use of "fox/vixen" and "bull/cow" in English, along with their Spanish counterparts "zorro/zorra" and "toro/vaca". The study revealed that these specific animal pairs are metaphorically applied to describe human characteristics in both languages. However, the metaphorical meanings associated with female animal terms generally convey more negative characteristics than those associated with the corresponding male terms.

Talebinejad and Dastjerdi (2005) focused on cross-cultural comparisons of metaphorical language use in English and Persian. Applying the GREAT CHAIN OF BEING metaphor framework, they analyzed various aspects of animal metaphors as perceived by native speakers of both languages. Their examination of 44 animal metaphors uncovered some similarities, but also highlighted culture-specific aspects in the use of these metaphors between English and Persian.

Tipler and Ruscher's study (2019) centered on the analysis of the metaphorical expressions "women-are-predators" and "women-are-prey". Their findings suggested that the persistent use of metaphors that animalize women might contribute to the perpetuation of biased beliefs regarding the appropriate roles of women in society. The study advocates for media communicators to recognize and eliminate the use of animalizing language in their work.

2.2 Maritime Metaphors

Isserlis (2014) conducted a comparative analysis between the self-constructed Maritime Text Corpus and the British National Corpus (BNC). In this comparison, a series of key terms were successfully identified, and the focus centered on the analysis of 61 metaphorical expressions, all beginning with the letter "A". Through this analytical lens, Isserlis explored how these metaphorical expressions, deeply entrenched in Britain's maritime history, serve as reflections of linguistic heritage and cultural significance.

Wu and Cai (2016) employed a dual approach, combining manual selection and expert review in their research. They identified metaphorical expressions within two distinct categories of texts: marine engineering English and maritime legal supervision English. Their study identified similarities and differences in metaphor use between marine engineering English and maritime legal regulation English.

Focusing on WAR metaphors in Maritime English news, Xu et al. (2023a) used Wmatrix to retrieve lexical items associated with the WAR source domain. This approach helped locate potentially metaphorical expressions for subsequent contextual analysis. The study examined how these expressions were used in maritime news.

Xu et al. (2023b) applied self-compiled Python codes to identify metaphors and metonymies in Maritime English. Subsequently, they categorized the research findings according to a standardized classification framework. Their investigation found a widespread presence of conceptual metaphor and metonymy in Maritime English.

In summary, the animal metaphor studies reviewed above have examined cross-linguistic similarities and differences or focused on particular metaphorical expressions. However, animal metaphors in Maritime English have received relatively limited attention. The present study therefore focuses on their use in maritime texts.

3. Data and Methodology

3.1 Data

Two corpora of nineteenth-century maritime-themed narrative and historical texts were compiled for this study: the American Maritime Text Corpus (AMTC), containing 607,526 tokens, and the Non-American Maritime Text Corpus (NAMTC), containing 476,646 tokens. The corpora include both fictional and non-fictional works. The AMTC served as the study corpus, while the NAMTC served as the reference corpus. All texts were downloaded from Project Gutenberg

(https://www.gutenberg.org/). Titles, author information, footnotes, and other supplementary material were removed, leaving only the main text.

3.2 Tools

WordSmith Tools 8.0 is a professional text analysis tool designed to assist users in conducting in-depth studies of language data. Users can utilize this tool for vocabulary analysis to gain a profound understanding of the usage and distribution of vocabulary in the text. Additionally, the co-occurrence analysis function helps users recognize words or phrases that appear together in the text, revealing the associative relationships between them. In this paper, these two functions will be applied.

Python 3.7 is a versatile and widely used high-level programming language, known for its simplicity and readability. It supports multiple programming paradigms and allows the installation of various libraries, such as WordNet. This makes Python a powerful, flexible programming language suitable for various domains.

Wmatrix 5.0 is a corpus analysis tool. Data can be analyzed by uploading text files to https://ucrel.lancs.ac.uk/wmatrix/. Wmatrix 5.0 incorporates the UCREL Semantic Annotation System (USAS) tool, which automatically assigns semantic domain and field codes to the text (Rayson, 2008). The semantic tagsets of USAS are based on the 1981 edition of the Longman Lexicon of Contemporary English and include 21 semantic domains, as illustrated in Figure 1. These domains can be further divided into 453 semantic tagsets.

A general and abstract terms	**B** the body and the individual	**C** arts and crafts	**E** emotion
F food and farming	**G** government and public	**H** architecture, housing and the home	**I** money and commerce in industry
K entertainment, sports and games	**L** life and living things	**M** movement, location, travel and transport	**N** numbers and measurement
O substances, materials, objects and equipment	**P** education	**Q** language and communication	**S** social actions, states and processes
T Time	**W** world and environment	**X** psychological actions, states and processes	**Y** science and technology
Z names and grammar			

Figure 1. 21 Major semantic domains of Wmatrix 5.0 from USAS

3.3 Metaphor Identification Procedures

This paper takes the Metaphor Identification Procedures (MIP) proposed by the Pragglejaz Group as the step of metaphor recognition. The basic steps of MIP are as follows:

1. Read the entire text-discourse to establish a general understanding of the meaning

2. Determine the lexical units in the text-discourse

3. (a) For each lexical unit in the text, establish its meaning in context, that is, how it applies to an entity, relation, or attribute in the situation evoked by the text (contextual meaning). Take into account what comes before and after the lexical unit.

(b) For each lexical unit, determine if it has a more basic contemporary meaning in other contexts than the one in the given context. For our purposes, basic meanings tend to be

-More concrete, what they evoke is easier to imagine, see, hear, feel, smell, and taste.

-Related to bodily action.

-More precise (as opposed to vague).

-Historically older.

Basic meanings are not necessarily the most frequent meanings of the lexical unit.

(c) If the lexical unit has a more basic current contemporary meaning in other contexts than the given context, decide whether the contextual meaning contrasts with the basic meaning but can be understood in comparison with it.

4. If yes, mark the lexical unit as metaphorical.

(Pragglejaz Group, 2007)

The core idea behind MIP is to assess the meaning of a word in a specific context. If, in that context, the word's contextual meaning differs from its usual literal meaning, we can classify the word as a metaphor.

3.4 Locating Metaphors

In general, this study identifies metaphors through three primary steps. Firstly, Wmatrix 5.0 is utilized to identify types associated with the semantic tagset of animals (L2). Secondly, two self-compiled Python codes[1] are employed, which categorize the results from Wmatrix 5.0 into non-animal-related types, animal-related types, and animal structure types. Following this, we manually classified animal-related types into three additional classifications. Lastly, using WordSmith Tools 8.0, we examined concordance lines for each type in animal-related types and animal structure types and, in conjunction with the Metaphor Identification Procedure (MIP), assessed the presence of metaphors. The following provides a detailed exposition of each step.

Step 1: Identification of types associated with the semantic tagset of animals (L2). By individually uploading two corpora to the Wmatrix platform, we obtained two lists (see Figure 2) concerning the semantic tagsets.



Figure 2. Screenshot from the Wmatrix 5.0 interface depicting the semantic tagsets

Due to the research question of this study being related to metaphorical issues concerning animals, we opted for the "USAS Tag only" option within the animal semantic tagset (L2). Consequently, distinct numbers of types related to animals are obtained for AMTC and NAMTC, specifically 205 and 293, respectively (see Figures 3 and 4).

Summary information:

Number of types shown: 205
Total frequency of types shown: 1101 (0.19%)
Total frequency overall: 574532

Number of items shown with a given frequency:

Frequency	Types	Tokens
1	80 (39.02%)	80 (7.27%)
2	40 (19.51%)	80 (7.27%)
3	31 (15.12%)	93 (8.45%)
4	10 (4.88%)	40 (3.63%)
5	11 (5.37%)	55 (5.00%)
6	5 (2.44%)	30 (2.72%)
7	3 (1.46%)	21 (1.91%)
8	3 (1.46%)	24 (2.18%)
9	2 (0.98%)	18 (1.63%)
10	2 (0.98%)	20 (1.82%)
> 10	18 (8.78%)	640 (58.13%)

Figure 3. Summary Information of the L2 Semantic tagset in AMTC.

Summary information:

Number of types shown: 293
Total frequency of types shown: 1866 (0.37%)
Total frequency overall: 498096

Number of items shown with a given frequency

Frequency	Types	Tokens
1	99 (33.79%)	99 (5.31%)
2	62 (21.16%)	124 (6.65%)
3	29 (9.90%)	87 (4.66%)
4	23 (7.85%)	92 (4.93%)
5	9 (3.07%)	45 (2.41%)
6	10 (3.41%)	60 (3.22%)
7	7 (2.39%)	49 (2.63%)
8	3 (1.02%)	24 (1.29%)
9	7 (2.39%)	63 (3.38%)
10	3 (1.02%)	30 (1.61%)
> 10	41 (13.99%)	1193 (63.93%)

Figure 4. Summary Information of the L2 Semantic tagset in NAMTC.

[1] The two Python codes for identifying animal-related and animal structure words are accessible.

Step 2: Classifying the types related to L2 in Wmatrix 5.0 using two self-compiled Python codes, followed by manual verification to get non-animal-related types, animal-related types, and animal structure types.

```python
import nltk
from nltk.corpus import wordnet

nltk.download('wordnet')

def is_animal_noun(word):
    synsets = wordnet.synsets(word, pos=wordnet.NOUN)
    return any('animal' in synset.lexname() for synset in synsets)

def filter_words(input_file, output_animals_file, output_non_animals_file):
    animal_words = set()
    non_animal_words = set()

    # 读取输入文件
    with open(input_file, 'r', encoding='utf-8') as input_file:
        all_words = [line.strip().lower() for line in input_file]

    # 分类词汇为动物和非动物
    for word in all_words:
        if is_animal_noun(word):
            animal_words.add(word)
        else:
            non_animal_words.add(word)

    # 将结果写入两个输出文件
    with open(output_animals_file, 'w', encoding='utf-8') as output_animals:
        output_animals.write('\n'.join(sorted(animal_words)))
```

Figure 5. Partial screenshot of the Python code for retrieving animal vocabulary.

```python
import nltk
from nltk.corpus import wordnet
import pandas as pd
import os

# 下载 WordNet 数据
nltk.download('wordnet')

def is_animal_structure(word):
    # 获取词汇的主同义词集合
    synsets = wordnet.synsets(word)

    # 动物结构的上位词、下位词、同义词列表
    animal_structure_related_words = ["feather", "hair", "hoof", "wing", "scale", "mane", "tail",
                                      "beak", "gill", "claw", "horn", "snout", "skeleton", "abdomi
                                      "skin", "tentacle", "dorsal fin", "tail fin", "mouth", "cara
                                      "plume", "crawl", "leg", "neck", "eye", "ear", "lip", "tooth
                                      "forelimb", "hind limb", "bristles"]

    # 判断词汇是否属于动物结构
    for synset in synsets:
        # 获取前两个含义
        meanings = [lemma.name() for lemma in synset.lemmas()[:1]]

        # 判断是否有词汇在动物结构相关词汇列表中
        if any(meaning in animal_structure_related_words for meaning in meanings):
            return True
```

Figure 6. Partial screenshot of the Python code for retrieving animal structure vocabulary.

Considering the inherent limitations of Wmatrix precision (Sun, 2012), our initial approach involved utilizing the first Python code to filter out types that are specifically relevant to animal-related categories (Figure 5 illustrates a portion of the Python code used for extracting animal vocabulary).

This Python script utilizes the WordNet module in the NLTK library, which encompasses a rich vocabulary database containing various meanings and relationships. The script is designed for the classification of vocabulary. In this script, there are primarily two functions: Firstly, the "is_animal_noun" function employs the "synsets" method from WordNet to obtain noun synsets for the input word. By checking whether 'animal' is included in the "lexname()" of each synset, the function determines if the word is a noun related to animals. Secondly, the "filter_words" function categorizes vocabulary into animals and non-animals by invoking the "is_animal_noun" function. The results are stored in the "animal_words" and "non_animal_words" sets, respectively.

To ensure the accuracy of the Python code, a manual review is conducted on the results obtained through the code. The results are shown in Table 1.

Table 1. Results of finding animal-related types filtered by Python code

	Wmatrix original type number	Python code detected as non-animal types	Python code detected as animal types	Manual review confirmed as non-animal types	Manual review confirmed as animal types
AMTC	205	44	161	45	160
NAMTC	293	56	237	59	234

By comparing the manually retrieved English terms related to animals with the results obtained by Python code, this study demonstrates the excellent efficacy of this approach. Apart from the inclusion of "germ," "webs," and "whiskers" in the NAMTC, as well as "whiskers" in the AMTC, minimal discrepancies were observed. Ultimately, a total of 160 animal-related terms were identified in the AMTC, while 234 were found in the NAMTC. This further validates the effectiveness of the employed technique in extracting animal-related vocabulary from corpora.

Simultaneously, during the review process, it was pleasantly surprising to discover that types related to animals could be further categorized into four specific classes: types associated with terrestrial animals (e.g., cat, dog), aquatic animals (e.g., fish, shell), avian species (e.g., dove, eagle), and structural aspects of animals (e.g., feathers, hoofs). To delve deeper into the distinctions in animal metaphors between the two corpora, we decide to further classify the animal-related vocabulary in Table 1 according to these four categories. Hence, two additional procedures were conducted.

1. Filter out types related to animal body parts. The approach involves using the other self-compiled Python code (Figure 6 shows the partial Python code for obtaining animal structure vocabulary), which includes relevant animal structure types (including their hypernyms, hyponyms, and synonyms). If the uploaded document contains these types, they are classified as animal structure types; otherwise, they are not. To ensure the accuracy of the Python code, a manual review is

conducted on the results obtained through this Python code. The results are shown in Table 2.

Table 2. Results of finding animal structure words filtered by Python code

	Animal-related type number	Python code detected as animal structure vocabulary	Python code detected as non-animal structure vocabulary	Manual review confirmed as non-animal structure vocabulary	Manual review confirmed as animal structure vocabulary
AMTC	160	12	148	147	13
NAMTC	234	15	219	215	19

By comparing the results of animal body parts retrieved by Python code and manual methods, the results of the code are still quite satisfactory. Apart from the fact that the word “bristles” is not classified under animal structure types in AMTC, the four types “bristles,” “paw,” “paws,” and “pelt” are not categorized as animal structure types in NAMTC either. Finally, in AMTC, there are 13 vocabulary items related to animal body parts, and 19 words in NAMTC.

2. Further categorizing the remaining types related to animals into three classifications by manual retrieval: terrestrial animals, aquatic animals, and avian species, after the initial division based on animal structure types. This process will ultimately result in the creation of Table 3.

Table 3. Results of animal types identification through manual retrieval

	Terrestrial animal types	Aquatic animal types	Avian species types	Animal structure types	Total
AMTC	102	27	18	13	160
NAMTC	142	34	39	19	234

Step 3: By examining the concordance lines of each type within the aforementioned four categories and applying the principles of the MIP, we aim to discern the presence of metaphorical expressions.

Taking the type “monkey” as an illustrative example, using WordSmith Tools 8.0, we can observe the concordance lines for “monkey” in the two corpora, depicted in Figures 7 and 8.

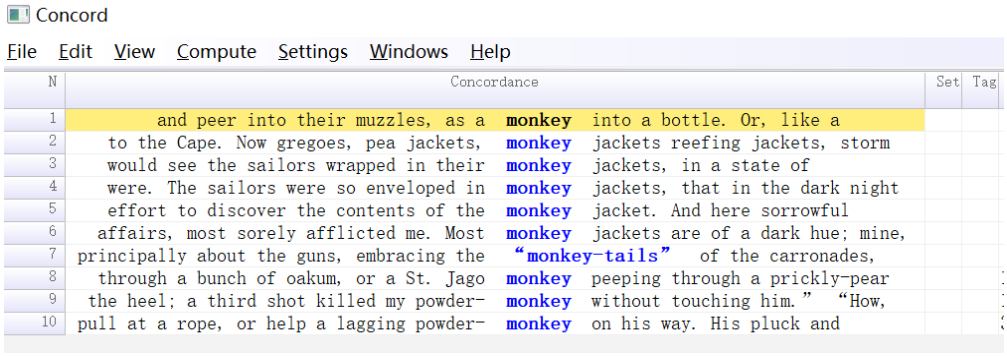


Figure 7. Concordance lines of the type “monkey” in AMTC

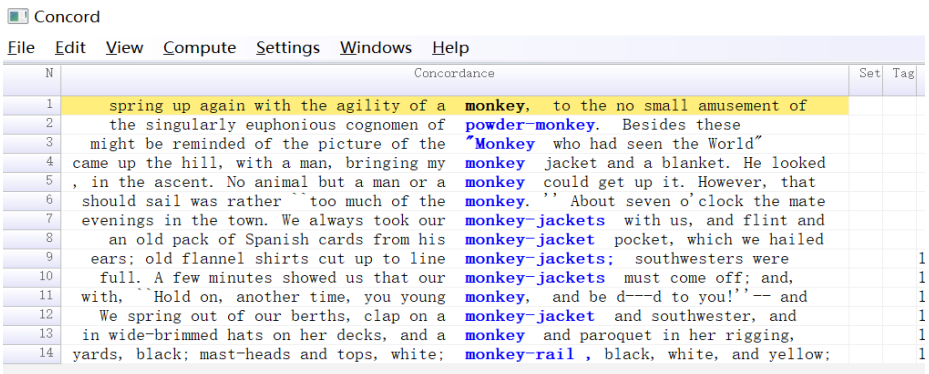


Figure 8. Concordance lines of the type “monkey” in NAMTC

From the analysis of Figures 7 and 8, it is evident that the occurrence of the type "monkey" in AMTC is 10 times, while in NAMTC, it appears 14 times. According to the MIP, when the basic meaning of a word diverges from its contextual meaning in the text, it can be considered metaphorical.

In this context, it is observed that "monkey jacket(s)/monkey-jacket(s)" and "powder-monkey" use "monkey" not in its literal sense of the animal but metaphorically, representing "a short sailor jacket" and "a young assistant responsible for carrying gunpowder" respectively. Thus, within the phrases "monkey jacket(s)/monkey-jacket(s)" and "powder-monkey," the type "monkey" is metaphorically employed.

4. Results and Discussion

4.1 Metaphorical Expressions Related to Terrestrial Animals

Metaphorical expressions related to terrestrial animals in AMTC and NAMTC.

The following examples illustrate terrestrial animal metaphors found in both corpora.

a. The hides, then, were not to go off. The captain came up the hill, with a man, bringing my *monkey jacket* and a blanket. (The Naval History of the United States)

b. The boatswain's mates, whose office it is to flog on board a man of war, stood ready with their dreadful weapon of punishment, the *cat-o'-nine-tails*. (Thirty Years from Home)

c. The engineer monitored the *donkey engine'*s steady hum as it efficiently powered the ship's auxiliary machinery during the overnight voyage. (Sailing Alone Around the World)

d. In the *dog-watches* at sea, during the early part of the evening, the main-deck is generally filled with crowds of pedestrians, promenading up and down past the guns, like people taking the air in Broadway. (White Jacket)

e. Now he would lend a hand at training some gun, now pull at a rope, or help a lagging *powder-monkey* on his way. (The Naval History of the United States)

f. The only shot that touched her hull merely glanced athwart her bows, indenting a plank beneath the *cat-head*. (The Naval War of 1812)

g. For though everything was more than twice as large and heavy, the *cat-block* being as much as a man could lift, and the chain as large as three of the Pilgrim's, yet there was a plenty of room to move about in, more discipline and system, more men, and more good-will. (U.S.S. Cairo: The Story of a Civil War Gunboat)

Table 4. Metaphorical expressions related to terrestrial animals in AMTC and NAMTC

N	Metaphorical expressions	Text meaning	Numbers in AMTC	Numbers in NAMTC
1	**monkey jacket**[2]	a short sailor jacket	5	6
2	**cat-o'-nine-tails**	instrument for punishing sailors	5	4
3	**donkey engine**	a small engine that provides power for ships	4	3
4	**dog-watch**	duty work time	4	2
5	**powder-monkey**	a young assistant responsible for carrying gunpowder	2	1
6	**cat-head**	beam-like structure on a ship	1	9
7	**cat-block**	pulley system on a ship	1	3
Total			22	28

From Table 4, it can be observed that there are a total of 7 metaphorical expressions related to terrestrial animals in both of these corpora, with overall frequencies of 22 and 28 occurrences, respectively. All seven of these metaphorical expressions appear as fixed maritime terms within the text. This suggests that certain metaphorical expressions associated with terrestrial animals have become an integral part of maritime terminology. It is noteworthy that, apart from "powder-monkey," "cat-head," and "cat-block," the frequencies of the remaining expressions are similar across both corpora. "Powder-monkey" appears only once in the reference corpus, while "cat-head" and "cat-block" each appear once in the study corpus. These raw counts illustrate both shared usage and differences in the occurrence of particular metaphorical expressions across the selected American and non-American nineteenth-century maritime-themed narrative

[2] In this paper, maritime terminology in section 4 is highlighted in bold.

and historical texts.

Metaphorical expressions related to terrestrial animals only in AMTC.

h. Lieutenant Cushing arrived here to-day, bringing with him the official report of the particulars attending his destruction of the *rebel ram* Albemarle. (Reminiscences of Two Years in the United States Navy)

i. Three *rams*, first the General Bragg and then the Sterling Price and the Sumter, struck the ironclad, inflicting considerable damage. (U.S.S. Cairo: The Story of a Civil War Gunboat)

j. To call a man a "*horse-marine*," is, among seamen, one of the greatest terms of contempt. (White Jacket)

k. Benjamin Franklin, the American envoy, was the *lion of* French society, and the idol of the Parisian mob. (The Naval History of the United States)

l. And, as the seventeenth century drew near its close, these *pests* of the sea so increased, that evil was sure to befall the peaceful merchantman that put to sea without due preparation for a fight or two with the sea robbers. (The Naval History of the United States)

m. And Captain Broke, as an additional stimulus beyond the emulation excited, gave a pound of tobacco to every man that put a shot through the *bull's eye*. (The Naval War of 1812)

n. Onboard of most men-of-war there is a set of sly, knavish *foxes* among the crew, destitute of every principle of honour, and on a par with Irish informers. (White Jacket)

o. Gaunt of form and grim of face; with their powder-horns slung over their buckskin shirts; carrying their long rifles on their shoulders and their heavy hunting-knives stuck in their belts; with their coon-skin caps and fringed leggings; thus came the *grizzly warriors* of the backwoods, the heroes of the Horse-Shoe Bend, the victors over Spaniard and Indian, eager to pit themselves against the trained regulars of Britain, and to throw down the gage of battle to the world-renowned infantry of the island English. (The Naval War of 1812)

p. We all know what working for *dead horse* means--sailors know too well its significance. (Voyage of The Liberdade)

q. The Americans saw that they had stirred up a *nest of hornets*, and sought safety in flight. (The Naval History of the United States)

Table 5. Metaphorical expressions related to terrestrial animals in AMTC

N	Metaphorical expressions	Text meaning	Numbers in AMTC
1	**rebel ram**	a type of armored ship owned by the Confederate States of America	9
2	**rams**	warships	8
3	**horse marine**	someone unfamiliar with naval affairs	3
4	lion of sth.	core leaders	2
5	**pests**	pirates at sea	2
6	**bull's eye**	circular skylight in the ship's cabin	1
7	fox	cunning, deceitful, and untrustworthy sailors.	1
8	grizzly warriors	strong, brave soldiers	1
9	**dead horse**	upfront payment made before commencing work	1
10	**nest of hornets**	hostile aircraft	1
Total			29

From Table 5, it can be seen that there are a total of 10 different metaphorical expressions in the AMTC corpus, with a total frequency of 29 occurrences. Within the selected corpora, these expressions occur only in the American maritime texts, illustrating patterns specific to this sample. Among them, there are 7 fixed maritime terms, such as "rebel ram" and "horse marine." This indicates that some maritime metaphorical expressions have special meanings and symbolic significance in the history and maritime culture of the United States, and have already formed relatively fixed maritime terms.

Metaphorical expressions related to terrestrial animals only in NAMTC.

r. Well, I was now indebted to the miners of Cooktown for the great privilege of adding a *mite* to a worthy cause, and to

Judge Chester all the town was indebted for a general good time. (Sailing Alone Around the World)

s. The Spray was booming joyously along for home now, making her usual good time, when of a sudden she struck the *horse latitudes*, and her sail flapped limp in a calm. (Sailing Alone Around the World)

t. In their *mosquito fleet* was a ship's boat stolen probably from a murdered crew. (Sailing Alone Around the World)

u. Still, I recognized the fisherman and sailor in the set and rig of the few duds he had on, and the ample *donkey's breakfast* that he wore, and doffed in a seaman-like manner, upon our first salute. (Voyage of The Liberdade)

v. This was done by the hands of a brave fellow named Watson, whose saddened brow told how severely it pained his *lion heart* to do it. (Thirty Years from Home)

Table 6. Metaphorical expressions related to terrestrial animals in NAMTC

N	Metaphorical expressions	Text meaning	Numbers in NAMTC
1	mite	small contribution	2
2	**horse latitude**	the unsettled wind zone near the equator	1
3	**mosquito fleet**	a fleet of small boats	1
4	donkey's breakfast	straw hat	1
5	lion heart	bravery and inner strength	1
Total			6

From Table 6, it can be observed that these five expressions have low raw occurrence counts in the selected non-American maritime texts. Among their six occurrences, only two involve fixed maritime terms.

Summary

Table 7. Overview of metaphorical expressions related to terrestrial animals

N	Metaphorical expressions	Text meaning	Numbers in AMTC	Numbers in NAMTC
1	**monkey jacket**	a short sailor jacket	5	6
2	**cat-o'-nine-tails**	instrument for punishing sailors	5	4
3	**donkey engine**	a small engine that provides power for ships	4	3
4	**dog-watch**	duty work time	4	2
5	**powder-monkey**	a young assistant responsible for carrying gunpowder	2	1
6	**cat-head**	beam-like structure on a ship	1	9
7	**cat-block**	pulley system on a ship	1	3
8	**rebel ram**	a type of armored ship owned by the Confederate States of America	9	0
9	**rams**	warships	8	0
10	**horse marine**	someone unfamiliar with naval affairs	3	0
11	lion of sth.	core leaders	2	0
12	**pests**	pirates at sea	2	0
13	**bull's eye**	circular skylight in the ship's cabin	1	0
14	fox	cunning, deceitful, and untrustworthy sailors	1	0
15	grizzly warriors	strong, brave soldiers	1	0
16	**dead horse**	upfront payment made before commencing work	1	0
17	**nest of hornets**	hostile aircraft	1	0
18	mite	small contribution	0	2
19	**horse latitude**	the unsettled wind zone near the equator	0	1
20	**mosquito fleet**	a fleet of small boats	0	1
21	donkey's breakfast	straw hat	0	1
22	lion heart	bravery and inner strength	0	1
Total			51	34

Through a meticulous examination of Table 7, it becomes evident that both corpora contain a plethora of metaphorical expressions related to terrestrial animals. Among these expressions, we identified a total of 22 distinct forms, with 17 found in AMTC and 12 in NAMTC. There are 7 expressions that are common to both corpora.

A closer analysis of these 22 metaphorical expressions reveals that only 6 are unrelated to maritime terminology. This

implies that in the domain of Maritime English, metaphorical expressions associated with terrestrial animals often intertwine with maritime jargon. Among the 6 expressions unrelated to technical terms, only "donkey's breakfast" is detached from character traits, while the remaining 5 expressions are intricately linked to portraying human characteristics.

The rationale behind this phenomenon lies in the relatively limited understanding of the maritime domain compared to the land. Hence, in Maritime English, when discussing features of vessels that may evoke associations with terrestrial animals, specialized terms related to land animals emerge within maritime terminology. This practice aids maritime professionals or readers in gaining a deeper understanding of the content while enhancing the vividness and imagery of expressions. Additionally, animals often carry rich symbolism and characteristics in culture, and applying these features to character descriptions vividly conveys the unique personality traits of individuals.

4.2 Metaphorical Expressions Related to Avian Species

The following sentences about metaphorical expressions related to avian species are as follows.

a. Just so we laid; heel and point, face to back, *dove-tailed* into each other at every ham and knee. (White Jacket)

b. Answer my question, or I'll make a *spread eagle* of you! (Voyage of The Liberdade)

c. The distance run was twenty-seven hundred miles as the *crow flies*. (Sailing Alone Around the World)

d. When the lookout cried, "Porpoises gone," we turned the bark's head off-shore, backed the main-tops'l, and sent out the *pigeon*. (Voyage of The Liberdade)

Table 8. Overview of metaphorical expressions related to avian species

N	Metaphorical expressions	Text meaning	Numbers in AMTC	Numbers in NAMTC
1	dove-tailed	people fitting closely to each other	2	0
2	spread eagle	limbs stretched out	0	2
3	**crow flies**	direct distance	0	1
4	**pigeon**	lead weight for water depth measurement	0	1
Total			2	4

Through a thorough analysis of Table 8, we observe that there are only four metaphorical expressions related to avian species in the whole study, and their usage frequency is relatively low. It is noteworthy that these four expressions do not coexist in the two corpora, indicating that avian metaphors have not yet gained widespread traction in Maritime English.

In the AMTC, one distinct avian metaphorical expression was identified, occurring twice, indicating limited representation of this category in the selected American maritime texts. However, what deserves attention is that, out of these four metaphorical expressions, two are still related to nautical terms. This indicates a tendency for people to employ familiar birds, such as crows and pigeons, to explain relatively complex or abstract maritime concepts. This perhaps reflects the use of specialized terminology, as using familiar birds for metaphors aids in conveying specific maritime concepts more clearly and making them easier to comprehend.

4.3 Metaphorical Expressions Related to Aquatic Animals

The sentence on metaphorical expressions related to aquatic animals is as follows.

a. But little by little the squaresail on the boom expanded to the dimensions of a serviceable mainsail with a peak to it and a *leech* besides. (Sailing Alone Around the World)

In this sentence, "leech" refers to the edge of a sail, typically located on the side farthest from the mast, rather than conveying its basic meaning as a blood-sucking leech. Therefore, it can be considered a metaphor. The metaphorical use of "leech" occurs three times in the NAMTC but was not identified in the AMTC. This indicates that the use of aquatic animals as metaphorical expressions in Maritime English is exceedingly rare.

The scarcity of aquatic animals as metaphorical expressions can be attributed to clear reasons. Maritime English texts frequently feature intricate depictions of the marine environment, including aquatic flora and fauna, given their direct relevance to maritime and oceanic topics. In such contexts, employing aquatic animals as metaphors could introduce ambiguity, as readers or professionals may interpret these descriptions literally, rather than as intended abstract concepts conveyed through the metaphors. Therefore, despite the rich symbolic meanings and metaphorical potential inherent in aquatic animals, their near absence as metaphors in Maritime English is notable.

4.4 Metaphorical Expressions Related to Animal Body Parts

In this section, there are three distinct metaphors related to animal body parts, as illustrated by the following sentences.

a. Toward sundown the ocean pawed its white *hoofs* to the spur of its helter-skelter rider, a strong blast from the Eastward, and, giving three cheers from decks, yards, and tops, we crowded all sail on St. George and St. Denis. (White Jacket)

b. Again, she was in a furious surf on the beach, and her *shell* sank, and she was buried in the waves; (The Phantom Ship)

c. This was his defensive frontier; the western, the offensive *wing* of his campaign. (Sea Power in its Relations to the War of 1812)

Table 9. Overview of metaphorical expressions related to animal body parts

N	Metaphors	Text meaning	Numbers in AMTC	Numbers in NAMTC
1	hoofs	waves of the sea	0	1
2	**shell**	the front half of the ship	2	13
3	wing	strategic layout or front in war	1	0
Total			3	14

From Table 9, it can be observed that "shell" can be considered a specialized maritime term used to describe a part of the ship's structure, and it is commonly used both in America and elsewhere. On the other hand, the remaining two expressions carry metaphorical meanings only in specific contexts.

4.5 Summary

The AMTC contains 20 distinct animal metaphor expressions with 56 occurrences, while the NAMTC contains 18 distinct expressions with 55 occurrences. The numbers of distinct expressions and raw occurrence counts are therefore similar in the two selected corpora. This is a descriptive observation; no statistical significance test was conducted, and the raw counts do not account for the difference in corpus size.

Upon closer examination, the analysis of four categories of metaphorical expressions reveals that AMTC does not include metaphors related to aquatic animals. Specifically, in AMTC, there are 17 types of metaphors related to terrestrial animals with a frequency of 51 occurrences; only 1 type related to birds occurring twice; and 2 types related to animal body parts with 3 occurrences. In NAMTC, there are 12 types of metaphors related to terrestrial animals with a frequency of 34 occurrences; 3 types related to avian species with 4 occurrences; 1 type related to aquatic animals with 3 occurrences; and 2 types related to animal body parts with 14 occurrences. The NAMTC covers all four animal categories, whereas the AMTC covers three; however, the AMTC contains more distinct metaphorical expressions overall.

5. Conclusion

This study examines animal-related metaphorical expressions through a descriptive comparison of nineteenth-century maritime-themed narrative and historical texts from the United States and other countries. Specifically, we utilized various technological tools, including Wmatrix 5.0 and Python code, etc., to identify animal vocabulary. Through manual inspection, we classified these words into four categories: terrestrial animal vocabulary, vocabulary related to avian species, aquatic animal vocabulary, and vocabulary related to animal body parts. Subsequently, following the Metaphor Identification Procedure, we identified sentences containing animal metaphorical expressions and analyzed the identified expressions and grouped them into four kinds of metaphors. The two corpora contain similar numbers of distinct animal metaphor expressions and similar raw occurrence counts: 20 expressions with 56 occurrences in the AMTC and 18 expressions with 55 occurrences in the NAMTC. These comparisons are descriptive, and no statistical significance test was conducted. At the category level, aquatic animal metaphors were identified only in the NAMTC. Avian metaphors and animal-body-part metaphors also have lower raw occurrence counts in the AMTC than in the NAMTC.

Analyzing the reasons behind this, we attribute it to the influences of geography and culture and language dissemination. The United States is a vast country. Across this extensive land, a relatively diverse array of terrestrial animals exists. This may manifest in American texts with a greater prevalence of metaphors related to terrestrial animals. In non-American texts, the inclusion of cultural elements from different countries and regions leads to a more varied spectrum of metaphors, so they are not solely concentrated on those related to terrestrial animals. From the standpoint of language dissemination, non-American texts may more readily incorporate linguistic expressions from diverse regions, contributing to a more balanced distribution of metaphor types. This reflects the international nature of Maritime English, which finds widespread use across different territories and cultures.

Through this study, we have provided an effective method for identifying vocabulary in the L2 semantic domain and established a solid foundation for the classification and discussion of animal metaphors in Maritime English. These findings hold implications for future metaphorical research and the teaching of Maritime English.

This study has several limitations. In the classification of animals, terrestrial animals encompassed insects (such as wasps, flies, etc.), mammals (like cats, dogs, etc.), and reptiles (such as lizards, chameleons). Further subdivision could have been explored to investigate the more subtle similarities and differences in animal metaphor expressions. However, such detailed classification was not conducted in this paper due to the overall limited quantity of animal-related vocabulary. The corpora include both fictional and non-fictional maritime texts, and differences in genre composition and authorial style may contribute to the observed patterns. The findings are descriptive and limited to the selected texts; future research could use larger corpora balanced for size and genre, compare normalized frequencies, and apply appropriate statistical tests.

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Author contributions

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