



# Age Effects on Bilingual Stroop Interference : A Test to Demystify Competing Hypotheses-The Inhibitory Mechanism and The Reserve Hypothesis

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# **Age Effects on Bilingual Stroop Interference: A Test to Demystify Competing Hypotheses - The Inhibitory Mechanism and The Reserve Hypothesis**

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## **1. INTRODUCTION**

Age effects on Stroop test performance have been extensively investigated targeting adult monolinguals, with the results suggesting that the decline of the speed-dependent Stroop scores is more pronounced in older adults. The increased interference is better explained by the slowing down of inhibitory control rather than a general cognitive slowing. Van der Elst *et al* (2006), for instance, administered the Stroop Color-Word Test to 1,856 healthy Dutch monolinguals aged 24 to 81 and found that response time increased with age. Similar findings of age-related decrements in Stroop test performance have been reported by many other researchers such as Davidson *et al* (2003), Hanauer and Brooks (2003), McGabe *et al* (2005), Milham *et al* (2002), Moering *et al* (2003), Mutter *et al* (2005), Troyer *et al* (2006), and West (2004).

Despite the fact that there exists some research (c.f. Gamboz *et al*, 2002; Graf *et al*, 1995; Uchiyama *et al*, 2002; Zysset *et al*, 2007) which produced counter evidence to the inhibitory-based theory, the theory seems to have gained support from the majority of studies tackling this issue in

monolingual adults. However, age effect on children vs. adults or monolinguals vs. bilinguals have not been researched as widely to date. Furthermore, the limited number of studies have produced contradictory results. There is no doubt that any additional findings arising from these comparisons would contribute to arriving at a firmer conclusion already constructed based on the monolingual adults' data.

Before elaborating on the aim of the present study, let us briefly summarize some of the scant research in the category of child/adult comparison. Sanada *et al* (2006) administered the Victoria Stroop Test to 193 monolingual Japanese aged from 5;01 to 49;00 and the results showed that the age bracket of 18 to 20 scored the best, which was consistent with Regard's study (1998) that indicated the age group of 17 to 29 exhibited the fastest performance. Shimada (1994), however, cites Comali *et al's* (1962) study in which response time in the incongruous task (a task where the meaning of a color word does not match the ink color it is written in: when the word 'green' is written in red ink, for instance, the subjects need to name the ink color 'red') exhibited a linear decrease from age 7 to 13 when it stabilized, until it shot up again in subjects aged 65 and older.

In the second category of Stroop effects in bilinguals, older bilinguals were slower than younger adult bilinguals in responding using a weaker, non-dominant, second language when tested by Zied *et al* (2004). Zied *et al* interpreted (1) the young vs. old results as supportive of inhibitory mechanisms slowing down with age and (2) the dominant vs. balanced bilingual results as consistent with the reserve hypothesis (advanced cognitive activities such as higher education or manipulating two languages slow down the deteriorating effects of aging of the brain faculties). Language dominance and inter-/intra-language effects in Japanese-English bilinguals were also examined using Stroop Tests by Ishio (2001) and Osaka (1994). Both studies found that intra-language interference is the highest for L1 incongruous tasks. Taura (2004) who targeted the same Japanese/English

population, however, found no statistical differences among Japanese dominant bilinguals (junior, senior high school, university students and adults) and early balanced bilinguals in the response time of Bilingual Stroop Task intralingually as well as interlingually.

Widening the scope by incorporating the studies that used tools other than the Stroop Test, we searched the literature for a possible comparison of monolinguals and bilinguals in their control over languages. Bilingual children's advantage over their monolingual counterparts in their ability to control linguistic processing is reported by Bialystok (2001). She argues that the superiority derives from enhanced executive functions through the constant management of two competing languages. Using Simon Task or Antisaccade Task, not Stroop Test, Bialystok *et al* (2004 and 2006) found that such an advantage is greater for older adult bilinguals and concluded that bilingualism helps to lessen age-related slowing-down in executive processes.

The literature shows indeterminate conclusions on Stroop effects in bilinguals in terms of children versus adults. The current study explores this age issue in relation to bilinguality as its primary aim. If our results fall in line with the majority of monolingual studies, then it could be concluded that the inhibitory system does slow down universally across monolinguals and bilinguals. If the results do not agree with the monolingual research findings, on the other hand, it indicates that the reserve hypothesis is upheld by bilinguals.

The operational definition of the Stroop interference effect in this study follows Van der Elst *et al's* (2006: 62).

An individual's performance on a basic task (e.g., reading names of colors) is compared with his or her performance on an analogous task in which a habitual response needs to be suppressed in support of an unusual one (i.e., naming the ink color that incongruously named color words are printed). The increase in time taken to perform the latter task compared with the basic task

is referred to as "the Stroop interference effect" and is considered a general measure of cognitive flexibility and control.

## 2. METHOD

### 2.1 Participants

A total of 140 Japanese dominant bilinguals (English being their weaker, second language) participated in this study. They were assigned into five groups depending on their age. The demographic data are presented in Table 1. Almost all the participants began their formal L2 (English) learning at 12, which indicates (1) that Group 1 includes those who had just started learning English several months before the experiment and (2) that the exposure length to English progressively increases from Group 1 to Group 4 since generally speaking people in Japan continue to study English until they graduate from university at the age of around 22.

**Table 1.** Demographic data of the participants

Group	<i>N</i> total (male/female)	Age		
		<i>M</i>	<i>SD</i>	<i>Range</i>
1	28 (16/12)	15.4	1.34	12-17 yrs
2	28 (11/17)	19.0	0.00	19 yrs
3	28 (13/15)	20.0	0.00	20 yrs
4	28 (18/10)	21.5	0.69	21-23 yrs
5	28 (13/15)	40.3	9.74	25-54 yrs

### 2.2 Procedure and instruments

Participants were tested either as a group in their university classrooms or individually at their own home, using the Bilingual Stroop Test devised by Taura (2004) based on Shimada's (1994) Japanese monolingual Stroop Test. This version of Stroop Test is comprised of three different A4-sized sheets for ten subtasks. The first sheet contains 48 solid color patches (12 in each row by four columns) with six basic colors (red, blue, yellow, green, black,

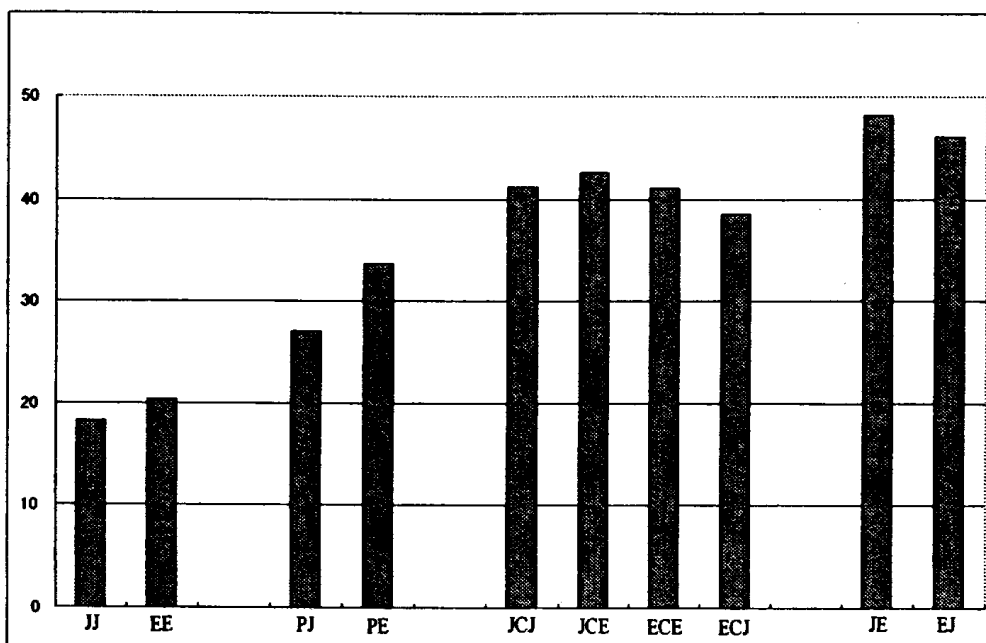
orange) placed in random order. The participants were instructed to orally name the colors as fast as possible first in Japanese (PJ), then in English (PE). The second sheet shows 48 color words (the same six basic color words as used in the first sheet) in Japanese (12 x 4) printed in an incongruous ink color, for example the Japanese word *AKA* (red) printed in green. Four subtasks were asked to perform orally - to read aloud the Japanese color words (JJ), name the ink color in Japanese (JC), translate the Japanese color name into English (JE), and name the ink color in English (JCE) - all as fast as possible. The third sheet displays 48 color words (using the six basic color words identical to other two sheets) in English (12 x 4) printed in an incongruous ink color, for instance, the English word 'blue' printed in yellow. The participants were asked to do the following four subtasks orally as quickly as possible - to read aloud the English color words (EE), name the ink color in English (EC), translate the English color words into Japanese (EJ), and name the ink color in Japanese (ECJ). There was no time limit set for the participants to complete each task. The times needed to complete individual Stroop subtasks were recorded. The examiner pointed out errors made during the test, though the number of errors, whether they were self-corrected or pointed out by the examiner, was not recorded.

### 3. RESULTS

The recorded times are summarized in Table 2 (See Appendix for detailed data). As a preliminary analysis, we first looked at the overall trends exhibited by the participants, regardless of their age. A one way analysis of variance (ANOVA) was carried out on 10 independent variables of subtasks:  $F(9, 1390) = 257.8, p < .0001$ ). A post-hoc Tukey HSD test revealed a number of group differences which have been simplified in graph form in Figure 1.

**Table 2.** Descriptive data of ten Stroop subtasks

Task	Group	N	Response time		Task	Group	N	Response time	
			M (second)	SD				M (second)	SD
PJ (name color patch in Japanese)	1	28	25.8	4.5	JCE (Japanese card to name color in English)	1	28	42.6	7.2
	2	28	25.8	4.3		2	28	43.4	7.4
	3	28	25.9	3.5		3	28	39.0	6.4
	4	28	27.3	4.0		4	28	41.2	5.3
	5	28	30.8	8.7		5	28	47.0	12.1
PE (name color patch in English)	1	28	34.0	7.8	EE (English card to read)	1	28	22.3	5.1
	2	28	34.3	7.4		2	28	19.5	1.9
	3	28	31.4	6.4		3	28	19.0	1.9
	4	28	31.8	5.1		4	28	20.2	2.8
	5	28	36.5	9.7		5	28	20.9	3.8
JJ (Japanese card to read)	1	28	18.6	3.2	ECE (English card to name color in English)	1	28	42.5	8.5
	2	28	17.9	2.5		2	28	40.1	6.1
	3	28	17.3	1.9		3	28	38.2	5.8
	4	28	17.9	2.5		4	28	39.2	6.0
	5	28	19.5	4.3		5	28	45.5	9.9
JCJ (Japanese card to name color in Japanese)	1	28	39.3	8.2	EJ (English card to translate)	1	28	47.8	10.1
	2	28	43.3	10.0		2	28	45.7	8.1
	3	28	37.5	7.8		3	28	44.1	7.9
	4	28	39.3	5.4		4	28	44.6	8.6
	5	28	46.3	11.7		5	28	48.6	10.2
JE (Japanese card to translate)	1	28	50.7	11.3	ECJ (English card to name color in Japanese)	1	28	41.0	11.4
	2	28	49.0	11.7		2	28	36.2	7.6
	3	28	45.3	8.5		3	28	34.9	6.2
	4	28	46.9	10.2		4	28	36.5	6.9
	5	28	49.3	9.8		5	28	44.0	10.2

**Figure 1.** Response times (seconds)

The fastest type of tasks included the two subtasks of simply reading aloud the color words in Japanese (JJ) or English (EE) without any differences between them. The second fastest type consisted of two subtasks of naming color patches, though naming patches in English (PE) took significantly longer than in Japanese (PJ). The second slowest type had four incongruent tasks with no differences, which involved naming ink colors of Japanese words in Japanese (JCJ) and English (JCE), and naming ink colors of English words in English (ECE) and Japanese (ECJ). The slowest type was comprised of two subtasks of translating color words from Japanese to English (JE) and the other way around (EJ) with no significant difference between them. Considering the cognitive load necessary for each task, the speed order of (simple reading of JJ/EE) < (naming color patches in Japanese) < (naming color patches in English) < (incongruent tasks of naming ink - JCJ/JCE/ECE/ECJ) < (translating color words of JE/EJ) is consistent with the literature. One noteworthy feature, however, occurs in Japanese dominant bilinguals when they exert inhibitory control in naming ink colors rather than simply reading the words aloud in the incongruent tasks. Suppressing the automatic activation of reading English color words in order to name the ink colors proves to cost as much effort and time as doing the same task using Japanese words. This is surprising since it was presumed that the inhibitory control would cost the participants more when they were functioning in their L1 (JCJ or JCE) than L2 (ECE or ECJ). One possible way of interpreting this would be that color words in English are processed as easily and quickly as in the participants' L1.

Turning to our main aim of this study, we conducted a MANOVA to explore age differences in each task:  $F(10, 40) = 1.89, p < .01$ ; Wilks' Lambda = .57, Eta Squared = .13. Post-hoc pair wise comparisons that detected significant group differences are presented in Table 3.



**Table 3.** Age group differences on 10 subtasks

Task	Group (age)	<i>M</i>	<i>SD</i>	Task	Group (age)	<i>M</i>	<i>SD</i>
PJ (name color patch in Japanese)	1 (12-17yrs)	25.8**	4.5	EE (English card to read out)	1 (12-17yrs)	22.3*	5.1
	2 (19yrs)	25.8**	4.3		2 (19yrs)	19.5*	1.9
	3 (20yrs)	25.9**	3.5		3 (20yrs)	19.0*	1.9
	4 (21-23yrs)	27.3	4.0		4 (21-23yrs)	20.2	2.8
	5 (25-54yrs)	30.8**	8.7		5 (25-54yrs)	20.9	3.8
JCJ (Japanese card to name color in Japanese)	1 (12-17yrs)	39.3*	8.2	ECE (English card to name color in English)	1 (12-17yrs)	42.5	8.5
	2 (19yrs)	43.3	10.0		2 (19yrs)	40.1	6.1
	3 (20yrs)	37.5*	7.8		3 (20yrs)	38.2*	5.8
	4 (21-23yrs)	39.3*	5.4		4 (21-23yrs)	39.2*	6.0
	5 (25-54yrs)	46.3*	11.7		5 (25-54yrs)	45.5*	9.9
JCE (Japanese card to name color in English)	1 (12-17yrs)	42.6	7.2	ECJ (English card to name color in Japanese)	1 (12-17yrs)	41.0	11.4
	2 (19yrs)	43.4	7.4		2 (19yrs)	36.2**	7.6
	3 (20yrs)	39.0**	6.4		3 (20yrs)	34.9**	6.2
	4 (21-23yrs)	41.2	5.3		4 (21-23yrs)	36.5**	6.9
	5 (25-54yrs)	47.0**	12.1		5 (25-54yrs)	44.0**	10.2

\*  $p < .05$ , \*\*  $p < .01$ 

Three aspects of age-related results will now be examined. The first characteristic involves the oldest group (Group 5, over 25 years old) which took the longest to perform four incongruent tasks where inhibition control had to be exerted to suppress the automatic reading of color words whether in Japanese or English in order to name the ink colors. In comparison, Group 3 (all twenty years old) was fastest in completing the four incongruous subtasks. The second aspect involved Group 5 which needed the longest time to name color patches in Japanese. Bilinguals of age twenty (Group 3) or younger (Groups 1 and 2) processed the task faster than Group 5, but Group 4 (ages ranging from 21 to 23) recorded no statistical difference against any other groups. The third aspect revealed itself with the relatively slower process of reading English color words in English (congruent task) by Group 1 (ages between 12 and 17). Group 1 members were significantly slower than age nineteen Group 2 or age twenty Group 3 bilinguals. The older bilinguals' superiority, however, disappeared once they reached the age of 21

(Groups 4 and 5).

The first aspect appears to lend support to the notion of the slowing down of the inhibitory system with age in Japanese dominant bilinguals. The second aspect implies that the general slowing down in executive control sets in as early as one's twenties since this was observed in naming color patches in L1 when no inhibition was used to suppress the automatic reading of words. The third aspect indicates that due to the relatively shorter period of learning English (less than five years), the automaticity of recognizing English words and uttering the corresponding sounds instantaneously has not yet been networked as efficiently in the younger participants as their older counterparts who have been exposed to English for a longer period of time. Furthermore, the longer processing time in bilinguals older than 21 (in the English word reading task) could be interpreted as a general cognitive slow down with age.

Thus, our data points to possible deterioration of both inhibitory mechanisms in incongruent tasks and general cognition, which can set in as early as 25 for the former and at 21 for the latter. Our data, on the other hand, provides no evidence to support the reserve hypothesis which posits education or the experience of manipulating two languages prevents cognitive skills from rapidly slowing down. One reason for this would be that we had no control group of monolinguals who matched in age. Another possibility could derive from the cross-sectional way this study was designed. A longitudinal study following up the same people might have provided us with another angle to this issue.

#### **4. CONCLUSION**

The present study attempted to disclose whether research on monolinguals using the Stroop Test is applicable to bilinguals. A special focus was placed on the age issue as to whether or not bilingual experiences help to prevent the inhibitory system from slowing down with age. Our data is supportive of

the view that the inhibitory system in bilinguals slows down with age in as early as one's mid-twenties. That is, the reserve hypothesis is not upheld in this study. Additionally, we found (1) Japanese dominant bilinguals find suppressing the automatic activation of reading color words is as difficult in L2 as in L1 when asked to name ink colors, independently of which language they are using, (2) that general cognition begins to slow down from one's early twenties, and (3) that at least five years is necessary for a newly learnt L2 network to automate itself in processing simple color words, and

Needless to say, more data is needed to confirm the conclusion. Additional subjects in the group older than 25 years of age would be valuable. The present study had only 28 subjects covering ages from 25 to 54. The remaining four groups had age ranges of only one to five years, yielding a larger SD in the older Group 5 on each subtask. Inclusion of subjects under the age of twelve would be also desirable and possible particularly now that English education is going to be offered on a wide scale at elementary schools in Japan. Secondly, we need to assess participants' bilinguality, particularly those who are not studying English at school any more. Only with this assessment can we label people in a stricter sense as dominant, balanced bilinguals, or monolinguals. When more data is obtained in this way, it can be used to validate our tentative conclusion.

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**APPENDIX : Participants' demographic and experimental data**

ID#	gender		Group	color patch		word card in Japanese				word card in English			
	m1,f2	age		PJ	PE	JJ	JCJ	JE	JCE	EE	ECE	EJ	ECJ
1	1	12	1	27	29	25	32	50	48	30	45	35	28
2	1	12	1	25	31	17	41	47	45	22	46	52	42
3	1	13	1	23	39	21	48	60	43	20	46	49	41
4	1	14	1	28	42	19	60	67	48	27	46	70	63
5	1	14	1	18	27	14	24	37	32	17	26	27	26
6	1	15	1	27	41	21	46	63	46	27	47	58	49
7	2	15	1	25	28	21	50	49	49	24	49	50	50
8	1	15	1	23	26	17	43	63	45	21	48	63	62
9	2	15	1	28	29	23	42	50	49	25	51	52	57
10	1	15	1	34	36	19	45	69	45	24	52	63	62
11	2	15	1	30	30	22	44	55	51	27	59	55	54
12	2	15	1	32	50	23	46	83	56	40	62	69	32
13	2	16	1	23	31	20	40	42	30	21	39	42	38
14	1	16	1	22	27	16	29	47	34	20	34	40	28
15	1	16	1	27	27	17	37	38	38	17	29	45	36
16	2	16	1	30	34	18	41	47	41	21	49	49	39
17	2	16	1	31	33	15	43	39	40	20	39	48	41
18	1	16	1	22	45	21	38	40	40	21	41	45	38
19	1	16	1	35	43	23	27	55	58	28	34	48	51
20	1	16	1	30	57	20	51	60	53	24	46	46	42
21	2	16	1	24	31	19	37	38	37	21	38	44	39
22	1	16	1	22	38	15	38	44	41	18	43	40	36
23	2	16	1	18	25	16	28	47	37	19	33	35	22
24	2	16	1	22	29	17	33	56	40	18	35	45	32
25	2	17	1	20	31	14	34	48	35	19	33	48	33
26	1	17	1	29	36	19	37	37	34	18	39	35	31
27	1	17	1	22	27	13	30	39	37	15	37	43	30
28	2	17	1	24	31	15	36	49	42	21	44	43	47
29	2	19	2	22	38	22	40	39	67	20	37	55	32
30	2	19	2	22	28	14	43	42	44	17	33	40	30
31	1	19	2	25	31	17	34	38	32	19	38	35	30
32	2	19	2	17	44	14	33	50	39	16	44	39	24
33	2	19	2	32	37	18	43	43	40	16	42	45	38
34	1	19	2	27	29	16	40	45	39	17	30	43	40
35	2	19	2	33	30	19	42	39	42	20	45	70	55
36	2	19	2	20	27	17	33	37	33	20	26	29	24
37	2	19	2	20	21	14	39	49	37	19	36	37	32
38	1	19	2	20	42	15	38	48	54	19	58	42	42
39	1	19	2	24	37	16	33	40	40	20	41	37	33
40	1	19	2	26	28	20	39	38	40	21	40	42	39
41	2	19	2	30	33	18	45	51	48	20	42	44	38
42	2	19	2	23	25	18	29	38	38	17	38	42	31
43	1	19	2	27	43	18	50	68	52	20	43	57	36
44	2	19	2	26	37	16	70	53	46	19	42	56	39
45	2	19	2	22	27	23	67	42	50	19	42	46	56
46	2	19	2	26	31	19	39	62	44	21	37	44	36
47	2	19	2	32	33	16	60	52	47	23	52	46	34
48	2	19	2	28	58	17	33	68	50	20	43	45	32
49	2	19	2	20	31	24	36	54	37	22	35	47	48
50	1	19	2	28	36	19	44	53	46	21	35	56	34
51	2	19	2	27	40	20	50	50	45	22	42	53	33
52	2	19	2	27	42	18	46	67	50	22	42	46	37
53	1	19	2	27	32	19	45	84	40	18	41	47	30
54	1	19	2	32	35	18	55	45	42	18	42	46	43
55	1	19	2	31	36	19	48	40	35	22	39	46	37
56	1	19	2	28	29	18	39	38	38	19	37	44	30

**APPENDIX : Participants demographic and experimental data (continued)**

ID#	gender		Group	color patch		word card in Japanese				word card in English			
	m1, f2	age		PJ	PE	JJ	JCJ	JE	JCE	EE	ECE	EJ	ECJ
57	1	20	3	33	30	16	33	42	36	18	37	40	31
58	1	20	3	27	31	17	42	48	39	21	41	42	37
59	2	20	3	27	30	17	40	45	39	16	41	41	27
60	1	20	3	28	34	17	64	35	50	18	46	46	46
61	2	20	3	25	30	19	32	40	32	22	52	59	35
62	2	20	3	22	28	18	30	40	33	20	40	51	38
63	2	20	3	28	29	19	38	40	39	19	38	37	32
64	1	20	3	25	31	18	33	40	32	19	39	36	29
65	2	20	3	28	29	20	37	39	38	17	40	43	38
66	2	20	3	21	27	18	30	51	34	19	33	37	39
67	2	20	3	32	32	20	40	38	40	24	39	48	35
68	2	20	3	19	54	20	38	45	43	18	35	48	40
69	1	20	3	28	36	16	38	57	41	18	39	54	37
70	1	20	3	22	28	15	29	37	36	18	33	36	29
71	2	20	3	26	37	19	40	42	45	20	36	45	28
72	1	20	3	30	41	15	37	52	51	17	48	55	54
73	2	20	3	30	32	20	37	45	50	22	46	50	39
74	2	20	3	20	21	19	55	50	49	22	46	50	39
75	2	20	3	25	27	15	40	42	41	17	38	40	29
76	2	20	3	29	27	13	24	40	30	17	30	37	29
77	1	20	3	22	32	17	32	39	30	18	28	26	36
78	1	20	3	23	34	16	33	36	34	18	34	38	29
79	1	20	3	24	26	17	39	43	39	20	36	39	28
80	1	20	3	26	28	18	45	52	49	18	38	42	39
81	2	20	3	28	42	17	38	75	41	21	39	57	39
82	1	20	3	25	27	13	39	56	37	18	38	52	35
83	1	20	3	27	30	18	32	44	31	19	30	50	30
84	2	20	3	24	25	17	36	55	33	18	30	35	31
85	1	21	4	28	30	20	37	50	47	19	57	55	43
86	2	21	4	30	33	22	45	48	40	22	39	45	40
87	1	21	4	24	30	17	45	38	40	17	34	42	30
88	1	21	4	29	27	16	39	38	42	17	30	51	49
89	2	21	4	25	35	17	38	43	38	20	37	42	31
90	2	21	4	28	29	16	37	41	35	20	40	42	35
91	1	21	4	30	35	17	43	70	42	20	49	64	63
92	1	21	4	32	40	18	48	58	44	24	46	45	39
93	1	21	4	30	34	17	43	48	51	21	41	43	37
94	1	21	4	26	28	16	50	51	43	19	30	49	31
95	1	21	4	32	45	21	44	72	47	23	48	60	36
96	2	21	4	23	32	20	48	42	37	20	40	47	35
97	1	21	4	27	28	18	40	38	39	18	40	45	35
98	1	21	4	23	24	16	26	50	28	19	34	41	28
99	1	21	4	21	29	13	31	35	38	18	39	53	35
100	2	21	4	25	31	17	39	70	46	20	45	43	36
101	1	22	4	33	29	20	40	42	38	20	40	38	31
102	2	22	4	32	31	17	39	41	38	21	38	45	37
103	1	22	4	35	40	17	40	42	51	28	38	38	36
104	2	22	4	33	42	25	33	50	48	27	40	35	38
105	2	22	4	21	30	17	33	34	40	18	37	28	34
106	2	22	4	23	27	17	36	43	39	18	37	61	29
107	2	22	4	26	29	15	40	50	40	17	40	42	39
108	1	22	4	31	36	19	40	43	40	18	38	42	35
109	1	22	4	26	25	22	32	35	35	23	40	32	34
110	1	23	4	23	30	17	41	53	50	20	38	50	40
111	1	23	4	23	30	17	36	42	38	20	28	33	30
112	1	23	4	25	30	16	38	46	40	18	34	37	36



**APPENDIX : Participants demographic and experimental data (continued)**

ID#	gender		Group	color patch		word card in Japanese				word card in English			
	m,f	age		PJ	PE	JJ	JCJ	JE	JCE	EE	ECE	EJ	ECJ
113	1	25	5	30	38	14	48	57	60	20	51	38	62
114	1	25	5	32	49	18	44	73	47	20	38	66	36
115	1	26	5	25	28	18	45	41	43	21	42	43	45
116	2	27	5	29	35	17	38	41	39	19	25	43	41
117	2	27	5	21	31	17	32	48	31	19	41	48	34
118	2	28	5	30	38	22	46	42	48	24	51	46	36
119	1	29	5	18	27	14	30	35	30	14	35	40	26
120	1	30	5	28	28	19	43	39	40	16	33	54	48
121	1	30	5	34	46	18	43	46	49	18	47	41	45
122	1	36	5	29	29	15	39	47	34	18	38	52	40
123	2	40	5	30	34	20	43	52	58	20	47	47	45
124	2	41	5	27	34	22	41	42	39	23	49	41	33
125	2	43	5	28	33	16	37	44	45	21	40	39	44
126	2	45	5	19	28	16	38	34	35	18	31	46	32
127	1	45	5	27	33	18	53	65	65	20	52	45	58
128	2	46	5	54	56	21	44	59	65	28	51	58	60
129	1	46	5	30	29	18	45	48	39	23	43	43	41
130	2	46	5	29	31	19	44	47	42	18	44	42	40
131	2	46	5	41	60	20	55	65	52	26	66	60	50
132	2	46	5	23	29	23	32	35	35	20	34	39	28
133	2	47	5	28	35	16	50	60	70	19	55	50	50
134	2	48	5	29	32	22	38	43	37	31	47	40	36
135	1	49	5	53	54	23	61	48	48	17	50	38	42
136	2	49	5	24	28	18	40	49	36	21	42	60	40
137	2	50	5	27	52	20	63	54	75	26	71	72	47
138	1	51	5	32	39	22	64	55	58	22	54	51	67
139	1	53	5	46	41	25	54	50	52	25	45	43	47
140	1	54	5	38	26	36	86	61	43	19	52	75	58

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