Original Research

Effects of age and cultural congruency on patterns of narrative recall

—— Strategies corresponding to cognitive goal in each life stage utilized to process unfamiliar stimulus text ——

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Abstract

The purpose of this study was to investigate effects of age and cultural congruency on the recall of the literal and interpretive meanings of narrative texts. 158 Japanese and American participants including older adults (aged : $M=69.75$, $SD=3.57$) and younger adults (aged : $M=19.58$, $SD=1.97$) were asked two tasks, to retell and interpret meanings of a narrative story representing either Japanese or American culture. When asked to recall the story, Japanese older adults interpreted the culturally-congruent story deeper and more synthetically than the culturally-incongruent story under the interpret-first condition whereas American older adults interpreted the culturally-incongruent story deeper and more synthetically than the culturally-congruent story under the both task order conditions. Younger adults produced more literal propositions than older adults in both cultural groups. Both older and younger adults utilized strategies corresponding to the cognitive goal in each life stage to process unfamiliar stimulus.

Key words : patterns of narrative recall, interpretation, cultural congruency

Traditional developmental psychologists define that cognitive changes in later life attribute to cumulative effects of losses whereas those in earlier life are related to cumulative effects of gains (Perlmutter, 1988). However, life-span developmental psychologists articulated that human development is lifelong process with plasticity influenced by multiple factors and involves both gains and losses across the life-span emphasizing multidimensionality and multidirectionality (Baltes, 1989).

The previous cross-cultural study on adult age-group differences on the recall of an American story between Japan and the United States found that Japanese older adults interpreted meanings of a story deeper and integrated significance of an event more than Japanese younger adults while younger adults recalled more of the literal pro-

positions than older adults across the culture when asked to recall the text (Hosokawa & Hosokawa, 2006). These findings were in accord with several earlier studies (Adams, 1991 ; Adams et al., 1997 ; Jepson & Labouvie-Vief, 1992 ; Labouvie-Vief, 1990) that older adults simultaneously reconstructed a portion of the literal version of a text into deeper interpretive meanings. These studies on narrative text recall between different age groups postulate qualitative age differences in text information processing such that older adults are less likely to show detailed recall but more likely to recall the gist of a text when compared to younger adults (Adams, 1991 ; Adams, et al., 1997 ; Hultsch & Dixon, 1984 ; Meyer & Rice, 1989 ; Stine & Wingfield, 1990). This gist-detail trade off could be considered an age-related compensatory strategy due to offset

declining information-processing efficiency. Older adults were also likely to represent essential meaning of the text and reproduce a brief and succinct version of the text according to higher order propositions in the criterion for gist (Adams, 1991 ; Adams, Labouvie-Vief, Hobar, & Dorosz, 1990 ; Labouvie-Vief & Schell, 1982). They might either not encode as many of the propositional details as younger adults do or rapidly decay surface level codes as the elements are transformed and integrated into deeper meaning codes in information processing (Labouvie-Vief & Schell, 1982). They generally process the deeper interpretive meanings of a story although they recall fewer surface-level propositions than younger adults when asked to retell a story as close to the original text as possible (Cohen, 1988 ; Hartley, 1989 ; Zelinski & Gilewski, 1988).

The previous study found these qualitative differences between age groups found only in the Japanese groups (Hosokawa & Hosokawa, 2006). It might be because only one Western cultural story which is culturally incongruent to Japanese participants was used as a stimulus text. From the wisdom-related perspectives, older adults could optimize their cognitive process to approach the culturally unfamiliar stimulus text by efficiently applying the extensive knowledge and wisdom acquired through rich lifetime experience and represent deep and synthetic interpretation to process information on unfamiliar text (Takahashi et al., 2006). Therefore, in the current study, two kinds of narrative story which represent either Japanese or American cultural meanings were used as stimulus texts to see how the cultural congruency of a stimulus text would influence on patterns of recall.

The previous study implied that the differences on the patterns of recall between age groups could be related to cognitive tasks and cognitive goals associated with each life stage (Hosokawa & Hosokawa, 2001) ; the retelling task corresponds to the goal in earlier life and the interpretation task corresponds to it in later life. In earlier life, it is important to efficiently acquire, retain, and recall numerous amounts of information and the young cognitive system tends to be ready to do so (Adams et al., 1997 ; Labouvie-Vief, 1985 ; Mergler & Goldstein, 1983 ; Meyer, 1986 ; Perlmutter, 1988). On the other hand, it is more important to efficiently access and apply the extensive knowledge acquired through a lifetime of experiences in later life (Adams et al., 1997 ; Baltes, 1993 ; Labouvie-Vief, 1985 ; Mergler & Goldstein, 1983 ; Meyer, 1986 ; Perlmutter, 1988).

This denotes that response task order, either retelling-first or interpreting-first, would influence on both older and younger adults' patterns of recall. Thus, assignments of two kinds of stories and two recall tasks were conducted in a counterbalanced design, in each group by age, culture, and gender in this study.

Focusing on elucidating qualitative difference of patterns of narrative recall between age and culture groups, the following hypotheses were formulated : (a) younger adults would recall of the literal meaning of a story more than older adults ; (b) participants would recall more propositions related to the main ideas than propositions related to details of the story ; (c) more older than younger adults would produce deep and synthetic interpretations for recall of the interpretive meanings of a story ; (d) cultural congruency of stimulus texts would draw age-group differences of patterns of recall as a result from utilizing strategies corresponding to cognitive goal in each life stage.

Method

Participants

Thirty-seven Japanese older adults aged between 65 and 75 ($M=68.0$, $SD=2.4$; 18 females) and 41 Japanese younger adults aged between 18 and 20 ($M=18.6$, $SD=.7$; 19 females) participated in the study. The older adults were recruited from a mutual aid university for older adults in the city of Sendai at which older adults regularly get physical, cognitive, and social activities. The younger adults were college undergraduates in Miyagi prefecture.

Forty American older adults aged between 65 and 77 ($M=71.3$, $SD=3.7$; 20 female) and 40 American younger adults aged between 18 and 28 ($M=20.6$, $SD=2.3$; 19 female) participated in the study. Ethnic distribution of the older group was 97.5 % European and 2.5% Native American. The older adults were recruited from the members of Missoula senior center in Montana, which was considered an equivalent facility to the mutual aid university for older adults in Japan who participated in the study in terms of offering regular physical cognitive, and social activities. Ethnic distribution of the younger group was 87.5% European, 5 % Latin, 5 % Native American, and 2.5% African. The younger adults were college undergraduates in Montana.

They were asked to rate their eyesight, hearing, and overall health on a scale from 1 (poor) to 3 (excellent) since cognitive function in later life

Table 1 Descriptive data for the Japanese and American participantsby age group

	Older adults		Younger adults	
	M	SD	M	SD
Japanese	(n＝37)		(n＝41)	
Age	68.03	2.46	18.61	0.7
Education (years)	12.95	1.68	12.05	0.22
Vocabulary scores	42.24	10.1	36.93	6.84
Vision rating*	94.59	0.58	100	0.48
Hearing rating	89.19	0.68	100	0.44
Health rating*	91.89	0.63	100	0.49
American	(n＝40)		(n＝40)	
Age	71.31	3.725	20.58	2.33
Education (years)	15.3	2.56	13.7	1.02
Vocabulary scores	29.6	5.87	26.35	5.14
Vision rating*	87.5	0.64	95	0.64
Hearing rating*	92.5	0.62	100	0.5
Health rating*	92.5	0.46	100	0.55

* Percentage of participants with a score of "poor," "good," or "excellent."

is correlated with self-reported health (Pelmutter & Nyquist, 1990) (Table 1).

All data was collected from February 2008 to July 2009.

Stimulus text

Two kinds of narrative story were used as the stimulus on the basis of length of text. One story represents Japanese cultural meanings and the other American cultural meanings. Both include cultural scenery, characters, and philosophical implications which are psychologically rich and call for deep interpretation. Based on a counterbalanced design, either the Japanese or American meaning stimulus text was assigned to half of the participants of each cultural group and age group.

The Japanese short story "The Spider's Thread," by Akutagawa (1986), was chosen as the Japanese stimulus because the story is considered to stem from a part of story centered on Buddhism, *Karma : A Story of Buddhist Ethics* by Paul Carus (1852) (Katano, 1968 ; Takahashi, 1997). The story includes the lotus flower, Buddha, a main character and other things with Asian names emanating the Eastern symbolic scenery. For Japanese participants, the original version written in Japanese was used. The same story in English published in the English textbook for Japanese on the ninth grade was used for American participants (New Horizon, 1987). The original Japanese-language text was composed of 490 words in 11 paragraphs including 195 propositions. The English version was composed of 477 words in 11 paragraphs including 194 pro-

positions.

An American story about two men in the same hospital room originally written in English was used as a stimulus though the author is unknown. The story emphasizes the virtue of friendship between the characters considering one another that leads to faith, which deemed to be one of the most important values in the Western culture (McFadden, 2012). Like the Japanese stimulus, the story includes the Western symbolism but unfamiliar scenery to Japanese readers, such as military service, parade on the street, or colorful description of nature. The original text was used for the American participants. The English-language version of the text was carefully translated into Japanese and back translated into English by three bilinguals to be used for the Japanese participants. The original text was composed of 455 words in 6 paragraphs including 186 propositions. The Japanese version was composed of 476 words in 6 paragraphs including 171 propositions.

Procedure

All participants were individually interviewed in a laboratory-set room. The participants were given demographic questions and self-rating health condition first. Then, they were given an instruction to read a narrative text in an unlimited time. Immediately after reading task, the Vocabulary subtest on Wechsler Adult Intelligence Scale−Revised was inserted between the reading task and the retelling tasks to avoid the effect of rehearsal in short-term memory. The two recall tasks, retelling as much of the literal meaning of a text as possible and interpreting meanings of the text, were conducted in accordance with a counterbalanced design, retelling-first or interpretation-first, in each group by age, culture, and gender. Finally, the participants were asked to rate the text from 1 (not at all) to 5 (very) after completing the recall tasks on a questionnaire including four items covering (a) difficulty ; the extent to which they found the meaning of the story difficult to understand, (b) familiarity ; the extent to which they were familiar with this type of story, (c) liking ; the extent to which they liked the story, and (d) identity ; the extent to which they identified with the characters in the story.

Response scoring

Each response to the two tasks, retelling and interpretation, was transcribed from the voice recorder for coding and assigned to an arbitrary

Table 2　Examples of Deep and Synthetic Interpretive Response

Story Type	Examples
Japanese Story	"The interpretation of the spider web in the story that I read is that anybody that tries can be forgiven. Life has a two way streetand there is good and bad. You've got to make a decision how you are going to lead your life. At the end, there is salvation. Thereare things that can happen to change the course of your life, and this kind of plays out in front of you how can truly be served, andeven the worst of us can be saved. So, I think that was the crux of the story is the best as I can remember. The most important thingto remember is that you want to try to make the right decisions in life and if sometimes you don't always do right, there is always a second chance."
American Story	"It is like the same "beauty is in the eye of beholder," so it is about the imagination how two different people can see the sameflower or view or art, and feel very differently about it. And also the man, I think he was very loving and concerned over hisroommate to do those things for him. He wanted to be helpful and do something that pleased the roommate. I think it sayssomething about how important our senses are like vision and hearing to us. The third thing is imagination. Our imagination will affectthe physical world how it looks to us like, a rainy day is a beautiful day, not necessarily with a sunshiny day. I think that's veryimportant to me. Well, because I think it's like, a glass of water, is it half empty or a half full? That tells you are an optimist orpessimist, so on. A couple of days ago, I saw a burnt house, a nice old house but it was burned. It was destroyed and I thought ithad its own beauty. A lot of people would say, "Oh it was a terrible thing." I mean, you know to think that maybe someone died inthat fire and fire is really negative. I had a different feeling looking at, like you know, is the mountain more beautiful than the volcano? I don't judge things that way."

code to avoid any biases in the scoring.

Each retelling response was checked against the respective text base for the presence of each proposition to score recall for the literal text. To assess recall of the gist relative to the details in the text, each proposition was categorized into four levels according to importance, from 1 (main idea) to 4 (detail idea). The original version of Japanese stimulus text contains 79, 36, 46, and 34 propositions for the first through to the fourth level respectively while the English version contains 78, 37, 47, and 32 propositions for each level. The original version of American stimulus text contains 49, 38, 49, and 35 propositions for each level while the Japanese version contains 39, 26, 42, and 31 propositions for each level.

To evaluate interpretation responses, two coders trained in scoring for interpretive responses in each language scored the two qualities of interpretive responses, depth and synthesis according to "rating scales for coding interpretation response protocols (Adams et al., 1997)." To score the depth and the synthesis qualities of interpretive response, 5-point scales were used with a score of 1 designating the low end of the scale and a score of 5 designating the high end (Adams et al., 1997).

The depth scale was designated to rate the degree to which the response represented a deep covert meaning of the text for multiple levels of interpretation. The depth scale assesses the degree to which the response represented a deep covert meaning of the text because multiple levels of interpretation emanated based on a continuum from literal to covert metaphorical comparison to deeper covert metaphoric representation. A literal or shallow interpretation closely tied to the proposition of the text base was rated low. A deep or symbolic interpretation going beyond the overt content and structure of the propositional text-base was rated high.

The synthetic scale was designated to rate the extent to which an interpretation integrated a complete whole. An analytic interpretation focused on a particular aspect of the propositional text-base, or was high in detail including a preoccupation with analysis, illustration, or explanation of parts of the allegory, or delineation or definition was rated low. A synthetic interpretation unified the symbolic concepts stated elaboration of the statement generated into holistic and dense response was rated high (Table 2).

Results

Preliminary analyses

First, a 2 (age group) $\times$ 2 (response task order) $\times$ 2 (story) $\times$ 2 (culture) ANOVA was conducted with the four rating scale scores including difficulty, familiarity, liking, and identity as the dependent variables.

A culture effect was significant for difficulty, F (1, 142) $=7.76$, $\eta^2 = .052$, $p < .01$, familiarity, F (1, 142) $=40.75$, $\eta^2 = .22$, $p < .01$. The American participants felt the story more difficult (M=1.82, SD=.965) than the Japanese participants (M=1.45, SD=.696).

A story effect was significant for familiarity, F (1, 142) $=6.86$, $\eta^2 = .046$, $p < = .01$. The participants were more familiar with the American story (M=4.03, SD=1.11) than the Japanese story (M=3.64, SD=1.13). A culture effect was significant, F (1, 142) $=40.75$, $\eta^2 = .223$, $p < .01$. The Japanese participants were more familiar with the given

story ($M=4.33$, $SD=.816$) than the American participants ($M=3.34$, $SD=1.179$). There was a significant Age×Culture interaction found, $F(1, 142)=4.61$, $\eta^2=.031$, $p<.05$. The simple effect test of the age was significant in the Japanese group, $F(1, 142)=7.2$, $\eta^2=.031$, $p<.01$. The older participants felt more familiarity ($M=4.66$, $SD=.17$) than the younger participants ($M=4.05$, $SD=.16$) in the Japanese group. The simple effect test of the culture was significant both in the younger group, $F(1, 142)=9.22$, $\eta^2=.061$, $p<.01$, and the older group, $F(1, 142)=35.41$, $\eta^2=.200$, $p<.01$. The Japanese younger adults felt more familiarity ($M=4.05$, $SD=.16$) than the American younger adults ($M=3.38$, $SD=.16$). The Japanese older adults felt more familiarity ($M=4.66$, $SD=.17$) than the American older adults ($M=3.3$, $SD=.16$).

A story effect was significant for liking, $F(1, 142)=11.07$, $\eta^2=.072$, p<.01. The participants liked the American story ($M=4.49$, $SD=.73$) more than the Japanese story ($M=4.07$, $SD=.82$). There was a significant Age×Story Group interaction found, $F(1, 142)=4.87$, $\eta^2=.033$, $p<.05$. The simple effect test of the story was significant in the older group, $F(1, 142)=14.89$, $\eta^2=.095$, p<.01. The older participants liked the American story ($M=4.68$, $SD=.63$) more than the younger participants ($M=4.32$, $SD=.79$).

A age effect was significant for identity, $F(1, 142)=18.66$, $\eta^2=.116$, $p<.01$. The older participants identified themselves with the characters in the given story ($M=4.06$, $SD=1.04$) than the younger participants ($M=3.41$, $SD=1.14$). A culture effect was significant, $F(1, 142)=29.62$, $\eta^2=.173$, $p<.01$. The Japanese participants identified themselves with the characters in the given story ($M=4.15$, $SD=.77$) more than the American participants ($M=3.31$, $SD=1.28$). There was a significant Age×Story Group interaction found, $F(1, 142)=6.65$, $\eta^2=.045$, $p<.05$. The simple effect test of the age was significant in the American story, $F(1, 142)=23.404$, $\eta^2=.141$, $p<.01$. The older participants identified themselves with the characters in the American story ($M=4.44$, $SD=.16$) more than the younger participants ($M=3.35$, $SD=.16$). The simple effect test of the story was significant in the older group, $F(1, 142)=10.02$, $\eta^2=.066$, $p<.01$. The older participants identified themselves with the characters in the American story ($M=4.43$, $SD=.65$) more than they did in the Japanese story ($M=3.73$, $SD=1.22$).

Second, 2 (age group)×2 (story) ANOVA was conducted to examine any differences in reading time. The data from each culture were sepa-rately analyzed because the composition of the text and the number of propositions are different between cultures though the content of both stimulus texts were basically equivalent. There was a significant main effects for age, $F(1, 78)=13.93$, $\eta^2=.158$, $p<.01.$, and story, $F(1, 78)=10.39$, $\eta^2=.123$, $p<.01$, among the Japanese group. The older adults took longer time to read the story ($M=300.95$, $SD=131.87$) than the younger adults did ($M=208.88$, $SD=83.73$). There was no significant Age×Story Group interaction found. There was a significant main effect for story, $F(1, 76)=25.72$, $\eta^2=.253$, $p<.01$ among the American group. Participants to whom the Japanese story took longer reading time ($M=158.73$, $SD=49.49$) than those to whom the American story was assigned ($M=115.50$, $SD=30.78$). There was a significant Age×Story Group interaction found, $F(1, 76)=11.50$, $\eta^2=.131$, $p<.01$. The simple effect test of the age was significant in the Japanese story, $F(1, 76)=14.10$, $\eta^2=.157$, $p<.01$. The older adults took longer time ($M=181.36$, $SD=8.52$) than the younger adults ($M=136.10$, $SD=8.42$) to read the Japanese story. The simple effect test of the story was significant in the older adults, $F(1, 76)=35.81$, $\eta^2=.320$, $p<.01$. The older adults took longer reading time to read the Japanese story ($M=181.36$, $SD=51.28$) than the American story ($M=109.22$, $SD=33.87$).

Age and cultural differences in the retelling task

To find age and cultural differences in recall for the literal propositional text, the number of propositions presented in the retelling protocols was transformed into a proposition score first. Second, the original raw scores for Importance Level 1and 2 (main ideas) were summed to form a single gist level score while Importance Level 3 and 4 (detail) were summed to form a single detail level score to simplify the gist-detail analysis. Third, the gist score was transformed into a proportion with the sum of the total number of proportions in Level 1 and 2 as the denominator in the third place. The detail score was transformed with the sum of the total number of propositions in Level 3 and 4 as the denominator in the same way with the gist score.

Total recall, gist recall, and detail recall

A 2 (age group)×2 (response task order)×2 (type of story)×2 (culture) ANOVA was con-ducted on total recall response. An age effect was found, $F(1, 142)=15.84$, $\eta^2=.100$, $p<.01$. The younger adults recalled more of the propositional text ($M=30.83$, $SD=10.31$) than the older adults
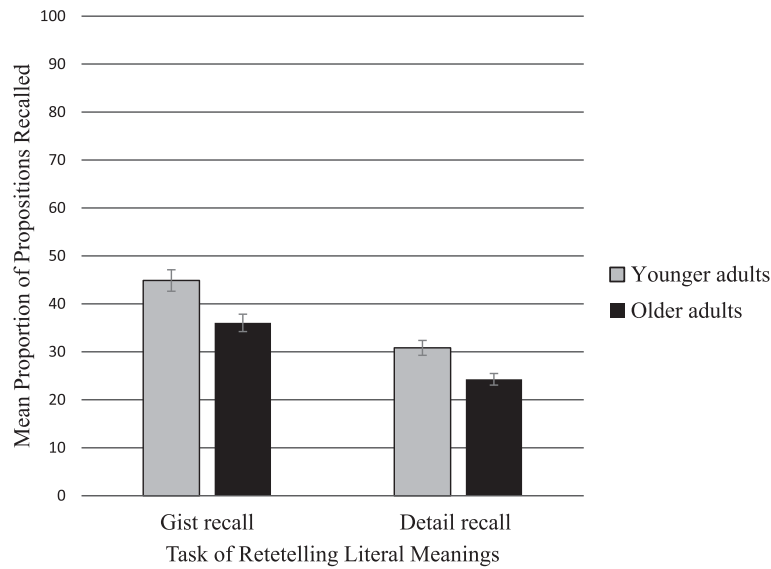
Figure 1   Retelling literal meanings of proposition

(M=24.28, SD=10.20).   There was a significant Response task order×Story interaction found, F (1, 142)=4.31, η^2=.029, p<.05 ; the Response task Order effect was found in the American story but not in the Japanese story condition, simple effect test, F(1, 154)=4.54, η^2=.029, p<.05.   The participants under the interpret-first condition recalled more propositions of the Japanese text (M=29.13, SD=12.54) than those who under the retell-first condition (M=27.43, SD=8.72).   However, the participants under the retell-first condition recalled more of the propositions of the American text (M=29.57, SD=9.64) than those who under the interpret-first condition (M=24.42, SD=9.02).

A 2 (age group)×2 (response task order)×2 (story)×2 (culture) ANOVA was conducted on gist and detail recall responses.   An age effect was found for the gist recall, F(1, 142)=16.65, η^2=.105, p<.01.   The younger adults recalled more gist propositions (M=44.88, SD=12.64) than the older adults (M=36.05, SD=14.183).   There were no significant interactions.

An age effect was found for the detail recall, F(1, 142)=9.79, η^2=.065, p<.01.   The younger adults recalled more detail propositions (M=14.36, SD=9.33) than the older adults (M=10.02, SD=7.50).   There were no significant interactions (Figure 1).

Age and Cultural group differences in the interpretation

Two coders for each cultural group scored interpretive responses.   Interrater reliability for depth and synthesis in both Japanese and American groups were 0.83, 0.83, 0.81, and 0.76, respectively.

Quality of interpretation

The mean score of the coders was calculated to achieve a single score for the depth and synthesis scale.   The resultant score ranged from 1 to 5 for these two scales, with a mean of 2.11 (SD=1.09) for the depth scale and a mean of 2.06 (SD=1.12) for the synthesis scale in the Japanese groups. Depth and synthesis were significantly correlated both in the older group, r=.99, p<.01, and the younger group, r=.83, p<.01.   In the American groups, the resultant scores ranged from 1 to 5 for these two scales, with a mean of 2.16 (SD=1.27) for the depth and a mean of 2.03 (SD=1.27) for the synthesis scale.   Depth and synthesis were significantly correlated both in the older group, r=.94, p<.01, and in the younger group, r=.95, p<.01. Separate 2 (age groups)×2 (response task order) ×2 (story)×2 (culture) ANOVA were conducted for the depth and synthesis scale to examine any differences in average of the criteria.

Depth criterion

The age group differences for the depth criterion were significant, F(1, 142)=126.90, η^2=.472, p<.01.   The older group's interpretation was rated higher (M=2.84, SD=1.19) than the younger group's (M=1.46, SD=.66).   Differences in the task order and the story type for the depth criterion were significant, F(1, 142)=18.17, η^2 =.113, p<.01., and F(1, 142)=12.99, η^2=.084, p<.01, respectively.   The interpret-first group's interpretation was rated higher (M=2.39, SD=1.41) than the retell-first group's (M=1.88, SD=.83).   Interpretation by the Japanese story group was rated higher (M=2.38, SD=1.30) than it by

the American story group ($M=1.88$, $SD=1.01$).

There was a significant Age×Response task order interaction found, $F(1, 142)=48.92$, $\eta^2=.256$, $p<.01$; simple effect test of the age group was significant both in the retell-first and the interpret-first conditions, , $F(1, 142)=9.25$, $\eta^2=.061$, $p<.01$ and 164.38, $\eta^2=.537$, $p<.01$, respectively. The simple effect test of the response task order was also significant in the older group but not in the younger group, $F(1, 142)=61.64$, $\eta^2=.303$, $p<.01$. The interpretation by the older group under the interpret-first condition was rated higher ($M=3.55$, $SD=1.05$) than those under the retell-first condition ($M=2.15$, $SD=.88$)

There was a significant Age×Response task order×Culture×Story interaction found, $F(1, 142)=4.04$, $\eta^2=.028$, $p<.05$; the simple effect test of the age group was significant in the Japanese group under interpret-first condition both with the Japanese story and the American story, the American group under the retell-first condition both with the Japanese story and the American story, the American group under the interpret-first condition both with the Japanese story and the American story, $F(1, 142)=58.46$, $\eta^2=.292$, and 38.30, $\eta^2=.212$, $p<.01$, 10.07, $\eta^2=.066$, $p<.01$, 6.02, $\eta^2=.041$, $p<.05$, 30.05, $\eta^2=.175$, and 40.29, $\eta^2=.221$, $p<.01$, respectively. The simple effect test of the response task order was significant in the Japanese younger group with the Japanese story, the Japanese older group both with the Japanese story and the American story, and the American older group both with the Japanese and the American story, $F(1, 142)=9.18$, $\eta^2=.003$, $p<.05$, 34.98, $\eta^2=.000$, $p<.01$, 11.26, $\eta^2=.001$, $p<.01$, 9.18, $\eta^2=.003$, and 11.99, $\eta^2=.001$, $p<.01$, respectively. The simple effect test of culture was significant in the older group under retell-first condition with the Japanese story, $F(1, 142)=6.74$, $\eta^2=.045$, $p=.01$. The simple effect test of the story was significant in the Japanese younger group under the retell-first condition, the American younger group under the interpret-first condition and the American older group under the retell-first condition, $F(1, 142)=4.91$, $\eta^2=.033$, 6.02, $\eta^2=.041$, 4.08, $\eta^2=.028$, $p<.05$, respectively.

Japanese older adults interpreted the story deeper under the culturally incongruent condition ($M=2.11$, $SD=.33$) than the culturally congruent condition ($M=1.80$, $SD=.63$) when asked to retell the story first. However, they interpreted the story deeper under the culturally congruent condition ($M=3.85$, $SD=1.03$) than the culturally incongruent condition ($M=3.38$, $SD=.79$) when asked to interpret the story first. Their inter-

pretation was deeper under the interpret-first condition than those under the retell-first condition over cultural congruency of story. To the contrary, the younger adults' interpretation was deeper under the culturally congruent condition ($M=2.25$, $SD=.42$) than those under the culturally incongruent condition ($M=1.50$, $SD=.50$) not only when asked both to retell the story first but also when asked to interpret the story first (congruent : $M=1.20$, $SD=.42$, incongruent : $M=1.10$, $SD=.32$). They interpreted both the culturally congruent and incongruent types of story deeper under the retell-first condition than they did under the interpret-first condition.

American older adults interpreted the story deeper under the culturally incongruent condition ($M=2.70$, $SD=1.49$) than under the culturally congruent condition ($M=2.00$, $SD=.24$) not only when asked to retell the story first but also when asked to interpret the story first (congruent : $M=3.20$, $SD=1.14$, incongruent : $M=3.75$, $SD=1.18$). The younger adults also interpreted the story deeper under the culturally incongruent condition ($M=1.60$, $SD=.97$) than they did under the culturally congruent condition ($M=1.15$, $SD=.34$) not only when asked to retell the story first but also when asked to interpret the story first (congruent : $M=1.00$, $SD=0$, incongruent : $M=1.85$, $SD=.82$) (Figure 2).

Synthesis criterion

The age group differences for the synthesis criterion were significant, $F(1, 142)=108.61$, $\eta^2=.433$, $p<.01$. The older group's interpretation was rated higher ($M=2.71$, $SD=1.26$) than the younger group's ($M=1.41$, $SD=.67$). Differences in the task order and the story type for the synthesis criterion were also significant, $F(1, 142)=21.32$, $\eta^2=.131$, $p<.01$, and $F(1, 142)=18.22$, $\eta^2=.114$, $p<.01$, respectively. The interpret-first group's interpretation was rated higher ($M=2.33$, $SD=1.39$) than the retell-first group's ($M=1.76$, $SD=.89$). Interpretation by the Japanese story's group was rated higher ($M=2.33$, $SD=1.26$) than it was by the American story's group ($M=1.74$, $SD=1.04$). There was a significant Age×Response task order interaction found, $F(1, 142)=51.45$, $\eta^2=.27$, $p<.01$; the simple effect test of the age group was significant both in the retell-first and the interpret-first condition, $F(1, 142)=5.35$, $\eta^2=.036$, $p<.05$, and 152.63, $\eta^2=.518$, $p<.01$, respectively. The simple effect test of the response task order was significant in the older group but not in the younger group, $F(1, 142)=67.63$, $\eta^2=.323$, $p<.01$. The interpretation by
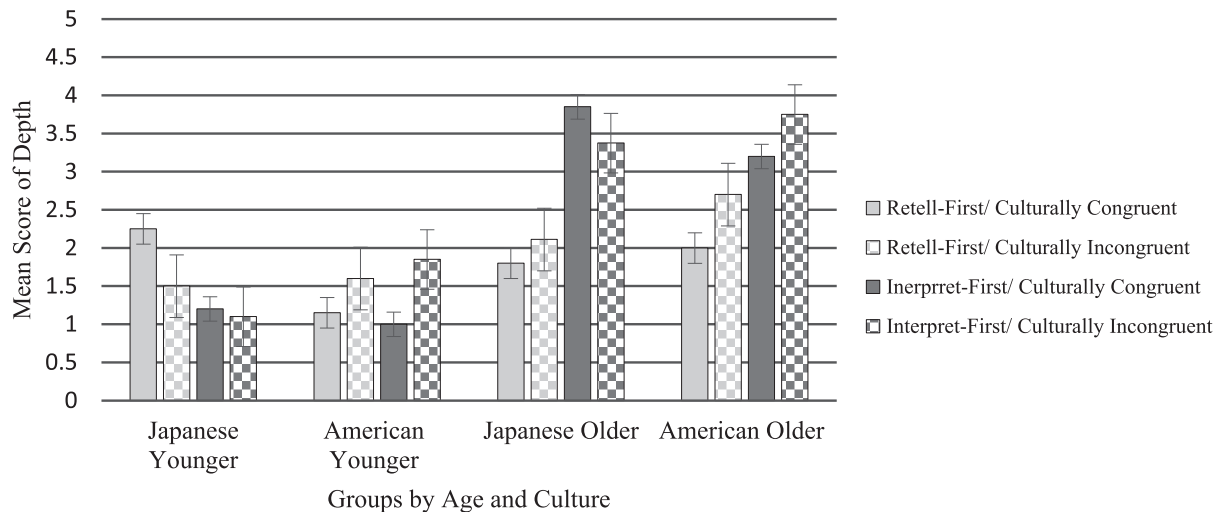
Figure 2 Interaction between Age Group, Response Task Order, Story Type, and Cultural Group

the older group under the interpret-first condition was rated higher ($M=3.46$, $SD=1.06$) than those under the retell-first condition ($M=1.97$, $SD=.97$).

There was a significant Age×Response task order×Culture×Story interaction found, F (1, 142)=8.97, $\eta^2=.059$, $p<.01$; the simple effect test of the age group was significant in the Japanese group under retell-first condition with the American story, the Japanese group under the interpret-first condition with the Japanese story, the Japanese group under the interpret condition with the American story, the American group under the retell-first condition with the Japanese story, the American group under the interpret-first condition both with the Japanese and the American story, $F(1, 142)=6.91$, $\eta^2=.046$, $p=.01$, 56.77, $\eta^2=.286$, 37.19, $\eta^2=.208$, 8.08, $\eta^2=.054$, 24.76, $\eta^2=.148$, and 37.37, $\eta^2=.21$, $p<.01$, respectively. The simple effect test of the response task order was significant in the Japanese younger group with the Japanese story, the Japanese older group both with the Japanese story and the American story, and the American older group both with the Japanese and the American story, F (1, 142)=8.91, $\eta^2=.059$, 33.97, $\eta^2=.193$, 10.94, $\eta^2=.072$, $p<.01$, 4.55, $\eta^2=.031$, $p<.05$ and 27.67, $\eta^2=.163$, $p<.01$, respectively. The simple effect test of the culture was significant in the older group under retell-first condition with the American story, the older group under the interpret-first condition both with the Japanese story and the American story, $F(1, 142)=6.55$, $\eta^2=.044$ and 5.04, $\eta^2=.034$, $p<.05$, respectively. The simple effect test of the story was significant in the Japanese younger group under the retell-first condition, the American younger group under the interpret-first condition and the American older group under the retell-first condition, $F(1, 142)=9.66$, $\eta^2=.064$, $p<.01$, 3.96, $\eta^2=.027$, $p<.05$, and 15.85, $\eta^2=.100$, $p<.01$, respectively.

The Japanese older adults' interpretation was more integrated under the culturally incongruent condition ($M=2.11$, $SD=.33$) than the culturally congruent condition ($M=1.80$, $SD=.63$) when asked to retell the story first. However, their interpretation was more integrated under the culturally congruent condition ($M=3.85$, $SD=1.03$) than the culturally incongruent condition ($M=3.38$, $SD=.88$) when asked to interpret the story first. Their interpretation was more integrated under the interpret-first condition than those under the retell-first condition over cultural congruency of story. To the contrary, the younger adults' interpretation was more integrated under the culturally congruent condition ($M=2.25$, $SD=.42$) than those under the culturally incongruent condition ($M=1.18$, $SD=.40$) not only when asked to retell the story first (congruent : $M=2.25$, $SD=.42$, incongruent : $M=1.18$, $SD=.4$), but also when asked to interpret the story first (congruent : $M=1.2$, $SD=.42$, incongruent : $M=1.10$, $SD=.32$). Moreover, their interpretation of both the culturally congruent and incongruent story more integrated under the retell-first condition than under the interpret-first condition.

The American older adults' interpretation was more integrated under the culturally incongruent condition ($M=2.70$, $SD=1.49$) than under the culturally congruent condition ($M=1.30$, $SD=.35$) not only when asked to retell the story first (congruent : $M=1.3$, $SD=.35$, incongruent : $M=2.7$, $SD=1.49$), but also when asked to interpret the story first (congruent : $M=3.15$, $SD=1.13$, incongruent : $M=3.45$, $SD=1.19$). The younger
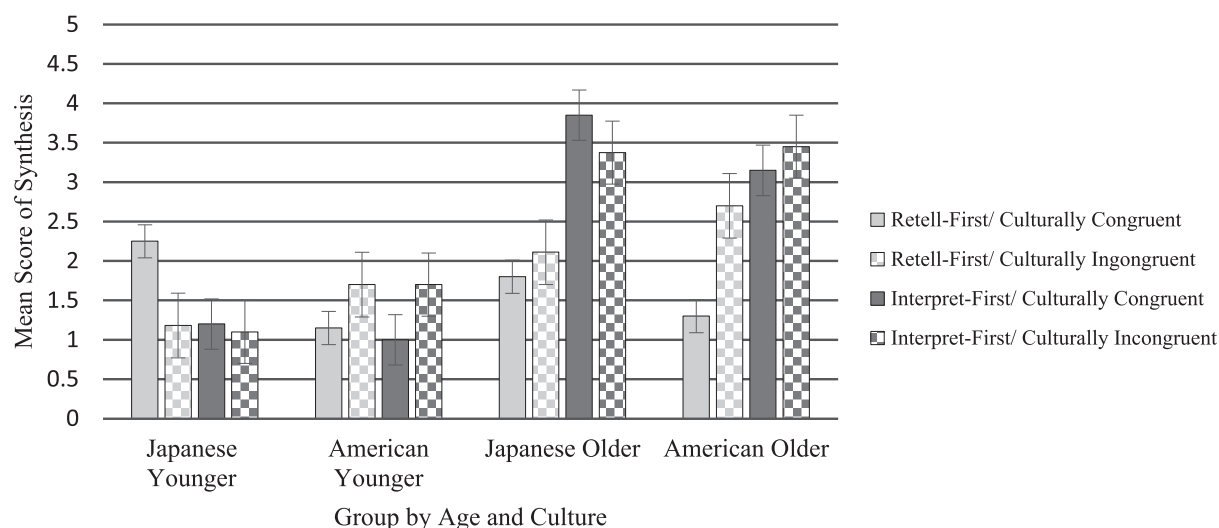
Figure 3   Interaction between Age Group, Response Task Order, Story Type, and Cultural Group

adults' interpretation was also more integrated under the culturally incongruent condition ($M=$1.70, $SD=$1.06) than under the culturally congruent condition ($M=$1.15, $SD=$.334) not only when asked to retell the story first (congruent : $M=$1.15, $SD=$.34, incongruent : $M=$1.7, $SD=$1.06), but also when asked to interpret the story first (congruent : $M=$1.00, $SD=$0, incongruent : $M=$1.70, $SD=$.82) (Figure 3).

Discussion

The results of the study support the hypotheses and elucidate qualitative differences in the use of strategies in each age and cultural group. Across the cultural groups, the younger adults outperformed the older adults in all retelling tasks and both older and younger adults across the cultural groups recalled the main ideas better than the details for recall of the gist of the story. This confirmed the findings by previous studies that younger adults recalled more propositions than older adults across the culture when asked to retell a story as close to the original as possible (Adams et al., 1997 ; Hosokawa & Hosokawa, 2006 ; Zelinski & Gilewski, 1988). The result is not surprising because the retelling task corresponds to the social-cognitive goals of the youth to efficiently process, acquire, retain, store, and recall much information (Adams et al., 1997 ; Labouvie-Vief, 1985 ; Mergler & Goldstein, 1983 ; Meyer, 1986 ; Perlmutter, 1988).

In the task of total recall, the significant interaction between the response task order and the type of story elucidates the adults across the age and the cultural group recalled more of the total

propositions of the Japanese story under the interpret-first condition while they recalled more of the total propositions of the American story under the retell-first condition. The scale of four ratings on the story shows that the participants were familiar with and liked the American story more than the Japanese story, and this resulted in a longer time they took to read the Japanese story than the American story. On the basis of these results, it could be considered what strategies the readers efficiently optimized to process text information on unfamiliar stimulus.

An emerging picture of qualitative difference in the use of strategies between each age and culture group could be set forth with the results of the interpretive tasks : Older adults represented deeper and more synthetic interpretive responses than the younger adults when asked to interpret the story across the culture. This suggests that older adults have text-processing capabilities that enable them to encode not only the gist of a story but also the deep interpretive meaning of the story in their memory process. Additionally, highly integrated interpretive response implies interpretive meanings patterned into whole. Older adults were likely to focus on the gist of a story and the deeper-level meaning in the story to read between the lines to grasp its implications instead of encoding details whereas younger adults were likely to focus on encoding the details of the text both at the literal and interpretive levels. The abstract thematic knowledge structure might explain this pattern of process whereby older adults focus on the depth and synthesis to represent the point, significance, and moral of a story scaffolded with numerous individ-

9

ual episodes, including related experiences connected, organized, and stored in memory (Black & Seifert, 1985 ; Dyer, 1983). Older adults' search for the underlying themes in the narrative could be led by the structure in memory accrued with a lifetime of experience.

The significant interactions between the age and the response task order both for the two criteria in the interpretation imply the cognitive goal in each life stage. The older adults deepened and integrated meanings of the story more under the interpret-first condition than the retell-first condition whereas the younger adults did so more under the retell-first condition. Deepening and integrating the meaning of a story by means of an interpret-first task might facilitate an elaborate memory structure which urges the retrieval of story gist for the older adults.

Focusing on the significant interactions between age, response task order, type of story, and culture both for the depth and the synthesis criteria in the interpretive response may denote the pattern of interpretation by which participants in each group by age and culture approach a culturally incongruent text. Except for Japanese younger adults, participants across age and culture represented deeper and more synthetic interpretation under culturally incongruent condition than culturally congruent condition. This result suggests they could access the culturally incongruent text with efficient focus on and interpreting meanings of a story under each condition of the response task order which corresponds to their life stage. Especially, older adults across the culture interpreted the unfamiliar text more deeply and in a more integrated way under the interpret-first condition. This implies that the older adults could deepen interpretation of encoded culturally unfamiliar meanings into a patterned whole because they applied lifetime knowledge and wisdom to access the unfamiliar stimulus text with efficient focus on and interpretation of the meanings of a story. The results that Japanese older adults deepened and integrated the culturally congruent Japanese story more effectively than the American story are not incompatible, however. Why? According to the results on the scale of four ratings, the participants felt more familiarity with and greater liking for the American story than for the Japanese story. Even though the Japanese story should have been culturally more familiar to the Japanese adults than the American adults, meanings of the story per se must not have been very familiar to Japanese older adults either. This

implied that the older adults across the culture might efficiently process texts with a deep and highly integrative interpretation of the main ideas of a story by apprehending all their knowledge and cognitive abilities accrued during their lifetimes. Older adults could apply extensive knowledge and their lifetime experience to access the unfamiliar stimulus.

However, a slightly different approach toward unfamiliar stimulus occurs among the younger adults by culture. The more the Japanese younger adults recognized a Japanese text as unfamiliar, the deeper and more synthetic interpretation they represented under the retell-first condition. This could be simply because they might be able to utilize their cognitive abilities under the retell-first condition which corresponds to the cognitive goal in the earlier life stage. In the synthesis criterion, both the older adults and the younger adults integrated the culturally incongruent text more effectively under the interpret-first condition. These results imply that deepening and integrating meanings of a story may require slightly different cognitive processes in younger adults than in older adults though the correlation between the two criteria was confirmed. As the American younger adults read the Japanese story, which was unfamiliar to them, they might have attempted to utilize various cognitive abilities to approach the meanings of the text. In other words, they might have been able to optimize their cognitive abilities by efficiently differentiating, deepening, and integrating the meaning of a story in one of two ways : On the one hand, they could have been forming schema about a story while processing both main and detail information in the retell task. On the other hand, they could have been deepening the meaning of a story by reading between lines in the interpretation task. This might have occurred because they were able to utilize cognitive goals from an early stage of life, which is to precisely process considerable information and extensively apply their cognitive process skill in the period to the retell task. Why could they do so?

The previous study also found similar results (Hosokawa & Hosokawa, 2006). This cultural difference implies that everyday life could tap the plasticity in the cognitive processing. The task of deepening and integrating the meanings of a story may overlap with the style of academic training. College undergraduates in the United States are often given assignments to shape their own ideas by reading between the lines or cultivating ideas. In addition, they are often asked to accurately

process the detailed information provided in readings and lectures (McMillan, 1987). However, Japanese educational institutions do not make such assignments as often. Instead, the traditional style of education in Japan is referred to as cramming, in which creativity, logical and critical thinking are not as important as the acquisition of facts and vocabulary. To successfully meet requirements for academic achievement in Japan, students learn how to efficiently encode, store, and recall as much information as possible. This learning style exactly corresponds to the cognitive goal in earlier stage (The Telegraph, 2013). One would suppose that Japanese students might learn how to deepen meaning by interpreting information and integrating meaning by retelling information because of the educational system that has trained them. Perhaps, the Japanese educational circumstance explains why younger Japanese adults efficiently deepen and integrate meanings of a story into a retelling task or an interpretation task respectively.

There are some limitations of the current study. First, the results of the study were yielded with only a small sample from a particular city in each country that might not be a representative of each culture. Therefore, the results are not considered sufficient to figure out cultural differences. Second, years of education was greater for older in both cultural groups, though most undergraduates were expected to acquire a college degree and educational background of the both age group would be equivalent. Strictly speaking, possibility of influence of educational background on the performance were not completely excluded. Finally, as regards stimulus texts, two story including a Japanese story and an American story were selected in terms of the length. Not only the length but also the contents were taken account, however, there would be more appropriate story in the world. It is implied that the control of educational background of sample and selection of stimulus should be more carefully manipulated if the further study is planned to be designed.

In sum, the results of the study found that patterns of narrative recall reflected a cognitive goals in each life stage and everyday life in each culture. In particular, older adults efficiently deepened their interpretation of unfamiliar meanings and encoded them into a patterned whole by utilizing the cognitive abilities accrued with their life time experience which could be considered to compensate for loss of detail. Both age groups utilized the cognitive process influenced by everyday life in each culture and corresponded to

their life stage to efficiently access and focus on the meanings of the text when an unfamiliar stimulus text was presented at any rate. As a future research proposal, it would be implied that focusing on qualities of recall produced in the real world rather than in a laboratory context may shed a light on uncharted parts of the cognitive process in later life.

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