Proceedings of the 4th International Symposium on Liberal Arts and General Education

Clock Tower Centennial Hall

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京都大学
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Preface

Welcome to the proceedings of the 4rd International Symposium on Liberal Arts and General Education which took place at Clock Tower Centennial Hall in Kyoto University, on November 22, 2013. This was the 4th International Symposium on Liberal Arts and General Education sponsored by Kyoto University in cooperation with OSAKA GAS CO., LTD, The Scientific Education Exchange, and IBM Corp.

With more and more high school students being able to pursue their studies in universities, reform and enhancement of higher education have become urgent business since the quality of the graduates need to be guaranteed. Many Japanese institutes of higher education are adopting the American program, and it is often reported that this system works well. As for Kyoto University, we have tried to adopt this program for two years. We expect that our symposium would motivate the students to learn what they want so that they would become sophisticated and acquire an independent global view through this symposium.

This year, we had 15 paper submissions from undergraduate students belonging to various faculties in various types of research area. Each of the submitted papers was reviewed by graduate students. Finally we accepted 11 papers. In order to motivate students to carry out research works, the following awards are prepared: Outstanding Presentation Award, Suzuran Award, and EINSTEIN Award.

Last but not least, we would like to extend our deepest appreciation to our sponsor, corporate partners, and all the members of the Organizing Committee, especially the Secretary, Miki Kioka, the Advisory Committee, Koji Koyamada and Naohisa Sakamoto. Without their invaluable contributions, this event would not have been possible.

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Which Is Really More Efficient: Self-catering or Eating Out?

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Many previous studies have attempted to determine whether self-catering or eating out is more efficient. This research has focused on cost, nutrition, and other factors. Although it is true that such studies have value, they merely compare the two activities. However, this study not only examines the costs of and the labor involved in self-catering and eating out but also compares and integrates the data from each. This research studies the menu and the cost of self-catering versus the average cost of eating out in a day and the labor involved in shopping for food, cooking, and doing dishes when self-catering versus that of walking to restaurants to eat out. According to the results, we cannot decide which of the two is really more efficient. In terms of both cost and labor, it is definitely possible to have more efficient meals by eating out than by self-catering, although this may be difficult to accomplish.

Key Words: meals, self-catering, eating out

1. Introduction

Most individuals who have lived on their own have had trouble deciding whether they should cook for themselves or eat out. This question has long been discussed. Previous research has shown that college students feel more comfortable when cook for themselves more often (Goto,2004,[1]); likewise, as college students engage in more exercise, they make less use of convenience stores that sell prepared foods (Goto,Odasaki,2006[2]). However, other research has also shown that the costs involved in eating out have been increasing [3].

Thus, which is more efficient: self-catering or eating out? Many people have suspected that self-catering is definitely more efficient by all metrics.

Although evidence from this study suggests that either of the two may be more efficient than the other, we know of no studies that have compared self-catering to eating out with respect to integrative effects. Integrating the two activities means considering the data from each on equal terms and then examining the two from multiple points of view. In this manner, we can more objectively evaluate the behaviors and elucidate more advantages and disadvantages of the two. This assessment should aid in reaching the most accurate result. This approach to considering the data has not been reflected in previous studies.

Hence, we compare the two dining straties, integrating the issues of cost and labor in an attempt to reveal which is really more efficient. First, the cost and labor of self-catering and eating out are researched sequentially. Then, we try to integrate the two activities.

2. Method

In this investigation, cost and labor were selected as the two factors used to determine which of the two activities—self-catering or eating out—was better. These two factors were selected because they are the most significant in differentiating between the two activities. People usually would like to eat at a low cost, with less labor. Additionally, many establishments in the food service industry try to sell their products at as low a cost as possible, and they try to place their shops in convenient locations for customers. For these reasons, the cost and labor of the two were compared.

2.1 In terms of cost

First, we calculated the cost of self-catering and eating out per day. The menu and volume of self-catered meals were drawn from “example[s] of the balanced meal[s] in a day” [4]. The costs of food were generated from lists of prices from the cities of Tokyo and Osaka in 2010 [5]. Using these data, we calculated the costs of breakfast, lunch, and supper. Next, we calculated the cost of eating out per day from data, supplied by the Bureau of Statistics of the Ministry of Internal Affairs and Communications [6].

2.2 In terms of labor

It was assumed that the labor involved in self-catering consisted of the walking required for food shopping, cooking, and doing dishes; the labor involved in eating out was assumed to consist of walking to a restaurant. People were assumed to walk at the same speeds when shopping and going to a restaurant.

The calories required for each activity were estimated according to Japanese DRIs [7]. Considering the time required for each activity, the labor values of self-catering and eating out were compared.

In this research, the less labor one engaged in, the more efficient an activity was judged to be because less labor meant that a person did not become as tired as he or she would otherwise have become.

3. Results

3.1 In ters of cost

On average, individuals spent 48895 yen per month on meals. Of that cost, 51.8% was used for eating out. Therefore, the cost a person used for eating out was 844.3 yen.

How high was the cost of self-catering? The following table shows a menu and its associated food costs for a day.

Table 1. A menu example and the cost of self-catering per day

Breakfast	Tokyo	Osaka (city)
rice	54.4	64.7
pumpkin miso soup	26.0	21.9
fried egg	21.8	19.5
yogurt	31.5	28.5
apple	52.4	55.6
Total	186.1	190.3

Lunch	Tokyo	Osaka (city)
rice	72.5	86.3
dish of raw fish and vegetables seasoned in vinegar	7.4	11.3
fried fish	111.5	93.3
mashed potatoes	93.3	92.1
milk	42.8	45.8
mikan	56.1	55.1
Total	327.5	328.8
Supper	Tokyo	Osaka (city)
rice	72.48	86.32
lettuce and cucumber salad	33.525	37.25
ginger-fried pork with cabbage	151.35	148.95
wakame and white radish sprouts soup	17.6	12.05
Total	274.96	284.57

From the above data, the total food prices per day were 788.5 yen in Tokyo and 803.6 yen in Osaka (city).

3.2 In terms of labor

A 20-year-old man who weighs 60 kg uses 130 kcal per hour for walking, 65 kcal per hour for cooking, and 85 kcal per hour for doing dishes.

The labor involved in self-catering and eating out was calculated. With regard to self-catering, X represented the total number of minutes used for food shopping, Y represented the total number of minutes used for cooking, and Z represented the total number of minutes used for doing dishes. With regard to eating out, W represented the total number of minutes used for walking. The total labor involved in self-catering was (130X+65Y+85Z)/60(kcal).

On the other hand, the total labor involved in eating out was 130 W/60 (kcal).

4. Discussion

4.1 In terms of cost

The costs of self-catering and eating out were calculated, and we found that self-catering was more efficient than eating out.

However, the costs associated with preparing one's own food differ depending on the store, the day, the weather conditions, and the season; the same is true of eating out. The menus associated with both self-catering and eating out vary according to one's health, mood, dietary habits, and so on. Furthermore, we cannot say that 844.3 yen is significantly larger than 803.6 yen or 788.5 yen. Hence, we admit that the findings are not especially conclusive.

4.2 In terms of labor

If the labor involved in self-catering and eating out were equivalent, the relationship among W, X, Y, and Z would be described by the equation W=X+0.5Y+0.65Z (Equation 1).

We made one additional assumption; it never required more than 20 minutes to do dishes. Under this assumption, Equation 1 could be transformed into the following inequality.

$W \leq X+0.5Y+13$.

Figure 1 shows the function X+0.5Y+13.

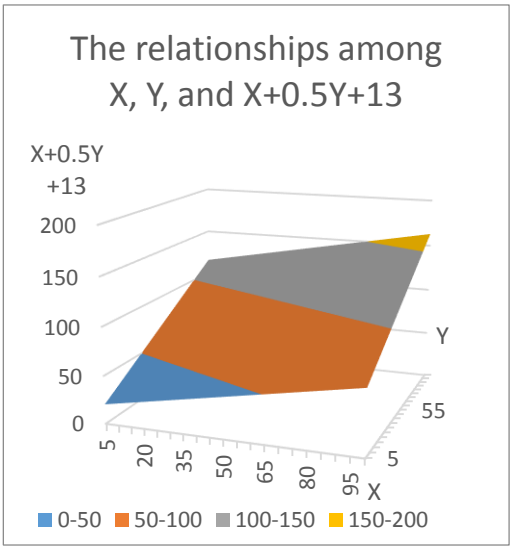

Figure 1. Equation 1. The relationships among X, Y, and X+0.5Y+13.

The above figure allows us to judge visually whether the value of W is smaller than that of X+0.5Y+13.

Because the values of X, Y, Z, and W change daily, we cannot say which of the two is really more efficient.

5. Conclusion

As stated in the Discussion section above, we cannot appraise either of the two activities as being more efficient than the other. In terms of cost, although the cost of self-catering is lower than that of eating out, the difference is not very large. In terms of labor, if the labor of eating out is less than value shown in Figure 1, eating out is more efficient. Regrettably, there is no clear way to show that either of the two is more efficient.

Integrating the two activities, we cannot say which is really more efficient: self-catering or eating out.

There is an equal possibility that either of the two is more efficient. Self-catering is not always more efficient than eating out, although many people believe that preparing one's own food is more efficient.

With regard to future directions, we will aim to research and integrate more aspects of the two activities. In calculating the costs associated with self-catering, we will take into account the costs associated with water, gas, and electric bills.

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The Unclear Truth about Japanese Professional Baseball in 2011: The Unofficial Change of the Strike Zone

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Abstract: During the 2011 Nippon Professional Baseball (NPB) season, a new type of ball, the TOITSUKYU, was introduced. After the ball's introduction, the total number of HOMERUNS rapidly decreased. Many have claimed that the new ball is responsible for the decrease in HOMERUNS during the 2011 season. In this paper, I reveal another factor that contributed to the decrease in the total number of HOMERUNS hit in 2011: the STRIKE ZONE. The STRIKE ZONE was unofficially changed in 2011.

Key Words: HOMERUN, TOITSUKYU, STRIKE ZONE, NPB (Nippon Professional Baseball)

1. Introduction

During the 2011 Nippon Professional Baseball (NPB) season, a new ball, the TOITSUKYU, was introduced. Figure 1 shows that the total number of HOMERUNS rapidly decreased after the introduction of the TOITSUKYU. Many baseball critics insisted that the decrease in HOMERUNS was caused by the new ball. Players also claimed that it was more difficult to hit the new ball as far as they could hit the old ball. It is true that the total number of HOMERUNS decreased, but several players were able to perform as well as they had in previous seasons. It is therefore an exaggeration to claim that the TOITSUKYU was the only factor responsible for the decreased total of HOMERUNS. The Great East Japan Earthquake, which occurred in March 2011, also played a role. Because Japan faced a limited electricity supply, the NPB introduced a new rule called the "THREE AND A HALF HOURS RULE". This RULE stated that no new innings could be played after the game had lasted more than three and a half hours. After the introduction of this rule, a rumor spread that the rule caused umpires to make more judgments in favor of the PITCHERS. It therefore seems likely that the STRIKE ZONE was expanded. This paper demonstrates that the decrease in HOMERUNS was the result not only of the introduction of the TOITSUKYU but also of the expanded STRIKE ZONE.

There are two instances in which a change in the STRIKE ZONE has been officially announced. First, in 2002 (Maruyama [2]), the STRIKE ZONE was expanded. In 2007, the STRIKE ZONE was again expanded, but only in the PACIFIC LEAGUE.

In this paper, the official definition of the STRIKE ZONE is used. The strike zone begins at the midpoint between the batter's shoulders and the pants of the uniform and ends just below the kneecap.

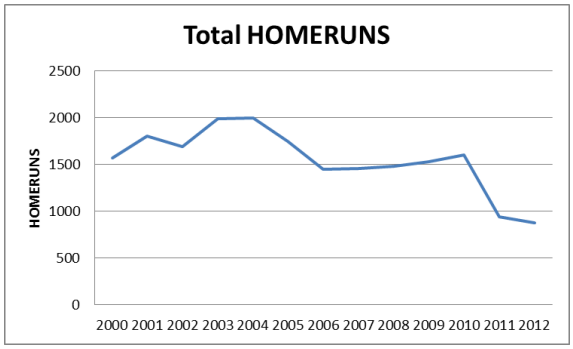

Figure 1. The total number of HOMERUNS

2. Method

This research is based on the official data published by the NPB ([3]). First, the changes in the number of OUTFIELD PUTOUTS were determined. A decrease in putouts indicates that the distance of the batted ball has also decreased. The converse is also true.

Second, to study the expansion of the STRIKE ZONE, two indices were used. The first is the total number of AT-BATS divided by the total number of WALKS (index A). The second is the total number of AT-BATS divided by the total number of STRIKE OUTS (index B). An AT-BAT is defined as the number of times a batter stands in the batter's box and attempts to hit the ball. This number includes STRIKE OUTS but excludes the WALKS statistic. For example, when a batter hits the ball and the ball is caught (a fly out), it counts as one AT-BAT.

Therefore, the number of AT-BATS is equal to the sum of the number of outs made and the number of hits for a given batter. If a batter is given the call of BALL, not STRIKE, four times, the outcome is known as a WALK. A WALK is equivalent to a SINGLE. A WALK is advantageous for the batter's team. Index A, which shows the number of AT-BATS a batter needs to draw one WALK, indicates how difficult it is to draw a WALK; the greater the value of Index A, the more difficult it is to draw a WALK. Index B, the number of AT-BATS a PITCHER needs to achieve one STIRIKE OUT and thus indicates how difficult it is to achieve a STRIKE OUT. These data will be used to demonstrate that the STRIKE ZONE was unofficially changed in 2011. I will conclude that this change was disadvantageous to batters and influenced the total number of HOMERUNS.

3. Results

Figure 2 shows the change in the number of PUTOUTS IN THE OUTFIELD. As this figure indicates, there was little change in the number of PUTOUTS IN THE OUTFIELD between 2010 and 2011. The number of PUTOUTS IN THE OUTFIELD indicates the number of PUTOUTS, excluding infield pop-outs. That is, PUTOUTS include only fly outs in the outfield. If it were truly difficult to hit the new ball a great distance, the number of PUTOUTS IN THE OUTFIELD would have decreased. However, Figure 2 suggests that this is not the case. Therefore, the decrease in the number of HOMERUNS does not seem to be caused by the new ball. We must therefore look for another factor responsible for the decrease in HOMERUNS.

Figure 3 shows that when the STRIKE ZONE was extended in 2002, index A rose rapidly, recovering in 2003. In 2011, this pattern was replicated. In short, it is highly likely that the STRIKE ZONE was modified in 2011. Figure 4 shows that index B dipped in 2002 and recovered in 2003. The situation reoccurred in 2011.

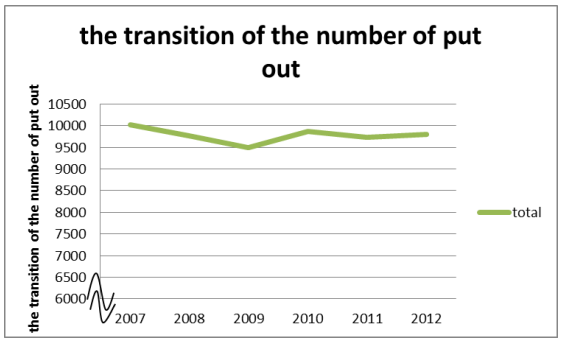

Figure 2. PUTOUTS in the OUTFIELD

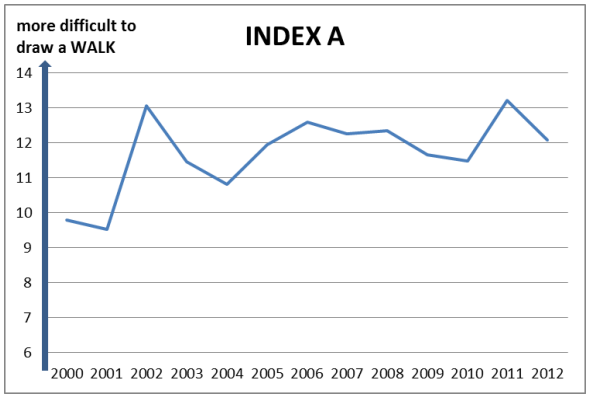

Figure 3. NDEX A

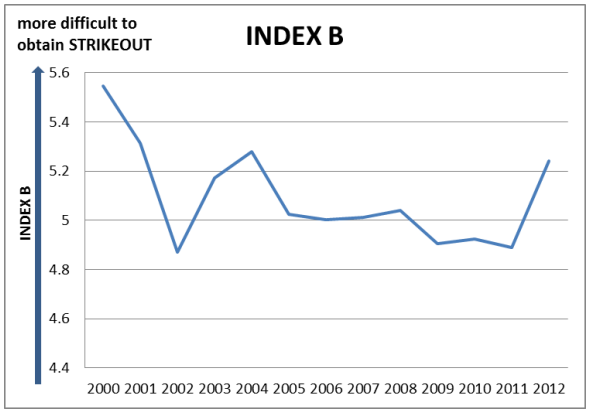

Figure 4. NDEX B

4. Discussion

As Figures 3 and 4 show, the variations in index A in 2011 are the same as those observed in 2002, indicating that it is likely that the STRIKE ZONE was unofficially modified in 2011. The 2002 and 2011 seasons both saw decreases in index B, with subsequent recoveries in the following year. Index B experienced a larger decrease in 2002 than in 2011 because in 2002, the official announcement introducing a wider STRIKE ZONE was widely broadcasted, which influenced the players' mindsets. Each baseball player has his own STRIKE ZONE, to which he has become accustomed since the beginning of his baseball career and during individual games. The STRIKE ZONE is therefore a standard that is understood by each player and that differs between players, games and umpires (Tokihira [4]). In 2002, the STRIKE ZONE was widened. This official announcement greatly influenced batters' games. In 2002, most batters maintained the STRIKE ZONE they had previously used so that they would not have to change their batting style. However, in 2011, no announcement was made about the change in STRIKE ZONE. The batters expanded their own STRIKE ZONES during the games to adapt to the

game. The differences between 2002 and 2011 were therefore caused by information asymmetry. In 2007, when the STRIKE ZONE was changed only in the PACIFIC LEAGUE, an official announcement was made. However, this change was limited to the PACIFIC LEAGUE, and the news was not broadcasted widely. The influence of the change is therefore unclear. In 2011, no official announcement was made, and batters were therefore less conscious of the change.

In 2011, index A suggests that batters seemed to be stymied by the difficulty of drawing a WALK. They would swing at balls that would have been considered outside of the strike zone (i.e., not swung at) in previous years, with poor success. The resulting change in the number of STRIKE OUTS was unanticipated. This style of batting also decreased the number of HOMERUNS. In summary, in the absence of an official announcement, the batters were confused, and the total number of HOMERUNS decreased. Index B suggests that the recoveries observed in 2002 and 2011 have similar causes. The STRIKE ZONE therefore appears to have been changed in 2011.

In the 2011 season, the NPB not only introduced the TOITSUKYU but also unofficially changed the STRIKE ZONE. The rapid decrease in the number of HOMERUNS in 2011 can be attributed not only to the new ball but also to the creation of a disadvantageous situation for the batters. Both of these factors decreased the total number of HOMERUNS in 2011.

5. Conclusion

This research revealed the possibility that the STRIKE ZONE was unofficially changed in 2011. However, to make this assertion, other factors should be researched. For example, the number of CALLED STRIKE OUTS and STRIKE OUTS should be compared by year. Moreover, for each AT-BAT, the number of WALKS and the numbers of BALLS and CALLED STRIKES should also be researched. At present, these data are not available. To make outside research possible, the NPB should remove some of their restrictions on data access.

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The Relationship between Legal Recognition of Same-sex Marriage and Affluence; Can Same-sex Marriage Be Legally Recognized in Japan?

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Abstract: At present, Japan does not legally recognize same-sex marriage. Recently, however, other countries have begun to recognize it. To protect each individual's freedom to make lifestyle choices, it is essential to legalize same-sex marriage. This research analyzes the correlation between economic conditions and the legalization of same-sex marriage to examine the elements required to secure the legal recognition of same-sex marriage. Moreover, it is clear that cultural and social factors are involved in the same-sex marriage debate. This study also considers the issue of same-sex marriage from such a perspective, and I realize that changing various legal frameworks, including same-sex marriage, requires devoting careful attention to complex cultural matters. I believe that this study will provide important insights to address gender problems and lifestyle issues in Japan.

Key Words: same-sex marriage, economic barometers, GNI, HDI, cultural background, religion, consciousness

1. Introduction

Japan does not legally recognize same-sex marriage. Article 24, Section 1 of the Constitution of Japan stipulates: "Marriage shall be based only on the mutual consent of both sexes and it shall be maintained through mutual cooperation with the equal rights of husband and wife as a basis" taking for granted that marriage is between a man and a woman. Moreover, the Civil Law of Japan assumes that the purpose of marriage is to supply the next generation of citizens, who are subject to certain rights and duties. Therefore, it is assumed that marriage should be between a man and a woman, not between two individuals of the same sex. While Japan offers a legal mechanism that functions as an alternative to same-sex marriage, namely, adoption arrangements, the way in which property is transferred under adoption law is substantially different from that under marriage law.

However, in recent years, same-sex marriage has been legally recognized in various countries. Everyone has the right to freely select his or her own lifestyle, regardless of whether he or she is a member of a sexual minority. Legalizing same-sex marriage is necessary to expand the rights of sexual minorities and to create a society in which more individuals can live happily. A movement for that purpose is occurring worldwide. At present, 18 countries legally recognize same-sex marriage.

・Europe (10 countries)
The United Kingdom, France, the Netherlands, Belgium, Denmark, Portugal, Spain, and Norway,
Sweden, Iceland
・The Americas (6 countries)
The United States of America (in 13 states and Washington, DC), Argentina, Canada, Uruguay, Brazil, and Mexico
・Africa (1 country)
The Republic of South Africa
・Oceania (1 country)
New Zealand

There are two ways to legally recognize same-sex marriage. Each of the 18 countries has selected one of these two approaches.

The first is to treat same-sex marriage as one would treat marriage between a man and a woman. That is, each member of a same-sex couple is placed on his or her partner's family register. For example, the Netherlands and Belgium recognize same-sex marriage in this way. The alternative approach is to establish laws (partnership laws, etc.) that accord same-sex couples all or some of rights enjoyed by a husband and wife. For instance, Denmark, Norway and Sweden have followed such an approach.

Various studies have been conducted on same-sex marriage, and many of them discuss the advantages and disadvantages of legalizing same-sex marriage. It is necessary to protect the rights of homosexual couples. (Hotta, 1999 [1]) Moreover, from a political perspective, it is necessary to recognize the existence

of various lifestyles. (Sato, 2008 [2]) Furthermore, the problems associated with same-sex marriage can be solved on an individual basis. (Shimizu, 2008 [3]) Additionally, prohibitions against same-sex marriage may be considered unconstitutional. (Ono, 2009 [4]) However, some argue that there are some difficulties associated with recognizing same-sex marriage. (Ikeya, 2013 [5])

This study investigated the necessary conditions for same-sex marriage to be legally recognized, based on the assumption that same-sex marriage should be legalized. I hypothesized that the more economically advanced countries are, the more likely they are to legally recognize same-sex marriage.

2. Methods

2.1 Subjects of this survey

As measures of each country's economic status, this study employed Gross National Income (GNI) and the Human Development Index (HDI).

GNI is an economic statistic. It reflects the total income earned by Japanese individuals and enterprises, both in Japan and abroad, over a fixed period of time. It is a suitable measure to evaluate a country's economic status.

HDI is an index that depicts the degree of human development and is calculated based on average life expectancy, educational level and income. Mahbub-ul-Haq, a Pakistani economist, developed the HDI in 1990. The nearer to 1 one a country's HDI is, the higher its level of human development. The United Nations Development Programme publishes a Human Development Report each year. In this document, the HDI (in a narrow sense), Human Poverty Index (HPI), Gender-related Development Index (GDI) and Gender Empowerment Measure (GEM) are combined into HDI (in a broad sense). Therefore, HDI not only reflects each country's economic conditions but also the cultural and intellectual development of its people.

This investigation employs GNI data from 2010 reported by the World Bank [6] and HDI data from 2011 reported in the Human Development Report [7].

2.2 Procedure

GNI and HDI data from all 193 members of the United Nations (including Japan) are included in this study. This research employed correlation analysis, and assigned countries that legally recognize same-sex marriage a value of 1 and countries that do not a value of 0. The following two analyses were performed.

Analysis 1: a correlation analysis between each country's GNI per capita (denomination: US$) and whether same-sex marriage is legally recognized in the country (1 or 0).

Analysis 2: a correlation analysis between each country's HDI and whether same-sex marriage is legally recognized in the country (1 or 0).

3. Results

Analysis 1 yielded a correlation coefficient between each country's GNI (denomination: US$) and whether that country legally recognizes same-sex marriage (1 or 0) of 0.48. There is no close correlation between the two data points. Analysis 2 yielded a correlation coefficient between each country's HDI and whether it legally recognizes same-sex marriage (1 or 0) of 0.36. These two data points are also not significantly related. These findings can be explained by there only being 18 countries that have legally recognized same-sex marriage, while as many as 193 countries are considered in the analyses.

Table 1. The numerical value of GNI
(Per capita, denomination: US$)

The average of 193 countries	**12056**
The average of 18 countries, which legalize same-sex marriage	**30158**
Japan	**34640**

Table 2. The numerical value of HDI

The average of 193 countries	**0.661**
The average of 18 countries, which legalize same-sex marriage	**0.849**
Japan	**0.901**

However, tables 1 and 2 indicate that the average GNI and HDI values among 18 countries that have legalized same-sex marriage are higher than those of the other countries. Therefore, countries that have legalized same-sex marriage are relatively better off.

Moreover, Japan's GNI and HDI are higher than the averages of the 18 countries that have legalized same-sex marriage. If my hypothesis is correct, Japan satisfies the necessary condition for the legal recognition of same-sex marriage. Thus, why has Japan not legalized Japan same-sex marriage?

4. Discussion

4.1 The history of same-sex marriage efforts in Japan

The four main reasons that same-sex marriage is not recognized in Japan are as given below.

First, Article 24, Section 1 of the Constitution of Japan states: "Marriage shall be based only on the

mutual consent of both sexes and it shall be maintained through mutual cooperation with the equal rights of husband and wife as a basis." Revising the Constitution of Japan is difficult, as a majority all Japanese citizens must agree to the revision. Thus, legalizing same-sex marriage will require substantial effort.

Second, there is an alternative legal framework: an adoption arrangement. Although this route is not marriage, it is a way for same-sex couples to cohabitate and come into each legacy. Therefore, organizations advocating for sexual minorities are not calling for the legalization of same-sex marriage as vociferously as they would otherwise.

As a result, the Diet has never discussed the legalization of same-sex marriage. The six major Japanese political parties have positions on same-sex marriage as follows. [8]

Table 3. Major political parties' positions (2013)

Agrees that same-sex marriage should be legalized	Japan Restoration Party
Believe that Japan should make some revisions to existing marriage laws	Japanese Communist Party Social Democratic Party of Japan Your Party
Does not support the legalization of same-sex marriage.	Liberal Democratic Party of Japan
No specific position	Democratic Party of Japan

The Liberal Democratic Party of Japan is currently the primary governing party in Japan, and it does not support same-sex marriage. Accordingly, establishing a legal system for same-sex marriage would be difficult.

The third reason is that the Japanese public is indifferent to the issue of same-sex marriage. The next section will consider this reason in detail.

4.2 Public consciousness of same-sex marriage

In many Eastern countries that are influenced by Christianity, the traditional understanding is that homosexual love prohibited. While the Bible makes no mention of homosexual love, some believe that it is a sin. Confucianism also prohibits homosexual love.

However, the Japanese public does not regard homosexual love as a particularly questionable behavior. In the past, certain noblemen and samurais loved other men, which is called nanshoku in Japanese. Currently, novels and comic books about gay couples have become popular.

However, many Japanese are indifferent to the issue of same-sex marriage. Moreover, some may be reluctant to accept same-sex marriage. Members of sexual minorities continue to suffer from prejudice and discrimination. To solve this problem, it is crucial to increase public awareness of the problem and confront the present situation. Even if the legal system were reformed and same-sex marriage were permitted, it would force same-sex couples to reveal that they are members of a sexual minority. How would society react to this? First, it is necessary to prepare a sympathetic environment for members of sexual minorities. To do so, it is essential to include lessons on sexual minorities in the education system. Reforms of the legal system should wait.

5. Conclusions

There is a relationship between economic factors and same-sex marriage. Moreover, Japan satisfies the economic conditions necessary to legalize same-sex marriage. However, circumstances in Japan present additional barriers to legalizing same-sex marriage that may be difficult to overcome. However, if everyone considers the present situation in Japan to be problematic and gains a better understanding of homosexual couples, a better society will emerge.

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Factors Determining the Existence or Non-existence of Girlfriends: A Case Study of Male Students in Kyoto University

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Abstract: Few previous studies on university students' romantic relationships have focused on the individual situations at specific schools. This study focused on individual situations at Kyoto University. In this study, nine independent variables were considered, and an anonymous Internet-based survey was conducted among male students at Kyoto University. The collected data were analyzed using multiple logistic regression analysis in IBM SPSS. The results confirm a positive correlation between the proportion of female students in a class and the presence of male students with girlfriends and significant negative correlations between platonic love and grade and the existence of a partner. No significant relationship was found between other independent variables predicted from related studies and the existence of girlfriends. The experimental results may support the idea that the pattern of college students' partnering is influenced by the individual situations in each university.

Keywords: university student, romantic relationship, multiple logistic regression analysis

1. Introduction

Love is one of the greatest interests in university students' lives. Many studies on college students' romantic relationships have revealed what students want in their partners and the influence of these relationships on students.

However, we know of no studies that have considered the individual situation in specific universities. The individual situation in Kyoto University has been not been previously researched. In Kyoto University, there are far fewer female students than male students. Moreover, even within the university, the number of female students differs considerably from faculty to faculty. As a result, some faculties are more like boys' schools, and some faculties seem to be women's universities near Kyoto University. In this situation, students' lifestyles also vary. Some students are absorbed in club activities only within their faculty, and other students cooperate with students from other universities in student groups.

This study tested the factors that determine the existence or non-existence of male students' girlfriends in the unique situation of Kyoto University based on multiple regression analysis. This article focuses on factors that affect whether male students have girlfriends and does not investigate the factors that affect whether female students have boyfriends or the factors that affect whether homosexual students have partners.

2. Related Studies

Related studies have discovered important information about university students' love lives. Imai & Morita (1996, [1]) identified what both male and female university students want in a partner. Kojima *et al.* (2006, [2]) identified factors that influence the success and failure of students' confessions of love.

According to Ono (1993, [3]), relationships in which one's identity is altered based on his or her partner's appreciation cannot be sustainable. Based on Ono (1993, [3]), Kitahara *et al.* (2008, [4]) revealed the influence of romantic love on identity development in university students.

3. Method and Materials

This study consisted of an anonymous survey (see Appendix I) of male students in Kyoto University, including those in graduate schools, through a Google document. Participants were recruited though Internet services such as Twitter, Facebook, and LINE. The collected answers were researched by multiple regression analysis using IBM SPSS.

In this research, nine independent variables that determine whether a male student in Kyoto University has a girlfriend were considered. These nine independent variables were represented as described below.

The nine variables and indicator variables are summarized in Table 1 (see Appendix III).

(1) Relationship experience was predicted to be an

independent variable. This was because Kitahara *et al.* (2008, [4]) found that the number of romantic love experiences for male students affect the development of their identities. As a result, a male student who has had many romantic relationships may more easily sustain his current relationship (cf. Ono (1993, [3])).

The romantic relationship experience was reflected by the number of partners that a student had had. If he was currently in a relationship, the number included his current girlfriend.

(2) Elapsed time since the first romantic relationship was also predicted. According to Kitahara *et al.* (2008, [4]), the identity development of female students is influenced by the elapsed time since their first romantic relationship rather than the number of romantic relationships. Kitahara *et al.* (2008, [4]) noted that the elapsed time also has the potential to influence male students. Therefore, the elapsed time was also predicted as an independent variable.

Elapsed time was measured as the time since a male student had begun to date his first girlfriend. Elapsed time of more than a year was counted in years, and time under a year was counted in months.

(3) It was hypothesized that sharing values with women would be an independent variable because Imai & Morita (1996, [1]) revealed that female students want their boyfriends to share their values.

Sharing values with women was evaluated based on the proportion of female members in a participant's club activity. Students in the same club activity or students' group ware predicted to share values.

(4) Reliability was also hypothesized to explain whether a male student had a girlfriend. According to Imai & Morita (1996, [1]), female students prefer reliable partners.

Reliability was difficult to represent. This research used the M-H-F scale developed by Ito (1978, [9]). This scale was developed to reveal an evaluation of gender roles. The M-H-F scale categorizes reliability and similar features. Therefore, this research represented reliability with the participants' scores of five masculinity scales from the M-H-F scale. The examinees' scores were measured by self-rating in the anonymous survey. The participants were asked five masculinity scale questions and dummy questions from the M-H-F scale.

(5) Appearance was hypothesized to be important because Imai & Morita (1996, [1]) found that female students liked good-looking boyfriends. Similarly, Kojima *et al.* (2006, [2]) found that good looks influence the success of approaching a potential partner.

Evaluating appearance was also difficult. The reliability of this indicator may be limited. This study used the variable of how much money the participant spent on fashion as a proxy for appearance.

(6) Whether a student lived with family or lived alone was predicted to be important. Kojima *et al.* (2006, [2]) showed that students living alone are more likely to successfully approach a potential partner than are those living with family.

Examinees were directly asked whether they lived with family or alone.

(7) Opportunity to communicate with female students was hypothesized to explain the dependent variable. According to Kyoto University (2012, [5]), the proportion of female students differs from faculty to faculty. As a result, it was assumed that some students might have difficulty finding female friends even if they have other attributes that girls prefer. Therefore, opportunity was predicted to be an explaining variable.

Opportunity to communicate with female students was measured based on the proportion of female students in the participants' classes.

(8) Opportunity to communicate with students in other universities was also predicted. This was because the proportions of female students in other universities are higher than that of Kyoto University. For example, the proportion of female students at Doshisha University is 36% (Doshisha University Basic Data Correction, 2012 [6]), and the proportion of female students at Kyoto Prefectural University is 59% (Summary of Kyoto Prefectural University, 2012 [7]), both of which are higher than the 24% at Kyoto University. Moreover, several women's universities are located in Kyoto City. Therefore, it was hypothesized that male students who can communicate with other universities are more likely to become acquainted with female friends.

Opportunity to communicate with other universities was determined based on whether there were members from other universities in the participant's club activities.

(9) Finally, grade was recorded. According to Kyoto University (2011, [8]), approximately 70% of Kyoto University students live away from their families. In this study, it was predicted that most students living away from their family do not remain romantically involved with their high-school girlfriends. These students typically leave their acquaintances from their high school days far behind. Moreover, given that only 30% of students

attend school in their hometown, this research predicted that few students come to Kyoto University along with their high school acquaintances. Therefore, students cannot remain romantically involved with partners from their high school days. It was hypothesized that many Kyoto University students find boyfriends or girlfriends after they enter the university.

Grade was also reported directly. In this study, 5th-/6th-grade Faculty of Medicine or Faculty of Pharmaceutical Science students and students in graduate schools were regarded to be in the same category.

An anonymous survey was conducted (see Appendix I) to measure the nine indicator variables using a Google document. Answers were collected though Internet services such as Twitter and Facebook.

A total of 109 responses (see Appendix II) were collected. This research analyzed 95 complete answers using multiple logistic regression analysis.

Multiple logistic regression analysis is a type of multiple regression analysis. Multiple regression analysis can reveal the real correlations between an independent variable and a dependent variable, which is observed if other independent variables are controlled. If the independent variable is a dummy variable, multiple logistic regression analysis is utilized.

In this research, nine independent variables were examined. These variables may affect each other. The independent variable was the dummy variable; the existence or non-existence of a girlfriend. Therefore, multiple logistic regression analysis was used.

4. Results

The multiple logistic regression analysis results are shown in Table 2 (see Appendix IV).

Inconsistent with the hypothesis, there was a significant negative correlation between grade and the existence of a partner at the 5% significance level.

In contrast, consistent with the hypothesis, the multiple logistic regression analysis found a significant positive correlation between the proportion of female students in a class and the existence of a partner among male students.

The analysis also found a negative correlation between the total number of partners and the existence of a current partner for male students. The table shows that the significance level of this correlation is outside of the 5% significance level. However, the significance level can be said to imply the existence of correlation.

Finally, this study found no significant correlation between other predicted independent variables and the existence of a girlfriend.

5. Discussion

In this study, the relationships between nine hypothesized independent variables and the existence of girlfriends were examined. These nine independent variables were predicted based on related studies and the specific situation at Kyoto University.

The results of the anonymous survey and the multiple logistic regression analysis confirm a significant positive correlation between the proportion of female students in a respondent's class and the likelihood that he has a girlfriend. This finding can be interpreted as proof of our hypothesis. In other words, it may be proof that the number of female friends determines one's opportunity to obtain a partner.

However, contrary to the proportion of female students in class, a correlation between the proportion of females in club activities and the existence of a girlfriend was not confirmed. According to Imai & Morita (1996, [1]), university students, including male students, expect their partner to share their values. The reason for this difference may be that male students in Kyoto University can more easily share their values with their female classmates than with female club activity members from other universities.

Inconsistent with our hypothesis, the result confirms a significant negative correlation between grade and the existence of a girlfriend. This result of the regression analysis may imply that the elapsed time since admission does not increase the opportunity to find a partner. Rather, the regression analysis suggests that male students find their girlfriends immediately after their entrance to the university, and the couples separate from year to year.

The results also confirm a negative correlation between the experience of platonic love and the existence of a girlfriend. According to Kitahara *et al.* (2008, [4]), male students can develop their identity through relationship experiences. Ono (1993, [3]) found that this love that shapes identity is not sustainable. However, our results suggest that at Kyoto University, even male students who have already developed their identities do not build sustainable relationships with their partners.

The multiple logistic regression analysis confirms no significant correlation between other independent variables and the existence of a girlfriend.

In particular, it is surprising that the results do not suggest a significant correlation between living

independently and the existence of a girlfriend, although this variable was directly reported by the respondents. According to Kojima *et al.* (2006, [2]), students who live alone are more likely to find success when approaching a potential partner than those who live with family. This result implies that single life does not influence the success of romantic propositions at this university or that male students at Kyoto University rarely approach potential partners.

Finally, this study has several limitations.

First, the sample size was small in comparison to the total number of students at Kyoto University. If the sample size had been larger, the results may have confirmed other significant correlations.

Another limitation is that it is doubtful whether all of the independent variables were accurately reflected by the indicators measured. The indicators used in this research could obscure significant correlations between the unsupported independent variables and the existence of a girlfriend.

Finally, the method was not necessarily suitable for this research. This study attempted to find the factors that determine the existence or non-existence of a girlfriend using multiple logistic regression analysis. The results of this analysis have some interesting implications. However, they were not sufficient to reveal the key factors. Therefore, in future research, other methods, such as interviews or follow-up surveys, should be used.

6. Conclusion

The experimental results demonstrated a significant positive correlation between the proportion of female students in a male student's class and the likelihood that he has a girlfriend. The results also demonstrated a significant negative correlation between the experience of platonic love and grade and the existence of a partner.

These findings imply that some previous findings about university students do not directly apply to Kyoto University. In other words, the experimental results may support the first hypothesized idea that the college students' romantic relationships are influenced by the individual situations in each university.

Finally, to test this hypothesis more accurately, further research is needed. This research should be conducted with larger samples. The indicator variables and method should also be better established. Moreover, similar studies are required at other universities. Through related studies at other universities, the factors that influence university students' relationships can be found.

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8. Appendix

8.1 Appendix I

Anonymous survey for The Symposium on Liberal Arts and General Education

Q1. Tell me your faculty.

Q2. Choose your grade.
☐1st ☐2nd ☐3rd ☐4th
☐ 5th/6th (Faculty of Medicine/Faculty of Pharmaceutical Science) or Graduate School

Q3.You live…. ☐with your family. ☐alone.

Q4. Do you currently have a girlfriend?
☐Yes ☐No

Q5. How long ago did you begin dating your first girlfriend?

Q6. How many partners have you had?
(If you have a girlfriend currently, include her in the total number.)

Q7. Tell me the proportion of female students in your class. (%)

Q8. Tell me the proportion of female members in your club activities. (%)

Q9. Are there any members from other universities in your club activities?
☐Yes ☐No
Q10. How much do you spend on fashion (clothes, shoes, etc.)?

In the following questions, please choose your answer … ☐True ☐Partly true ☐Maybe ☐Partly false ☐False

Q11. You have leadership.

Q12. You are masculine.

Q13. You are reliable.

Q14. You are good at asserting yourself.

Q15. You are permissive.

Q16. You are optimistic.

Q17. You have a cheerful disposition.

Q18. You are open.

Q19. You are patient.

Q20. You have your own idea of your life.

Q21. You are dedicated.

Q22. You are winning.

Q23. You have a sensitive nature.

Q24. You are sedate.

8.2 Appendix II

(1) Faculties and graduate schools of the respondents are as follows.
Faculty of Integrated Human Studies: 5
Graduate School of Human and Environmental Studies: 1
Faculty of Letters: 7
Graduate School of Letters: 1
Faculty of Law: 20
Law School: 4
Faculty of Economics: 19
Faculty of Education: 4
Faculty of Science: 8
Faculty of Engineering: 20
Graduate School of Engineering: 2
Faculty of Agriculture: 6
Faculty of Medicine: 5
Faculty of Pharmaceutical Science: 3
Graduate School of Information: 4

(2) Grades of respondents are as below.
1st: 32
2nd: 28
3rd: 14
4th: 14
5th/6th or Postgraduate: 21

Total: 109

8.3 Appendix III

Table 1. Summary of independent variables and indicator variables

Original independent variable	Indicator variable
Relationship experience	The number of partners respondent has had
Elapsed time	Elapsed time since the beginning of his first relationship
Sharing values	Proportion of females in his club activities
Reliability	Masculinity measured by M-H-F scale
Appearance	Money spent on fashion per month
Single life	Whether he lives alone or with his family
Opportunity to communicate with female students	Proportion of female students in his class
Opportunity to communicate with students from other universities	Whether there are members from other universities in his club activities
Grade	1st, 2nd, 3rd, 4th or 5th/6th and postgraduate

8.4 Appendix IV

Table 2. The results of multiple logistic regression analysis

Point estimate

Existence of girlfriend [a]		B	STDERR	Wald	DOF	significance probability	Exp (B)	Exp(B) 95% confidence interval	
								inf	sup
0	Intercept	-.072	1.736	.002	1	.967			
	Elapsed time	.010	.012	.698	1	.404	1.010	.986	1.035
	Number of previous partners	-.340	.187	3.294	1	.070	.712	.493	1.028
	Grade	-.634	.271	5.483	1	.019	.530	.312	.902
	Female proportion in class	.071	.027	6.826	1	.009	1.073	1.018	1.132
	Female proportion in club activity	.007	.021	.116	1	.733	1.007	.966	1.050
	Cost on fashion	.000	.000	.614	1	.433	1.000	1.000	1.000
	Masculinity	-.025	.097	.064	1	.801	.976	.806	1.181
	[Single Life Dummy=0]	-.539	.797	.457	1	.499	.583	.122	2.782
	[Single Life Dummy=1]	0[b]	.	.	0	.	.	.	.
	[Inter college Activity Dummy=0]	.637	.936	.464	1	.496	1.891	.302	11.829
	[Inter college Activity Dummy =1]	0[b]	.	.	0	.	.	.	.

a. Reference category is 1.

The Development of A Society that Emphasizes the Importance of Educational Achievement Has Caused the Development of the Preparatory School

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In Japan, there are many preparatory schools, and many students depend on these schools for their studies. Extensive research has been conducted about the causes of the development of preparatory schools. In this study, I will analyze the development of a society that places importance on educational achievement and examine the development of the preparatory school, and I will examine their correlation. I have limited the study to the last ten years. This study shows that the development of the society has been caused by economic factors and that the development of the preparatory school has been caused by the increase of households' expenditure on education. Thus, this study concludes that the development of the society has caused the development of the preparatory school through household expenditures.

Keywords: preparatory school, educational achievement, household's expenditure

1, Introduction

In Japan, preparatory schools have grown enormously, and most Japanese students depend on the preparatory school for their studies. The situation in Japan is unique in the world. Therefore, it is expected that characteristics of Japanese society and ideals of education will be revealed by researching this situation.

Many researchers have analyzed this situation in Japan in an attempt to reveal its causes. For example, Komiyama (2008[1]) researched the process of the development of preparatory school in Japan as it related to educational policy by the Japanese government. Iwase (2006[2]) examined the influence of the preparatory school on Japanese society. Yoshikawa (2006[3]) analyzed the unique causes of the development of the preparatory school in Japan in terms of educational achievement.

The correlation between the development of the preparatory school and the development of a society that places importance on educational achievement has been researched in the past. However, sufficient research on this issue has not been conducted in the past decade. Thus, the recent trends in preparatory schools and society requires research, and their correlation must be analyzed.

In this study, I suggest that the development of the preparatory school in Japan is due to the development or existence of a society that emphasizes the importance of educational achievement.

First, I define the society that places importance on educational achievement, and then I consider the development of this society.

Next, I show the development of the preparatory school in terms of the educational expenditure of the household budget. Then, I compare the educational cost in Japan with other countries, especially those in Southeast Asia.

Finally, I present the causes of the development of the preparatory school in Japan.

2, Method

The definition of a society that emphasizes the importance of educational achievement involves an increase in the proportion of people who enter and graduate school. Thus, this study suggests that an increase in college attendance reflects an increase in the society's focus on educational achievement. College is limited to four-year colleges. Preparatory school includes cram school and after-school programs to supplement schoolwork.

This study finds that the development of a society that emphasizes the importance of educational achievement has caused the development of preparatory schools in three ways.

First, to examine the development of the society, this study addresses the number of college students and the population of 18- or 19-year-olds and analyzes their correlation. For this purpose, this study uses data on the final educational achievement that parents expect of their children, the starting salary of new college graduates, and the number of new college graduates who become

employed for the first time.

Second, to examine the development of the preparatory school, this paper uses data on households' expenditures on supplementary lessons and total consumption and analyzes the correlation. Moreover, this study considers data on households' expenditures on education and the ratio of the cost of preparatory school to the total supplementary educational cost. In addition, this research uses data on the market size of the preparatory school and the population aged 9 to 19 years old and examines the correlation.

Third, to reveal the scale of the educational cost of the government in Japan, this study examines data on the GDP versus the educational cost of the government and the GDP versus the educational cost of the household and private sectors. Data on Korea, Japan, China, and the average of the countries belonging to the OECD are used.

3, Results

First, I will analyze the development of the society that emphasizes the importance of educational achievement from two perspectives.

From one perspective, I will examine the macro factors of the development of this society. As industries have developed, more specialized labor has been demanded. The numbers of college students were increased by the Japanese government, and more people had the opportunity to enter college.

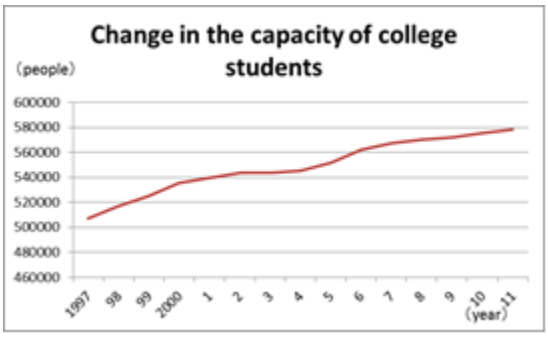

Figure 1 Change in the capacity of college students.

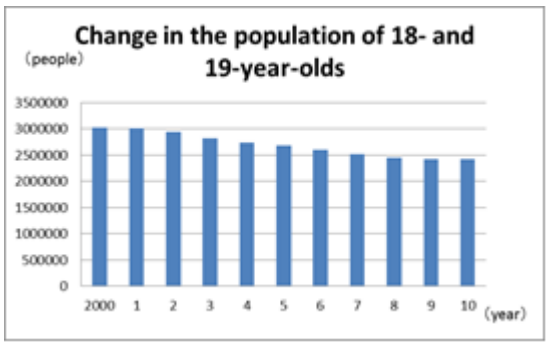

Figure 2 The population of 18- and 19-year-olds.

Figure 1 shows that the capacity of college students has been increasing every year.

Figure 2 shows that the population of 18- and 19-year-olds has been decreasing every year.

Figure 1 and Figure 2 show that the population of college students has increased over the past decade in a consistent way, although the population of people 18 years old and 19 years old, corresponding to those who should be entering college, is decreasing. This result shows the development of a society that emphasizes the importance of educational achievement.

From another perspective, I will examine the micro factors of the development of this society. It is believed that parents hope for their children to have high educational achievement (e.g., to become college students). This prediction is demonstrated in the analysis of parents' hopes for their children's education (see Figure 2).

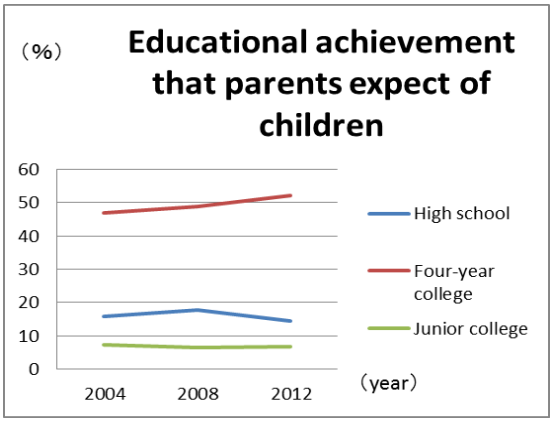

Figure 3. Educational achievement that parents expect of their children.

Figure 3 shows that, with regard to the educational achievement that parents expect of their children, expectations of attendance at four-year college have been increasing, whereas expectations of completing only high school has been decreasing and expectations of attending junior college have been low.

Then, I analyze the cause of these expectations. It is thought that the cause is economic; college graduates can earn more money than high school graduates do. In fact, there is evidence that the starting salary for new college graduates has been higher than that of new high school graduates in the past decade (see Figure 3 and Figure 4).

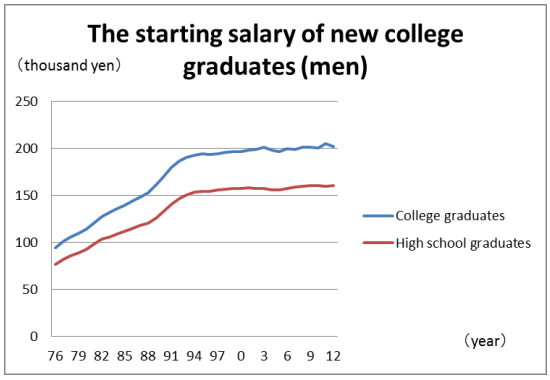

Figure 4. The starting salary of new college graduates (men).

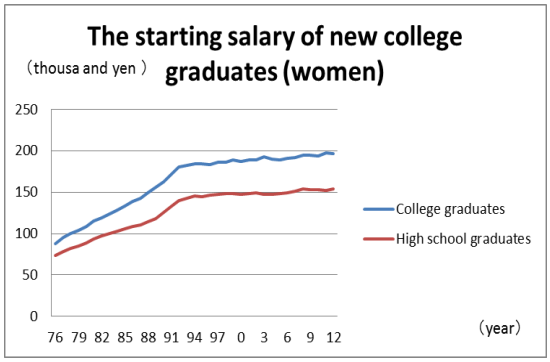

Figure 5. The starting salary of new college graduates (women).

Figure 4 and Figure 5 show that the starting salary of new college graduates has been higher than that of high school graduates for both men and women.

As stated above, the development of a society that emphasizes the importance of educational achievement can be understood in terms of macro and micro factors.

Second, Figure 1 shows the development of the society discussed here. Figure 5 shows the substantial increase of educational expenditure for supplementary lessons. Thus, the development of this society causes an increase in households' expenditure for education.

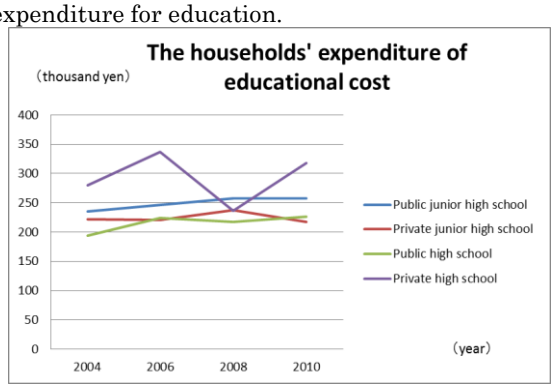

Figure 6 Households expenditures on education

Figure 6 shows that households' expenditures on education has been increasing in almost every type of school.

Third, as noted above, households' expenditures on education has increased. In addition to the results of the analysis, expenditures for preparatory school as a proportion of the supplementary educational cost is increasing (Figure 7 and Figure 8).

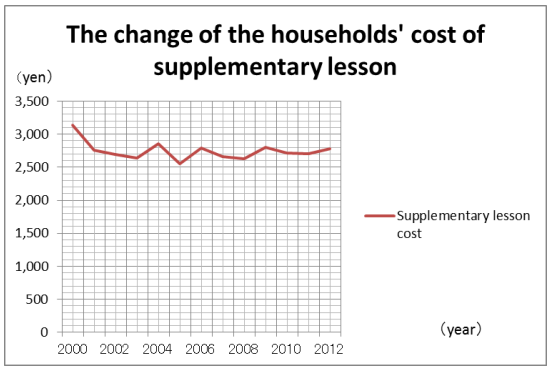

Figure 7. Change in households' expenditures on supplementary lessons

Figure 7 shows that households' expenditures on supplementary lessons has been constant.

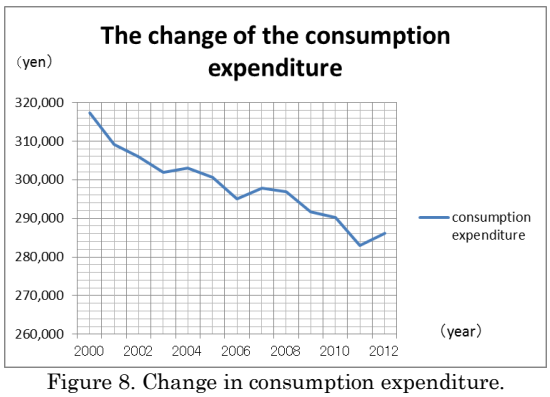

Figure 8. Change in consumption expenditure.

Figure 8 shows that consumption expenditure has decreased.

Thus, these results show that people depend on preparatory school for their supplementary education. In fact, Figure 2 and Figure 10 show that the market scale of preparatory school was almost fixed and has not decreased even though the population of people between 9 and 19 years old has decreased. Therefore, Japanese people rely on preparatory school for education. Moreover, the Japanese trend has been encouraged by the fact that the ratio of the cost of education among households in Japan is lower than that in other

countries, such as Korea and China (Table 1). Thus, households in Japan can spend more on preparatory school than households in other countries.

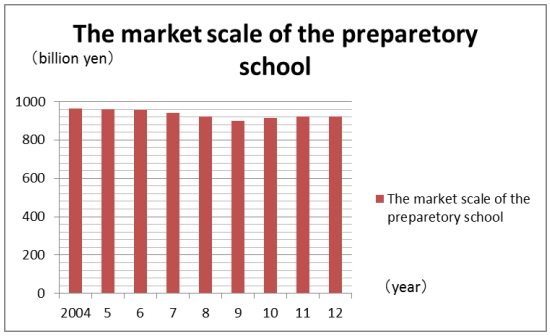

Figure 9. The market scale of the preparatory school.

Figure 9 shows that the market scale of the preparatory school has been invariable.

Table 1. The ratio of cost of school education by household.

	Japan	Korea	China	The average of the countries in OECD
The ratio of public educational cost in GDP	3.6	4.9	4.7	5.4
The ratio of private educational cost in GDP	1.7	3.1	1.5	0.9

Table 1 shows that the ratio of the cost of school education by households in Japan is lower than other foreign countries, such as Korea and China.

4, Discussion

This study analyzed how the development of a society that emphasizes the importance of educational achievement has caused the development of the preparatory school in the past decade. The result is that the development of this society is proceeding. Parents recognize that people who have high educational achievement are apt to have high salaries in the future, so parents hope for their children to have high educational achievement. Therefore, to encourage children to have high educational achievement, households' expenditures on educational cost have been increasing, in part because households in Japan spend more on preparatory school than households in other countries. The ratio of the cost of preparatory school in educational cost is increasing, showing that Japanese students depend on preparatory school for their studies. Japanese students may depend on preparatory schools because in Japanese schools, individually adapted studies are not practiced; nearly the same content is taught to every student at nearly the same speed. Thus, students tend to depend on the preparatory school for individualized education. Another reason is that in Japanese schools, club activities are popular after school, but supplementary lessons are held less often after school. Thus, the preparatory school provides students with the opportunity or the space to study. As noted above, the development of a society that emphasizes the importance of educational achievement has caused the development of the preparatory school.

This study addressed the current situation of the development of this type of society in terms of educational expenditure, but it did not analyze the reason for the development of preparatory school among other types of educational industries. It is expected that this reason may involve public school, students' opinions, or parents' opinions about preparatory school or public school.

5, Conclusion

The development of a society that emphasizes the importance of educational achievement has led to the increase of households' expenditure on educational costs, and it has caused the development of the preparatory school.

This research suggests that the fact that students depend on preparatory school for their studies has not changed, unless other educational industries except preparatory schools will be improved.

Thus, the difference between preparatory school and the education in schools or other educational industries should be examined. By doing so, it may be possible to identify the reason for the dependence on preparatory school and reveal the solution to improving these organizations.

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Figure 1, Source: The change in the capacity of college students and people who enter colleges, from the Ministry of Education, Culture, Sports, and Technology (MEXT).

Figure 2, source: The population of each year, men and women, from Ministry of International Affairs and Communications (MIC)

Figure 3, Source: Survey of the consciousness of school education among parents who have children, from cooperative research by Asahi Press and cooperative research by Tokyo University.

Figure 4, Source: Change in the first wage of new graduates, from Ministry of Health, Labour, and Welfare

Figure 5, Source: Change in the first wage of new graduates, from Ministry of Health, Labour and Welfare

Figure 6, Source: Research on households' expenditure in educational cost for children, from MEXT.

Figure 7, Source: Research om households' expenditure in educational cost for children, from MEXT.

Figure 8, Source: Research on households' expenditure in educational cost for children, from MEXT.

Figure 9, Source: Results of the survey of the educational industry market, from Yano Institute.

Table 1, Source: Statistics in the world, from MIC. The international comparison of education, from MEXT. Educational statistics in China.

Sense of Time about Eating Familiar and Unfamiliar Snacks

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Abstract: When humans recall past events in everyday life, there are sometimes differences between the actual elapsed time and their sense of elapsed time. Most previous studies have investigated sense of time by exposing participants to words and pictures, and this research has shown that sense of time varies based on experiences. This study conducted experiments that focused on eating; participants ate snacks, rested, and were then asked two questions. Most participants sensed that there are differences between time about familiar and unfamiliar snacks, though there were no significant tendencies. These findings show that there could be a relationship between sense of time and experiences, such as being exposed to words and pictures.

Keywords: sense of time, familiar snacks, unfamiliar snacks, eating time, rest time

1. Introduction

Humans recall past events when, among other things, they are talking with someone or are lost in thought. When recalling past events, sometimes humans feel that a great deal of time has passed, even though little time has actually passed. In contrast, sometimes it may seem that past events have occurred recently, even though significant time has actually passed. As such, there are differences between reality and human perceptions of reality. Furthermore, humans sometimes talk about their sense of time in daily life. These discussions have shown that humans are sometimes, but not always, conscious of their sense of time.

Friedman (1993, 1996) classified two time judgment patterns. First, time judgment can be based on location. Humans judge when past events occurred by remembering information about past events, and relating this information to social, daily, and personal senses of time, such as a particular day, week, or month. Second, time judgment can be based on distance. Humans judge time lag according to episodes. This study analyzed previous studies using Friedman's definition.

A number of researchers have investigated sense of time. Most of these researchers have judged sense of time based on location, but the other researchers have judged it based on distance. This study consults one study based on distance, and more study need to be conducted based on distance in the future.

Yano found that humans feel as though less time has passed than real time when they experience similar events (2010 [1]). She also found that, by old age, much less time seems to have passed than actual elapsed time. To obtain these findings, she conducted experiments that showed participants words and pictures on computer screens. However, whether sense of time varies when humans recall performing actions instead of seeing things is unclear. This study examined sense of time for real actions. Although people perform many actions in everyday life, this study focuses on eating. Eating is a familiar and painless act for humans, and easily translated to experimental research.

2. Methods

Eating is familiar to people and easy to investigate in terms of their senses of time when they perform real actions.

First, participants ate a snack for 60 seconds. Then, they rested for 60 seconds. After these two steps, participants were asked to answer two questions.

1. How long did it take you to eat?
2. How long did you rest after eating?

This experiment was conducted twice using familiar and unfamiliar snacks. They ate Pocky, Toppo, or Pretz as familiar snacks. They also ate a type of gummy that they had never eaten before as an unfamiliar snack. Even if the participants had previously eaten gummies, the gummies used in this study were defined as an unfamiliar snack because the taste of the gummies differed from those participants had previously tasted.

60 seconds intervals were chosen because participants may have felt ill if this experiment was performed after they have eaten breakfast, lunch, or dinner.

Although eating order may affect psychology, the

experiments were conducted for all participants in the same way.

The experiment was conducted for 40 participants. They consisted of 29 students, 1 teacher, and 10 workers.

3. Results

35 participants sensed that there are differences between eating time of familiar and unfamiliar snacks. 24 participants felt as if they took less time to eat familiar snacks than unfamiliar snacks, and 11 participants felt as if they took longer to eat familiar snacks than unfamiliar snacks (Figure.1).

Figure 1. Eating Time Results

After eating familiar and unfamiliar snacks, 32 participants sensed that there are differences between each rest time. 19 participants sensed a shorter rest time after eating familiar snacks, and 13 participants felt a longer rest time after eating familiar snacks (Figure.2).

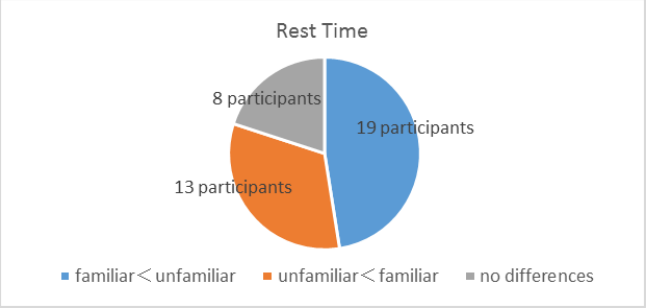

Figure 2. Rest Time Results

According to these results, 60 second eating and rest intervals are perceived as long or short varied among participants.

4. Discussion

Figure.3 illustrates the relationship between eating familiar and unfamiliar snacks. According to this regression analysis, participants tend to perceive eating time of unfamiliar snacks as longer than that of familiar snacks, and this validity is 0.1601. The validity of more than 0.3 based on regression analysis is reliable. However, 0.1601 is very low. Thus, this tendency result may not be statistically significant.

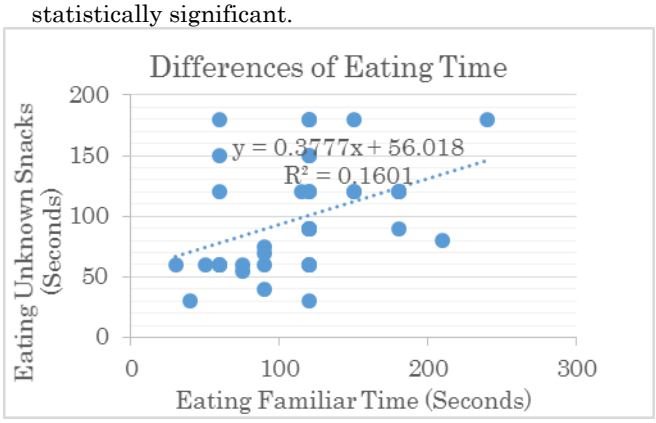

Figure 3. The Eating Relationship

Figure.4 illustrates the relationship between rest times after eating familiar and unfamiliar snacks. According to this regression analysis, participants tend to feel longer rest times after eating unfamiliar snacks than after eating familiar snacks, and this validity is 0.1632. However, 0.1632 is very low. Thus, this tendency result may not be statistically significant.

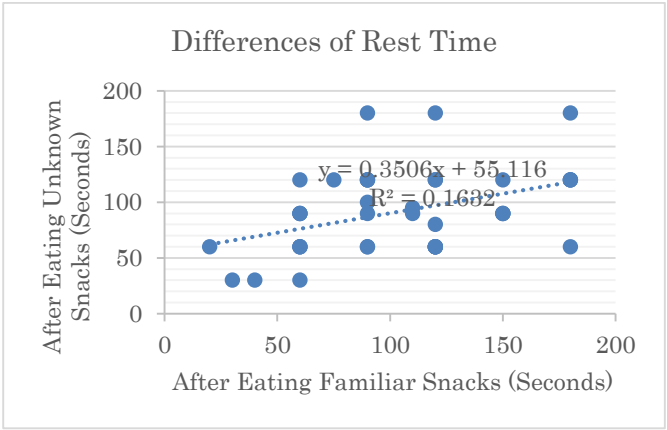

Figure 4. The Rest Time Relationship

5. Conclusion

Sense of time does vary because most participants sensed that there are differences between time about familiar and unfamiliar snacks. These results may reveal some relationships between sense of time and experiences. Time about unfamiliar snacks were longer than time about familiar snacks. However, this analysis may not be statistically significant.

Although this study selected a gummy flavor that the participants had never experienced as unfamiliar snacks, most people have eaten gummies. Further research should be conducted to introduce completely.

Yano (2010 [1]) has also shown that age has an effect on sense of time. This study was conducted

without considering the age of participants. Further research should be conducted divide into age groups.

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The Relationship between Brain Function and Breakfast

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Abstract: Many scientific recommendations are reported in the media, but some of them are dubious, and others are vague. Thus, it is important to verify the truth and the degree to which such claims are accurate. In this paper, we aimed to determine the effects of eating breakfast on the brain and the effect of breakfast time on mental clarity. We asked 29 people to complete a simple calculation quiz, recorded the time taken to complete the quiz, and analyzed the data. The results show that the brain functions better after breakfast than before breakfast and that it functions optimally at this time. This research confirmed that eating breakfast is important. This study also suggests that the feeling of mental clarity does not necessarily correspond to actual mental clarity.

Key Words: breakfast, brain function

1. Introduction

'Scientific' recommendations permeate television and Internet media. For example, claims are made that the caffeine contained in coffee helps us to concentrate or that the anthocyanin in blueberries is good for our eyes. Such assertions affect our daily lives, changing our dietary habits and lifestyles. However, are all of these claims accurate? Some of them may be correct, but just as many are incorrect. Furthermore, even if people are informed that certain behaviors or foods are good for their health, they cannot properly implement the advice if it is too vague. For example, one popular claim is that consuming a small amount of alcohol has health benefits, but the definition of "a small amount" is vague. Is a "small amount" one cup or 10 ml? The advice is so unclear that it is impossible to implement. Thus, it is important for us to verify these suggestions, determine the truth behind each recommendation, and understand how following the advice may improve health.

Researchers have ascertained the truth about several of these 'scientific' claims. For example, Une and Imai (2001 [1]) showed that caffeine does improve concentration. They presented a graph showing that the caffeine contained in a cup of coffee begins take effect after 20-25 minutes. Based on such reports, people can choose how and when to eat or drink a recommended substance or how to implement a recommended behavior. Such studies allow people to more fully understand and facilitate the biological mechanisms that make recommended processes successful.

This study investigates the frequently encountered claim that eating breakfast improves brain function. This claim is persuasive because many people, including students, want to improve their mental performance. Workers and students feel pressure to complete their work or homework and are eager to complete these tasks effectively. Suggestions for improving concentration abound. Among such suggestions, the broad claim is made that "eating breakfast enables us to get into good condition and to think clearly". Many people follow this suggestion because they wish to receive the promised benefits and because it is inexpensive and simple. However, is the claim true? In the media, it is generally accepted that eating breakfast is good for the health. However, Kobayashi (2000 [2]) has found that eating breakfast is not related to brain function immediately after eating. Many people feel sleepy after eating breakfast, and some people continue to feel these negative effects until noon. This paper therefore investigates the effects of eating breakfast and the duration of these effects on mental acuity. If this information is understood, people may be able to improve their morning routines. Researching these questions can make our daily morning routines more fruitful.

2. Methods

Individuals' condition in the morning is largely similar to their condition the previous day. Therefore, the subjects for this research should be people with similar lifestyles. I asked 29 people attending club camp to participate in the research.

To objectively measure brain function, a quantifiable performance measure was used. Participants were asked to perform simple

calculations three times every morning. These were basic addition problems called "*hyakumasu keisan*" in Japanese.

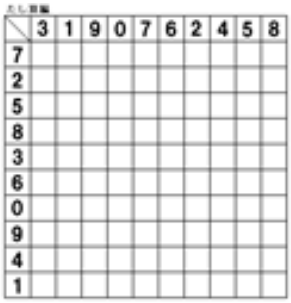

Figure 1. Hyakumasu keisan.

The task involves performing 100 simple calculations. The calculations were performed at the following times each morning: (1) Just after waking up (approximately 7:10 am); (2) 20minutes after waking up (approximately 7:30 am); and (3) after breakfast (approximately 7:50 am). In addition, the task was completed when participants thought that they felt the most clear-minded (4). This sequence is represented in Figure 2.

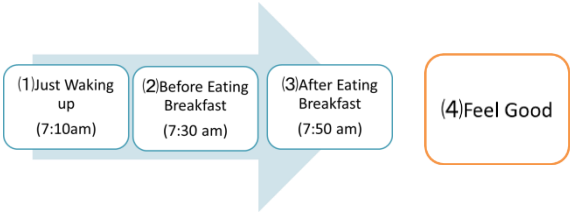

Figure 2. Calculation sequence

The time taken to complete the quiz was recorded. The task is familiar and is therefore one of the most accurate methods for measuring brain activity.

Scores differed widely among participants. We therefore used Score (E) to represent the participants' scores. For every 4 scores, the average score (A) was used to determine the score rate (P).

The higher the score rate, the more active the brain is considered to be. The average score rate is 100. The score rate, the time point, and the mental clarity at each time point are easily determined.

$$P(x)=\frac{A}{E(x)}\times 100\%$$

$(x=1,2,3,4)$

P=Score Rate

E=Score

A=Average Score

3. Results

3.1. Personal data

The average score rates for each time point are shown in Figure 3. As this figure shows, the brain is more active after breakfast than before breakfast. Furthermore, the brain is more active when in its best condition than after breakfast, but the difference between these two time points is smaller than the difference in brain activity before and after breakfast.

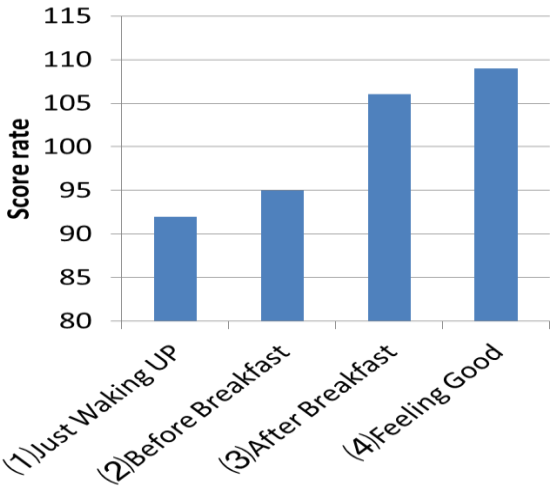

Figure 3. Score rate

3.2. Comprehensive Results

The score rates are used to determine the best and worst scores of each participant, which were then marked. Then, at each time point, the number of marked scores were calculated. The results are shown in Figures 4 and 5. If the scores were in equal more than one time point, both times are marked and counted.

As these figures show, more participants achieved their best score at time point (3) than at time point (4). In addition, more people achieved their worst score at time point (1) than at time point (2), but the difference is smaller than that between time points (3) and (4).

4. Discussion

We studied the effect of breakfast on the brain to determine whether the hypothesis that breakfast improves brain activity is true. As Figure 3 shows, brain activity increases over time. The difference in score rate between time points (1) and (2) was three.

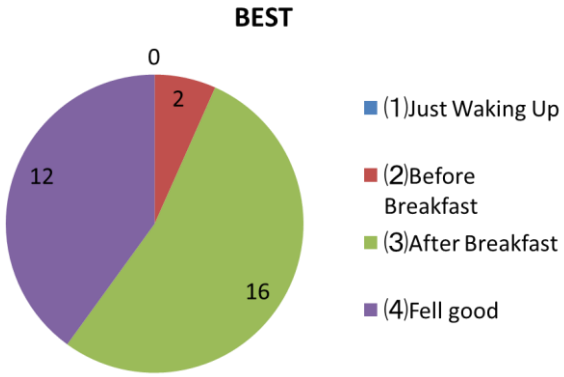

Figure 4. The proportion of best scores at each time point

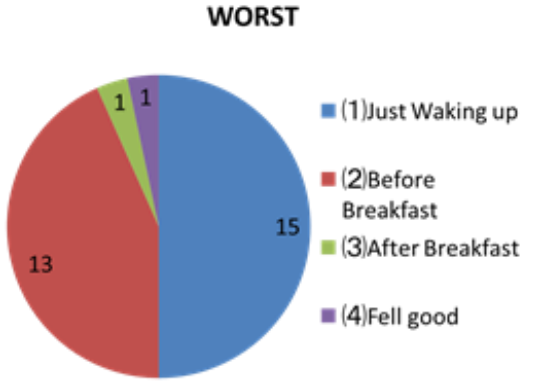

Figure 5. The proportion of worst scores at each time point

Therefore, the average score at time point (3) was expected to be 98. However, the result was 106. This result indicates that eating breakfast improves brain function. The score rate at time points (1) and (2) in Figure 3, and the data in Figure 4 suggest that before eating breakfast, time has no effect on brain function. Based on this analysis, eating breakfast appears to be one of the most important factors for increasing brain activity.

Next, we investigated to what degree brain activity improves as a result of eating breakfast by comparing time points (3) and (4) of Figures 3, 4, and 5. Figure 3 indicates that participants usually functioned slightly better when in their best condition than after breakfast. However, as Figure 4 shows, the number of people who received their best score at time point (3) was slightly larger than those who performed best at time point (4). Figure 5 shows that both time points (1) and (2), the before-meal time points, had worse performance than time points (3) and (4). According to these results, the brain is as active after breakfast as when we are in the best condition. As "Kaimin no kagaku" (2002 [3]) suggests, the glucose intake during breakfast likely improves brain activity.

These results can be used to assess the hypotheses. First, eating breakfast has a significant effect on brain function. Second, the brain may not be the most active when the mind feels the clearest. Therefore, the results show that the first hypothesis was correct. The scores at time points (1) and (2), or the before-breakfast time points, were worse than those at time points (3) and (4).

5. Conclusion

5.1 Conclusion

This research yielded four primary results. First, eating breakfast improves brain activity. Second, the brain does not function optimally before eating breakfast. Third, the brain achieves peak activity shortly after waking up. Fourth, the best mental condition differs little from the condition after breakfast.

5.2 Future Research

This experiment confirmed that eating breakfast is closely tied to brain activity and suggests future lines of research. For instance, what are the effects on the brain of eating lunch or dinner? The authors of "Kaimin no kagaku" claim that when we feel sleepy, sleep substances are produced in our bodies. Understanding the relationship between these substances and food intake could be helpful. In addition to breakfast, sunlight may also improve brain function. Moreover, as has previously been mentioned, brain activity does not always match the perceived mental condition, and further study is required to understand this phenomenon.

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A Study on the Locations Where Children Catch Insects

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Abstract: This paper aims to suggest practical ways of creating environments that encourage children to become interested in catching insects. In an investigation on where children go to catch insects, this study found that children tend to catch insects around their neighborhood. Places such as home gardens, public parks, and woods are indispensable for allowing children to find various insects around their neighborhood; these places encourage children to become interested in catching insects.

Key Words: catching insects, locations, neighborhood

1. Introduction

This paper aims to suggest practical ways of creating environments that encourage children to become interested in finding and catching insects. Today, the increasing popularity of portable games and information technologies has diversified virtual communities and indoor recreation. At the same time, children have been shown to have less motivation to play outside, which may be associated with there being fewer outdoor environments in which to play (Iriguchi et al., 1987 [1]). There are grave fears that children are becoming more deeply involved in virtual materials, money, and communication rather than their actual lives and communities. This trend will cause great harm on cultivating children's sentiment for human relations and living things.

Therefore, the cultivation of children's artistic sentiments should be done carefully. Interest in living things is a basic sense for children and allows them to pay attention to humans and nature, which enriches their sensitivity (Okada et al., 2001 [2]). Catching insects plays an important role in cultivating children's interest in living things, as seeing and handling insects teaches children about the sophistication of the body and ecology of insects (id. [2]). In addition, by catching insects, children exercise outside, which is a desirable activity that allows children to cultivate their bodies and minds.

For the purpose of stimulating children to become interested in living things, locations for catching insects are indispensable. According to the research by Yoshino et al., natural locations such as woods and rivers are the primary places in which today's urban children play in nature (Yoshino et al., 2011 [3]). Understanding the types of locations where children catch insects will enable adults to create environments that are suitable for the activity.

2. Methods

In this paper, "catching insects" is defined as "capturing or collecting wild insects alive for the purpose of breeding, observation, and making specimens". he research is based on a questionnaire about children catching insects. The survey was conducted among college students and included the following questions:

1. Why did you become interested in catching insects during your childhood?
2. In what types of locations did you play and catch insects during your childhood?
3. How far was the major location in which you caught insects from your home or school?

Answer choices are shown in Tables 1, 2, and 3. Question 2 had multiple responses. Forty-four students participated, and the average age of the respondents was approximately 20. Thirteen (29.5%) of the respondents were female, and 31 respondents were male.

Table 1 Responses to question 1, "Why did you become interested in catching insects during your childhood?"

Response	Details
Location	The respondent could find and catch insects around his or her home or school
Family	Because of the respondent's family
Friends or Teachers	Because of the respondent's friends or teachers
Picture books	By reading picture books about insects
TV	By watching TV programs about insects

Table 2 Responses to question 2, "In what types of locations did you play and catch insects during your childhood?"

Response	Details
Garden	Garden of the family home
School yard	Trees and bushes in a school yard
Park	Trees and bushes in a park
Shrine	Precinct and grove in a shrine
Paddy field	Paddy field
Plowed field	Plowed field
Unoccupied grounds	Unoccupied field and barren land
Woods	Woods near a human settlement

Table 3 Responses to question 3, "How far was the major location in which you caught insects from your home or school?"

Responses	Details
By the home or school	In a home garden or school yard
Near the school-commuting road	In rivers, parks, or farm lands near the school-commuting road
In the neighborhood	In the neighborhood where the respondent could go by foot or bike
In a distant place	In distant places that required cars or trains to access

3. Results

3.1 The Reasons Respondents Became Interested In Catching Insects

As shown in Figure 1, 64% of the respondents became interested in catching insects because they had access to familiar locations that were suitable for catching insects near their homes or schools.

3.2 The Locations In Which Children Catch Insects

Figure 3 shows that 55% of the respondents caught insects primarily around their homes or schools. On the contrary, only 4% of the respondents caught insects in locations that were far from their homes and that required a car or train. A detailed breakdown of the locations is shown in Figure 2. Places in which children can freely visit and find insects, such as home gardens, common garden, and woods near a human settlement, are popular locations for catching insects.

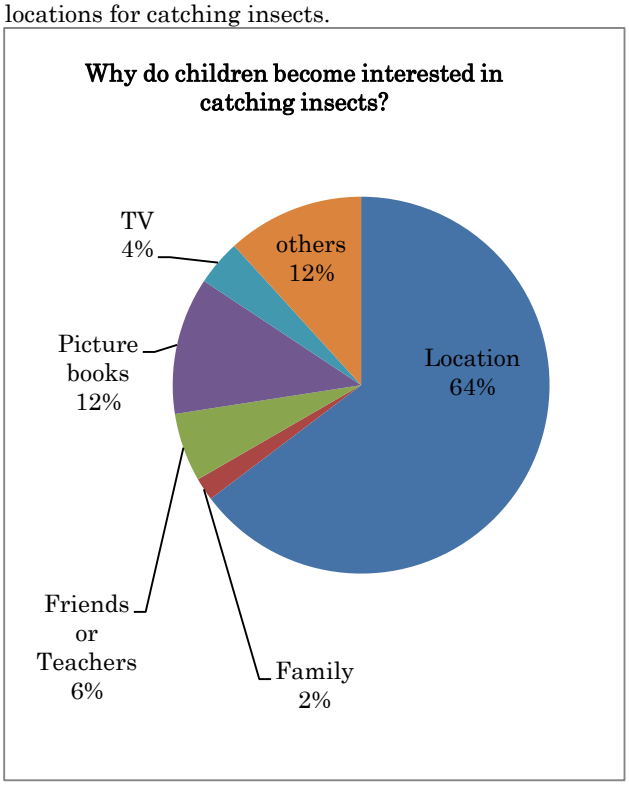

Figure 1. Responses to question 1, "Why did you become interested in catching insects during your childhood?"

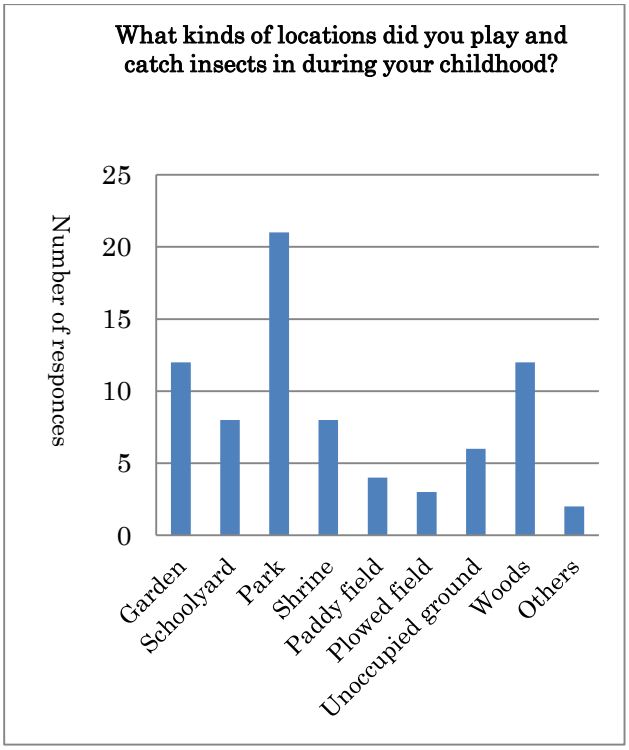

Figure 2. Responses to question 2, "In what types of locations did you play and catch insects during your childhood?"

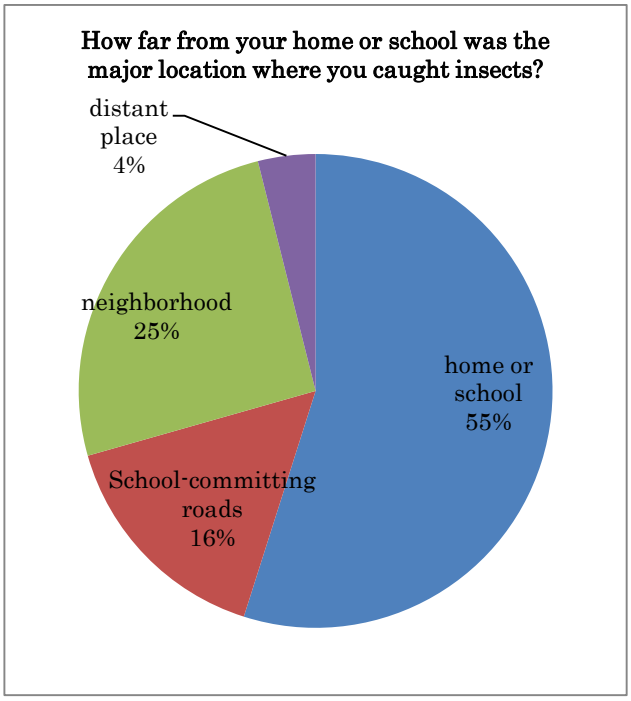

Figure 3. Responses to question 3, "How far from your home or school was the major location where you caught insects?"

4. Discussion

This research displays a characteristic aspect of children catching insects. Children tend to catch insects in familiar places, such as home and common gardens. In addition, most of the respondents became interested in catching insects because they had access to familiar locations near their homes or schools that were suitable for catching insects. One can infer that maintaining or creating environments where children can find various insects is indispensable for fostering children's interest in catching insects. Therefore, planting trees or entomophilous flowers in parks or gardens are appropriate methods that will preserve the culture of catching insects.

However, in this study, the number of responses was insufficient to compare the respondents who caught insects in their childhood with the respondents who did not. Further research is needed to improve the validity of this study.

5. Conclusion

Children catch insects in familiar places, such as common gardens and woods around their neighborhoods. For the purpose of fostering interest in catching insects, environmental preparations, such as developing gardens, are needed.

To improve the validity of this study, further research should compare children that catch insects with children who do not. Future research will make the present study more applicable.

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Brown Fat: A Promising Solution to Japan's Obesity Problem

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Abstract: Obesity is a major health problem worldwide, and Japan is no exception. Although many studies have investigated obesity in general, few have specifically focused on Japanese obesity. However, to solve the obesity problem in Japan, the unique characteristics of the people must be taken into consideration. Therefore, in this study the characteristics of the Japanese people were examined from a new perspective. Herein, statistical data of Japanese diets were analyzed to identify why obesity has become a problem in Japan. After interpreting the results, further research on brown fat is proposed as a promising and appropriate solution for Japan's obesity problem.

Key Words: Brown fat, BMI, METs

1. Introduction

Due to the improvement of living conditions, obesity has become a worldwide problem. The WHO (2008 [1]) revealed that more than 1.4 billion adults are overweight (BMI≧25) and more than half a billion are obese (BMI≧30). Additionally, at least 2.8 million people each year die as a result of being overweight or obese. Thus, obesity is a global health issue that not only distorts the proportions of the body but also severely damages people's health and leads to death.

Many studies have suggested cures for obesity. One of the studies, which will be focused on in this paper, implicates activating brown fat. Brown fat is one of the two types of fat found in mammals and its primary function is to generate body heat in animals or newborns that do not shiver. The other type of fat is white fat and it is prevalent in many places. Its main function is to store energy. As a result, brown fat differs greatly from white fat. The heat production from brown fat is an energetically inefficient process and can burn many calories, so it is of interest whether the activation of brown fat can be one way to treat obesity. The existence of active brown fat was suggested in human adults in 2000 using PET-CT (Positron Emission Tomography-Computerized Tomography) (Hany et al., 2002 [2]). Since this discovery, data implying that brown fat can be used to cure obesity have accumulated. For example, white fat was found to convert to "brown-like" fat when treated with agonists PPARγ agonists. (Petrovic et al., 2010 [3]) Recently, brown fat cells were successfully induced from human iPS (induced pluripotent stem) cells with a high efficiency (>90%) without using exogenous gene transfer. This result suggests that research on brown fat will accelerate due to unlimited expansion capabilities. (Nishio et al., 2012 [4])

There are many studies investigating obesity in general. However, few of them focus on how to deal specifically with obesity in Japanese people. Japan is no exception to the world trend toward obesity. Previous studies indicated that Japanese people are more susceptible to obesity than people in other countries. (Matsuzawa et al., 2000 [5]) While the definition of obesity is BMI≧30 in other countries, it is BMI≧25 in Japan.

When specifically examining obesity in Japanese people, most previous studies focused only on Japanese people's constitution and then proposed cures. Conversely, this study focuses on the reason why obesity became a problem in Japan and offers a new way to approach solutions. By analyzing past statistical data of Japanese nutrition intake changes and then determining the reason for the obesity problem, this study suggests that further research on brown fat can affect this Japanese health issue.

2. Methods

2.1. Analysis of Statistical Data of Japanese Diet

The National Health and Nutrition Examination Survey is conducted every year with approximately 18000 people who are randomly chosen from all over Japan. The raw data from this survey comes from a vast amount of samples and was used in this study to eliminate the possibility of bias. Based on the surveys from 1946 to 2011, a line graph was generated to show the change of Japanese people's average nutrition and calorie intake during this period. Only the three major nutrient classes "carbohydrate", "protein", and "fat were analyzed. A line graph was

also developed to show how the number of obese males in Japan with a BMI of 25 or greater has changed from 1980 to 2011. This BMI graph only reports results for men because it was assumed that Japanese women tend to emphasize improving their figure rather than their health when dealing with obesity. Therefore, when discussing obesity and health in this paper, it was convenient to only focus on Japanese men. However, the data from 1968 and 1969 could not be obtained. In the carbohydrate intake graph the data from 1946 and 1947 could not be obtained.

2.2 The Evaluation of Brown Fat

The effectiveness of activating brown fat when dealing with the Japanese obesity problem was evaluated by comparing it with other methods of burning calories.

Researchers estimate that just 2 ounces of active brown fat (56.7 g) could burn 300 to 500 calories a day. (Wenner, 2012 [6]) Thus, in this study it was also estimated that 2 ounces of active brown fat is needed to burn 400 calories a day. As other methods to burn calories, we examined walking and doing aerobic dance. METs (metabolic equivalents) were applied to calculate the calories that can be burned with these activities.

METs are a physiological measure expressing the energy cost of a certain physical activity and 1 MET is considered to be the Resting Metabolic Rate that is obtained during quiet sitting. The MET for walking was 3.0 and the MET for aerobics was 6.5. (Japanese Ministry of Health, Labor and Welfare, 2006 [7]) The following equation is used to calculate METs:

Energy Consumption (kcal)=MET (kcal/kg/hr)×time of exercise(hr)×weight (kg)

This formula was used to calculate the number of hours a 65 kg Japanese person will have to do a certain exercise to burn 400 calories.

3. Results

3.1. Analysis of Statistical Data of Japanese Diet

Figure 1 shows how the percentage of Japanese people with BMI greater than 25 (considered to be obese) has changed over the years. It should be noted that this graph only focused on Japanese men. The line graph shows that the number of obese people in Japan has increased steadily in the last 30 years. Obese patients in their twenties have increased by 2-fold. Obese people in their thirties, forties, and fifties have increased by approximately 1.5- fold.

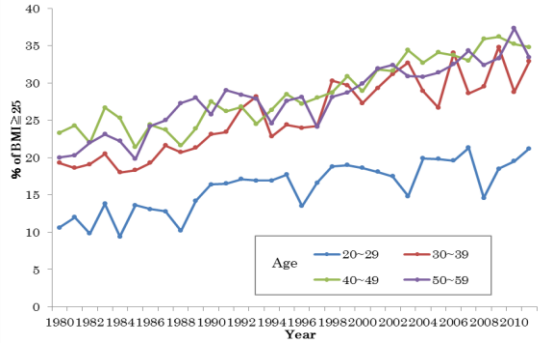

Figure 1. The rate of obese people in Japan

Figure 2 (a) shows how the calorie intake of the Japanese population has changed over the 65 years from 1946 to 2011. The results show that since 1946 the calorie intake has increased drastically from 1903 calories a day to its maximum in 1971, which was 2287 calories a day. However, after 1971 the calorie intake decreased gradually and reached its lowest in 2011, which was 1840 calories a day.

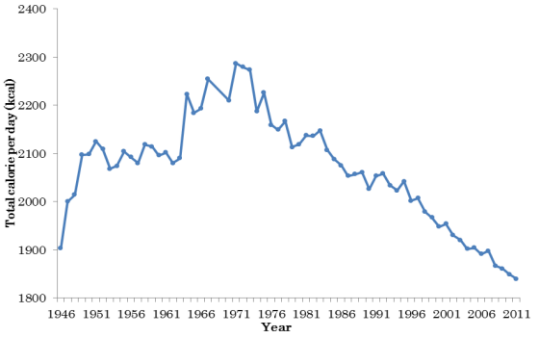

Figure 2 (a). The total calorie intake per day

Figure 2 (b), (c), (d) shows how the carbohydrate, fat, and protein intake, respectively have changed over the 65 years from 1946 to 2011. The results of Figure 2 (b) show that the carbohydrate intake has decreased gradually over time. Now Japanese carbohydrate intake is approximately 60% of the intake in 1948. Figure 2 (c) shows that the fat intake increased drastically by approximately 3 times from 1946 to 1971. However, since 1971 the fat intake has not changed substantially. Figure 2 (d) shows that although the total protein intake has not changed, the amount of animal protein now exceeds vegetable protein. Thus, it can be concluded that the total calorie intake decrease since 1971 shown in Figure 2 (a) can be attributed mostly to the decrease in carbohydrate intake. The graph shows that in the ten years from 1971 to 1981 carbohydrate intake decreased by 71 g from 378 g to 307 g. This a relatively large decrease considering in the 22 years from 1949 to 1971, the carbohydrate intake decreased by only 45 g.

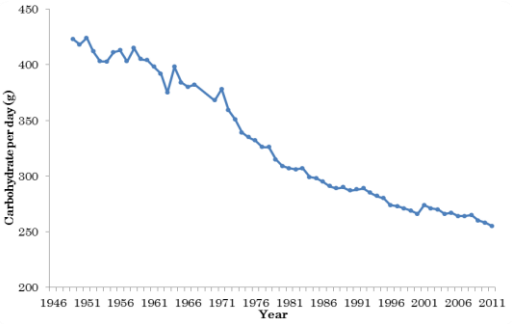

Figure 2 (b). The carbohydrate intake per day

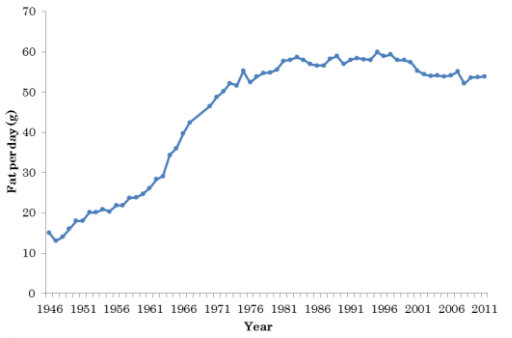

Figure 2 (c). The fat intake per day

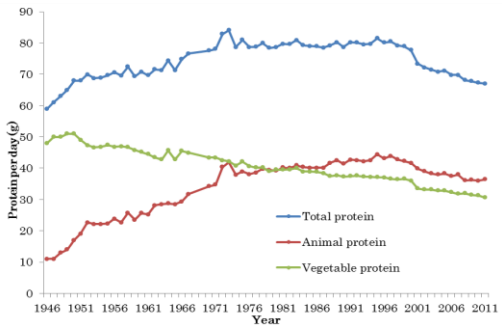

Figure 2 (d). The protein intake per day

Table 1 compares the effectiveness of 3 different ways of consuming energy; activating brown fat, walking and doing aerobic exercise. The results show that while it is only necessary to have 56.7 of active brown fat to consume 400 calories a day, it will be necessary to walk for 2 hours or do aerobic dance for 56 minutes to burn the same number of calories.

Table 1. Physical requirements to burn 400 calories a day

Brown Fat	Walking	Aerobic Dance
56.7 g	2 hours	56 min

4. Discussion

4.1 Analysis of Results

The results of this study confirmed that there was a gradual increase in the rate of obese people in Japan from 1980 to 2011. Thus, the past data of Japanese dietary habits were analyzed to identify the reason for this increase.

From the nutritional intake graphs, a drastic change was found in Japanese nutritional intake from 1946 to 1971. Of the three major nutrients, carbohydrate intake decreased by 10% while fat intake increased by 3 times. Although the total protein intake has not changed dramatically, the ratio of animal protein and vegetable protein has changed drastically during this time. One of the reasons for these changes may be the Westernization of food culture during that time.

Interestingly, the results indicate that the calorie intake of Japanese people each day has steadily been decreasing since 1971. Japanese total calorie intake is now lower than that of 1946, one year after the end of World War II. This change in calorie intake may be problematic. The results suggest that in 1971, Japanese people became more conscious of the amount of food they eat and decreased it. However, only the intake of carbohydrate changed and fat and protein nutrient intake did not change. This is a very unhealthy situation because the same ratio of the three major nutrients should be eaten and the intake of only one type of nutrient should not be decreased. The results indicate that Japanese people are not very good at controlling the amount and nutrients they eat and tend to decrease only the amount of carbohydrate consumed when they want to eat less. It is necessary is to increase the amount of carbohydrate intake, but this is not easy to achieve if people fear becoming fat as a result.

Moreover, though the amount of calories Japanese people consume has been decreased, there is still a gradual increase in the obesity rate. Considering that obesity is caused by calorie intake exceeding the calorie consumption per day, these results imply that the daily calorie consumption is actually decreasing at a faster pace than the calorie intake decrease. This can be attributed to a lack of exercising, which comes from the progress of transportation systems. The importance of exercise has been emphasized. However, it may be difficult to overcome obesity by exercise alone because the obesity rate is still increasing gradually.

To solve these problems, finding a way to decrease calorie consumption efficiently to address obesity will be important. This is because without finding a way to decrease calorie consumption efficiently, it is impossible to increase the amount of food eaten.

Additionally, it may be difficult to continue without people quitting.

4.2 Proposal of brown fat

An analysis of the results suggests that Japanese people must first find a novel and effective way to increase their daily calorie consumption. By doing so, they will also be able to eat more and increase their calorie intake because as long as energy is consumed, they will not gain weight.

The results indicate that brown fat can be the most effective way to address the Japanese obesity. While it is necessary to walk for 2 hours, or perform aerobics for approximately 1 hour, a person only needs 56 g of active brown fat to burn 400 calories a day. Considering that 56 g is a very small amount, less than 0.1% of body weight for a 65 kg Japanese person, having active brown fat is an easier way to burn calories than other methods such as walking and aerobics. As indicated above, there are many research findings in the field of brown fat, so it can be concluded that further research and clinical applications of brown fat will absolutely impact this Japanese health issue.

4.3 Future Considerations

In this study, Japanese people's attitude toward brown fat was not investigated. In the future, a survey will need to be conducted to determine whether they will choose brown fat technology to suppress obesity instead of other methods. Additional research will be required to evaluate whether brown fat technology will be successful in the Japanese population.

5. Conclusions

This study focused on the past data of Japanese diet and examined the cause of Japanese obesity. As a result of the data analysis better approaches to curing obesity in Japan can be proposed.

The results suggest that to solve the Japanese health issue of obesity an easy and effective way to burn calories must be found. Japanese people will be able to consume more carbohydrate because the results indicate this is one approach that should be taken.

The results suggest that further research on brown fat can offer the best cure for Japanese obesity because it can burn calories efficiently and is also very easy compared to other methods.

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Simple Vowel Target Model for Ambulance Sirens' Onomatopoeia

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In this paper, 16 types of artificial sounds were made from an ambulance siren by modulating the first formant F1 and the second formant F2. A total of 18 Japanese people were allowed to hear these sounds and were asked to choose from 25 options made from two prolonged sounds of the pa column of the Kana syllabary (e.g., "pâpâ [パーパー]", "pâpî [パーピー]", "pâpû [パープー]", …, "pôpû [ポープー]", "pôpê [ポーペー]", "pôpô [ポーポー]"). The mean values for each option were calculated, and a convex region, which included 5 types of vowels, was drawn in the F1, F2 field. This region was compared with other vowel regions in the F1, F2 field from previous studies. An experimental study proved "Into what 2-cycle vowels the types of artificial sound are translated depends on the relative displacement of F1 and F2, rather than their absolute displacement, even if these sounds do not have F1 and F2 in the domain of a natural voice."

Key Words: simple vowel target model, phonetics, onomatopoeia, voice synthesis

1. Introduction

Sounds are completely different types of information that come from words. We hear sounds that others make and can understand the words that they transmit. There have been many studies of such phonetic recognition. The process of non-speech sound that is translated into words has not been researched. Although how natural sounds are translated into words has been studied somewhat, we know of no studies of how artificial sounds are translated into words. Regardless of sounds being continuous quantities, as noted above, we have studied a part of a process of translating sounds into words. Onomatopoeia is useful for the aurally challenged because sounds, which cannot be seen, are translated into words, which can be seen. Therefore, using knowledge of the origin of onomatopoeia, combined with the technology of augmented reality, such as 'Google Glass', we will be able to "see" sounds as words in 3D space.

In this paper, while translating all the sounds into words were set as the ultimate goal, I researched how artificial sounds are translated into words, using an ambulance's siren as an example. Analyzing this sound, I found the ambulance siren's F1, F2 differ from phonetic voice-recognition theory, i.e., the simple vowel target model (c.f. 2. Previous Studies). Hence, the following hypothesis was proposed in this study.

"Which 2-cycle vowels the types of artificial sound are translated into depends on the relative displacement of F1 and F2, rather than their absolute displacement, even if these sounds do not have F1 and F2 in the domain of a natural voice." To prove this hypothesis, the following psychological experiment was conducted.

2. Previous Studies

Peterson and Barney (1952) analyzed the local maximum values of envelopes noted above (=formant) (c.f. Appendix [1] to see what a formant is and the meaning of formant in phonetics). The formant with the lowest frequency is called F1, and the format with the second-lowest frequency is called F2. Peterson and Barney found that English vowels have specific 2D domains in the F1, F2 field. As a result, they reported that vowels are distinguished from the values of F1 and F2. This model is called the simple vowel target model.

Fujisaki and Sugito (1977) analyzed Japanese vowels in the same manner and found specific 2D domains that Japanese discontinuous vowels have in the F1, F2 field. Kanamori (1975) reported that 2D domains that the continuous Japanese vowels have was neutralized in comparison with those the discontinuous vowels have, and the union of five 2D domains that Japanese discontinuous vowels have includes those that the continuous vowels have. Additionally, he found that the earlier a person spoke Japanese, the smaller the union of the five 2D domains of the Japanese continuous vowels was, and the larger the intersection of those five 2D domains was.

Hiyane et al (1998) experimented with onomatopoeia of impulse sounds by listening to synthesized sounds generated by Gammatone and

asking subjects to choose onomatopoeia. They found that the vowels of onomatopoeia were dependent on central frequency.

There have been few studies similar to these that have investigated translation from non-voiced sounds to words. There have been no studies about non-natural sounds and idiomatic onomatopoeia applied to descriptions of given things (e.g., mêmê [sheep], bûbû [car]), although we hear those sounds and use these words on a regular basis.

3. Methods

(1) First, the F1 and F2 of the 2 sounds the Japanese ambulance siren contains were computed using the LPC (linear predictive coding) algorithm by Burg, in the Praat phonetic analysis software, which was created by Paul Boersma and David Weenink of the Institute of Phonetics Sciences of the University of Amsterdam, and the following values were obtained:

The higher-pitched sound (i.e., the sound translated into pî (ピー) in Japanese Onomatopoeia): (F1, F2) = (960, 1920); and

The lower-pitched sound (i.e., the sound translated into pô (ポー) in Japanese Onomatopoeia): (F1, F2) = (780, 1560).

(2) The level of the 2 sounds' sound pressures of frequency around F1 and F2 and the low-frequency part were weakened, using the High Pass Filter and the Notch Filter in the Audacity software program for recording and editing sounds.(by Audacity Team (2013): Audacity (Version 2.03) [Computer program]. Retrieved Jan 21, 2013, from http://audacity.sourceforge.net/)

(3) A simple vowel target model confirmed that the vowels into which the ambulance siren was translated depended on the change in the frequency of F1 and F2. To understand this mechanism, the four sounds were produced by a method that focused on antiformants, using the value of the four following F1 and F2 (c.f. Appendix [2]):

(F1,F2)={(780,1560),(780,1920),(960,1560),(960,1920)}.

(4) The higher-pitched sound edited in (2) and one of the four sounds produced in (3) were synthesized and were named ①②③④in (3). In the same manner, the lower-pitched sound edited in (2) and another one of the four sounds produced in (3) were synthesized and were named ⅠⅡⅢⅣin (3).

(5) One of ①～④ and the one of Ⅰ～Ⅳ were synthesized, and 16 types of 2-cycle sounds were created resembling an ambulance's siren.

(6) A total of 18 native Japanese people were asked to listen to these sounds and were asked to choose from 25 options made by combining two prolonged sounds from the pa column of the Kana syllabary (e.g., pâpâ [パーパー], pâpî [パーピー], pâpû [パープー],..., pôpû [ポープー], pôpê [ポーペー], pôpô [ポーポー]).

4. Results

(C.f. Appendix [3] for the questionnaire results)

(1) Analysis focused on one prolonged sound

The following table shows what the sounds of ①～④ and Ⅰ~Ⅳ were translated into, based on the examination of method (6). The largest number for each sound appears in yellow.

Table1. How many of each prolonged sound was chosen for each sound of ①～④

	pâ	pî	pû	pê	pô
①	5	17	17	15	18
②	5	25	16	8	18
③	13	19	10	13	17
④	6	41	11	9	5

Table 2. How many each prolonged sound was chosen for each sound of Ⅰ～Ⅳ

	pâ	pî	pû	pê	pô
Ⅰ	4	12	18	6	38
Ⅱ	6	10	18	6	30
Ⅲ	13	7	14	10	29
Ⅳ	6	15	11	10	24

(2) Analysis focused on two prolonged sounds

Table 3 shows how many of 25 options of method (6) were chosen in all 288 questionnaire results (16 sounds × 18 persons＝288).

Table 3. How many of each option were chosen for the 16 sounds

pâpâ	pâpî	pâpû	pâpê	pâpô
6	3	9	2	9
pîpâ	pîpî	pîpû	pîpê	pîpô
9	11	22	8	52
pûpâ	pûpî	pûpû	pûpê	pûpô
6	12	12	5	19
pêpâ	pêpî	pêpû	pêpê	pêpô
1	2	10	5	27
pôpâ	pôpî	pôpû	pôpê	pôpô
7	17	8	12	14

The F1 and F2 from method (3) differ from the F1 and F2 computed by Praat. Consequently, the F1 and F2 of ①～④and Ⅰ～Ⅳwere computed.

Table 4.
F_1 and F_2 of ①～④ and Ⅰ～Ⅳ by Praat

	F_1	F_2		F_1	F_2
①	779	1560	Ⅰ	785	1600
②	675	2022	Ⅱ	675	2044
③	844	1687	Ⅲ	847	1740
⑤	959	1917	Ⅳ	959	1934

Analyzing Table 4 and the questionnaire results, the median point in the F1, F2 field of the lower-pitched sound and the higher-pitched sound edited in (2) of the 25 options was calculated. For each vowel of the prolonged sounds of the pa column of the Kana syllabary of the lower-pitched sound and for the higher-pitched sound edited in (2) from the 25 options, the convex domain that contained their median point was analyzed.

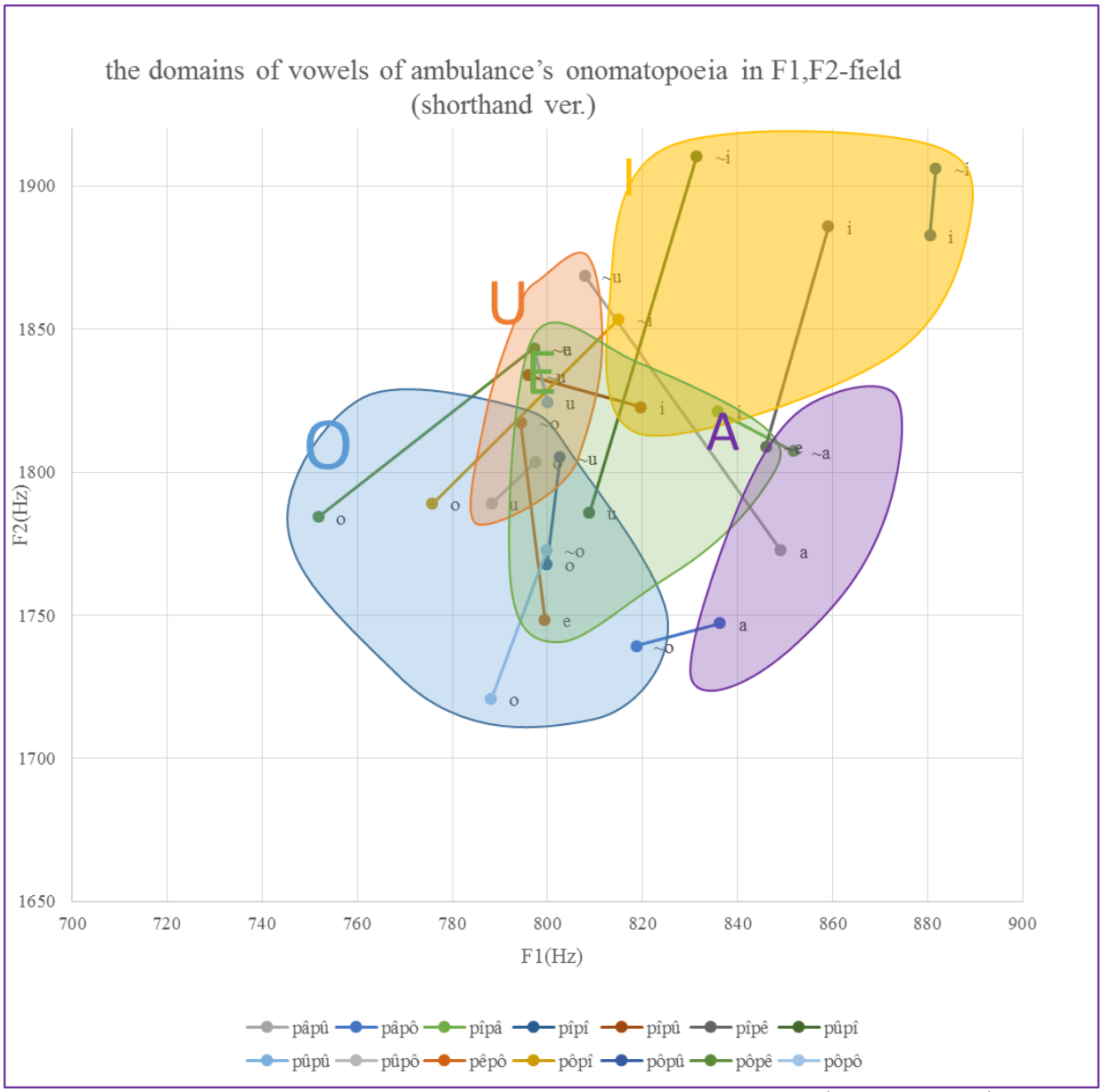

Figure 1. The domains of vowels of the ambulance's onomatopoeia in F_1, F_2-field (shorthand version)
In this graph, the lower-pitched sound edited in method (2) had only a wave dash ("~").

However, because the domains of the vowels overlapped, options that lacked data (some of the 25 options, the numbers of samples of which were less than or equal to 8) were eliminated. The option of pîpô (ピーポー) was chosen with a higher probability because Japanese onomatopoeia of an ambulance is pîpô, and this siren was used in this examination. As a result, believing that the option of pîpô was not

chosen as characteristic of the sounds, the option of pîpô was also eliminated from the 25 options. Figure 1 was created through this process.

5. Discussion

As shown in Figure 3, the domain of Figure 1 and the domain of continuous Japanese vowels have no intersection in the F1, F2-field.

Compare Figure 1 with Figure 2 or 3. Assuming that the vowels into which onomatopoeia translated depends on the absolute displacement of F1 and F2, then the sounds that do not have F1 and F2 in the domain of vowels of natural language in the F1, F2 field were translated into syllables having vowels the domains of which were the closest to the F1, F2 of the sounds in the F1, F2 field. Thus, it is presumed that the lower-pitched sound and the higher-pitched sound edited in (2) were translated into only pê (ペー) or pâ (パー) from Figure 2 or Figure 3, respectively. However, in fact, options containing pâ, pî, pû, pê and pô as syllables, containing all the Japanese main vowels, were chosen. Because of this finding, it is illustrated that " the types of artificial sound are translated into depends on the relative displacement of F1 and F2, rather than their absolute displacement, even if these sounds do not have F1 and F2 in the domain of a natural voice." Still, further examination of different types of sounds or frequency bands is needed to prove this hypothesis generally. The sounds that were made by synthesizing the lower-pitched sound and the higher-pitched sound edited in (2), having the same F1 and F2 by the voice synthesis method focused on antiformants (①I、②II、③III、④IV) were more often than the others translated into syllables having the same vowels (c.f. Appendix [3]). This result also supports the hypothesis.

Moreover, the domains in Figure 1's /a/~/o/ in F1, F2 field are very different from the domains in Figure 2 or Figure 3 in the F1, F2 field. This fact implies that the domains of Figure 1's /a/~/o/ in the F1, F2 field are up to 3 and more formants of the sounds or of the high-frequency component.

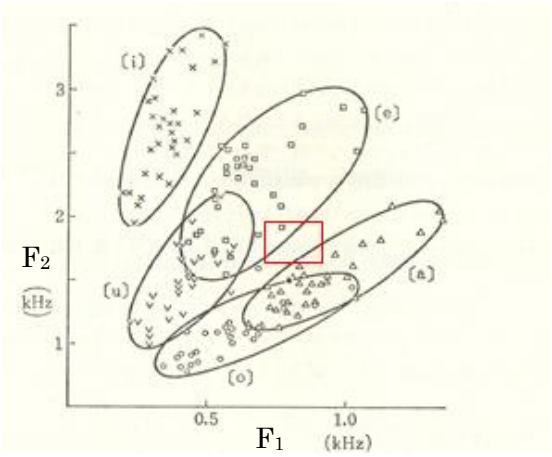

Figure 2. A scatter plot and the domains in the F1, F2 fields of 5 Japanese discontinuous vowels that 30 persons over the age of 3 years old pronounced (referred from Fujisaki Hiroya & Sugito Miyoko [1977])

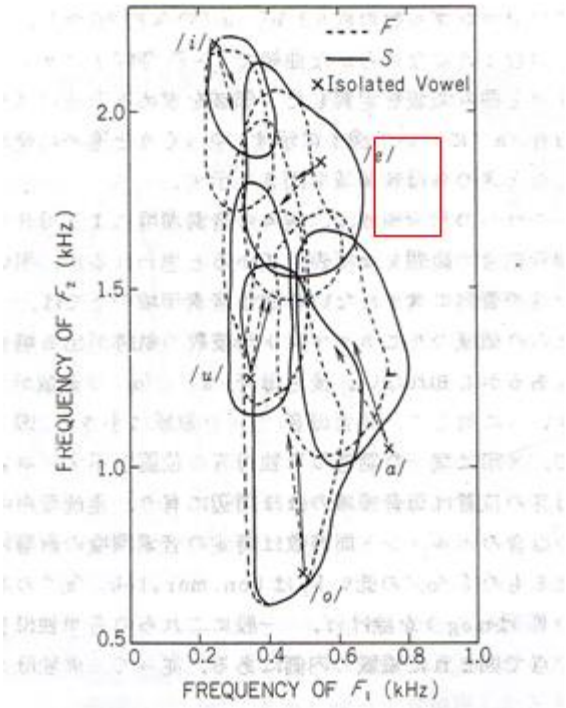

Figure 3. Domains of 5 Japanese continuous vowels (as referred to by Kanemori Yoshinari [1975])

In this Figure, F indicates the domains spoken faster, and S indicates the domains spoken slower. Further, the arrows indicate the displacements of median points in comparing F or S with the domains of 5 Japanese discontinuous vowels. ("X" refers to the 5 Japanese discontinuous vowels.)

6. Conclusion

In this paper, the vowels of the words that the sound produced in the Methods section were

translated into depended on the relative displacement of F1 and F2, rather than their absolute displacement. Moreover, in this paper, there is no discussion of three or more formants of sounds, the high-frequency component, or why the vowels' domains in Figure 3 were what they were. Ultimately, it is not clear how the relationships depend on the character of the sounds between the vowels and the domains in the F1, F2 field in the Simple Vowel Target Model. Further, why an ambulance siren is translated into pîpô is also unknown. Further study in brain science and physiology is needed to address these questions, because it is probable that the Simple Vowel Target Model is a macroscopic characteristic of the acoustic system and the language area of the brain. In contrast, further bibliographic surveying is needed regarding the latter question because it is self-evident that culture is also an important factor in the generation of onomatopoeia. Studies are needed not only regarding how the ambulance siren is translated into words but also regarding how the word is created and how the mass media use the word, based on a bibliographic survey.

7. References

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8. Appendix

[1] Meaning formant in phonetics

We make sound by vibrating the vocal folds, and we translate it using the vocal tract.

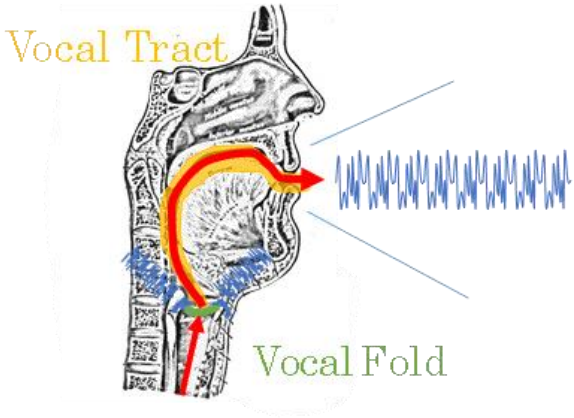

Figure 4. A human speaking

Sound is a wave. A vocal tract operates as a resonator, and harmonics are made from sound produced at the vocal fold. The frequency of sound produced at the vocal fold have is called the fundamental frequency. Harmonic frequency is an integral multiple of fundamental frequency. The amplitude of harmonics exponentially decays for frequency.

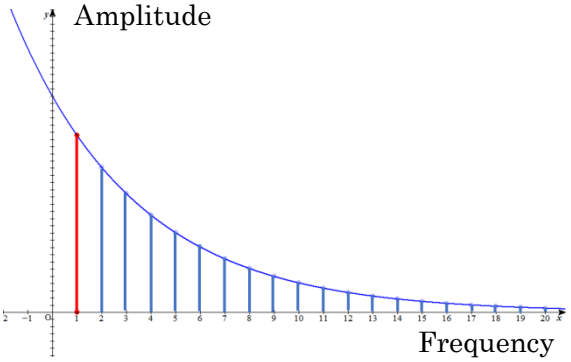

Figure 5. Sounds and their resonances

A vocal tract operates not only as a resonator but also as an equalizer, and it can weaken sound as in the green and yellow components of the following graph.

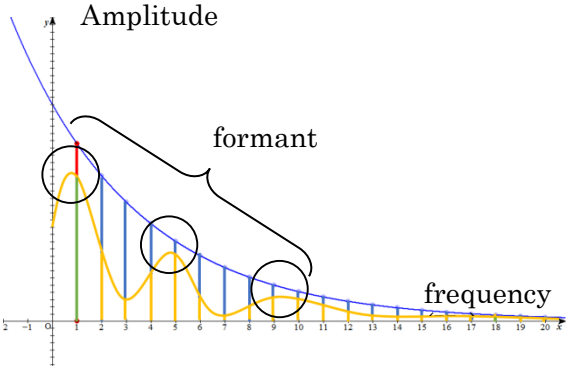

Figure 6. An attenuation of sound in the vocal tract

Therefore, the value of the formant (peak of frequency spectrum) depends on the characteristics of the vocal tract or how we use the mouth and tongue to

make sound. Hence, we can expect vowels based on the form of the mouth and tongue. For the first formant, F_1 is first lowest peak, and for the second formant, F_2 is the second lowest peak. According to the Simple Vowel Target Model, we distinguish vowels based mainly on F_1 and F_2.

[2] A speech synthesis method based on an antiformant

This method is a type of formant synthesis based on the idea that if frequency bands around F_1 and F_2 have high amplitude, and frequency bands between the F_1 and F_2 have low amplitude. F_1 and F_2 from the sound based on this method are more clearly recognized by the auditory system. Synthetic speech, f(t), was generated by the following method.

(1) Fundamental frequency F_0 and basic frequency A_0 were determined.

(2) Harmonic sounds of F_0 are made:

$$F_n(t) \equiv \begin{Bmatrix} A_0 \sin t & n \in \mathrm{N} \\ 0 & n \notin \mathrm{N} \end{Bmatrix}.$$

(3) A curve G(f) that has local maxima at a point of (F_1, $G(F_1)$) and (F_2, $G(F_2)$) and a limit of G(f) as f approaches 0 or infinity is 0 was drawn in the f (=frequency), G (=a gain of amplitude) field using exponentiation. See the following for details.

(4) A more than 0 function a(f) decreasing monotonically was made using exponentiation.

(a) A function b(f), which is a line graph and satisfies $b(0)=0$, $b(\frac{F_1+F_2}{2})=0$, $b(F_1)=1$, $b(F_2)=1$ and $\lim_{f\to\infty} b(f) = 0$, was made.

(b) A function c(f), satisfying the following requirements, was made:

$$c(f) \equiv \begin{cases} b(f) & (f \le F_1) \\ b(f)^4 & (F_1 < f \le F_2) \\ b(f)^{16} & (F_2 < f) \end{cases}.$$

(c) A function G(f), equal a(f)×c(f), was made, and G(f) was adjusted in an attempt not to make an unnatural sound that had a frequency component between F_1 and F_2, which was low, although F_1 was near F_2 by changing $b(\frac{F_1+F_2}{2})\neq 0$ when $F_2\text{-}F_1 \leqq 1000$ (Hz).

(5) A function (= a sound) f(t), satisfying the following requirements, was made:

$$f(t) \equiv \sum_i F_i(t) G(iF_0).$$

The wave file was created in mono using Java software, at a sampling rate of 44.1 kHz at 8-bit amplitude quantization.

In this paper, the first four sounds that had the following F_0, F_1 and F_2 were made:

(F0,F1,F2)={(780,780,1560),(680,780,1920),(850,960,1560),(960,960,1920)}.

This time, these F0 were defined as the harmonic sounds with frequencies around F1 and around F2.

[3] Questionnaire results

Table 5 shows the two prolonged sounds into which the 16 types of sounds are translated (① I …④Ⅳ), and the sex of the subjects is noted at the top of the each row. The options consisted of two of the same prolonged sounds (pâpâ, pîpî,…,pôpô), which are colored green, and the option of pîpô is colored red.

Table 5. Questionnaire results

Sounds	woman	woman	man	woman	man	man	man	man	man
① I	pêpê	pêpû	pôpô	pûpû	pîpâ	pêpô	pôpô	pôpô	pôpô
① II	pêpô	Pîpû	pôpî	pêpô	pôpû	pûpî	pôpâ	pôpî	pôpê
① III	pêpô	Pôpû	pêpâ	pûpô	pûpô	pêpô	pôpâ	pûpô	pîpû
① IV	pôpê	Pêpô	pâpô	pîpô	pîpô	pîpô	pôpî	pîpô	pîpô
② I	pêpô	Pîpû	pôpî	pêpô	pûpô	pûpô	pûpâ	pîpô	pôpê
② II	pôpô	Pîpô	pîpî	pêpê	pîpî	pûpû	pâpâ	pîpû	pîpô
② III	pôpâ	pîpê	pûpô	pôpî	pîpô	pûpô	pâpû	pîpû	pîpô
② IV	pêpô	pîpô	pôpê	pîpô	pîpû	pîpâ	pûpî	pôpâ	pûpô
③ I	pêpû	pôpê	pôpô	pîpê	pôpî	pôpû	pâpô	pôpê	pûpô
③ II	pâpô	pêpô	pîpô	pêpî	pâpû	pôpî	pâpû	pôpû	pûpô
③ III	pôpî	pôpâ	pîpî	pêpê	pâpô	pâpâ	pâpâ	pâpâ	pôpô
③ IV	pîpô	pâpû	pâpî	pôpî	pîpô	pôpî	pâpî	pôpû	pôpê
④ I	pâpô	pîpû	pîpô	pôpî	pîpô	pâpô	pîpô	pâpû	pîpô
④ II	pîpô	pîpô	pîpô	pûpî	pîpê	pâpû	pîpû	pîpâ	pôpâ
④ III	pîpô	pôpû	pîpâ	pîpô	pîpô	pûpî	pîpâ	pâpû	pêpô
④ IV	pûpû	pîpû	pâpâ	pûpû	pêpû	pîpî	pîpî	pîpî	pêpê

Sounds	man	man	woman	woman	woman	man	man	man	man
① I	pôpô	pîpô	pîpâ	pûpû	pûpû	pêpô	pûpô	pêpô	pîpî
① II	pôpê	pêpô	pêpû	pôpê	pûpô	pôpî	pûpî	pûpô	pîpû
① III	pôpô	pêpû	pîpû	pûpê	pûpâ	pâpû	pâpê	pûpê	pîpû
① IV	pîpô	pêpô	pâpû	pûpî	pîpâ	pâpô	pûpê	pûpî	pîpô
② I	pêpû	pêpô	pâpô	pôpî	pôpê	pôpû	pîpô	pûpâ	pîpû
② II	pûpî	pôpî	pûpû	pôpô	pôpô	pôpê	pêpô	pûpû	pûpû
② III	pîpô	pûpâ	pêpô	pôpû	pôpî	pôpê	pîpô	pûpô	pîpô
② IV	pîpô	pôpî	pîpê	pâpî	pûpî	pâpê	pîpô	pîpû	pîpâ
③ I	pîpû	pêpû	pêpô	pêpô	pâpô	pûpî	pîpô	pûpû	pîpû
③ II	pêpô	pîpô	pîpô	pîpô	pîpô	pîpô	pîpû	pûpô	pîpô
③ III	pîpô	pîpô	pêpê	pôpô	pâpâ	pîpê	pêpô	pêpô	pûpû
③ IV	pôpô	pêpô	pêpî	pôpî	pûpî	pûpê	pûpê	pûpô	pîpû
④ I	pûpô	pîpô	pîpô	pîpô	pîpô	pêpû	pîpû	pîpô	pîpô
④ II	pûpâ	pûpâ	pêpô	pîpû	pêpô	pûpô	pêpû	pîpô	pîpû
④ III	pêpû	pêpô	pîpê	pûpô	pîpâ	pîpû	pîpê	pîpô	pûpî
④ IV	pôpô	pîpô	pûpû	pîpî	pîpî	pôpâ	pîpê	pîpî	pîpî

The Relationship between Nickname and Psychological Distance

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Abstract: Even small changes in manner of address may decrease bullying. Previous studies have found that some nicknames reduce psychological distance, whereas other nicknames increase psychological distance. However, whether psychological distance has an impact on nicknames has remained an open issue. Based on previous research, the aim of this study is to examine the factors that change psychological distance. The hypothesis of this paper is that the impact of nicknames on the self changes psychological distance. In this study, 32 people answered a questionnaire between July and September 2013. The results indicated that nicknames related to one's own name that sound affectionate decrease psychological distance. Nicknames that are used to make people look foolish and that do not sound affectionate increase psychological distance. Further research is needed to consider the complexity of feelings.

Keywords: nickname, psychological distance, impression

1. Introduction

The number of reports on bullying behaviors has recently increased in Japan. Many people have been perplexed and stressed due to difficulties dealing with personal relationships and social communication. These problems have occurred not only among adults but also among children (relevant to the field of education) and have remained alarmingly high in rich countries.

Even small changes in nicknames are likely to make a positive or negative impression on oneself and others in one's company. Previous studies have demonstrated this finding by means of questionnaires, indicating that the variety of the nicknames ameliorate rather than exacerbate the psychological situation of communication between humans. However, whether psychological distance has an impact on nicknames has remained an open question.

Hagihara used projection and x2 test methods and found that people tend to call others with whom they have a large psychological distance by their own family names. She also found that the smaller the psychological distance between people, the more frequently people call others not by their family name but by a pet name or other nickname (Hagihara, 2007 [1]).

In this study, the relationship between nicknames and psychological distance is examined in a different way. This issue is investigated through a reputation survey of the difference between real nicknames and unreal nicknames. The objective of this study is to examine the reasons for changes in psychological distance with variations of nicknames. The hypothesis of this study is that the impression nicknames have on the self changes the psychological distance between humans.

In this regard, the term "nickname" as used here includes both positive and negative meanings. The respondents were able to determine what names they regarded as nicknames. For example, some people may not regard their family name without an honorific as a nickname, whereas others may do so. Each person makes his or her own judgment. Thus, nicknames cannot be defined by the questioner.

2. Methods

The questionnaire survey was conducted from July to September 2013. The responses were obtained from 32 people (17 female and 15 male participants) of different ages. The specific details of the questions are as follows.

2.1. Question1

Full name and hiragana printed beside each kanji (on a voluntary basis)

2.2. Question2

Nicknames (from as early as you can remember through kindergarten, elementary school, junior high school, senior high school, and university) and favorability rating (on a scale of one to five, where one is negative and five is positive).

2.3. Question3

Whether you are satisfied with your nickname

2.4. Question4

Regarding Q. 3, the reasons you are satisfied with your nicknames (multiple choice)

a. Leaves a good impression
b. Leaves a bad impression
c. Seems to read smoothly
d. Does not seem to read smoothly
e. No relation to one's own name
f. Relation to one's own name
g. Called by person on bad terms
h. Called by person on good terms
i. Makes a fool of you
j. Shows respect to you
k. Seems to be said affectionately
l. In good taste
m. In bad taste
n. People usually use it
o. People hardly use it
p. Other ( )

2.5. Question5

The nicknames you are not willing to be called

2.6. Question6

Regarding Q.5, the reasons why you are not willing to be called these nicknames (multiple choice)

2.7. Question7

The nicknames you are willing to be called

2.8. Question8

Regarding Q.7, the reasons you are willing to be called these nicknames (multiple choice)

2.9. Question9

For male participants, suppose your name is "Hiroshi Sato" (佐藤ひろし). For female participants, suppose your name is "Keiko Sato" (佐藤けいこ). (The most popular family name in Japan is "Sato". In addition, the most common given name in Japan is "Hiroshi" for males and "Keiko" for females.)

Rate the nicknames below on a scale from one to five (one is most negative, and five is most positive).

For male participants:
さとう sato^
さとうさん sato^san
さとうくん sato^kun
さとうちゃん sato^chan
さっとん satton
さとうきび sato^kibi
さとぴーsatopi^
さとっち satocchi
さとぽん satopon
さっちゃん sacchan
さとちゃん satochan
さとう先輩 my senior sato^
部長 my captain
たけのとのさと takenoko no sato
さとどぅ satodu
さとひろ satohiro
ひろし hirosi
ひろしさん hirosisan
ひろしくん hirosikun
ひろくん hirokun
ひろしちゃん hiroichan
ひろちゃん hirochan
ひろぴーhiropi^
ひろっち hirocchi
ひろぽん hiropon
ひろ hiro
ひろすけ hirosuke
ひろこ hiroko
ひろお hiroo
ひーろーhi^ro^
ひーくん hi^kun
ひーちゃん hi^chan
ひろたろう hirotarou
ひろし先輩 my senior hiroshi
らいおん lion
うさぎ rabbit
かえる frog
めがね glasses
あべ abe
たける takeru
ルフィーruhyi^
ごくう goku^

For female participants:
さとう sato^
さとうさん sato^san
さとうくん sato^kun
さとうちゃん sato^chan
さっとん satton
さとうきび sato^kibi
さとぴーsatopi^
さとっち satocchi
さとぽん satopon
さっちゃん sacchan
さとちゃん satochan
さとう先輩 my senior sato^
部長 my captain
たけのとのさと takenoko no sato
さとどぅ satodu
さとけい satokei
けいこ keiko
けいこさん keikosan
けいこくん keikokun
けいくん keikun
けいこちゃん keikochan
けいちゃん keichan
けいぴーkeipi^
けいっち keicchi
けいぽん keipon
けい kei
けいすけ keisuke
けいお keio
けいりん keirin
けいみん keimin

けいたろう keitarou
けいこ先輩 my senior keiko
らいおん lion
うさぎ rabbit
かえる frog
めがね glasses
とだ toda
たけした takeshita
ありさ arisa
ルフィーruhyi^
ハイジ haiji

3. Results

3.1. Results of Q.1 and Q.2

Considering privacy protection in relation to personal data, the results of Q.1 and Q.2 are disclosed here.

3.2. Results of Q.3

Regarding the number of people who are satisfied with their present nicknames, the results suggest that no participant is dissatisfied with his or her nicknames (see Figure 1).

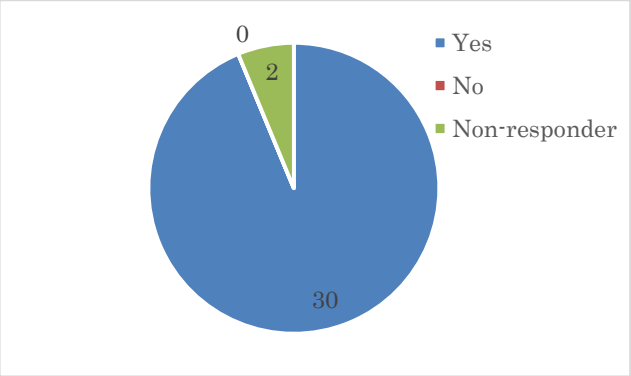

Figure 1. How many people are satisfied with their present nicknames.

3.3. Results of Q.4

Concerning the reasons why people are satisfied with their present nicknames, as in Q.3, the results revealed that the most important reason is k, ”Seem to be said affectionately”. The second most important reasons are c, ” Seems to read smoothly” and h, “Called by person on good terms”, followed by f, “Relation to one’s own name” (see Figure 2).

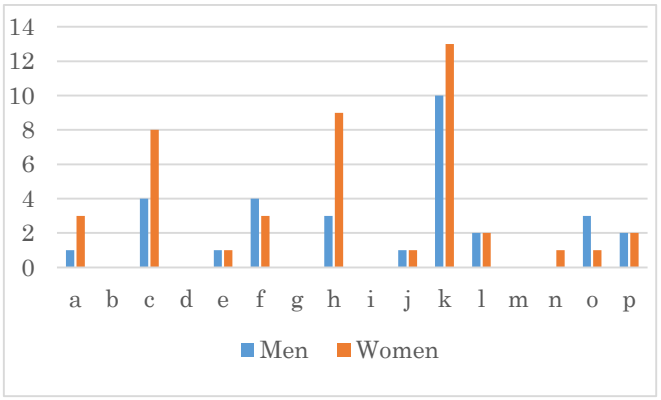

Figure 2. The reasons people are satisfied with their present nicknames.

3.4. Results of Q.5

With respect to the nicknames people are not willing to be called, the results demonstrated that males do not like nicknames that have a negative impact on them, whereas females do not like nicknames that do not seem to be said affectionately (see Figures 3, 4, 5, and 6).

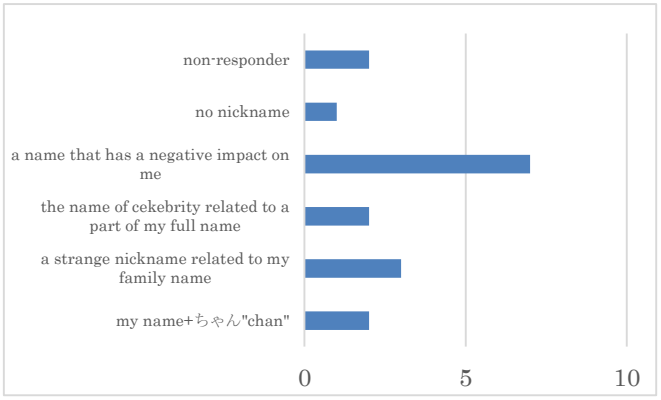

Figure 3. Nicknames males are not willing to be called.

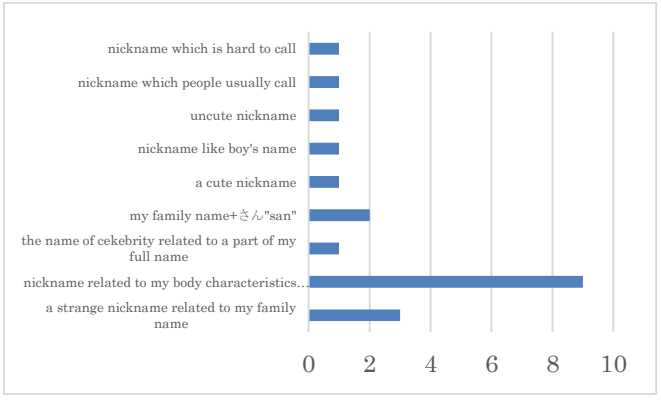

Figure 4. Nicknames that females are not willing to be called.

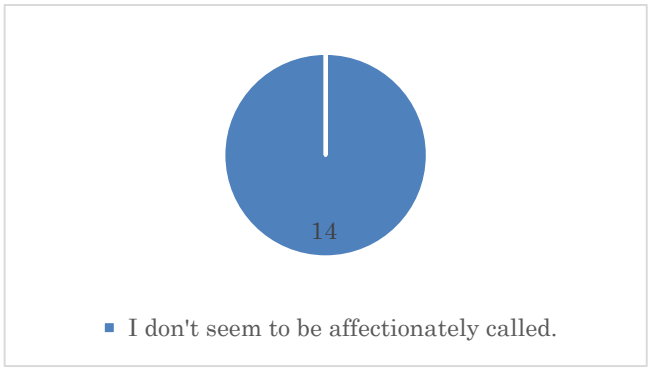

Figure 5. How many females are not willing to be called nicknames that do not sound affectionate

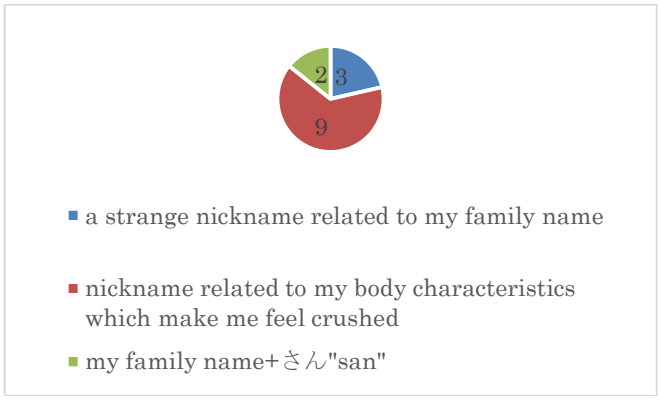

Figure 6. Detailed breakdown of females who are not willing to be called nicknames that do not sound affectionate.

3.5. Results of Q.6

Regarding the reasons people are not willing to be called certain nicknames, such as Q.5, the results revealed that the most important reason is i, "Make a fool of you", followed by b, "Leaves a bad impression". These two reasons account for over two-thirds of all the answers from both male and female participants (see Figure 7).

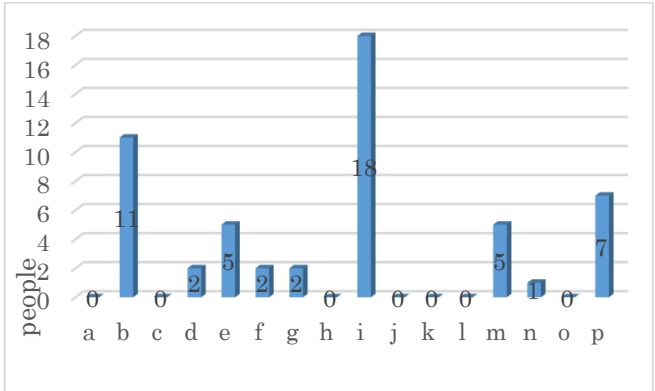

Figure 7. Reasons people are not willing to be called nicknames

3.6. Results of Q.7

In terms of the nicknames that people are willing to be called, the results demonstrated that males want nicknames related to their name, and females do not want any nicknames specifically. Females are satisfied with their present nicknames (see Figures 8 and 9).

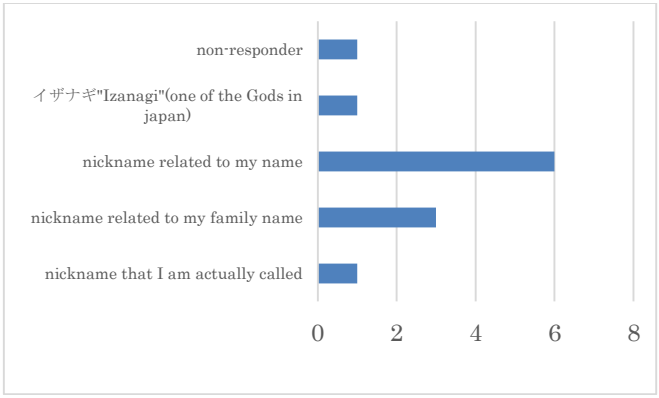

Figure 8. The nicknames which males are willing to be called.

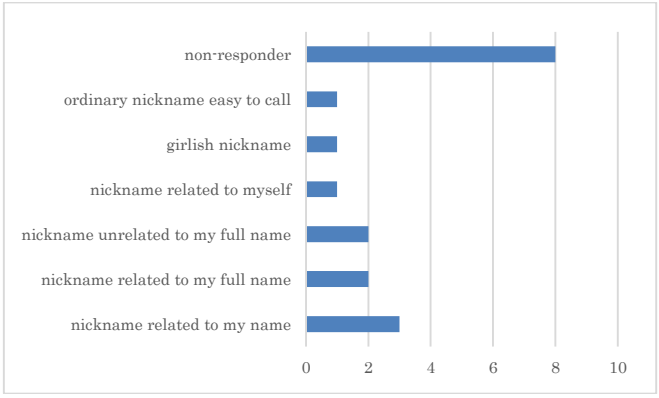

Figure 9. Nicknames females are willing to be called.

3.7. Results of Q.8

Regarding the reasons people are willing to be called certain nicknames, such as Q.7, the results suggested that the most frequently cited reason is k, "Seem to be said affectionately", followed by f, "Relation to one's own name". The above two reasons account for the majority of all the answers from both male and female participants (see Figure 10).

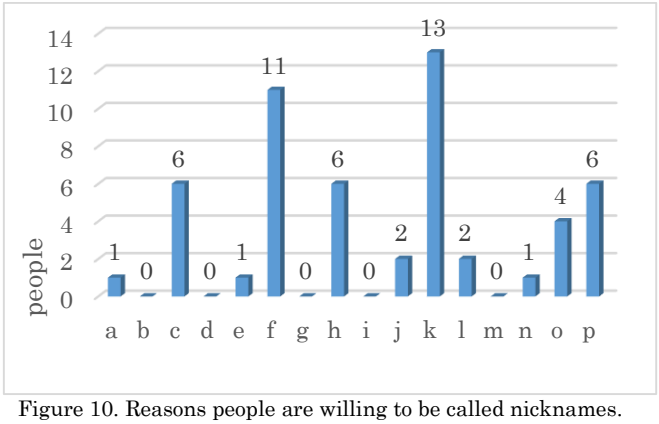

Figure 10. Reasons people are willing to be called nicknames.

3.8. Results of Q.1, 2, and 9

There were few male responses to Q.1 and Q.2; only five males answered. For this reason, only data from females are used. Female nicknames that were actually used in both the first research results and the second (present) research results are used to obtain a more accurate conclusion. The answers from 22 female participants were collected. Females ranked their real nicknames from best to worst using scores (see Tables 1 and 2). They ranked imaginary nicknames (on the basis of the real nicknames obtained in the first research) in the same way. Tables 3 and 4 show the ranking of the average of respective favorability for imaginary nicknames.

Table 1. Real nicknames that females like.

Nicknames	people
Nickname related to given name	10
Nickname related to family name	5
Nickname related celebrity's name connected with name	1
Other	1

Table 2. Real nicknames that females dislike.

Nicknames	people
Nickname related to family name	6
Nickname related to given name	5
Their own role	2
Nickname related to celebrity or famous company connected with name	2
Appearance	1

Table 3. Unreal nicknames that females like

Nicknames
けいちゃん"keichan"
けいこ"keiko"
けい"kei"
けいぴー"keipi^"
けいこ先輩"my senior keiko"

Table 4. Unreal nicknames that females dislike

Nicknames
めがね"glasses"
ありさ"arisa"
らいおん"lion"
たけした"Takesita"
かえる"frog"
ルフィー"ruhyi^"
けいくん"keikun"

4. Discussion

The evidence from the questionnaire can be summarized as follows.

a) No one was unsatisfied with their present nicknames, mainly because they seemed to be affectionately used.

b) Males did not want others to call them names that had a negative impact, whereas females did not want others to call them nicknames that did not sound affectionate because they thought these nicknames made a bad impression.

c) Males wanted others to call them nicknames related to their family name. Males did not want any specific nicknames because they seem to be said affectionately or because they were related to their name.

The relationship between a nickname and psychological distance can be measured in various ways. In this research, it is measured by conducting a reputation survey of the difference between real nicknames and unreal nicknames (see Tables 1, 2, 3, and 4). Tables 1 and 2 show favorability for the condition that females are actually called when communicating with others, or the condition of existing psychological distance. Tables 3 and 4 show favorability for the condition of an existing lack of communication and no psychological distance. Comparing Table 1 to Table 3, there is almost no difference, but comparing Tables 2 and 4, there is a difference. Imaginary nicknames were based on the real nicknames obtained from the first research survey, so this difference stems from psychological distance. The nicknames that females like are not as deeply connected to psychological distance. However, the nicknames that females dislike are deeply connected to psychological distance. Thus, females tend to dislike nicknames used by those with whom they are on bad terms, even if they like the same nickname when it is used by those with whom they are on good terms.

Moreover, the results suggested that there is a difference in appreciation of nicknames between males and females. Further studies are needed to analyze these differences. Humans have many feelings beyond expression, and they often have paradoxical feelings. Further research should be conducted to consider the complexity of human feelings.

5. Conclusions

In conclusion, these results indicate that nicknames related to one's own name that sound affectionate reduce psychological distance. It can also be concluded that nicknames that make others

look foolish and do not sound affectionate increase psychological distance. Thus, the hypothesis that the impression nicknames have on the self changes psychological distance is proven correct. The finding that nicknames that females like are not as deeply connected to the psychological distance between humans, but the nicknames that people dislike are deeply connected to psychological distance may suggest that people should call females in their company nicknames related to their own given names regardless of the psychological distance between them if they want to be on friendly terms with them.

There is a need for more research on nicknames that males are willing to be called. As stated in the discussion section, it is necessary to consider the complexity of human feelings.

6. References

[1] Hagihara, H. (2007). Tasha tono shinritekikyori to koshou no kanren [The relation of the psychological distance between self and others to how to call each other]. The lecture of the faculty of educational psychology, Tokyo Gakugei University. Retrieved from http://db1.wdc-jp.com/cgi-bin/jssp/wbpnew/master/download.php?submission_id=2007-E-0229&type=1

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