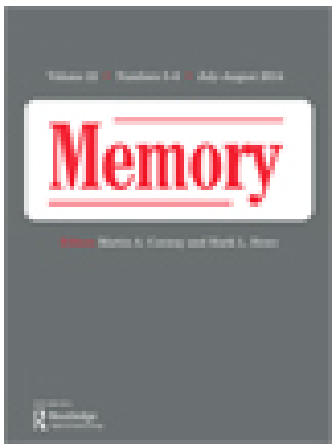

Memory
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/pmem20

Cross-cultural variability of component processes in autobiographical remembering: Japan, Turkey, and the USA

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Published online: 02 Jul 2007.

To cite this article: David C. Rubin , Robert W. Schrauf , Sami Gulgoz & Makiko Naka (2007) Cross-cultural variability of component processes in autobiographical remembering: Japan, Turkey, and the USA, Memory, 15:5, 536-547, DOI: 10.1080/09658210701332679

To link to this article: http://dx.doi.org/10.1080/09658210701332679

MEMORY, 2007, 15 (5), 536–547

Psychology Press
Taylor & Francis Group

Cross-cultural variability of component processes in autobiographical remembering: Japan, Turkey, and the USA

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Although the underlying mechanics of autobiographical memory may be identical across cultures, the processing of information differs. Undergraduates from Japan, Turkey, and the USA rated 30 autobiographical memories on 15 phenomenological and cognitive properties. Mean values were similar across cultures, with means from the Japanese sample being lower on most measures but higher on belief in the accuracy of their memories. Correlations within individuals were also similar across cultures, with correlations from the Turkish sample being higher between measures of language and measures of recollection and belief. For all three cultures, in multiple regression analyses, measures of recollection were predicted by visual imagery, auditory imagery, and emotions, whereas measures of belief were predicted by knowledge of the setting. These results show subtle cultural differences in the experience of remembering.

In psychology, the cross-cultural study of autobiographical memory has focused on two areas: the development of narrative in autobiographical memory (Han, Leichtman, & Wang, 1998; Jin & Naka, 2002; Mullen & Yi, 1995; Wang & Brockmeister, 2002) and the distribution of autobiographical memories across the lifespan (Conway & Haque, 1999; Conway, Wang, Hanyu, & Haque, 2005; Larsen, Schrauf, Fromholt, & Rubin, 2002; Schrauf & Rubin, 2000, 2003). In both these areas one notes the same basic results in different cultures, often with small but interpretable modifications for culture or major events in the cultural life of the society.

Here we view autobiographical memories as the products of component processes, with each process occurring in a separate behaviourally and neurally defined system. This is the basic-systems model of autobiographical memory summarised in Rubin (2005, 2006) and elaborated in a series

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Support was provided by National Institute of Aging grants RO1 AG16340 and R01 AG023123 and National Institute of Mental Health Grant R01 MH066079. We wish to thank Ali Tekcan for comments on the paper.

http://www.psypress.com/memory DOI:10.1080/09658210701332679

of empirical studies (Greenberg & Rubin, 2003; Rubin, 1998; Rubin & Greenberg, 1998, 2003; Rubin, Schrauf, & Greenberg, 2003; Schrauf, 2000; Schrauf & Rubin, 1998, 2000; Rubin & Siegler, 2004). This model is distinctive, eschewing the notion of abstract, amodal information in the brain and in tracing the components of autobiographical memories (visual imagery, auditory imagery, emotion, language, narrative, and others) to specific systems represented by identifiable areas in the brain. Thus, an autobiographical memory is the result of selectively reintegrating sensory, motor, emotional, and linguistic information from various brain centres into a narrative whole that corresponds to the original binding of some or all of that information at the encoding of the event (Rubin, 2006).

In previous work (Rubin, Schrauf, & Greenberg, 2003; Rubin & Siegler, 2004) we provided behavioural evidence that supports this basic-systems model by having participants retrieve memories and then complete rating scales representing the cognitive and metacognitive properties that make up the basic systems. In particular, we examined how the component processes of autobiographical memory clearly represented in subsystems of the brain (e.g., visual imagery, auditory imagery, emotional reinstatement, language, narrative, etc.) influenced two important metacognitive processes of autobiographical memory (recollection and belief). These latter, while not specific subsystems, are nevertheless critical dimensions of autobiographical memory.

Recollection is a metacognitive judgement about the extent to which a person re-experiences or relives an event upon remembering it. It differentiates memory from other states such as dreaming or imagining, but even within memory there is room for variability in recollection, as abundant research has drawn the distinction between ''remember'' vs ''know'' judgements in episodic memory tasks (Gardner & Java, 1990; Tulving, 1985). Belief is a metacognitive judgement about the extent to which a person believes that a memory accurately represents an event from the personal past. Again, there is room for variability here as individuals commonly judge that memory is fallible and sometimes simply wrong. We found that higher recall of visual imagery, auditory imagery, and emotional reinstatement in memory predicted higher ratings of reliving the event (recollection), and that higher recall of the spatial setting of events predicted belief in the accord between what happened and the memory of what happened.

Because judgements of recollection and belief are metacognitive and not grounded in specific subsystems, we suspected that they might be more culturally variable than the component, cognitive processes represented in the basic-systems model. In this approach to culture and cognition, we assume that basic information-processing systems, represented by identifiable areas in the brain, are panhuman, but that the actual processing (integration and manipulation of information) is subject to cultural entrainment. This is analogous to other cross-cultural cognitive research such as that by Hedden et al. (2002), which assumed that basic processing mechanisms such as processing speed and working memory would be present and measurable across cultural groups but that differences would emerge in processing outcomes as a result of interaction with culture. A similar assumption is made in social psychology, for instance in the work of Markus and Kitayama (1991) who find cultural differences in cognitive processing related to the ''self'' (but by implication find that the ''self'' as a basic component of human being is pancultural). Thus, we sought to assess the cross-cultural variability of the metacognitive processes of recollection and belief in Japanese, Turkish, and American (USA) samples. Given that natural languages differentially draw attention to some aspects of experience and elide over others (Boroditsky, Schmidt, & Phillips, 2003; Slobin, 1996), we began by informally assessing whether the distinctions in the American ratings existed in Japanese and Turkish.

Consider the case of recollection. Just as the remember/know distinction makes sense in English, a similar distinction exists in Turkish between *hatirlamak* and *bilmek*, and in Japanese between the verbs *kiokushiteiru* and *shitteiru*. Moreover, studies distinguishing remember from know judgements have been conducted in Japan and Turkey as well as the USA (e.g., Horiuchi, 2004; Rubin, Hinton, & Wenzel, 1999; Tekcan et al., 2002). Thus, each of the languages spoken by participants in our study make similar distinctions between mnemonic information that is remembered vs simply known. Nevertheless, it remains an empirical question whether and to what extent the component processes that predicted recollection in the American sample will predict recollection in the Japanese and Turkish samples.

On the other hand, there may be reason to predict that belief in one's memories—judgements that memories accurately represent originating events—is more variable cross-culturally. In this regard it is of note that Turkish grammar has a special status for the narrative that impacts upon belief (Slobin & Aksu, 1982). There are two forms of past tense in Turkish, the *-di* form and the *-mis* (pronounced as *mish*) form. These two forms are verb suffixes for past tense that have different implications. The *-di* form is used for actions that are personally experienced or witnessed. The *-mis* form denotes hearsay and secondary sources as well as information that the individual inferred, or for which he or she was unprepared, or that has a quality of otherworldliness (e.g., myths and fairytales). These two grammatical forms distinguish the reliability of narratives. If a particular event is told in the *-di* form, the narrator has seen, experienced, or felt it and therefore there is no reason to doubt the reality of the event. However, if the event is told in the *-mis* form, then the narrator has not seen it directly, suggesting that the reliability may not be ascertained.

We chose Japan, Turkey, and the USA for several reasons. One practical reason was the availability of research participants in these three areas who were sufficiently familiar with rating scales to take part in the study. Another reason for our choice was that we wanted a diversity of cultures. Anthropologists define ''culture areas'' as regions comprising groups of societies with common environmental influences, geographical contiguity, shared history, and similar social structure (Burton, Moore, Whiting, & Romney, 1996). Clearly, Japan, Turkey, and the US represent historically different cultural and geopolitical regions.

The three cultures also differ from each other on more quantitative measures (Hofstede, 1980, 2001). Hofstede (2001), ranked 53 countries and regions on four cultural dimensions derived from factor-analytic studies. His participants were marketing and service employees of a large multinational company. Most were middle-class college graduates. Additional data were collected from managers receiving post-graduate training. Thus, the sample on which cultural diversity was measured was at least as educated as our own. Japan, Turkey, and the USA had the following ranks on the four cultural dimensions: *Power Distance* (the degree of power difference between superior and subordinate as perceived by the less powerful): 33, 18.5, 38; *Individualism* (the level of distinction of the individual from the other in the social environment): 22.5, 28, 1; *Masculinity* (the importance attached to masculine goals as opposed to feminine goals) 1 32.5 15; and *Uncertainty Avoidance* (the need for clear, defined, and specified environment with a predictable future): 7, 16.5, 43. *Uncertainty Avoidance* is highly affected by the age of the respondents and once age is equated across samples, the spread in *Uncertainty Avoidance* becomes even larger with Japan, Turkey, and USA, being ranked 1, 22, and 37 in the 40 countries in which the age correction was done. Thus the ranks of the three cultures vary widely, implying that the three cultures are, in fact, quite different.

McCrae et al. (2005) examined the similarities between 51 cultures on 30 Revised NEO Personality Inventory facet scores. A multidimensional scaling procedure where two dimensions were extracted and rotated to maximise correlations with Neuroticism and Extraversion revealed that the Japanese, Turkish, and American cultures are represented in separate clusters.

We are not claiming that differences described by global regions, Hofstede's four dimensions, or McCrae et al.'s personality factors are the only differences in our three cultures, only that they indicate that we have sampled widely. Similarly, although we assume that differences in *Individualism* and *Uncertainty Avoidance* or personality dimensions like Extraversion are likely to provide us with considerable variability among our three samples on some of the properties we measure, we are not claiming that these differences are the only reason or cause for any variability that is observed.

In terms of autobiographical memory, a question like our scale of belief in the accuracy of a memory (i.e., I believe the event in my memory really occurred in the way I remember it and that I have not imagined or fabricated anything that did not occur, rated from $1 = 100\%$ imaginary to $7 = 100\%$ real) should be highly related to *Uncertainty Avoidance*. If one cannot usually trust one's own memories to be accurate, then the world would be a very uncertain place. Given the range of uncertainty avoidance across these three cultures, we should obtain a good range in our belief measures with Japanese participants being higher than Turkish participants, who should be higher than the USA. Similarly, the USA ranks highest in *Individualism*, whereas Japan is

near the middle and Turkey ranks lower. This suggests that compared to Turkey and possibly Japan, participants in the USA should show less dependence on auditory imagery (at least to the extent that it reflects spoken language), language, and narrative compared to other component processes such as vision. That is, it seems logical to assume that participants from highly individualist cultures might rank their privately verifiable visual evidence over socially derived (e.g., ''heard'' evidence). Given these predictions, differences in mean values should follow, but these would say little about the mechanisms used to produce the belief in the accuracy of an autobiographical memory or auditory versus visual imagery. Thus, for questions of the relationships among variables we use correlations and multiple regressions.

METHOD

The basic procedure was set first in English and so we present the methods in detail for the USA sample, noting deviations from it for the Japanese and Turkish samples. All instructions and rating scales were translated and back-translated by fluent bilinguals in order to ensure as close a translation of meaning as possible. The USA sample was analysed in Experiment 1 of Rubin et al. (2003).

Participants

All participants were native speakers of the language group in which they were tested. For each culture we tested in excess of 50 individuals and then reduced the number to 50 to produce equal *n*s by eliminating those participants who had the most missing data, either because they failed to report a memory to a cue word or failed to answer questions about a cue word. In the Japanese, Turkish, and USA samples there were initially 52, 57, and 55 individuals. The average age of the 50 Japanese participants was 19.30 ($SD = .99$, range 18–23); 26 were female. For Turkey, the average age of the 50 participants was 18.94 ($SD = .71$, range 17–21); 31 were female. For the USA, the average age was 18.54 ($SD = .76$, range 17–21); 34 were female. Being university undergraduates effectively holds SES and education high so that any cross-cultural differences that do emerge should be due to culture and not these other factors.

Materials

Each participant was presented with a booklet consisting of a cover page with instructions, a double-sided sample page containing a sample cue word and 15 questions about the memory it cued, a dividing page, and then 30 more double-sided pages, each of which contained one of 30 cue words and the 15 questions referring to the memory it elicited. All questions were 7-point rating scales anchored at extreme values such as ''not at all'' and ''completely''. Exceptions to the 7-point scales were responses for the date of the memory and the judgement of whether the memory was of an event that occurred within a single day or was extended over longer than a day, or was the merging of several events The instructions began:

> In this study we are trying to find out about the basic properties of autobiographical memories. To do this we will cue you with 30 words. For each word we will ask you to recall the first memory from your life that comes to mind and to think about it for a while before answering questions about the memory. There are no correct answers; we are just trying to document the kind of memories people have.

Table 1 provides a list and brief description of our measures along with the brief names to which we refer throughout the text. The concepts tapped by these measures are the ones commonly considered and rated in the autobiographical memory literature (Conway & Pleydell-Pearce, 2000; Johnson, Foley, Suengas, & Raye, 1988; Rubin, Groth, & Goldsmith, 1984; Rubin & Schulkind, 1997; Sheen, Kemp, & Rubin, 2001). Each question is a proxy for one or more complex theories or theoretical ideas (Rubin, 2005). The full set of questions is given in the Appendix of Rubin et al. (2003).

Procedure

The participants were tested in large groups. The printed instructions were read to them, and they were asked to think of a memory to the word *tree* and then answer all 15 questions about it. Each of

TABLE 1
Variables used in the study

Variable	*Brief description of rating scale*
Recollection and belief	
Reliving	I am reliving the original event.
Back in time	I travel back to the time when it happened.
Remember/know	I remember it rather than just knowing it happened.
Real/imagine	I believe the event in my memory really occurred.
Component processes	
See	I can see it in my mind.
Setting	I can recall the setting where it occurred.
Hear	I can hear it in my mind.
Talk	I or other people are talking.
In words	It comes to me in words.
Story	It comes to me as a coherent story.
Emotions	I can feel now the emotions that I felt then.
Reported properties of events or memories	
Importance	It is significant for my life.
Rehearsal	I have thought or talked about this event.
Once/many	It occurred once at one particular time.
Merged/extended	A merging of events versus an extended event.
Age of memory	Please date the memory (month/day/year).

All measures are 7-point rating scales anchored at extremes, except for *once/many*, *merged/extended*, and *age of memory*, which is converted to days reported since the event.

the 15 questions was discussed briefly and any questions from the participants were answered. The participants were then asked to recall a memory to each of the remaining 30 cue words in turn and, while they were thinking about that memory, to answer the 15 questions about it. This part of the task was self-paced. The complete procedure took between 50 and 90 minutes.

RESULTS

For each group, the maximum number of possible memories was 1500 (50 participants $\times$ 30 memories each). There were few missing data. For Japan, Turkey, and the USA, with the exception of the dating of the memories, the number of missing ratings for our various scales varied: between 7 and 9 for Japan with the exception of *once/many* which had 27 missing values; between 28 and 31 for Turkey; and between 2 and 6 for the USA. All groups were asked to date their memories to the exact day, giving their best guess when possible. The Japanese students had 53 missing years, 222 missing months, and 858 missing days. We therefore restricted the Japanese dating to years. With this modification there were 53, 35, and 8 missing dates for Japan, Turkey, and the USA, respectively. Whether the missing dates in the Japanese data were caused by a reluctance to guess and thereby provide inaccurate answers—a conjecture consistent with differences in *Uncertainty Avoidance*—remains an open question.

Means

As shown in Table 2, some rating scales, such as *real/imagine*, are generally high and others, such as *in words*, *importance*, and *rehearse* are generally low. In addition, there was considerable consistency in the ordering of ratings given to component processes. In all cultures, the highest ratings were given to either *see* or *setting*. These were followed by ratings of *emotions*. Next were the three ratings of auditory imagery and narrative (*hear*, *talk*, and *story*). The lowest ratings were given to *in words*. Yet there are still differences among the three cultures that are fairly large. For the 7-point rating scales, the difference between the cultures with the highest and lowest rating is about three-quarters of the average standard deviation within a culture. Thus, a person who scored at the 50th percentile in the culture with the highest score would be at the 77th percentile in the culture with the lowest score. For two scales, *remember/know* and *setting*, all three cultures differ by a Tukey's test; for two other scales, *merge/extend* and *age of memory*, none of the cultures differs. For the remaining 12 scales, there are 9 scales on which Japan differs from the USA, 6 on which Japan differs from Turkey, and 3 on which Turkey differs from the USA. More conservatively, of these 12 scales, there are 4 scales on which Japan is lower than the other two cultures (*hear*, *talk*, *story*, and *once/many*), 1 scale on which Turkey is lower than the other two cultures (*rehearse*), and 1 scale on which the USA is higher than the other two cultures (*see*).

One interesting difference in the means that arises again in the correlational analyses that follow is that hearing appears more important in the Turkish sample. If one compares *see* to *hear*, two questions with very close wording that each ask about a different sensory modality, *see* is 1.33 and 1.14 higher in the Japanese and USA samples on a 7-point scale, respectively, but only .49 higher in the Turkish sample. A repeated measures

TABLE 2
Means and ANOVA for differences in memory variables across countries

	Country			
Variable	*Japan* *Mean (SD)*	*Turkey* *Mean (SD)*	*USA* *Mean (SD)*	$F(2, 147)$
Recollection and belief				
Reliving	4.27 (0.97)[a]	4.59 (0.77)[a,b]	4.83 (0.80)[b]	5.52**
Back in time	4.18 (1.07)[a]	4.54 (0.81)[a,b]	4.85 (1.09)[b]	5.70**
Remember/know	4.37 (0.85)[a]	4.94 (0.72)[b]	5.69 (0.65)[c]	9.55***
Real/imagine	6.19 (0.78)[a]	6.01 (0.73)[a,b]	5.75 (0.72)[b]	4.34*
Component processes				
See	4.83 (0.77)[a]	4.84 (0.77)[a]	5.37(0.72)[b]	8.57***
Setting	4.80 (0.80)[a]	5.45 (0.80)[b]	5.85 (0.75)[c]	22.72***
Hear	3.50 (0.96)[a]	4.35 (0.80)[b]	4.23 (0.96)[b]	12.90***
Talk	3.55 (0.84)[a]	4.10 (0.88)[b]	4.34 (0.87)[b]	10.95***
In words	3.21 (1.14)[a]	3.75 (0.79)[b]	3.43 (1.36)[a,b]	2.99
Story	3.52 (1.03)[a]	4.20 (0.83)[b]	4.49 (1.06)[b]	13.05***
Emotions	4.07 (0.85)[a]	4.41 (0.86)[a,b]	4.65 (0.91)[b]	5.47**
Reported properties of events or memories				
Importance	3.14 (0.84)[a,b]	2.98 (1.04)[a]	3.51 (0.88)[b]	4.20*
Rehearse	3.50 (1.04)[a]	2.99 (0.73)[b]	3.41 (0.81)[a]	4.83**
Once/many	0.61 (0.16)[a]	0.71 (0.18)[b]	0.69 (0.15)[b]	5.60**
Merge/extend	1.42 (0.26)[a]	1.54 (0.30)[a]	1.43 (0.27)[a]	2.53
Age of memory[1]	1943 (743)[a]	1902 (899)[a]	1565 (779)[a]	3.28*

Means with different superscripts are different at $p < .05$ by a Tukey's test.
* = .05, ** .01, *** .001.
[1]Age of memory is the reported time between the event and recall in days.

ANOVA confirms the difference in mean level, $F(1, 147) = 313.75$, $p < .0001$, in culture, $F(2, 147) = 9.18$, $p < .001$, and their interaction, $F(2, 147) = 21.03$, $p < .0001$.

Multiple regressions predicting belief and recollection

In order to better understand why an autobiographical memory is recollected, why it is believed, and the relation between the two, we used multiple regression analyses to predict the *reliving*, *back in time*, *remember/know*, and *real/imagine* variables with 10 of the remaining 11 variables; *merge/extended* was excluded because it could not be calculated on the more than half of the memories that were rated as "once" on the *once/many* scale. The analyses were conducted between subjects using the mean ratings of the 50 participants, and within subjects for each participant individually before aggregating over individual subjects' analyses. Table 3 presents these results. For the between-subjects analysis, the equation with the highest *r*-squared that had only variables with beta weights significantly different from chance at the .05 level was chosen. For the within-subjects analyses, regressions were conducted for each participant separately and the parameters of the resulting equations were averaged (see Estes, 1956, for a discussion of averaging such linear equations; see Rubin et al., 2003, 2004; Rubin & Siegler, 2004, for other examples of using within- and between-subject analyses). A *t*-test was performed on the set of 50 beta weights associated with each independent variable to see if its mean was different from zero at the $p < .0001$ level. This procedure was first conducted with all 10 independent variables. Next, the independent variable with the smallest average beta weight was removed if it was not different from zero at the .0001 level. This step was repeated until all remaining beta weights were statistically significant. We used the .0001 level instead of the .05 level to arrive at a roughly equal number of predictors in the between- and within-subjects equations in order to facilitate comparisons between them. The change in *p* level from .05 between subjects to .0001 within subjects indicates the high degree of similarity among the regression equations of the individual participants.

TABLE 3
Multiple regressions

Dependent variable	*Type of analysis*	*Beta weights for independent variable*											R^2
		See	*Setting*	*Hear*	*Talk*	*In words*	*Story*	*Emotions*	*Importance*	*Rehearse*	*Once/many*	*Age of memory*	
Reliving													
Japan	b/t	.49		.24				.31		−.22			.73
	w/i	.21	.17	.17				.29					.65
Turkey	b/t	.44		.38		.21					−.14		.91
	w/i	.31		.33		.12		.19					.79
USA	b/t	.50				.15		.45					.76
	w/i	.33		.27			.15	.17					.66
Back in Time													
Japan	b/t	.58					.28					−.18	.58
	w/i		.32				.19	.37					.65
Turkey	b/t	.51		−.40	.23		.63						.83
	w/i		.18			.24	.26	.20					.66
USA	b/t	.39					.30		.24				.51
	w/i	.25		.13			.36		.14				.62
Remember/Know													
Japan	b/t	.81										−.20	.70
	w/i		.40					.39	.16				.72
Turkey	b/t		.51				.48						.79
	w/i	.14	.24			.30	.21						.67
USA	b/t		.67				.35	−.27					.57
	w/i	.26	.31				.21					−.11	.63
Real/Imagine													
Japan	b/t		.47										.22
	w/i	.33								.20			.35
Turkey	b/t			.58									.33
	w/i		.34	.16			.29						.55
USA	b/t		.49				.28	−.32					.30
	w/i	.19	.19				.26					−.20	.54

b/t = the between-subjects analysis; w/i = the within-subjects analysis.

The between-subjects and within-subjects analyses ask different questions. The between analysis is a standard individual differences analysis. It asks whether the average ratings of people on our 4 dependent measures can be predicted by the average ratings of people on our 10 independent measures. For example, we test for whether people who tend to relive their memories are also people whose memories have high visual imagery. The within analysis examines each individual separately, doing multiple regressions for that individual. These regression equations are then ''averaged''. The question here is at the level of most theory in experimental cognitive psychology; that is, it asks what independent measures, within an individual, predict our four dependent measures within the same individual. For example, within each individual considered separately, are the memories that are relived most also the memories that have the highest visual imagery? Because the means used by the between analysis are subtracted out by the correlation formula of the within analysis, each form of analysis is based on information that the other does not use, and the two levels of analysis are independent of each other.

The regression equations shown in Table 3, using the between and within units of analysis, are fairly consistent across cultures. As in our earlier work (Rubin et al., 2003; Rubin & Siegler, 2004), the *reliving* and *back in time* variables tend to have different predictor variables from the *remember/know* and *real/imagine* variables. First, although the *see* and *setting* variables are highly correlated, *see* more often enters into predictions of *reliving* and *back in time*; by contrast, *setting* more often enters into predictions of *remember/know* and *real/imagine*. The difference between being able to ''see in my mind'' and being able to ''recall the setting where it occurred'' could be a distinction between imagery and context, or between visual imagery and multimodal spatial imagery (Farah, Hammond, Levine, & Calvanio, 1988). Second, *emotion* or the correlated variable of *importance* enters more often into regression equations for the *reliving* and *back-in-time* variables and always with a positive weight, but enters into the two regression equations for the between-subjects analyses for the *remember/know* and *real/imagine* variables with a negative weight.

There is one major difference in the within- and between-subjects multiple regressions, a difference that also occurred in our earlier work. The *r*-squared values are similar for most of the equations, and if anything are larger for the between-subjects regressions, but they are considerably lower for the between-subjects regression of *real/imagine*. *Real/imagine* is not as well predicted as an individual differences variable as our other measures.

Comparing across cultures there are few differences, but they are robust and either predicted or easy to interpret. Variables related to language and narrative (i.e., *hear*, *talk*, *in words*, and *story*) tend to have their largest contributions for the Turkish data, especially when compared to the Japanese data. *Talk*, *in words*, and *story* do not enter into any equations for the Japanese data except for *back in time*, where they enter for all cultures. In order to further examine these differences, the raw within-subject correlations between the independent and dependent variables in Table 3 were examined, as opposed to the partial correlations used by the multiple regression equations. Correlations were calculated for each of the 150 participants individually. The Fisher's z transforms of these correlations were submitted to one way ANOVAs with three levels of culture. These are shown in Table 4 along with the average correlation (calculated from the Fisher's z) for each culture. Of the 48 ANOVAs represented in the table, 25 are significant at the .05 level (whereas 2.5 would be expected by chance) and 13 are significant at the .001 level (which is the corrected table-wise .05 level; i.e., $.001 = .05/48$). Moreover the distribution of significant differences is far from random. Of the 16 analyses involving auditory imagery and language, 13 have significant F values. In all 16 of these analyses, the correlation from the Turkish sample is the highest numerically, and in 10 of these analyses the Turkish sample differs significantly from the other two samples. All four analyses involving *emotion* are significant. In contrast, of the 28 analyses from the remaining seven independent measures, only eight are significant and these show no clear pattern.

TABLE 4
Mean correlations among independent and dependent measures of Table 3 compared across countries

	Phenomenological report															
	Reliving				*Back in time*				*Remember/know*				*Real/imagine*			
Variable	$F(1, 147)$	J	T	U	$F(1, 147)$	J	T	U	$F(1, 147)$	J	T	U	$F(1, 138)$	J	T	U
Component processes: Visual-spatial and emotion																
See	13.74***	66^{a}	83^{b}	70^{a}	0.29	64^{a}	64^{a}	61^{a}	0.20	67^{a}	66^{a}	65^{a}	1.64	51^{a}	59^{a}	54^{a}
Setting	2.31	66^{a}	61^{a}	58^{a}	9.46***	70^{a}	60^{a}	53^{b}	4.98**	75^{a}	65^{b}	65^{b}	2.74	54^{a}	62^{a}	52^{a}
Emotions	9.04***	60^{a}	76^{b}	63^{a}	5.02**	70^{a}	$67^{a,b}$	58^{b}	20.15***	76^{a}	66^{b}	52^{c}	5.29**	42^{a}	56^{b}	$47^{a,b}$
Component processes: Sound and language																
Hear	18.08***	59^{a}	93^{b}	68^{a}	2.63	54^{a}	63^{a}	57^{a}	1.90	57^{a}	64^{a}	56^{a}	10.57***	35^{a}	56^{b}	46^{a}
Talk	6.86**	51^{a}	64^{b}	49^{a}	1.47	53^{a}	55^{a}	48^{a}	4.32*	$54^{a,b}$	58^{a}	45^{b}	7.40***	33^{a}	50^{b}	38^{a}
In words	21.99***	40^{a}	71^{b}	38^{a}	18.96***	41^{a}	71^{b}	37^{a}	13.87***	50^{a}	71^{b}	37^{a}	15.02***	30^{a}	57^{b}	32^{a}
Story	21.67***	41^{a}	69^{b}	59^{c}	5.64**	53^{a}	69^{b}	67^{b}	6.83**	50^{a}	68^{b}	$58^{a,b}$	20.72***	30^{a}	62^{b}	58^{a}
Reported properties of events or memories																
Importance	0.33	48^{a}	48^{a}	45^{a}	1.30	52^{a}	47^{a}	44^{a}	10.21***	56^{a}	43^{b}	33^{b}	0.98	35^{a}	41^{a}	36^{a}
Rehearse	1.76	41^{a}	48^{a}	41^{a}	0.85	46^{a}	42^{a}	40^{a}	5.48**	50^{a}	$43^{a,b}$	34^{b}	2.06	40^{a}	40^{a}	31^{a}
Once/many	4.46*	$00^{a,b}$	03^{b}	11^{a}	2.65	00^{a}	00^{a}	10^{a}	3.05	01^{a}	00^{a}	11^{a}	1.43	04^{a}	06^{a}	12^{a}
Merge/extend	0.67	09^{a}	07^{a}	19^{a}	1.01	20^{a}	06^{a}	18^{a}	0.29	18^{a}	10^{a}	14^{a}	1.42	27^{a}	09^{a}	14^{a}
Age of memory	5.65**	-33^{a}	49^{b}	$43^{a,b}$	0.54	-37^{a}	42^{a}	41^{a}	2.24	-33^{a}	43^{a}	40^{a}	4.57*	-31^{a}	42^{a}	47^{b}

J = Japan, T = Turkey, U = USA; * = .05 ** = .01 *** = .001; for *merge/extend* the *df* in the denominator are 116, 115, 116, and 102. Means with different superscripts are different at $p < .05$ by a Tukey's test.

DISCUSSION

There are three key findings. First, there is a marked similarity across cultures in the relative values of the means and correlations of the 15 scales and in the multiple regressions. These include: *real/imagine* was predicted better at the within- than between-subjects level of analysis, *remember/know* ratings were predicted in multiple regression equations in ways that were more similar to measures of *real/imagine* than recollection, and *setting* was a better predictor of *real/imagine* whereas *see* was a better predictor of recollection. These results also occur in other samples from the USA. Second, within that pattern of similarity, as expected, the Japanese sample expresses less uncertainty in the accuracy of their memories. Their high rating of *real/imagine* is in contrast to their generally lower ratings on other measures. The order of *real/imagine* across the three cultures follows the order of *Uncertainty Avoidance* as expected: Japan, Turkey, USA. Given the many differences among these cultures, we cannot infer that *Uncertainty Avoidance* caused the differences in *real/imagine,* but the order of *real/imagine* is consistent with a prediction based on *Uncertainty Avoidance.* Third, the Turkish sample has higher correlations of measures of auditory imagery and language with measures of recollection and belief, and higher mean rating of auditory imagery relative to visual imagery. This is consistent with the emphasis shown in Turkish grammar on whether one learned about an event through language or direct observation. Thus it appears that the same basic processes and relations are operating in all three cultures, but that there are small but measurable and understandable differences in means and in the basic relations among the variables as measured by correlations.

The clearest of these correlational differences among the cultures is the greater emphasis on sound and language in the Turkish sample vis-à-vis the other two cultures. In the introduction we suggested that members of individualist cultures could be expected to rate the visual intensity of their memories higher than members of collectivist cultures, because the former might rely more on visual evidence while members of a collectivist culture would rate auditory imagery and narrative character of their memories due to the salience of social links. Thus participants from Turkey, which is the most collectivist culture of the three (Hofstede, 2001), show higher rankings on language and narrative variables. However, one might have expected the USA to be the outlier, with Turkey and Japan being closer together. One possible explanation for this may be found in work on narrative development by Minami and McCabe (1995). This work shows that the narratives of Japanese children are composed of brief and plain episodes of past events, and that Japanese mothers interact with their children in ways that encourage their production of these shorter narratives. This structure is not solely a discourse structure; instead it reveals a cultural norm for a socially situated activity (Labov, 1972). This Japanese enculturation into a more terse narrative style may counteract the more elaborate social and linguistic effects found in the Turkish sample (Kuntay & Ahtam, 2004). At an early age, the narratives children in these cultures showed differences such as use of evaluative remarks. Turkish children often tended to use evaluative remarks that did not emerge in the narratives of the Japanese children (Kuntay & Nakamura, 2004). Thus it may be that elaborated conversation plays a greater role in Turkey and thus in autobiographical memories collected from Turkey.

More speculatively, research indicating cultural differences in personality traits coincides with the differences in emphasis on sound and language. Research comparing cultures on the cultural averages of the five personality factors measured by the Revised NEO Personality Inventory shows about one standard deviation of difference between Extraversion mean for Japanese people in comparison to Turks and Americans (McCrae, 2002). The higher ratings of auditory information by the Turkish and American samples may be related to the elevated auditory component in the interactions of people who are highly extraverted. Furthermore, cultural and personality differences in the contents of memories and the need for coherence with self-images may impact on the type of imagery associated with the memory of the event (Conway, 2005).

The basic-systems model of autobiographical memory maps the phenomenology of remembering (e.g., ''see it in my mind'', ''feel now what I felt then'', ''reliving the event'', etc.) onto the neuropsychology of remembering (e.g., ''visual cortex'', ''auditory cortex'', ''frontal lobes'', etc.) in a way that acknowledges that the biological architecture of memory and the fundamental

sensory accompaniments are pancultural universals. Nevertheless, our research suggests that different components in the system may be activated differentially in stable patterns that differ cross-culturally. Specifically, the question we addressed in our analysis was: How do ratings of sensory and other features and judgements of metacognitive processes interact in predicting Japanese, Turkish, and American undergraduate judgements about two other key properties of memory—the sense of reliving one's memories and one's belief in the veracity of one's memories? Results indicate that the Turkish pattern differs from the Japanese and American patterns in that language and narrative variables are more implicated in the Turkish students' sense of reliving and believing their memories than they are in Japanese and Americans' sense of reliving and belief in their memories. Thus, while the underlying mechanics of memory may be cross-culturally identical, the processing taking place seems to differ. It is not simply a difference in how Turkish individuals *assess* their memories; the *reliving*, *back in time*, *remember/know*, and *real/imagine* judgements are post-hoc assessments of a memory already retrieved. It is also a difference in how these individuals *experience* their memories. That is, the sense of reliving and experience of being ''back in time'' are constitutive of on-line vivacity. While such experiential reliving of memories is common across the three cultures (and arguably universal), its mental provenance is not. For Turkish students it is grounded more on language and narrative processes than for Japanese and American students. Why this should be so is certainly interesting, but *that* it is so suggests we need to continue refining our understanding of how cognition and the sociocultural environment interact in cognitive processing. Put simply, it is not that people from different cultural backgrounds think different thoughts—rather they think differently. Our research suggests one way of understanding how this might work at a processing level.

Manuscript received 21 January 2005
Manuscript accepted 12 March 2007
First published online 11 June 2007

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