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Master's Thesis
Academic Year 2020

Coai : Design of a Game of Japanese Loanwords
Learning for Chinese Students Studying in Japan



Keio University
Graduate School of Media Design

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A Master's Thesis
submitted to Keio University Graduate School of Media Design
in partial fulfillment of the requirements for the degree of
Master of Media Design

Junming Du

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Abstract of Master's Thesis of Academic Year 2020

Coai : Design of a Game of Japanese Loanwords Learning
for Chinese Students Studying in Japan

Category: Design

Summary

With globalization in Japan's various fields, many words from foreign languages were converted into Japanese-loanwords written in katakana phonetic script. By the loanwords appear one after another year-by-year, more international students find it difficult to remember, especially Chinese students. They are overwhelmed by the momentum of foreign words written in katakana. In this article, I am focusing on finding out some Japanese- loanwords learning strategies and developing a Japanese-loanwords learning game combined with gamification.

More than 80% of loanwords are derived from English. Chinese students have more than ten years of English learning experience. If they find out the rule on converting English words into Japanese-loanwords, they will instantly increase their vocabulary in the loanwords.

In this research, I design an educational game in which the Japanese-loanwords learner can compare the Arabic letters and Katakana letters of the words simultaneously. Furthermore, I develop useful vocabulary lists based on text mining techniques, which help us learn about the high-frequency words appearing in a concrete situation or environment. I also re-design the word-review system originated from the Ebbinghaus forgetting curve and utilize the immersive learning strategy during the vocabulary learning section.

Keywords:

Japanese loanwords, Chinese International students, educational game, text mining, gamification

Keio University Graduate School of Media Design

Junming Du

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Chapter 1

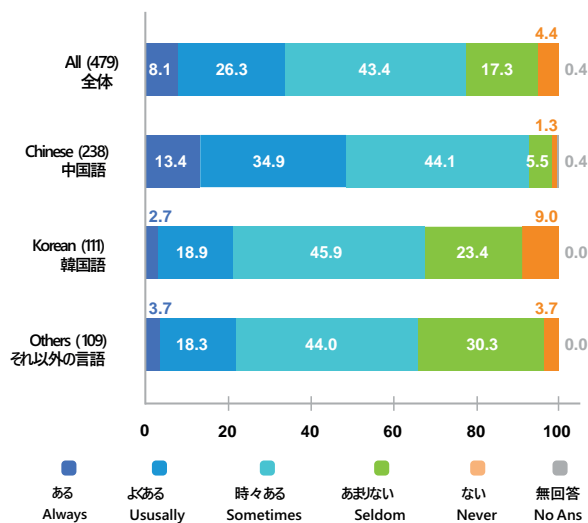
Introduction

1.1. Background

With the progress of globalization in Japan's various fields, many words from foreign languages were converted into the Japanese-loanwords, which written in katakana phonetic script [1]. By the loanwords appear one after another year-by-year, more and more international students find it difficult to remember, especially Chinese students. They are overwhelmed by the momentum of foreign words written in katakana.

Among the Japanese language textbooks for foreigners, "Minna no Nihongo" and "Nihongo Sou Matome" are used as main teaching materials by many Japanese language education institutions. However, if you summarize the vocabulary list of the above textbook, the number of vocabulary exceeds 10,000, but the number of foreign words is less than 400, a mere 4%. The 7th edition of "Kojien" contains 250,000 words [2], and "Concise Katakana Dictionary" contains 56,000 katakana words [3]. A rough calculation revealed that about 20% of the Japanese language is composed of loanwords. This suppose is also shown by many Japanese researchers before. Lack of vocabulary in Japanese-loanwords is one of the major causes of international students struggling with Katakana.

According to research on Japanese-loanwords' consciousness among international students [4], more Chinese students had trouble with loanwords than students from other countries (Figure 1.1). The reason for this situation is the different national policies on the importation of foreign words.



(Source: Katakana Awareness and Education of Japanese Language Learners (2008) by Masataka Jinnai)

Figure 1.1 Problems Caused by Inadequate Katakana Words (%)

To let the domestic people master foreign words quickly, translating foreign words by meaning is an advanced strategy. However, converting by sounds can leave a connection with the international environment. So the result is that when you study or work abroad, you should learn these foreign words all over again by the pronunciations are different from the original words. Then, in consideration of various current situations and other factors, contrary to Japan and South Korea [5], Mainland China prefers to translate foreign words by meaning instead of sound.

1.2. Research Problem

My main research question is whether there is a method to assist Chinese students to speed up the transfer of words accumulated in English to a Japanese loanwords. More than 80% of loanwords are derived from English (Figure 1.2). Chinese students have more than ten years of English learning experience [6]. If they find out the rule on converting English words into Japanese-loanwords, they will instantly increase their vocabulary in the loanwords.

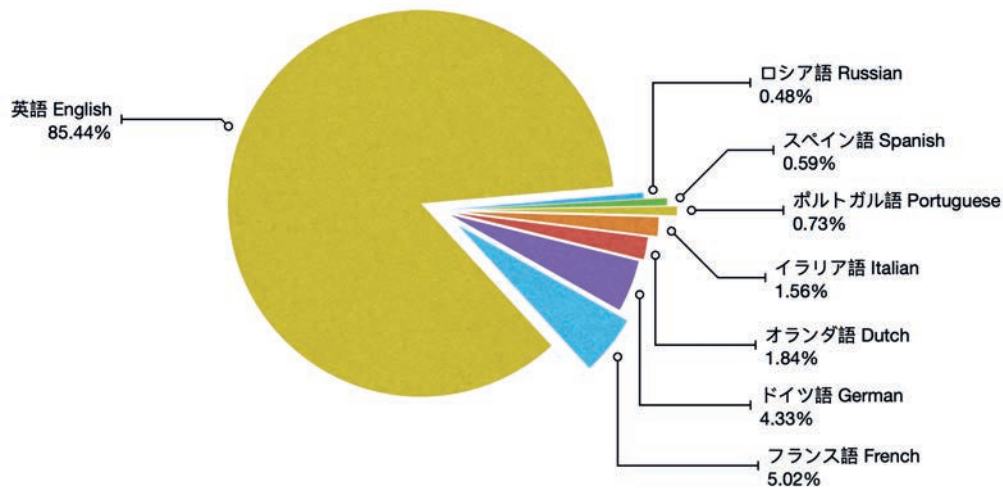


Figure 1.2 Consists of loanwords of Shinmei Keisei Japanese Dictionary (2005)

Based on the research about the Japanese-loanwords learning approach, when studying Japanese-loanwords, comparing the alphabet spelling of the word would let you find more details between the origin and the katakana writing [7]. It will leave a stronger impression on your brain. From 2001, Chinese students start their English courses from grade 3 of elementary school, So most students start their Japanese learning with over nine years of English learning experience [8]. By owning the English learning experience, it indicates that they can remember the loanwords efficiently by comparing the Arabic letters and katakana characters at the same time.

Besides, since the 1960s, elementary school students in mainland China have been using Hanyu Pinyin to memorize the pronunciation of Chinese kanji so that they have been accustomed to using Roman characters to spell words since young. Therefore, when learning Japanese loanwords, adding the corresponding English labels can help Chinese students memorize loanwords more familiarly.

A study of Japanese learning resources [9] suggests that if you have hobbies such as Japanese anime and games, light novels, dramas, and cooking, this will become your motivation to persevere in learning Japanese. For example, if you are a game fan, to get the latest news of the game, you will spontaneously watch

the official live broadcasts, check information flowing on the Internet [10]. In the process, you get used to the katakana words gradually.

In this article, I am focusing on finding out some Japanese-loanwords learning strategies and developing a Japanese-loanwords learning game combined with gamification.

1.3. Contribution

The three main contributions of this research are as below:

- Creation of a mobile educational game that allows international students in Japan to use their accumulated knowledge of English as well as their insights from Japanese culture, such as mangas, animes, games, to learn Japanese loanwords more effectively and specifically.
- A positive strategy for memorization of vocabulary replaces the traditional spaced-out reminder strategy to allow the learners to review words based on their current status independently.
- A multi-language translation strategy is built for the vocabulary list, which uses back-translation and multiple translation APIs to figure out the closest translation to the target word. Due to this, we can provide an easy way for international students worldwide to use the game to learn Japanese loanwords.

1.4. Thesis Structure

Chapter 2: Literature reviews on the development of Japanese loanwords, the current status of Japanese learning among Chinese students, theories related to vocabulary learning, and cases of their application.

Chapter 3: Discussion on the overall design concept of Coai.

Chapter 4: Evaluation of usability of Coai and effects on intergeneration.

Chapter 5: Conclusion, research limitation, and possible improvement.

Chapter 2

Literature Review

2.1. Japanese loanwords

2.1.1 Definition

The Japanese written language is composed of three writing systems: katakana, hiragana, and Kanji. Except for loanwords imported from China, loanwords imported from the West are generally written by katakana [11].

In a broad sense, Japanese loanwords are mainly composed of the Chinese language from the East and the English language from the West. However, the Chinese language was introduced into Japan much earlier than other languages, when the Japanese language was still developing, so the loanwords imported from China were categorized directly into Kanji written system.

In a narrow sense, loanwords are mainly imported from western culture [12], so the loanwords in this study are mainly western languages, especially English, and Chinese are excluded from this study's scope.

2.1.2 Development

With the advent of the Age of Sail [13], common words used in Portuguese and Spanish, such as the words for daily life and food, as well as specialized terms related to Christianity, began to spread among the Japanese society as the first loanwords of the Latin language introduced from Western civilization. Some of these words, such as bread and cigarettes, are still in common use today.

Along with Japan's entry into the Edo Shogunate era and the curtailment of Western religious influence in Japanese society, the Japanese government began a seclusion policy, with only the port in Nagasaki being reserved for overseas

trade. Furthermore, for Western countries, trade was only allowed by the Netherlands. Besides, the First Industrial Revolution advanced the development of astronomy and medicine for all humanity, and foreign words that came into Japan at this time included not only Dutch words for everyday life, but also terms for some experimental tools such as scalpels.

Following the Meiji Restoration Movement [14], Japanese society, from the top down, started a comprehensive study of the advanced technology and civilization produced by the Western Industrial Revolution. As a result, many Japanese students were dispatched to various European countries to study and exchange knowledge and experience with local communities. Therefore, the loanwords generated in Japanese society were mainly the vocabulary of Europe, mainly English and French.

In the second half of the 20th century [15], with the formation of a global economic system dominated by the United States, Japan began to learn from the achievements actively and accumulated experience of the United States. After a period of rapid economic growth, Japan became the world's second-largest economy, and exchanges and cooperation between Japanese and American companies became increasingly common. As a result, the economic, political, diplomatic, military, scientific, technological, and cultural terms used in the English language are brought into Japanese society until now.

Period	Culture	Language
Muromachi Period (14-16th century)	Christian Culture	Portugese, Spanish
Edo Period (17-18th century)	Early Science and Culture	Dutch
Meiji Period (19th century)	Early Western Culture	English, Germany, French, etc.
Taisho-Showa Period (the first half of 20th century)	Modern Western Culture	English, Germany, French, etc.
Modern (2nd half of 20th century)	World Culture	Languages of the world

Table 2.1 The Development of Loanword in Japan

2.1.3 Current Status

Since the Meiji Restoration, Japan has always been open to Western culture, so every year, many books and articles are shipped into Japan from overseas. In the beginning, the new loanwords were written in kanji, a reference to the Chinese

practice. Gradually, the loanwords were written in katakana for the convenience of reading and writing.

At present, loanwords produced every year are mainly from English. As the pronunciation of loanwords is always in katakana form, some pronunciation information is missing, making it difficult for English speakers who have not Japanese skills to understand the katakana's pronunciation of English words and recover the original pronunciation at once. Furthermore, the simplified pronunciation of loanwords usually reflects more than one English word, and without situation analysis, it is impossible to reconstruct the spelling of the word in English.

With the globalization of Japan, the number of loanwords being introduced is increasing year by year. The 7th edition of “ Kojien ” contains 250,000 words, and “ Concise Katakana Dictionary ” contains 56,000 katakana words. A rough calculation revealed that about 20% of the Japanese words is composed of loanwords.

Some national institutes for the Japanese language have called for the reduction of reading and communication disorders caused by the excessive use of loanwords. They also provide a manual to tell you to change the loanwords that are uneasy to understand into traditional Japanese expression. Unfortunately, this move has not generated a great response in Japanese society.

In 2005, the National Institute of the Japanese Language surveyed more than 70 Japanese contents between 1956 and 1994 [16]. The use of loanwords exceeded 24.7%, which is nearly a three times increase from the 1965 (Figure 2.1). The results show that the trend of the increasing use of loanwords will not decrease.

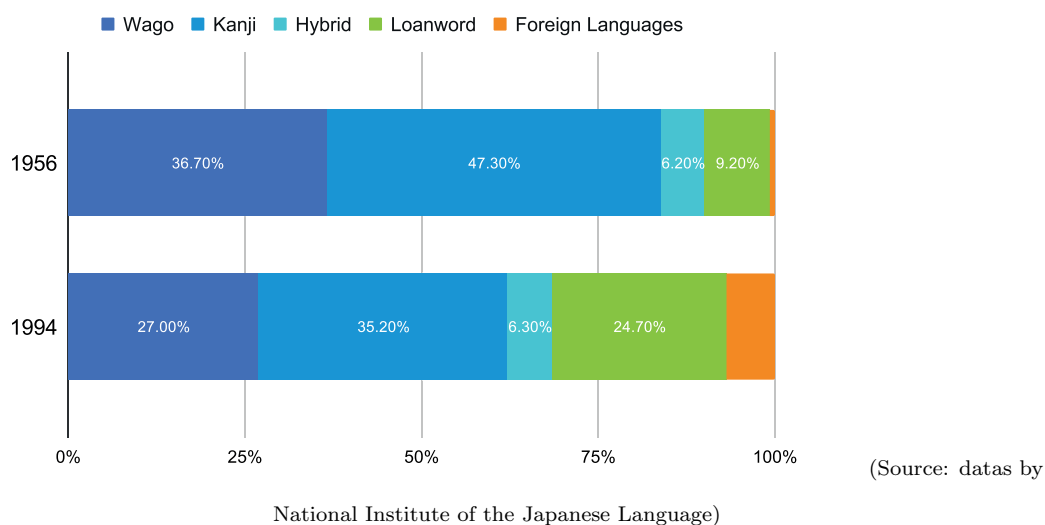


Figure 2.1 Growth of Use of Japanese loanwords in Magazines

2.2. Chinese Students in Japan

2.2.1 Current Situation

As globalization accelerates, exchanges across borders are becoming more and more frequent. It is becoming increasingly important to develop cross-cultural communication skills and personnel with international competence to respond to a global society. Governments and educational institutes worldwide are actively encouraging their students to go abroad and accept international students into their countries. In some countries, international student education has been included in the national policy. In this circumstance, countries are making specific programs and accepting as many international students as possible. The competition for international students in each country is intense.

As the world's third-largest economy and a center of cultural and artistic exchange in Asia, Japan has always been one of the most popular destinations for international students. With the introduction of the 300,000 international students policy in 2008 and the many preferential policies for international students, the total number of international students in Japan has been growing at an average rate of 8% -10% per year for the past 14 years. Due to cultural and geographi-

cal reasons, the number of international students in Japan is currently composed mainly of Asian students, 39.9% of who are from the China mainland (Figure 2.2).

Country/region	Number of students	% of total	Country/region	Number of students	% of total
China	124,436 (114,950)	39.9% (38.4)	France	1,635 (1,493)	0.5% (0.5)
Vietnam	73,389 (72,354)	23.5% (24.2)	Germany	949 (924)	0.3% (0.3)
Nepal	26,308 (24,331)	8.4% (8.1)	Russian Federation	831 (771)	0.3% (0.3)
Republic of Korea	18,338 (17,012)	5.9% (5.7)	Italy	789 (715)	0.3% (0.2)
Taiwan	9,584 (9,524)	3.1% (3.2)	Cambodia	751 (913)	0.2% (0.3)
Sri Lanka	7,240 (8,329)	2.3% (2.8)	United Kingdom	730 (703)	0.2% (0.2)
Indonesia	6,756 (6,277)	2.2% (2.1)	Brazil	548 (466)	0.2% (0.2)
Myanmar	5,383 (5,928)	1.7% (2.0)	Pakistan	470 (397)	0.2% (0.1)
Thailand	3,847 (3,962)	1.2% (1.3)	Australia	457 (460)	0.1% (0.2)
Bangladesh	3,527 (3,640)	1.1% (1.2)	Singapore	438 (408)	0.1% (0.1)
Mongolia	3,396 (3,124)	1.1% (1.0)	Canada	437 (483)	0.1% (0.2)
Malaysia	3,052 (3,094)	1.0% (1.0)	Mexico	427 (360)	0.1% (0.1)
United States	3,000 (2,932)	1.0% (1.0)	Sweden	419 (425)	0.1% (0.1)
Philippines	2,852 (2,389)	0.9% (0.8)	Spain	419 (386)	0.1% (0.1)
Uzbekistan	1,942 (2,132)	0.6% (0.7)	Other countries	7,995 (8,491)	2.6% (2.8)
India	1,869 (1,607)	0.6% (0.5)	Total	312,214 (298,980)	100.0% (100.0)

(Source: datas and graphics by Japan Student Services Organization)

Figure 2.2 Number of international students by nationality 2019

According to the Japan Foundation's Survey of Overseas Japanese Language Education Institutions (2019), there are currently 3,846,773 Japanese language learners in 142 countries worldwide. That number is likely to increase further in the future. Among this number, there are 1,173,328 (30.5%) Chinese. Many people who belong to the same Chinese language group tend to think that Chinese learners are easier to understand than those who use romaji when learning

Japanese [17]. That may be true, but thanks to the Chinese character culture, learning that part of the Japanese language can be made easier. Japanese words are classified as 33% in the modern Japanese language, Kanji words as 49%, and Katakana words (including hybrids and Japanese English) as 18% of the vocabulary [18]. So, the difficulty for Chinese learners of Japanese is that the number of loanwords in Japanese is constantly increasing.

2.2.2 Awareness of Japanese Loanwords

From an early time, Japanese researchers soon realized that Chinese students were not very good at reading Japanese loanwords [19]. There are two main explanations for this. The first reason is that the loanwords are often originated from English words, so it is difficult for learners who are not good at English to make the connection between English and loanwords described in katakana. The second reason is that when adopting foreign words into Chinese, they preferably avoid phonetic translations and seek to translate them into meaning. Younger people prefer to use the original pronunciation of foreign words rather than transliteration in daily conversation. Therefore, they are somewhat confused and resistant to Japanese loanwords, pronounced in a much different way from the original language.

Masakazu Jinnouchi, a Japanese language researcher, surveyed from July to October 2006, by asking 479 Japanese language learners from Japanese language education institutions all over Japan. In 2008, The results showed that the difficulty generated in learning a foreign language could vary greatly depending on the native language. Chinese students had the most difficulty, while international students from Korea or other Asian countries had the same difficulty and were in the middle. The least inhibited are students who are native English speakers.

2.2.3 Approach of Japanese Loanwords

According to a Japanese linguist survey, the Japanese elite and academics need to master at least 5,000 loanwords to obtain information through newspapers, magazines, and television. It would not be surprising if the average citizen also has to know more than 2,000 loanwords to communicate smoothly with others [20].

Among the Japanese language textbooks for foreigners, “ Minna no Nihongo ” and “ Nihongo Sou Matome ” are used as main teaching materials by many Japanese language education institutions [21]. However, if you summarize the vocabulary list of the above textbook, the number of vocabulary exceeds 10,000, but the number of foreign words is less than 400, a mere 4%.

It is a fact that the learning of loanwords cannot be overlooked by the causes of the still-developing state in Japanese. Still, there are few educational materials for authentic loanwords learning [22].

2.2.4 Popular Languages Learning Apps in China

The following list is the popular foreign language vocabulary learning apps in China’s app market, mainly focusing on the range of English vocabulary that needs to be examined, such as SAT, TOEFL, IELTS, GRE, GMAT, and so on.

Num.	Name	Feature
1	HundredWordsCut	Every word is paired with picture and sentence
2	Shanbay English	Customizable vocabulary lists
3	New Oriental LECI	Most words are explained by an expert teacher
4	ToWords	interactive operation, anti-wandering alerts
5	Hujiang Happy Word Field	Gamified level path design
6	YIBEI English	Updating with the latest trending words
7	Open Language	Provide reasonable memorization plans for words

Table 2.2 Main features of Chinese popular linguistics learning apps

In “ Hujiang happy word field ” the app developers present the learning content in a game path to help users set visual goals and keep them motivated through gamification. In “ HundredWordsCut ” each word has a corresponding picture and a typical sentence so that users can understand more aspects of the words. In “ Shanbay English ” users can customize their vocabulary lists based on their demand, allowing them to learn much-needed words according to current conditions. “ Open Language ” is an app based on a Chinese/English mix of radio dialogue programs, which integrates words, phrases, and sentences updated with

current events, allowing learners to rapidly apply what they have learned to their daily English conversation.

2.3. Ebbinghaus Forgetting Curve

2.3.1 Explanation

The Ebbinghaus forgetting curve [23] is a learning and memory forgetting curve that German psychologist Ebbinghaus summed up by recording himself memorizing more than 2000 meaningless words with himself as an experimental object. According to the forgetting curve, the means of converting short-term memory into long-term memory are mainly two kinds:

- Active repetition to deepen the memory.
- Interval repetition, review learning contents in time before they are started to be forgetting.

Using the first way, it is easy to make the memory content boring and time-consuming. The second method requires the learner to be able to manage the review interval effectively. Although current mobile applications can automatically remind users to review within a certain time interval [24], many applications cannot provide optimal intervals due to individual variations. Besides, suppose the user is learning a large number of words simultaneously. In that case, too many reminders can make the learner feel frustrated and anxious, thus reducing the motivation to learn the language.

2.3.2 Related Works

Anki (Figure 2.3), a well-known flashcard memory software based on the review algorithm proposed by UpperMemo. It utilizes the active recall test theory and spaced repetition theory to help students review accurately and improve memory efficiency.

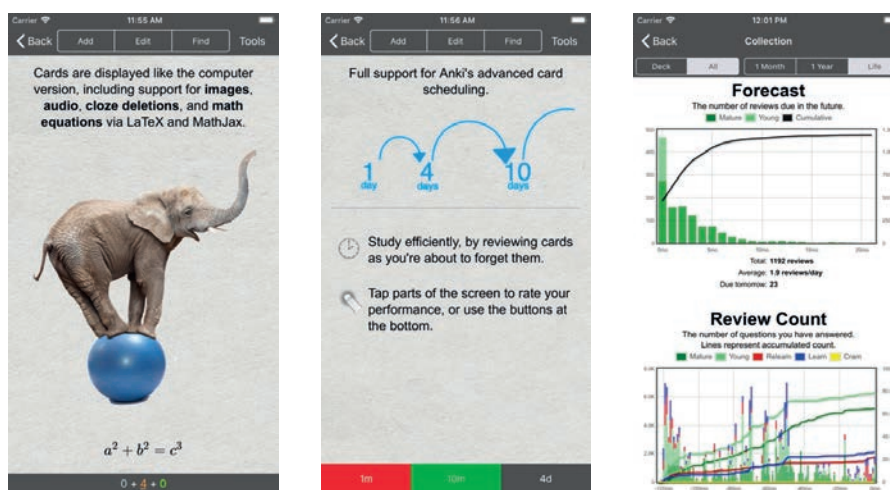
Advantages:

- Save learners' progress, statistics, and create reports automatically.

- You can create your flashcards or use the flashcards created by other learners.

Disadvantages:

- Since flashcard mnemonics tend to break up large chunks of knowledge into many smaller knowledge pieces, learners lose their understanding of the overall structure of knowledge.



(Source: <https://apps.apple.com/us/app/ankimobile-flashcards/id373493387>)

Figure 2.3 Screenshots in AnkiMobile Flashcards

Memrise (Figure 2.4) grew out of the multilingual learning community founded by Ed Cooke, one of the world's top memory gurus. The app helps language learners improve their vocabulary recall by effectively utilizing the science of memory and forgetting in the human brain. It currently offers more than 200 language courses to over 600,000 language learners worldwide.

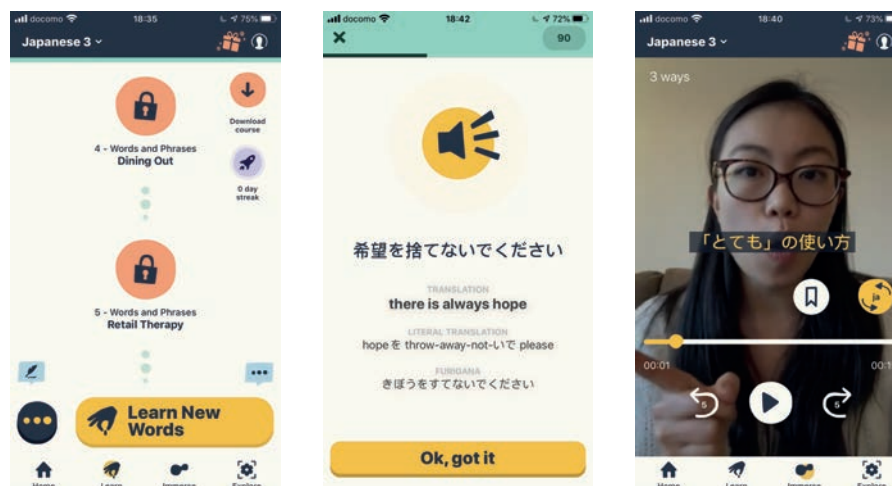
Advantages:

- Based on the game level to learn vocabulary and unlock new content.

- Record the proficiency of each word and remind users to review regularly.
- Explain the terms in the form of illustrations and stories, and provide spelling, pronunciation, and definition of the terms.

Disadvantages:

- The application focuses on spelling and memorizing vocabulary, and cannot teach the relevance of words and their application in real-life situations.



(Source: <https://apps.apple.com/us/app/memrise-learn-languages-fast/id635966718>)

Figure 2.4 Screenshots in Memrise

2.4. Immersive Learning

2.4.1 Definition

Immersion learning [25] can be traced back to the French immersion experiment conducted in Quebec, Canada, in 1974, which placed native English-speaking students in a French environment to develop their French language skills through

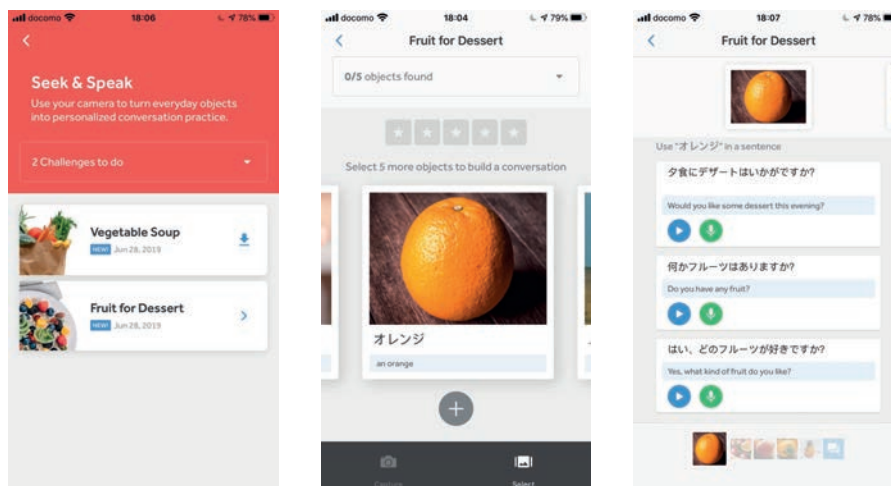
subject matter learning. It uses French as the medium of instruction for English-speaking children. Students learn the language primarily through subject matter rather than formal language lessons, and students are always in a French-speaking environment to develop proficient French language skills. This experiment is considered one of the most successful bilingual education models and is used in a wide range of social, cultural, and political circumstances.

2.4.2 Related Works

Rosetta Stone (Figure 2.5) is one of the most classic and earliest foreign language learning software products. Its name comes from an ancient Egyptian stele of the same name, which was carved more than 2000 years ago with the Egyptian Codex Memphis in three different writing systems. Thus its name is a metaphor for the multilingual nature of the language. This software product uses a combination of images, text, and sound to help users learn vocabulary and grammar using the “spaced repetition” method for language teaching purposes.

Features:

- Provide learners with a learning path from beginner to advanced levels.
- Through the self-developed dynamic immersion learning system, learners can learn the target language directly without the help of a translator and without using the user’s native language as an intermediate medium.



(Source: <https://apps.apple.com/us/app/rosetta-stone-learn-languages/id435588892>)

Figure 2.5 Screenshots in Rosetta Stone

2.5. Fragmented Learning

2.5.1 Explanation

Fragmented learning is the use of the Internet and mobile devices to learn pieces of knowledge anytime, anywhere, according to the learner's learning demands. Fragmented learning is a mobile, digital learning strategy, and relatively small-scale learning unit and short-duration learning activities [26].

- As opposed to large chunks of time for formal study or work, fragmentation of learning time refers to the short, fragmented chunks of time that people utilize after formal study or work. In contrast, instructional time in the traditional classroom typically occurs during a fixed, limited time [27]. Fragmentation of learning time breaks the limitations of traditional English learning time. It allows learners to engage in self-paced English learning whenever and wherever they want, such as in queues, waiting for buses, 10 minutes before bed, and other indeterminate bits of time.

- Fragmentation of learning space refers to learning spaces that are not bound by time and space, not just the traditional classroom, but also virtual learning communities. In contrast, the traditional classroom is relatively fixed in location and usually occurs in a fixed classroom, library, etc. within the campus environment. Fragmented learning is more flexible and can occur in any location, such as a classroom, dorm room, or cafeteria.

2.5.2 Related Works

Duolingo (Figure 2.6) is a foreign language learning application that provides free learning of more than ten languages and allows users to complete all language courses from beginner to advanced level.

Features:

- daily learning achievement points, with rewards and feedback mechanism, after reaching a certain level of language proficiency, users can receive translation practice assigned by the system.
- lightweight learning content and tasks, learning in fragments of time, suitable for general users.
- equipped with TEST CENTER for language testing, test results are recognized by universities and companies.



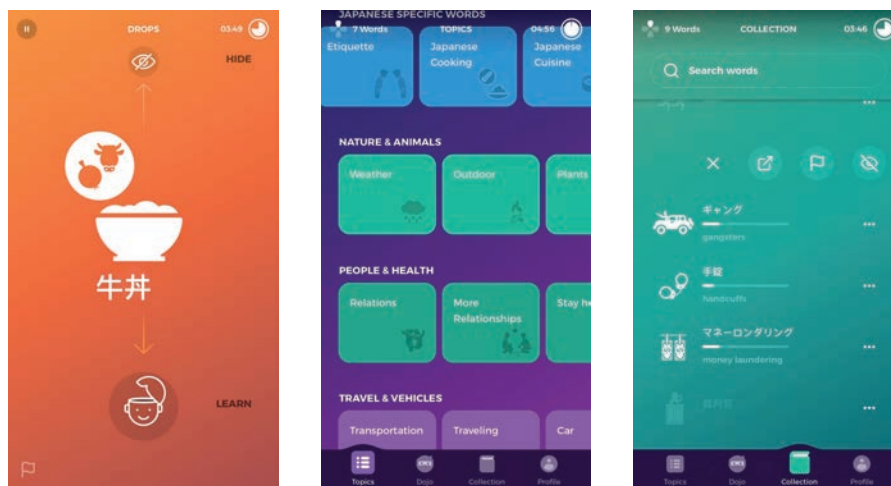
(Source: <https://apps.apple.com/us/app/duolingo-language-lessons/id570060128>)

Figure 2.6 Screenshots in Duolingo

Drops (Figure 2.7) is a vocabulary learning application that focuses on 5 minutes a day to master 2000 vocabulary words in every day quickly. All of 2000 words are divided into 13 categories: Food, Basics, Nature & Animals, to Science & Intelligence, to Sports & Fitness, etc. Each category is divided into several sub-categories.

Features:

- Provide immersive vocabulary memorization games, such as puzzle spelling, link spelling, word meaning multiple-choice questions, and the section which needs you to find pictures that match the words.
- Vocabulary category memory, each mini-module only 13 words, suitable for fragmented learning.
- With pictures and sound, learn new words through simple visual graphics, and set aside time for readers to read along.



(Source: <https://apps.apple.com/us/app/drops-fun-language-learning/id939540371>)

Figure 2.7 Screenshots in Drops

2.6. Educational Game

2.6.1 Definition

The concept of Educational Games was first proposed in the United States in the 1980s. Educational games are digital game products that provide both entertainment and education at the same time. Educational games are an innovation in teaching methods and approaches and essential support to the teaching process. In terms of educational value, educators can use educational games to complete the teaching plan and goals according to the curriculum. On the other hand, players can use educational games to achieve sufficient mastery of essential knowledge and effective achievement of skill levels. In terms of game objectives, the primary purpose is to gamify the contents of teaching and learning so that the players can better know and understand knowledge through the participation and completion of challenges.

2.6.2 Strengths of Educational Game

Marc Prensky, an American education specialist, proposes that, in essence, the reform of learning is not only to provide remote online games or digital courses but also to achieve the harmonious co-existence and mutual fusion of education and entertainment. From the process of game development, the rapid development of computer network technology in the 1990s has led to the flourishing of online games. Online games bring fun and excitement to young people and easily make them addicted to them and lose the direction of life. Educational games can let students experience the fun of the game and prevent them from being addicted to it. Besides, educational games utilize gameplay and technology to show new things and new knowledge to students to achieve the in-depth integration of information technology and education.

2.6.3 Development

Since the first interactive typing game in 1961, many educational experts have come to understand the role of games in motivating learning. They have attempted to work with game developers to make their educational curriculum digital and gamified. 2004, with the release of the Nintendo DS, educational games had their first golden period of development. At that time, both mobile phones and game consoles were still operated by pressing buttons, but the DS provided not only voice recognition but also a touch screen that supported handwriting. This new edition has allowed game developers to generate several exciting gameplay ideas but has also allowed many educators to discover the device's unlimited potential for developing educational games. In 2008, with the release of the first iPhone, touch screen smartphones became widely popular. Compared to game consoles, touchscreen phones have a broader user base, so smartphone gaming quickly became one of the most significant areas of the gaming industry. However, due to the influence of usage situations and cell phone operating habits, users prefer to operate with a vertical screen and one hand. In the process of game transplantation or development, the interface design and interaction operation for the vertical screen has become one of the essential aspects.

2.6.4 Gamification Education

Gamification Education applies game concepts, game elements, and game mechanics to education [28]. By utilizing the positive aspects of games to stimulate interest in learning and maintain motivation, and to improve learning effects.

In the research on the educational game, Mr Keller proposed the ARCS model of motivational design, which identifies four strategic elements of motivational education:

- Attention strategies are used to arouse and sustain curiosity and interest.
- Relevance strategies connect learners' needs, interests, and motivations.
- Confidence strategies help learners develop positive expectations for success.
- The Satisfaction strategy provides extrinsic and intrinsic reinforcement for learning efforts.

The ARCS model emphasizes providing the learner with appropriate challenges, setting specific goals, building control mechanisms, and providing clear feedback. There is not much difference between learning and entertainment in nature; both are intended for the acquisition of specific knowledge through practice.

However, in many cases, students will only learn seriously if they have some interest in the subject, so if you want students to know well, it is essential to develop their interest in learning. Educational games can be researched not only as a teaching medium but also as a game-based learning environment.

2.6.5 Related Works

Eigomonogatari (Figure 2.8) is a Japanese RPG education game based on English vocabulary and grammar puzzles. The game has a rich story, thousands of characters, and Japanese-style card battles, allowing language learners to get rid of the traditional boring vocabulary and grammar memorization. They continue to enjoy the game while completing various English examinations that need to remember the content.

Features:

- The game stories are bilingual and have corresponding English reading audio, so you can improve your English reading skills while reading game stories.
- All English questions and answers are supervised and screened by professional English teachers and combined with the TOEFL, TOEIC, and EFL tests, we have accumulated more than 20,000 questions and answers.
- The learning record system provides a focused repetition of questions that you often answer incorrectly.



(Source: <https://apps.apple.com/jp/app/eigomonogatari/id805477882>)

Figure 2.8 Screenshots in Eigomonogatari

Chapter 3

Design

3.1. Concept Overview

This research focuses on the problems of Japanese loanwords learning for international students, especially for Chinese students. As discussed in Chapter 2, international students in the kanji region have certain advantages in Japanese language learning when opposed to students in the non-kanji region. As long as they can find out the differences between Chinese and Japanese pronunciation of kanji, they can gradually transfer the vocabulary they mastered in Chinese into Japanese.

However, as they gradually stepped into Japanese society, they had more encounters with loanwords in their daily study and work. Whether they are receiving professional education in universities or communicating with Japanese friends, they are always surrounded by loanwords. If they do not grasp these words effectively, they will be confused and inconvenienced in various ways. This research aims to solve the problems that Chinese students face in learning loanwords to utilize their English language experience and knowledge accumulated over the past ten years to expand their Japanese loanwords vocabulary efficiently.

The summary of related works are:

- The Japanese learning apps for Chinese students do not provide any English explanations of Japanese loanwords.
- The vocabulary list is mainly aimed at language exams, with a significant lack of advanced vocabulary such as interest and occupation.
- The words review section is based on passive reminder. When many words are learnt, it is almost like an endless review reminder state.

According to the related works and the interview among the Chinese students, the following conclusions are drawn: Firstly, they prefer to utilize the fragmented time to learn loanwords because they have to spend more time on their major studying or working. Secondly, due to the nation's free translation policy, it is hard for them to effectively convert Chinese-loanwords into Japanese-loanwords. Thirdly, although the educational apps are very convenient, if you learn a certain number of words, the endless reminder from the review system will make them lose the motivation to continue learning.

The core concepts of this development are:

- Supply an Educational Game for Fragmented Learning of Japanese loanwords by utilizing their accumulated knowledge from English.
- Customize useful vocabulary lists based on hobbies or specialist fields.
- Re-design a new reviewing system for motivating them to learn.

3.2. Target Audiences

Their main characteristics are that they are between 17 and 30 years of age, have received secondary education or higher in mainland China, and are enrolled in Japanese language schools, vocational schools, or universities.

Besides, to enter a prestigious university in Japan, international students are usually required to provide internationally recognized English scores, so most of them need to continue learning English and Japanese after they leave for Japan. Therefore, if the approach is designed to provide effective clues for them to relate their English words to Japanese loanwords, they can expand their vocabulary in loanwords as quickly as native English speakers.

However, some students are not good at learning English in their home countries, which leads them to choose countries that are not English-speaking when they study abroad. Therefore, these students can easily transfer the negative feelings about learning English to studying a foreign language in Japan. Still, most of these students choose to study in Japan because they like Japanese culture, such as traditional history and culture, popular idol groups, anime, games, etc. Even though there are many loanwords in these contents, they have a strong motivation

to absorb these words due to their hobbies and interests. Therefore, the vocabulary list is designed to consider finding their entry point to learning Japanese loanwords.

3.3. Design Inspiration

3.3.1 Konpeito

In the 15th century, during the Age of Exploration, Japan started to have cultural and trade exchanges with Spain and Portugal. The first loanwords from the Latin language family began to be spread to the local people.

During the Warring States period in Japan, Oda Nobunaga actively absorbed Western civilization and introduced Western musketry and reformed the military system, becoming the most powerful daimyo of the late Warring States period. His favourite snack was a piece of candy called konpeito (Figure 3.1), which was brought to Japan by Portuguese missionaries. This word, along with tempura, pan, and tobacco, is still active today as one of the first loanwords introduced from the Western countries.

Therefore, the game uses this richly meaningful, multi-coloured and flavoured traditional candy as the main item and the main reference for the interface colour scheme.



(Source: Image by Leungchopan)

Figure 3.1 Traditional Japanese Candy Konpeito

3.3.2 Moai

During the Age of Exploration, In an attempt to open up a new avenue of the spice trade, Western countries accidentally discovered the American continent and the farthest island from human civilization, Easter Island.

The island is full of stone statues of half-bodied human beings, all facing the sea as if waiting for someone to arrive. The Spaniards named them Moai (Figure 3.2), which means sculpture in Spanish and were absorbed as a foreign word in English and Japanese, which led to Moai becoming the specific name for these statues.



(Source: Image by Peter Wollinga)

Figure 3.2 Moai Statues In Easter Island

3.3.3 Cat

Pokemon is a well-known global intellectual property, and both the game and its extension, the anime, have had a huge impact on the world. Due to the younger generation's open attitude towards loanwords and the cool image that they convey, the naming of pokemons and skills in the early days of the game was flooded with loanwords. In this anime, a cat (Figure 3.3) speaks the human language and is responsible for translating the messages between humans and Pokemon, contributing to the whole story. This game will be set in a story where a cat from a different world has an adventure in the human world and learns the human languages.

Based on Japan's unique cat culture and the tourist spots, Cat Island, I will incorporate the two elements of Easter Island and Cat Chino Island into the setting of this game.



(Source: Image by SakSa)

Figure 3.3 Red Cats In Japan Island

3.3.4 Lock

A good interactive operation can leave a deeper impact and memory for the user. When I was a kid, I had a friend whose mom would lock up all the entertainment stuff, toys, games, etc., in a suitcase with a custom lock (Figure 3.4) during the school day. My classmate would systematically try various combinations of numbers before his mom came home from work every day, and would continue until he unlocked the custom lock. When he talked to me about it again many years later, he still mentioned that the password was still in his head at the time.

Therefore, the game is planned to design the first gameplay in the vocabulary practice section to find the correct answer by rotating a set of text reels. Users will need to use the clues provided to find the correct answer, and the combined answers will reduce the risk of randomly selecting the right answer so that players will have to know the word correctly before answering.



(Source: Image by Ulu Bird)

Figure 3.4 Combination Lock On The Suitcase

3.4. Game Components

3.4.1 Title

1. Why called Coai?

With the introduction of the design inspiration in the previous section, it was mentioned that the story is about a cat from a different world who goes on an adventure of learning the languages of the human world. In the background setting, the cat's world and the human world are connected through the mysterious Moai statues. Naturally, in the cat world, the moai statues are redesigned to match the appearance of the cat's features.

The English title of this game is called Coai, the title is mainly inspired by the English word Moai, and then the first letter of M is changed to C, which is the initials of a cat. The Japanese title is a direct translation from the English title, based on the naming rules for Katakana's loanwords.

“ Coai ” is pronounced close to “ core ” from the English and Japanese pronunciations. I hope to convey the core of language learning through this game. On the other hand, the Chinese pronunciation of “ Coai ” has the meaning of “ cute ”. It is also the goal of this game to clear away the

negative impression of learning languages caused by exam-oriented education and restart the fun journey of language learning with the cute little cat. On a literal meaning, it is mainly “ co ” + “ ai ”, the language learning game operated with artificial intelligence. I hope that the game’s kitty would accompany the fellow learners to develop language learning habits as a partner and then recommend specific language learning strategies based on their situation.

2. Logo Design

The theme of this research is to study the acquisition of loanwords in Japanese, so the first version of the logo is based on the English name, followed by a Japanese katakana title that forms a left-right symmetry. The English title is written from right to left, while the Japanese title is written from left to right, meaning that the path of cultural exchange between East and West. In terms of composition, the bracket structure formed also means that this project’s core learning materials are locked in Japanese and English (Figure 3.5).

The logo is surrounded by three konpeito candies that rotate around it. The konpeito was chosen because it was one of Japan’s first loanwords and is still active in modern society. Moreover, it was also one of the favorite snacks of Oda Nobunaga, a famous general during the Warring States period in Japan. At that time, Oda Nobunaga strongly advocated learning Western culture and reforming the military system even though traditional society was generally conservative towards Western culture. His philosophy is also closely related to the content of the Japanese loanwords in this research. The main reason for the appearance of loanwords is to absorb Western civilization and learn advanced knowledge. Furthermore, the three konpeito represent that Chinese students need to find out the English, Japanese and Chinese meaning of the loanwords at the same time.

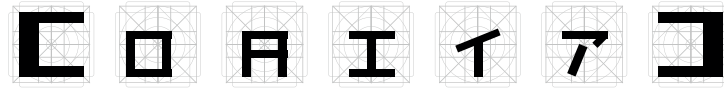


Figure 3.5 Black and White Letter Logo Draft

3.4.2 Story

“ Coai ” is a mysterious statue in Cats World just like the “ Moai ” statue in Humans World (Figure 3.6). One day the little cat called “ Somami ” was absorbed by the “ Coai ” statue’s mouth and head into the Humans World. During looking for a way to return the Cats World, “ Somami ” met a young girl called “ Aiko ” who enjoy her trip to Easter Island.

After the destiny encounter, “ Somami ” accompanied “ Aiko ” to the multiple culture city “ Kioka ”. By finding out how to go back to its world, “ Somami ” need know more about the Humans World. So It decided to disguise as human beings and start learning the human language as its first step in “ Kioka ”.



Figure 3.6 Manga for Game Story Description

3.4.3 Character

The main character (Figure 3.7) is a little cat from a different world. After an encounter with a human, the cat is led to a city known for its multicultural co-existence. By accident, he eats a konpeito with mystical powers, which gives him the capability to transform into humankind. At present, this cat appears as a human form in the illustrations of each vocabulary theme in the game, a spherical form in some game icons and illustrations of words, and a normal form will appear in later developed game scenes.

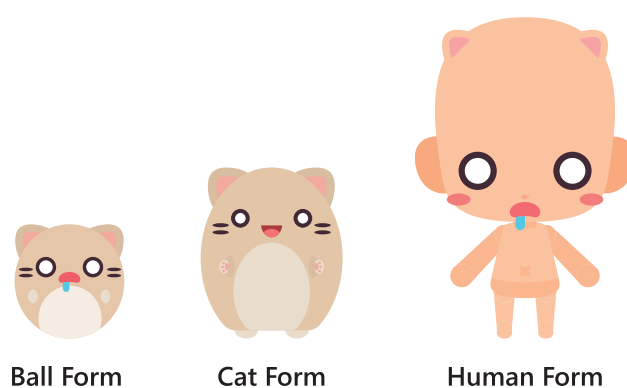


Figure 3.7 Main Character Portrait

3.4.4 Color Scheme

The colors are chosen regarding konpeito and common objects found in Japanese classrooms. The game aims to let all learners feel the charm of language learning and start a fun vocabulary learning journey together with the kitty. The overall color scheme is low purity so that the colors coordinate with each other to provide a relaxed, harmonious atmosphere. The game's primary colors come from the green chalkboard and the red, yellow, and blue konpeito (Figure 3.8).

Then, based on the above proposal, the primary colors are picked up and adjusted. Several low purity color rings were chosen as references for the interface design and word images design. After the color scheme was finalized, the first step was to try coloring the black and white logo to see if the overall effect was

as expected, in other words, if it conveyed a relaxed and playful message. I also interviewed 6 of my friends who play many Japanese games and their first impressions of the logo (Figure 3.9). Their feedback said that the logo is adorable and that it looks easy on the eyes.



Figure 3.8 Main Colour Combo and Palette



Figure 3.9 Logo Design with Selected Colors and Items

3.4.5 Scene

The current scene design is mainly game scene design and menu scene design. Since the game is still in the pre-development stage, I need to handle graphic design, programming and vocabulary data sorting, and so on at the same time. Therefore, I prefer to use flat design to reduce the production time for the scene design. Besides, flat design is one of the most commonly used design strategies in the early stages of commercial game development or indie game development.

Game Scene Design

Low-fidelity design (Figure 3.10). Firstly, the game scene's low-fidelity design is based on the core gameplay of unlocking and decrypting. The game interface has a vertical screen layout. When international students live in Japan, they tend to spend most of their time on the train. Therefore, to meet one of this game's design concepts, we help learners utilize their time to learn loanwords. Using a vertical screen layout, learners can complete all the operations with just one hand on the train. Based on the one-handed control range, the more heavily used buttons are arranged in easy-to-use areas. Buttons for infrequently used are then placed away from the operating area.

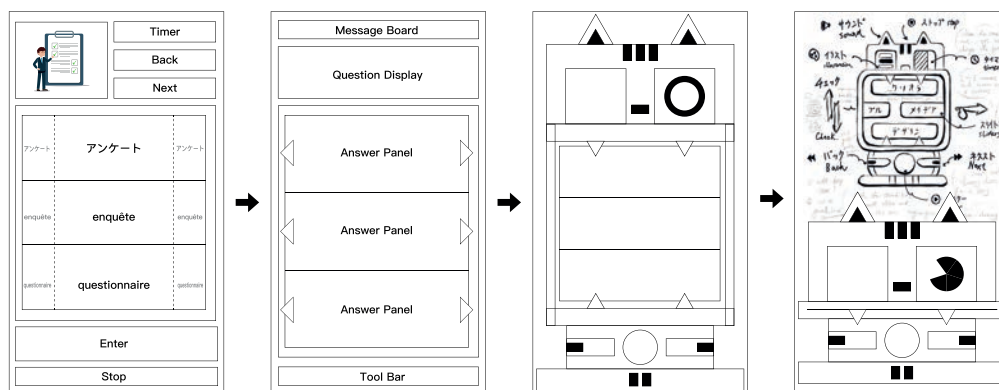


Figure 3.10 The First Low Fidelity Design

Flat design. In combination with the Moai statue feature (Figure 3.11), a cat-shaped statue is placed in the middle of the game screen that can open and close its mouth flexibly. The statue's eyes are used to display hints related to the current

word, such as pictures and audio playing buttons. The mouth is used to display the questions related to the current word. By flicking the slate in the mouth, the user can find the word text and other responses matching the word picture and audio. There is a large red button in the center of the cat's body. When the user has finished searching for the answer, the user can press this red button and let the system confirm whether the answer is correct or not. The background image chosen is an endless ocean. In the human world, the Moai statues are all facing the sea. So opposite to the cat world, all the statues are facing the continent.

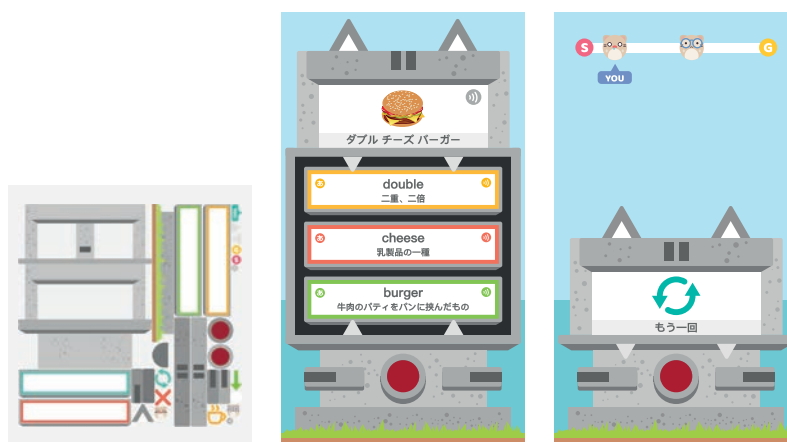


Figure 3.11 Flat Design of Game Scene in First Version

Menu Scene Design

Flat design. The menu scene (Figure 3.12) design is mainly based on the concept of a green chalkboard, displaying various text and picture contents. The text is primarily rendered in white, which corresponds to the most common white chalk used in classrooms.



Figure 3.12 Menu Scene in Current Version

3.4.6 Game Flow Summary

The development of the game follows a modular design concept. In the initial stage, the game's hierarchical management system is referenced to traditional Japanese RPGs, where learners browse through an index of directories to execute the various functions supplied within the game. For instance, players use the theme index to find out the vocabulary they are interested in and start learning. After proceeding to learn, the player can select the words they need to memorize according to their condition to start the practice session.

Throughout several user tests, it took time for non-gamer learners to become familiar with the various modules and functions of the game. Consequently, in-game tutorials must be provided for each module. During the research of popular applications, content recommendation algorithms were found to be widely used in a variety of social media apps. Both young and old have adapted to the extended operating habits of the content recommendation algorithms. These tools are based on the use of big data analysis and the collection of initial information from users to provide them with targeted content that they may be attracted to.

Accordingly, in later stages, the overall flow of the game was redesigned by combining content recommendation algorithms. Learning materials and sessions are automatically recommended based on the user's learning track.

1. Manual Selection Mode

In the overall manual selection mode design (Figure 3.13), the current version of the game is divided into 2 main work areas, the main menu scene and the game scene. In the main menu scene, it mainly displays the game title, basic user data and buttons to open sub-menus. The sub-menus are Game Start, Collections, Scores, Review Plan, Somami Story, and Settings.

- Game Start, the vocabulary learning entrance. Here users can choose the vocabulary they are interested in and start learning.
- Collections, the dictionary of words. Here users can find all the information about the words which have been activated in the theme.
- Scores, the learning progress and results. Users can check the time spent on practicing each theme, the relevant results, and the proficiency of each word.
- Review Plan, the vocabulary review system. Here users can check the progress of words they have learned recently.
- Somami Story, the story introduction. It presents the overview of the game's story in an illustrated book.
- Settings, the game settings. Users can adjust the number of times the words appear in the practice mode and switch the learning language.

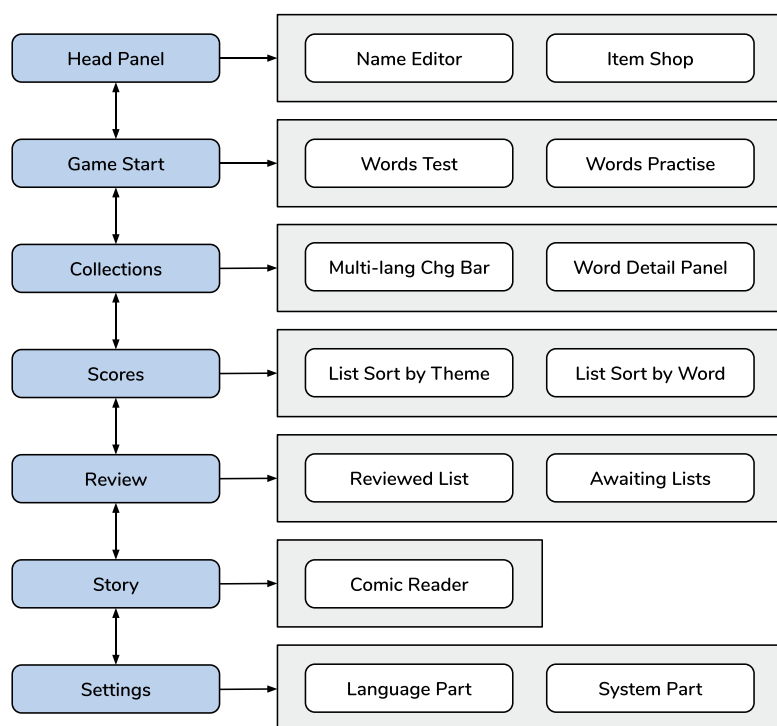


Figure 3.13 Manual Selection Mode Overall Flow Chart

2. Auto Recommendation Mode

In the overall auto recommendation mode design, the current version is divided into the core area and configuration area. The configuration area is based on a modified version of the menu area in manual mode. If learners do not need to change their target learning language or change their interests of themes, they can keep in the core area.

In the core area, the system recommends content based on the information submitted by the user during the initial setup (Figure 3.15). As an example, recommendations for content and each training session are based on the learner's level in the current language, and the range of vocabulary selected, as well as the learner's behaviour and acquisition of vocabulary. In-game, we call this core area the Fast Learning Mode (Figure 3.16). In this mode, it currently consists of a words browsing module, a practice module, a feedback

module, a test module, and a review reminder module (Figure 3.14).

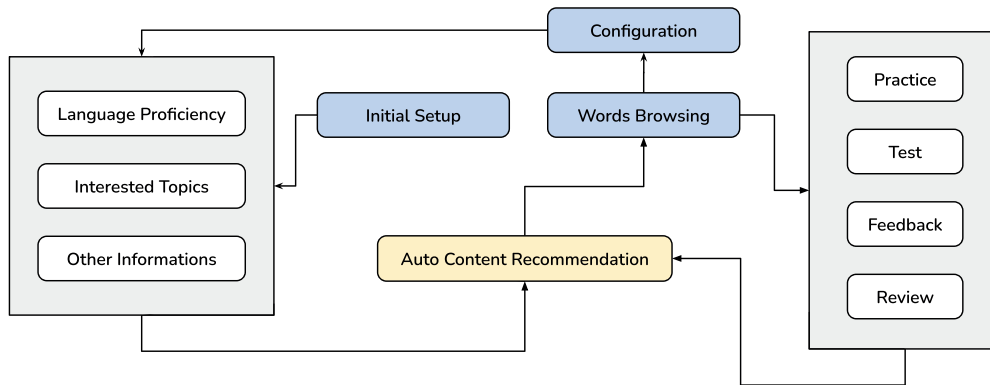


Figure 3.14 Auto Recommendation Mode Overall Flow Chart



Figure 3.15 Screenshots in Auto Recommender System Part One

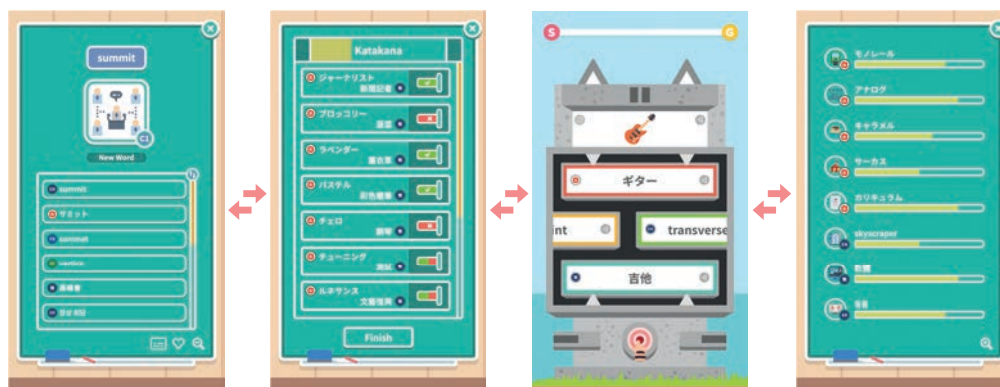


Figure 3.16 Screenshots in Auto Recommender System Part Two

- Words browsing module, basic information corresponding to words is provided. Due to the diversity of the origin of Japanese loanwords, it currently provides not only the English spelling but also French, Spanish, German, Italian and other popular foreign languages. In future versions, each word will be accompanied by explanations, example sentences, and applications in dialogues. In addition, the user can manually bookmark the recommended words, and in subsequent automatic suggestions, the system will try to recommend other words associated with the word, and then extend the recommendation to the next learning theme.

Moreover, during the browsing session, the system will record the learner's traces under each word viewed. For instance, if the learner skips over the word quickly, the system will first determine that the user may have mastered the word or is not interested in the suggested word, and will then confirm this in future practice or testing sessions.

- Practice module, whenever the user completes a certain number of word browsing, the system will ask the user if they want to enter the practice module. Currently, the practice module offers two interactive gameplay. In the future development, we will continue to enrich the gameplay so that learners can enhance their knowledge of the words from different perspectives.

- Test module, based on the analysis of learners' action traces and feedback during the training sessions, certain erroneous words are periodically selected to test learners. Besides, when recommending a new vocabulary list, users will also be suggested to take a full test of the vocabulary list to eliminate words that they have already mastered. The test module is mainly divided into a test of recently learned words and a test of topics.
- Feedback module, as the user completes the practice or test modules, the system lets the learner know the current proficiency level of each word. If the learner needs to modify the study plan, they can click on the detail button to reprogram the following recommendations.
- Review reminder module, in contrast to other word learning apps, the system will not force the user to review the words, but will only display a slide to remind the learner. If the learner is not currently willing to study, they can skip the review session with a simple swipe and continue learning new words. The system will then record the interval between each time the learner enters the review module, and by combining the principle of the Ebbinghaus memory curve, it will remind the learner at the appropriate time. During the review reminder, the system will also show the learner the list of words for the current review. If the learner skips these words several times, the system will determine that the learner may not be interested in these words at that time.

3.4.7 Test Section

Test session (Figure 3.17), meaning that by providing textual information about the word, and quickly judging whether it matches the provided translation or not. Depending on the number of questions, a progress bar at the top of the interface tells the users the time remaining until the test's end. A word question is displayed in each bar. At the top left is the original text and at the bottom right is the translation. Users need to slide the lever on the right side of the bar to confirm whether the provided translation is correct or not. The translation is displayed based on the interface language selected by the user, which means that

if the interface language is English, the corresponding translation will be English. If the learning language is the same as the interface language, the system will prompt the user to choose another language they already know as the translation for the test.

The test session is currently available in 2 modes (Figure 3.18), which can be toggled by the user via the drop-down menu. Special test mode, in which ten core words of that theme are recommended to be tested. Full test mode, which means that users need to test all the words under that theme. To make it easier for users to learn the words, they have not yet mastered it. Words that are answered incorrectly in the test session will be automatically checked off in the practice session's word selection.

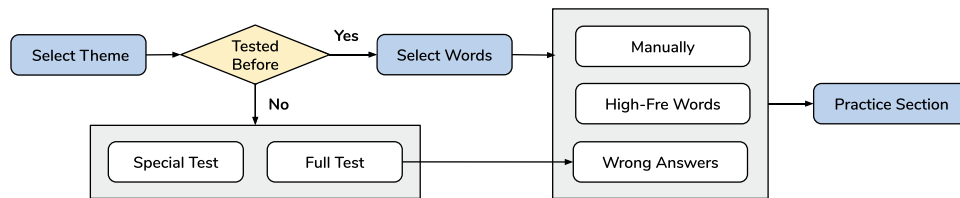


Figure 3.17 Test Section Flow Chart

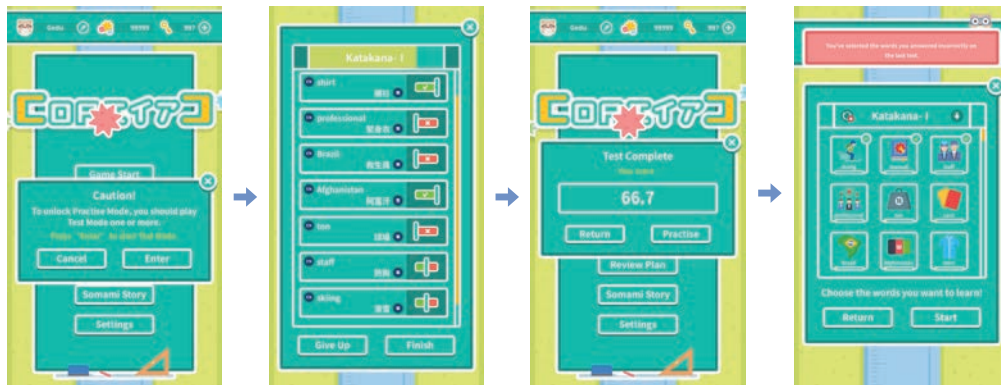


Figure 3.18 Screenshots in Test Section

3.4.8 Practice Section

Practice Section means Game Scene (Figure 3.19). Before entering the practice section, users need to select the theme they want to learn. If it is the first time to practice the theme, the system will require users to do a fast test. Through this test, the system can ensure the mastery of the vocabulary of the theme.

In the word selection panel, users can not only look up the word's proficiency but also check its frequency for specific themes. For instance, in the Japanese anime theme, users can also check how often the word appears in the theme and whether it is a special word. Through this function, users can select the words they need to learn currently.

After entering the practice session, the user will focus on learning the selected words. At the top of the interface, the current progress of the practice session will be displayed. By observing the kitty's position on the track, the user can know the progress of the practice session.

The main interaction area is right in the middle of the screen (Figure 3.20). The cat's forehead is equipped with a pause button that allows the learner to interrupt the playing when the fragment time ends and resume the game when the fragment time is restarted.

Through the eyes of the statue cat, it mainly displays picture information corresponding to the current word and some functional buttons. For example, for some words that you want to add to the review plan actively, you can click on the camera icon, and then the system will pop up a kitty bulletin board to tell the user that the word has been enrolled in the review plan. In the loanword learning mode, for some loanwords, the system will give further text information on the spelling of some Roman words, which will help users to remember and find the relevant answers. If the user clicks on the audio button icon, it will play the current word's pronunciation.

There is a large red button in the center of the cat's body, which can be pressed when the user completes the answer search so that the system can confirm whether the answer is correct or not. If the learner answers correctly, the answer will move on to the next word or prompt the practice section's end. If the answer is incorrect, the current version asks the user to continue seeking the relevant answer until the answer is correct.

On the way to the practice section, Konpeito will be dropped from the cat's mouth. This is currently the only item used in the game and is used to unlock new vocabulary themes. At the end of the exercise, the system will tell the user the proficiency status of each word and the number of items acquired.

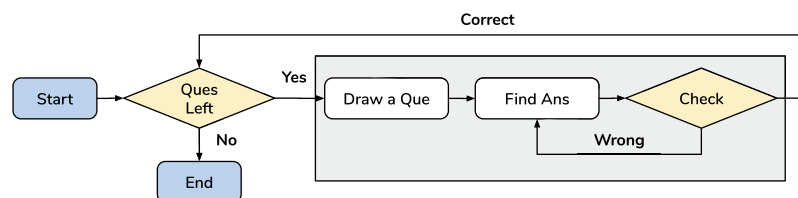


Figure 3.19 Practice Section Flow Chart

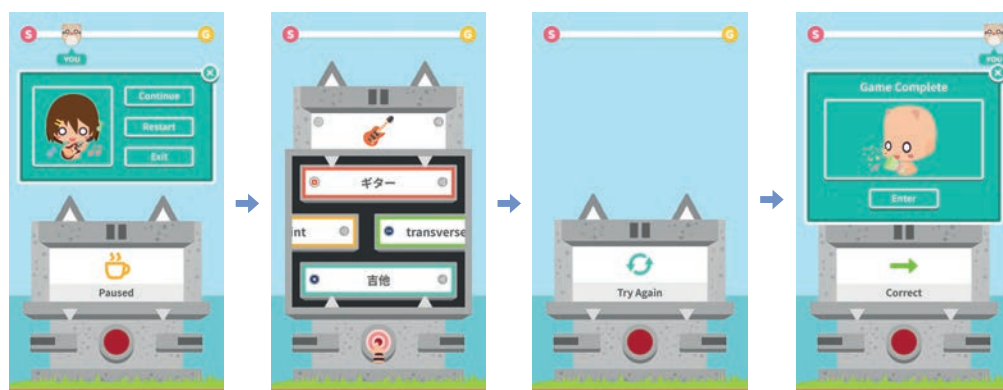


Figure 3.20 Screenshots in Practice Section

3.4.9 Review Section

Words that the user answered incorrectly in the test, and practice sessions will be added to the review system (Figure 3.21). In the review system interface, there are two main areas. Area 1, the table of reviewed words. Area 2, the table of words to be reviewed.

Area 1 shows the words that the learner has already reviewed, and these words will be transferred to Area 2 after a specific time.

In Area 2, the form is divided into four tables based on four timelines. The latest words added to Area 2 go into a table called 24 Hours or Less. If the user reviews it in time, the word is moved to Area 1, which is the table where the word has been reviewed. If the user does not review the word within 24 hours, it is moved to a 3 Days or Less table. If the user has not reviewed the word in a month, it is shown that the user has no current interest in learning the word. The system will automatically remove the word from the review system. In the review system (Figure 3.22), the user can review the word repeatedly. When the word reaches maximum proficiency, the system will also remove the word from the review system.

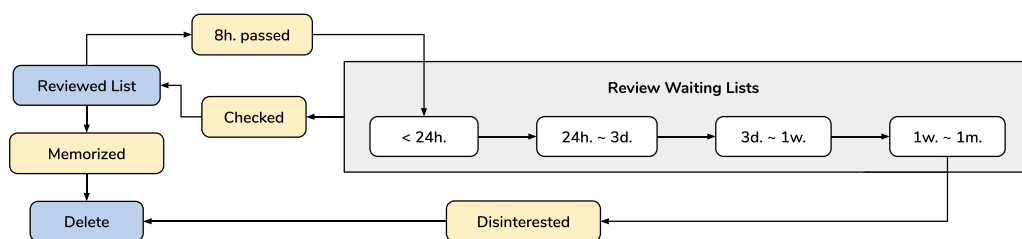


Figure 3.21 Review Section Flow Chart

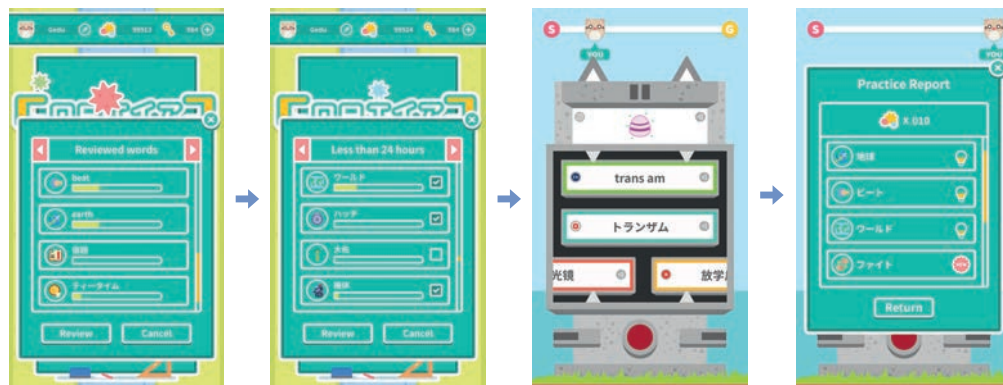


Figure 3.22 Screenshots in Review Section

3.4.10 Scores and Collections

1. Scores

In the scores menu (Figure 3.23), there are currently two display modes. In the word list mode, it shows the proficiency of words the user has learned so far. In the theme list mode, it shows the test scores for each theme list. The users can view their initial test score and highest test score for the theme, the amount of practice time spent, and the number of words with maximum proficiency in the theme.



Figure 3.23 Screenshots in Scores

2. Collections

In the Collections mode (Figure 3.24), the user can view messages for all words under all activated themes. These are pictures of the word, text, and audio information and proficiency for the word in multiple languages. When the user clicks on a word's thumbnail, the top panel will zoom in to show the word's picture and text information and play the word's audio in the currently selected language.



Figure 3.24 Screenshots in Collections

3.5. Vocabulary

The vocabulary currently contains a total of 17 themes (Figure 3.26), 187 sub-themes (Figure 3.27) and over 8,000 words (Figure 3.28) from everyday life, work, interests, subjects, and any other topic among the international students in Japan.

Since the educational game is not solely focused on learning Japanese loan-words, therefore, in the original vocabulary list design, the text information for all words is not limited to English, Japanese, Traditional Chinese, and Simplified Chinese. It also provides Arabic, Spanish, French, Italian, Hindi, Korean, Polish, Portuguese, and Russian languages (Figure 3.25). According to international students' nationality distribution in Japan, I have translated the words meaning into Vietnamese, Malaysian, Thai, and other Southeast Asian languages.

en-uk	ja	zh-tc	ar	de	es	fr	hi	it	kr	pl	pt	ru
course	コース	課程	قورس	kurs	curso	cours	कॉर्सेस	corso	코스	kurs	curso	курс
copy	コピー	拷貝	كوبى	kopieren	copiar	copie	प्रतिलिपि	copia	부	kopij	cópia	копия
Colombia	コロンビア	哥倫比亞	كولومبيا	kolumbien	colombia	colombie	कोलंबिया	colombia	콜롬비아	kolumbia	colômbia	колумбия
Reuters	ロイター	路透社	زوت روتر	reuters	reuters	reuters	रॉयटर्स	reuters	로이터	reuters	reuters	рейтер
design	デザイン	設計	ديزاين	design	diseño	conception	डिजाइन	design	디자인	projektowanie	design	дизайн
Netherlands	オランダ	荷蘭	النيرلاندي	niederlande	países bajos	pays-bas	नीदरलैंड	otanda	네덜란드	holandia	países baixos	нидерланды
Iran	イラン	伊爾蘭	ایران	iran	irán	Iran	ईरान	iran	이란	iran	irá	иран
celebrity	タレント	藝人	ريتلر	berühmtheit	celebridad	celebrité	सेलब्रिटी	celebrity	유명 인사	celebryci	celebridade	знаменитость
soft	ソフト	柔和	مراغن	sanft	suave	doux	सुसावस	morbido	부드러운	miękki	suave	мягкий
Hawaii	ハワイ	夏威夷	هاواي	hawaii	hawai	hawaii	हवाई	hawaii	하와이	hawaje	hawai	гавайи

Figure 3.25 Part of the Multilingual Words Database



Figure 3.26 Some Examples of Theme Icon

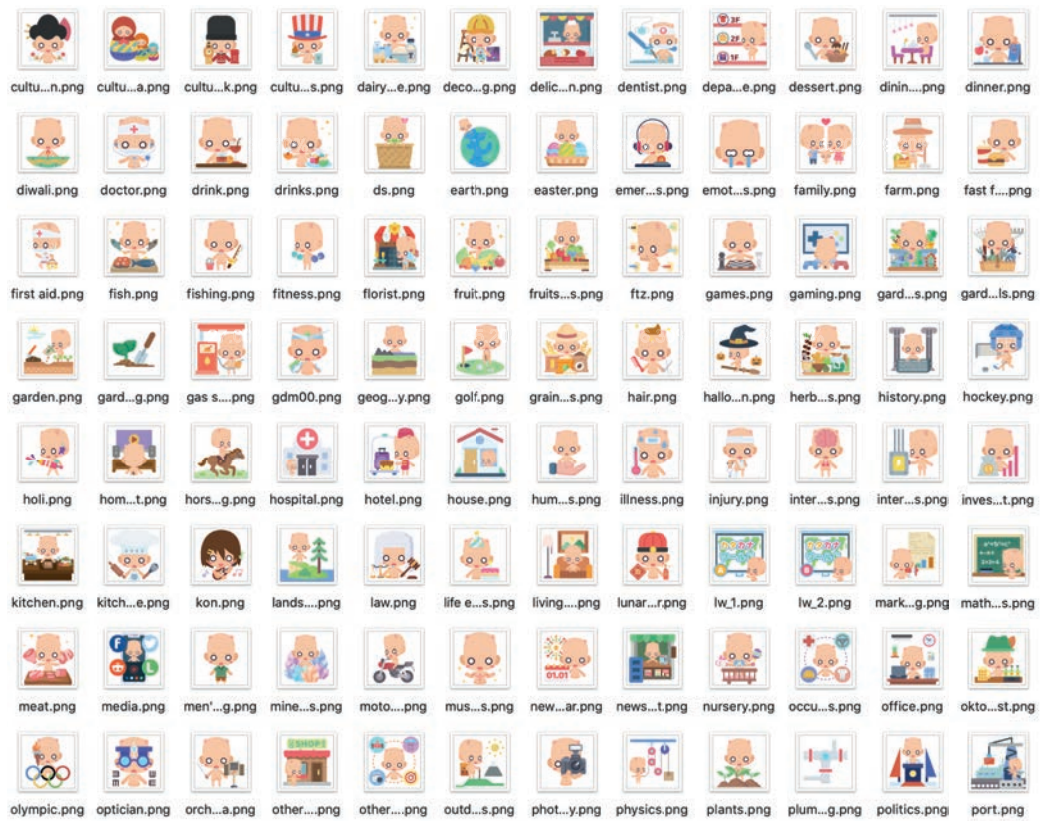


Figure 3.27 Some Examples of SubTheme Icon

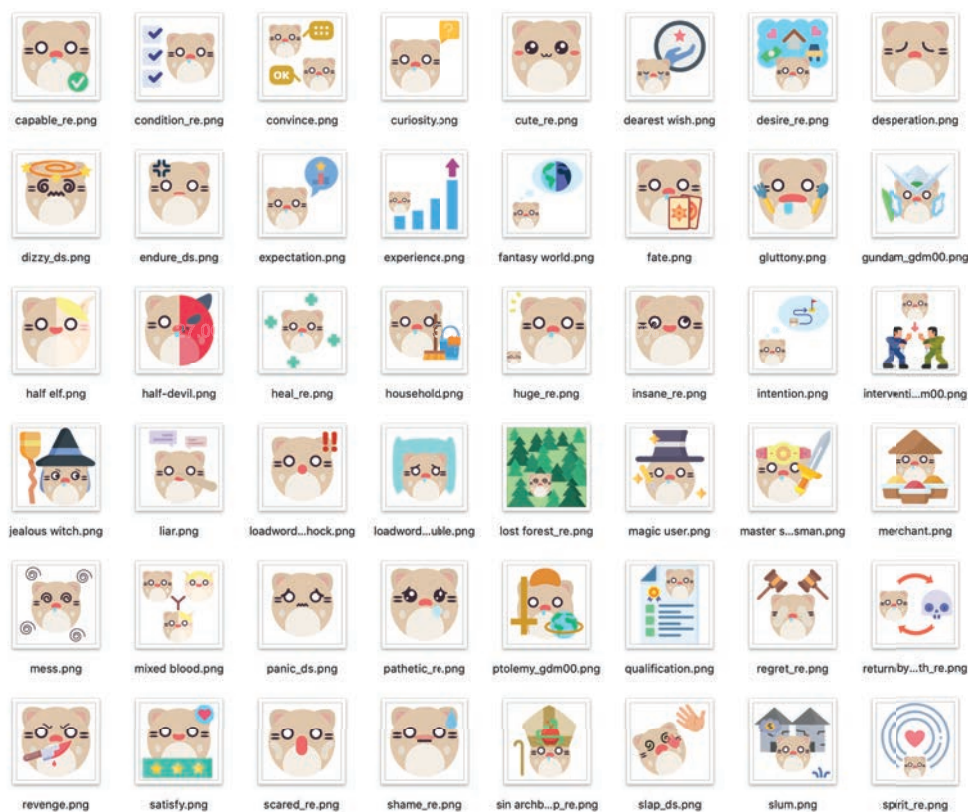


Figure 3.28 Some Examples of Word Icon

3.5.1 Simultaneous Learning of Two Similar Languages

In our globalized society today, mastering English can allow us to communicate quickly and effectively with people from other countries. But for non-native English speakers, much of the communication is superficial. If you want to engage in more in-depth contact with them, the best way is to learn their native language. Moreover, mastering a new foreign language gives us the key to open the door to the country's culture and history.

Furthermore, with the global spread of English education, many students who reach higher education are already familiar with English. At their undergraduate level, many colleges and universities require students to take a second foreign language course. As a result, people choose to study a second foreign language

based on the first foreign language that they have mastered. For example, English is closely related to German and Dutch, which are also Germanic languages, and the Romance languages, which are near associated with English in terms of vocabulary, French, Italian, Spanish, and Portuguese.

All the above languages have a remarkable similarity in spelling and pronunciation of various words. By comparing words in several languages (Figure 3.29), we can understand the subtle differences in the description of the same object in each language from a multi-dimensional perspective and breakthrough a single language's boundaries to gain a deeper understanding of the human history hidden behind the word. I will introduce the details of the above in my next research topic.

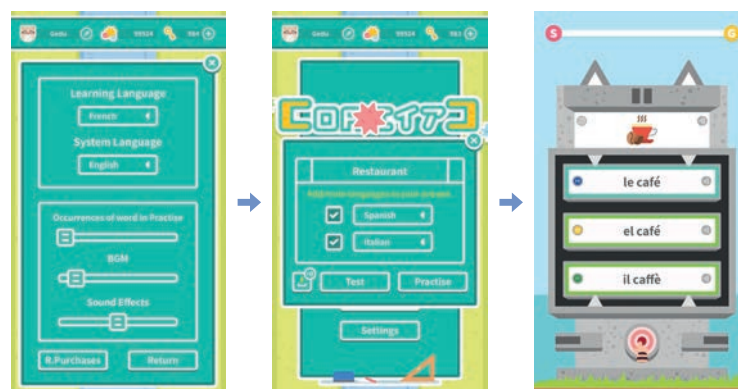


Figure 3.29 Screenshots in Multi-Lang Learning

3.5.2 Multi-Language Translation Strategy

Based on my language skills range, I can determine the anime vocabulary list in English, Japanese, and Chinese without mistakes. Then, we translate the Japanese, English, and Chinese words into words in the target language through the language translation API call. After that, the API used above is called again to translate the three translated results back to English. The three back translations are then compared with the original English words, and the word with a similar meaning is picked out (Figure 3.30).

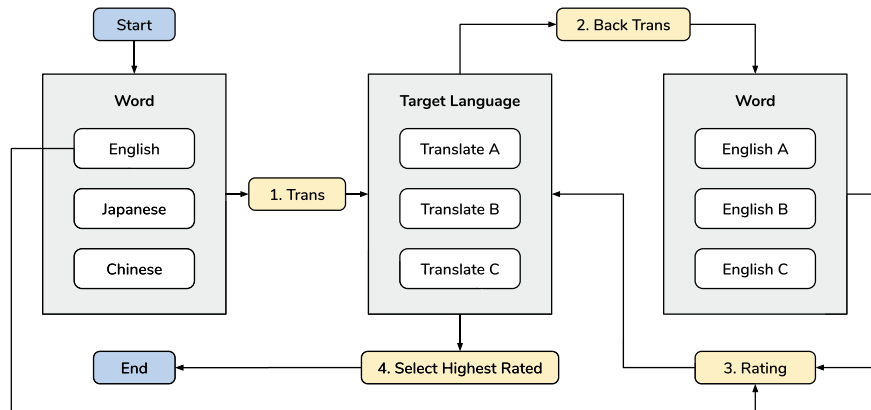


Figure 3.30 Multi-Lang Trans Flow Chart

The above description is only the case of using one translation API. At present, when I translate word lists, I call the translation APIs of Google, Sohu, Netease, and DeepL at the same time, which can generate 12 translation results each time (Figure 3.31). Currently, I have scripted an algorithm to score each translation result. There are two main scoring criteria. The first is the similarity of the back translation results to the original English word. The second is the similarity of the reverse translation results to those of the same group. The high score translation result is then selected from them. The system will mark recommended results below a certain score for later manual checking and correction.

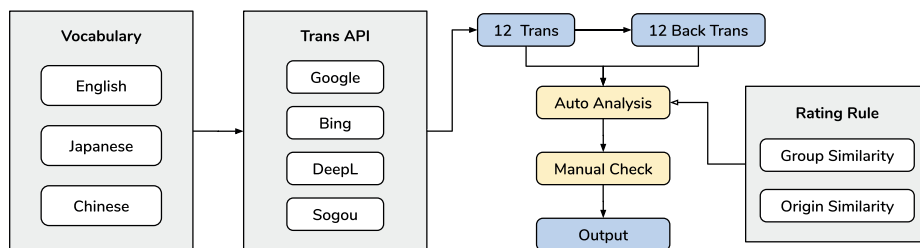


Figure 3.31 Current Processing of Multi-Lang Trans

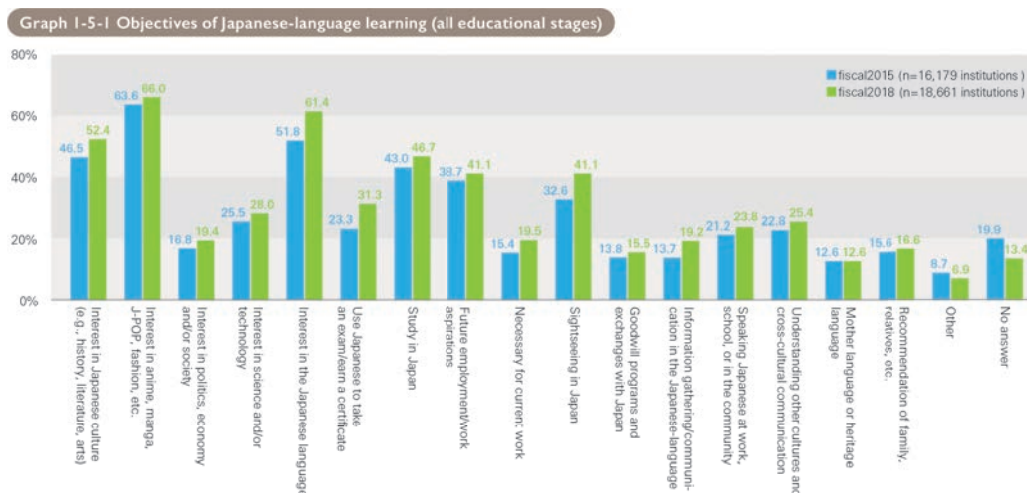
3.5.3 Designing Vocabularies from the Interest Perspective

To remember words in a foreign language has always been a difficult task. If words are memorized through dictionaries or vocabulary flashcards, they have very often failed to achieve much due to a lack of language environment. For example, they memorize many required vocabulary lists before a language test through a specific word learning app. When the exam is over, they will quickly forget what they remembered before the exam because they do not have any chance to reencounter these words in their daily lives. Many language education institutions are now using VR technology or deeply customizing various video resources to prepare enough associated material for each learning word. For instance, allowing users to view clips of that English word being used in different scenes of different American dramas.

The concept of this research is to learn Japanese loanwords by using the fragmented time of international students. Therefore, it is unnecessary to provide a large amount of relevant information about the learning words within the fragmented time. The research focuses on activating the user's past background information on the topic of the word list by categorizing the word list, thereby assisting the user in forming links between the currently learning words and their past knowledge to be memorized efficiently. The vocabulary list is highly relevant to international students in Japan, mainly based on their experiences. Since learners themselves have some awareness of the classified themes, it is easier for them to connect what they have learned with new words. Besides, since the words in the word lists are from a fixed range, there are also some connections among them.

Based on the latest Survey Report On Japanese-language Education Abroad 2018 (Figure 3.32). We can understand that more than 60 percent of foreigners are learning Japanese with the primary purpose of acquiring a deeper understanding of the culture of Japanese anime and games. Before receiving formal Japanese language education, these learners had already watched a great deal of anime, manga, and games through native language dubbing or subtitles. They have a particular awareness of the high-frequency words that appear in these anime series. Besides, for native English speakers, most foreign words that appear in the shows come from English. As they choose the anime vocabulary list, they are interested

in, and learners can already associate these fragmentary words together in their minds.



(Source: Survey Report on Japanese-Language Education Abroad 2018 by The Japan Foundation)

Figure 3.32 Objectives of Japanese-language Learning

As an example, the topic of cyborg contains a lot of high-frequency nouns and verbs that are commonly used in the military field. Since the learners themselves are familiar with the topic, when they see the pictures of the word and the text information, they can quickly recall how the word appears in the anime show and how it relates to other words.

3.5.4 Text Mining

After completing the general vocabulary list, I attempted to design the vocabulary list based on the above proposal to develop the interest aspect's vocabulary list. Most of the international students in Japan have some knowledge of Japanese anime. Some famous anime works from the last ten years were chosen as the vocabulary list design objects in the experimental stage. By using the text data statistical analysis tool, Kh Coder, developed by Associate Professor Higuchi Koichi, Department of Industrial Sociology, Ritsumeikan University, the high frequency word list of the selected anime was obtained (Figure 3.33).

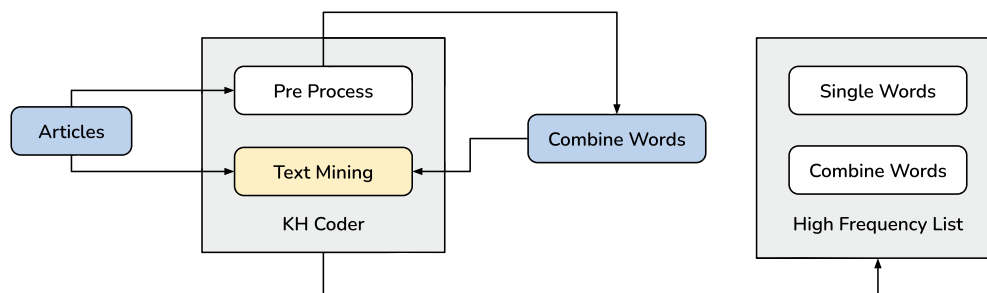


Figure 3.33 High Frequency Words Computing Process

Take Sword Art Online as an example. After data analysis and statistics, we found each word and phrase's frequency in the whole series (Figure 3.34). First, we sorted the words by the number of appearances and selected 100 high-frequency words from the results. Then a manual check was conducted to eliminate some non-subject-related words. Then, through data review, the corresponding expressions of the word in English and Chinese are determined. Finally, through the translation strategy described above, a multilingual vocabulary list for the anime is built.

en-uk	ja	zh-tc	fre.
back	バック	後面	281
player	プレイヤー	玩家	186
try	トライ	嘗試	161
game	ゲーム	遊戲	160
memory	メモリ	存儲器	139
live	ライブ	直播	117
save	セーブ	儲存	116
power	パワー	力量	113
stop	ストップ	停止	110
attack	アタック	攻擊	102
Death Gun	デスガン	死槍	100
knight	ナイト	騎士	99
real world	リアルワールド	現實世界	92
guild	ギルド	公會	77
love	ラブ	愛	69
stand	スタンド	立場	66
System Call	システムコール	系統調用	62
system	システム	系統	62
party	パーティー	團隊	58

en-uk	ja	zh-tc	fre.
party	パーティー	團隊	58
monster	モンスター	怪物	57
level	レベル	等級	56
money	マネー	金錢	54
return	リターン	返回	52
member	メンバー	成員	51
shoot	シュート	發射	51
turn	ターン	回合	51
item	アイテム	道具	50
single	シングル	單一	49
Under World	アンダーワールド	地下世界	48
art	アート	藝術	47
safe	セーフ	安全	47
idea	アイデア	想法	44
line	ライン	行	44
beat	ビート	打擊	40
hit	ヒット	點擊	40
virtual world	バーチャルワールド	虛擬世界	39
account	アカウント	帳號	37

en-uk	ja	zh-tc	fre.
catch	キャッチ	捕捉	37
bit	ビット	比特	33
element	エレメント	元素	32
clear	クリア	通關	32
change	チェンジ	改變	32
pass	パス	通過	32
set	セット	設置	32
area	エリア	區域	31
case	ケース	案件	31
quest	クエスト	任務	30
convert	コンバート	轉移	27
server	サーバー	伺服器	27
sword skill	ソードスキル	劍技能	17
Light Cube	ライトキューブ	光立方	12
solo	ソロ	獨行	10
log out	ログアウト	登出	3
login	ログイン	登錄	3
data	データ	數據	1

Figure 3.34 Frequency of Japanese Loanwords in Sword Art Online

3.6. Project Timeline

- 08.2019 - 09.2019, Theme Decision

The initial discussions confirmed that this research aimed to develop Japanese language education tools for international students in Japan. The first idea was to create a prop for the Japanese conversation class in a small group. Using the prop, the teacher and students can role-play and quickly engage in dialogues in each session. And this prop was also equipped with a battle chess mode, which trained students to express Japanese logically through board games.

After a small-scale interview, it was revealed that international students in Japan, especially from mainland China, were most confused by katakana words in the Japanese language. Based on my own experience in learning katakana and my knowledge in game development, I decided to focus my research on helping Chinese international students grasp katakana words efficiently through an educational game.

- 10.2019, Research on Related Works and Ideation of First Version

In the literature review, it was also discovered that mainland China has long been absorbing foreign words by free translation. This has led to the fact that mainland Chinese students are not as adaptable to learning foreign words in Japan as other students from countries that use literal translation to absorb foreign words. Some of the papers also show that it is possible to promote katakana words memory by including information about the origin alphabet writing of the words, especially the foreign words from English.

Because Chinese students commonly have more than ten years of English language learning experience, it was decided to design a vocabulary memorization gameplay that could simultaneously display three languages. The first version of the proposal explained how to answer the questions by rotating a combination lock and the vocabulary theme used for the first user test.

- 11.2019, Prototype Development of First Version

On the development of the first version, the focus was placed on the implementation of the core gameplay. Regarding the main tools used in this project, Clip Studio Paint was used for sketching, Adobe Illustrator was used for graphic design, Cocos Creator was chosen for the game development platform, and the development language was mainly JavaScript.

The first vocabulary was focused on eating out, and three fast-food restaurants that are well-known in both Japan and China were selected. The names of foods containing foreign words were picked up from the menus. More than 20 words were chosen for each restaurant, and each word had a Japanese, English, and Chinese meaning. According to the name of the food, design the visualization material for the words.

- 12.2019, First User Test

For the first user test, three students who are studying at Japanese language schools were invited. All of them have lived in Japan for more than one year and have a JLPT N2 qualification. After the testing, they gave me suggestions on how to improve the vocabulary list and gameplay further. Some examples were that they would like to contain vocabulary related to university subjects and the possibility to exclude words that they have mastered before practising.

- 12.2020, Ideation of Second Version

In the first version, it was almost implemented the core gameplay. On the game system development, the second version mainly planned to complete the following modules.

- Main game interface design: It is used to link the various modules of the system, user profile and game title display.
- Level management system: There are two hierarchical levels, parent and child.
- Words Index system: Display of text, pictures and audio for each word in each theme.
- Achievement system: Shows the user's test score and total practice time for each vocabulary theme.

- Review system: Words that are answered incorrectly in the practice session are automatically added to the review system. There are two main sections in the review system, the reviewed list and the waitlist. The waiting list is divided into four divisions according to forgetting curve theory.
- Setting system: Switching learning language and interface language. Controlling the number of questions per word in the practice mode and the volume of sound effects.

On the vocabulary database building, based on the feedback from the testers and the popular topics in the life of international students in Japan, 53 sub-themes were collected and categorized into eight parent themes.

- 12.2019 - 03.2020, Vocabulary Design and Data Collection

Based on the 53 sub-themes defined in the second version, a total of 1984 common words are included. Pictures, audio and text messages accompany each word. The text data includes phonetic information in English, kanji, hiragana, and katakana in Japanese, and traditional and simplified phonetic symbols in Chinese.

- 01.2020 - 04.2020, Prototype Development of Second Version

According to the plan of the second version, I set up a project development schedule, and it took three months to complete the functions as mentioned above. Since some of the features were implemented for the first time, a small-scale user testing was conducted during the development process. Then, based on the feedback, we optimized the interface display and interaction.

- 05.2020, Second User Test

Three international students studying in university in Japan were invited for this user test. This time, in addition to collecting suggestions for game improvement, it also gave me ideas on how to upgrade the vocabulary list further.

In Japanese universities, many students take a foreign language course other than English. For Chinese students, although some of them take Japanese classes, most of them, like their Japanese classmates, take a popular second language such as Spanish, Italian and French. They also mentioned that studying these languages helps them to improve their vocabulary in English and Japanese loanwords.

English contains many foreign words from other languages as well. In previous English words learning, some words that are difficult to pronounce or have unnatural spelling patterns are mostly from the languages as mentioned above. In the Indo-European family of languages, the pronunciation and writing of their words have a certain correlation.

- 05.2020, Ideation of Third Version
 - Expansion of Vocabulary List and Multi-language Support: Collect more intermediate and above common high-frequency words and build a multilingual vocabulary database through searching and with the help of multilingual specialists.
 - Story Design: Reintegrate elements imported from the current game and give special meaning to the game’s material through an overhead world view and original story.
 - Character Design: Different shapes are designed for the main character to suit different situations to identify the difference between game icons in themes and words.
 - Optimization of the game’s internal interactions and visual and audio effects.
- 06.2020 - 07.2020, Prototype Development of Third Version

In this version update, the focus was on considering the game’s worldview, story outline, and character design. After defining the main character, all vocabulary-themed icons were first redesigned. A daily plan was then established to gradually redesign the word icons by incorporating elements of the main game character. The character’s 2D visualization was boned using the Dragonbone software, and a short animation was designed for each theme.

While building the multi-language vocabulary database, we started to try to call several translation APIs to mechanically translate the words we could not find the corresponding translation reference. When confirming whether the mechanical translation results are correct, we mainly use the back-translation approach. If the English translation result is similar to the original meaning, it is initially considered correct. For non-abstract words, the translation results are further searched for images, and if the results are the same as the original meaning of the words, then the translation results are adopted.

- 06.2020 - 10.2020 Specialized Vocabulary Design

Utilizing Kh-Coder, a text-mining tool developed by Ritsumeikan University, high-frequency words from various anime such as Sword Art Online, Mobile Suit Gundam 00, K-On!, Re: Zero, Demon Slayer, and Attack of the Titan were figured out, totalling 1,000 words.

Moreover, for anime works with science fiction or magic genre, there are relatively more foreign words in the high-frequency vocabulary. And for similar topics, the high-frequency vocabulary lists are more similar. This leads to a new learning proposal that, after learners have finished learning the high-frequency vocabulary of a certain anime, they can be recommended to watch anime with similar themes as part of their vocabulary learning practice.

- 07.2020 - 09.2020, Third User Test

The user test was conducted with seven international students from China studying in Tokyo and a group of non-mobile game users. The main feedback was that the game's interface is complex and requires some learning time. They suggested optimizing the interface and operation flow to enter the vocabulary learning process after launching the app immediately. Furthermore, the gameplay can be further enriched by adding some existing word puzzles as long as they are not original.

- 08.2020, Ideation of Four Version

The automatic multi-language translation system of words: Establish an utterly automated translation process by using Python+Pandas and Google App Script. Optimize the judgment process to improve the closeness of the selected one to the original meaning.

Learning contents auto-recommendation mode: Setting up a data analysis system in the cloud and an auto-recommendation algorithm for the game modules lets the system automatically estimate the next steps the user is supposed to practice. And for users, who only need to have some experience in social media app operation, every time they swipe their finger, the system will automatically recommend different sections based on the user's current learning progress.

- 09.2020 - 11.2020, Prototype Development of Four Version

The difficulty of the development of this version is mainly in the design of the automatic recommendation algorithm. Moreover, to ensure that the content learning recommendation function can be effective, when user data is still on a relatively small scale. Therefore, we added some default learning paths for some languages.

For example, when learning Japanese, language learners from Kanji circles will be recommended mainly Japanese words and Kanji words. If they are from Europe or the United States, they will be given priority in learning Japanese loanwords. In this way, the learners can connect the new learning language and their acquired language at an early stage and increase their interest in language learning.

Chapter 4

Evaluation

4.1. Methodology

4.1.1 Research Design

To verify whether providing International students learning loanwords with the Arabic letters, mainly from English, affects vocabulary memorization, I designed the following experiment.

Seven international Chinese students in Japan will be invited for this experiment, and they will learn Japanese loanwords in two conditions by using the game prototype mentioned in Chapter 3. For condition A, the prototype will not provide the English spelling of loanwords when the tester is learning. Contrary to condition B, English spellings will be presented to the tester.

The vocabulary list was based on 200 high-frequency vocabulary words from social news, from research supporting the proposed rephrasing of loanwords conducted by the National Institute of Linguistics in 2008. The learning materials used in conditions A and B will be equally divided between the 200 high-frequency words described above. In addition, jreadability analysis, a system to judge the reading difficulty of Japanese vocabulary, showed that the learning difficulty of the two vocabulary lists was almost the same.

Since Condition A and Condition B had the same sample, this means that the experimental group was also the control group itself, the paired t-test was mainly used in the data analysis to verify whether the hypothesis of the experiment was established.

To check the testers' understanding of the vocabulary list, a pre-test was conducted with the whole participants before learning. After finishing the pre-test, the tester will learn the loanwords by using the provided game, and the learning

session for each vocabulary list is 30 minutes. To avoid the influence of instant memory, the post-test is conducted 2 hours after the end of the learning session. After the pre-test, I will interview the testers to discuss their opinions on Japanese loanwords learning and suggestions for modification.

4.1.2 Participants

The test participants, aged between 20 and 30 years old, were Chinese students studying in Japan whose Japanese language proficiency was N2 or above.

For international students who have not participated in the JLPT, their Japanese proficiency will be judged based on their other Japanese scores or attending a Japanese university or graduate school. For example, to apply for admission to a university or graduate school in Japan, it is generally necessary to have a Japanese language proficiency of N2 or higher. In addition to the JLPT pass result, it is also possible to submit the equivalent EJU Japanese test score. Some Chinese students choose the 2+2 program, a joint study abroad program between a local university and a university in Japan. Therefore, when they graduate, they will also get a graduation certificate from the Japanese university. Therefore, even if they do not have N2 or N1 certificates, they will be considered international students with the appropriate Japanese language proficiency level when applying for graduate school in Japan.

Therefore, in this study, we will determine whether the N2 level or above is met based on the Japanese university's criteria for measuring international students' Japanese language ability.

4.1.3 Test Items

About the Selection of Vocabulary. The purpose of this research is to design an educational game for learning Japanese loanwords efficiently on mobile devices, based on the current study and living situation of international students in Japan, so that students can communicate more smoothly with their Japanese friends in daily life and at work. Therefore, 200 high-frequency loanwords from Japanese social news were chosen for this vocabulary list. The vocabulary was then divided into two lists of 100 high-frequency words each while maintaining the same learn-

ing difficulty level. The list is based on a research report on Japanese loanwords published by the National Institute of Japanese Language in 2008. The data were obtained by analyzing all articles on social news in the Mainichi Shimbun over ten years.

en-uk	ja	zh-tc	en-uk	ja	zh-tc	en-uk	ja	zh-tc	en-uk	ja	zh-tc
kilometer	キロメートル	千米	start	スタート	開始	clovis	ダイオキシソ	二噁英	interview	インタビュー	採訪
group	グループ	群體	computer	コンピューター	電腦	concrete	コンクリート	混凝土	hit	ヒット	點數
centimeter	センチ	厘米	pachinko	パチンコ	彈珠機	Mexico	メキシコ	墨西哥	Pakistan	パキスタン	巴基斯坦
building	ビル	建築物	ton	トン	噸	ticket	チケット	門票	Turkey	トルコ	土耳其
New York	ニューヨーク	紐約	London	ロンドン	倫敦	recall	リコール	召回	consultant	コンサルタント	顧問
member	メンバー	成員	Italy	イタリア	義大利	Africa	アフリカ	非洲	lead	リード	導數
team	チーム	團隊	Peru	ペルー	秘魯	symposium	シンポジウム	研討會	Vietnam	ベトナム	越南
gas	ガス	氣體	tape	テープ	帶子	motorcycle	バイク	摩托車	restaurant	レストラン	飯店
France	フランス	法國	Los Angeles	ロサンゼルス	洛杉磯	set	セット	設置	Switzerland	スイス	瑞士
terrorism	テロ	恐怖主義	ballot	トドル	票所	California	カリフォルニア	加州	space shuttle	スペースシャトル	太空梭
system	システム	系統	card	カード	卡片	Australia	オーストラリア	澳大利亞	Afghanistan	アフガン	阿富汗
home	ホーム	家	helicopter	ヘリ	直升機	Indonesia	インドネシア	印度尼西亞	zero	ゼロ	零
professional	プロ	專業	knife	ナイフ	刀	appeal	アピール	展示	stress	ストレス	壓力
apartment	アパート	公寓	news	ニュース	新聞中心	beer	ビール	啤酒	sexual harassment	セクハラ	性騷擾
comment	コメント	評論	network	ネットワーク	網路	bag	バッグ	袋子	shirt	シャツ	襯衫
Washington	ワシントン	華盛頓	bubble	バブル	泡沫	manual	マニュアル	手冊	journalist	ジャーナリスト	記者
Thailand	タイ	泰國	dome	ドーム	穹頂	tour	ツアー	旅遊	gram	グラム	公克
Iraq	イラク	伊拉克	camera	カメラ	照像機	staff	スタッフ	職員	curry	カレー	咖哩
volunteer	ボランティヤ	志願者	money	マネー	錢	game	ゲーム	遊戲	stand	スタンド	立場
fax	ファクス	傳真	general contractor	ゼネコン	建築承包商	privacy	プライバシー	隱私	page	ページ	頁面
service	サービス	服務	media	メディア	媒體	peak	ピーク	峰頂	pipe	パイプ	管道
contest	コンテスト	競賽	series	シリーズ	系列	campaign	キャンペーン	活動	supporter	サポーター	支持者
video	ビデオ	視頻	skiing	スキニー	滑雪	millimeter	ミリ	毫米	motorcycle	オートバイ	摩托車
glass	ガラス	玻璃	Brazil	ブラジル	巴西	poster	ポスター	海報	season	シーズン	季節
taxi	タクシー	計程車	level	レベル	等級	homeless person	ホームレス	流浪漢	title	タイトル	標題

(Source: <https://www2.ninjal.ac.jp/gairaigo/Report126/report126.html>)

Figure 4.1 Vocabulary List Used in Control Group

en-uk	ja	zh-tc	en-uk	ja	zh-tc	en-uk	ja	zh-tc	en-uk	ja	zh-tc
center	センター	中心	club	クラブ	俱樂部	engine	エンジン	發動機	model	モデル	模型
television	テレビ	電視	theme	テーマ	主題	image	イメージ	形象	Spain	スペイン	西班牙
hotel	ホテル	酒店	open	オープン	開	camp	キャンプ	露地	loan	ローン	貸款
case	ケース	案子	check	チェック	檢查	virus	ウイルス	病毒	Nobel	ノーベル	諾貝爾
apartment	マンション	公寓	door	ドア	門	concert	コンサート	音樂會	restructuring	リストラ	重組
Russia	ロシア	俄羅斯	Seoul	ソウル	漢城	dam	ダム	壩	Florida	フロリダ	佛羅里達州
trouble	トラブル	麻煩	India	インド	印度	Canada	カナダ	加拿大	donor	ドナー	捐贈者
bus	バス	巴士	tunnel	トンネル	隧道	Olympics	オリンピック	奧運會	leader	リーダー	領導
miss	ミス	失誤	mass communication	マスコミ	大眾傳播	course	コース	課程	swimming pool	プール	游泳池
manufacturer	メーカー	製造商	mini	ミニ	迷你	copy	コピー	拷貝	drama	ドラマ	電視劇
data	データ	資料	supermarket	スーパー	超市	Colombia	コロンビア	哥倫比亞	test	テスト	測試
Asia	アジア	亞洲	party	パーティー	派對	Reuters	ロイター	路透社	access	アクセス	訪問
dollar	ドル	美元	shock	ショック	震驚	design	デザイン	設計	clone	クローン	克隆
internet	インターネット	互聯網	Paris	パリ	巴黎	bed	ベッド	床	demonstration	デモ	示威
truck	トラック	卡車	route	ルート	路徑	Netherlands	オランダ	荷蘭	bread	パン	麵包
gol	ゴルフ	高爾夫	part-time job	アルバイト	兼職	Iran	イラン	伊朗	orange	オレンジ	橙色
Germany	ドイツ	德國	memo	メモ	備忘錄	class	クラス	階層	summit	サミット	高峰會
top	トップ	頂端	event	イベント	事件	celebrity	タレント	藝人	marathon	マラソン	馬拉松
hall	ホール	大廳	list	リスト	列表	soft	ソフト	柔軟	stop	ストップ	停止
homepage	ホームページ	主頁	messages	メッセージ	訊息	radio	ラジオ	無線電	brake	ブレーキ	剎車
personal computer	パソコン	個人電腦	bonus	ボーナス	獎金	debut	デビュー	首秀	speed	スピード	速度
sports	スポーツ	運動	ball	ボール	球	Hawaii	ハワイ	夏威夷	Manila	マニラ	馬尼拉
email	メール	電子郵件	questionnaire	アンケート	問卷	energy	エネルギー	能量	forum	フォーラム	論壇
net	ネット	網	Moscow	モスクワ	莫斯科	point	ポイント	觀點	lease	リース	租約
Philippines	フィリピン	菲律賓	Sydney	シドニー	悉尼	tank	タンク	箱	post	ポスト	郵遞

(Source: <https://www2.ninjal.ac.jp/gairaigo/Report126/report126.html>)

Figure 4.2 Vocabulary List Used in Experimental Group

Measuring the learning difficulty of loanwords. Jreadability, which is used to analyze the difficulty of reading Japanese articles for non-native learners. So it

also supports the analysis of the difficulty of the vocabulary reading. The results of the analysis will show how difficult the vocabulary word is to learn and at what educational level the word is relative to Japanese students. The analysis showed that the two vocabulary lists were very similar in terms of composition and learning difficulty, which could be considered the same learning difficulty. In addition, the testers in this experiment were given a pre-test before learning two vocabulary lists. So it is possible to further verify whether the learning difficulty of the two vocabulary lists is the same with the paired t-test.

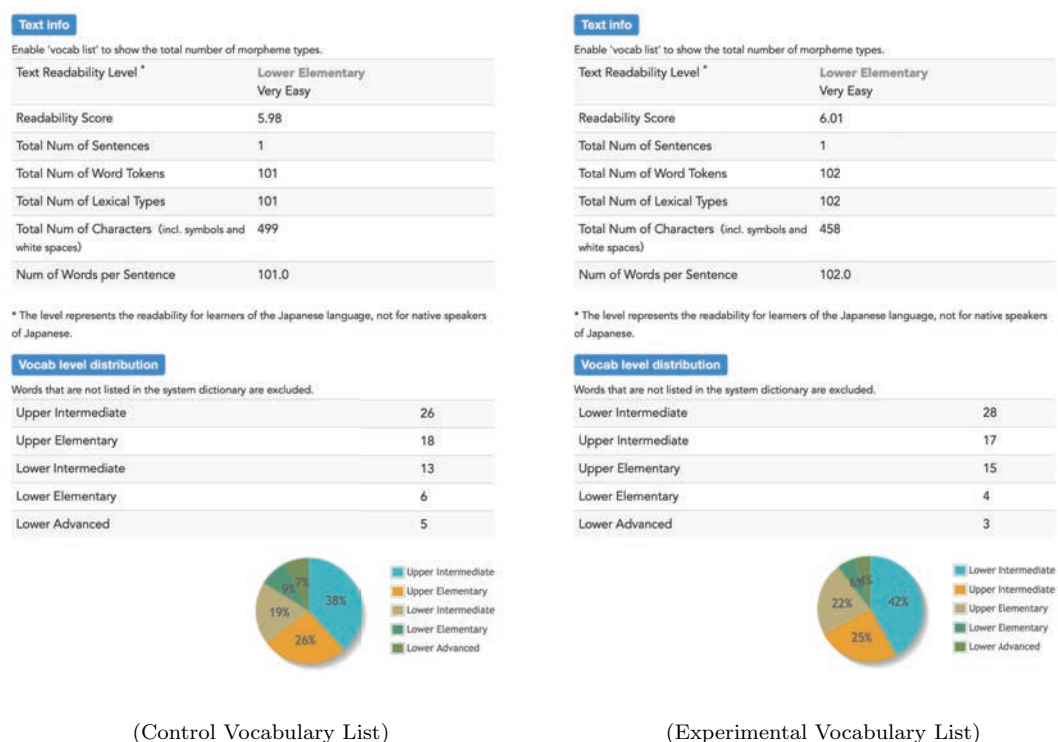


Figure 4.3 Text Readability Analysis Between Two Vocabulary Lists

About the prototype for testing. Since August 2020, the game has been available for download and installation on Apple Store, and testers will need to use a specific account to participate in this experiment after accessing the game. Besides, all testers are being informed that the scores generated from the different stages of the test are being synced to a prepared cloud storage space.

4.1.4 Test Design

After checking the overall test flow, the tester will spend 5 minutes completing the two vocabulary lists in the pre-test.

The tester will then spend half an hour each in the game's practice session, learning the loanwords that were answered incorrectly in the pre-test or that still have ambiguous meanings. To avoid instant memory effect on the post-test, the test will be conducted 24 hours after the end of the practice session.

After the post-test, students will be interviewed about their opinions on the loanword learning format that provides Arabic letter prompts. Additionally, they will be asked what they thought about some of their experiences with the game and any improvements that need to be made.

- Step 1: Fast Test

There are totally 100 questions in the test, and just toggle sliders to confirm whether the meaning of words are correct.

- Step 2: Browsing Words

Swipe left to view the content of next word. Some of the words during browsing will provide not only the Chinese meaning but also the original English meaning.

- Step 3: Quiz Game

Follow the image and audio to figure out the Japanese and Chinese meaning of the word, and some of them also need to be matched with English.

- Step 4: Fast Test

Do a test of the words that were answered incorrectly in Step 1.

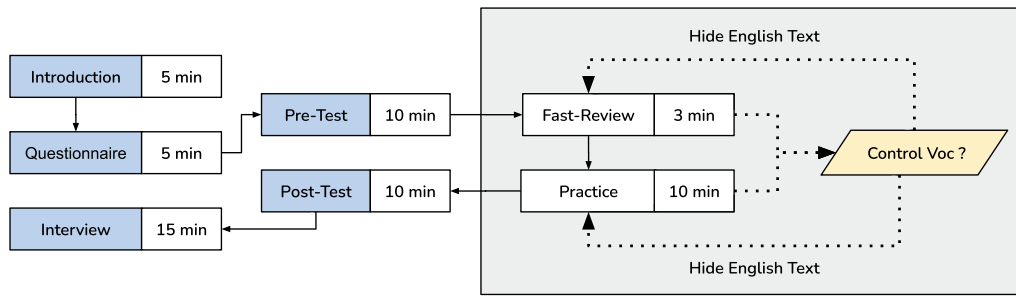


Figure 4.4 Test Flow Chart



Figure 4.5 Screenshots of User Test Information on Zoom

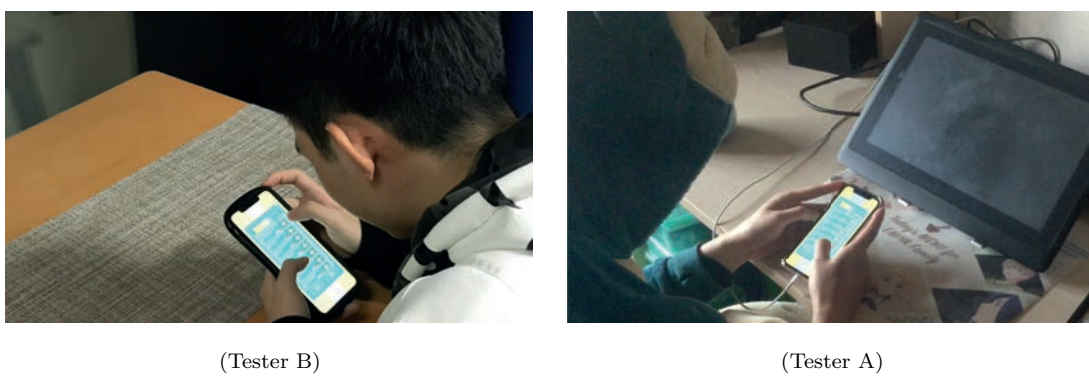


Figure 4.6 Screenshots of Video Recorded by Players during Testing

4.2. Result Analysis

4.2.1 Test Result

The purpose of this research is to investigate whether Chinese students learning Japanese loanword improve their vocabulary memorization by comparing the English spelling content associated with that word. A controlled experiment was conducted on the same sample, and the following are the results of the pre-test and post-test conducted under two conditions.

Control Group				Experimental Group			
Tester ID	Pre Test Score	Post Test Score	Δ Score	Tester ID	Pre Test Score	Post Test Score	Δ Score
1	21	53	32	1	20	76	56
2	34	61	27	2	40	90	50
3	27	58	31	3	26	82	56
4	60	82	22	4	55	100	45
5	31	70	39	5	26	75	49
6	44	66	22	6	55	88	33
7	48	68	20	7	40	80	40

Figure 4.7 Tester Results

Before the paired T-test analysis, the K-W test was used to analyze whether the scores matched the normal distribution test.

One-Sample Kolmogorov-Smirnov Test					
		PreTestScoreA	PostTestScoreA	PreTestScoreB	PostTestScoreB
N		7	7	7	7
Normal Parameters ^{a,b}	Mean	37.8571	65.4286	37.4286	84.4286
	Std. Deviation	13.50837	9.41377	14.11686	8.86674
Most Extreme Differences	Absolute	.184	.171	.219	.179
	Positive	.184	.171	.219	.179
	Negative	-.106	-.104	-.179	-.144
Test Statistic		.184	.171	.219	.179
Asymp. Sig. (2-tailed)		.200 ^{c,d}	.200 ^{c,d}	.200 ^{c,d}	.200 ^{c,d}

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

Figure 4.8 K-S Test

From the results of the above data analysis, it can be seen that the scores before and after the practice section in the two conditions were normally distributed and satisfied with the paired T-test condition.

This experiment hypothesizes that learning Japanese loanwords can significantly enhance memory by comparing the English spelling of the words. Although the vocabulary lists in the two conditions were of equal difficulty, it cannot be excluded that all the words were completely new words to the testers. Therefore, the paired t-test was not conducted directly through the post-scores' results in this experiment, but rather through the value of the difference in the testers' scores before and after practice.

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Control	27.5714	7	6.85218	2.58988
Experimental	47.0000	7	8.40635	3.17730

Paired Samples Correlations			
	N	Correlation	Sig.
Control & Experimental	7	.677	.095

Paired Samples Test								
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Control - Experimental	-19.42857	6.29437	2.37905	-25.24989	-13.60725	-8.167	6	.000

Figure 4.9 Paired Sample T-test

Figure 4.9 shows that the mean value of the difference is 19.42857, with $p=0.000$ and $p<0.01$, and the difference of the mean value is also quite different from 0. Therefore, it indicates a significant difference in the variation of scores with or without providing the Arabic letters associated with the loanwords. So it can be argued that the inclusion of origin spelling cues for loanwords has a positive effect on their memorization of Japanese loanwords.

4.2.2 Comments and Observations

Some summaries of comments from the participants on this test:

- Insert relevant English cues into loanwords learning.

Most of the testers responded that some loanwords they had to know would try to look up the English spelling of the word. When using loanwords that they are not yet familiar with, they will try to recall the word's English spelling in their mind. Then, they will say the words based on the pronunciation rules for loanwords in Japanese. The pronunciation may be a little incorrect at first, but the listener will usually repeat the word's correct pronunciation to confirm it. As time passes, the loanwords are grasped.

In many cases, they only need to look up the English meaning of loanwords they encounter in their daily lives. However, when it comes to specialized words used in universities or the workplace, they still need to search for the meaning of the word in Chinese and English. The game for this test was very efficient in learning loanwords, and it helped them understand the meaning of the loanword in both English and Chinese. It is expected that a dictionary function will be added to the game in the future.

- Provide a selection of Japanese anime themes in the vocabulary list learning materials.

Feedbacks of international students who are already enrolled in Japanese colleges. They are more interested in learning some high-frequency vocabulary from classic anime shows than from popular anime shows in recent years. The reason is that when they watched Japanese anime as children, it was usually dubbed in Mandarin or with Chinese subtitles. Since they didn't learn Japanese, all the words they remembered were the translated Chinese meanings. Now when they go to campus and have a conversation with their Japanese friends about anime, they will often mention many classic Japanese anime shows. Since Chinese translations into Japanese are usually done by free translation, it is impossible to convert the words known in Chinese into Japanese dialogue. Therefore, they often have to search for the relevant Japanese expressions on their smartphones while having a conversation. With these themes available, they do not need to re-watch the original Japanese animations but rather learn the high-frequency vocabulary of those shows and apply them to their daily conversations.

Feedbacks of international students who are still in a Japanese language school and are preparing for the entrance exam. While anime-themed vocabularies are very attractive, they need to memorize loanwords that are relevant to the exam. For example, many Japanese university entrance exams include a short essay and an interview. Many scientific words are converted from English to Japanese through literal translation. Since mainland China uses mainly free translation to absorb specific words, most terms need to be relearned. Without the help of seniors or cram schools, they need to collect and arrange the common vocabulary of the subject they are applying to and then use it in their exams. It is expected that the game will provide high-frequency vocabulary lists for popular majors in Japanese universities in the future.

- Evaluations of other game's functions.

About the Test Section. The Process of taking a mock test before word learning is pretty impressive. Many words learning apps are currently designed to practice and memorize words directly, and only a few apps allow the user to eliminate the words they already master independently. After the test, before the start of the practice section, the system will automatically recommend the words that have been answered incorrectly in the test. Most testers find this feature quite convenient, and as it allows them to learn the words, they do not know before efficiently.

About the Review System. It's quite user-friendly with the optimization of the words reviewing process. The word learning apps previously used were all passive reminders to review, and the more words they learned, the more they needed to check. If you were to clear all the review plans every day, it would take more than 2 to 3 hours. Also, the timeline table inside the review system allows you to see precisely the progress of each word you are reviewing. You can visualize the date of the last review for each word.

Some of the points that I noticed during user testing:

- In the Test Session, for words encountered for the first time, the testers would pronounce the loan word in a vocal spelling, thus obtaining the Japanese's

approximate pronunciation. In the interview afterwards, they explained that the main reason for doing this was that they could directly search for English or Chinese word close to the pronunciation in their minds by pronouncing the word. Some of the loanwords they heard in Japanese TV programs or conversations with Japanese friends before. They had formed an auditory memory for these words, but they did not have a deep impression of writing yet. Therefore, spelling can help them to recall the meaning of the word.

- Although there is no tutorial for testers in the game, just a short animation draws the testers' attention to some key interactions and function buttons. But all testers followed the animated instructions to recognize each component's function immediately. From the test to the practice sessions, most testers completed the entire experiment smoothly with little or no pause.

4.3. Summary and Discussion

Based on the results of the test and feedbacks from the testers, I summarize the following points.

1. Provide corresponding alphabetic spelling hints when learning Japanese loanwords, which significantly affects memorization.

Both the experimental data and the testers' feedback indicate that the English spelling hints enhance their memory for loanwords and save them time in searching. The game can also display texts in three languages during the practice sessions, which helps learn loanwords and convenient for multilingual learners to extend their learning to related foreign languages. Take the example of a Chinese student who is interested in both Japanese and Korean culture. Since Japan, Korea, and China belong to the same East Asian culture circle and kanji circle, many Japanese and Korean words have a significant similarity in pronunciation, so it is possible to memorize words by mutual reference.

2. By Text Mining method to generate special theme vocabulary for post-Japanese language learning has a positive effect.

There are few vocabulary learning materials customized for special needs. Even fewer have been analyzed scientifically and can keep up with the latest trends. As Internet technology continues to advance, it has become possible for individuals to design professional-quality vocabulary list. This allows each learner to clearly understand the significance of each word that needs to be learned. By simplifying and visualizing the production process, many Japanese teachers can also design vocabulary lists targeted to current student interests. As an example, Text Mining analyzes all the Japanese subtitles of the current popular drama. It then picks out 50 high-frequency words or phrases based on the students' Japanese proficiency to explain in the class.

3. Although the fundamental function as a vocabulary learning App is relatively complete, there are still many contents to be added as an educational game.

The game is used as a tool to prove the hypothesis of this research and serves as a real game project. The entertaining features of the game will be released in a later version. For the vocabulary learning part, several new interactive gameplay is being designed and will be added to the practice sessions in a randomized way after internal testing. For the text data of the words, it has been added to corresponding phrases and sentences in Japanese, English and Chinese databases so that learners can understand the differences in the meaning of the words in each situation.

4. As influenced by covid-19, it has not yet been verified whether the game helps international students engage in word learning through fragmented time.

Currently, Japanese colleges and universities are mainly offering lectures via an online format. This leads to a significant reduction in the number of times students go to campus. This learning tool is intended to be used mainly in outdoor queues and during train rides. Therefore, an easy-to-use and comfortable 2D vertical screen layout was adopted, and mobile devices were chosen as the central distribution platform. If the pandemic continues, the learning environment for international students in Japan may change

further in response to the format of online lectures. With the spread of high-performance, low-cost VR devices recently, virtual classes may soon become a mainstream form of lecturing in our daily lives. In this new form of learning, there may be a need to redesign word learning gameplay based on 3D immersive spaces.

5. The modified review system, while well received by testers, carried the risk of causing learners to spend more time remembering words.

Based on the Ebbinghaus forgetting curve theory, after 24 hours, only about 20 percent of memorized information remains if the content is not reviewed in time. Therefore, it seems necessary to check the newly learned words in time during the early stages of remembering. At present, it is planned to associate this dry review section with character raising and the rare item getting in the game. Together with the social function activation, to make your character more potent or to get more things in the dedicated virtual room, you will spontaneously review new words regularly.

Beyond the above mentioned, I received a lot of new inspirations and suggestions for the development of this game and this user test. This part will be described in detail in the Future Work section of Chapter 5.

Chapter 5

Conclusion

5.1. Summary

With the advance of globalization, the use of loanwords in Japanese has increased significantly, and even the Japanese cannot recognize them. Japan's international student policy has been relaxed in recent years due to the ageing population and declining birthrate. There are numerous loanwords in this fast-changing society, and if second language learners do not acquire these words, they will face serious obstacles in their studies and work.

According to international students' current situation in Japan, this thesis aims to find an efficient Japanese loanwords learning strategy to decrease communication barriers. Based on a literature review of the current state and teaching strategies of loanwords, this research hypothesizes that it is useful to increase word recall by providing the English spelling when learning loanwords.

After that, a questionnaire and interviews were conducted to understand international students' attitudes and learning strategies towards loanwords, and then three concepts for developing loanword learning tools were concluded.

- Supply an Educational Game for Fragmented Learning of Japanese loanwords by utilizing their accumulated knowledge from English.
- Customize useful vocabulary lists based on hobbies or specialist fields.
- Re-design a new reviewing system for motivating them to learn.

Incorporating the above 3 concepts, as well as the recent rise of the idea of gamification and the success of educational games in other fields, I have developed an educational game for simultaneous multi-language learning, which is named: Coai. There are three main features of this word learning game.

- Find out the expression of a word in three languages simultaneously in the form of rotating the combination lock.
- Designed a proactive vocabulary review system by integrating the forgetting curve theory and gamification mechanism.
- Provides multi-language high-frequency vocabulary lists for hobbies and professional fields through text mining technology and back-translation strategy.

Since most of the international students in Japan are from Asia and most of their mother language is not English, it is necessary to provide translation in English and their native language when learning Japanese loanwords. Besides, to prepare for future research on the possibility of acquiring multiple foreign languages simultaneously, the game was originally designed to be interactive with three languages together, and the word data was inputted in 10 popular languages such as French, Spanish, Italian, and Korean.

The test results in Chapter 4 show that learning a Japanese loanword by comparing its English spelling can effectively enhance the memorization of the loanword. Through the questionnaire and post-interview, we learned more about the problems international students have in learning loanwords and how they cope with them, which provides a lot of clues for further upgrading and improving the game.

5.2. Limitations

There were two main deficiencies in the experimentation:

- The experiment time and frequency were insufficient

According to the forgetting curve theory, it should be reviewed regularly one day, three days, one week, two weeks, and one month after the user completes the word learning, to shift the storage place of the word from the short-term memory area to the long-term memory area.

But this user test only checked how well participants remembered the vocabulary list they learned after one day and did not check for the following

time points. Therefore, it does not adequately clarify that this research's hypothesis can maintain the effectiveness even in the long term.

- The validation is quite singular

There is no comparison between popular word learning apps on the market and this game for the effects of word memorization. Both the experimental group and the control group were conducted on the game developed for this research. Moreover, did not import selected word lists into the traditional flashcards app for the same experiment to check that the gameplay of rotating a combination lock was more helpful than traditional quizzes in enhancing word recall.

Since the tester came from different social backgrounds, the preferences for anime were comparatively dispersed. Therefore, it was not possible to determine whether using anime vocabulary lists to remember words was more efficient than using traditional vocabulary lists.

There were three main inadequacies in the development of the game:

- Contents Provision

Each word is currently provided with pictures, audio and multi-language text data. Phrases and sentences are not accompanied by the word to help learners better understand how the word is used in different situations. Loanwords from other foreign languages are not well identified and explained. Although over 80% of the total number of Japanese loanwords derive from English, the high-frequency words used in daily life is more than 20% of the other languages.

- Gameplay

Practice section only provides one interaction mode, which still needs to be supplemented with different playing modes to keep the learner's attention. Besides, it is possible to explore more in-depth vocabulary memorization by calling the interface of the mobile device, based on the voice recognition function and photo recognition function.

- Intelligent Recommendation

The vocabulary list or word learning auto recommendation system is not yet available in the game. At present, vocabulary learning is mainly conducted through user-selected themes. Nevertheless, as the number of topics increases, it becomes more and more difficult to locate the exact vocabulary that one wants to learn.

5.3. Future Works

According to the above summary, although the game has all the features required for a word learning app, it is still not qualified as an educational game. In order to further enhance the gameplay, a character development system and a multiplayer casual combat system integrating vocabulary recall are being developed. Through these two systems, the game's reward mechanism can be properly used to motivate users to complete the review of each word spontaneously.

During this test, several testers asked whether all the language translations of the word could be displayed on the same interface. In response to this demand, a word theatre scene and new practice gameplay have been designed. This allows multilingual learners to find the translations of the word from different languages in one scene at the same time. Furthermore, it was found that the process of finding the corresponding expressions in other languages is a very interesting puzzle game for normal users by integrating the language they already master. Therefore, in future research, it is possible that attempts to weakens the educational aspect of the game and strengthens the gaming aspect. Just like the casual puzzle games, finding the same shape or object to get along with, only that in this case, it is finding the corresponding translation in the language of each country.

By using the text ming technique and the back-translation strategy in this research, I gained experience on how to develop a multi-language version of the high-frequency vocabulary for niche areas. We plan to visualize the entire operation process in the front-end interface so that as long as users can provide corresponding text information, they can customize their high-frequency vocabularies for importing into the flashcard app or the game we are developing.

Additionally, we are now contacting several Japanese language schools in Tokyo

and plan to collaborate with current Japanese language teachers. We are planning to design two sets of high-frequency vocabulary lists for international students who want to enter the university and for those who want to work. For employment, we will customize high-frequency vocabulary lists for companies and jobs that are popular with international students, so that they will have supplementary knowledge before their written exams and interviews.

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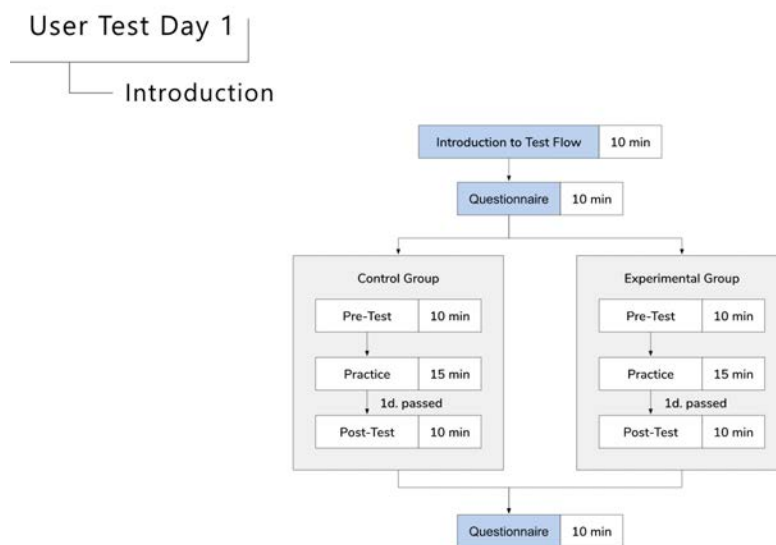
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Appendices

A. User Test GuideLine

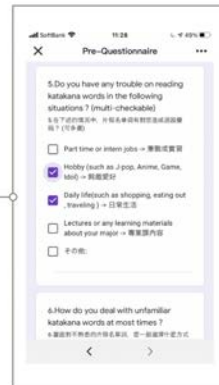


User Test Day 1

Pre-Questionnaire

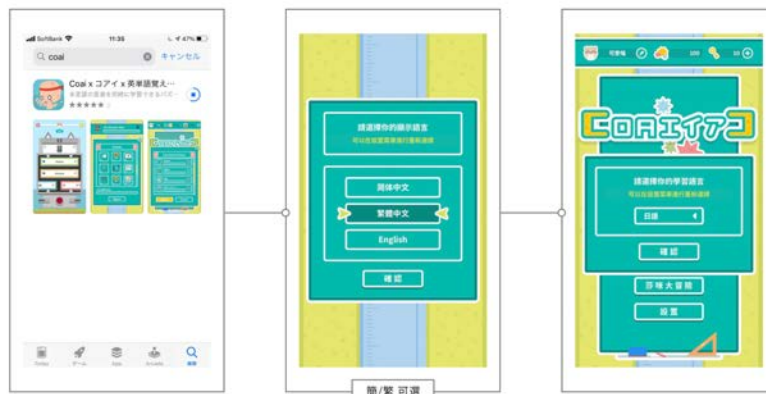


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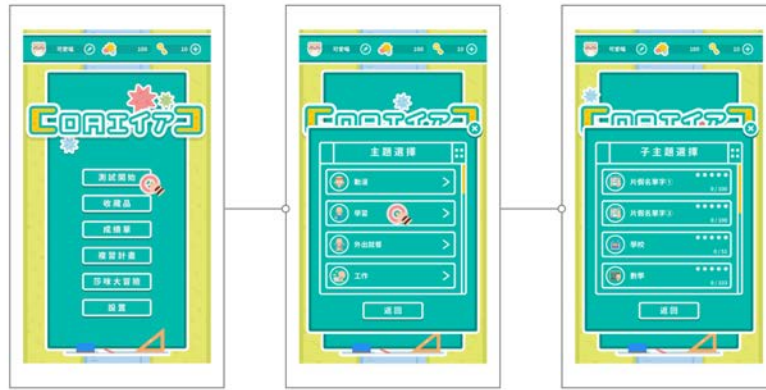
User Test Day 1

Game Start Guide: Download the game and some Basic Settings



User Test Day 1

Game Start Guide: How to Find the Test Materials



User Test Day 1

Control Voc: How to start the Fast Test Section and some Cautions



(Control Group)

User Test Day 1

Experimental Voc: How to start the Fast Test Section and some Cautions



(Experimental Group)

Figure A.1 Day 1: How to Start the Test Section and Some Cautions

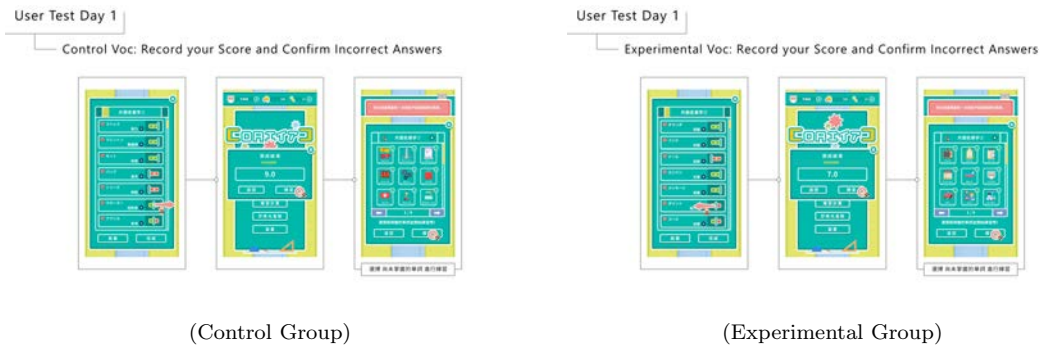


Figure A.2 Day 1: Record your Score and Confirm Incorrect Answers

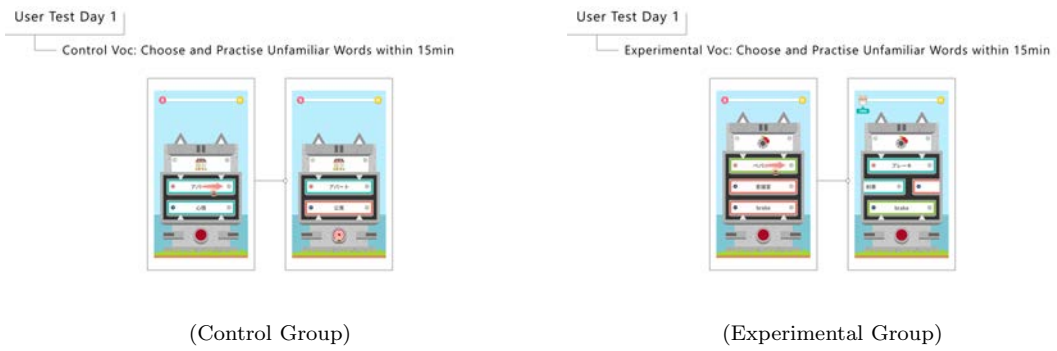


Figure A.3 Day 1: Choose and Practise Unfamiliar Words within 15min

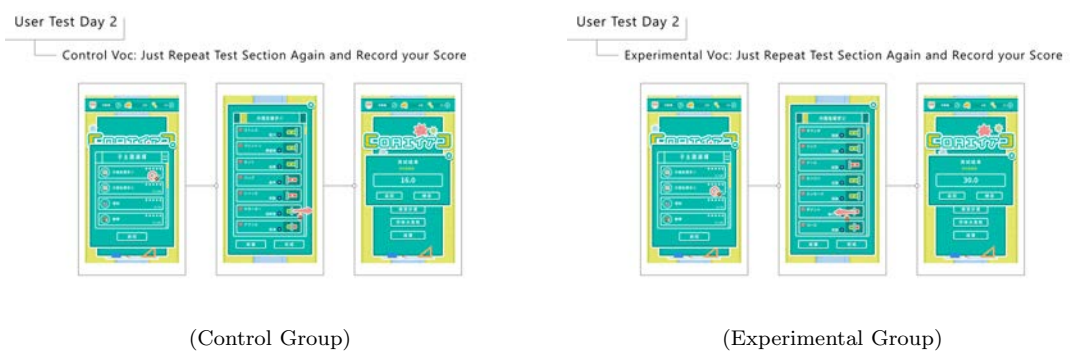


Figure A.4 Day 2: Repeat Test Section and Record your Score

User Test Day 2

Post-Questionnaire



<https://forms.gle/H86gJo8mXBJD7z52A>



B. Pre-Questionnaire

Pre-Questionnaire

事前-問卷調查

1. 1.How about your Japanese level ? (eg. N1:123 || EJU:321)
1.您參加過的日語能力考試以及所取得的最高分數？(例. N1:123 或 EJU:321)

2. 2.How about your English Level ? (eg. IELTS:6.8 || TOEFL:88 || TOEIC:876)
2.您參加過的英語能力考試以及所取得的最高分數？(例. IELTS:6.8 或 TOEFL:88 或 TOEIC:876)

3. 3.What's your major ? (eg. Computer Science)
3.您所學的專業是？(例. 情報工學)

4. 4.How long has it been since entering a Japanese college or university ?
4.從您進入日本的大學或者專門學校，已經經過多長時間了？

Mark only one oval.

- less than 1 year
- 1~2 years
- 2~3 years
- more than 3 years

5. 5.Do you have any trouble on reading katakana words in the following situations ?
(multi-checkable)

5.在下述的情況中，片假名單詞有對您造成過困擾嗎？(可多選)

Check all that apply.

- Part time or intern jobs -> 兼職或實習
 Hobby (such as J-pop, Anime, Game, Idol) -> 興趣愛好
 Daily life(such as shopping, eating out , traveling) -> 日常生活
 Lectures or any learning materials about your major -> 專業課內容

Other: _____

6. 6.How do you deal with unfamiliar katakana words at most times ?

6.當面對不熟悉的片假名單詞，您一般選擇什麼方式應對？

Mark only one oval.

- Just let it go -> 隨風而去
 Search words in dictionary or Google -> 查閱資料
 Guess the meaning but not check -> 意會
 Ask someone around you who may know -> 問身旁可能知道的人
 Other: _____

7. 7.Have you ever used any educational software or game on vocabulary learning ?
(multi-checkable)

7.您有用過下述的APP應用進行日語外語單詞記憶嗎？(可多選)

Check all that apply.

- HundredWordsCut -> 百詞斬
 Shanbay English -> 扇貝英語
 Hujiang Happy Word Field -> 滬江開心詞場
 DuoLingo -> 多鄰國
 Memrise -> 憶術家
 Anki -> 暗記
 Busuu -> 博樹
 Rosetta Stone -> 羅塞塔石碑
 Drops
 Mondly

Other: _____

8. 8.If you check for above Q3, Which features or functions make you start to use it?
(multi-checkable)

8.如果您回答了Q7，這些應用的哪些功能或特徵吸引您開始使用？(可多選)

Check all that apply.

- Auto Reminder for Reviewing -> 自動複習提醒
- Rich Category of Vocabulary -> 豐富的詞彙表分類
- Gameplay System -> 練習玩法
- Personalized Learning Path -> 個性化的學習路徑
- Interaction with other Learners -> 與其他學習者之間的互動
- Advice from specialists or native speakers -> 专家或母语者的建议

9. 9.How do you type Japanese?

9.您是通過什麼方式輸入日語的？

Check all that apply.

- Kana Input -> 假名
- Romaji Input -> 羅馬字

Other: _____

10. 10.How do you type Chinese?

9.您是通過什麼方式輸入中文的？

Check all that apply.

- Shape-based Input -> 倉頡 筆畫 五筆
- Phonetic Input -> 注音
- Pinyin Input -> 拼音 粵拼

Other: _____

11. 11.Do you have any idea or strategy about learning katakana words ?

11.關於片假名單詞的學習，妳有什麼想法或記憶技巧嗎？

Mark only one oval.

- Yes
- No

12. 12. Could you mind sharing your study methods or materials on katakana words ?
12. 方便詳細分享一下妳在片假名單詞的學習方法或相關資料嗎？

C. Post-Questionnaire

Post-Questionnaire

事後-問卷調查

1. 1. Day1 "Katakana-I" Test Score
1.第一天【片假名單詞①】 測試成績

2. 2. Day1 "Katakana-II" Test Score
2.第一天【片假名單詞②】 測試成績

3. 3. Day2 "Katakana-I" Test Score
3.第二天【片假名單詞①】 測試成績

4. 4. Day2 "Katakana-II" Test Score
4.第二天【片假名單詞②】 測試成績

5. 5. I think it's helpful to remember loanwords by checking its original spelling.
5. 我認為了解日語外來詞在英語中的拼寫方式對單詞記憶有幫助。

Mark only one oval.

1 2 3 4 5 6 7

Strongly Disagree -> 非常反對 Strongly Agree -> 非常認同

6. 6. I found out through this game that learning loanwords can be so fun and easy!
 6. 通過這個遊戲，我發現學習日語外來詞可以變得這麼輕鬆有趣!

Mark only one oval.

1	2	3	4	5	6	7	
Strongly Disagree -> 非常反對	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree -> 非常認同

Skip to question 7

7. 7. Have you experienced the following sections while playing and how do you rate them.
 7. 請您對在測試中嘗試過的功能或環節給予評價。

Mark only one oval per row.

	1:Very Bad -> 非常 不好	2	3	4	5:Very Good -> 非常好
vocabulary classification -> 詞彙 表分類	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
fast test section -> 測試環節	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
practise section -> 練習環節	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
review system -> 複習計畫	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
collections system -> 收藏品系統	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
scores system -> 成績單系統	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
animation -> 遊戲動畫	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
game story -> 遊戲故事	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sound effects -> 遊戲聲效	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. 8. According to Q7, what's the most impressive things for you while playing this game, could you tell more details about these?
 8. 根據問題7，在這次測試中遊戲的哪個部分給您留下了深刻印象，可以詳細說明以下嗎？

Skip to question 9

9. 9. If you have any theme vocabulary want to study, please note them down in the following lines. (eg. Drama:Hanzawa Naoki || Anime:Cardcaptor Sakura || Subjects:Graphic Design)

9. 請將您想學習的主題詞彙表紀錄在下方的空白欄中。(例: 日劇:半澤直樹 或 動漫:百變小櫻 或 科目:平面設計)

10. 10. Is that any ideas and suggestion you want me to know, and expect them can append into the game? (eg. More details about my learning progress || Some interesting game plays)

10. 關於遊戲您是否有任何想法或者意見跟我們分享的, 或者期待追加的功能?(例: 更詳細的學習進度報告 或 更多單詞練習玩法)

11. 11. While playing the game, did you find anything you were not satisfied with or needed to fix?

11. 在測試的過程中, 您是否发现不满意或者需要修改的地方?

12. 12. Do you find that learning Japanese loanwords makes it easier to remember the pronunciation of long words in English, such as curriculum and algorithms? (例えば、カリキュラム や アルゴリズム など)

12. 是否覺得學習日語外來詞會幫助您記住英語中一些長單詞, 比如 curriculum(カリキュラム) 和 algorithms(アルゴリズム)?

Mark only one oval.

Yes

No

13. 13. Besides Japanese and English, do you have any other languages you are learning and what are they? (eg. Spanish || French || Italian || Portuguese || Korean)

13. 除了日语和英语, 還有哪些語言您計畫學習或者正在學習的?(例: 西班牙語 法語 義大利語 葡萄牙語 韓語)

14. 14. Through this experiment, do you want to learn more details about loanwords, such as which languages they come from?

14. 通过這次測試，您是否對日語外來詞學習產生興趣，例如想了解它們都來自哪些國家的語言？

Mark only one oval.

Yes

No