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Is There a Significant Difference Between Those Who Eat Breakfast Regularly and Those Who Do Not in Their EFL Proficiency?*

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1. Introduction

Citing Hirose (1989), Kageyama (2004) reports a correlation between Japanese junior high school students' scores on term tests and the number of foods they eat at breakfast: the larger the number of foods the students eat for breakfast is, the better their scores on the term tests are. Maki et al. (2009) report a statistically significant difference in the scores on the University Entrance Examination (English Part) administered in 2007, between university freshmen who regularly eat breakfast seven days a week, and those who do not. This study examines whether the results by Maki et al. (2009) still hold now, and addresses the question of whether there is still a significant difference between those who eat breakfast regularly and those who do not in their EFL proficiency by analyzing the data from college freshmen from 2007 to 2013. The results of this study show a change in the tendency in the period of seven years.

The organization of this paper is as follows. Section 2 introduces the materials used in this study. Section 3 reports the results. Finally, Section 4 concludes this paper.

2. Materials

In this study, we used seven materials to measure university freshmen's EFL proficiency: the University Entrance Examinations (English Part) from 2007 to 2013 created by the University Entrance Examination Center. We call the tests the Center Tests (CTs) from 2007 to 2013. The CT contains two sections: reading and listening. The reading section contains questions about pronunciation, grammar, reordering of sentences, and reading comprehension, and the listening section contains questions about listening comprehension.

The University Entrance Examination Center (2013) provides the summaries of the results of the CTs 2007-2013, which are shown in (1)-(7).

(1) The Results of the CT 2007

The Reading Section of the CT 2007

Observations	500,995
Full mark	200
Number of questions	50
Average score	131.09
Standard deviation	40.35
Time limit	80 minutes
Date	January 20th, 2007

The Listening Section of the CT 2007

Observations	493,213
Full mark	50
Number of questions	25
Average score	32.48
Standard deviation	9.14
Time limit	30 minutes
Date	January 20th, 2007

(2) The Results of the CT 2008

The Reading Section of the CT 2008

Observations	497,101
Full mark	200
Number of questions	50
Average score	125.26
Standard deviation	39.28
Time limit	80 minutes
Date	January 19th, 2008

The Listening Section of the CT 2008

Observations	490,853
Full mark	50
Number of questions	25
Average score	29.45
Standard deviation	8.72
Time limit	30 minutes
Date	January 19th, 2008

(3) The Results of the CT 2009

The Reading Section of the CT 2009

Observations	500,297
Full mark	200
Number of questions	50
Average score	115.02
Standard deviation	37.54
Time limit	80 minutes
Date	January 17th, 2009

The Listening Section of the CT 2009

Observations	494,342
Full mark	50
Number of questions	25
Average score	24.03
Standard deviation	9.65
Time limit	30 minutes
Date	January 17th, 2009

(4) The Results of the CT 2010

The Reading Section of the CT 2010

Observations	512,451
Full mark	200
Number of questions	50
Average score	118.14
Standard deviation	39.96
Time limit	80 minutes
Date	January 16th, 2010

The Listening Section of the CT 2010

Observations	506,898
Full mark	50
Number of questions	25
Average score	29.39
Standard deviation	9.24
Time limit	30 minutes
Date	January 16th, 2010

(5) The Results of the CT 2011

The Reading Section of the CT 2011

Observations	519,538
Full mark	200
Number of questions	50
Average score	122.78
Standard deviation	41.24
Time limit	80 minutes
Date	January 15th, 2011

The Listening Section of the CT 2011

Observations	513,817
Full mark	50
Number of questions	25
Average score	25.17
Standard deviation	9.55
Time limit	30 minutes
Date	January 15th, 2011

(6) The Results of the CT 2012

The Reading Section of the CT 2012

Observations	519,867
Full mark	200
Number of questions	50
Average score	124.15
Standard deviation	42.05
Time limit	80 minutes
Date	January 14th, 2012

The Listening Section of the CT 2012

Observations	514,748
Full mark	50
Number of questions	25
Average score	24.55
Standard deviation	8.03
Time limit	30 minutes
Date	January 14th, 2012

(7) The Results of the CT 2013

The Reading Section of the CT 2013

Observations	535,835
Full mark	200
Number of questions	50
Average score	119.15
Standard deviation	41.20
Time limit	80 minutes
Date	January 19th, 2013

The Listening Section of the CT 2013

Observations	529,440
Full mark	50
Number of questions	25
Average score	31.45
Standard deviation	8.61
Time limit	30 minutes
Date	January 19th, 2013

3. Results

This study is based on the data on the CTs 2007-2013 obtained from college freshmen belonging to several institutions in Japan. We asked the participants to report their scores on the CT of the year, and at the same time, asked them to answer the question in (8).

(8) How many days per week do you eat breakfast?

The answers to question (8) range from 7 to 0. We then examined if there would be a statistically significant difference between those who eat breakfast regularly and those who do not in the scores on the CT of the year by a two-sample *t*-test assuming unequal sample variances.

First, in order to see if there would be a statistically significant difference between those who eat breakfast seven days a week and those who do not in the scores on the CT 2007, Maki et al. (2009) analyzed the data by a two-sample *t*-test assuming unequal sample variances. The result is shown in (9).

(9) The Difference in the Total Scores on the CT 2007 (7)

	Those who eat breakfast seven days per week	Those who eat breakfast less than seven days per week
Mean	203.29	197.69
Variance	789.65	967.21
Observation	601	276
<i>t</i> Stat	2.55	
<i>t</i> Critical One Tail	1.65	

The mean of those who eat breakfast seven days per week was 203.29 out of 250 points on the CT 2007, and that of those who do not was 197.83 points. The absolute value of *t* Stat (2.55) is larger than that of *t* Critical One Tail (1.65). Therefore, (9) shows that, with respect to the scores on the CT 2007, there was a statistically significant difference between those who eat breakfast seven days a week and those who do not by 8.55 points out of 250 points (2.27 %).

Second, in order to see if there would be a statistically significant difference between those who eat breakfast six days or more per week and those who eat breakfast less than six days per week in the total scores on the C 2007, Maki et al. (2009) analyzed the data by a two-sample *t*-test assuming unequal sample variances. The result is shown in (10).

(10) The Difference in the Total Scores on the CT 2007 (6)

	Those who eat breakfast six days or more per week	Those who eat breakfast less than six days per week
Mean	202.50	197.83
Variance	820.68	955.07
Observation	694	183
<i>t</i> Stat	1.85	
<i>t</i> Critical One Tail	1.65	

The mean of those who eat breakfast six days or more per week was 202.50 out of 250 points on the CT 2007, and that of those who eat breakfast less than six days per week was 197.83 points. The absolute value of *t* Stat (1.85) is larger than that of *t* Critical One Tail (1.65). Therefore, (10) shows that, with respect to the total scores on the CT 2007, there was a statistically significant difference between those who eat breakfast six days or more per week and those who eat breakfast less than six days per week by 5.69 points out of 250 points (13.66 %).

In the following, we will present the results of the analyses of the CTs 2008-2013, which are shown in (11)-(22).

(11) The Difference in the Total Scores on the CT 2008 (7)

	Those who eat breakfast seven days per week	Those who eat breakfast less than seven days per week
Mean	186.23	179.67
Variance	1118.89	1194.57
Observation	468	211
<i>t</i> Stat	2.31	
<i>t</i> Critical One Tail	1.65	

(12) The Difference in the Total Scores on the CT 2008 (6)

	Those who eat breakfast six days or more per week	Those who eat breakfast less than six days per week
Mean	185.87	178.76
Variance	1117.28	1224.60
Observation	519	160
<i>t</i> Stat	2.27	
<i>t</i> Critical One Tail	1.65	

(13) The Difference in the Total Scores on the CT 2009 (7)

	Those who eat breakfast seven days per week	Those who eat breakfast less than seven days per week
Mean	173.78	170.20
Variance	1077.90	1087.13
Observation	819	528
<i>t</i> Stat	1.95	
<i>t</i> Critical One Tail	1.65	

(14) The Difference in the Total Scores on the CT 2009 (6)

	Those who eat breakfast six days or more per week	Those who eat breakfast less than six days per week
Mean	173.25	170.24
Variance	1075.05	1101.56
Observation	957	390
<i>t</i> Stat	1.51	
<i>t</i> Critical One Tail	1.65	

(15) The Difference in the Total Scores on the CT 2010 (7)

	Those who eat breakfast seven days per week	Those who eat breakfast less than seven days per week
Mean	182.53	181.52
Variance	1223.45	983.02
Observation	373	186
<i>t</i> Stat	.35	
<i>t</i> Critical One Tail	1.65	

(16) The Difference in the Total Scores on the CT 2010 (6)

	Those who eat breakfast six days or more per week	Those who eat breakfast less than six days per week
Mean	182.64	180.84
Variance	1161.66	1086.70
Observation	421	138
<i>t</i> Stat	.55	
<i>t</i> Critical One Tail	1.65	

(17) The Difference in the Total Scores on the CT 2011 (7)

	Those who eat breakfast seven days per week	Those who eat breakfast less than seven days per week
Mean	188.48	183.44
Variance	938.17	1029.80
Observation	353	139
<i>t</i> Stat	1.59	
<i>t</i> Critical One Tail	1.65	

(18) The Difference in the Total Scores on the CT 2011 (6)

	Those who eat breakfast six days or more per week	Those who eat breakfast less than six days per week
Mean	187.47	185.46
Variance	961.21	996.83
Observation	391	101
<i>t</i> Stat	.57	
<i>t</i> Critical One Tail	1.65	

(19) The Difference in the Total Scores on the CT 2012 (7)

	Those who eat breakfast seven days per week	Those who eat breakfast less than seven days per week
Mean	190.79	192.09
Variance	1148.86	851.17
Observation	279	89
<i>t</i> Stat	-.35	
<i>t</i> Critical One Tail	1.65	

(20) The Difference in the Total Scores on the CT 2012 (6)

	Those who eat breakfast six days or more per week	Those who eat breakfast less than six days per week
Mean	191.17	190.77
Variance	1091.86	998.51
Observation	311	57
<i>t</i> Stat	.09	
<i>t</i> Critical One Tail	1.66	

(21) The Difference in the Total Scores on the CT 2013 (7)

	Those who eat breakfast seven days per week	Those who eat breakfast less than seven days per week
Mean	197.47	199.78
Variance	947.56	968.50
Observation	325	120
<i>t</i> Stat	-.70	
<i>t</i> Critical One Tail	1.65	

(22) The Difference in the Total Scores on the CT 2013 (6)

	Those who eat breakfast six days or more per week	Those who eat breakfast less than six days per week
Mean	197.30	201.44
Variance	954.80	937.84
Observation	360	85
<i>t</i> Stat	-1.12	
<i>t</i> Critical One Tail	1.66	

Therefore, up to the CT 2009, there was a statistically significant difference between those who eat breakfast seven days a week and those who do not, and up to the CT 2008, there was a statistically significant difference between those who eat breakfast six days or more per week and those who eat breakfast less than six days, as summarized in (23).

(23) Summary

	2007	2008	2009	2010	2011	2012	2013
7 days	√	√	√				
6 days or more	√	√					

4. Conclusion

The results of this study show a change in the tendency in the period of seven years, and do not support Maki et al.'s (2009) results. Since the CT 2010, there have been no statistically significant difference between those who eat breakfast seven days a week and those who do not. Also, since the CT 2009, there has been no statistically significant difference between those who eat breakfast six days or more per week and those who eat breakfast less than six days.

At the present stage of our understanding, no explanation can be provided for this change, partly because we have only investigated whether college freshmen eat breakfast regularly, and have not asked how many hours per day or how intensively they studied English for the preparation for the CT of the year. In future research, other relevant questions need to be asked in order to see whether life style habits such as eating breakfast regularly may or may not be a factor that distinguishes college freshmen's EFL proficiency.

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