

# Metaphorical Vocabulary in English as a Medium of Instruction Courses

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## Reference Data

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English as a Medium of Instruction (EMI) programs are growing in popularity in Japanese universities. Accordingly, there is a need to examine the linguistic demands of EMI instruction. The value of lexical knowledge is well known, but there is also growing recognition of the importance of metaphor in expressing abstract concepts in academic disciplines. Lack of metaphor awareness is known to affect learner comprehension, but no systematic studies of metaphor in Japanese university EMI courses have yet been conducted. This study used a two-million-word corpus of EMI course materials to identify common metaphors used to describe key concepts in applied linguistics, literature, philosophy, and political science. The findings confirm that metaphor is frequently used in EMI instruction. Results suggest that in applied linguistics, philosophy, and political science 10 to 25% of metaphor use can be accounted for by 9 to 12 conceptual metaphors, while literature appears to draw on a wider range of source terms.

日本の大学では、英語による専門教育(EMI)プログラムの人気が高まっている。したがって、EMIの言語的要求を検討する必要がある。語彙知識の重要性はよく知られていますが、学問分野で抽象的な概念を表現する際の比喩の重要性についての認識も高まりつつある。比喩の認識の欠如は学習者の理解に影響を与えるが、日本の大学のEMIコースにおいて比喩の体系的な研究はまだ行われていない。本研究では、200万語のEMIコース資料のコーパスを使用して、応用言語学、文学、哲学、政治学の主要な概念を説明するために使用される一般的な比喩を特定した。調査結果は、比喩がEMIコースで頻繁に使用されることを確認し、応用言語学、哲学、および政治学では、比喩の使用の10~25%が9~12の概念比喩によって説明できるのに対し、文学はより広い範囲の用語の利用を示唆している。

In EMI programs, content knowledge is delivered in English to L2 students. The last 30 years have seen a rapid increase in the number of universities offering these courses (Dearden, 2014). In Japan, MEXT (2017) has reported that the number of programs has doubled since 2000, and EMI is now offered in over 40% of tertiary institutions.

As a relatively recent teaching method, EMI is still developing a research base to guide practitioners towards best practices (Chapple, 2015). In a broad-scale review of EMI in higher education, Macaro et al. (2018) detailed commonly held views of the benefits and challenges of EMI instruction. The positive views they identified were that EMI is beneficial to the internationalization of universities and that it helps to develop progressive outlooks in students while enhancing their career prospects. Regarding challenges, they noted that concerns have been raised over limited language proficiencies affecting students' ability to fully participate in class.

While vocabulary size is commonly cited as a major concern for language development (Coxhead & Boutorwick, 2018; Hellekjær, 2009; Henriksen & Danelund, 2015; Webb & Chang, 2012), there is also interest in how learners deal with metaphor in academic contexts (Boers, 2004; Littlemore et al., 2011). With this issue in mind, the present study is a preliminary step in a project with the ultimate goal of developing materials to help students understand the use of metaphorical vocabulary in EMI programs. Before material development can take place, it is necessary to identify frequent metaphors in a range of disciplines, which will be the focus of this paper.

## Addressing the Challenges of EMI

Students face a variety of challenges in EMI courses, but vocabulary deficits are commonly cited as a major concern. The Japanese university students interviewed in Uchihara and Harada (2018) reported difficulties in speaking, listening, reading, and writing due to a perceived lack of vocabulary. This is unsurprising, as lexical knowledge is known to be a strong predictor of performance across the four skills (Koizumi & In'nami,

2013; Stæhr, 2008). Similarly, studies by Lin and Morrison (2010) and Pessoa et al. (2014) found that limited vocabularies interfered with students' ability to comprehend aural and written input and to express themselves clearly in EMI settings.

To address this problem, wordlists of high-frequency, academic, or technical vocabulary can be used to highlight words that will be useful for students in EMI courses. Learners who master wordlists such as the New General Service List and New Academic Word List (Browne et al., 2013a; 2013b) might expect to recognize around 90% of the words in EMI materials (Brown et al., 2019). Likewise, Nation (2013) notes that lists of discipline-specific technical terms can be valuable aids for learners.

However, wordlists alone may not deal with all of the lexical challenges of EMI. Studies by Durrant (2014) along with Hyland and Tse (2007) have found considerable differences in the behaviour of lexical items across disciplines that are not reflected in general purpose wordlists. One important issue that these studies raise is that of monosemic bias. Apart from clearly unrelated homographs, no attempt is made in wordlist development to account for the different meanings lexical items may possess, and learners are assumed to be able to differentiate between related word senses.

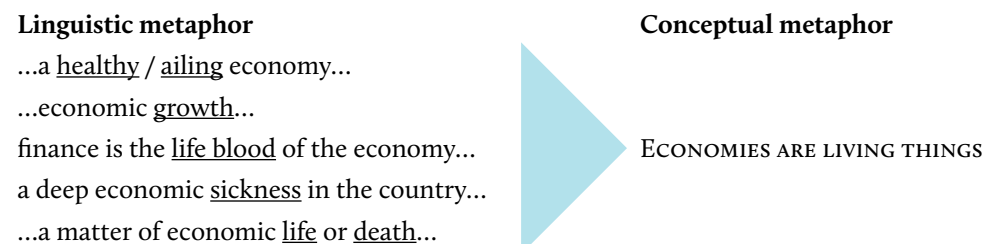
In fact, there is potential for misunderstanding even when learners are aware of a word's meaning, as revealed in Littlemore's (2001; 2003) investigations into lecture comprehension by Bangladeshi students in UK universities. She found that these students frequently confused key issues in lectures owing to their misinterpretations of known words being used metaphorically. For example, when asked to interpret a lecturer's statement that civil servants should *attack* their jobs (meaning they should bring energy and enthusiasm to their roles), some students were unsure whether *attack* had a positive or negative connotation and understood this to mean either improving or reinventing the jobs.

Metaphor has been found to occur frequently in both spoken and written academic input. Low et al. (2008) found that 10 to 13% of words appearing in university lectures were metaphorical, and Herrmann (2013) found that 18.5% of lexical items in a sample of written academic discourse were used metaphorically. How metaphor use in EMI settings compares to these cases is as yet unknown. Since these courses deal with abstract concepts and cognitively demanding content, metaphor may well play just as important a role as that found in other studies. However, there is the possibility that language control in texts or speech aimed at L2 English speakers will lead to different rates of metaphor use.

Conceptual Metaphor Theory (Lakoff & Johnson, 1980) holds that metaphorical thinking underlies much human thought about abstract concepts, such as time, politics,

or human relationships. Lakoff and Johnson argued that recurrent metaphorical patterns are evidence of how humans conceptualize our world by understanding abstract states in terms of concrete entities. In Figure 1, the examples on the left are drawn from the Corpus of Contemporary American English. Each contains a metaphor drawn from the source domain of health and being applied to the target domain of economies. These examples are taken as evidence of an underlying conceptual metaphor (CM), ECONOMIES ARE LIVING THINGS<sup>1</sup>. CMs can therefore be seen as general categories of thought that are exemplified by linguistic metaphors.

**Figure 1**  
*Linguistic and Conceptual Metaphors*



Given that metaphor is an important device for expressing cognitively challenging abstract notions, it follows that students in EMI courses may benefit from instruction on common CMs in their own fields. This approach may be a useful complement to wordlist-based methods for vocabulary development.

### Current Study

The goal of this study is to identify common patterns of metaphor use in EMI course materials for four disciplines. Since the frequency of a language feature is a useful gauge of its value for learners (Ellis, 2002; Nation 2013), it should first be confirmed that metaphor use is comparable to that of non-EMI academic discourse. Then it will be useful to identify groups of CMs that appear frequently in the discourse of a given field. Another question to resolve is whether individual disciplines exhibit their own unique patterns of metaphor use or whether commonalities exist across disciplines. In the former case, learners would be better served by instruction tailored to their own field, while in the latter, instruction might be provided for metaphorical language across a range of disciplines.

This study uses a corpus of spoken and written EMI materials from Japanese universities. The paper discusses the initial steps that have been taken to identify prominent CMs in the selected four disciplines. The research questions (RQs) guiding the study were as follows:

- RQ1 Do materials used in EMI courses contain a similar proportion of metaphorical vocabulary to that found in previous studies?
- RQ2 For individual disciplines, can groups of CMs be identified that account for a substantial proportion of metaphor use?
- RQ3 Do individual disciplines make use of distinct sets of CMs, or is there similarity in metaphor usage across disciplines?

## Methodology

### Corpus Construction

The EMI corpus used in this study is an expansion of the one compiled by Brown et al. (2019) (Table 1). Corpus materials are a convenience sample of course readings (both adapted for English learners and unadapted; i.e., written for an L1 English audience), and the present corpus includes lecture transcripts to add a proportion of spoken data. All materials were cleaned of information that identified private individuals or institutions. This paper will deal with an analysis of the data from four disciplines, as shown in Table 2.

**Table 1**  
*Corpus Comparison*

	Brown et al. (2019)	Current EMI corpus
Tokens (approx.)	500,000	2,000,000
Media	Written (100%)	Written (84%) & spoken (16%)
Modification (written only)	Adapted (17%) & unadapted (83%)	Adapted (13%) & unadapted (87%)
Disciplines	3	15
Institutions	2	5

**Table 2**  
*Subset of the EMI Corpus Used in the Present Study*

Disciplinary subcorpus	Tokens in EMI corpus
Applied Linguistics	470,736
Literature	193,503
Philosophy	171,872
Political Science	375,158

Corpus data were marked up with semantic tags using the Wmatrix program (Rayson, 2008). Like POS tags, semantic tags appear bound to the end of each corpus token, but each tag classifies words into broad conceptual domains, then more specific concepts. For example, words such as *deep* and *widen* can receive the *\_N3.7* tag, which refers to length and height, while the tag *\_N3.5* refers to weight and can be applied to words like *heavy* or *pressure* (Table 3).

**Table 3**  
*Example Semantic Tags*

Tag	Referent
<i>_A1.1.1</i>	General actions, making, etc.
<i>_H1</i>	Architecture, kinds of houses & buildings
<i>_L1</i>	Life and living things
<i>_N3.5</i>	Measurement: Weight
<i>_N3.7</i>	Measurement: Length & height

## Data Analysis

Two techniques were used to identify metaphors in the corpus. The first was the Metaphor Identification Procedure Vrije Universiteit (MIPVU) (Steen et al., 2010). In this procedure, every word or phrase in a text is considered individually, and a series of steps are followed to determine whether metaphor is present. First, the contextual meaning of the word is considered and matched to a sense in the Macmillan Dictionary. The next step is to determine whether a more basic sense exists. Senses that are more

human oriented or concrete are treated as more basic. If these two senses are given separate numbered entries in the dictionary, they are treated as being sufficiently distinct to contain a possible metaphorical mapping. We then consider whether the contextual meaning can be understood by comparison with the basic sense of the word, and if so, whether this comparison involves a crossing from one domain to another. If this is the case, then the word is coded as a metaphor-related word (MRW). A worked example of the analysis for the word *approach* is provided in Table 4.

**Table 4**  
*Steps and Outcomes in MIPVU Coding for the Word Approach*

MIPVU step	Outcome
Context	"...content and language integrated learning, an <u>approach</u> to language teaching which is growing in popularity..."
Contextual meaning	Dictionary sense 1: a particular way of thinking about or dealing with something
Basic sense	Dictionary sense 2: the fact of coming closer in time or distance
Understood by comparison?	Yes. Efforts to teach languages can be compared with movement, and language acquisition can be seen as the destination.
Coding	MRW

For the MIPVU analysis, 50,000-word random samples were taken from each of the four disciplines and coded as described above. The samples included data from every text for that discipline in the corpus and were weighted proportionally to reflect the size of each source text. The MIPVU analysis provided the total number of metaphors in each sample, which was used to calculate the proportion of metaphorical words and allow for comparison with previous studies. Since this study is concerned with vocabulary knowledge, the metaphor counts were subdivided into open-class parts of speech (nouns, verbs, adjectives, and adverbs) and closed-class forms (e.g., prepositions), with open-class metaphors treated as lexical forms. This analysis provided a thorough account of metaphor use within each sample, but the time-consuming nature of the procedure (11 months of coding) means that it cannot be applied to entire corpora.

The second technique drew on the semantic tags. First, a keyword analysis was used to identify prominent concepts in each discipline. In corpus linguistics, a keyword is a word

that appears more often than would be expected by chance in a particular corpus. By comparing, for example, the applied linguistics subcorpus with the combined subcorpora from other disciplines, keywords that are important in discussing language and learning could be identified. For each discipline, the 10 nonmetaphorical nouns with the highest log-likelihood values from the keyword analysis were taken as prominent disciplinary concepts (Table 5).

**Table 5**  
*Keywords in each Discipline*

	Applied Linguistics	Literature	Philosophy	Political Science
1.	language	life	argument	government
2.	word	reader	reason	policy
3.	speaker	character	mind	politics
4.	speech	story	belief	institution
5.	grammar	love	knowledge	party
6.	verb	desire	experience	economy
7.	learning	novel	existence	market
8.	vocabulary	poem	truth	trade
9.	teaching	narrative	moral	election
10.	teacher	narrator	god	democracy

Next, metaphors used in discussing these concepts were identified. Lists of all collocates within four spaces on either side of each keyword were created using AntConc (Anthony, 2020). Potentially metaphorical collocates were noted in each list, and then these were coded for metaphoricality by inspecting concordance lines and applying MIPVU. The semantic tags for metaphorical collocates were then added to each list, and frequently occurring tags appearing among the collocates could be identified. For example, in the philosophy subcorpus, the keywords *argument* and *belief* had several metaphorical collocates with semantic tags related to making or building, suggesting that logical reasoning and the development of opinions may be compared with constructing an object. A search of the philosophy subcorpus for words with the same semantic tags then revealed other lexical items that could be grouped into the same CM.

Metaphorical collocates were grouped into CMs using semantic tags and dictionary entries. If two metaphors shared a semantic tag, this was taken as evidence of referring to a similar concept. If words did not share the same tag, but were defined in the dictionary using the same words, they were also grouped into the same CM. For example, in the CM IDEAS ARE CONSTRUCTED OBJECTS, the word *structure* received an \_H1 tag, referring to architecture and buildings, while the word *framework* had an \_X4.2 tag, referring to mental objects. However, one definition of *framework* in the Macmillan dictionary uses the word *structure*, so these words were placed into the same CM.

The final step was to estimate the frequency of each CM in the subcorpus for each discipline. Accordingly, samples of concordance lines were taken of the metaphorical collocates. Up to 100 concordance lines were checked for each collocate and coded with MIPVU. Therefore, the total frequency of each linguistic metaphor could be estimated. The frequency of a CM was obtained by summing the frequencies of each linguistic metaphor it contained.

## Results and Discussion

### Research Question 1

The first RQ was to establish whether EMI course materials contained a similar proportion of MRWs to that found in other studies. In the MIPVU coding, the four subcorpora contained 13 to 17% of open-class words coded as metaphors (Table 6). These figures are similar to other findings on metaphor use in academic discourse. EMI students in one of these fields can expect to encounter an open-class MRW roughly once every 10 to 13 words, or perhaps once or twice every sentence.

**Table 6**  
*Percentage of Metaphor-Related Words in the Four Disciplines*

Disciplinary subcorpus	% open-class tokens that are MRWs	Open-class MRWs encountered once every... words
Applied Linguistics	16.69%	9.82
Literature	13.94%	12.50
Philosophy	13.34%	12.86
Political Science	16.21%	10.13

### Research Question 2

For the second RQ, semantic tags were used to group linguistic metaphors into CMs. In the four disciplines, between 9 and 12 CMs were identified. The entire data set cannot be displayed here, but the five most frequent CMs for each discipline and example linguistic metaphors that realise them are presented below (Tables 7 to 10).

In applied linguistics, language can be described as a construction. This is often the case when syntax or discourse elements are discussed. When acquisition or interaction is the topic, language is seen more as a physical object: something that can be possessed or that can exert a force on others. When relationships between linguistic elements or skill development are the focus, language can be compared to a living entity, capable of change. Teaching and learning, meanwhile, are viewed as goal-oriented processes, which explains the presence of directed-movement metaphors. Finally, the complexity of linguistic knowledge probably explains the use of machine-operating metaphors.

**Table 7**  
*Conceptual Metaphors in Applied Linguistics*

Conceptual metaphor	Example linguistic metaphors
LANGUAGE IS A CONSTRUCTION	assemble, build, broken, foundation, framework, reconstruct, scaffolding, structure
LANGUAGE IS A PHYSICAL OBJECT	absorb, borrow, cluster, compound, contact, grasp, impact, possess, retrieve, string
LANGUAGE IS A LIVING ENTITY	blossom, family, growth, related, root, stem
LANGUAGE TEACHING & LEARNING IS DIRECTED MOVEMENT	approach, direct, follow, lead, map, movement, path, progress, target
LANGUAGE USE IS OPERATING A MACHINE	breakdown, control, device, fine tune, input, switching

In literature, characters in novels are often taken on literal or metaphorical journeys, during which a truth or conclusion is revealed to them. Thus, the two most frequent CMs in this discipline relate seeing to knowing and plot developments to movement. As with applied linguistics, we also see physical terms used as metaphor, but here, it is the properties of concrete objects that are most commonly used to describe features of the narrative. The role of writers in portraying a fictional world and their degree of success in

conveying that world to readers is frequently expressed using terms of giving and taking. Again, the language of living things appears, being used in metaphors to depict the development of plot features and to relate texts to their influences.

**Table 8**  
*Conceptual Metaphors in Literature*

Conceptual metaphor	Example linguistic metaphors
KNOWN IS SEEN, UNKNOWN IS UNSEEN	blind, hide, look, reflect, see, trace, unfold, view
PLOT DEVELOPMENTS ARE MOVEMENT	arrive, avoid, emerge, explore, follow, pursuit, return
NARRATIVE IS A PHYSICAL PROPERTY	break, core, hard, heavy, link, pure, strong
ACCEPTANCE & UNDERSTANDING IS GIVING & TAKING	accept, adopt, capture, give, grasp, obtain, supply
LITERATURE IS A LIVING ENTITY	bud, cultivate, evolve, gestate, grow, root

Philosophical discourse often involves consideration of arguments and whether or not they are accepted. This explains the use of construction metaphors to portray argument formulation and the language of acceptance and rejection to express agreement or opposition. Philosophy is also seen as the pursuit of truth, so again we have movement terms being used to express this goal-oriented behaviour. Similarly, that which we can see is something we can know, while things that are hidden to us remain unknown. Lastly, the tension between competing ideas in philosophy leads to frequent use of metaphors of aggression.

**Table 9**  
*Conceptual Metaphors in Philosophy*

Conceptual metaphor	Example linguistic metaphors
IDEAS ARE CONSTRUCTED OBJECTS	architect, blueprint, bridge, construct, fabricate, framework, pillar, reconstruct
ACCEPTANCE & UNDERSTANDING IS GIVING & TAKING	accept, adopt, dispose, grip, hold, inherit, offer, possess, provide, retain, withhold
ACQUIRING KNOWLEDGE IS PURPOSEFUL MOVEMENT	approach, arise, avoid, come into, follow, lead, leave, reach, step
KNOWN IS SEEN, UNKNOWN IS UNSEEN	bury, conceal, display, exhibit, find, obscure, reflect, reveal, see, uncover, veiled, witness
DEBATE IS AGGRESSIVE BEHAVIOUR	argue, attack, challenge, clash, defence, deploy, fight, grapple, hostile, struggle

As a study of power, political science concerns itself with the interactions between competing ideologies and institutions. It is unsurprising then to find metaphorical expressions related to force and size. Force metaphors are used to express interactions between political entities, while size is often equated to power. Once again, we find metaphors of construction emphasizing the complexity of political creations and movement metaphors reflecting both goal-oriented actions and general change. One CM not present in the other disciplines highlights the performative nature of political life, with politicians' actions compared to those of stage actors.

**Table 10**  
*Conceptual Metaphors in Political Science*

Conceptual metaphor	Example linguistic metaphors
POLITICAL INTERACTION IS PHYSICAL FORCE	bind, boost, burden, containment, destabilize, drive, erode, force, impact, restrain, shape
POLITICAL POWER IS SIZE	capacity, expansion, growth, large, scale, small, sphere
POLITICAL ENTITIES ARE CONSTRUCTIONS	architect, construct, engineer, fortify, foundation, machinery, support
POLITICAL CHANGE IS MOVEMENT	access, approach, direction, emerge, enter, progress, pursue, shift
POLITICS IS PERFORMANCE	actor, drama, dramatic, masquerade, perform, player, prompt, role, stage

By identifying key concepts in each discipline and linguistic metaphors used to express them, the frequency of CMs in EMI courses could be estimated. Table 11 shows the number of CMs identified in each subcorpus, the estimated percentage of all open-class MRWs belonging to one of the identified CMs, and the estimated frequency with which students might encounter such metaphors. There is considerable variation in the proportion of total metaphor provided by these CMs. In applied linguistics, 12 CMs account for almost a quarter of the estimated number of open-class MRWs in the entire subcorpus, and learners might encounter one such expression roughly every 40 words, or perhaps every other sentence. Conversely, the 11 CMs found in the literature data account for less than 2% of the estimated number of metaphors in the subcorpus, suggesting a much wider range of source terms being drawn on for metaphorical expression.

**Table 11**  
*Frequency of Conceptual Metaphors in each Discipline*

Disciplinary subcorpus	Conceptual Metaphors	Estimated % of open-class MRWs in CMs	Metaphors encountered once every ... words
Applied linguistics	12	24.41%	40.36
Literature	11	1.91%	657.83
Philosophy	11	10.29%	125.30
Political science	9	19.64%	51.68

### Research Question 3

Regarding the third RQ on the overlap between CMs across disciplines, the picture appears mixed. Some source domains (movement, construction, and physical objects) appear in most disciplines. However, there is also evidence for distinct metaphor usage. Both political science and applied linguistics were found to contain CMs not present in the other fields, while even in cases where a CM appeared in several fields, the actual linguistic realizations sometimes differed. For example, metaphors related to construction were found in three of the fields, but while philosophy and political science made use of the words *architect* and *engineer* in this CM, these terms did not appear in the applied linguistics subcorpus.

### Conclusion

This study investigated metaphor use in EMI course materials for four disciplines. The results generally support the argument that metaphor is a feature of academic discourse worthy of L2 classroom attention. For applied linguistics, philosophy, and political science, the identified CMs represented 10 to 25% of all open-class metaphorical words. For literature, the identified CMs covered a much smaller proportion of all metaphor use, and it is possible that in this discipline, a broader range of source terms is used.

The findings suggest that commonalities in metaphorical patterns could allow for metaphor to be taught in cross-disciplinary settings. The results indicate that certain concepts, including physical objects, seeing and hiding, movement, construction, giving and taking, and living things are commonly used as source domains for metaphors in

different disciplines. It should also be acknowledged, however, that the prominence of each concept is likely to differ across disciplines.

Another allowance that would have to be made in cross-disciplinary metaphor instruction is for variations in target domains. While movement metaphors in applied linguistics and philosophy can be seen as applying to the acquisition of knowledge, literature tends to employ the same metaphors to describe plot developments, while in political science they refer to the process of change. Finally, there may also be variation in the specific linguistic forms used to realise a given CM. For example, use of the words *architect* and *engineer* in philosophy and political science and their apparent avoidance in applied linguistics may reflect a more agentive role for participants in the former fields, while the role of language learners is seen as assembling a prefabricated construction rather than being an act of creativity.

The findings of this study reveal common metaphorical patterns that would be useful for EMI course learners. As with all corpus studies, however, greater corpus size would allow for more detailed analysis. To strengthen the claim that the data are representative of EMI instruction, it would also be of great benefit to expand the corpus with materials from beyond the present five institutions. Over time, the corpus can hopefully be expanded to represent more academic disciplines and institutions, and to include a greater proportion of spoken data.

Further steps in this project will address the specific lexical choices that exemplify CMs in each discipline. The process of CM identification will also be expanded to examine metaphorical collocates of verbs as well as nouns. It is hoped that these findings will shed further light on the value of metaphor in EMI courses.

### Acknowledgements

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### Notes

1. In cognitive linguistics, small capital letters are used to refer to conceptual metaphors. This indicates that while the particular wording of the CM may not occur in language, it is thought to underlie a variety of actual linguistic expressions.

### Bio Data

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