**Japanese Written Language Learning Techniques Applied to an Interactive Web Application**

Jordan Carr

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Rough Draft

**Introduction**

As the world becomes more interconnected by the day, the need to learn multiple languages increases exponentially. Using one universal language presents various cultural issues that can be too hard to overcome, and current language translation software is not accurate enough to make its use outside of simple vocabulary viable. National governments stress the necessity to learn multiple languages to facilitate communications with other nations. Businesses and corporations desperately seek out suitable employees who can communicate with clients from a wide variety of backgrounds. Among the major global political and economic powers is Japan, whose language is notoriously difficult for native English speakers to learn as a second language. One of the most challenging factors associated with learning Japanese is its written language, which consists of multiple sets of characters known as hiragana, katakana, and kanji. By the time the average Japanese citizen graduates high school they are expected to know at least 2,000 different characters in order to interact with the world around them. It is far easier for them to pick up on it than foreigners in another cultural setting that is not constantly immersed in kanji. Non-native speakers are sometimes expected to recognize hundreds of different characters after only a few months to a few years of study, certainly a challenging feat. This raises the question of how this can be done effectively. The task of learning kanji through various methods such as relational story-telling and motivational manipulation will be explored and used to develop a web-based application to further develop Japanese language learners’ abilities with the written language.

Kanji are morphological characters that originated in China and represent the language through a mix of meaning-based and sound-based units, as opposed to mostly sound-based units that most western learners are accustomed to. It can be argued that English itself is not entirely phonological, having numerous exceptions on how to read certain words. However, the sheer number of kanji and kanji radicals that one must learn in order to make pattern recognition and radical analysis a practical option to learn quickly makes the task more complex.

The background of the learner plays an influential role when trying to teach them a new written language. Those with an English background tend to use phonological information to learn a written language. This means of learning also extends to kanji (Kubota 1). Kanji can often be broken up into radicals or subunits which can give information on how it should be read (Saito 237). Analysis is made easier by the fact that phonological radicals have been shown to be mostly used for their phonological function (Saito 234). Thus, if a user can recognize these radicals they should be able to at least guess the reading and use other information to conclude its meaning. However, the sheer number of radicals that must be learned in order to do this efficiently is itself a difficult task. Those who come from a Chinese background may have less difficulty with this but it does not necessarily improve their results. Kanji have both native Chinese (on) and Japanese (kun) readings, and this is a large task for all learners to overcome (Saito 237). Various other factors can lead to different rates of literary acquisition. For example, for Japanese children phonological awareness, naming speed, and letter knowledge can predict reading attainment concurrently and longitudinally (Inomata, 2). Studies have shown that all of the above are important for literary acquisition in Japanese, especially for young children (Inomata 9).

Employing a single learning strategy that can be applied to all language students has been shown to not be an effective means of teaching. According to James Heisig, there are certain factors to consider when teaching kanji to students that could help them retain the knowledge long term. First is all or nothing, in that one should either commit to learning the language in its entirety or not do it at all. Next is the order in which they learn the kanji. In order to effectively learn the kanji, one must master the simple kanji before they can move on the complicated ones. Third is that learning different aspects of the language such as reading, writing, and speaking should be kept separate from each other (Heisig). Since each will present differing degrees and types of difficulties to the student, it is important to keep them separate in order to keep the problems associated with them separate. Finally, each student learns at a different pace. Knowing this, it becomes apparent that lessons in teaching kanji should become tailored to the student in order to maximize their ability to learn it affectively (Heisig).

**Mnemonic and Pictorial Strategies**

One strategy to increase the rate of kanji acquisition for non-native speakers to is to use mnemonic strategies. The tactic of creating audio or visual means by which the student can better grasp the meaning of a kanji is a popular way to help them not only learn its shape but also its meaning. The use of mnemonics among second language learners varies wildly. Both ends of the spectrum of use exist, from constant use to flat out refusal (Rose). Some students believe that it is an invaluable tactic to learning while others believe it is too silly to be considered a viable means of study. Others theorize it could actually hinder the acquisition of the reading or meaning of the kanji, depending on how the mnemonic device is derived. Overall, mnemonic devices can be of some use early on in one’s language studies. However, it is a tactic that has its limitations and one that should not be overly relied upon (Rose).

Another common strategy to learn kanji is to use visual stimuli to form pictorial relations that the student can understand. The strategy involves breaking down the kanji into parts, usually radicals, and from their meaning or shape forming a story that somehow relates to the overall meaning of the kanji. Many studies have been done on its effectiveness. One study undertaken by Norman Lin, Shoji Kajita, and Kenji Mase at Nagoya University investigated it through the use of a tabletop computer system. In the study, participants were required to combine valid kanji components into valid kanji compounds. The kanji components were written on cards that the participants had to rearrange. Then they had to form a mnemonic device to memorize them in the form of a story (Lin 28). The results of the system suggested that the more creative the participants were with their stories the better they were able to memorize the kanji (Lin 41). From these results it can be concluded that letting the learner to adapt the system to themselves and be creative about how they choose to learn in regards to kanji analyzation increases their learning ability.

Another study on this topic was conducted by Mariko Kubota and Etsuko Toyoda at the University of Melbourne. The study was done with the assumption that kanji were more difficult for those who came from an English speaking background. The kanji were selected by the number of kana that they could be represented by (Kubota 2). They were also selected so they would represent commonly used words, had radicals that were recognizable to those in the study, were nouns, had no double consonants, and were completely new to those who participated in the study. All who participated were native English speakers (Kubota 3). They received a list of kanji, a pencil, and paper in order to memorize the list and were encouraged to think aloud. Participants were given 20 minutes to study and then chatted with researchers on something unrelated for 10 minutes to rule out short-term memory for the test. They were then quizzed on the list (Kubota 4). The study showed that Japanese proficiency doesn’t correlate to rate of kanji acquisition. Three main techniques were used by the participants: analysis, writing repeatedly, and analysis combined with tests (Kubota 7). According to the results of the tests, writing repeatedly was shown to have the worst results (Kubota 8). Radical recognition and analyzation of the kanji produced the best overall results (Kubota 10). This studies results show that mindless memorization without analyzation yields poor overall results when trying to learn kanji. It also proves that understanding the meaning behind radicals can help assist with future kanji acquisition.

Another kanji study tactic to examine is the idea of air writing. Kusho, or the manual tracing of kanji on the hand, on a desktop or in the air is a common means for native speakers to learn while in school. It is also used as a means to avoid miscommunication when speaking about the written language. Kusho is a means of studying that gives the learner kinesthetic and visual feedback on the kanji under examination. It has been proven to show better results on memorization than iterative writing. However, it seems to have its limits when the kanji reaches a certain threshold of difficulty for the individual learner (Thomas). This study suggests one of the keys to helping learners memorize kanji is to provide connections with other types of stimulation in order to more permanently plant its meaning or reading in the mind of the student.

**Motivational Strategies**

Motivation is one of the largest influences on language study patterns. Different studies have explored the effects of motivation on the ability to learn languages such as Japanese. An example of these studies that noticed its effects was centered on a mobile-phone email based application. The user would send a text message to the system to request a kanji quiz. After filling in the results of the quiz the user would send it back, the system would automatically grade it, and it would send back the results to the user (Li 521). Although this is a fairly outdated approach to kanji applications that was developed before the prevalence of smart phones, some of features and the results of its effects on users are still applicable. To try to keep users interested in the application, it would dynamically change the vocabulary being tested and the difficulty of said vocabulary (Li 523). In addition to this, it would periodically send the user an email if they hadn’t used the application after a certain period of time (Li 524). Although the application does not put its focus on keeping the user interested in learning kanji, it does try to make use of motivational strategies to keep the user interested and therefore learn more.

A study carried out by Akie Hirata delved further into motivational effects on kanji studies. In that study, Hirata described three types of motivational orientations: intrinsic orientation, instrumental mastery, and performance orientation. Four different sources of motivation were also listed. They included self-efficacy, self-concept, intrinsic value, and extrinsic value. On top of that he also described cognitive, metacognitive, behavioral, and environmental self-regulation factors (Hirata 87). In his study Hirata explored motivational patterns of Japanese language students and analyzed what strategies and motivational patterns led to the most success in kanji studies. Those in his study were more likely drawn to instrumental mastery of kanji followed by intrinsic value. In terms of the actual learning of kanji, they placed some extrinsic value on the practice (Hirata 87).

The results of Hirata’s studies led to some conclusions on how motivation can be used to enhance kanji studies. According to his results, practice outside of the classroom may foster motivation and self-regulation in the learner (Hirata 90). In order to improve results in the learner it is suggested that the teacher be aware of the cultural interest of the learner when teaching and use appropriate teaching methods to do so (Hirata 91). The study also produced results on how other students can negatively affect each other and how the teacher can negatively facilitate this. Hirata notes that the teacher should not threaten self-concept of students by forcing learners to compete with each other (Hirata 91). Some studies have shown effects on how it can enhance performance in the work place, but those results may not be applicable to a classroom setting. Instead, they should be rewarded for their efforts in order to build upon their self-worth as a student. To protect self-efficacy, the teacher should offer conditions so the student can experience mastery of the subject. This would include fostering familiarity for the task at hand to bolster the student’s sense of capability with kanji. It also becomes important to encourage the student to use the language outside of the classroom to foster their own interests (Hirata 91). All of the stated results are worth noting for the focus on the individuality of teaching methods for the student. It suggests that kanji studies should be more focused for the individual rather than for a group task. This method could facilitate the learner’s own interests and reasons for learning the language as well as to isolate them from those who learn at different paces.

In order to better understand the motivational problems of studying kanji the different levels of commitment required must be considered. According to Heath Rose and Lesley Harbon, there are multiple levels to take into account. First is commitment control and preserving the learner’s goals in kanji studies. Learners at higher levels of literacy tend to have more difficulty with commitment strategies than those at lower levels. This stems from the sheer work load and commitment required to learn high numbers of kanji at a time. Due to this they tend to set higher goals that grow increasingly impossible to achieve. On the other hand, lower level learners tend to be less serious in their studies of the language. They set goals that aren’t as serious and set more short term goals than those who were more literate (Rose and Harbon). These results vary due to the importance of considering the level of the learner when focusing on motivational strategies. It is something that should be further customized to the learner and will be far different for different levels of literacy. To increase improvement for high level learners, it was recommended for them to set specific short term goals for their studies and to break up long term goals into smaller ones. These suggestions have be shown to increase learning rates by 50 percent (Rose and Harbon). To tailor the learning program for a learner, it may be important to give larger goals to first time students and over time create smaller, more specific goals for kanji studies.

The second motivational roadblock to overcome is emotional control. Due to the difficulty of learning kanji students tend to become more frustrated with their progress the longer they study the language. It creates a sense of defeatism and lack of self-confidence that becomes increasingly a hindrance to progress in the future. Early in the kanji learning process this is not as much of an issue. Learners will see more immediate progress early on so they feed off of it and want to learn more from it (Rose and Harbon). The idea of emotional control provides a difficult challenge to consider. To curtail its possible negative effects, it may be important to remind the user to be realistic in their goals to learn kanji and that kanji becomes increasingly more difficult as more progress is made. Positive reinforcement of current progress could also be used in order to boost the learner’s confidence.

Another motivational aspect to consider is satiation control. As time progresses with one’s kanji studies it becomes easy to lose motivation to continue do to boredom. Lower level learners see kanji as something new, foreign, and fascinating. They are able to focus on it as a result. However, as their studies continue it becomes so familiar to them that it becomes boring, routine, and mundane (Rose and Harbon). This is an issue that is not quite as difficult to solve since it can easily be reduced by a change in the way one studies. It is recommended to break up study sessions with something unrelated to keep the learner focused. Another way to increase interest is to use a reward based system of study, a system of self-gift giving to ensure that goals can be met more easily (Rose and Harbon). Other factors can improve this as well. One can develop techniques to change the way they study, such as implementing a study game or trying to apply their knowledge of kanji to cultural aspects. Relating the learned material to something that interests the learner can also improve satiation control. Encouragement to change study locations may help as well.

The topic of quizzes as related to kanji motivation is tricky. In can have both positive and negative short term effects in that it can easily show progress to the learner (Rose and Harbon). However, it can also lead to competition with other students to achieve high grades. This may have the effect of taking away motivation to study. It is important to show how the quizzes can relate to short term goals of learning kanji to the learner in order for them to not see them as a hindrance. Some studies have shown other ways in which a user can become more motivated to learn kanji. One study showed that a learner tends to learn kanji better if they learn the vocabulary and corresponding kanji that they want to learn. In order to make their accomplishments with this into a malleable achievement, the researcher had the students create their own dictionary of kanji. This helped them relate some of the different aspects of kanji, including shape, on-reading, kun-reading, and meaning/reading in context of a given compound. Other ideas in the study were different activities that enabled the learner to become more engaged with the kanji learning process than what a quiz could attain (楊敏4). However, for the purposes of this site and to narrow the focus of the site on a few key aspects of motivational development to learn kanji, simple quizzes were chosen. In regards to having the user choose which kanji to learn, although it is a good way to keep the user engaged in the process the desire to keep the site simple enough to use and to abstract away the process of entering in vocabulary onto the user’s profile was chosen instead. Quizzes were used to try to measure in some way the progress that the user could make in their kanji studies on the site.

**Web Application Development**

To narrow down the focus of the application it has been decided to put emphasis on motivational enhancement techniques in order to keep the user interested both in using the website but also learning kanji in general. The only aspect of the Japanese language that this site tries to teach is literacy. It does not in any way teach grammar, speaking, writing, or any other language skills in order to narrow its scope and make the task of learning kanji more focused. It is assumed that the user has a fair grasp on some of the basics of Japanese grammar before use of the site is commenced.

The issue of how kanji should be presented to the user of the website also becomes a concern to development. Numerous different learning applications and textbooks have taken differing approaches to this task. In *Japanese Kanji Power: A Workbook for Mastering Japanese Characters*, John Millen presents the kanji in order of ascending number of written strokes. Millen also pairs common English meanings with the kanji and gives hints at trying to memorize the kanji’s etymology. A completely different approach is undertaken by Eleanor Harz Jorden and Mari Noda. Along with their spoken language text book whose vocabulary are in sync, all kanji are presented in order of practicality and commonality of use as opposed to ease of learning. It is an approach that has drawbacks. It does not in any way mention to the reader anything about radicals and how they can contribute to the general meaning of a kanji or kanji compound. The text also only provides a few vocabulary words with which a kanji might correspond with no helpful hints or tricks on how to memorize them. For the task at hand, neither approach was used due to the possible drawbacks. Instead, the kanji presented are from the standard 3rd grade curriculum of Japanese elementary schools. All kanji in 1st and 2nd grades as well as hiragana and katakana are considered as prerequisites for this site’s use.

Upon visiting the site the user is required to sign up for an account via the sign up page. From there they can log into their account and visit their home page, consisting of multiple tabs from which the user can do various tasks. The default tab loaded upon login is a page briefly explaining the functions of the website and the research that was implemented to create it. There is also a quiz tab, where the user can take quizzes on various sets of kanji from the aforementioned set. Each quiz will consist of 30 questions where users must match the kanji or kanji compound to the correct reading in hiragana out of 4 choices. The reports tab shall consist of all of the grade reports from kanji quizzes thus far. Upon completion of a quiz a report will be sent to the website and some overall statistics taken from all of the quizzes shall be presented the user along with a history of all reports. The kanji sheets tab holds all of the kanji that the site offers for study. The default option is to display all kanji at once, but users may filter out kanji for a specific lesson that they want to learn. Lessons shall consist of 30-40 kanji and kanji compounds, holding their hiragana readings and meanings in English. The order in which they are introduced to the user will be based off the order they are introduced in a standard Japanese elementary school curriculum. Next is the achievement tab where users can find which achievements for the site they have unlocked thus far. This will be discussed later in more detail. Finally is a user settings tab, where the user can check their user information, change emails, change passwords, and anything goal related to the site.

Next is the issue of how the site should tackle the issues of motivational sustainment. A way to control and keep the commitment of the user is to set goals and remind the user why they are learning the language. When the user signs up, they must fill out a short text box with the main reason they are studying Japanese. This statement will be posted on the homepage every time the user logs in to remind them of this, and it can easily be changed if the user so desires via user settings. This will act as their long term goal at which they will work over time. Users will also be required to create weekly short term goals for their studies. The system reminds the user to try to keep their kanji acquisition low, around the order of 10 per week. This is to ensure that their short term goals are achievable. The recommended range for the goals will be 5 to 15 kanji per week. This will equate to roughly one set of kanji. New goals are to be set every week. To remind the user to use the system, a reminder email will be sent to the user after a week of inactivity, reminding them of the reasons they chose to study kanji along with some helpful study tips on how to change up their study routine. These can range from changing the location of where they study to rewarding themselves if a specific goal is reached. To implement a reward based system on the site, a user can unlock achievements on the site. These can include one for using the site for over month, one for reaching a specified number of goals, or another for taking a certain number of quizzes. The use of outside resources to further gain knowledge and promote cultural interest in learning kanji will also be implemented. This will mainly consist in the form of links to outside language resources such as The Asahi Shinbun and other free literature sources. Increasing visual appeal of the site will come in the form of theming the site around anime, a common interest among those learning Japanese at the university level. Animated characters will act as visual accessories and will become animated upon when the user selects the correct answer in the quiz to promote a small sense of satisfaction and reward. The color scheme can also be changed at will by the user.

Lastly, the technical details of KanjiMaster.com shall be discussed. The backend is programmed primarily in Flask, a micro-framework written in Python. It acts as the main code to run the server, handle user traffic to visit the site, and request any information available from it. Because Flask is a micro-framework, it does not have a built-in database to store and manage data about kanji, user information, and quiz reports. To solve this, an object relational model known as SQLAlchemy was used to implement a database. It includes three main tables to store its data. First is used to store user related data such as name, username, and email address. All passwords are securely encrypted, salted, and hashed using the bcrypt hashing algorithm to ensure user accounts are as secure as possible. The second table stores information regarding user quiz reports. This includes the date, lesson quizzed upon, and percentage of the questions answered correctly. Another table stores all kanji that the website can teach the user.

The front end of the website was done primarily with JavaScript, HTML, and CSS. In order to reduce the amount of code for the site written in HTML, a templating tool known as Jinja2 was used to write a base template for the rest of the pages. This was mainly used to write the main framework of the web page visible to the user, with the details of the specific pages being filled in with more specific code. In order to handle requests from the server and make the site more interactive, JavaScript was used to manipulate page actions. Some of these would include sending quiz results to the server, changing which tab was open to the user on the home page, and password requirement checks on the signup page.

**Conclusion**

With all of the techniques stated above an interactive website that tutors the user in kanji was developed. Its focus primarily lies with motivational tactics used at keeping the user engaged throughout the rigorous process of becoming literate in Japanese. The presented research gives it some basis for its effectiveness, but its results have yet to be analyzed. This site provides a different approach to language studies that will hopefully lead to further research and development into an application that can help even more people study a variety of different languages.

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