

Using AI to Increase Morphological Awareness in an L2 Learner of Japanese: A Self-Directed Autoethnographic Case Study

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Abstract— Vocabulary acquisition is a major hurdle in second language learning. This exploratory study employed a single-subject autoethnographic case study to examine the role of morphological awareness in the acquisition of complex compound Japanese words. The study used self-directed, AI-assisted (OpenAI, 2026) intervention as well as AI evaluation and feedback. In this study, an advanced Japanese language learner who struggled with complex written Japanese kanji characters was taught compound lexical items and grammatical morphology through AI-assisted learning, and then evaluated on progress along markers of inference, production, decomposition, and transfer. These measures helped distinguish simple recall after a study session from strategies for morphological understanding when presented with new vocabulary. This study suggests that morphological awareness can play a critical role in second language vocabulary acquisition.

Keywords— Morphological Awareness, AI-Assisted Learning, Kanji.

I. INTRODUCTION

Learning vocabulary is often an obstacle in second language (L2) learning. Vocabulary is arguably more important than other aspects of language such as grammar. Rasouli and Jafari (2016), citing Lewis (1993), state that “while without grammar very little can be conveyed, without vocabulary nothing can be conveyed” (p. 89).

Attaining a vast vocabulary in an L2 can be a daunting obstacle in the path towards fluency. Brysbaert et al. (2021) inform us that a native speaker knows 42,000 lemmas (base words) derived from 11,000 word families by age 20. The author (Brysbaert et al., 2021), citing Cobb (2007, 2016), suggests that many L2 learners only attain 2,500 – 3,000 of the most frequent word families of a particular language.

In this paper, I will describe a few terms that may recur. Brown (2018) describes a lemma as “[...] a base word and its inflections (i.e., paradigmatically related

forms of the same word class). Thus, act verb and acted verb are part of a single lemma” (p. 52). Bauer and Nation (1993) clarify “word family” as consisting of a “base word and all its derived and inflected forms that a learner can understand without having to learn each form separately” (p. 253). As an example, the words *run*, *runner*, and *ran* would all belong to the same word family. Finally, “morpheme” is defined by Cao (2022) as “the smallest unit with meaning and sound” (p. 324). The author goes on to state that they cannot be further reduced without losing meaning. Essentially, “writer” could be broken into two morphemes, “write”, and “er” (signifying a person). Breaking the word down any further would strip its parts of meaning.

As a teacher of language for over 21 years in Japan and Slovakia, I have experienced many textbooks and methods of instruction for vocabulary building. Most methods I have used in my profession employ vocabulary words and matching definitions, bolded

words in articles, listen and repeat exercises, flashcards, or other means for rote vocabulary acquisition. I have not experienced course materials that focus on morphemes for building an L2 learner's lexicon.

1.1 Problem Statement

The problem of practice I observed is that many textbooks and teaching materials focus primarily on singular vocabulary words rather than multiple morphological constructions of a single lemma. This prevents a student from obtaining many words from one memorable base word. For example, learning the word "create" alone is less efficient than learning create, creation, creative, recreate, etc.

1.2 Research Gap

Morphological awareness (MA) is well-studied in English, but less is known about MA and its impact on L2 learners of Japanese. While some research exists regarding morphological awareness in L2 Japanese learners, the majority of research deals with English. Morphological awareness refers to "the conscious awareness of the morphemic structure of words and someone's ability to reflect on and manipulate that structure" (Carlisle & Feldman, 1995, p. 194).

1.3 Research Purpose

This paper seeks to investigate whether learning free and bound morphemes can increase vocabulary acquisition efficiency. Cao (2022) defines these terms by suggesting, "Free morphemes can stand on their own and function as single words such as 'cat, desk, go, nice, sunflower' while bound morphemes couldn't occur alone and they are usually attached to another form(s) such as "un-, dis-, -ment, -ly" (p. 683). Knowledge generated from this research is expected to equip educators with better strategies to increase L2 language learners' vocabulary.

Additionally, this paper aims to evaluate whether an L2 language learner can become aware of language morphology through self-directed AI-assisted learning. Price and Sakellarios's (2026) research shows ambiguity with regard to proper AI usage as a language learning tool. Students in their research (Price & Sakellarios, 2026) were unclear about how to use AI in a beneficial and ethical manner. This paper explores one method for ethical AI-assisted learning that is not simply copy-and-pasting responses from AI.

1.4 Research Question

- 1.) Does morphological awareness improve vocabulary inference, word production,

and meaning transfer to unfamiliar words?

II. LITERATURE REVIEW

2.1 Morphology in Second Language Acquisition (SLA)

The role of morphological awareness (MA) in SLA is well-researched, particularly with regard to English as a Second Language (ESL). Díaz (2023), citing Apel, (2014) describes morphological awareness as "the capacity to identify and comprehend the smallest elements of meaning in language" (p. 60). For example, being able to recognize that adding the grammatical morpheme "er" to the end of the lexical base "speak" changes the meaning of the word.

Morphological Instruction (MI) may benefit language learners to tackle unfamiliar vocabulary words. Wrestler (2025), informs us that MI is instruction focused on teaching morphemes (such as roots, prefixes, and suffixes) in order to help learners better analyze unfamiliar words and build vocabulary. Regarding MA and its impact on ESL, Tareq et al. (2023) found that MI improved ESL students' language proficiency, student outcomes, reading comprehension, contextualized learning, and writing proficiency. As the researchers suggest, "students taught by teachers who emphasize morphological awareness outperform their peers" (p. 11). Similarly, Waziana and Rohmatillah (2025), exploring the impacts of MA on Indonesian learners, found significant improvements in ESL vocabulary acquisition between the experimental group (those receiving MI) and the control. Amirjalili and Jabbari (2018), whose research also found that students treated with MI showed significant improvements in overall comprehension, suggest, "EFL learners need explicit instruction in how to use morphemes to find word meanings" (p. 22). The researchers (Amirjalili & Jabbari, 2018), found that MI gave students a strategy for deriving meaning from unknown words. The research of Li et al. (2020) also found that MI significantly improved Malaysian primary school students' reading comprehension in ESL. The researchers (Li et al., 2020) found that the intervention helped students analyze the structures existing within words and decode meaning. This led to higher levels of comprehension.

2.2 Japanese Morphology

Japanese language, which includes Chinese-derived characters known as *kanji*, often employs the use of compound words such as 影響 (influence) where two kanji join together to form a new word. In this case, 影

(shadow) and 響 (echo/sound) form the word influence. As Hagiwara (2025) suggests, “In Chinese and Japanese, the majority of the vocabulary consists of compounds comprising multiple Chinese characters [...] with each character representing a morpheme” (p. 2262).

Interestingly, the researcher (Hagiwara, 2025) informs us that these compounds can be either transparent or opaque. With transparent kanji, the meaning can be derived from the morphemes within the compound word. An example of a transparent compound might be 火山 (volcano), where 火 means “fire” and 山 means “mountain.” Conversely, an opaque compound word may be found in my prior example, where 影 (shadow) and 響 (echo/sound) come together to form the word “influence.” Transparent compounds may highlight the importance of understanding how meaning is derived at a cultural level, which may be harder for second language learners to understand. Research has shown that language meaning and interpretation often convey cultural origins (Sakellarios & Egitim, 2021).

Additionally, compound words like the previous 影響 (influence) can take a grammatical morpheme at the end, such as 力 (power) to form the new word 影響力 (clout). Ross (1985) suggests that morphemes that attach in the suffix position (at the end of the compound lexical item) function primarily as grammatical morphemes. An example of a grammatical morpheme that appears in the suffix position after lexical kanji compounds is 的 (adjectival), as is the case with 傳統的 (traditional), where the grammatical morpheme 的 turns “tradition” into an adjective. An exhaustive description of Japanese morphemes is beyond the scope of this paper.

III. METHODOLOGY

3.1 Research Design

The research in this paper is based on my own experiences being taught Japanese morphology by means of AI instruction. As such, it functions as an autoethnographic intervention case study. The researcher instructed AI to devise a pre-test to baseline my understanding of Japanese morphology. AI was then instructed to teach me twenty target compound lexical items as well as ten grammatical morphemes. I then spent thirty minutes studying, which was followed by a parallel post-intervention test to measure whether I could use morphemes to infer meaning to new vocabulary.

The aim of this study was not simply to measure improvement after a brief study session, which could be expected in most learning contexts, but rather to measure whether MA changed the subject’s approach and strategies to understanding new words. For this reason, AI was asked to create pre- and post-tests that measured inference, production, decomposition, and transfer applied to new words, rather than simply measure recall of rote vocabulary after a study session.

3.2 Participant

The subject of this study, myself, was a 48-year-old male who has lived in Japan for twenty years. The subject has worked as a language professor in Japanese universities for thirteen years. Additionally, the subject has a good command of the Japanese language, particularly when it comes to speaking, but struggles with difficult compound kanji forms and morphology, particularly with reading and writing.

3.3 Procedure

AI was given a prompt at the onset of the experiment. The prompt was written as follows:

I would like you (AI) to help me with my research. I am studying effective ways to increase vocabulary in L2 (second language) learners. Specifically, I would like to increase my Japanese vocabulary by learning compound lexical items (e.g., 影響 “influence”) and connecting them to grammatical morphemes (e.g., 力 “power”). This approach would help me acquire new vocabulary words (影響 “influence” and 影響力 “clout”) from a single lexical base word. As part of this research, I would like you to devise a test to serve as a baseline for post-intervention comparison. Next, I would like you to teach me twenty target compound lexical items such as 影響, along with a list of grammatical morphemes that can be attached to each base word. I will then spend thirty minutes studying these lexical items and grammatical morphemes. At the end of this study time, I would like you to administer another test to evaluate the effectiveness of my study compared to the baseline, particularly with regard to inference, production, decomposition, and transfer.

From this prompt, AI created a baseline test and a parallel structure post-intervention test. Both tests measure 1) inference: the ability to understand new

words from known morphemes, 2) production: the ability to produce new valid words using known morphemes, 3) Decomposition: the ability to break down words into smaller morphemes and explain their meaning, and 4) transfer: the ability to apply morpheme awareness to completely unfamiliar words. The researcher, at this stage, was only able to see the baseline test, and a prompt was required to receive the twenty target compound lexical items and grammatical morphemes generated by AI. This was followed by a 30-minute solo study session, while AI was instructed to wait for a prompt to administer the parallel structure post-test. The post-test measured if improvements were made in learner inference, production, decomposition, and transfer skills.

3.4 Scoring Method

The pre- and post-tests contained 20 items, 5 for each skill (inference, production, decomposition, and transfer). AI then awarded two points to each item, one point for “meaning accuracy” (understanding the meaning of the compound word), and one point for “morphological reasoning” (understanding the parts of the word and how they combine to

create meaning). Each test had a total of 40 points.

3.5 Data Analysis

This study uses a raw score comparison between the pre-intervention baseline test and the post-intervention test. AI was also instructed to analyze the improvement in the four skills (inference, production, decomposition, and transfer). Additionally, AI was asked to estimate the

vocabulary gain through MA based on the test results.

IV. RESULTS

The results section is organized into four parts. In the first section, I will talk about the overall performance at baseline and improvements measured during the post-test. In the second section, I will talk about categorical improvements along the four measured skills (inference, production, decomposition, and transfer). In the third section, I will discuss error analysis throughout the tests. Finally, in the fourth section, I will discuss AI’s estimated vocabulary gains through intervention.

4.1 Overall Performance

With regard to overall performance, I scored poorly in the baseline test (6.5/40). The 6.5 was a result of AI being generous and awarding me half-a-point for being very close in one of my answers. While my

conversational ability is rather fluent, my baseline compound kanji reading and writing skills were quite low. My score improved dramatically in the post-test (27/40), which shows significant improvement in meaning accuracy and morphological reasoning. In terms of percentage points, my score increased from 16.25% to 67.5%, amounting to a 52.25% substantial improvement overall.

4.2 Sectional Improvement

Categorically, the baseline test produced the following scores: Inference (4/10 points), Production (2/10 points), Decomposition (0.5/10), and Transfer (0/10). This suggests a moderate ability to infer meaning from written compound kanji forms, but a minimal to weak ability when it comes to production, decomposition, and transfer. This perhaps stems from the rote manner in which I learned kanji. I failed to, during my previous experiences studying Japanese, break words into the morphological parts and produce them in new written forms.

The post-test showed a drastic increase in inference (8/10 points), production (8/10 points), decomposition (7/10 points), and transfer (4/10 points). This suggests that MA not only helped me infer meaning in vocabulary, but also helped me produce new kanji compound words, decompose words into their morphological parts, and transfer this knowledge to new vocabulary.

These results show that the subject went from almost no decomposition ability to a fairly strong ability to break down new words into morphological parts. Additionally, the results suggest an emerging ability to generate new words rather than simply recognize them, as well as infer meaning in unseen words.

4.3 Error Analysis

An interesting result came when AI analyzed the errors I made in the post-test. It noted that

while the words I produced were not standard Japanese, they were “morphologically logical.” One such mistake was when I produced the compound 認識化, which joins the compound lexical item 認識 (recognize) to the grammatical morpheme 化 (-ization). Another such instance was when I joined 解決 (solution) to 感 (feeling), which I thought might produce “A sense of resolution.” AI suggested that these were not standard Japanese constructions, but showed a growing internationalization of the morphological system, rather than simply memorizing words.

4.4 Vocabulary Gain Estimate

Finally, the researcher prompted AI to estimate how much new vocabulary I had gained from this MA intervention. I gave AI the following prompt:

“I want you to analyze how many words I have learned, including new words formed through connective morphemes. In other words, if I only studied 20 compound lexical items, I would have learned twenty new words; however, based on the results of the parallel test, please estimate how many new word constructions I may have actually gained.”

AI estimated that, in addition to the twenty target compound lexical items I studied, 14 additional words were demonstrated. That is, I demonstrated the ability to build or understand the meaning of 14 new words that I had not studied. From this, AI estimated a gain of 34 new vocabulary words. Additionally, AI estimated that it is possible that 60 new generative vocabulary items were gained from MA but not covered in the 20-question post-test. It is important to note that these are simply AI estimates and should be interpreted as such. These estimates are not standard measurements.

V. DISCUSSION

5.1 Interpretation of Results

This study, while autoethnographic, does support the use of MA for rapid vocabulary improvement in second language learners. What is of particular interest is the rapid expansion of vocabulary and transfer in a short period of time. The intervention period involved morphological instruction and a brief 30-minute study period. As a case study, this research is limited in scope, but it does suggest MA as a strategy for rapid vocabulary gain, particularly for Japanese, which employs morphology in the form of compound words built of blocks of kanji.

5.2 Morphological Productivity

This study suggests that learning compound lexical items, with the addition of grammatical suffix-placed morphemes had a positive impact on language learning. The subject of the study moved from memorization to deeper morphological generative competence. I was able to deconstruct complex compound words into their respective morphemes, and generate new words. This perhaps shows a shift from a passive learner to an active learner who uses words less prescriptively, but rather descriptively as tools for expression.

5.3 Transfer Ability

One of the more interesting findings of this study was the emergence of transfer ability. The score in the baseline test showed 0/10 points with regard to transfer ability. This jumped to 4/10 in the parallel post-test. New words in the post-test, such as 柔軟性, were recognized by their transparent lexical morphemes 柔 (soft), 軟 (pliable), and grammatical morpheme 性 (property of). Through decomposition, I was able to infer the word as meaning “flexibility.” This demonstrates transfer of MA to new lexemes.

5.4 Comparison to Traditional Methods

Methods for language instruction found in SLA classrooms and textbooks typically involve rote memorization of vocabulary words. A student may be presented with an article with bolded difficult words that are defined below or in the margins of the page. Little to no treatment is given to morphological awareness. ESL learners can also benefit from understanding prefix and suffix-placed morphemes such as -ness (a state of), un- (not), mis- (wrong), -ity (property of), etc. Theoretically, MI learners could be presented with a lexical item such as “happy” and generate additional words like “unhappiness.” Even if they produce a logical error like “inhappyness”, it still perhaps shows progress in language production and creativity. Additionally, the word “inhappyness” is intelligible to English speakers. Moreover, they might develop a skill to transfer understanding to words they have not yet encountered. For example, after understanding the morphological construction of “happiness”, they may guess at the existence of a word like “sadness.”

VI. LIMITATIONS

This paper has many limitations. First, it is a single participant exploratory autoethnographic study, so there is no generalizability to broader populations. Additionally, the intervention was short (30 minutes), so it is not possible to evaluate whether longer sessions would lead to diminished returns in vocabulary improvement. Future research could employ an additional delayed post-test to examine retention of vocabulary among L2 learners. AI was used to both instruct and evaluate vocabulary improvement in the subject of this study. That is both a strength and a limitation. It is a strength because it examines how much a language can be acquired and evaluated independently (without a teacher) through AI-assisted

learning. It is a weakness in that it did not use standardized tests, which can be compared to other studies. Since AI was used for instruction and evaluation, this study should be viewed as exploratory rather than evidence garnered from more traditional methodology.

VII. IMPLICATIONS

This study has implications in the field of SLA and AI-assisted self-directed learning. It offers students a method for independent study that is efficient for vocabulary building. For teachers and institutions, it offers a strategy for language instruction that raises awareness of morphology in complex vocabulary compound words. For future research, it suggests a method of both analyzing and intervening in SLA through the use of AI. It would be interesting to see how this research could be applied to larger sample studies, longitudinal studies, and experimental studies that utilize a rote learning control group.

VIII. CONCLUSION

This study suggests MA possibly improved the vocabulary of a L2 learner of Japanese. The subject improved their ability to infer meaning, produce words, decompose complex words to their constituent morphemes, and transfer MA knowledge to new words. This suggests a transition from memorization to generative vocabulary use and understanding. This study has broader applications in L2 pedagogy in that it suggests strategies for classroom language instruction as well as self-directed AI-assisted instruction. This exploratory study suggests MA and MI may be powerful tools in SLA instruction, though more research is needed, particularly with Japanese language instruction.

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