The Role of Utility Value in Achievement Behavior: The Importance of Culture

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Abstract
Two studies tested how participants’ responses to utility value interventions and subsequent interest in a math technique vary by culture (Westerners vs. East Asians) and levels of initial math interest. Participants in Study 1 were provided with information about the utility value of the technique or not. The manipulation was particularly effective for East Asian learners with initially lower math interest, who showed more interest in the technique relative to low-interest Westerners. Study 2 compared the effects of two types of utility value (proximal or distal) and examined the effects on interest, effort, performance, and process variables. Whereas East Asian participants reaped the most motivational benefits from a distal value manipulation, Westerners benefited the most from a proximal value manipulation. These findings have implications for how to promote motivation for learners with different cultural backgrounds and interests.

Keywords
value, culture, interest, utility, motivation

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The academic fields of math and science hold the key to innovation and power in today’s world, yet recent statistics show that fewer and fewer students choose to enter them (Simpkins, Davis-Kean, & Eccles, 2006) and that beliefs about the importance of mathematics start declining around the time students reach eighth grade (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). The challenge for educators is to provide instructional support in order to sustain students’ motivation to study mathematics and science, even after their students are already turned off to these subjects (Hidi & Harackiewicz, 2000). Moreover, it is necessary to consider how this instructional support might differ depending on the needs of students from different cultures who populate today’s classrooms (Phalet, Andriessen, & Lens, 2004).

A perennial question asked by students is: “Why are we learning this?” It is often hard for students to see value or the connection between course material and their lives outside of the classroom, especially in subjects such as mathematics (Brophy, 1999). Eccles et al. (1983) define three types of task value, one of which is utility value, perceived when a task is useful for accomplishing important short- or long-term goals. Tasks that benefit everyday activities or have relevance for a learner’s future are high in utility value. Research has shown that perceptions of value are associated with a wide range of positive motivational outcomes such as performance (Hulleman & Harackiewicz, 2009; Simons, Dewitte, & Lens, 2003), effort (Cole, Bergin, & Whittaker, 2006), interest (Hulleman, Durik, Schweigert, & Harackiewicz, 2008; Hulleman & Harackiewicz, 2009), and course enrollment decisions (Meece, Wigfield, & Eccles, 1990). In particular, the four-phase model of interest development (Hidi & Renninger, 2006) identifies the mechanism through which utility value can promote interest: Utility value can empower learners who are in the early stages of interest development to seek repeated engagement with the subject matter over time and, in this manner, deepen their interest (Renninger, 2000).

Research on perceived instrumentality has also highlighted the crucial role of perceptions of relevance and usefulness in the development of motivation (Husman & Lens, 1999; Malka & Covington, 2004; Nuttin & Lens, 1985). According to this line of work, perceiving a task as

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instrumental for reaching important goals influences motivation, persistence, and performance. For example, Lens and Decuyrneaere (1991) showed that students who perceived their schoolwork as instrumental for their life were more motivated to do well in school. Lens, Simons, and Dewitte (2001) showed that students who perceived course material as more instrumental for their future success engaged in more deep-level learning strategies than those who perceived course material as less instrumental. Considered together, these correlational findings suggest that utility value may be a powerful tool to promote motivation, but these studies have been conducted with primarily Western samples.

**Culture, Personal Interest, and the Effects of Utility Value Interventions**

Engaging in tasks that are perceived as relevant and useful for accomplishing goals should be functional in any culture, but it is important to consider how the effects of utility value might differ as a function of culture and individual differences. Consideration of cultural factors may be particularly important when designing interventions to promote utility value, as there are major cultural differences in how individuals conceptualize and value their futures (Hofstede, 2001; Hofstede & Bond, 1988). Cross-cultural theorists have argued that East Asians perceive more relationship between the present and distal future events than Westerners do (Maddux & Yuki, 2006), which suggests that East Asians may be especially sensitive to utility value information that helps them connect their present experiences with their future goals (Ji, Guo, Zhang, & Messervey, 2009; Nisbett, 2003; Nisbett, Peng, Choi, & Norenzayan, 2001).

Even within cultures, there may be important individual differences that influence the ways in which individuals value tasks and connect them to their lives. For example, recent experimental studies have found that individual differences moderate the effectiveness of utility value interventions in Western samples. These manipulations have involved either embedding information about the specific uses and applications of a task in the task instructions (Durik & Harackiewicz, 2007; Vansteenkiste et al., 2004) or having participants write about specific examples of how they could use it in their own life (Hulleman, Godes, Hendricks, & Harackiewicz, 2010; Hulleman & Harackiewicz, 2009). In both lines of research, utility value interventions were compared with a control group that did not receive the utility value instructions. Findings from these studies showed that participants exhibited very different responses to these manipulations depending on their preexisting beliefs. For example, Durik and Harackiewicz (2007) taught participants a new math technique under conditions where its utility value was either emphasized or not, and then measured interest in the technique. The manipulation raised interest only for participants who came in with higher levels of initial interest in math, suggesting that externally provided utility value is adaptive for learners who are already interested in the subject content. These individuals may be particularly receptive to learning about additional applications to incorporate math into their lives more fully.

Experimental research showing that higher levels of initial interest are necessary for utility value interventions to work has been conducted only with predominantly Western samples. The central role of personal interest, however, may be specific to the Western culture, where people are relatively less aware of relationships between the present and distal future events (Maddux & Yuki, 2006) and thus are less sensitive to utility value information. Instead, Western culture places a greater emphasis on following one’s own interests, maximizing positive emotions (Eid & Diener, 2001; Kitayama, Markus, & Kurokawa, 2000), and making one’s own achievement-related choices (Iyengar & Lepper, 1999). Compared to East Asian culture, such as China, Korea, and Japan, which emphasizes an interdependent model of self-construal, Western culture, such as Western Europe and the United States, is characterized by an independent model of self-construal (Markus & Kitayama, 1991, 2003), which emphasizes independence from others and uniqueness. This view of the self shapes the nature of experiences in different situations, including achievement situations. For example, in college, students explore their interests through electives and often choose their major based on prior interests (Harackiewicz, Barron, Tauer, & Elliot, 2002).

Empirical support for this idea comes from research conducted with Moroccan and Turkish students in the Netherlands (Andriessen, Phalet, & Lens, 2006). Similar to East Asian cultures, Moroccans and Turks place a greater emphasis on collective values than the Dutch culture (Phalet et al., 2004). Andriessen et al. (2006) showed that Moroccan and Turkish students rated perceived instrumentality of their major for their personal life as significantly lower than Dutch students. In contrast, they perceived instrumentality of their major for getting a good job significantly higher than their Dutch counterparts. These findings suggest that when choosing their majors, students from collectivistic cultures may be less influenced by their personal interests but more influenced by their utility value for accomplishing salient goals.

Our cultural analysis suggests that the differential effects of utility value interventions reviewed earlier may hold for Westerners but not for East Asian learners. We hypothesize that the provision of utility value information should be sufficient to motivate East Asian learners to strive for high levels of achievement, even if the activity is not in a subject of high interest, because of their heightened sensitivity to utility value. Thus, the presentation of utility information is predicted to enhance motivation for both lower interest and higher interest East Asian individuals. In contrast, this manipulation should only enhance motivation for Westerners who have higher interest and not for Westerners who have lower interest.
Study 1

Study 1 was conducted to examine how cultural variations and individual differences in initial interest moderate participants’ responses to a utility value manipulation. Specifically, we hypothesize that utility value by itself is not sufficient to motivate Westerners to strive for high levels of achievement, whereas it should be sufficient to motivate East Asians even when they lack interest. This laboratory study examined how culture, initial interest, and a utility value manipulation influenced effort, performance, and interest on a math task. The main objective of the study was to test whether emphasis on utility value would promote achievement behavior only for Westerners with higher initial interest in math but promote achievement behavior for East Asian learners irrespective of their initial interest.

Method

Participants. The sample consisted of 282 undergraduates (131 males and 151 females) from a Midwestern university, who received extra credit for participation. There were 210 Westerners (100 males and 110 females) and 72 East Asians (31 males and 41 females). All Western participants were European Americans and born in the United States. All East Asian participants were born in an East Asian country (China, Taiwan, Japan, or Korea) and had attended high school in their home country. East Asian participants’ average time spent in the United States was less than 1 year.

Design and procedure. The study used a 2 (culture: Westerner vs. East Asian) × 2 (initial interest in math: low vs. high) × 2 (utility value intervention: control vs. utility value) between-participants design. The dependent variables were participants’ effort to learn a new mental math technique (measured behaviorally), task performance, and subsequent interest in the technique.

Participants completed the session individually. To obtain a measure of baseline math performance, participants were given 2 min to solve as many problems as they could with their traditional method of multiplication, and then they indicated their interest in math. Next, participants learned a new four-step technique for solving two-digit multiplication problems in their head without paper and pencil using an instructional notebook, accompanied by an audio recording that guided them through the notebook (developed from Math Magic by Flansburg & Hay, 1994; see Barron & Harackiewicz, 2001, for more detail). The technique involved working from left to right and sequentially computing a series of products, holding them in memory to obtain the final answer. Pretesting showed that only 1% of participants had been familiar with this technique.

The utility value intervention was embedded in the instructional notebook. Participants were told about the usefulness of the technique for their performance in future classes, preparation for graduate school admissions tests, and their careers. For example, the passage in the beginning of the notebook described how practicing and using the new mental math technique can increase working memory capacity, which becomes essential when trying to remember material for exams in college courses or when taking graduate school admissions tests. The utility value manipulation in the middle of the notebook explained the ways in which six representative occupations require direct or indirect use of math (e.g., “A psychologist may use mental math to evaluate a test report”). Pictures of professionals from these careers accompanied the manipulation. At the end of the notebook, participants were reminded of the usefulness of mental math for their college courses and career and graduate school objectives in a summary paragraph. In the control condition there was no mention of utility value in the instructional notebook.

After learning the technique, participants were asked to practice the new technique on some multiplication problems. They were not explicitly told how much time they had, so the experimenter surreptitiously recorded the number of seconds participants spent practicing as a behavioral measure of their effort. Next, participants completed a questionnaire assessing the degree of utility value they perceived from the new technique. Then they solved two 4-min sets of multiplication problems, which constituted a measure of their performance. At the end of the experimental session, participants reported their interest in the technique.

Measures

Initial performance. Participants’ baseline performance was measured in terms of the number of problems solved using traditional methods; these scores ranged from 0 to 9 correct.

Initial interest. Initial interest in math was measured with three items. A sample item was “I find math enjoyable.” This and all of the other self-report items were rated from 1 (strongly disagree) to 7 (strongly agree).

Perceived utility value. The amount of utility value that participants perceived was measured with a two-item scale (e.g., “I think this technique is useful for my future”).

Behavioral effort. Effort was assessed by the number of seconds participants spent working on the practice problems; these scores ranged from 0 to 322.

Performance. Performance was measured by the total number of problems participants solved correctly on the two problem sets. These scores ranged from 0 to 71.

Interest. Subsequent interest in the technique was measured using a four-item scale (e.g., “The left-to-right technique is interesting,” “I enjoyed using the left-to-right technique”).

Results

Preliminary Analyses. First we compared the two cultures on variables collected at the beginning of the session, before the manipulations, to evaluate whether individuals from the two cultures were comparable in their initial interest and
ability in math. A one-way ANOVA, using culture as the factor and initial interest in math as the dependent variable, did not yield a significant difference between cultures, $F(1, 280) = 0.69, p = .41$. However, a difference between cultures emerged revealing that East Asian participants performed better than Westerners at the beginning of the session, $F(1, 280) = 42.90, p < .01$ (see Table 1 for descriptive statistics by culture). We therefore added initial performance as a factor to all regression analyses to evaluate whether any observed effects were due to cultural differences in initial performance.

**Overview of statistical models.** Multiple regression was used to analyze the effects of culture, initial interest, and the utility value intervention on behavioral effort, performance, and interest. These variables were entered on the first step, and then initial performance and its interactions with other terms were added on the second step. This allowed us to evaluate whether predicted interactions were accounted for by cultural differences in initial performance.

The continuous predictors were standardized. We created contrast codes for culture ($-1 = \text{Westerner}, +1 = \text{East Asian}$), the utility value intervention ($-1 = \text{control}, +1 = \text{utility value}$), and gender ($-1 = \text{women}, +1 = \text{men}$), and computed all possible two-way, three-way, and four-way interactions between culture, utility value, initial interest, and initial performance. We tested for interactions with gender, but they were not significant and were therefore excluded from the final model.

The first step in each regression included eight terms: culture; initial interest; the utility value contrast; gender; the 3 two-way interactions between culture, initial interest, and utility value; and the three-way interaction. On the second step, initial performance and its seven interaction terms were added. To examine significant interactions, we computed predicted values fixed at 1 SD below and above the mean of the predictor (Aiken & West, 1991). Table 1 contains the descriptive statistics and zero-order correlations for all measures from Study 1, separately for each culture.

**Utility value manipulation check.** We conducted a set of preliminary analyses to check that our utility value intervention influenced participants’ perceptions of utility value. Importantly, the main effect of the intervention was significant on the first step, $t(273) = 2.93, p < .01, \beta = .20$, indicating that all participants in the utility value condition perceived more utility value from the new technique than did those in the control condition. Individuals with higher initial interest, $t(273) = 3.92, p < .01, \beta = .26$, and Westerners, $t(273) = -2.53, p = .01, \beta = -.15$, also perceived greater utility value in the technique. In addition, an interaction between the value manipulation and initial interest emerged, $t(273) = -2.19, p < .05, \beta = -.14$, which revealed that the positive relationship between initial interest and perceived utility was stronger for individuals in the control condition than in the utility value condition. These effects remained statistically significant when initial performance and its interactions were included on the second step.

**Primary Analyses.**

**Interest.** The first step revealed a significant positive effect of initial interest, $t(273) = 5.40, p < .01, \beta = .35$, which was qualified by an interaction with culture and utility, $t(273) = -2.71, p < .01, \beta = -.18$. When initial performance and its interactions were entered on the second step, both effects remained statistically significant.

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**Table 1. Zero-Order Correlations and Descriptive Statistics for Variables in Study 1 for East Asian (Above Diagonal) and Western (Below Diagonal) Participants**

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<th>1</th>
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<tbody>
<tr>
<td>1. Gender</td>
<td>—</td>
<td>.03</td>
<td>-.08</td>
<td>.02</td>
<td>-.03</td>
<td>.27*</td>
<td>-.01</td>
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<tr>
<td>2. Initial performance</td>
<td>-.02</td>
<td>—</td>
<td>.27*</td>
<td>.18</td>
<td>-.29*</td>
<td>.33*</td>
<td>.21*</td>
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<tr>
<td>3. Initial interest in math</td>
<td>.13</td>
<td>.19*</td>
<td>—</td>
<td>.38*</td>
<td>-.11</td>
<td>.30*</td>
<td>.42*</td>
</tr>
<tr>
<td>4. Perceived utility value</td>
<td>.03</td>
<td>-.01</td>
<td>.20*</td>
<td>—</td>
<td>.17</td>
<td>.25*</td>
<td>.67*</td>
</tr>
<tr>
<td>5. Behavioral effort</td>
<td>-.16*</td>
<td>-.19*</td>
<td>-.26*</td>
<td>-.02</td>
<td>—</td>
<td>-.41*</td>
<td>.23</td>
</tr>
<tr>
<td>6. Performance</td>
<td>.23*</td>
<td>.30*</td>
<td>.44*</td>
<td>.23*</td>
<td>-.43*</td>
<td>—</td>
<td>.31*</td>
</tr>
<tr>
<td>7. Interest</td>
<td>.01</td>
<td>.16*</td>
<td>.30*</td>
<td>.45*</td>
<td>-.15*</td>
<td>.37*</td>
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**Reliability**

<table>
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<tr>
<th></th>
<th>East Asian</th>
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<tbody>
<tr>
<td>M</td>
<td>-0.14</td>
<td>-0.05</td>
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<td>SD</td>
<td>1.00</td>
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<td>Reliability</td>
<td>.92</td>
<td>.92</td>
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</table>

$N = 282$. Items ranged from 1 (strongly disagree) to 7 (strongly agree) except for gender ($-1 = \text{women}, +1 = \text{men}$), initial performance (from 0 to 9 problems), and performance (from 0 to 71 problems). Reliability for multi-item scales was assessed with Cronbach’s alpha.

*p < .05.
interaction between initial interest and the value manipulation was marginally significant and had the opposite sign as that observed for Westerners, \( t(67) = -1.69, p < .10, \beta = -.18 \).

Simple effect tests for East Asian participants revealed a significant positive effect of the value manipulation among those with lower initial interest, \( t(67) = 2.22, p < .05, \beta = .36 \), and no effect among those with higher initial interest, \( t(67) = -0.13, p = .89, \beta = -.02 \).

**Behavioral effort.** A positive main effect of initial interest and a two-way interaction between value and initial interest were qualified by a three-way interaction among initial interest, the utility intervention, and culture, \( t(273) = -2.17, p < .05, \beta = -.15 \) (see Figure 1, lower panel). When initial performance and its interactions were added, the three-way interaction remained statistically significant, but the main effect and two-way interaction were no longer significant.

The three-way interaction was probed with separate analyses for each culture, yielding a significant two-way interaction between interest and the value manipulation for East Asian participants, \( t(67) = -2.09, p < .05, \beta = -.24 \), but no interaction between interest and the value manipulation for Western participants, \( t(205) = .37, p = .72, \beta = -.02 \). Simple effect tests revealed that the value manipulation increased effort for East Asian participants with lower initial interest, \( t(67) = 2.40, p < .05, \beta = .43 \), but did not affect effort for any other group. Similar to the effects on task interest, East Asian participants with lower initial interest were positively affected by the value manipulation.

**Performance.** A significant main effect of gender, \( t(273) = 3.76, p < .01, \beta = .21 \), indicated that men solved more problems than women, and initial interest also positively predicted performance, \( t(273) = 6.18, p < .01, \beta = .39 \), but no effect of the manipulation emerged on the first step. These effects remained statistically significant when initial performance and its interactions were added on the second step.

**Summary.** The utility value intervention was particularly effective in promoting interest for East Asian learners who were less interested in math. Their counterparts with higher interest showed high levels of interest in the new technique even without the utility value intervention. The utility value intervention had the opposite effect on Westerners, revealing somewhat positive effects for those with higher initial interest and somewhat negative effects for those with lower initial interest.

**Discussion**

These findings reveal that East Asians and Westerners who are less interested in math exhibit very different responses to externally provided utility value. East Asian learners with lower interest responded positively to the external instructional manipulation focused on utility value. These individuals worked harder after learning that the technique held utility
value for their classes and future careers. They also found the new technique to be somewhat more interesting. In contrast, Westerners with lower levels of interest did not benefit from the description of the utility value of the technique. They did not increase their effort after learning that the new technique was useful, and they expressed slightly less interest in the technique following the utility value manipulation. This is consistent with our hypothesis that Westerners who lack interest in a subject may be unable to reap motivational benefits from externally provided utility value.

Somewhat surprisingly, however, East Asian learners with higher interest in math also did not benefit from the presence of utility value information, and Western learners with higher interest showed only modest benefits of the utility value manipulation on interest. One possibility is that a ceiling effect may have precluded detection of a utility value effect among these interested participants. Individuals with higher levels of initial interest reported very high levels of subsequent interest in the control condition, which might have made it difficult for high-interest learners in the utility value intervention condition to surpass them.

The utility value intervention did not influence participants’ performance on the problem sets. Baseline math performance, gender, and initial interest were the only predictors of performance. This finding speaks to the challenges that educators face when trying to affect student performance. It might be easier to promote greater effort and interest in instructional material than to influence performance, at least in the short term. Over time, however, increased effort and cognitive involvement should translate into better performance (Corno, 1986).

**Study 2**

Study 1 helped clarify whether utility value interventions increase interest among both East Asian and Western participants, and our results suggest that effects differed as a function of both culture and initial interest. For Westerners, utility value interventions had a slight positive impact on interest only for those with higher initial interest, presumably due to the importance of personal interest in Western culture, and lower sensitivity to utility value. In contrast, the utility value intervention increased interest for East Asians with lower initial interest. These observed cultural differences are consistent with our hypothesis that East Asians would be more sensitive to utility value information, and they illuminate cultural differences in how initial interest moderates the effects of utility value interventions. In Study 2, we extended our analysis of cultural differences in sensitivity to utility value by examining different types of utility value. In Study 1, the utility value intervention had generally stronger effects for East Asian participants, and it is possible that this was due to the type of utility value emphasized in the intervention, which focused primarily on long-term utility value. This possibility suggests that it may also be important to consider the type of utility value manipulated in interventions. In particular, individuals from the two cultures may be differentially sensitive to short-term and long-term utility value.

The degree of value perceived in a task is determined by its potential to fulfill the learner’s short-term (proximal) or long-term (distal) goals. The utility value of a task is proximal when it is important for reaching immediate goals, such as studying math to be able to quickly perform calculations at restaurants and supermarkets (Simons, DeWitte, & Lens, 2004). The utility value of a task is distal when it is important for reaching future goals, such as studying math in college to become an accountant. Although some researchers have emphasized proximal utility value to learners (Simons et al., 2004) and others have emphasized distal utility value or a combination of the two (Durik & Harackiewicz, 2007), this distinction between the two types of utility value has not been systematically examined before either within the Western culture or across Western and East Asian cultures.

Interestingly, cross-cultural theorists have suggested that East Asian culture is more long-term oriented than Western culture (Hofstede, 2001; Hofstede & Bond, 1988). Studies on temporal discounting showed that when Western cultural ideas are activated, participants are more likely to prefer immediate consumption, thus discounting the future, than when Asian cultural ideas are activated (Chen, Ng, & Rao, 2005; Zhang & Shrum, 2009). Furthermore, Maddux and Yuki’s (2006) research on the ripple effect in Western and East Asian cultures suggests that East Asians perceive a stronger connection between the present and distal future events than Westerners do. They found that East Asians were more aware of distal consequences of events, or of their “ripple effects.” This can be explained by the fact that people from East Asian cultures tend to process incoming information in a holistic manner, so they often see events as interrelated, and are able to envision complex linkages between current and future events (Ji et al., 2009; Miyamoto, Nisbett, & Masuda, 2006; Nisbett, 2003; Nisbett et al., 2001). Westerners, on the other hand, process information in an analytical manner, which leads them to view current events as relatively independent and unrelated, and to focus primarily on their proximal consequences. Consequently, holistic East Asians may be better equipped than analytical Westerners to think about the long-term future and to connect their present experiences with their future goals. In fact, Randel (2001) found that more East Asian students thought that math was useful for their future career (a distal outcome), whereas more Westerners thought that math was useful for problem solving (a more focal, proximal outcome).

Building on the literature documenting cultural differences in cognitive style, we hypothesized that East Asian participants would be more motivated by distal utility value than by proximal utility value because they can clearly visualize the connection between instructional material and their
long-term goals. In contrast, Westerners, who tend to focus on more immediate outcomes, should be more motivated by proximal utility value than by distal utility value because it should be easier for them to see how the instructional material is useful for their everyday life activities. To test this hypothesis, we examined how East Asians and Westerners responded to proximal and distal utility value interventions, and how individual interest moderated these effects.

Using the same mental math task, Study 2 extended Study 1 in two important ways. First, we differentiated distal and proximal utility value and compared two types of utility intervention with a control group. We predicted that East Asians would be more motivated by distal utility value than by proximal utility value, whereas Westerners would be more motivated by proximal utility value. Second, we explored the processes through which utility value interventions influence achievement behavior. Previous research with Westerners has applied Harackiewicz and Sansone’s (1991) process model of motivation to understand how utility value interventions affect achievement behavior (Durik & Harackiewicz, 2007). This model outlines three processes through which people develop and maintain motivation: Competence valuation refers to the degree to which people care about doing well on an activity, task involvement refers to the degree they become engaged and caught up in the activity, and perceived competence refers to how confident they feel about their ability to do well (Harackiewicz & Sansone, 1991, 2000). Durik and Harackiewicz (2007) showed that after receiving a utility value intervention, participants with higher interest became committed to performing well, were engrossed in the learning process, and felt more competent, all of which in turn positively affected their subsequent achievement behavior. The reverse was true for those with lower interest, who exhibited decreased task involvement and perceived competence in response to utility value and subsequently had lower levels of achievement behavior. In the present study, we examined whether competence valuation, task involvement, and perceived competence would explain the effects of distal and proximal utility value across or within cultures.

Method

Participants. Participants were 176 undergraduates (89 women and 87 men) from a Midwestern university who were compensated with extra credit. The sample consisted of 91 Westerners (56% were women), 58 East Asians (55% were women), 5 Southeast Asians (60% were women), and 22 Asian Americans (41% were women). All of the Western participants were European Americans and were born in the United States. All of the participants categorized as East Asian or Southeast Asian had attended high school in their home country and, on average, had spent less than 1 year in the United States. All of the Asian American participants identified themselves as being from an East Asian ethnic background and reported speaking their native language at home (Chinese, Japanese, or Korean). Because preliminary testing revealed that results were the same whether or not the Asian American participants were included in the East Asian sample, they were retained in the final analyses. Therefore, the sample referred to as East Asian included Southeast Asian as well as Asian American participants.

Design and procedure. The study used a 2 (culture: Westener vs. East Asian) × 2 (initial interest in math: low vs. high) × 3 (utility value intervention: control, proximal utility value, distal utility value) between-participants design. The primary dependent variables were self-reported effort on the problem sets, interest, and performance. Unlike in Study 1, we did not collect a behavioral measure of effort, to reduce variability in practice time before performance. We also measured competence valuation, task involvement, and perceived competence to examine whether these processes mediated the effects of culture and the utility value interventions on interest, effort, and performance.

The basic procedure was identical to Study 1, and utility value was manipulated in the context of the learning program. Participants were randomly assigned to one of three conditions. In the proximal and distal utility value conditions, participants received information in the instructional materials about the everyday or long-term utility value of the technique, respectively. If they were in the control condition, there was no mention of utility value.

Distal and proximal utility value interventions. The distal utility value intervention was similar to the intervention used in Study 1, which emphasized longer term uses for the technique for future college courses, graduate school, and career endeavors. In contrast, the proximal utility value intervention emphasized how the technique could be used at the present time in various everyday life situations (e.g., managing personal finances, shopping at the supermarket, measuring ingredients when cooking, and calculating tips). The two utility value interventions were matched in terms of parallel structure of the content, number of examples, and number of pictures. The only difference was whether the utility value of the math technique was for short-term or long-term objectives.

Following the learning program, participants completed measures of perceived utility value and competence valuation. Next, they were given two problem sets. Participants then completed measures of task involvement, effort, and perceived competence. Finally, participants reported their interest in the technique and were debriefed.

Measures

Several measures were assessed the same way in Study 2 as in Study 1. These included initial performance, initial interest, perceived utility value, task interest, and task performance. All self-report items were rated on a scale from 1 (strongly disagree) to 7 (strongly agree).
Process measures. To measure competence valuation, the extent to which participants cared about doing well in the session was measured with a two-item scale (e.g., “It is important to me to do well on the upcoming problem sets”). Task involvement was measured with two items (e.g., “I got caught up in solving the problems with the new method”), each rated twice, once following the first problem set and again after the second set. Participants’ perceived competence was measured with a two-item scale (e.g., “I felt confident using the technique”).

Self-reported effort. The amount of effort that participants exerted on the problem sets was measured with a single item (“I worked really hard on the problems”).

Results

Preliminary Analyses. Table 2 shows the descriptive statistics and zero-order correlations for all measures for each culture. As in Study 1, one-way ANOVAs were conducted to compare the cultures on variables measured at the beginning of the session. As in Study 1, the ANOVA on initial performance yielded a significant effect, \( F(1, 231) = 57.38, p < .01 \), showing that East Asian participants’ initial performance was higher than that of Western participants. An effect of culture also emerged on initial interest in math, \( F(1, 231) = 13.74, p < .01 \), showing that East Asians reported more initial interest than Western participants in Study 2.

The cultural differences in both initial performance and initial interest (our hypothesized moderator) presented a challenge, which we handled in two ways. As in Study 1, to test whether the effects of the manipulations could be accounted for by preexisting differences between cultures, we conducted the series of regression analyses in two steps. After entering the primary predictors in the first step, we entered initial performance and its interactions with all other variables in a second step. This allowed us to examine whether any effects observed in the first step changed by including these additional 12 terms. If a given effect was no longer significant as a consequence of including these terms, we did not interpret the effect. Second, because we found cultural differences in initial interest, a hypothesized moderator, we conducted a parallel set of analyses on a subsample wherein participants from each culture were matched on initial interest and initial performance to test whether the effects that emerged in the initial analyses were still present in a subsample matched on both initial interest and performance.

Multiple regression was used to analyze the effects of culture, initial interest, and type of utility value intervention on the perceived utility value manipulation check, outcome variables, and the process variables. We used orthogonal contrast codes to compare the experimental conditions. One code compared both utility value conditions (+1) with the control condition (–2) to test the effect of utility value presence. The other code compared the distal utility value condition (+1) with the proximal utility value condition (–1), while coding the control condition as zero, to test the type of utility manipulated. Culture and gender were coded as in Study 1. We computed all possible two-way and three-way interactions

Table 2. Zero-Order Correlations and Descriptive Statistics for Variables in Study 2 for East Asian (Above Diagonal) and Western (Below Diagonal) Participants

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East Asian

| M     | 0.11 | 7.62 | 4.76 | 4.27 | 5.01 | 5.39 | 5.87 | 6.11 | 40.25 | 5.75 |
| SD    | 1.00 | 1.54 | 1.60 | 1.45 | 1.06 | 0.84 | 1.09 | 0.93 | 12.61 | 0.94 |
| Reliability | .86 | .70 | .59 |     |     |     |     |     |     | .86 |

Westerner

| M     | -.12 | 5.69 | 3.92 | 3.99 | 5.02 | 5.34 | 5.69 | 5.87 | 31.37 | 5.35 |
| SD    | 1.00 | 2.37 | 1.96 | 1.50 | 1.13 | 0.89 | 1.21 | 1.00 | 10.34 | 0.80 |
| Reliability | .95 | .72 | .74 |     |     |     |     |     |     | .81 |

\( N = 176 \). Items ranged from 1 (strongly disagree) to 7 (strongly agree) except for gender (–1 = women, +1 = men), initial performance (from 0 to 9 problems), and performance (from 0 to 78 problems). Reliability for multi-item scales was assessed with Cronbach’s alpha.

*\( p < .05 \).
None of the interactions with gender were significant, and they were therefore excluded from the final models. The basic model therefore consisted of 12 terms: culture, initial interest, the two contrast codes, gender; 5 two-way interactions between the contrast codes and culture, contrast codes, and initial interest, and culture and initial interest; and 2 three-way interactions between the contrast codes, culture, and initial interest. These terms were entered simultaneously into the first step of the regression to predict each outcome. Then, initial performance and its interactions with these 11 terms (excluding gender) were added to the model and any changes in the previous effects were identified.

The first set of analyses was conducted on perceived utility value to test the effectiveness of the manipulations across cultures. The second set of analyses was conducted on the primary outcomes, including interest, effort, and performance. The third set of analyses was conducted on the motivational processes of competence valuation, task involvement, and perceived competence. In the final set of analyses, we examined whether the process variables mediated the effects of culture, initial interest, and the utility value interventions on the achievement outcomes.

**Self-Reported Utility Value.** We found a significant interaction between culture and initial interest in math, $t(163) = -1.98$, $p < .05$, $\beta = -.15$, and this effect was qualified by a marginally significant three-way interaction among culture, initial interest, and type of utility value, $t(163) = -1.86$, $p = .06$, $\beta = -.18$. The predicted values are presented in Figure 2. We tested the simple effects of value type at each level of culture and initial interest, but none were significant. However, the pattern was consistent with our predictions, such that East Asians perceived greater utility value following the distal compared to proximal utility value manipulation whereas Westerners showed the reverse pattern. This effect was unchanged when initial performance and its interactions were partialled out in the second step.

**Primary Outcomes**

**Interest.** Three significant effects emerged. First, and not surprisingly, there was a positive main effect of initial interest in math, $t(163) = 1.94$, $p = .05$, $\beta = .15$. A main effect of culture also emerged, $t(163) = 2.73$, $p < .01$, $\beta = .21$, but it was qualified by an interaction with type of utility, $t(163) = 2.84$, $p < .01$, $\beta = .25$. This effect remained statistically significant in the second step when controlling for initial performance and its interactions with the other terms.

The top panel of Figure 3 shows the predicted values for the two-way interaction. Simple effects of value type were calculated for each culture. Consistent with our hypotheses, East Asian learners found the technique more interesting if the utility value manipulation emphasized distal versus proximal utility, $t(163) = 2.74$, $p < .01$, $\beta = .30$; however, Westerners found the technique slightly more interesting if the manipulation emphasized proximal versus distal utility, $t(163) = -1.23$, $p = .22$, $\beta = -.13$.

**Self-reported effort.** A positive main effect of initial interest emerged, $t(163) = 2.11$, $p < .05$, $\beta = .16$. In addition, a two-way interaction emerged between culture and the type of utility value manipulation, $t(163) = 3.27$, $p < .01$, $\beta = .25$. When initial performance and its interactions were included...
on the second step, the main effect of initial interest was no longer significant, but the interaction between value type and culture remained statistically significant.

The bottom panel of Figure 3 shows the interaction and reveals a pattern similar to that found on task interest, such that the type of utility value manipulation had different effects depending on culture. Consistent with our hypotheses, East Asians reported trying harder if the manipulation emphasized distal instead of proximal utility, $t(163) = 2.65$, $p < .01$, $\beta = .29$. The reverse was true for Westerners, who reported trying harder after the proximal versus distal utility value manipulation, $t(163) = –1.95$, $p = .05$, $\beta = –.20$.

**Performance.** There was a significant main effect of gender, $t(163) = 2.15$, $p < .05$, $\beta = .15$, revealing that men solved more problems than did women, as well as significant positive effects of initial interest, $t(163) = 3.21$, $p < .01$, $\beta = .23$, and culture, $t(163) = 3.81$, $p < .01$, $\beta = .27$. A significant three-way interaction also emerged among the presence of value, culture, and initial interest, $t(163) = 2.64$, $p < .01$, $\beta = .19$. However, when the initial performance terms were entered on the second step, this interaction was no longer significant although the three main effects remained statistically significant.

**Motivational Processes**

**Competence valuation.** Two significant effects emerged. First, initial interest in math positively predicted competence valuation, $t(163) = 2.74$, $p < .01$, $\beta = .22$. There was also a significant two-way interaction between culture and type of utility value, $t(163) = 2.24$, $p < .05$, $\beta = .17$. Although the pattern was in line with the hypothesized results, the interaction did not remain significant when the effect of initial performance and its interaction terms were included in the model, suggesting that it emerged at least in part as a consequence of cultural differences in initial performance.

**Task involvement.** A two-way interaction between culture and type of utility value emerged, $t(163) = 2.87$, $p < .01$, $\beta = .22$. The predicted values (lower panel of Figure 4) show that the effects of type of utility value again depended on culture. Whereas East Asians became more involved after receiving information about distal utility value, $t(163) = 2.13$, $p < .05$, $\beta = .24$, Westerners became slightly more involved after receiving information about proximal utility value, $t(163) = –1.92$, $p = .06$, $\beta = –.21$. This effect remained statistically significant after controlling for initial performance and its interactions.

**Perceived competence.** This analysis yielded a significant two-way interaction between culture and type of utility value, $t(163) = 3.16$, $p < .01$, $\beta = .29$. Simple effects showed that whereas East Asians felt more competent after receiving the distal versus proximal value manipulation, $t(163) = 1.94$, $p = .05$, $\beta = .21$, Westerners felt more competent after receiving
the proximal versus distal value manipulation, $t(163) = -2.55, p < .05$, $\beta = -.27$. A three-way interaction also emerged among culture, initial interest, and type of utility value, $t(163) = -2.24, p < .05$, $\beta = -.17$; however, this effect was attenuated and not significant when the effects of initial performance were accounted for in the model. The other effect remained statistically significant.

**Summary of Direct Effects.** When we compared the effects of distal utility value and proximal utility value side by side, East Asian participants benefited the most from the distal utility value intervention, whereas Western participants benefited the most from the proximal utility value intervention. This pattern emerged for both task interest and effort. On the process measures, this pattern was mirrored in task involvement as well as perceived competence.

**Analyses With Samples Matched on Initial Interest and Initial Performance.** To further control for preexisting differences in initial interest or initial performance, we conducted a parallel set of analyses as above with samples of East Asians and Westerners (drawn from the initial sample) who had equal scores on initial interest and initial performance. Specifically, we sorted the data based on participants’ initial performance and initial interest separately for each culture. Then, blind to experimental condition, we identified pairs of individuals across cultures who shared identical scores on both variables. This yielded a sample of 68 individuals, 34 participants from each culture. We reasoned that if these analyses, with a reduced sample and matched on the variables that differed by culture, yielded similar results as with the entire sample, then we could be confident that the emergent results did not occur because of initial cultural differences in performance and interest. This set of analyses yielded very similar results. Most importantly, the interaction between value type and culture emerged with this reduced sample on final interest, $t(55) = 3.88, p < .01, \beta = .43$; reported effort, $t(55) = 2.33, p < .05, \beta = .27$; task involvement, $t(55) = 1.90, p = .06, \beta = .24$; and perceived competence, $t(55) = 2.85, p < .01, \beta = .35$, suggesting that these effects were not due to preexisting differences between cultures. It is noteworthy that the effects that emerged from analysis using the matched samples were the same as those that remained significant in the original analyses after controlling for initial performance and its interactions with other terms. Accordingly, we only tested mediation for effects that remained significant in both analyses.

**Mediation Analyses.** Given the requirements outlined by Baron and Kenny (1986), and the effects previously described, our mediation analyses were limited to examining whether task involvement and/or perceived competence explained the direct effects of the interaction between culture and type of utility value on final interest and self-reported effort.

We conducted a path analysis using Mplus 3.01 (Muthén & Muthén, 2004) to test the extent to which task involvement and perceived competence mediated the interaction of culture and type of utility value on final interest and effort (see Figure 5). The model that was specified used culture, type of value, and the interaction term to predict task involvement and perceived competence (the mediating variables). Initial interest, the three terms involved in the interaction, task involvement, and perceived competence were then used to predict both final interest and reported effort. Perceived competence and task involvement were allowed to covary. The results indicated that the specified model fit the data, $\chi^2(3) = 4.47, p = .21$, which was corroborated by the fit indices (comparative fit index [CFI] = .99, Tucker–Lewis index [TLI] = .90) and the root mean square error of approximation (RMSEA; .05). The solid lines in Figure 5 reveal the significant paths. Consistent with a mediation interpretation of the current effects, the interaction term was tested but was not a significant predictor of either final interest or reported effort after the mediating variables were included in the model.

**Discussion**

These results reveal that whether utility value is proximal or distal is critical for predicting how individuals will respond to a utility value manipulation. Consistently across all outcomes except performance, East Asian participants reaped the largest motivational benefits from learning that the new technique could help them reach their long-term graduate school and career goals. They were less involved in using the new technique, felt less competent, worked less hard, and evidenced less interest after receiving the proximal utility value intervention that focused on reaching their proximal, everyday life goals. Westerners evidenced the opposite response. They became somewhat more involved in problem solving, felt more competent, worked harder, and found the new technique somewhat more interesting when they were told that it was useful for their proximal as opposed to distal goals.
This pattern of results is consistent with Maddux and Yuki’s (2006) research on the ripple effect in Western and East Asian cultures. Compared to Westerners, East Asians are more aware of distal consequences of events, or of their ripple effects on their own lives and on the lives of others. Westerners, on the other hand, process information in a more analytical manner, which leads them to view current events as independent and unrelated, and to focus primarily on their proximal consequences. East Asian participants in Study 2 may have been more motivated by distal utility value than proximal utility value because they could clearly visualize the connection between the new technique and their long-term goals. Westerners, on the other hand, may have been more motivated by proximal utility value than by distal utility value because they could clearly see how the new technique could be useful for their everyday life activities.

Furthermore, findings from Study 2 provide cross-cultural evidence that is supportive of Harackiewicz and Sansone’s (1991) process model of intrinsic motivation. Mediation analyses revealed that task involvement and perceived competence accounted for the differential effects of distal and proximal utility value on interest. After learning that the new technique contained distal utility value for their future, East Asian participants became more involved and felt more competent, and this in turn promoted their interest. Westerners, on the other hand, became more involved in problem solving and felt more competent after learning that the new technique contained proximal utility value for their everyday life. As a result, they ended up showing more interest in the technique. In contrast, the differential effects of distal and proximal utility value on self-reported effort occurred through task involvement. After learning that the new technique contained utility value for their future, East Asian participants became more involved and worked harder on the problem sets. Westerners, on the other hand, became more involved after learning how the new technique could help them in everyday life.

Finally, it is noteworthy that individual differences in initial interest did not play as large a role in moderating how Westerners and East Asians responded to utility value in Study 2 as they did in Study 1. Although the three-way interaction among culture, initial interest, and type of utility value observed in Study 1 emerged initially on perceived utility and perceived competence in Study 2, these effects were attenuated when initial performance was accounted for. Moreover, the effects did not emerge on the key outcome variables of final interest and effort. One explanation for the weaker effects of initial interest as a moderator of culture and utility value effects may be that culture and initial interest were more highly correlated in Study 2, and thus the culture effect may have attenuated the moderating effects of initial interest. A second explanation for the absence of the interactive effect of initial interest and utility may be due to sampling. The overall mean for initial interest in Study 2 was lower than that in Study 1 and below the midpoint of the scale. By chance, this sample of Western participants appeared to have relatively lower initial interest in math, and there may not have been a sufficient number of participants with high initial interest to show the positive effects of utility value among high-interest individuals. Despite these differences in initial interest, our analyses revealed strong cultural differences in sensitivity to proximal and distal utility values, and these differences remained even when we tested them in a subsample matched on initial interest.

Given that the current research began with preexisting groups (i.e., East Asian vs. Westerner), however, it is important to consider other cultural differences that may have affected these results. One variable to consider is the cultural stereotype of Asians’ and Asian Americans’ high identification with the math domain (Niemann, Jennings, Rozelle, & Baxter, 1994) and research showing that they show performance gains when cultural identity is made salient (Armenta, 2010; Shih, Ambady, Richeson, Fujita, & Gray, 2002; Shih, Pittinsky, & Ambady, 1999). The existence of this stereotype in the math domain highlights the need to conduct research on utility value in other academic domains. For example, it is possible that the distal utility value manipulation was more motivating for East Asian participants in this research because math is more central to their long-term goals overall compared to those of Westerners. In other words, a distal utility value manipulation may be more motivating for individuals who identify more strongly with a domain, regardless of culture, and this should be investigated further. That said, the matched analyses that equated the cultures on interest still yielded effects of culture, which decreases the likelihood of this interpretation.

**General Discussion**

The main purpose of this research was to shed light on the motivation of Westerners and East Asians and, in particular, to examine the effects of an external manipulation of utility value on motivation and related processes. In Study 1, we found striking differences between how Western and East Asian learners with low interest in math responded to utility value. After learning that the new technique was useful, East Asians with lower interest in math increased their effort and reported greater interest in the new technique, whereas Westerners with lower interest in math did not. The utility value intervention did not affect the effort or interest of East Asians and Westerners who were already interested in math. In Study 2, however, when we examined how East Asians and Westerners responded to a distal as compared to a proximal utility value intervention, we found more similarities than differences between learners with low and high interest in math. Westerners were more motivated by proximal utility value than distal utility value regardless of individual interest. East Asians exhibited the highest overall levels of motivation.
after receiving the distal utility value intervention than after receiving the proximal utility value intervention. We did, however, detect some evidence that our utility value interventions were particularly effective for individuals with lower interest in math.

Findings from Study 2 also illustrate the mediating processes through which our utility value interventions influenced achievement behavior. East Asians increased their effort after learning about distal utility value and Westerners began working harder after learning about proximal utility value, because the distal and proximal utility value interventions motivated these participants to become involved in the task. The distal utility value intervention promoted interest for East Asian learners by getting them involved in problem solving and making them feel more confident. The proximal utility value intervention influenced interest for Western learners by increasing their task involvement and perceived competence.

The present findings extend previous utility value research in several important ways. First, they add to the growing number of experimental studies that have investigated the effects of experimentally manipulated utility value on achievement behavior (e.g., Durik & Harackiewicz, 2007; Hulleman et al., 2010; Hulleman & Harackiewicz, 2009; Vansteenkiste et al., 2004). The present studies demonstrate that these effects can depend on culture, on the interest students bring into the learning situation, and, most importantly, on whether the task is useful for proximal or distal outcomes. Second, by creating two utility value interventions that focused on either long-term or everyday life goals, we were able to test the differential effects of distal and proximal utility value interventions. This distinction proved to be crucial for understanding motivation across the two cultures studied here. Finally, and most importantly, this was the first study to examine the effects of experimentally manipulated utility value on achievement behavior of Westerners and East Asians. Today’s classrooms are increasingly multicultural, so if utility value is the missing ingredient in students’ learning experiences, we need to design utility value interventions that will be effective for learners from different cultures.

According to Hidi and Renninger’s (2006) four-phase model of interest development, interest in a subject evolves over time, and each of its developmental phases is characterized by varying amounts of reliance on external instructional support. During early phases of interest development, learners possess little stored knowledge and value of the subject, so they may need considerable external support. This support can come in the form of attention-grabbing stimuli, engaging presentation of the subject content, and positive encouragement (Hidi & Harackiewicz, 2000). At this stage, learners may not yet be ready to appreciate the value of the subject. In contrast, interest at later stages is largely self-driven and is characterized by large amounts of stored value.

Our findings from Study 1 with Westerners are consistent with the four-phase model, as they demonstrate that Westerners with lower levels of interest in math, who were still in the early phases of interest development, did not experience heightened motivation after learning about the utility value of the new math technique. Utility value by itself, without the additional external support, was not sufficient to spark their interest in the new technique. Their counterparts who were already interested in math, however, found the new technique interesting irrespective of whether it was useful for their future. These individuals already knew that math was useful so they did not reap any additional motivational benefits from learning about its utility value.

Interestingly, Study 1 findings with East Asian participants extend the four-phase model, by showing that culture moderates the learners’ response to value at early stages of interest development. East Asian culture places less emphasis on following personal interests and more emphasis on fulfilling social roles (e.g., being a good student to please parents; Oishi & Diener, 2001), which may be why East Asian learners with lower levels of interest in math worked harder and showed more interest in the new technique after learning that it could be valuable for their future. They did not need the external support that was so critical for Westerners in the early phases of interest development, and they were motivationally ready to internalize and benefit from distal utility value (Brophy, 1999). East Asians who were already interested in math behaved similarly to Westerners who were already interested in math, and they found the new technique interesting irrespective of its utility value. Their interest in the technique was driven by their already existing stored value for math.

The present findings extend Eccles et al.’s (1983) expectancy-value model, which posits that perceptions of utility value are positively related to persistence, performance, and task interest. Although there has been some discussion about how task values might function among individuals of different cultures (Wigfield, Tonks, & Eccles, 2004), our findings reveal that the distinction between proximal and distal utility value is critical and that the effects of these two types of utility value are not the same for Westerners and East Asians. Eccles et al. recognize that individuals enter achievement situations with their own prior history and values, and the research reported here specifies further how different types of utility value can resonate more or less with individuals depending on their value systems.

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