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Emotional Complexity: Clarifying Definitions and Cultural Correlates

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Abstract

There is much debate about the notion of emotional complexity (EC). The debate concerns both the definition and the meaning of ostensible cultural differences in the construct. Some scholars have defined EC as the experience of positive and negative emotions together rather than as opposites, a phenomenon that seems more common in East Asia than North America. Others have defined EC as the experience of emotions in a differentiated manner, a definition that has yet to be explored cross-culturally. The present research explores the role of dialectical beliefs and interdependence in explaining cultural differences in EC according to both definitions. In Study 1, we examined the prevalence of mixed (positive-negative) emotions in English-language online texts from 10 countries varying in interdependence and dialecticism. In Studies 2-3, we examined reports of emotional experiences in six countries, comparing intra-individual associations between pleasant and unpleasant states, prevalence of mixed emotions, and emotional differentiation across and within-situations. Overall, interdependence accounted for more cross-cultural and individual variance in EC measures than did dialecticism. Moreover, emotional differentiation was associated with the experience of positive and negative emotions together rather than as opposites, but only when tested on the same level of analysis (i.e., within vs. across-situations).

Keywords: culture, emotional dialecticism, emotional complexity, emotional differentiation, independence-interdependence.

Emotional Complexity: Clarifying Definitions and Cultural Correlates

Emotions are rarely simple. When people talk about their emotional experiences, they usually report not just one but multiple emotions (Izard, 1977). Consider, for example, life events such as a graduation or a wedding. When looking back at one's high school graduation, person A may report feeling happy, whereas person B may feel happy and sad. A number of scholars suggest that the emotional experience of person B is more complex (Labouvie-Vief, 2003; Larsen, McGraw, & Cacioppo, 2001; Lindquist & Barrett, 2010; Spencer-Rodgers, Peng, & Wang, 2010). Moreover, some scholars have proposed that cultures vary in emotional complexity, with greater complexity in East-Asians than North Americans (e.g., Bagozzi, Wong, & Yi, 1999; Kitayama, Markus, & Kurokawa, 2000; Perunovic, Heller, & Rafaeli, 2007; Schimmack, Oishi, & Diener, 2002; Shiota, Campos, Gonzaga, Keltner, & Peng, 2009).

What do affective scientists mean by “emotional complexity”? A quick perusal of the most recent *Handbook of Emotion* suggests that the term has been used inconsistently, and that only some types of complexity have actually been tested across cultures (Lindquist & Barrett, 2010). To fill this void, the present paper systematically explores cultural variability in emotional complexity (EC), using several distinct operational definitions of the construct. The primary focus of our research concerns the relationship between EC and two cultural factors previously proposed as contributing to it: dialectical beliefs and interdependent social orientation. Concurrently, we also test the interrelations between different ways of measuring EC, as a way to study its nomological network (cf. Cronbach & Meehl, 1955).

Conceptual and Operational Definitions of Emotional Complexity

Two conceptual definitions of emotional complexity are common in research on people's reports of their emotions (Lindquist & Barrett, 2010): 1) *emotional dialecticism*, which refers to

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the experience of positive and negative states together, although in practice it usually refers to a weaker opposition between positive and negative states (Bagozzi et al., 1999; Larsen et al., 2001; Spencer-Rodgers, Peng, et al., 2010); and 2) *emotional differentiation*, which refers to the experience of emotions in a highly differentiated and granular manner, with a greater variety of negative and positive discrete emotions reported (Barrett, Gross, Christensen, & Benvenuto, 2001; Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Kashdan, Barrett, & McKnight, 2015).

Some researchers have operationally defined emotional dialecticism in terms of the magnitude of the negative correlation between reported pleasant and unpleasant states (e.g., Bagozzi et al., 1999; Carstensen et al., 2000; Miyamoto & Ryff, 2011; Schimmack et al., 2002). Others have examined the frequency of the co-occurrence of positive and negative emotions in a given situation (cf. mixed emotions; Larsen, McGraw, Mellers, & Cacioppo, 2004; Miyamoto, Uchida, & Ellsworth, 2010; Spencer-Rodgers, Peng, et al., 2010).¹ Emotional differentiation has also been measured in more than one way. Some researchers have measured it by exploring the intra-individual correlations among different emotional states (e.g., anger, sadness, and nervousness) across several points of assessment – typically across situations and/or across time (Lindquist & Barrett, 2010; Tugade, Fredrickson, & Feldman Barrett, 2004), and others have focused on the number of different emotions a person reports experiencing on a given occasion, as well as the extent to which these emotions are experienced in an even fashion (see Quoidbach et al., 2014). Thus, operational definitions sometimes describe emotional responses across situations and sometimes in a single situation.

Although these definitions and operationalizations have all been called “emotional complexity,” there is no a priori reason to expect them to measure the same psychological tendency. On the conceptual level, a person who reports both positive and negative emotions

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may not necessarily be a person whose descriptions of her experiences are highly nuanced and differentiated. Her emotional vocabulary could be limited to the terms “good” and “bad.” On the operational level, the intra-individual association between positive and negative emotions across situations may not be related to the co-occurrence of positive and negative emotions in the same situation (Miyamoto et al., 2010; Russell & Carroll, 1999; Schimmack, 2001). Each operationalization may capture some distinct facets of the construct, but none can be taken as “definitive” of emotional complexity. To provide a framework for comparing results across different definitions and operationalizations of emotional complexity, in Table 1 we classify separate definitions (dialecticism vs. differentiation) in rows, and different measurement levels (across time or situations vs. within a single situation) in columns.

Emotional Complexity across Cultures

Do some or all of these forms of emotional complexity vary across cultures? Based on observations that East Asians report experiencing positive and negative emotions in a less oppositional way than Americans (e.g., Bagozzi et al., 1999), some cross-cultural researchers have suggested that this may be the case and have pointed to two interrelated cultural dimensions along which East Asians differ from Americans: a) the prevalence of dialectical belief systems (Schimmack et al, 2002; Spencer-Rogers et al., 2010); and b) a social orientation towards interdependence (Bagozzi et al., 1999).

Dialectical belief systems. Although dialectical beliefs can mean many things (see Grossmann, 2015b, for a review), psychologists typically refer to them as the teaching of the complementarity of opposites (the ying-yang principle) and the view that life is full of contradictions and change (Nisbett, Peng, Choi, & Norenzayan, 2001; Peng & Nisbett, 1999). Historically, such teachings have been associated with Buddhism, Confucianism, Hinduism,

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Jainism or Taoism, which are more prevalent in East Asian than Western countries. Empirical studies from the last 20 years suggest that East Asians think in a more dialectic fashion than Westerners. For instance, they prefer proverbs involving contradictions (e.g., “Too humble is half proud”; Peng & Nisbett, 1999) more than Americans, and they also tend to make non-linear forecasts about social events (e.g., predicting an upward trend followed by a downward trend and vice versa; Ji, Su, & Nisbett, 2001). Drawing on both historical analyses and on empirical observations (Peng & Nisbett, 1999), scholars have suggested that the reason that East Asians are less likely to represent positive and negative emotions as opposites than Westerners, is the greater prevalence of dialectical beliefs among East Asians (Goetz, Spencer-Rodgers, & Peng, 2008; Schimmack et al., 2002; Spencer-Rodgers, Peng, et al., 2010). It is apparent that this explanation mainly concerns the “emotional dialecticism” form of EC and there is little theory about the relation of dialectical beliefs to emotional differentiation. It is plausible, however, that dialectical epistemological beliefs might encourage consideration of multiple perspectives on an experience, thus promoting greater emotional differentiation as well.

Independent vs. Interdependent social orientation. Having multiple perspectives on an experience may also be intimately linked with an interdependent orientation -- i.e., the degree to which people attend to relational concerns and social expectations rather than to their own personal desires, attitudes, and goals (Kitayama et al., 2000; Scollon, Diener, Oishi, & Biswas-Diener, 2005). The cultural dimension of independence-interdependence (Markus & Kitayama, 1991) has been referred to as ego- vs. socio-centrism (Shweder & Sullivan, 1993), individualism-collectivism (Hofstede, 1980; Triandis, 1989), and Gesellschaft vs. Gemeinschaft (Greenfield, 2009; Tönnies, 1887). Despite subtle distinctions between these constructs, on the cultural level of analysis we view them as generally overlapping (Grossmann & Na, 2014; Kitayama, Park,

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Sevincer, Karasawa, & Uskul, 2009; Na et al., 2010; Varnum, Grossmann, Kitayama, & Nisbett, 2010). We use the term independence-interdependence, because it includes both behavioral tendencies and subjective experiences, rather than focusing on (individualist-collectivist) beliefs and values alone.

Western societies typically embrace *independence* -- i.e., attending to one's private qualities and inner attributes that make one appear unique (Markus & Kitayama, 1991), and seeing one's emotions as reflecting the inner self, originating from within (Uchida, Townsend, Markus, & Bergsieker, 2009). Conversely, East Asian societies embrace *interdependence* -- i.e., attending to the wishes and concerns of others, focusing on the social context and the emotions of other people in their group (Mesquita, 2001), and seeing one's emotions as originating through interactions with other people in one's environment (Greenfield, 2013; Kashima, Siegal, Tanaka, & Kashima, 1992; Uchida et al., 2009). Interdependence may promote greater emotional complexity (Bagozzi et al., 1999), because it enables recognition that the same situation could evoke different emotional responses in different people (Masuda, Ellsworth, Mesquita, Leu, & van de Veerdonk, 2008; Ortony, Clore, & Collins, 1988). Note that this explanation can be applied to both types of emotional complexity. A person who is sensitive to the emotions of group members may be more likely to notice subtle differences in their feelings (emotional differentiation), including differences in valence (emotional dialecticism).

Prior Cross-cultural Work

Variability in emotional complexity. To our knowledge, no prior work has explored the magnitude of cultural differences in the emotional differentiation operationalizations of emotional complexity. Furthermore, very few cross-cultural studies have examined emotional dialecticism (i.e., the frequency of co-occurrence of positive and negative affect) in response to a

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particular situation, see Table 1. Miyamoto and her colleagues (2010) found that Japanese report greater co-occurrence of positive and negative affect than European Americans in pleasant situations. However, they did not observe cultural differences in the co-occurrence of positive and negative affect in unpleasant or neutral situations.

Instead, most of the prior cross-cultural work has focused on correlations between reports of positive and negative emotions across time, typically comparing Asian to Western samples (Bagozzi et al., 1999; Kitayama et al., 2000; Spencer-Rodgers, Williams, & Peng, 2010). For instance, Scollon and colleagues (Scollon et al., 2005) examined between- and within-person variability in positive and negative affect in Asian (Indian, Asian American, Japanese) and Western (European Americans and Hispanics) samples. On the within-person level, the magnitude of the negative correlation was weaker for Asians than for Westerners, and on the between-person level, Asians showed positive correlations, whereas Westerners showed zero correlation.

We know of only three published studies that have gone beyond the typical East vs. West dichotomy in looking at correlations of positive and negative affect to study cultural variability in EC, and their results are inconsistent. Schimmack and colleagues (2002) examined between-person correlations in reports of positive and negative affect over the past month in college students from 38 countries, observing variability in the magnitude of the correlation across countries. Using a similar paradigm, Kööts-Ausmees, Realo, and Allik (2012) tested the association between experiences of positive and negative affect over the past week in the European Social Survey, and also observed some cross-country variability. Finally, Yik (2007) examined between-person correlations in affective descriptions from the prior day among eight samples of college students from English-, Chinese-, Spanish-, Japanese-, and Korean-speaking

countries. In contrast to Schimmack et al. (2002) and Kööts-Ausmees et al. (2012), Yik observed few cultural differences, with similarly negative correlations in each sample. It is possible that these studies measured different forms of emotional complexity. Though all studies relied on single-shot judgments and between-person correlations, Schimmack et al. (2002) and Kööts-Ausmees et al. (2012) assessed ratings across days or weeks, whereas Yik (2007) assessed ratings for specific situations. People are more likely to rely on general cultural norms when describing their emotional experiences over a week or month in general than when they are asked about specific experiences from a prior day, leading to less pronounced cultural differences for the latter type of measurement (Robinson & Clore, 2002).²

Role of dialecticism and interdependence for cultural differences in EC. There is little work comparing the role of dialecticism and social orientation in relation to EC. Schimmack et al. (2002) concluded that dialectical belief systems rather than independence-interdependence are responsible for cultural differences in EC. To reach this conclusion, the researchers categorized countries as dialectical vs. non-dialectical, based on their personal intuitions about the prevalence of dialectical beliefs in each country, and into individualist (independent) vs. collectivist (interdependent), based on external indices reported in a paper by Suh and colleagues (1998). In turn, Suh et al.'s indices were averages of rank scores that Triandis personally assigned to countries with scores from Hofstede's initial study of individualism-collectivism (Hofstede, 1980). Both categorizations explained a small amount of the variance in the impact of culture on cross-valence correlations, with more variance explained by dialecticism. The operationalization of dialectical beliefs and interdependence in this study is problematic, because neither variable was based on actual prevalence of dialectical beliefs or

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interdependence. Thus, the observation of greater variance explained by dialecticism (vs. interdependence) may merely reflect researchers' personal beliefs rather than empirical reality.

Overall, research has not yet adequately dealt with the question of cultural variability in emotional complexity. Largely equating emotional complexity with correlations of positive and negative affect, no prior work has systematically compared cultural differences across different EC methods. In addition, very little work has ventured beyond East-vs.-West comparisons to evaluate cultural factors contributing to EC, and what research there is has yielded inconsistent results. Expanding beyond the East-vs.-West dichotomy is necessary because in East-West comparisons, dialecticism and interdependence are completely confounded, and because there are a host of other factors in which East Asians differ from Westerners (e.g., economy, language structure, social ecology; Cohen, 2007; Leung & van de Vijver, 2008).

Present Research

The first aim of the present work was to explore whether country- and individual-level distributions in EC are associated with cultural- and individual-level tendencies to emphasize either dialectical beliefs or interdependent - vs. - independent social orientation, or both. The second aim was to examine the nomological network of emotional complexity, i.e., to explore whether different operationalizations of emotional complexity are systematically related to each other.

In Study 1, we provide the first multi-national evidence of variability in the co-occurrence of positive and negative affect. We eliminated the confounding factor of language (Freeman & Habermann, 1996; Heath, 1982; Nisbett et al., 2001; Wierzbicka, 1999) by performing a computerized content analysis of spontaneous expression of mixed emotions in 1.3 million internet blogs and websites from 10 countries which differ in dominant belief systems

and independence-interdependence, but which all have English as one of their dominant languages. In Study 2 we focused on individual reports of EC among college students in six countries that vary in dominant belief systems and independence-interdependence, simultaneously examining 4 different operational definitions of EC. In Study 3, we focused on age-heterogeneous community samples from the U.S. and Japan, directly testing whether individual-level variance in dialectical thinking or independence-interdependence better accounts for cultural differences in EC. Moreover, in Studies 2-3 we provided the first systematic analysis of the relationship between various methods of assessing EC.

Study 1: Emotional Complexity in Online Text from 10 Countries

Based on the assumption that cultural variations in individual experiences are reflected in external media (Chiu & Hong, 2006; Greenfield, 2013; Grossmann & Varnum, 2015; Morling, Kitayama, & Miyamoto, 2002; Morling & Lamoreaux, 2008; Oishi & Graham, 2010), we examined over a million blog- and web-pages from 10 countries. In this initial study, we assessed the prevalence of mixed emotion statements as indicators of situation-specific emotional dialecticism, and tested the relationships between the cultural prevalence of dialectical beliefs and interdependence and this kind of emotional complexity.

Method

Corpus selection. We examined emotional expressions in over 1.4 billion word combinations from the standardized Corpus of Global Web-based English (Davies, 2013), which is the largest database of English language in the world. A list of 1.3 million web pages was randomly sampled in December 2012, separately for each country based on the Google “Advanced Search.” The process was repeated separately for blogs and general searches, resulting in more than half of the corpus consisting exclusively of blogs³. Texts were stripped of

web formatting and duplicate texts were removed. For the purpose of our study, we focused on ten countries with a high proportion of native English speakers and wide internet access (see Figure 1, as well as Table S1 in on-line supplement). As documented in prior work, some of these countries endorse independence (e.g., Australia), whereas others endorse interdependence (e.g., Singapore; see Figure 1).

Computerized content analysis of mixed emotions. We quantified co-occurrences with the help of computer-guided context-based searchers of *collocates* (words near a given word). Specifically, we counted all instances in which positive emotions appear within 2 words of negative emotions in the same sentence. Positive emotions were defined as ‘happy’ and its major synonyms (glad, joyful, cheerful, content, ecstatic, cheery, pleased, lucky, jovial), whereas negative emotions were defined as ‘unhappy’ and its major synonyms (sad, down, angry, miserable, upset, disappointed, depressed, annoyed, unfortunate, despondent, hopeless, gloomy, fateful, discontented, dejected). We accounted for lemmatization by including all forms of the word. To control for negations, we also performed analyses with ‘not [negation] happy’ and ‘unhappy’ (including all synonyms), as well as ‘not [negation] unhappy’ and ‘happy’ (including all synonyms), excluding these frequencies from subsequent analyses.

Focusing on the collocates within 2 words represents a more accurate and conservative test than examination of words 3, 4, or 5 words apart, because the latter approaches may conflate cultural differences in co-occurrence of emotions with cultural differences in preference for complex sentence structure. Inclusion of emotion words several words apart may also misrepresent a narrative about temporally distinct emotional experiences (e.g., “It was a sad day yesterday. I am pleased with today”) as a single statement, in which positive and negative emotions co-occur. Conventional norms of English language use suggest that an emotional expression within 2

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words (e.g., “I am happy and sad”) reflects the emotional tone of the same experience or an immediate juxtaposition of contrasting emotional experiences.

Further, we explored the possibility that differences in mixed emotions would be due to cultural differences in the general use of multiple emotion words within the same utterance. To this end, we performed a parallel set of analyses, separately counting the frequency of negative emotion collocates within 2 words, as well as the frequency of positive emotion collocates within 2 words. To control for differences in corpus size between countries, we divided each set of frequency counts by the number of words in the respective text corpora.

Country-level prevalence of dialectical belief systems and individualism-collectivism. Finally, we sought to examine whether cultural variability in mixed emotions is best explained by country-level differences in prevalence of dialectical belief systems or independence-interdependence. To quantify the prevalence of dialectical belief systems, we obtained frequency data of various belief systems from a recent report by the Pew Research Center (Pew Research Center, 2015; Appendix C). In this report, demographers calculated the 2010 population percentages of people who self-identify as Buddhist (including Mahayana Buddhism, Theravada Buddhism, and Vajrayana/Tibetan Buddhism), Hindu (including Vaishnavism and Shaivism), and “Other Religions.” The latter category is defined broadly, because it is not measured separately in censuses and surveys. It largely draws from adherents of Jainism, Shintoism, Taoism, Tenrikyo, and Zoroastrianism (Pew Research Centre, 2015) – all belief systems that promote dialecticism. We operationalized prevalence of dialectical belief systems as the sum of these percentages.⁴

To quantify independence-interdependence, we used the country-level estimates from two of the most extensive multi-country studies of individualist-collectivist attitudes: 1) The

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most recent estimates of individualism-collectivism by Hofstede, based on a series of surveys of employees (Hofstede et al., 2010); 2) Scores of in-group collectivist practices in the GLOBE study of managers by House and colleagues (House, Hanges, Javidan, Dorfman, & Gupta, 2004). These studies use somewhat different methodologies, focus on different population strata and have different strengths and weaknesses. However, when we examined associations across 45 countries in which Hofstede's and House et al.'s surveys overlap, we observed a highly significant degree of convergence across indicators, $r = -.730, p < .001$. Therefore, we first reverse-coded Hofstede's scores, so that higher scores on both indices reflect greater interdependence, and collapsed these scores into a single index. Next, we standardized each set of scores across all countries available in the respective databases and averaged the resulting z-scores, so that higher scores on this index indicate greater interdependence.

Results

As the top part of Figure 1 indicates, we observed substantial variability in mixed emotion sentences across countries, with countries like Malaysia, Singapore, and Philippines showing substantially higher prevalence of mixed emotions than countries like Australia, Canada, the UK, the US, with South Africa in-between. Further, as the middle and bottom parts of Figure 1 show, this variability was somewhat more aligned with country-level variability in collectivism, $r = .872, p < .001$ than with country-level variability in the prevalence of dialectical beliefs, $r = .761, p = .011$. Because dialecticism and interdependence scores were also positively correlated, $r = .461, p = .097$, we entered both dialecticism and interdependence as predictors in a linear regression model. We observed a significant effect of interdependence, $B = .466, SE = .122, t = 3.822, p = .007, \eta_p^2 = .676$, and a marginally significant effect of dialecticism, $B = .020, SE = .009, t = 2.297, p = .055, \eta_p^2 = .430$. It is evident from Figure 1 that

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expressions of mixed emotions were more than twice as common in the interdependent countries (e.g., Malaysia or Philippines) than in the independent countries (e.g., Australia or Canada).

The expression of two positive emotions in the same sentence ($M = 2.363$, $SD = .755$) was more frequent than the expression of two negative emotions in the same sentence ($M = .168$, $SD = .053$), $t(df = 9) = 9.155$, $p < .0001$, a finding which is consistent with earlier work suggesting that people in most countries typically report happiness more than unhappiness (Diener & Diener, 1996). Country-level differences in interdependence were not significantly related to variability in expression of negative emotions, $r = -.013$, *ns.*, but they were positively related to variability in the expression of positive emotions, $r = .814$, $p = .004$, with the highest proportion of positive emotions in Philippines, Malaysia and Singapore (see Figure 1). We also conducted a linear regression analysis with interdependence as a predictor, frequency of mixed emotion as a dependent variable, and frequencies of co-occurrence of positive-positive and negative-negative emotions as covariates. Results indicated that controlling for expressivity, interdependence remained a marginally significant correlate of mixed emotions, $B = .360$, $SE = .164$, $t = 2.194$, $p = .071$, $\eta_p^2 = .445$.

Discussion of Study 1

Study 1 explored how cultures differ in the co-occurrence of positive and negative emotions, examining the co-occurrence of emotion-related words in the largest available corpus database of online English. The results of Study 1 provide multi-country evidence of cultural variability in the co-occurrence of positive and negative emotions, which has been described as one of the key elements of emotional complexity (Larsen et al., 2001; Lindquist & Barrett, 2010; see Table 1). Analyses of the corpus data revealed that both dialectical beliefs and independence-

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interdependence are important cultural factors that are related to emotional complexity, as operationalized by prevalence of mixed emotions in blogs and other web entries. Notably, the cultural dimension of interdependent social orientation showed a stronger positive association with the country-level tendency to report mixed emotions than did the prevalence of dialectical belief systems. The observed pattern of cross-cultural differences in mixed emotions in written text cannot be explained by differences in linguistic structure, as we included only English language texts. These results persist when controlling for emotional expressivity.

Study 2: Emotional Complexity in Reports of Subjective Experiences from Six Countries

Study 1 was based on blogs and web sites, providing ecological validity to claims of cultural variability in emotionally complex expressions. Yet, it is possible that observed cultural differences also reflect idiosyncratic blog-writing styles or features of the environment, which may not match subjective experiences of emotion in these countries. The first goal of Study 2 was to replicate and extend Study 1 findings to a different form of emotional expression.

The second goal of Study 2 was to compare cultural differences across different definitions of emotional complexity. To this end, we examined cultural variability in four major operationalizations of EC (see Table 1). This allowed us to provide the first empirical test of the individual-level relationships between these markers as a way to provide support to a nomological network of a general emotional complexity construct.

Based on the results of Study 1, our first hypothesis was that country-level differences in the prevalence of dialectical belief systems and interdependence would be related to emotional complexity, with a greater association between emotional complexity and interdependence. Our second hypothesis was that emotional dialecticism and emotional differentiation markers of EC would be positively related to each other. Following from the second hypothesis, our third

hypothesis was that cultural differences in emotional differentiation would be comparable to cultural differences in emotional dialecticism.

Method

Sample. A total of 1,396 college students from six countries (India, Japan, Germany, Russia, the UK, and the US) answered questions about their daily experiences. These student samples were recruited by several research teams in 2006-2007 (see Table 2 for sample characteristics). Participants in India, Japan, Germany, and the UK completed the study for partial fulfillment of a course requirement. Participants in Russia and in the US completed the study for 350 rubles (approximately \$11 at the time of the study completion) or for \$12, respectively.

Materials and procedure. All materials were presented to participants in a paper and pencil format in the dominant language of each country, establishing translation equivalence via a back-translation procedure (Brislin, 1970). Participants completed the study in the laboratory on their own, guided by written instructions.

Participants were presented with 10 situations and asked to remember their most recent experience of each one (for further details, see Kitayama et al., 2009). These situations involved social experiences concerning friends and family members (“something good happened to a family member of yours,” “had positive interaction with friends,” “had good interaction with family member,” “had a problem with a family member”), and non-social experiences (“watched TV or listened to music,” “read a novel or book,” “got ill or injured,” “were overloaded with work,” “thought about your appearance,” “were caught in a traffic jam”). Participants were asked to report the extent to which they experienced various emotions in each situation, four positive

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emotions (proud, elated, calm, happy) and five negative emotions (ashamed, frustrated, guilty, angry, unhappy) on six-point scales that ranged from 1 (not at all) to 6 (very strongly).⁵

Indices of emotional complexity. Our goal was to examine how people differ across the emotional dialecticism and differentiation forms of EC and their intra-individual and situation-specific operationalizations.

Emotional dialecticism. We focused on ratings of feeling “happy” and “unhappy” across the 10 situations as an index of *intra-individual correlations of pleasant and unpleasant experiences*. Preliminary analyses indicated similar results when examining cross-valence correlations across all emotions (i.e., $r[M_{\text{positive}}, M_{\text{negative}}]$). Focusing on intra-individual correlations in subsequent analyses allowed us to control for cultural differences in response sets (East Asian moderacy bias vs. North American extremity bias; Heine, Lehman, Peng, & Greenholtz, 2002) or differences in preferred level of emotional intensity (East Asians value low intensity emotions while Americans value high intensity emotions; Tsai, Knutson, & Fung, 2006). This approach is comparable to multi-level analyses, in which associations between positive and negative emotions are calculated within individuals.

Calculation of correlations resulted in missing values for participants with zero variance on the same emotion terms across the 10 situations, or for participants with very small variance (e.g., deviation of a single unit from an otherwise singular trend across the 10 episodes) in the relationship between feeling “happy” and “unhappy.” Because the situations participants were asked to recall differed in expected valence (e.g., compare “had good interaction with a family member “to” had a problem with a family member”), one interpretation of zero variance is that these participants were not paying attention to the task, which would justify their exclusion. Very small variance in the relationship between “feeling happy” and “feeling unhappy” across

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the 10 situations may also reflect genuine differences in emotional experience. It is more likely when the difference between ratings of “feeling happy” and “feeling unhappy” is very small, as is the case for individuals with a lower tendency to view positive and negative affect as distinct (i.e., those with a greater tendency to report positive and negative affect as co-occurring). Indeed, preliminary analyses indicated that participants from interdependent cultures were more likely to have missing values (4.6%) for the correlations than participants from the independent cultures (0.9%), $\chi^2 (df = 1, N = 1397) = 12.12, p < .001$. Further, it may also reflect genuine experience of very little or no affect, which can reflect a form of emotional disengagement promoted in some interdependent countries such as Japan (Kan, Karasawa, & Kitayama, 2009). Because very small differences between ratings of being “happy” and “unhappy” and the experience of “nothingness” may be qualitatively different from the indices we focused on in the present project, and because we did not observe significant group differences in missing value patterns for other intra-individual indices (i.e., emotional differentiation), $\chi^2s < 1.76$, we thought it would be conservative not to impute missing values and instead focused on statistical procedures utilizing full information in the data.

To obtain the *mixed emotions* index – i.e., the frequency of co-occurrence of positive and negative emotions, we followed the procedure used by Miyamoto and her colleagues (2010). For each situation, we counted the number of times participants reported experiencing cross-valence combinations (e.g., happy and unhappy, proud and frustrated, angry and elated) above “not at all.” To control for cultural differences in response set bias, we performed a linear regression across all samples, with individual’s mean-level response tendency across all items in the questionnaire as a predictor and mixed emotions as a dependent variable, saving unstandardized residuals for further processing. In each country, these scores were highly reliable across the ten

situations, Cronbach's $\alpha s > .71$. Preliminary analyses further indicated that the pattern of results was essentially identical across nine of the ten situations.⁶ Therefore, averaged scores across the ten situations were used as final indices of mixed emotions.

Emotional differentiation. To calculate the *intra-individual* index, we followed previous work (Lindquist & Barrett, 2010) and computed intra-class correlation coefficients (ICC; Shrout & Fleiss, 1979) of valence-specific ratings over the 10 episodes for each participant. So as not to confound these scores with the correlation of positive and negative affect, in line with earlier work (Demiralp et al., 2012; Suvak et al., 2011; Tugade et al., 2004) we examined differentiation among emotions of the same valence.⁷ A lower ICC suggests that a person distinguishes among different emotions of the same valence (i.e., more differentiation). We subtracted these scores from 1, so that greater values represented higher differentiation.

To calculate the *situation-specific* index, we followed the procedure outlined in earlier work (cf. emodiversity; Quoidbach et al., 2014), with the first author personally consulting with Quoidbach to validate the procedure. We quantified the richness and evenness of the emotional experience in each of the ten given episodes, based on the Shannon's entropy formula:

$$\text{Emodiversity} = \sum_{i=1}^s (p_i \times \ln p_i)$$

In this formula, s reflects the number of emotions, representing the richness (i.e., how many emotions are experienced), whereas p_i reflects the proportion of s made up of the i th emotion, representing the evenness (i.e., the extent to which a specific emotion is experienced in the same proportion; for further details, see Quoidbach et al., 2014). To apply this formula, we rescored the scale items so that 0 reflects "not at all." Note that the scores capture in a single index both the number of emotions an individual experiences (richness) and the relative intensity

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of the different emotions that makes up a person's emotional experience (evenness). For individuals who reported experiencing no emotion (score 0), scores were manually set to 0.

For the sake of consistency with the intra-individual differentiation scores, we calculated situation-specific scores separately for positive and negative emotions.⁸ Moreover, so as not to confound these scores with mean levels of positive and negative emotions and to control for response set bias, we regressed each set of scores on the mean level of positive and negative affect, saving unstandardized residuals for subsequent processing. Given that scores were highly reliable across the 10 situations, Cronbach's $\alpha > .76$, for the sake of parsimony we averaged subsequent scores.

Country-level estimates of dialectical belief systems and independence-interdependence. As in Study 1, we measured of dialectical belief systems by summing the population percentages of Buddhist, Hindu, and "Other Religions" (Jainism, Shintoism, Taoism, Tenrikyo, and Zoroastrianism) from the Pew Research Center (2015). To calculate country-level indices of independence-interdependence, we first combined scores from the Hofstede study (Hofstede, Hofstede, & Minkov, 2010) and the GLOBE study (House et al., 2004), so that higher scores indicate greater interdependence (see Study 1 methods). Next, we supplemented these survey-based estimates, which may be subject to response set bias (Heine et al., 2002), with estimates of behavioral tendencies by obtaining country-level estimates for a self-inflation task assessed in cross-cultural studies by Kitayama and colleagues (2009; in Germany, Japan, UK, US) and by Grossmann and Varnum (Grossmann & Varnum, 2011; in Russia and the US). In this task, participants drew their social network by using circles to represent the self and others. The size (i.e., diameter) of the others-circle relative to the self-circle reflects a more interdependent sociogram (i.e., greater collectivism). The score was the average size of other

circles minus the self-circle divided by the average size of all circles, this way controlling for the overall size of the sociogram. We adopted the country-level mean estimates from published work (Grossmann & Varnum, 2011; Kitayama et al., 2009). Because country-level estimates on this behavioral marker showed a high degree of convergence with the survey-based estimates, $r = .73$ (see Table 2), we averaged the standardized behavioral and survey-based estimates into a single index of independence-interdependence, with higher scores indicating greater interdependence.

Results

Relationship between Indices of Emotional Complexity

The correlations among all the pertinent measures were computed within each country. They are summarized in Table 3 for Americans, British, Germans, Indians, Russians and Japanese. For ease of detecting systematic correlations across samples, the bottom of Table 3 also indicates the cross-sample averages of the respective correlations.

Emotional dialecticism-indices were positively related to each other in all countries, except for Russia, with the magnitude of association in the small-medium range. The intra-individual emotional dialecticism index was positively linked to the inter-individual index of greater emotional differentiation (positive emotions: in India, Germany, UK, US; negative emotions: in all countries but Japan). In contrast, the relationship between the intra-individual emotional dialecticism index and the situation-specific index of emotional differentiation was less systematic. The situation-specific emotional dialecticism index (mixed emotions) was positively related to situation-specific differentiation of both positive and negative emotions, with the magnitude of association in the medium-high range. Further, in all countries but Japan we observed a medium-small positive relationship between the prevalence of mixed emotions and the intra-individual tendency to differentiate positive emotions. The relationship of mixed

emotions to intra-individual differentiation of negative emotions was less systematic, with a medium-small positive association only in India, Britain, and the US.

Finally, when examining the relationship between intra-individual and situation-specific indices of emotional differentiation, we observed a remarkable absence of systematic patterns of correlations. For instance, whereas indices of positive emotions were modestly positively related in India, Germany, and Russia, there was no relationship between these indices in the UK and Japan, and they were negatively related in the US. On average, intra-individual and situation-specific indices of emotional differentiation were largely unrelated to each other (also see the bottom of Table 3). However, within a single measurement domain indices showed systematic relationships. That is, in all countries except the UK a greater intra-individual tendency to view positive emotions in a differentiated fashion was positively associated with a tendency to view negative emotions in a differentiated fashion. Similarly, in all countries a situation-specific tendency to report positive emotions in a diverse fashion was positively related to a similar tendency for negative emotions. These observations suggest that the lack of cross-level correlations is not due to reliability issues. Rather, in most countries emotional dialecticism indices were positively associated with emotional differentiation indices, yet mainly when examined on the same level of analysis.

Cultural Differences in Four Indices of Emotional Complexity

As Figure 2 indicates, we observed substantial cross-cultural differences in each of the four operationalizations of emotional complexity, $8.23 < F_s \leq 42.11$, $ps < .001$, $.029 < \eta_p^2s = .136$. Americans and British reported the greatest intra-individual tendency to report positive and negative emotions as opposites; Japanese showed the lowest tendency, with Indians, Russians, and Germans in-between. Similarly, Japanese, Indians, Russians, and Germans showed more

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intra-individual positive differentiation than Americans and British. For intra-individual negative differentiation, Japanese, Indians and Russians scored substantially higher than Americans, British, and Germans. Consistent with previous work on US samples (e.g., Barrett et al., 2001; Demiralp et al., 2012; C. Smith & Ellsworth, 1985), in all countries but Germany individuals reported greater intra-individual differentiation of negative than positive emotions, $F_{\text{Japan}}(1,621) = 194.554, p < .001, \eta_p^2 = .239$, $F_{\text{India}}(1,266) = 55.797, p < .001, \eta_p^2 = .173$, $F_{\text{Russia}}(1,69) = 16.413, p < .001, \eta_p^2 = .192$, $F_{\text{Germany}}(1,121) = .012, ns.$, $F_{\text{UK}}(1,124) = 47.953, p < .001, \eta_p^2 = .279$, $F_{\text{US}}(1,185) = 30.556, p < .001, \eta_p^2 = .142$. Finally, for situation-specific differentiation of positive and negative emotions, Japanese scored the highest, Americans and British scored the lowest, and Indians, Russians and Germans were in between. Notably, this pattern of cross-cultural variability was very similar to the cross-cultural pattern of mixed emotions.⁹

Do Dialectical Belief Systems and Interdependence Account for Cultural Variation in Emotional Complexity?

We performed a series of multi-level regressions, simultaneously entering country-level estimates of interdependence and prevalence of dialectical beliefs as predictors of each of the four markers of emotional complexity, with dependence scores nested within participants. As Table 4 indicates, greater interdependence was significantly positively associated with each index. In contrast, prevalence of dialectical belief systems was either uncorrelated or negatively associated with these indices. To follow-up on these results, we compared the scores of participants from the interdependent regions (India, Japan, Russia) and the independent regions (Germany, UK, US) for each operationalization of emotional complexity. Results indicated significantly higher scores in the interdependent than in the independent regions (see Table 5).

Discussion of Study 2

Extending Study 1 findings to subjective experiences, Study 2 revealed substantial and systematic differences across four operationalizations of EC. These operationalizations aimed to capture two distinct definitions of emotional complexity, emotional dialecticism and emotional differentiation, on both the intra-individual and situation-specific levels of analysis. On each of the four indicators, respondents from independent countries such as the US and UK reported the lowest level of emotional complexity, respondents from Japan showed the highest level of EC, and respondents from Germany, India, and Russia were in-between.

We found little support for the claim that cultural differences in emotional complexity are due to the prevalence of dialectical belief systems, with country-level differences in prevalence of dialectical beliefs only weakly if at all related to any of the EC indices. In contrast, country-level differences in interdependence accounted for substantial variance in each marker of emotional complexity across countries. People from interdependent countries (Japan, India, Russia) show weaker negative intra-individual correlations between ratings of positive and negative affect than people from the independent countries, a greater tendency to report experiencing positive and negative emotions at the same time, and a greater tendency to differentiate positive and negative emotions on the both within and across situations..

Another noteworthy set of findings concerns the relationship between measures of emotional dialecticism and emotional differentiation definitions of emotional complexity. In the introduction we pointed out that a central way to test the validity of claims about the relationship of emotional dialecticism and emotional differentiation to emotional complexity is to examine the nomological net, i.e., the relationship of different operationalizations to each other. Results from Study 2 indicate that individual differences in both operationalizations of emotional

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dialecticism – the intra-individual tendency to view positive and negative emotions as relatively compatible (assessed via intra-individual correlations between ratings of positive and negative emotions) and the tendency to report positive and negative emotions in the same situation (assessed via prevalence of mixed emotions) - were positively related to each other. Moreover, in most countries these indices were positively linked to indices of emotional differentiation. The intra-individual emotional dialecticism index was positively related to greater intra-individual emotional differentiation, whereas the situation-specific emotional dialecticism index (mixed emotions) was positively related to both intra-individual and situation-specific indices of emotional differentiation, with a stronger association with the situation-specific indices.

Unlike emotional dialecticism, the intra-individual and situation-specific indices of emotional differentiation were largely unrelated to each other, suggesting that the tendency to experience a greater variety of emotions across time is not associated with a tendency to experience several different emotions at the same time. There are reasons to expect these operationalizations to yield independent results. Like the intra-individual correlational method of emotional dialecticism, intra-individual emotional differentiation concerns a general tendency to view one's emotions in a differentiated fashion across situations. In contrast, like the mixed emotion measure of emotional dialecticism, situation-specific emotional differentiation concerns the complexity of response to a particular experience. We will return to the latter observation in the general discussion.

Study 3: Emotional Complexity among Representative Samples of Americans and Japanese

Despite the systematic cultural-level differences in emotional complexity in , we cannot conclude from Study 2 whether a person is interdependent or who holds dialectical beliefs is likely to experience more complex emotions,, because insights from the cultural level of analysis

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do not necessarily correspond to findings observed on the individual level (e.g., Grossmann & Na, 2014; Na et al., 2010; Smaldino, 2014). In Studies 1 and 2 we did not measure individuals' dialectical beliefs or their interdependent orientations. The first aim of Study 3 was to replicate the findings of Study 2, adding 10 individual-level measures of dialectical thinking and independence-interdependence, so as to examine which of these constructs accounts for group differences across the four operationalizations of emotional complexity.

Our second aim for Study 3 was to extend our explorations to include a more diverse populations of respondents. Although the vast majority of cross-cultural research, like our own Study 2, uses college student samples, there is substantial evidence that people change emotionally as they age (for reviews, see Charles & Carstensen, 2010; Isaacowitz & Blanchard-Fields, 2012). In particular, some research suggests that 60-75 year olds report more complex emotions than 25 year olds (Carstensen et al., 2000; Ong & Bergeman, 2004; Schneider & Stone, 2015). So far this work has been confined to the US, raising the question whether cultural differences in emotional complexity hold across different age group.

Method

Sample. We analyzed unpublished data from a large-scale cross-cultural project involving US Americans and Japanese (see Grossmann et al., 2010, 2012; Grossmann, Na, Varnum, Kitayama, & Nisbett, 2013, for other publications from this project). Participants were recruited via an age-stratified random sampling procedure, targeting community-dwelling adults with comparable proportions of participants from both genders (% female: Japan = 49.4 vs. U.S. = 51.3), each of three age groups (Japan: $M_{age} = 49.4$, $SD = 13.87$; U.S.: $M_{age} = 47.33$, $SD = 14.67$; % 25–40 years: Japan = 40.9 vs. U.S. = 39.8; % 41–59 years: Japan = 35.5 vs. U.S. = 32.3; % 60–79 years: Japan = 24.6 vs. U.S. = 27.9), and higher (% college-educated: Japan =

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50.4 vs. U.S. = 58.2) and lower levels of education (% high school or less: Japan = 24.2 vs. U.S. = 11.5; % some college: Japan = 25.4 vs. U.S. = 30.3). American participants were recruited by randomly selecting names from a telephone directory of Washtenaw County (population ~340,000), situated in the southeastern corner of the State of Michigan. The two major cities in the county, Ann Arbor and Ypsilanti, have quite divergent demographic characteristics. Whereas Ann Arbor is predominantly middle or upper middle class, Ypsilanti is in large part working class. This research was conducted in the period 2006 –2009, when a large majority of individuals in Washtenaw County had landlines. All American participants completed three separate 2-hour sessions.

In Japan, a survey company randomly selected names from a municipal registry of two wards in the metropolitan Tokyo area, of which Arakawa was predominantly working class and Suginami was predominantly middle class. These Japanese participants received a survey composed of demographic and emotional experience questionnaires. Participants responded to the survey at home and mailed it back. Participants who responded to the survey were further invited to participate in subsequent lab sessions, as in the U.S.

The final sample included 403 Japanese in the Tokyo metropolitan area and 226 Americans in Michigan. Participants were compensated with \$70/7,000 yen for each of the 2-hr individual experimental sessions. Of those eligible for participation (i.e., age and health criteria), 54% in the United States and 53% in Japan agreed to participate in the laboratory sessions.

Procedure. In addition to measuring emotional experiences, we gave respondents two tasks measuring dialectical thinking and eight tasks measuring independence-interdependence (self-construal and behavioral tendencies involving interactions between the self and the social environment). All materials were back-translated from English into Japanese. Participants

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completed a battery of cognitive and social tasks on their own, guided by written instructions. Tasks were assessed across multiple sessions. The use of multiple sessions reduced the cognitive demand for participants in the study and lowered the likely carryover effects from one task to the next, yet it also resulted in some attrition between sessions. We describe these measures below.

Measure of emotional experiences, Emotional experiences were assessed using the same instrument as in Study 2, in which people recalled their most recent experiences of 10 social and nonsocial situations. This instrument was included in the initial survey in Japan. See Study 2 methods for details of the procedure.

Measures of dialectical thinking and independence-interdependence. The two measures of dialectical thinking involved expectations of contradiction and change (Ji et al., 2001) and preference for proverbs involving contradictions (Peng & Nisbett, 1999). Further, we included 4 tasks measuring independent-interdependent self-construal: Self-inflation (Kitayama et al., 2009); inclusion of family in the self (Aron, Aron, & Smollan, 1992); Singelis' self-construal scale (1994); and the twenty-statement task (Cousins, 1989; Rhee, Uleman, Lee, & Roman, 1996). Finally, we included 4 tasks measuring behavioral components of independence-interdependence, involving both interpersonal sensitivity and social context focus: Interference by vocal tone (Ishii, Reyes, & Kitayama, 2003; Kitayama & Ishii, 2002), search for contextual information (Choi, Dalal, Kim-Prieto, & Park, 2003); third – vs. first person self-reflection (Cohen & Gunz, 2002; Grossmann & Kross, 2010); and context- vs. main agent-focused recall (Chua, Nisbett, & Leu, 2005). This test battery consisted of behavioral (implicit) as well as survey-based (explicit) measures, in the hope of alleviating concerns about the reliability of survey-based measures (Oyserman, Coon, & Kimmelmeier, 2002). See Table 6 and online

supplement for information on procedure for each task. Upon completion of the last task, participants provided demographic information, were debriefed and dismissed.

Analytic strategy. We followed the same analytic procedure to obtain the four markers of emotional complexity as in Study 2. Patterns of missing data across emotional measures did not significantly differ by country (Japan: 13.72%; US: 14.06%), $\chi^2 (df = 1, N = 686) < 1$.

Given the large number of independence-interdependence measures, we sought to guard against inflated likelihood of Type-I errors by performing a data reduction procedure on these measures. Results from principal component analyses indicated that the four tasks measuring self-construal loaded onto a single factor (eigenvalue = 1.205; 30.118% variance explained; loadings; self-inflation = .428, inclusion of family in the self = .576, self-construal scale = .476, twenty statement task = .681). Similarly, the four tasks measuring interpersonal/social context sensitivity loaded onto a single factor (eigenvalue = 1.353; 33.383% variance explained; loadings; interference by vocal tone = .523, search for contextual information = .618, 3rd vs. 1st – person self-reflection = .702, context- vs. main agent-focused recall = .452). We utilized self-construal and interpersonal factor scores for subsequent analyses.¹⁰⁻¹¹

Results

Effects of Culture and Demographic Factors

Because we were interested in the effects of country and age,¹² in the initial step we sought to guard against inflated likelihood of Type-I errors by performing a multivariate analysis of variance (MANOVA) with mean-centered age, country, their 2- and 3-way interactions as predictors of the six emotion-related variables concerning emotional dialecticism, and emotional differentiation. Based on prior suggestions of curvilinear effects of age on socio-emotional parameters (Charles & Carstensen, 2010; Labouvie-Vief, 2003), we also tested the quadratic

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effect of age and respective interactions in this analysis. Based on the MANOVA results, we included main effects of country, Wilks $\lambda = .830$, $F(6,565) = 19.253$, $p < .001$, $\eta_p^2 = .170$, age, Wilks $\lambda = .965$, $F(6,565) = 3.449$, $p = .002$, $\eta_p^2 = .035$, as well as the quadratic effect of age, Wilks $\lambda = .979$, $F(6,565) = 2.032$, $p = .060$, $\eta_p^2 = .021$, and the country X age interaction, Wilks $\lambda = .974$, $F(6,565) = 2.518$, $p = .021$, $\eta_p^2 = .026$, in our subsequent series of General Linear Model (GLM) analyses, separately for each dependent variable. The other interactions were not significant, $F_s < 1.638$. To accurately interpret the country X age interactions in the presence of a quadratic effect of age, the GLMs also included the country X age² interactions. We visualized significant interactions with help of simple slope plots (Aiken & West, 1991).

Emotional dialecticism. As predicted, the significant main effect of country showed that Japanese reported less negative intra-individual correlation between ratings of positive and negative affect ($M = -.449$, $SD = .322$, $n = 377$) than Americans ($M = -.643$, $SD = .236$; $n = 214$), $t = 5.497$, $p < .0001$, $\eta_p^2 = .050$. Similarly, Japanese reported more mixed emotions ($M = .059$, $SD = .221$, $n = 431$) than Americans ($M = -.119$, $SD = .133$; $n = 219$), $t = 7.882$, $p < .0001$, $\eta_p^2 = .090$. No other GLM effects was significant in either analysis, $t_s < 1.160$.

Emotional differentiation. As in Study 2, people in both countries reported greater intra-individual differentiation of negative than positive emotions, $F_{\text{Japan}}(1,424) = 297.66$, $p < .001$, $\eta_p^2 = .412$, $F_{\text{US}}(1,213) = 84.855$, $p < .001$, $\eta_p^2 = .285$. For positive emotions, we observed a country x age interaction, $t = 1.722$, $p = .086$, $\eta_p^2 = .005$. As Panel A of Figure 3 indicates, age was associated with greater intra-individual differentiation among the Japanese, $t = 1.672$, $p = .095$, but not among the Americans, $t < 1$, *ns*. Countries did not significantly differ from each other either at younger age (1st age quantile), $t = 1.444$, *ns.*, or at older age (3rd age quantile), $t = .229$, *ns*. There were no further significant effects, $t_s < .906$, *ns*. For negative emotions, a significant

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main effect of country showed that Japanese showed more intra-individual differentiation ($M = .649$, $SD = .213$, $n = 426$) than Americans ($M = .591$, $SD = .184$; $n = 220$), $t = 2.361$, $p = .019$, $\eta_p^2 = .009$. This effect was qualified by a significant country X age interaction, $t = 2.496$, $p = .013$, $\eta_p^2 = .010$. As Panel B of Figure 3 and simple slope analyses indicate, the country effect was significant for younger adults (at 1st age quantile), $t = 3.941$, $p < .0001$, and middle-aged adults (at median age), $t = 2.742$, $p = .006$, but not for older adults (at 3rd age quantile), $t = .550$, *ns*. Further, greater age was linked to more intra-individual differentiation of negative emotions in the US, $t = 2.316$, $p = .021$, but not in Japan, $t = 1.500$, *ns*. In addition, we observed a significant age² effect, $t = 3.626$, $p < .001$, $\eta_p^2 = .020$. As Figure 3-B indicates, in both countries middle-aged adults showed the lowest levels of intra-individual differentiation of negative emotions as compared to younger and older adults.

Turning to the situation-specific indices, a significant main effect of country showed that Japanese showed greater differentiation in their positive emotions ($M = .057$, $SD = .195$, $n = 429$) than Americans ($M = -.118$, $SD = .153$, $n = 218$), $t = 8.377$, $p = .0001$, $\eta_p^2 = .100$. Further, we observed a main effect of age, with greater age linked to more situation-specific differentiation of positive emotions, $B = .002$, $SE = .001$, $t = 3.257$, $p = .001$, $\eta_p^2 = .017$. These effects were qualified by a country X age interaction, $t = 1.974$, $p = .049$, $\eta_p^2 = .006$. As Panel C of Figure 3 and simple slope analyses indicate, the country effect was pronounced for each age group, $7.792 < ts < 9.310$, $ps \leq .0001$. However, the age effect was significant for Japanese, $B = .003$, $SE = .0007$, $t = 3.441$, $p = .001$, but not for Americans, $B = .0003$, $SE = .0009$, $t = .328$, *ns*. Similarly, a significant main effect of country showed that Japanese showed greater situation-specific differentiation in their negative emotions ($M = .057$, $SD = .195$, $n = 429$) than Americans ($M = -$

.118, $SD = .153$, $n = 218$), $t = 5.565$, $p = .0001$, $\eta_p^2 = .047$. There were no further significant effects, $ts < 1.523$, *ns*.

Relationship between Emotional Complexity, Dialectical Thinking, and Interdependence

As reported elsewhere (Kitayama et al., 2015), Japanese were more likely to predict change in the ways social matters will unfold ($M = 46.268$, $SD = 12.390$, $n = 178$) than Americans ($M = 32.105$, $SD = 10.610$, $n = 209$), $F(1,385) = 148.844$, $p = .0001$, $\eta_p^2 = .279$. Similarly, preferences for dialectical proverbs were more pronounced in Japan ($M = .502$, $SD = .698$, $n = 188$) than in the US ($M = .322$, $SD = .802$, $n = 231$), $F(1,417) = 5.827$, $p = .016$, $\eta_p^2 = .014$. Further, Japanese showed a significantly greater degree of interdependence (self-construal index: $M = .352$, $SD = .716$, $n = 156$; interpersonal index: $M = .516$, $SD = .691$, $n = 152$) than Americans (self-construal index: $M = -.425$, $SD = 1.099$, $n = 173$; interpersonal index: $M = -.440$, $SD = .993$, $n = 126$), $F_{\text{self-construal}}(1,327) = 56.426$, $p < .001$, $\eta_p^2 = .147$, and $F_{\text{interpersonal}}(1,276) = 88.944$, $p < .001$, $\eta_p^2 = .244$.¹³

As Table 7 indicates, preference for dialectical proverbs was not related to any of the EC indicators. In contrast, prediction of dialectical change and interdependence indices were significantly related to three out of four operationalizations of emotional complexity, including both indices of an attenuated tendency to report positive and negative emotions as opposites (emotional dialecticism), as well as indices of greater situation-specific differentiation of positive and negative emotions. In the next step, we explored whether prediction of change and interdependence partially account for the variance in emotional dialecticism and situation-specific emotion differentiation between the two countries, i.e., whether these individual-level variables mediate cross-country differences in respective indices of emotional complexity. We performed a series of linear regressions with country (Japan vs. US) as a predictor, dialectical

beliefs about change and interdependence (self-construal / interpersonal index) as a mediator and each EC index as a dependent variable. To estimate the significance and magnitude of the mediator effect, we used a non-parametric bootstrapping procedure with 2000 resamples. The mediator/indirect effect is significant when the bootstrapped confidence interval (CI) does not include zero (Preacher, Rucker, & Hayes, 2007).

Results indicated no significant indirect effects of either dialectical thinking or either index of interdependence on situation-specific emotional differentiation. Similarly, dialectical beliefs about change and self-construal did not significantly mediate the cross-country differences in emotional dialecticism-types of emotional complexity. Rather, the relationship between these factors and indicators of emotional complexity became non-significant when accounting for cultural differences in each variable. However, we observed systematic and significant effects of intrapersonal interdependence for both emotional dialecticism operationalizations. As Figure 4 indicates, the interpersonal index of interdependence partially mediated the effect of country on intra-individual correlations, $B = .039$, $SE = .020$, 95% CI [.002; .080], and on mixed emotions, $B = .025$, $SE = .014$, 95% CI [.0003; .054].

Relationship between the Four Operationalizations of Emotional Complexity

As in Study 2, we computed the correlations among various operationalizations of emotional complexity (see Table 8). The pattern of results was similar to the one observed in Study 2. In each country emotional dialecticism indices were positively related to each other; the inter-individual correlational emotional dialecticism index was linked to greater intra-individual differentiation of positive and negative emotions, but not to situation-specific indices of emotional differentiation; and mixed emotions were positively linked to situation-specific emotional differentiation. Further replicating Study 2, intra-individual and situation-specific

indices of emotional differentiation were largely unrelated to each other, with the exception of a negative relationship between intra-individual differentiation of negative emotions and situation-specific differentiation of positive emotions in Japan.

Discussion of Study 3

Study 3 results replicated and extended Study 2 results on age-heterogeneous community samples in several ways. Across a range of operational definitions, we observed that people from an interdependent country (Japan) show greater emotional complexity than people from an independent country (US). Also, in each country measures of two distinct operationalizations of emotional complexity -- the attenuated tendency to report positive and negative emotions as opposites (emotional dialecticism) and the experience of emotions in a highly differentiated manner (emotional differentiation) -- were systematically related to each other: The intra-individual emotional dialecticism index was positively related to greater intra-individual tendency to differentiate one's emotions, whereas the situation-specific emotional dialecticism index (mixed emotions) was positively related to the situation-specific emotional differentiation. Finally, intra-individual and situation-specific indices of emotional differentiation were largely unrelated to each other, suggesting that the tendency to experience several different emotions across time is not the same thing as the tendency to experience several different emotions at once.

Representative community sampling allowed us to explore age-related effects. In the US, aging was linked to a more differentiated representation of negative emotions, but a trend in the opposite direction for positive emotions. In contrast, in Japan, aging was linked to a more differentiated (and diverse) representation of positive emotions, but not negative emotions. The observation of country-specific trajectories of differentiation across adulthood dovetails with

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research suggesting that Japanese and American cultures differ in up- vs. down-regulation of positive and negative emotions (Miyamoto & Ma, 2011), as well as culture-specific ways of maintaining well-being in older age (Grossmann, Karasawa, Kan, & Kitayama, 2014). It is also noteworthy that we observed some curvilinear effects of age, with middle-aged adults showing the least differentiation of negative emotions, suggesting that this group may be most vulnerable to emotional dysregulation (Barrett et al., 2001; Demiralp et al., 2012; Kashdan et al., 2015).

Finally, Study 3 explored whether individual-level measures of dialectical thinking and interdependence account for cross-cultural differences in emotional complexity. The results indicated that only one of the two indicators of dialectical thinking -- prediction of change -- was related to any EC indicators, and even this relationship became negligible when including country as a covariate in the analysis. In a similar vein, the relationship between interdependent self- construal and a number of EC indicators became non-significant when controlling for country differences in these indicators. In contrast, the interpersonal index of independence-interdependence, concerning the interaction between the self and the social world, partially mediated cultural differences in both measures of emotional dialecticism. This observation suggests that some aspects of interdependence are more influential than others for understanding the complexity of emotional life, consistent with evidence of a heterogeneous (rather than unitary) independence-interdependence construct on the level of the individual (for a review, see Grossmann & Na, 2014).

General Discussion

Our primary goal was to shed light on the influence of culture on emotional complexity. To achieve this goal, we carried out the first known cross-cultural effort to test reports of emotional complexity across different levels of analyses, involving both cultural products and

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reports of personal emotional experiences. We examined online blogs and websites from 10 countries across five continents, subjective reports of college students from six countries across three continents, and subjective reports in stratified random samples of non-student Americans and Japanese who vary in age. Unlike most studies, we simultaneously tested cultural differences across a range of definitions and operationalizations of emotional complexity (see Table 1) and compared cultural variability in these indicators to country and individual-level estimates of dialecticism and interdependence. This approach allowed the first systematic test of the magnitude and robustness of the effects of dialecticism and interdependence on emotional complexity across multiple levels of analysis.

Our first conclusion is that cultural differences in emotional complexity are robust and often sizable. These cultural effects unfolded on a continuum across countries differing in interdependent social orientation, with the least emotional complexity in the UK and the U.S., the most in Malaysia, Philippines and Japan, and India, Germany, Russia, and South Africa in-between. Although some cultural effects vary by age group, the cultural effects appear to hold overall, regardless of age. What varied as a function of demographics was the magnitude of the effects. Consistent with some previous research (Carstensen et al., 2011), we found that older people tended to reflect on their emotional experiences in a more complex fashion. However, these effects were fairly small and less systematic than the effects of country-level differences. That is, the age effects varied as a function of the culture and/or the method used to assess emotional complexity.

Studies 1 and 2 showed that the cultural differences were systematically related to the culture's interdependence, and less so to the prevalence of dialectical belief systems. Moreover, Study 3 showed that cultural differences in emotional dialecticism were in part accounted for by

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individual differences in interpersonal interdependence, but not by individual differences in dialectical thinking. This work extends prior research exploring individual factors contributing to various aspects of emotional complexity (e.g., Koots-Ausmees et al., 2012; Rafaeli, Rogers, & Revelle, 2007), suggesting that certain forms of interdependence play a role in emotional complexity.

The lack of a robust relationship between dialectical beliefs and emotional complexity is noteworthy. It seems natural to assume that belief in a life full of contradictions and change would allow for a more nuanced processing of positive and negative experiences. Indeed, the idea of emotional dialecticism was suggested by the idea of cognitive dialecticism (Peng & Nisbett, 1999), and past work has indicated that people from countries with a history of dialectical belief systems are less likely to see positive and negative emotions as opposites. However, it is important to keep in mind that this work mainly involved East-West comparisons, perfectly confounding differences in dialectical beliefs and differences in interdependent social orientation. Moreover, on the cultural level dialectical thinking and interdependence often go hand-in-hand (Grossmann & Varnum, 2011; Nisbett, 2003; Peng & Nisbett, 1999; Spencer-Rodgers, Williams, et al., 2010; Varnum et al., 2010). Our findings suggest that interdependence is the mechanism through which dialectical thinking is related to emotional complexity.

The second goal of the present research was to explore whether different types (and their operationalizations) of emotional complexity are related to each other. In Studies 2 and 3, we observed that experiencing positive and negative emotions together, rather than as opposites (emotional dialecticism) is positively associated with experiencing several different emotions at once (emotional differentiation). These correlations were strongest when the level of analysis was the same. That is, individuals who report positive and negative emotions as relatively

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compatible across time also report greater emotional differentiation across time, whereas individuals who report positive and negative emotions at the same time also report greater diversity of emotions in the same event. It is noteworthy that the intra-individual indicators of EC draw on cross-situational analyses over time, which are typical in personality research for assessing stable, trait-like tendencies (Fleeson, 2004), whereas the situation-specific indicators of EC draw on experience-specific analyses, which are typical for understanding state-specific tendencies.

We focused on intra-individual vs. situation-specific levels of analysis, as they provide a structure for understanding how to measure EC, without confusing units (magnitude vs. frequency) and level (across time vs. within situations) of analysis. We started with a parsimonious 2 X 2 structure for a range of methods developed to assess emotional complexity, distinguishing between two types of emotional complexity: emotional dialecticism and emotional differentiation. We further sought to differentiate between intra-individual methods, in which people report on their emotional experiences across situations (or over time), and situation-specific methods, in which people report on their emotional experience during a particular episode. As Table 1 indicates, we also categorized methods in terms of units of analysis, with some methods aiming to quantify the magnitude of association between positive and negative emotions, and other methods exploring the frequency with which certain emotions or emotion combinations are experienced. We considered magnitude of association measures to reflect the intra-individual approach, and frequency measures the situation-level approach.

Which definition or operationalization is better? In our view, it depends on one's research question. For exploring individual or group differences in the *experience* of emotional complexity, the situation-specific measures are appropriate, possibly aggregating across multiple

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similar situations. This approach sheds light on how a person *experiences* complexity, as well as how it is related to features of specific situations.

In contrast, for exploring individual or group-differences in *general tendencies* to represent one's emotional life as complex, one may consider using the intra-individual measures, assessing the magnitude of association between different emotions. Such an approach would shed light on how people vary in their general tendencies to experience a variety of emotions across different situations, and to see the world they live in as complex, as well as how these tendencies are related to personality traits and general abilities.¹⁴

Limitations and Future Directions

One limitation of the current work was that we used tasks that rely on retrospective recall of emotional experiences. Even though the instructions in Studies 2 and 3 asked people to recall specific events, attenuating the impact of recall biases (see Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004, for a similar procedure), it is possible that cultural differences in emotional complexity are due in part to cultural differences in the ways people in different countries generally recall their emotional experiences (Oishi, 2002; Robinson & Clore, 2002; Ross & Wang, 2010). At this point, it is unclear whether such a tendency could fully account for the cross-cultural pattern of results in the present project, or whether it reflects a general phenomenon that is not specific to emotional experiences. In the future it will be important to replicate these findings with diary reports or experience sampling procedures.

In our work we focused on independence-interdependence. We did so because interdependence has been emphasized in the literature as a factor contributing to emotional complexity, primarily emotional dialecticism. However, interdependence did not fully account for cross-cultural variation in all aspects of EC, suggesting that other cultural dimensions also

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play a role. For instance, cultures also differ in heterogeneity (Rychlowska et al., 2015) and tightness-looseness (Gelfand et al., 2011), both of which may affect the complexity of people's emotional experiences. Though beyond the scope of the present investigation, future work should explore whether adding these or similar cultural dimensions can provide a fuller account of cultural differences in emotional complexity.

The findings of Study 1 suggest that cultural differences in mixed emotions are visible when examining cultural products such as online blogs and websites. It would be interesting to explore whether cultures also differ in emotional complexity in online communications via dominant platforms (e.g., Badoo, Facebook, Twitter) across cultures. For example, is it confusing when someone tells you they are happy and sad? How would people across cultures manage different levels of emotional complexity? Knowledge about cultural differences in communication styles can shed additional light on the modes of transmission of cultural practices of emotional complexity (Kashima, 2008). A challenge to this endeavor would be to develop tools to assess emotional complexity in the -brief communications common on these platforms, or possibly the use of multiple emoticons.

A number of epidemiological studies have indicated higher prevalence rates of mental health disorders in Western than in East Asian countries (Bromet et al., 2011; Ferrari et al., 2012; Kessler et al., 2007; Weissman, 1997). Given parallel findings for emotional differentiation that we observed in the present project, and preliminary insights that these markers of emotional complexity are linked to mental health in the Western samples (e.g., Barrett et al., 2001; Demiralp et al., 2012; Quoidbach et al., 2014; Tugade et al., 2004; Zaki, Coifman, Rafaeli, Berenson, & Downey, 2013), it is possible that differences in emotional complexity may contribute to cultural differences in mental health. Future work should test this

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possibility, examining the relationship between emotional complexity and mental health in a non-Western cultural context.

Finally, the relationship between interdependence and emotional complexity suggests that one path to increasing emotional complexity may be to engage with the world in a more interdependent (vs. independent) fashion. In light of prior work on Westerners suggesting that some forms of emotional complexity are beneficial for well-being (e.g., Kashdan et al., 2015; Quoidbach et al., 2014), future work should examine whether training people to engage with their social environment in a more interdependent fashion (Grossmann & Kross, 2014; Kimel, Grossmann, & Kitayama, 2012; Kross & Grossmann, 2012; for a review, also see Oyserman & Lee, 2007) may enhance their emotional complexity.

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Table 1. Major definitions and operationalizations of the emotional complexity of subjective experiences

Type	Definition	Operationalization	Typical measurement level	Typical unit of analysis	Labels used in past work
1. Emotional dialecticism	Experience of positive and negative emotions together rather than as opposites.	a. Decrease in the magnitude of the negative correlation between reported pleasant and unpleasant states.	Global or Intra-individual (e.g., across time or situations)	Magnitude of association	Emotional dialecticism; Mixed emotions; Emotional co-occurrence
		b. Frequency of co-occurrence of pleasant and unpleasant emotions in a given situation.	Episode/ judgment-specific	Frequency	Emotional dialecticism; Mixed Affect; Mixed Feelings; Emotional Co-occurrence
2. Emotional differentiation	Experience of emotions in a differentiated manner, distinguishing among a variety of negative and positive discrete emotions.	a. Decrease in intra-individual correlation between emotions of the same valence (e.g., anxious, nervous, worried).	Intra-individual (e.g., across time or situations)	Magnitude of association	Emotional Differentiation; Emotional Granularity
		b. Number of experienced emotions X balance in intensity across these emotions.	Episode/ judgment-specific	Frequency	Emodiversity

Notes. In past research, measurement levels did not always match the unit of analysis. For instance, Yik (2007) examined magnitude of association between positive and negative emotions on the level of a specific episode, whereas Quoidbach et al., (2014) examined frequency (and balance) of emotions on the level of global reports (i.e., assessed on a scale from “never” to “most of the time”). Further, terms “mixed emotions” and “emotional co-occurrence” have been sometimes applied to the intra-individual correlations of pleasant and unpleasant states (e.g., Hershfield et al., 2013; Ong & Bergeman, 2004), despite arguments against inferring mixed emotions prevalence from negative correlations approaching zero (Russell & Carroll, 1999; Schimmack, 2001).

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Table 2.

Demographics, Data Sources, and Distribution of Individualism-Collectivism in Study 2

Country	Survey-based Interdependence	Behavior-based Interdependence	Interdependence Index	Dialectical Beliefs (%)	<i>n</i>	<i>M</i> _{age}	%♀	Study Location	Data Source
Japan	-.36	.02	.44	41.00	623	18.58	33.71	Kyoto, Hokkaido, & Tokyo Universities	(Ishii & Kitayama, 2007)
India	.38	--	.38	82.60	267	18.48	84.27	St. Xavier's College, Mumbai	(Savani, 2010)
Russia	.58	-.04	.66	.30	70	20.14	74.29	Moscow City University of Psychology & Education	(Grossmann, 2015a)
Germany	-1.04	-.20	-.88	.50	123	26.84	68.29	University of Hamburg	(Kitayama et al., 2009)
UK	-1.70	-.13	-.88	2.50	126	21.06	76.98	University of Essex University of Michigan	(Kitayama, et al., 2009)
U.S.	-1.64	-.26	-1.41	2.00	187	18.84	69.52	Washtenaw Community College, Ypsilanti, MI	(Bowman, Kitayama, & Nisbett, 2007; Grossmann, 2015a)

Notes. Survey-based Interdependence = average score of standardized coefficients from a multi-country studies by Hofstede (Hofstede et al., 2010) and House and colleagues (2004). Behavior-based interdependence = $(M(\text{others' circles}) - M(\text{self-circle})) / M(\text{all circles})$, derived from country-level estimates by Kitayama et al. (2009) and Grossmann & Varnum (2011). Interdependence Index = Average of standardized survey- and behavior-based estimates of collectivism. Dialectical beliefs = country-level percentage of people reporting adherence to dialectical belief systems (e.g., Buddhist, Hindu, Jainist, Shinto, Taoist).

Table 3.

Correlations among Indices of Emotional Dialecticism and Differentiation in Study 2.

Measure		1	2	3	4	5	6
Japan	1. Emotional dialecticism: Intra-indiv. correlations	--	.189***	-.076	-.090*	-.068	-.104*
	2. Emotional dialecticism : Mixed emotions		--	.002	-.095*	.786***	.862***
	3. Intra-indiv. differentiation: Positive emotions			--	.212***	-.012	.029
	4. Intra-indiv. differentiation: Negative emotions				--	-.087*	-.082*
	5. Sit.-specific differentiation: Positive emotions					--	.720***
	6. Sit.-specific differentiation: Negative emotions						--
India	1. Emotional dialecticism: Intra-indiv. correlations	--	.320***	.245***	.358***	.161***	.194*
	2. Emotional dialecticism : Mixed emotions		--	.322***	.324***	.729***	.750***
	3. Intra-indiv. differentiation: Positive emotions			--	.274***	.120*	.096
	4. Intra-indiv. differentiation: Negative emotions				--	.155*	.204
	5. Sit.-specific differentiation: Positive emotions					--	.471***
	6. Sit.-specific differentiation: Negative emotions						--
Russia	1. Emotional dialecticism: Intra-indiv. correlations	--	-.059	-.034	.217	.035	-.172
	2. Emotional dialecticism : Mixed emotions		--	.311**	-.002	.593***	.671***
	3. Intra-indiv. differentiation: Positive Emotions			--	.276*	.176	.029
	4. Intra-indiv. differentiation: Negative Emotions				--	.015	.075
	5. Sit.-specific differentiation: Positive Emotions					--	.266*
	6. Sit.-specific differentiation: Negative Emotions						--
Germany	1. Emotional dialecticism: Intra-indiv. Correlations	--	.232*	.271**	.549***	.172***	.132
	2. Emotional dialecticism : Mixed Emotions		--	.313***	-.045	.806***	.809***
	3. Intra-indiv. differentiation: Positive Emotions			--	.102	.217*	.210*
	4. Intra-indiv. differentiation: Negative Emotions				--	-.162	.031
	5. Sit.-specific differentiation: Positive Emotions					--	.493***
	6. Sit.-specific differentiation: Negative Emotions						--
UK	1. Emotional dialecticism: Intra-indiv. Correlations	--	.405***	.233**	.353***	.190*	.346***
	2. Emotional dialecticism : Mixed Emotions		--	.207*	.256**	.781***	.763***
	3. Intra-indiv. differentiation: Positive Emotions			--	.027	.056	.009
	4. Intra-indiv. differentiation: Negative Emotions				--	.065	.185*
	5. Sit.-specific differentiation: Positive Emotions					--	.484***
	6. Sit.-specific differentiation: Negative Emotions						--
US	1. Emotional dialecticism: Intra-indiv. Correlations	--	.248***	.239***	.445***	.004***	.149*
	2. Emotional dialecticism : Mixed Emotions		--	.159*	.158*	.720***	.732***
	3. Intra-indiv. differentiation: Positive Emotions			--	.278*	-.126	-.116
	4. Intra-indiv. differentiation: Negative Emotions				--	-.117	.060
	5. Sit.-specific differentiation: Positive Emotions					--	.448***
	6. Sit.-specific differentiation: Negative Emotions						--
Average Across Six Samples	1. Emotional dialecticism: Intra-indiv. Correlations	--	.222	.146	.306	.082	.091
	2. Emotional dialecticism : Mixed Emotions		--	.219	.099	.736	.764
	3. Intra-indiv. differentiation: Positive Emotions			--	.195	.072	.023
	4. Intra-indiv. differentiation: Negative Emotions				--	-.027	.054
	5. Sit.-specific differentiation: Positive Emotions					--	.480
	6. Sit.-specific differentiation: Negative Emotions						--

Notes. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

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Table 4.

Multi-level Analyses with Interdependence and Dialectical Belief Systems as Predictors of

Emotional Complexity in Study 2.

		Interdependence			Prevalence of Dialectical Belief Systems		
		<i>B (SE)</i>	<i>t (df)</i>	<i>p -value</i>	<i>B (SE)</i>	<i>t (df)</i>	<i>p -value</i>
Emotional dialectic dialectic	Intra-individual correlations	.174 (.016)	10.880 (1394)	< .001	-.001 (.0004)	-2.604 (1394)	.009
	Mixed emotions	.062 (.008)	7.616 (1394)	< .001	-.0002 (.0002)	-.880 (1392)	.379
Intra- individual differentiation	Positive emotions	.031 (.010)	3.011 (1393)	.003	.0002 (.0003)	.751 (1393)	.453
	Negative emotions	.057 (.009)	6.383 (1359)	< .001	.0003 (.0002)	1.279 (1391)	.201
Situation- specific differentiation	Positive emotions	.060 (.009)	6.792 (1395)	< .001	-.0004 (.0002)	-1.985 (1395)	.047
	Negative emotions	.036 (.010)	3.734 (1357)	< .001	-.0003 (.0002)	-1.346 (1395)	.179

Notes. To account for individual-level variability, emotional complexity scores are nested within participants.

Table 5.

Emotional Complexity in Independent (Germany, UK, US) and Interdependent (India, Japan, Russia) Regions in Study 2.

		<i>Descriptives</i>			<i>General Linear Model Results</i>	
		IND <i>M (SE)</i>	INTER <i>M (SE)</i>	<i>df1,df2</i>	<i>F</i>	η^2
Emotional dialecticism	Intra-individual correlations	-.698 (.015)	-.475 (.010)	1, 1347	154.42***	0.103
	Mixed emotions	-.061 (.008)	.030 (.005)	1, 1393	96.41***	0.065
Intra-individual differentiation	Positive emotions	.424 (.010)	.480 (.007)	1, 1391	22.74***	0.016
	Negative emotions	.502 (.008)	.607 (.006)	1, 1392	105.19***	0.07
Situation-specific differentiation	Positive emotions	-.050 (.008)	.022 (.006)	1, 1393	50.72***	0.035
	Negative emotions	-.030 (.009)	.013 (.006)	1, 1393	15.28***	0.011

Notes. IND = Independent Region. INTER = Interdependent Region. *** < .001

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Table 6.

Description and Reliabilities of the Tasks Measuring Dialectical Thinking and Independence-Interdependence in Study 3.

Factor	Task	Example/ Task Description	n (items)	Reliability	
				Japan	US
Dialectical thinking	1. Expected change in the future	Estimation of likelihood of change. Examples: Childhood enemies becoming lovers as adults	8 ^a	.70	.59
	2. Preference for dialectical vs. non-dialectical proverbs	Too humble is half proud (dialectical) vs. One against all is certain to fall (non-dialectical)	8 / 8 ^a	.88 / .87	.85 / .86
Independent - interdependent self-construal	1. Self-inflation	Participants draw their social network by using circles to represent the self and others. The size (i.e., diameter) of the drawn self-circle divided by the average size of other-circles was calculated as an index of self-inflation.	1	--	
	2. Inclusion of family in the self	A series of two circles is provided where the degree of overlap between them progresses linearly, creating a seven-point scale of relational closeness. Participants selected the pair of circles that best represented their relationships with family members.	1	--	
	3. Self-construal scale	Self-report questionnaire assessing relative self-representation in terms of interdependence vs. independence (difference score).	24 ^a	.82 / .79	.65 / .63
	4. Twenty statement task	Content-analysis of 20 self-descriptions: Specific/contextualized (e.g., I am kind to children) vs. generalized/abstract terms (e.g., I am kind).	1 ^b	.62 - 98	
Independent - interdependent self-construal	1. Interference by vocal tone	RT for words, which content is incongruent with the tone of voice (e.g., positive word in negative tone), as an index of sensitivity to social cues.	14 ^a	.94	.84
	2. Search for contextual information	Number of contextual cues participants see as important to consider in a crime case	1	--	
	3. Third – vs. first person self-reflection	Reflection on an autobiographic event from a third vs. first-person perspective	2 ^c	.34	.52
	4. Context- vs. main agent-focused recall	Content-analysis of free memory recall of events in videos and written text: Statements about supporting vs. main characters.	2 ^c	.31 / .60	.29 / .67

Notes: Reliabilities are based on a. Cronbach’s α ; b. Cohen’s κ ; c. Pearson’s r .

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Table 7.

Full Sample Correlations among Dialectical Beliefs, Interdependence and Indices of Emotional Complexity in Study 3.

Measure	1	2	3	4	5	6	7	8	9	10
1. Dialectical thinking: Prediction of change	--	.093	.197***	.331***	.225***	.249***	-.026	.058	.244***	.170***
2. Dialectical thinking: Proverbs		--	.018	.097	-.017	.026	-.096	-.060	.047	.041
3. Interdependence: Self-construal index			--	.263***	.133*	.133*	-.013	.066	.181***	.124*
4. Interdependence: Interpersonal index				--	.240***	.293***	-.047	.049	.278***	.222***
5. Emotional dialecticism: Intra-individual correlations					--	.301***	.181***	.207***	.165***	.157***
6. Emotional dialecticism : Mixed emotions						--	.102**	.010	.794***	.870***
7. Intra-indiv. differentiation: Positive emotions							--	.124**	.017	-.052
8. Intra-indiv. differentiation: Negative emotions								--	-.068	.005
9. Situation-specific differentiation: Positive emotions									--	.695***
10. Situation-specific differentiation: Negative emotions										--

Notes. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Table 8. Country-wise Correlations among Indices of Emotional Complexity in Study 3.

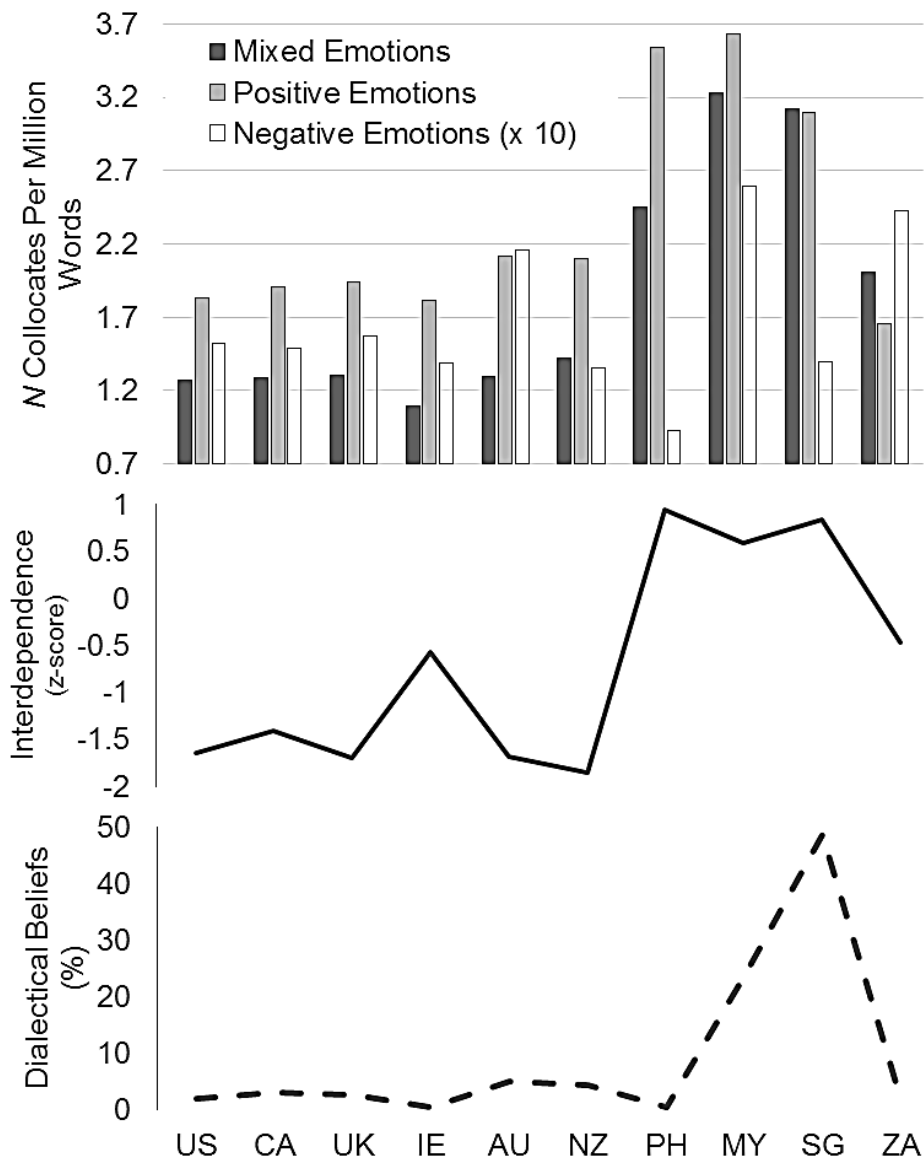
	Measure	1	2	3	4	5	6
Japanese Participants							
Emotional dialecticism	1. Intra-indiv. correlations	--	.190***	.222***	.124*	.040	.073
	2. Mixed emotions		--	.049	-.067	.772***	.899***
Intra-indiv. differentiation	3. Positive emotions			--	.149**	.008	-.060
	4. Negative emotions				--	-.139**	-.060
Sit.-specific differentiation	5. Positive emotions					--	.704***
	6. Negative emotions						--
U.S. American Participants							
Emotional dialecticism	1. Intra-indiv. correlations	--	.232***	.166*	.377***	.028	.012
	2. Mixed emotions		--	.335***	.034	.702***	.614***
Intra-indiv. differentiation	3. Positive emotions			--	.078	.057	-.035
	4. Negative emotions				--	-.121	.063
Sit.-specific differentiation	5. Positive emotions					--	.482***
	6. Negative emotions						--

Notes. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

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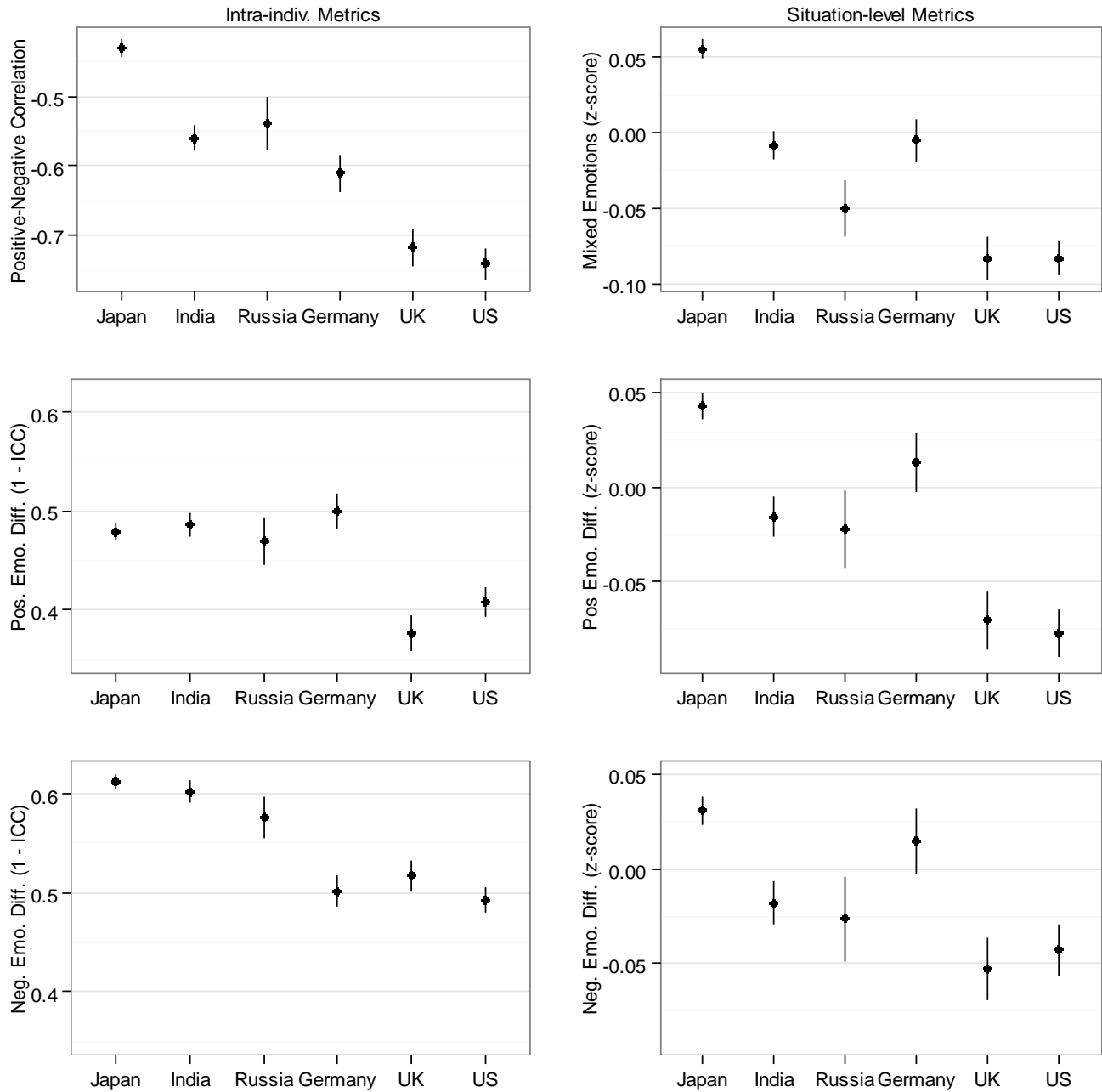
Figure 1. Country-level estimates of mixed emotions in online blogs and web-sites (top panel), interdependence (the middle panel), and prevalence of dialectical belief systems (e.g., Buddhist, Hindu, Taoist, Jainist; bottom panel). For comparability, the top panel also includes estimates of the co-occurrence of two positive words, and two negative words in the same sentence.

To enhance visual clarity, frequency of negative emotions is multiplied by 10. MY –Malaysia, SG - Singapore, PH - Philippines, ZA - South Africa/Zuid Afrika, NZ – New Zealand, AU – Australia, IE – Ireland, UK – United Kingdom, US – United States.



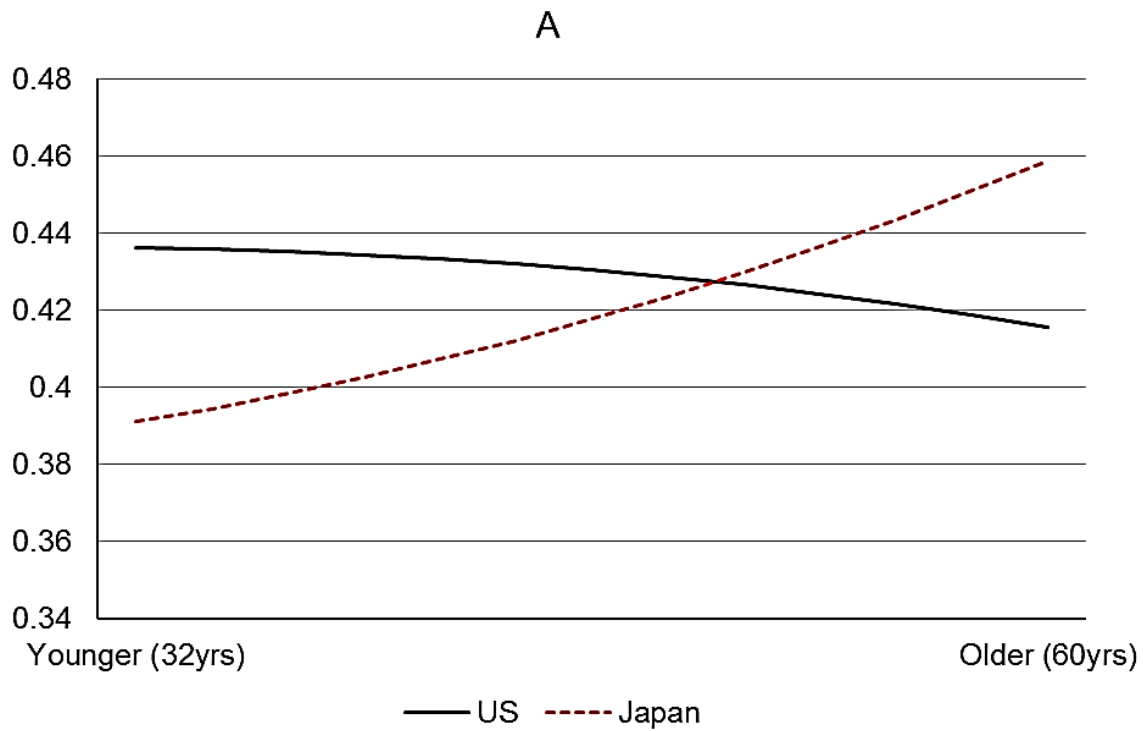
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Figure 2. Country-wise estimates of emotional complexity across four operationalizations, including intra-individual (left) and situation-level metrics (right). Mean \pm standard error of the mean.



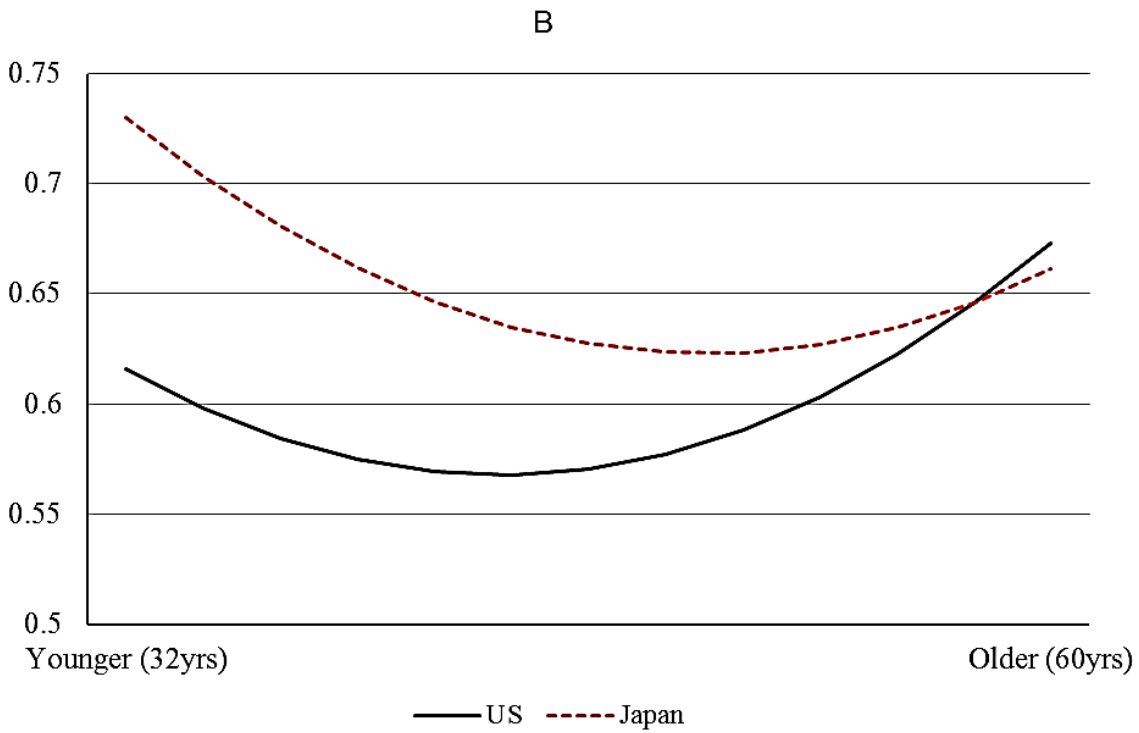
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Figure 3. Simple slope estimates of intra-individual and situation-specific emotional differentiation as a function of age and country in Study 3. Panel A: Intra-individual differentiation of positive emotions. All analyses include estimates based on the model: $y = \text{intercept} + \text{country} + \text{age} + \text{gender} + \text{country} \times \text{age} + \text{country} \times \text{age}^2$.



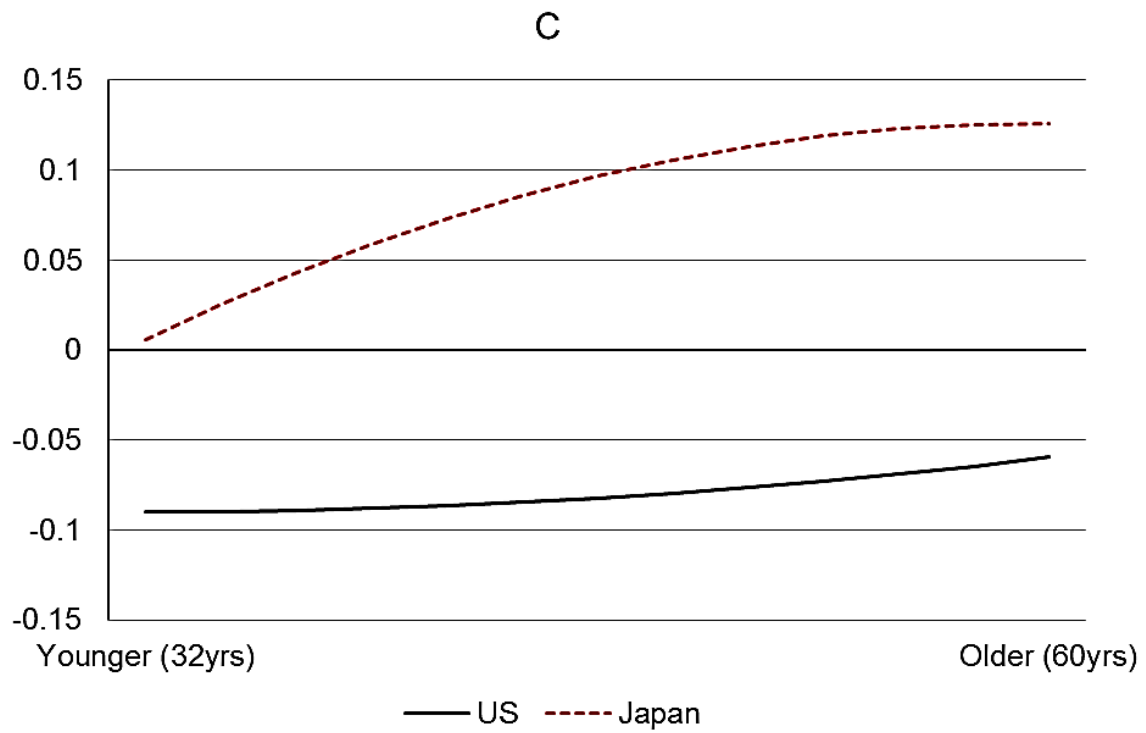
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Figure 3. Simple slope estimates of intra-individual and situation-specific emotional differentiation as a function of age and country in Study 3. Panel B: Intra-individual differentiation of negative emotions. All analyses include estimates based on the model: $y = \text{intercept} + \text{country} + \text{age} + \text{gender} + \text{country} \times \text{age} + \text{country} \times \text{age}^2$.



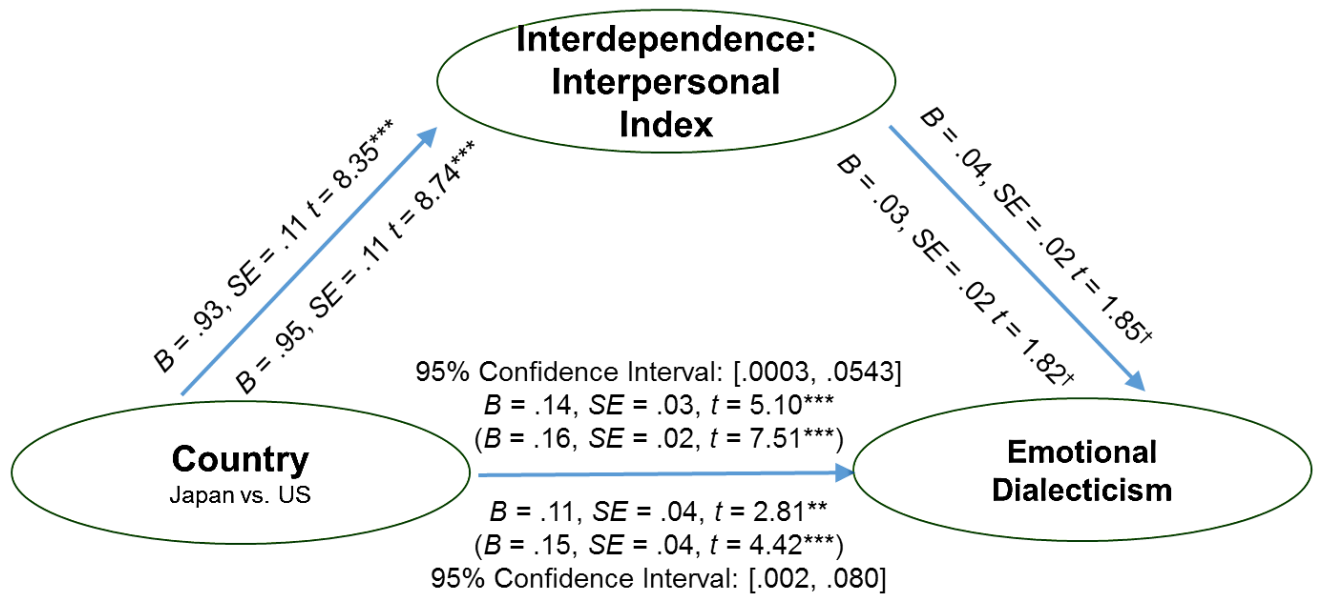
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Figure 3. Simple slope estimates of intra-individual and situation-specific emotional differentiation as a function of age and country in Study 3. Panel C: Situation-level differentiation of positive emotions. All analyses include estimates based on the model: $y = \text{intercept} + \text{country} + \text{age} + \text{gender} + \text{country} \times \text{age} + \text{country} \times \text{age}^2$.



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Figure 4. Mediation of country differences (Japan vs. US) in emotional dialecticism-type of emotional complexity with interpersonal (behavioral) index of interdependence as a mediator. Effects for intra-individual correlations [mixed emotions] as a dependent variable are on the outer part [inside] of the diagram.



Footnotes

¹ Some researchers (e.g., Priester & Petty, 1996; Schimmack, 2001; Spencer-Rodgers, Peng, et al., 2010) have proposed to measure mixed emotions by adopting measures of ambivalence from attitude research (e.g., Kaplan, 1972; Scott, 1966). The ambivalence index is based on the intensity of the weaker of positive and negative emotions. We decided not to consider this measure, because it perfectly confounds mixed affect with documented cultural differences in response bias (i.e., preference for moderate vs. extreme responses (Chen, Lee, & Stevenson, 1995; Heine et al., 2002; P. B. Smith, 2004).

² It is also noteworthy that Yik (2007) relied on between-person correlational methodology to assess emotional dialecticism, making her results difficult to compare to situation-specific measures concerning frequency of co-occurrence of positive and negative emotions.

³ Note that GloWbe does not allow for separate analyses by blogs vs. general websites.

⁴ Preliminary analyses indicated comparable results when focusing on percentages of Buddhist and “Other Religions” alone.

⁵ Because Study 2 partially involved re-analysis of data collected by other researchers (for sources, see Table 1), we were not able to modify the materials. Note that the scale also included such items as “close feelings” and “friendly feelings.” Prior work indicates cultural differences in meaning structures across these terms (Kitayama, Mesquita, & Karasawa, 2006). To maintain comparable meaning structure, we therefore opted not to include them in the main body of results. Preliminary analyses indicated similar pattern of results when including these items.

⁶ The only exception to this pattern of mixed emotion results concerned the situation involving being “ill or injured,” in which Germans reported highest levels of mixed emotions. However,

even for this situation, Japan, India, and Russia reported higher levels of mixed emotions than England and the U.S.

⁷ There are two types of intra-class correlation coefficients: Absolute agreement scores and consistency scores. Absolute agreement scores are sensitive to systematic differences across items, such as differences due to baseline differences in affect intensity. In contrast, consistency scores discount these baseline differences. Because we were interested in responses not confounded by individual differences in overall affect intensity, we focused on the ICC consistency scores.

⁸ Supplementary analyses of global granularity across all emotion terms indicated comparable cultural differences to those observed on other indicators (Japan > Germany = India = Russia > England = the U.S.).

⁹ Prior observations suggest that gender plays a role in emotional dialecticism (e.g., Bagozzi et al., 1999; Yik, 2007). Analyses with gender as an additional factor revealed higher scores among men than women, $7.531 < Fs \leq 25.364$, $ps \leq .006$, $.005 < \eta_p^2s \leq .018$, specifically for pos-neg intra-individual correlations, mixed emotions, and positive intra-individual and situation-level markers of emotional differentiation. Yet, Gender did not moderate the effect of interdependence, $ts < 1.758$, *ns*, with an exception of negative differentiation, gender X interdependence interaction, $t = 2.309$, $p = .021$. Men were marginally more likely to differentiate negative emotions than women in interdependent countries (at the 3rd quartile of interdependence), $t = 1.647$, $p = .100$, but this gender difference was not significant in independent countries (at the 1st quartile of interdependence), $t = 1.417$, *ns*.

¹⁰ An alternative omnibus analysis across all tasks yield a less interpretable 3 –component solution. Notably, factor scores from the two separate PCA analyses were significantly related to each other, $r = .263$, $p < .001$.

¹¹ See Kitayama, Karasawa, Grossmann, Na, Varnum, and Nisbett (2015), for further details concerning how culture and age influences each of these tasks.

¹² Supplementary analyses indicated a main effect of gender across the emotion-related variables, Wilks $\lambda = .976$, $F(6,565) = 2.323$, $p < .032$, $\eta_p^2 = .024$. These gender effects in Study 3 resembled effects observed in Study 2, with men showing somewhat higher scores on some of the emotion-related variables (mixed affect: $M = .015$, $SD = .216$; positive intra-individual differentiation: $M = .445$, $SD = .207$) than women (mixed emotions: $M = -.012$, $SD = .210$; $n = 323$; positive intra-individual differentiation: $M = .403$, $SD = .199$), $t_{\text{mixed emotions}} = 1.653$, $p = .099$, $\eta_p^2 = .004$, $t_{\text{pos intra-individual differentiation}} = 2.686$, $p = .007$, $\eta_p^2 = .011$).

¹³ Attrition across tasks was not systematic across countries and not related to emotion-related responses.

¹⁴ In addition, one could also make a distinction between the global method, in which researchers explore correlations between retrospective single-shot assessments of positive and negative emotions from the past week (e.g., Koots-Ausmees et al., 2012) or a month (e.g., Schimmack et al., 2002), and the intra-individual method (e.g., Scollon et al., 2005, as well as the present paper), in which correlations are assessed within a situation. The former “between-individual” method is more likely to yield positive association between pleasant and unpleasant emotions. However, such positive estimates are less likely when using the intra-individual method. As our studies and prior work (Scollon et al., 2005) indicate, even in Asian countries, intra-individual correlations between pleasant and unpleasant emotions are typically negative.