Self-Assessed Reading Comprehension in English Among Adults in Japan: Implications of Lifestyle and Information Technology

Hachiro UCHIYAMA *Doshisha University*
Mark TAYLOR *University of Hyogo*
Hiroki INOUE *Niigata University of Health and Welfare*

Abstract

This study commences with statistical data analysis of Japanese adults' self-assessment of their English reading comprehension and various explanatory variables. Data from the Japanese General Social Survey (JGSS) were analyzed in two stages. In the first stage, a series of bivariate analyses were conducted with demographic, socio-economic, and lifestyle-related indicators as independent variables and self-assessed reading comprehension in English as the dependent variable. In the second stage, several multivariate models were constructed to determine which model best accounts for the effects on the dependent variable. The variables in the category of lifestyle-related factors—which includes the degree of information technology (IT) utilization—surfaced as predictive of the variable on self-assessed reading comprehension in English for Japanese adults. Subsequent to the analyses, implications and possibilities of IT as a reading resource for Japanese adult learners of English are discussed.

1. Introduction

Literacy is one characteristic that differentiates *Homo Sapiens* from the rest of the species on earth. It is reasonable to state that no other species on earth has had the development of and reliance on literacy as humans have. In effect, literacy has profoundly affected the progress and sustenance of human cultures and social organizations. Reading and writing play a critical role in our social engagements, between friends and coworkers, among citizens, and across nations. Moreover, reading and writing skills enable us to transcend time and space in these interactions. Through literacy, we can share ideas with our fellows here and now, or for posterity. Even though time may separate us from the past by centuries, we can still access the stories, knowledge, and ideas jotted down or authored by those that had lived in distant times.

Now, early into the 21st century, the term "literacy" has come to encompass the realm of information technology (IT). IT has turned communication across great distances into a practice that is not only feasible but also commonplace particularly in developed countries. Today, people can communicate asynchronously as in e-mails or synchronously as in online meetings, regardless of their physical distance. The recent worldwide crisis caused by the COVID-19 pandemic has augmented the IT's essential and decisive role in disseminating and sharing ideas across the globe. With these

circumstances in the background, this study scrutinizes how (1) IT literacy—or the level of IT utilization—as one component of lifestyle-related factors and (2) one conventional aspect of literacy—viz., reading comprehension in the English language—are associated with each other.

Some studies have been conducted prior to the present one on a wide range of topics dealing with IT utilization, its impacts on learners, and English language learning. Many of the studies focus on the use of IT as a set of tools to implement in classroom settings to assist instructions (Becker & Ravitz, 1999; Zhao, 2008; Ogino, 2012; El Hariry, 2015). Some of them report positive influences of introducing IT into the classroom (Zhao, 2008; El Hariry, 2015). There are other studies that deal with Internet use and the students' cognitive development (Johnson, 2006; Johnson, 2010). In particular, Johnson found that teachers' assessments of the students' social development levels were related to their Internet use at home (Johnson, 2010). All of the studies above have certainly contributed to a better understanding of IT use in classrooms, how it affects the learners, and learning English as a foreign language.

The present study is distinct from the above in that it explores aspects of IT and the English language that, heretofore, have not been analyzed, as far as the authors are aware. This study examines, in particular, one cross-section of 21st century literacy in Japan—namely, the adult sample population in Japan, and the role IT may play in developing reading skills in English. The study begins with bivariate analyses of factors influencing adult Japanese individuals' self-assessment of English reading comprehension. The research then employs multivariate analyses to highlight statistical associations between demographic, socio-economic, and lifestyle-related factors as explanatory variables and self-assessed reading comprehension in the English language as the outcome variable. The analyses demonstrate a correlation between IT utilization and self-assessed reading comprehension. The analyses are then followed by discussions illuminating online reading behavior with some potential benefits to the Japanese learner of English.

2. Methodology

The current study draws on data compiled for the Japanese General Social Survey (Center for Social Research and Data Archives, 2010; JGSS Research Center, 2010). The method of analysis is primarily statistical. In the first stage, a series of bivariate analyses were conducted between such variables as "Age," "Education," "Self-Identified Social Class," "The Degree of Internet Use," "The Degree of Mobile IT Use," and "The Degree of English Use in Daily Life" as explanatory variables, and a single response variable—i.e., "Self-Assessed Reading Comprehension in English"—to appraise their predictive associations. The validity of the use of the proxy variable—self-assessed reading skills—in estimating objective reading ability in the context of foreign language learning has been studied prior to this one (Johansson, 2013; Yoshizawa, 2009). The results of the studies have respectively attested to the usefulness and validity of employing self-assessed reading skills to predict *bona fide* reading ability.

In the second stage, several multivariate models consisting of various combinations of variables were constructed from deliberations on outcomes of the preceding bivariate analyses. Stepwise

multinomial logistic regression analyses then evaluated the models to determine the best fit model or combination. Finally, essential outcomes from the above analyses were prudently considered, yielding some promising implications for English language learners and clues for researchers and educators.

2.1 Sample Descriptions

The JGSS data were collected by a two-stage stratified random sampling procedure from February to April in 2010 (Center for Social Research and Data Archives, 2010). The selected respondents were people living in Japan with voting rights (which, in 2010, was granted to citizens over 20 years of age). Table 1 below lists the respondents' breakdowns of "Gender" and "Marital Status."

Table 1 *Sample Descriptions*

Variable	Number	Percentage
Gender ($n = 2,507$)		
Male	1,146	46.0
Female	1,361	54.0
Marital Status ($n = 2,506$)		
Male ($n = 1,145$)		
Married	880	76.9
Not Married[1]	265	23.1
Female ($n = 1,361$)		
Married	943	69.3
Not Married[1]	418	30.7

Note: [1] "Not Married" includes those who answered "Single," "Divorced," or "Separated by Death."

2.2 Nominal, Ordinal, and Composite Variables

For analyses involving ordinal data for explanatory as well as outcome variables, strengths of predictive associations were calculated and reckoned by Goodman and Kruskul's *gamma* (γ) whose values signify the proportional reduction of errors. On the other hand, Goodman and Kruskul's *lambda* (λ) is used to assess associations between nominal variables, since that is the appropriate measure for this particular type of data (Babbie & Halley, 1998).

Some of the ordinal variables utilized in this study are composite variables that have been constructed from a group of nominal variables by the investigators of the present study. For instance, the ordinal variable "The Degree of Internet Use" is compositely formulated from the following variables: "Use the Internet to Search for Information," "Use the Internet for Shopping," "Use the Internet for Banking," "Use the Internet to Send E-mails," and "Use the Internet to Make a Homepage Including a

Blogging Site." Based on answers to each of the preceding questions, one point was assigned to the respondent, if the given answer confirmed the Internet usage. For example, if the respondent used the Internet to search for information, he or she was allotted one point; similarly, another point was assigned if the respondent used the Internet for shopping online, and likewise for the rest of the variables mentioned above. In this manner, a rank variable with the range of 0 to 5—the former value being the least active of Internet use and the latter representing the most active utilization level—was constructed using IBM SPSS® Statistics software. Additional examples of variables constructed in a manner akin to the aforementioned variable include "The Degree of English Use in Daily Life," and "The Degree of Mobile IT Use," each of which is also an ordinal variable generated from multiple nominal variables.

2.3 Outcome/Response/Dependent Variable

Table 2 *Frequency Distribution of the Response Variable (n = 2,506)*

Self-Assessed Reading Comprehension in English	Number	Percentage
Able to read English books and newspapers without trouble	22	0.9
Manage to read English books and newspapers	99	4.0
Able to read short sentences in English	480	19.1
Able to understand easy English words	973	38.8
Hardly able to read English	932	37.2
Total	2,506	100.0

This study focuses on a single outcome—i.e., response or dependent—variable: "Self-Assessed Reading Comprehension in English" whose frequency distribution is displayed as shown above in Table 2. In the JGSS, there is a question that addresses the respondent's level of English reading comprehension. Specifically, the question—translated into English—is "How well can you read English?" (JGSS Research Center, 2010). The respondents were asked to select a choice that most closely matches their reading comprehension level in English from the five choices listed in Table 2. Since these choices rank English reading competency from high to low, the data set for this question is on the Likert scale, and is, therefore, treated as an ordinal/ranked variable accordingly.

3. Results

3.1 Stage 1: Bivariate Analyses

Table 3 *Results of the Bivariate Analyses*

Explanatory Variable	Gamma (γ) value[1]	ASE	Approx. T	p-value
Demographic				
Age (*n* = 2,506)	0.415***	0.020	20.471	0.000
Gender[1] (λ) (*n* = 2,506)	0.000**	0.000	2.275	0.023
Geographic Location[1] (λ) (*n* = 2,506)	0.000	0.016	0.643	0.520
Marital Status[1] (λ) (*n* = 2,505)	0.032**	0.014	2.214	0.014
Socio-economic				
Education (*n* = 2,496)	- 0.684***	0.016	- 34.656	0.000
Income (*n* = 2,101)	- 0.164***	0.025	- 6.439	0.000
Self-Assessed Social Class (*n* = 2,482)	0.254***	0.031	7.990	0.000
Lifestyle-related				
The Degree of Internet Use (*n* = 2,043)	- 0.457***	0.023	- 18.784	0.000
The Degree of Mobile IT Use (*n* = 2,503)	- 0.552***	0.019	- 26.268	0.000
The Frequency of Newspaper Reading (*n* = 2,500)	- 0.051*	0.030	- 1.698	0.089
The Number of Books Read Per Month (*n* = 2,496)	- 0.367***	0.024	- 14.301	0.000
The Degree of English Use in Daily Life (*n* = 2,502)	- 0.714***	0.016	- 30.769	0.000

Note: [1] The outcomes shown above for the variables "Gender," "Geographic Location," and "Marital Status" are of *lambda* (λ) in lieu of *gamma* (γ), since these variables are nominal variables. ASE = Asymptotic Standard Error. Approx.= Approximate. $^* p < .10,$ $^{**} p < .05,$ $^{***} p < .01.$

Table 3 above lists noteworthy outcomes obtained in the series of bivariate analyses during the first phase of the study. For analyzing predictive associations between the variables on the list and the response variable, "Self-Assessed Reading Comprehension in English," the majority of the combinations of variables entailed the use of *gamma* (γ) for the analyses to reckon the relationships. This tendency is due to the preponderance of combinations consisting of ordinal variables (including the response variable) with the exceptions of "Age," "Gender," "Geographic Location," "Marital Status," and "Income." Two of the exceptions above—i.e., "Age" and "Income"—are not only continuous but also ratio variables, each with an absolute 0 value. In this case, nonetheless, the outcome variable—an

ordinal measure—makes it appropriate to utilize *gamma* (γ) to reckon predictive associations with these two variables (Babbie & Halley, 1998).

In terms of the outcome values, several variables from the three classificatory groups—i.e., (1) demographic, (2) socio-economic, and (3) lifestyle-related categories—are conspicuous from the rest. In particular, "Age" ($\gamma = 0.415$, $p < .0005$), "Education" ($\gamma = -0.684$, $p < .0005$), "The Degree of Internet Use" ($\gamma = -0.457$, $p < .0005$), "The Degree of Mobile IT Use" ($\gamma = -0.552$, $p < .0005$), and "The Degree of English Use in Daily Life" ($\gamma = -0.714$, $p < .0005$) are noteworthy for their respective outcome values. The predominance of lifestyle-related variables over the two remaining categories is also remarkable.

3.2 Stage 2: Multivariate Analyses with the Stepwise Multinomial Logistic Regression Model

Subsequent to the bivariate analyses, multivariate models were constructed for the second phase of the study. The second stage was conducted while heeding the postulation that, in lieu of a single factor in isolation, multiple variables in conjunction influence the proxy measure—i.e., perception of one's own reading comprehension in the English language. It was reasoned that discreetly-constructed multivariate regression analyses would help demystify the combinations of influential variables that may be at work simultaneously while substantiating their associations by mathematical sensibilities. Additional benefits of multivariate models are described by Iwai and Yasuda (Iwai & Yasuda, 2010).

The stepwise multinomial logistic regression analyses yielded results in terms of odds ratios, as shown in Table 4 in Appendix. One of the notable outcomes in Table 4 is the odds ratio for the variable "The Degree of Mobile IT Use." The observed value is 1.503 in the row of the "*Moderate*" in "The Degree of Mobile IT Use" and the column of the *Second Lowest* in "Self-Assessed Reading Comprehension," and it is statistically significant ($p < .05$). Interpretations of this observation and other remarkable outcomes are discussed in the next section.

4. Discussion

Before delving into a discussion of the results, the outcomes obtained heretofore are summarized for organization and clarity. The first stage of the bivariate analyses has yielded outcomes that highlight predictive values of such explanatory variables as "Age," "Education," "The Degree of Internet Use," "The Degree of Mobile IT Use," "The Number of Books Read Per Month," and "The Degree of English Use in Daily Life" being relatively high on the single response variable—viz., "Self-Assessed Reading Comprehension in English." Based on the results of the bivariate analyses, several multivariate models were constructed and tested for their validity. The stepwise multinomial logistic regression analyses highlighted that one of the models with five explanatory variables was the best fit for the data. The five explanatory variables included in the model were "Education," "The Degree of Internet Use," "The Number of Books Read Per Month," "Age," and "The Degree of Mobile IT Use."

It was observed that three of the five aforementioned variables are of the category of the lifestyle-related variables—namely, "The Degree of Internet Use," "The Number of Books Read Per Month,"

and "The Degree of Mobile IT Use." Of the remaining variables, "Age" falls in the category of demographic variables, while "Education" is classified into the group of socio-economic variables. The preponderance of lifestyle-related variables among the statistically significant ones is noteworthy, and it is, in effect, a compelling tendency that deserves special attention, as far as this study is concerned.

Relevant to contemporary lifestyle are advancements in IT which have brought about numerous changes in how people carry out their activities of daily living. The present study shows associations between the extent of IT utilization, which includes the use of the Internet and mobile devices, and the outcome variable, viz., the level of self-assessed reading comprehension in English. Taking the statistically significant as well as notable outcomes into account, the focus of the discussion now turns to IT's impacts on reading skills in the English language—in particular, implications of IT for Japanese adult's English reading comprehension.

According to Table 3, the results of the bivariate analyses show that the variable "The Degree of Internet Use" is moderately predictive of "Self-Assessed Reading Comprehension in English" ($\gamma = -0.457$, $p < .0005$). This association could be interpreted as a general tendency that the more purposes for which the respondent utilizes the Internet, the higher his/her perception of his/her reading comprehension in English tends to be.

The multivariate model has also confirmed the effect of the explanatory variable's fitment with the data and the effect on the response variable. For example, one may realize in Table 4 of the Appendix that two of the odds ratios for Internet use are statistically significant ($p < .0005$): i.e., *Lowest* in "The Degree of Internet Use" (OR = 0.063; CI: 0.009 – 0.434) and *Low* in "The Degree of Internet Use" (OR = 0.119; CI: 0.026 – 0.539) both of which fall under the category *Second-Highest* in "Self-Assessed Reading Comprehension." One may surmise what potential implications of these multiple numerical values might be.

One possible interpretation is that in comparison with the reference group—i.e., the group of the *Highest* in "The Degree of Internet Use"—those of the *Lowest* in "The Degree of Internet Use" are 0.063 times more likely to be in the *Second-Highest* category of "Self-Assessed Reading Comprehension in English." Similarly, those *Low* in "The Degree of Internet Use" are 0.119 times more likely to be classified into the category of the *Second-Highest* in "Self-Assessed Reading Comprehension" than the reference group composed of those who are categorized into the *Highest* group in terms of "The Degree of Internet Use." These two odds ratios are much smaller than 1.00; i.e., the former case can be construed to mean that those of the *Lowest* in "The Degree of Internet Use" are much less likely (since its likelihood is 0.063) to be in the *Second-Highest* category of self-assessed reading comprehension in English than those who are in the category of the *Highest* in "The Degree of Internet Use." Likewise, those who are classed into *Low* in "The Degree of Internet Use" are much less likely to be in the *Second-Highest* category for the variable "Self-Assessed Reading Comprehension in English," due to the likelihood of 0.119 in this case.

In Table 4, the odds ratio, 1.503, is statistically significant ($p < .05$) for the variable "The Degree of Mobile IT Use" in the row of *Moderate* in "The Degree of Mobile IT Use" and the column of the

Second-Lowest in "Self-Assessed Reading Comprehension." This specific odds ratio—to reiterate, 1.503—can be construed as an indication that, as compared to the person with the highest degree of mobile IT use, one with a moderate degree of mobile IT use is 1.503 times more likely to be in the *Second-Lowest* category in terms of "Self-Assessed Reading Comprehension in English." In other words, having a lower degree of mobile IT use makes it 1.503 times more likely for the person to be in the *Second-Lowest* category of "Self-Assessed Reading Comprehension in English." In the authors' opinion, this odds ratio is by no means trivial, and certainly deserves special attention.

Combined with the results of "The Degree of Mobile IT Use," it could be inductively reasoned from these multiple results that there is a tendency for those with a high degree of IT use—encompassing personal computers as well as mobile IT devices—to be more likely to be high also in terms of self-assessed reading comprehension in English. Notwithstanding the reductionism involved in such inductive reasoning, the results of the bivariate analyses in Table 3 do indicate this relational tendency between the degree of IT use and self-assessed reading comprehension in English.

As discussed earlier, outcomes of the present research indicate associations of "The Degree of Internet Use," including mobile IT use, on the one hand, and "Self-Assessed Reading Comprehension in English" on the other. To put it another way, it signifies, in general, that those respondents, whose IT utilization level is high, tend to have a higher degree of "Self-Assessed Reading Comprehension in English" than the respondents whose IT use is low. How this happens would be a subject for lengthy discussions, as there is a myriad of possible relations at work.

From the results of the present study, one might conjecture that a person who uses the Internet for more purposes than another is likely to encounter a larger volume of reading materials than the latter. In other words, for the Japanese adult English learner with a basic IT proficiency, not only he/she would come across and consume a larger volume of information on the web than another without basic IT skills, but also the former would get to exercise selective reading online, which, according to Liu's study, is one of online reading behavioral tendencies (Liu, 2005). Liu found that online readers tend to use selective reading frequently (Liu, 2005). In this scheme, while being online, it is conceivable that the one who uses the Internet for various purposes may end up applying selective reading in a language (or languages) the websites are written, even though the individual concerned may not recognize the act as training or exercising in selective reading. Though Liu's study concerns the behavior of readers in the United States, it does not seem far-fetched to hypothesize or theorize that adult readers in Japan engage in similar selective reading behavior.

There are additional advantages to selective reading online. Selective reading can save time spent per passage, thus giving the user some additional time to browse through more material. It appears that online readers do more skimming and scanning, regardless of whether or not they are aware of such tendencies. In other words, because of skimming and scanning involved in selective reading, the online reader tends to go through more passages in a given amount of time. Much of the information a Japanese adult would read on the web is likely to be in Japanese, even though a Japanese learner of English would possibly access online materials in English as well, especially if he/she is a more advanced, motivated,

and keen learner of the language. In this scenario, selective reading online would offer a means of exposure and consumption of a greater volume of English reading materials.

Finally, there seems to be a further benefit to using the Internet for developing reading skills, if a proper online reading material is selected: That is, its psychological effects on the learner. Potentially, online reading makes it possible for the reader to be in a more relaxed state than if he or she were reading a textbook in a classroom setting. The results of a study by Molchanova are relevant to this observation. She examined the effects of the Internet on studying English in Russia and found that the Internet contributed to students' psychological comfort (Molchanova, 2015). Moreover, she concluded that the Internet facilitated the students' realization of their educational potential, enhanced confidence, and motivation for further studies in English (Molchanova, 2015). IT utilization in a suitable environment has promising effects on the students' psychological states, possibly providing stimulation and opportunities for additional learning at the click of a mouse—quite literally.

5. Conclusion

The results of this study found that the degree of IT use is predictive of the level of self-assessed reading comprehension in English among Japanese adults. It is advisable for learners of English as a foreign language including those in Japan to take advantage of available IT resources such as the ones on the Internet, with a specific goal of improving their English language proficiency. In particular, setting a specific aim or an attainable benchmark is critically important, for undirected, haphazard, or erratic surfing on the Internet is likely to end up being unproductive. The significance of having a tangible goal is buttressed by a study carried out by Harackiewicz and others (Harackiewicz et al., 2002). In all likelihood, it is sensible to state that some IT resources serve as a powerful language learning tool for the 21st century, albeit it is certain that more research is expected to better understand how we might use IT to maximize its advantages while minimizing its disadvantages.

Acknowledgments

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Appendix: Table 4 *Outcomes of Multinomial Logistic Regression Analysis (Odds Ratios and 95% Confidence Intervals)*

Predictor Variables	Self-Assessed Reading Comprehension: The Highest		Self-Assessed Reading Comprehension: Second-Highest		Self-Assessed Reading Comprehension: Third-Highest		Self-Assessed Reading Comprehension: Second-Lowest	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Education								
Elementary School[1]	0.000	0.000 - 0.000	0.000	0.000 - 0.000	0.000	0.000 - 0.000	0.070***	0.015 - 0.327
Junior High School	0.000	0.000 - 0.000	0.000	0.000 - 0.000	0.019***	0.006 - 0.056	0.203***	0.125 - 0.331
Senior High School	0.043***	0.009 - 0.200	0.036	0.017 - 0.076	0.132***	0.088 - 0.196	0.506***	0.351 - 0.730
Two Year College	0.143	0.031 - 0.673	0.097	0.042 - 0.225	0.371***	0.235 - 0.586	0.739	0.479 - 1.140
University or higher	Reference	-	-	-	-	-	-	-
The Degree of Mobile IT Use								
Low	0.499	0.057 - 4.386	0.707	0.244 - 2.052	0.880	0.542 - 1.428	0.849	0.576 - 1.252
Moderate	0.624	0.212 - 1.842	1.113	0.635 - 1.952	1.231	0.856 - 1.772	1.503**	1.093 - 2.066
High	Reference	-	-	-	-	-	-	-

Note: Reference group: The respondents whose "Self-Assessed Reading Comprehension in English" was categorized as the lowest of the five groups; * $p < .10$, ** $p < .05$, *** $p < .01$.   [1] "Elementary School" refers to elementary education in pre-World War II Japan.

Appendix: Table 4 *Outcomes of Multinomial Logistic Regression Analysis (Odds Ratios and 95% Confidence Intervals)*

Predictor Variables	Self-Assessed Reading Comprehension: The Highest		Self-Assessed Reading Comprehension: Second-Highest		Self-Assessed Reading Comprehension: Third-Highest		Self-Assessed Reading Comprehension: Second-Lowest	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
The Degree of Internet Use								
Lowest	0.000	0.000 - 0.000	0.063***	0.009 - 0.434	0.320	0.087 - 1.173	0.667	0.203 - 2.193
Low	0.165	0.014 - 1.923	0.119***	0.026 - 0.539	0.427	0.126 - 1.447	0.728	0.230 - 2.301
Moderate	0.298	0.026 - 3.381	0.383	0.254 - 5.869	0.763	0.224 - 2.603	0.945	0.296 - 3.020
High	1.310	0.107 - 16.034	1.220	0.254 - 5.869	1.552	0.416 - 5.792	1.271	0.364 - 4.443
Highest	Reference	-	-	-	-	-	-	-
The Number of Books Read Per Month								
Seldom	0.076***	0.017 - 0.346	0.146***	0.063 - 0.337	0.275***	0.150 - 0.503	0.754	0.427 - 1.331
1 book	0.154**	0.034 - 0.702	0.371**	0.161 - 0.855	0.642	0.342 - 1.205	1.515	0.838 - 2.738
2 books	0.593	0.151 - 2.321	0.445	0.173 - 1.145	0.920	0.463 - 1.830	1.073	0.558 - 2.061
3 books	0.455	0.091 - 2.291	0.543	0.186 - 1.580	0.602	0.253 - 1.436	0.959	0.424 - 2.167
4 or more	Reference	-	-	-	-	-	-	-
Age								
	1.093	0.761 - 1.569	0.937	0.775 - 1.133	0.774	0.689 - 0.870	0.905**	0.825 - 0.994

Note: Reference group: The respondents whose Self-Assessed Reading Comprehension in English was categorized as the lowest of the five groups; * $p < .10$, ** $p < .05$, *** $p < .01$.