

Implicit Theories of Creative Ideas: How Culture Guides Creativity Assessments

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Abstract

The current studies provide evidence of two distinct implicit theories of creative ideas and so help to resolve the debate over differences in creativity assessments between Chinese and American samples. In three studies using three methodologies (qualitative inductive, cultural consensus modeling, and experimental), we employ data from 2,140 participants to reveal 26 domain general cues that can indicate whether a product or process is creative. About 95% of the Chinese used a broad range of cues whereas about 75% of the Americans used a narrow range of cues. Members of both cultures found cues such as *breakthrough*, *surprise*, and *potential* to indicate creativity. In contrast, cues such as *easy to use*, *feasible*, and *for a mass market* were indicators of creativity for most Chinese and non-creativity for most Americans. Thus, in addition to domain knowledge, knowledge about creativity itself contributes to creativity assessments. Cross-cultural differences in knowledge about creativity can help explain differences in how members of different cultures assess creativity. These findings have implications for the scholarly conceptual definition of creativity and suggest an array of possibilities for research on creativity and innovation.

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People in their everyday experience judge whether the ideas underlying products, processes, and proposals are creative. These creativity judgments have important implications for many aspects of individual and organizational effectiveness. Supervisors assess whether subordinates generate proposals embodying creative ideas and use these assessments to grant rewards and promotions (Amabile & Mueller, 2008). Consumers assess whether products embody creative ideas, judgments that positively relate to product desirability and intentions to buy (Horn & Salvendy, 2009). In organizations that desire to innovate, decision-makers need to consider whether proposals embody creative ideas when determining which subset to fund and pursue (George, 2007). While judgments about creative ideas are ubiquitous in many aspects of organizational life, empirical evidence of how the average employee or consumer makes these judgments is limited. From a theoretical perspective, this gap is important to fill because, for the kind of reasons just noted, creativity is considered to fuel competitive advantage (Woodman, Sawyer, & Griffin, 1993). Further, there is an active debate on how people form these judgments. Scholars are suggesting that people in China and the US assess creativity differently (Leung, Au, & Leung, 2004; Leung & Morris, 2011; Lubart, 2010; Morris & Leung, 2010; Niu & Sternberg, 2006). If there are cultural differences, it would be important for advancing theoretical understandings of creativity assessments and could have implications for understanding business in two of the world's largest economies. Therefore, reconciling the debate by providing the data needed to characterize cultural differences in creativity assessments has the potential to advance scholarship and practice on innovation across cultures as well as open up new lines of research on creativity.

The most widely held theoretical account of the disagreement between Chinese and American creativity assessments is that Chinese norms and values around collectivism and traditionalism should lead Chinese people to prioritize usefulness over novelty in their creativity assessments, whereas American people's norms around individualism and egalitarianism should lead American people to prioritize novelty over usefulness in their creativity assessments (Bechtoldt, De Dreu, Nijstad, & Choi, 2010; Chiu & Kwan, 2010; De Dreu, 2010; Erez & Nouri, 2010; Leung et al., 2011; Rudowicz, 2003; Zhou & Su, 2010). Yet the one empirical study to date examining how members of the two cultures weight novelty and usefulness when assessing the creativity of products has found that Chinese participants weighted novelty *more* than US participants did (Paletz & Peng, 2008). Further, work examining overall creativity ratings (rather than how novelty and usefulness play into these ratings) has not found significant differences between the creativity ratings of US and Chinese judges (Niu & Sternberg, 2001; Rostan, Pariser, & Gruber, 2002). Given this gap between theory and evidence around how members of the two cultures assess creativity, and because the ability to recognize ideas as creative is critical for many aspects of individual and organizational effectiveness (Csikszentmihalyi, 1997; Frese, Teng, & Wijnen, 1999), several theorists have issued a call for more research to better understand how people in China and the US assess creativity (Anderson, Potočnik, & Zhou, 2014; Erez et al., 2010; Hempel & Sue-Chan, 2010; Leung et al., 2011). We take up this call and provide evidence that clarifies how people in each culture might make creativity assessments that have the potential to impact many aspects of an organization's ability to innovate.

How Culture Shapes Creativity Assessments

The literature examining how culture shapes creativity assessments proposes that people in different cultures disagree about what is creative primarily because culture shapes what people

know. For example, Niu and Sternberg (2002) identified that critics in China described the movie “Crouching Tiger, Hidden Dragon” as pedestrian, while American critics described the movie as highly creative, presumably because Chinese audiences had been exposed to many similar types of movies before whereas Americans had not. Theory has long asserted that domain knowledge alone shapes creativity assessments (Amabile, 1982; Hennessey, Amabile, & Mueller, 2010). The main reason for this claim is that creativity is a relative judgment. To determine an idea’s creativity, people need to understand how the idea relates to what has already been established in the domain (Hennessey et al., 2010). However, recent work has shown that, even without systematic differences in domain knowledge, people’s assessments of creativity can differ systematically (Mueller, Melwani, & Goncalo, 2012; Mueller, Wakslak, & Krishnan, 2014). This raises the possibility that, separate from the domain knowledge people bring to bear to assess the ideas embodied in products, processes, and proposals, people may also have knowledge about creativity itself that they bring to bear to assess those ideas.

Specifically, people may have implicit theories about what cues indicate that ideas are creative. If so, different people may draw on different implicit theories to assess ideas. Implicit theories (e.g., Atran, Medin, & Ross, 2005; Chiu, Hong, & Dweck, 1997; Detert & Edmondson, 2011), sometimes also called cultural models (Atran et al., 2005), lay beliefs (Yates, 1992) or naïve beliefs (Snyder & Swann, 1978), are mental representations about what causes, predicts, or indicates what (Levy, Chiu, & Hong, 2006). Implicit theories are developed through socialization, exposure to media, and perceiving enacted cultural norms. This is why culture has been shown to shape implicit theories of, for example, leadership (House, Javidan, Hanges, & Dorfman, 2002), personality (Chiu et al., 1997) and cooperation (Keller & Loewenstein, 2011). Just as different people might view a cue (e.g., height, aggressiveness, charisma) as more or less

indicative of someone being a leader, so too might people view a cue as more or less indicative of creativity.

The predominant view in the creativity literature is that all people share the implicit beliefs that creative ideas embodied in products, processes, and proposals are characterized by novelty and usefulness, the conceptual definition used by creativity researchers (Amabile, 1982; George, 2007). However, rather than assume that all lay people draw on the same definition of creativity, it is possible that people tend to use implicit theories of creativity drawn from shared cultural experience when they assess outcomes for creativity. For example, people may take a more expansive view of what indicates creativity and so look to cues beyond novelty and usefulness to assess creativity. If people in different cultures have different beliefs about what implicit cues indicate creativity, this could explain why research has found conflicting evidence regarding whether and what differences in creativity assessments there are across cultures. Thus, rather than assume any particular definition of creativity, we examined the implicit theories about what specific cues people believe are indicators of creativity.

We employ an expansive view of culture and creativity assessments that encompasses the possibility that people might look to many cues to diagnose creativity (Batey, 2012; Rudowicz, 2003). There are many hints from the literature that an expansive framework may provide a fruitful avenue for examining differences in implicit theories of creativity between members of Chinese and US cultures. Although not yet systematically examined empirically, there are suggestions from case studies and examples that Chinese people may view cues such as moral goodness (Wu, 1994), collective spirit (Khaleefa, Erdos, & Ashira, 1996), social harmony (Liu, Wang, & Liu, 1997), and intuitiveness (Wonder & Blake, 1992) as indicating creativity.

This approach of considering a wide range of specific cues indicating creativity has been used successfully by the literature on implicit theories of creative *people*. The literature on the implicit theories of creative people asserts that members of a culture have shared belief systems about which specific cues indicate whether a person is creative (Sternberg, 1985). Work from this paradigm has generally asked individuals in a given culture to nominate specific cues characterizing creative people, such as “unconventional,” “artistic,” and “quirky” (Elsbach & Kramer, 2003). If a person behaves in a way that is suggestive of these cues, then others are more likely to categorize the person as “creative.” The question remains whether the same approach that has been used to examine how we diagnose creative *people* could also be used to examine how we diagnose creative *ideas*.

Regarding creative ideas, no work to date has developed a broad and comprehensive examination or conceptual understanding of the implicit theories lay people in different cultures may have about what cues indicate that the ideas embodied in a product, process, or proposal are creative. Unpacking the implicit theories lay people have about creative ideas is important because it can add to what we know about the processes through which creative ideas are recognized. Accordingly, we examine whether, apart from domain knowledge, culture can shift the implicit theories of what cues indicate creativity, and thereby shift how lay people in different cultures assess creativity.

To understand the relationship between culture and creativity assessments, it is important to map out the many cues seen to indicate creativity by American and Chinese people. This can also provide a basis for explaining when and why people in the US and China agree and disagree in their creativity assessments. Specifically, people from the US and China may agree that certain ideas are creative because those ideas all share cues that members of both cultures agree

indicate creativity. In addition, people in the US and China might disagree that certain ideas are creative if those ideas have cues that members of the two cultures disagree about with respect to whether they indicate creativity. Prior work has theorized about the possibility that certain cues might indicate creativity (Rudowicz, 2003; Wu, 1994), but to our knowledge, no research to date has systematically described a comprehensive set of cues and considered how each of those cues are viewed by people in both the US and China. Doing so could provide the empirical basis for resolving the ongoing debate over the prospect of systematic cultural differences in assessing creativity.

In the three studies that follow, we contribute to the literature on creativity and culture by documenting cultural differences in implicit theories about what cues indicate creative ideas and using these differences to show systematic differences in creativity assessments. The first study is an inductive one seeking to surface, without constraint, people's implicit theories about what cues indicate creativity (following Weller's, 2007 recommendations and as done by, e.g., Atran et al, 2005 and Keller & Loewenstein, 2011). It first derives cues using a content analysis from one large sample of participants explaining why they perceive something to be creative or uncreative. Then, with a second sample, we tested for whether there are broadly shared implicit theories about whether and how those cues indicate creativity. Next, following prior models of deriving and testing implicit theories (e.g., House et al, 2002), the second and third studies provide experimental tests of whether those different implicit theories yield different assessments of creativity. The studies provide evidence that knowing what implicit theory of creativity people hold is useful for anticipating their creativity assessments. Taken together, these studies provide a basis for building new theory on implicit theories of creative ideas, for explaining cultural

differences in creativity assessments, and for generating new insights about how people recognize creative ideas.

STUDY 1

Methods

To provide an inductive study of implicit theories of creative ideas, we follow the two-phase methodological approach of cultural consensus analysis (Borgatti & Carboni, 2007; Keller et al., 2011; Weller, 2007). In the first phase, we engaged one sample of participants to identify cues about products and processes that they believe indicate creative ideas. In the second phase, we then used the cues they generated to form a questionnaire, engaged a second sample of participants to take that questionnaire, and used the second sample's responses to assess whether there were consensus implicit theories of creative ideas.

Phase 1: Identifying cues

We sought beliefs about cues to creativity by asking for explanations of why products and processes were creative or not creative. Then we engaged in a content analysis of the explanations to identify the recurring cues.

Cue participants. We involved 817 participants in this phase. There were 419 participants from China, recruited and paid using the Chinese sample provider Sojump (age $M = 30.5$ years, $SD = 6.2$ years; percent female = 56%; years of work experience $M = 7.6$ years, $SD = 5.6$ years). There were 398 participants from the United States (US), recruited and paid using Amazon Turk (age $M = 34.2$ years, $SD = 13.0$ years; percent female = 63%; years of work experience $M = 13.7$ years, $SD = 11.5$ years). All Chinese participants were natives of China and all information was presented in Chinese. All US participants were natives of the US and all information was presented in English. Participants who did not self-report being natives of the

US (in the US sample) or China (in the Chinese sample), participants whose IP address did not place them in the expected country, and participants who did not complete the survey were dropped from analysis in this sample as well as all subsequent samples reported in this paper.

Cue elicitation. All participants were asked to nominate both a product and a process. We randomly assigned half the participants to describe creative products and processes and the other half to describe uncreative products and processes. Specifically, the product prompt said: “We encounter a large number of products every day—cars, clothing, toys, electronics, foods, and much more. Just some of them strike us as creative, and some strike us as being uncreative. Please name a product you encountered recently that you thought was [un]creative in the space provided below.” The process prompt said: We have many interactions at work, leading us to encounter new ideas, proposals, actions, and more. Just some of them (e.g., new ideas, proposals, actions) strike us as creative - some strike us as uncreative. Please name something at work that you encountered recently that you thought was [un]creative in the space provided below.” Then, participants were asked to provide at least three reasons as to why the product or process was or was not creative “so we understand what is important to you about a product [process] being [un]creative.”

Cue coding. Participants’ responses were analyzed by three native Chinese coders and three native US coders, depending on the sample. The coders unitized each explanation to identify discrete statements about cues, and then evaluated each statement as to what cue it indicated. The authors and the six coders started with an initial subset of about 10% of the explanations ($n = 160$) and engaged in an iterative process of generating, seeking out, and then merging highly similar cues. This process was then expanded to about 25% of the explanations ($n = 400$), with the possibility of modifying or proposing new cues to address new observations

and ambiguities. The result was a list of 26 cues. The six coders then evaluated the remaining explanations, making small refinements to the coding categories as warranted by these further examples to maintain clarity and distinctiveness. Each of the final cues was used in a median of 47 explanations (range: 11-600) to explain why an item was or was not creative.

The cues are listed in Table A1. Each cue has two levels, high and low. This is because each cue was used in explanations for why an item was creative (high) or was not creative (low). Of the 26 cues, 22 were found in the US sample and all 26 appeared in the Chinese sample. The four distinct cues were Observable, Social Approval, Social Harmony, and Updates Tradition. For 98% of the responses, at least two of the three coders (either US or Chinese) independently coded the same segment as containing the same cue. The average Cohen's kappa across all the cues was .84.

Finally, we note that the distributions of the cues in participants' explanations for products and for processes were remarkably similar. The proportion of statements using each cue differed on average by one percent. The only exception was that explanations for non-creative products were about three times more likely to use the low artistic cue than explanations for non-creative processes. As cues for products and processes were otherwise substitutable, we simplify by discussing products in what follows.

Cue Questionnaire. We generated a questionnaire to present every cue to creativity that emerged from the content analysis to a new set of participants. We used the explanations offered in the first phase to form items that were simple, concrete statements instantiating each cue. We formed six items for each cue, three "high" items from the explanations for creative products and processes and three "low" items from the explanations for non-creative products and processes. The items are listed in Table A1. In support of the initial content analysis, we note here that from

the responses of new participants in Phase 2 (described shortly) the mean Chronbach's alpha for the cues was .78.

Paradigm shift refers to a significant change in thinking that a product or process represents. This cue is indicative of "thinking differently," of radical rather than incremental alterations in approach (cf., Kuhn, 1970). High levels indicate thinking in a new way and low levels indicate thinking in typical ways, to generate products or processes.

Breakthrough is concerned with overcoming a difficult challenge to be able to make a product or process. This cue is about doing something others had failed to accomplish or did not think could be done, and so represents progress in a previously blocked direction (Fleming, 2001). High levels indicate accomplishing something challenging and low levels indicate doing something easy that anyone could accomplish.

Potential refers to the future possibilities opened up as a result of the product or process. High levels of potential indicate that a product or process leads to many new options and pathways and low levels of potential indicate that it is limited to just its immediate application.

Rare refers to the unusualness of a product or process. This cue is similar to what Guilford's (1956) notion of novelty (later, originality) captures, the sheer likelihood of occurrence of a product or process. High levels of rarity indicate that it is something unlike what has been seen before and low levels indicate that it is like what is already present. It is perhaps ambiguous as a cue, because it could indicate something bizarre as well as something extraordinary.

Repurposing is concerned with taking something from one context and adapting it to a second context. It captures the element of flexibility (Guilford, 1956) of seeing new functions for

existing items. High levels of repurposing indicate a product or process uses ideas from other contexts and low levels indicate using items in typical ways.

Surprise refers to the affective reaction—the amazement, the astonishment—of experiencing something unexpected. It captures arousal and change in understanding (Filipowicz, 2006). High levels of surprise indicate something is experienced as a surprise and low levels indicate that something is experienced as boring or dull.

Artistic is concerned with the aesthetics of the product or process. Scholars have long discussed aesthetics and creativity (e.g., Amabile 1982) and at least in some domains it is an aspect of why a product or process might be perceived to be valuable. High levels indicate the item is perceived to be beautiful and low levels indicate it is perceived to be ugly.

Updates Tradition refers to providing a fresh take on an established item or process. It concerns a form of change that acknowledges the past. High levels indicate re-imagining a tradition and low levels indicate adhering to tradition. This cue may correspond to “renovation” or the development of existing traditions that is discussed as one important cue to creativity identified in Arab societies (Khaleefa et al., 1996).

Combination is concerned with bringing together items that are normally separate. It refers to integrating functions, features, or other aspects that are typically distinct (as in the “individualist definition” of creativity in Sawyer, 2012). High levels indicate mixing features from different items and low levels indicate not combining items or combining items that are typically combined.

Functional refers to an item addressing a need or having a use. It captures a concern over performing adequately or accomplishing some outcome (Amabile, 1982). High levels indicate

that an item does have a use and low levels indicate that an item does not have a use or does not function effectively.

Variety is concerned with an item being available in many versions or having many options. It indicates customization or specialization and the generation of many variations (cf., Simonton, 1999). High levels indicate that there are many versions or options and low levels indicate that there is one version.

Experiential refers to an item being interactive. It captures an aspect of engagement, or being hands-on, with the item. High levels indicate that the item is interactive and low levels indicate that it is not interactive.

High Tech is concerned with the role of technology. It captures a link between engineering and scientific discovery and creativity. High levels indicate a presence of sophisticated new technology and low levels indicate the presence of simple or existing technology. The lay press often associates “high technology” with innovation and entrepreneurship as well as consumerism (Thiel, 2014), which is a growing theme in Chinese culture (Lan & Kaufman, 2012).

Joy refers to a positive affective experience with the item, capturing the happiness or fun involved in engaging with it. It acknowledges a connection between how people feel about something and their assessments of its creativity (Amabile, Barsade, Mueller, & Staw, 2005). High levels indicate an item is fun and makes people happy, whereas low levels indicate it is annoying or frustrating.

Social Interaction is concerned with an item prompting people to engage with one another. High levels indicate that the item promotes social interaction and low levels indicate the

item limits social interaction or involves only individual use. Liu et al (1997) noted that in Chinese contexts products that allow for sociability are seen as creative.

Ease of Use is concerned with the item being simple to use and simpler than other possibilities. It is concerned with design and the end user of the item. High levels indicate the item is simple to use and low levels indicate it is complicated or hard to use.

Wide Use refers to the generality of an item's application. It captures the question of whether the item is for a specialized audience or whether anyone might use it. High levels indicate that anyone might use it and low levels indicate that it is only for certain people.

Intuitive refers to the item being easy to understand. It addresses how comprehensible and explainable an item is. High levels indicate that the item is easy to understand and low levels indicate that the item is hard to understand. Wonder and Blake (1992) considered whether Easterners focus more on intuitive approaches to creativity than do Westerners.

Observable is concerned with whether an item is tangible or conceptual. It captures an aspect of the nature of the item and how it is experienced. High levels indicate that the item is tangible and can be touched or seen, whereas low levels indicate that the item is abstract or theoretical.

Social Approval refers to an item fitting with social rules, being socially appropriate, legitimate, and abiding by existing norms and values. High levels indicate the item does not break any social rules and low levels indicate that it breaks social rules. A concern with social approval is related to a point made by Wu (1994), that in a Chinese context creativity may be associated with moral goodness.

Credibility is concerned with the item being reputable and not in question. It indicates whether the item comes from a known source with evidence of effectiveness. High levels

indicate that it comes from reputable sources and is tested to work and low levels indicate that it does not come from reputable sources and is untested.

Fashionable is concerned with whether the item is current and in style. It indicates the fit of the item to current trends. High levels indicate that the item is in style and low levels indicate that it is not in style.

Harmony refers to the item helping people get along with one another – a feature commonly described as important to creativity in communal cultures such as Chinese culture (Goncalo & Staw, 2006). It indicates a concern over the implications for social functioning that an item represents. High levels indicate that the item promotes social unity and low levels indicate that the item diminishes social unity.

Mass Market refers to an item being advertised and for a large consumer base. It acknowledges the consumer context of many items being assessed for creativity. High levels indicate that the item is for a large market and low levels indicate that it is for a small market.

Name Brand is concerned with whether the item is labeled with a well-known brand. It is also acknowledging the consumer context, through connections between company identities and reputations and the assessments of products. High levels indicate the item is from a large, known brand and low levels indicate the item is not from a known brand.

Feasibility is concerned with the feasibility of producing the item. It captures information about what it takes to produce items. High levels indicate the item is cheap and easy to produce, and low levels indicate an item is costly and difficult to produce. Feasibility is often described as one manifestation of the usefulness component of creativity (Rietzschel, Nijstad, & Stroebe, 2010).

The items instantiating all of these cues to creativity were written in English. Three bilingual speakers translated subsets of the items into Chinese and then back-translated a different subset into English. Participants in the US were given either the original or the back-translated version of the survey. The mean ratings on each item from the back-translated survey were strongly correlated ($r = .95$) with the mean ratings on each item from the initial survey. We generated t-tests to examine whether there were notable differences between the initial and back-translated versions of each item on the survey. After correcting for family-wise error-rate using a false discovery rate analysis (Benjamini & Yekutieli, 2001), we found two individual items, for different cues, with discrepancies. Dropping these items yields the same pattern of results in what follows.

Phase 2: Identifying consensus

We surveyed participants to have them complete the questionnaire about the cues, followed by demographic and exploratory measures. Then we analyzed whether participants' responses reflected consistent beliefs about the cues indicating creativity using the most current analyses for applying cultural consensus theory to assess beliefs.

Survey participants. A total of 365 people completed the survey. There were 177 participants from China, recruited and paid using the Chinese sample provider Sojump, (age $M = 32.5$ years, $SD = 5.6$ years; 46% female; years of work experience $M = 8.9$ years, $SD = 5.5$ years; 98% Han). There were 188 participants from the US, recruited and paid using Amazon Turk (age $M = 33.6$ years, $SD = 11.3$ years; 62% female; years of work experience $M = 12.0$ years, $SD = 10.3$ years; 85% White, 6% Latino, 4% African-American). The differences in gender ($\chi^2(1, N = 365) = 9.32, p < .01$) and work experience ($t(363) = 3.58, p < .01$) were reliable. However, once country is accounted for, gender and work experience did not predict

participants' beliefs about creativity. An additional 13 participants completed the surveys but failed to pass catch trials monitoring attention to the task. Their data was not analyzed. This is a lower rate of careless responding than is sometimes reported from online samples (see, e.g., Landers & Behrend, 2015, and the following responses in that special issue), presumably because it was a long survey that inattentive participants were unlikely to have completed. Some 90 participants started but did not complete the survey, spending a median of 1.63 minutes to make that decision. For those who completed the survey and passed the catch trials, the Chinese participants (median = 14.40 minutes; mean = 19.17 minutes) and US participants (median = 13.67 minutes; mean = 15.63 minutes) tended to take similar amounts of time (e.g., a Mann-Whitney test just using score rank orders to limit the influence of skewed response times was inconclusive, $Z = 0.71$, *ns*).

Procedure and design. We asked participants to consider three high items and three low items for each of the 26 cues using an online survey. One high item and one low item for every cue, for a total of 52 items, were presented on each of three pages. The three pages and the order of the 52 items on each of those pages were presented in a unique random order for each participant. Consequently, on average, items for any given cue were presented after 16 intervening items for other cues, which is well over the largest distance (6 items) that might bias contrastive ratings (Weijters, Geuens, & Schillewaert, 2009).

For each item, participants answered the question: "How important is this feature to a product being creative (1 = not at all, 6 = extremely)?" This question addresses what cues participants believed to be most central or critical to judging creativity. We surveyed additional participants and asked them different questions. Specifically, we asked additional groups of participants: "Is a product with this feature likely to be creative (1 = not at all, 6 = extremely),"

“Is a product with this feature creative (1 = no, 2 = yes)?” and “Is a product with this feature innovative (1 = no, 2 = yes)?” As we found highly similar results from these questions and the importance question and because the analyses we present are sufficiently complex, we focus our presentation on the data from the importance question. We discuss the ratings from questions other than importance in a later section on the robustness of the findings.

Following the items about the cues, participants answered exploratory questions about openness to experience, fixed mindset, and analytic-holistic thinking, as well as demographic questions. We included these exploratory measures because each has been prominently discussed in research on generating creative outcomes as well as research on US and Chinese culture (Chan, 2012; Feist, 1998; Karwowski, 2014; Monga & John, 2007; Yang, McCrae, & Costa, 1998; Zhang, 2002), allowing us to align or to distinguish culturally generated implicit theories of assessing creative ideas from models of generating creative ideas.

Measures. We used the Multi-Culture Latent Truth Rater Model (Anders & Batchelder, 2012, 2013) to apply Cultural Consensus Theory (Romney, Weller, & Batchelder, 1986) to analyze the cue questionnaire. The Multi-Culture Latent Truth Rater Model is a method for aggregating information to reveal whether groups of individuals tend to give the same answers to the same questions, indicating that they are drawing on a common system of cultural beliefs. It is in the broad family of clustering approaches to analyzing data, but used to form clusters of respondents, rather than clusters of items. It is part of a thirty-year effort in cultural anthropology and psychology to provide theory and methods for assessing collective beliefs. The Multi-Culture Latent Truth Rater Model is an updated analytic procedure using hierarchical Bayesian inference to allow for the simultaneous identification of multiple groups each drawing on a

different system of cultural beliefs. Anders (2014) distributed an R package, CCTpack, which we used for conducting the analysis.

The Multi-Culture Latent Truth Rater Model procedure addresses several issues that can arise when people with potentially differing belief systems encounter collections of questions that require scale responses. The model estimates the difficulty for each item—how likely individuals are to know and provide the cultural group’s answer to that item. Information varies in how widely known it is and some cues to creativity may be more widely acknowledged. The model also estimates a scaling bias and a shifting bias for each participant, which capture how each uses the extent of the scale (scaling bias) and whether each tends to use one end of the scale (shifting bias). Together, these help to account for tendencies to, for example, constrain responses in the top, middle, or bottom of the scale or use the entire scale. By separating out item- and respondent-level biases, the model minimizes the influence of these sources of variance when generating estimates of group level patterns.

Number of implicit theories is the first measure derived from a Multi-Culture Latent Truth Rater Model analysis. We follow Anders and Batchelder in minimizing the Deviance Information Criterion (DIC) to find a best-fitting model to identify the number of distinct groups with distinct patterns of beliefs.

Cue ideal values are the core measurements we derive from the model. The model derives the ideal response for each item for each implicit theory. The ideal responses are a bit like a weighted mean in that the ideal response is generated from combining group members’ responses to that item, weighted by each members’ overall fit to the group. This minimizes the influence of respondents whose answers poorly match the group, such as people with idiosyncratic beliefs or noise responders. Also, the ideal responses are generated after separating

out the effects of each participant's scaling and shifting biases and the difficulty of each item. Once we had the ideal response to each item for each cultural group, we aggregated the items for each cue, separately for the high and low sets. These cue ideal values then represent the ideal responses to each cue for each implicit theory.

Implicit theory endorsement is a probabilistic assessment, for each participant, of which implicit theory their responses indicate they are using. In our data, 85% of participants were placed into a group with a probability greater than 99.9%. Individuals not clearly fitting one implicit theory or another can indicate that they are drawing on rare or idiosyncratic beliefs, or using a hybrid of multiple belief systems. We dichotomized the measure for the sake of convenience in describing the data, given the bimodal distribution.

We also gathered additional ratings to relate to the cue and model data. *Openness to experience* ($\alpha = .82$) was assessed using 11 items from the Big 5 measure developed by Costa and McCrae (1992) (e.g., "I enjoy trying out new ways to solve problems" and "I like to talk to people whose opinions differ from mine").

Fixed mindset ($\alpha = .94$) was assessed using the three-item scale from Dweck, Chiu and Hong (1995), including "People can do things differently, but the important parts of who they are can't really be changed."

Analytic-holistic thinking was assessed using the Choi, Koo, and Choi (2007) measure. It yields an overall score, as well as sub-scores for causality ($\alpha = .85$; "Everything in the world is intertwined in a causal relationship"), contradiction ($\alpha = .66$; "It is more desirable to take the middle ground than go to extremes"), change ($\alpha = .71$; "Current situations can change at any time"), and attention ($\alpha = .79$; "It is more important to pay attention to the whole than its parts").

Demographics included measures of sex, age, years of work experience, and native language.

We note here that none of these measures—openness to experience, fixed mindset, analytic-holistic thinking (overall or the four subscales separately) and the demographics items—were related to the pattern of creativity cues presented in the results section. None predicted implicit theory endorsement over and above country of origin. So, we do not discuss them further.

Results

Participants' ratings indicated two distinct implicit theories about cues to creativity. The model with two implicit theories ($DIC_2 = 130,858$) fit the data better than models with one ($DIC_1 = 133,258$) or three ($DIC_3 = 168,606$) implicit theories. Consistent with the pattern in the DIC outcomes, a scree plot of the cue questionnaire data is suggestive of a two-factor solution (the black line in Figure 1), and an eigenvalue posterior predictive check generated from the two-implicit theory model (the gray region in Figure 1) fits the scree plot.

The model forms implicit theories solely based on the similarity in individuals' ratings, so a key question is what predicts implicit theory endorsement. In these data the answer is quite clear: nationality strongly predicts implicit theory endorsement, $r(365) = .74$, $p < .001$. Once country is accounted for, no further measure (e.g., individual difference measure) contributes to predicting which implicit theory individuals endorsed. Organized in terms of country, these data indicate that 92% of our Chinese participants share an implicit theory about cues for creative products, with a minority of 8% adopting a second implicit theory. In addition, 80% of our US participants share that second implicit theory, with a larger minority of 20% drawing on the first

implicit theory held by most of the Chinese participants. So, implicit theories about what cues indicate creative products are strongly, but not entirely, shaped by national culture.

The content of the two implicit theories are indicated by their cue ideal values, presented in Table 1. The implicit theories can be characterized as taking either a broad view or a narrow view. We describe them as broad and narrow implicit theories because they deemed different numbers of cues important for creativity. The broad implicit theory is the common view among the Chinese participants, and the narrow implicit theory is the common view among the US participants.

The narrow implicit theory of what cues indicate creativity holds that only a small set of cues are important for creativity (i.e., the 95% confidence interval for the cue ideal value lies above 3.5, the midpoint of the scale): Paradigm Shift, Breakthrough, Potential, Rare, Updates Tradition, and Surprise. A few more cues, Repurposing, Artistic, Combination, and Functional, are also viewed as modestly important (i.e., the 95% confidence interval for the cue ideal value includes the midpoint of the scale). Of the remaining cues that arose in explanations of why an item was creative, the cue ideal values indicate that these are not important to creativity (i.e., the 95% confidence interval for the cue ideal value lies below the midpoint of the scale). These are cues such as Name Brand, Mass Market, Social Approval, and Feasibility, among many others. The cue ideal values for the low levels of the cues were nearly all deemed not important to creativity. Thus, the narrow implicit theory of cues to creativity, the view of about 80% of our US sample, is strongly oriented around just a few cues.

The broad implicit theory, in contrast, includes all 26 cues as important or modestly important for creativity. Most of the low levels of the cues were deemed not important to creativity, except for low level of Breakthrough (e.g., “It was easy to think of”), which was

deemed important to creativity. So, the broad implicit theory of using cues to indicate creativity and non-creativity, the view of nearly the entire Chinese sample and about 20% of the US sample, largely follows the indications from the explanations for creative and non-creative products.

The narrow and broad implicit theories of cues for creativity are different not just in which cues are deemed important for creativity, but also in the relative ranking of those cues. As a simple indication, just looking at the high level items (i.e., items derived from what people said to explain why something was creative), the correlation between the cue ideal values for the broad and narrow implicit theories is at best modest, $r(26) = .29$, $p = .14$. Some of the broad implicit theory's most important cues, such as Ease of Use, Intuitive, and Harmony are deemed unimportant by the narrow implicit theory.

As a simple indication of the stark difference in the viewpoints of the two implicit theories, we consider raw data for a few of these cues with large differences and contrast the US participants taking the narrow and the broad views. For the item "It is for a mass market" we found $M_{USbroad} = 3.92$, $M_{USnarrow} = 2.18$, $t(186) = 6.97$, $p < .001$. For the item "It is easy to use" we found $M_{USbroad} = 4.58$, $M_{USnarrow} = 2.96$, $t(186) = 6.02$, $p < .001$. For the item "It is easy to understand" we found $M_{USbroad} = 4.50$, $M_{USnarrow} = 2.95$, $t(186) = 5.94$, $p < .001$. And, for the item "It is socially acceptable" we found $M_{USbroad} = 4.45$, $M_{USnarrow} = 2.41$, $t(186) = 7.83$, $p < .001$. These are qualitatively different responses, indicating substantively different beliefs about these cues as indications of creativity.

Robustness

To examine the robustness of these analyses, we ran an array of additional models. As the Multi-Culture Latent Truth Rater Model uses sampling methods, multiple runs of the same

model can return different parameter estimates. We generated multiple runs and found that they gave results that were quantitatively minimally different and qualitatively identical. We dichotomized the raw data and submitted them to the Anders and Batchelder (2012) updated analysis for dichotomous data, and found nearly identical patterns. We individually standardized the raw data and submitted them to a model suited to continuous data and found nearly identical patterns. We also generated an analysis using the original cultural consensus model approach, outlined in the appendix, which also generated nearly identical patterns. Finally, we considered the robustness of the results to concerns over random noise responders by randomly replacing real participants' responses with randomly generated responses and found that the results were highly robust. Even 20% random responses did not appreciatively change the final patterns, which is about twice the level of estimated random responding estimates in typical survey data (Meade & Craig, 2012). Partly this lack of an effect is because we used reasonably large sample sizes. But critically, the Multi-Culture Latent Truth Rater Model diminishes the impact of responses deviating from collective patterns, so unless responses deviate systematically, they will have minimal influence. Thus, the particular choices in the modeling and the form of the data are not dramatically altering the pattern of results.

We have also engaged in several replications of the cue questionnaire data presented here. We involved another 745 participants (49% China, 51% US) and asked them different questions about the items in the cue questionnaire: how likely each cue indicates creativity, whether an item with each cue is creative, and whether an item with each cue is innovative. We found a broad and a narrow implicit theory that was strongly but not entirely predicted by nationality with every type of instruction. The mean correlation between the cue ideal values produced by participants using these different instructions and the importance data that was our

focus was $r_{\text{mean}} = .97$. Consequently, we have reason to believe that the findings we presented are stable. In addition, these supplementary data allow us to note that the cues deemed not important were also deemed not likely to indicate creativity and deemed not creative. Thus, the supplementary data clarify that the cue ideals that were evaluated as not important to creativity are also indicating that something is *not* creative.

Finally, the high and low items were derived from explanations for why something was creative or uncreative, but it is possible that participants in our sample may have responded to items less because of this than whether the items were seen to be positive (e.g., good, beautiful) or negative (e.g., bad, frustrating) in valence. Because many of the items were neither positive nor negative in valence (e.g., it is concrete, it is abstract), we generated a coding scheme with three categories: positive, negative and neutral valence. Three coders rated each item's valence ($\alpha = .91$). Regressions predicting creativity ratings, controlling for these valence ratings, showed a reliable difference between high and low items for the broad model ($t(153) = 3.20, p < .01$) and for the narrow model ($t(153) = 4.76, p < .001$), indicating that the high versus low distinction is providing information about creativity apart from valence.

Discussion

Study 1 revealed that nationality, but not demographic or individual difference variables (including age, work experience, and openness to experience) predicted adopting one of two distinct implicit creativity theories: broad and narrow. We found that about 80% of US respondents were narrow and about 95% of Chinese respondents were broad. Hence, the typical Chinese respondent tended to employ a wider range of cues than the typical US respondent when determining creativity. The result is evidence of two culturally shaped implicit theories of creativity.

Study 1 provides the means to identify specific cues that might lead to similar creativity assessments as well as cues that might lead to different creativity assessments between most US and Chinese respondents. In Study 2, we used a vignette study to test these predictions for three cues predicted to yield similar responses from Chinese and US participants and three cues predicted to yield different responses from Chinese and US participants. The goal was to assess whether that the Study 1 findings about the cues and how they tend to be treated across national cultures can be used to predict creativity assessments. We also examine whether implicit theory endorsement will mediate the relationship between nationality and creativity assessments. Thus, Study 2 examines whether people will form systematically different creativity assessments, and whether understanding which implicit theory people hold can be used to predict those distinct creativity assessments.

STUDY 2

Method

Participants

We recruited 516 participants for an online study. A total of 272 US participants were recruited from Amazon Mechanical Turk (61% male, Mean Age = 32.24, SD = 10.32; Mean Years of Work Experience = 10.83, SD = 9.48; 82% White, 6% Latino, 7% African-American), and 244 Chinese participants were recruited via Sojump (47% male, Mean Age = 31.64, SD = 5.97; Mean Years of Work Experience = 8.78, SD = 5.81; 96% Han). We found significant differences on the demographic variables between the US and China samples for gender ($\chi^2(1, N = 516) = 9.48, p < .01$) and work experience ($t(514) = 3.00, p < .01$). Controlling for gender and work experience did not alter any of the findings when included as control variables, so we did not explore them further. Participants were randomly assigned to rate one of six cues. To

simplify the analyses, we aggregated these six cues into two types: 1) cues that both Chinese and US participants are likely to view as indicating *the same* level of creativity (Potential, Surprise, or Paradigm Shift) and 2) cues that Chinese and US participants are likely to view as indicating *different* levels of creativity (Mass Market, Intuitive, or Social Approval). Thus, the experiment involved a 2 (Country: China, US) by 2 (Cue Type: Same, Different) between subjects design.

Procedure and Materials

All materials were displayed in Chinese for participants in China, and were displayed in English for US participants. Participants were first asked to complete a 12-item questionnaire asking them which features they viewed as important to creativity. This questionnaire was a much-abbreviated version of the survey used in Study 1, generated to quickly identify which of the two implicit theories of creativity people likely hold. We expected the type of implicit theory to mediate the relationship between nationality and creativity assessments for the cues predicted to show national differences.

We note for the sake of completeness that participants next completed two surveys assessing cultural tendencies. They answered scales for tightness-looseness (Gelfand et al., 2011; Harrington & Gelfand, 2014) and vertical-horizontal-individualism-collectivism (Triandis & Gelfand, 1998) as past research has indicated they might explain why Chinese and Americans differ in creativity assessments (Kwang, 2005; Lubart, 2010). However, as the results from these measures were inconclusive, we do not discuss them further.

Participants were then prompted to rate an outcome: “You were reading and came upon a review of a wrist watch. The review said this product....” The product was then described with a cue we expected to produce similar or different assessments between Chinese and Americans. Specifically, for the cues expected to yield similar assessments, the product was described as: is

surprising (Surprise), has the potential for many different uses (Potential), or the designers had to use a different perspective to come up with this product (Paradigm Shift). For the cues expected to yield different assessments, the product was described as: is for a big market (Mass Market), is easy to understand (Intuitive), or does not break any social rules (Social Approval). Participants were then prompted to rate whether they agreed the product was “creative” and “innovative” on a scale ranging from 1 (= not at all) to 7 (= very much so). The items “creative” and “innovative” were averaged to create a two item creativity scale, $\alpha = .89$.

Participants ended the survey by reporting demographic information. The Chinese participants (median = 4.63 minutes; mean = 10.65 minutes) tended to take longer on the survey than the US participants (median = 4.00 minutes; mean = 5.08 minutes) as shown by a Mann-Whitney test (i.e., just using score rank orders to limit the influence of skewed response times), $Z = 2.85, p < .01$.

Development and validation of the abbreviated implicit theory measure. The development of the 12-item implicit theory survey was somewhat different than traditional approaches to developing shortened scales (as discussed by, e.g., Smith, McCarthy & Anderson, 2000), as our survey is not a scale in the usual sense. It is not seeking to generate an index or a particular factor structure for the items on the survey. Instead, our aim was to submit the shortened survey to a Multi-Culture Latent Truth Rater Model analysis to identify the implicit theory of creativity that individuals are most likely to hold. Accordingly, the first task was to select items with large differences between the broad and narrow implicit theory so as to readily identify which implicit theory they hold. The second task was to provide items that are likely to represent important and unimportant aspects of creativity for most respondents so as to anchor the scale and so identify how each participant is using the scale to improve the accuracy of

identifying individuals' implicit theories. For this reason, there were three kinds of items on the short scale. Most critical were six cues that should yield different responses from people holding the broad and narrow implicit theories: "it is in fashion" (Fashionable), "people I know use it" (Credibility), "it helps people get along with each other" (Harmony), "it is a big brand" (Name Brand), "it is straightforward to make" (Feasibility), and "many people might use it" (Wide Use). It also included cues that should be deemed important by both the broad and narrow implicit theories: "nobody thought it could be done, and yet they did it" (Breakthrough), "it re-imagines a tradition" (Updates Tradition), and "it uses something for a new purpose" (Repurposing). Finally, there were three cues that should be deemed unimportant by both broad and narrow implicit theories: "it makes life harder" (Low Ease of Use) "it is ugly" (Low Artistic), and "it limits social interaction" (Low Social Interaction).

A Multi-Culture Latent Truth Rater Model analysis of just these 12 items from Study 1 revealed that the best fitting model was a two implicit theory solution. Implicit theory endorsement using the 12-item scale accurately predicted implicit theory endorsement from the full 156-item scale for 87% of participants ($\kappa = .73$), putting 188 into the broad implicit theory correctly and 35 incorrectly, and 128 into the narrow model correctly and 12 incorrectly. This likely underestimates the effectiveness of the short scale. For the 90% of participants for which the model's likelihoods of assigning the correct implicit theory from the long survey were 95% or higher, the model from the short survey assigned the same implicit theory as the full survey for 91% ($\kappa = .81$). The short survey does best at classifying those the long survey classifies with the greatest likelihoods. Further, the model is helpful in clarifying from the short survey who is likely to be most accurately classified: for the 66% of participants for which the model's likelihoods from the short survey were 95% or higher, the model assigned the same implicit

theory as the full survey for 98%. Thus, the short survey pretty aptly distinguishes who holds the broad and narrow implicit theories and also signals the likelihood of its classifications being correct accounts.

As further support for the usefulness of the 12-item scale, we conducted an additional pilot study with the 12-item scale with a new sample of 297 participants from the US ($n = 158$) and China ($n = 139$). We submitted the data to a Multi-Culture Latent Truth Rater Model analysis, which revealed a two implicit theory solution, again showing the broad and narrow implicit theories, with similar proportions for the Chinese (93% broad) and US (70% narrow) participants holding each implicit theory as found in Study 1. Thus, the short scale appears able to capture much of the ability of the long survey to identify which implicit theory individuals hold and the proportions of the two implicit theories appears stable across samples.

Results

As expected, country and the type of cue interacted to predict creativity ratings, as indicated by an ANOVA ($F(1, 313) = 5.56, p < .05, \eta^2_p = .02$). Simple effects tests conducted within the ANOVA reveal that when rating cues expected to indicate the same high levels of creativity for all, US ($M = 4.95, SD = 1.23$) and Chinese ($M = 5.64, SD = .88, p = .15$) participants' creativity ratings were both high. In contrast, when rating cues we expected to differ, US participants' ($M = 2.94, SD = 1.50$) ratings were substantially lower than those from Chinese participants ($M = 5.46, SD = 1.15, p < .00$). Whereas the Chinese participants' ratings were comparably high for the two types of cues ($p = .19$), the ratings from US participants differed ($p < .00$). As shown in Table 2, the pattern of creativity ratings for each individual cue was quite consistent with the overall pattern for the cue types. In addition, one sample t-tests identified that all cues seen to similarly indicate creativity were rated significantly above a 4, the

midpoint of the scale, whereas cues seen to differentially indicate creativity were all significantly above or below the mid-point.

We examined whether the influence of country on creativity ratings was driven by the implicit theories individuals held. We analyzed the abbreviated implicit theory survey using the Multi-Culture Latent Truth Rater Model. We found that a model with two implicit theories ($DIC_2 = 16,598$) fit the data better than models with one ($DIC_1 = 17,092$) or three ($DIC_3 = 16,831$) implicit theories. The implicit theory endorsements showed that 34% of US participants ($n = 92$) likely hold the broad implicit theory identified in study 1, whereas 66% of US participants ($n = 180$) likely hold the narrow implicit theory. The narrow implicit theory was likely only held by 10 of the 244 Chinese participants (4%), with the rest likely holding the broad implicit theory.

As a simple indication of the similarities and differences in responding to the abbreviated implicit theory survey, the average rating for the items predicted to be similarly high for all participants were indeed high ($M_{\text{China}} = 4.73$, $SD = 0.62$; $M_{\text{US}} = 4.86$, $SD = 0.82$), the items predicted to be low for all participants were indeed low ($M_{\text{China}} = 2.80$, $SD = 1.14$; $M_{\text{US}} = 1.80$, $SD = 0.88$), and the items predicted to be different were indeed sharply different ($M_{\text{China}} = 4.81$, $SD = 0.64$; $M_{\text{US}} = 3.08$, $SD = 1.19$). The sharp difference was because most of the US sample adopted the narrow implicit theory and so rated these items low ($M = 2.49$, $SD = 0.99$), whereas a minority of the US sample adopted the broad implicit theory and so rated these items high ($M = 4.22$, $SD = 0.54$). The correlation between implicit theory endorsement and mean ratings for the items predicted to be different was quite strong, $r = .84$.

To assess whether implicit theory endorsement mediated the effect of country on creativity ratings, moderated by cue type, we used Hayes's (2013) PROCESS procedure (model 15, default settings) and found that country predicted implicit theory endorsement, $b = 0.60$ (SE

= .03), 95% CI [0.55, 0.66], $p < .001$, that the country by cue type interaction predicted creativity ratings, $b = 1.21$ (0.29), [0.64, 1.79], $p < .001$, and that the conditional direct effect of country on creativity ratings was clearly stronger for the different cue types $b = 1.65$ (.22), [1.22, 2.08], than the same cue types, $b = 0.43$ (0.20), [-.05, 0.82]. Further, we found that the implicit theory endorsement by cue type interaction predicted creativity ratings, $b = 0.76$ (.33), [0.11, 1.42], $p < .05$. Critically, the conditional indirect effect of country on creativity ratings through implicit theory endorsement was only reliable for the different cue types, $b = 0.68$ (.18), [0.32, 1.05], not the same cue types, $b = 0.22$ (0.13), [-.03, 0.47]. Thus, for descriptions using different cue types, one's implicit theory of creativity predicts one's creativity ratings.

Discussion

Study 2 found that the cues examined in Study 1 could be used to predict similarities and differences in Chinese and American individuals' creativity assessments. Cues to creativity on which we found agreement regarding importance ratings in Study 1, when used to describe an item, led to comparable ratings of creativity in Study 2. Cues to creativity on which we found a difference regarding importance ratings in Study 1, when used to describe an item, led to different ratings of creativity in Study 2. Further, a brief survey (rather than the lengthy one used in Study 1) was sufficient to identify which implicit theory an individual endorsed (i.e., broad or narrow). This allowed for still more refined predictions about how individuals would react to cues to form creativity assessments. In sum, Study 2 provides support for both the usefulness of culture and the cues in predicting assessments of creativity and the usefulness of identifying which implicit theory individuals are using to assess creativity.

Although the pattern across cues was consistent with our predictions, we found a larger difference between Chinese and US ratings for the "potential" cue than we would have expected

based on the overall findings from Study 1. It is possible, for example, that the core concerns of potential are not that there are many ways in which something might be used (the statement tested in the current study) but rather that something might lead to many further possibilities. Potential was a lower-reliability cue in Study 1, it is a relatively unexplored in discussions of creativity, and it likely warrants further conceptual clarification.

Study 2 provided evidence that individual cues can shift creativity assessments. An important next question is how individual cues combine to influence creativity assessments. One possibility is that cues combine in a multiplicative fashion, such that the combination of two cues is perceived in a qualitatively different way than either cue alone. If the cues we have examined in Studies 1 and 2 combine in multiplicative fashion, then examining each cue independently is too simplistic to predict how people interpret ideas when multiple cues are present. An alternative possibility is that the cues combine additively, such that they provide independent information about creativity. In an additive model, each cue seen to indicate creativity that is present is expected to increase creativity ratings, while each cue seen to decrease creativity that is present is expected to decrease creativity ratings. We test these possibilities in Study 3 by simultaneously varying high and low levels of two cues from Study 2 to see if cues combine in an additive or multiplicative fashion. If an additive model appears sufficient to describe the data, this will provide support for using the data from Study 1 (particularly Table 1) to make predictions about creativity assessments.

STUDY 3

Method

Participants and Design

We recruited 444 participants for an online study. A total of 225 US participants were recruited from Amazon Mechanical Turk (59% male, Mean Age = 33.11, SD = 10.73; Mean Years of Work Experience = 12.05, SD = 10.86; 84% White, 8% Latino, 5% African-American), and 219 Chinese participants were recruited via Sojump (49% male, Mean Age = 32.15, SD = 6.68; Mean Years of Work Experience = 9.27, SD = 6.68; 95% Han). Once again, we found reliable differences between the samples for gender ($\chi^2(1, N = 444) = 4.29, p < .05$) and work experience ($t(442) = 3.23, p < .01$), and found consistent results whether we controlled for these variables or not in what follows. The experiment involved a 2 (Country: China, US) by 2 (Surprise: Yes, No) by 2 (Mass Market: Yes, No) between subjects design.

Procedure, Measures, and Materials

We employed the same procedure and measures as in Study 2. Participants were randomly assigned to view one of four possible descriptions, based on their Surprise and Mass Market conditions: “You were reading and came upon a review of a wrist watch. The review said the product is [not] surprising. Later the review said this product is [not] for a big market.” Surprise and mass market cues were selected because surprise was the most similarly assessed and mass market was the most differently assessed between the broad and narrow implicit theories. Again, the Chinese participants (median = 5.07 minutes; mean = 8.71 minutes) tended to take longer on the survey than the US participants (median = 3.86 minutes; mean = 4.57 minutes), with a Mann-Whitney test showing a reliable difference, $Z = 5.54, p < .001$.

Results

We first tested whether cues were multiplicative. A two way interaction between mass market and surprise would indicate that the interpretation of one cue (e.g., surprise) depends upon the presence of another cue (e.g., mass market) and a three way interaction between mass

market, surprise and country would indicate that this multiplicative pattern is further altered by country. We found no support for an interaction between surprise and mass market ($F(1, 436) = 0.32, p = .57, \eta^2_p = .00$) or a three way interaction between country, surprise, and mass market cues ($F(1, 436) = 0.11, p = .74, \eta^2_p = .00$). Hence, we found no evidence of a multiplicative model.

We then tested to see whether cues are interpreted by participants in an additive fashion. If cues are additive then we would expect that the interpretation of each cue would only vary depending upon culture (as opposed to the presence of the other cue). We found that the surprise cue yielded higher creativity ratings for all participants and that reactions to the mass market cue differed by country (Table 3). An ANOVA revealed reliable interactions between country and surprise cues ($F(1, 436) = 27.80, p < .00, \eta^2_p = .06$) as well as between country and mass market cues ($F(1, 436) = 12.12, p < .01, \eta^2_p = .03$). The interaction between country and surprise cues was due to a larger difference in creativity between surprising and non-surprising items for US participants ($M = 4.83$ and 2.67 , respectively; contrast test: $F(1,436) = 160.98, p < .001, \eta^2_p = .43$) than for Chinese participants ($M = 5.50$ and $4.63, F(1,436) = 24.72, p < .001, \eta^2_p = .10$). The interaction between country and mass market cues was due to opposing effects of mass market cues. The Chinese participants rated items for a mass market as more creative than items not for a mass market ($M = 5.33$ and $4.80; F(1,436) = 9.27, p < .01, \eta^2_p = .04$), whereas US participants showed a marginal tendency to rate items for a mass market as less creative than items not for a mass market ($M = 3.59$ and $3.91, F(1,436) = 3.47, p = .06, \eta^2_p = .02$).

To replicate and extend Study 2, we considered whether implicit theories of creativity could help explain the effect of country on creativity ratings. Importantly, in Study 2 we found that implicit theories only mediated the relationship between country and cues interpreted

differently by the narrow and broad models. Cues interpreted similarly across the two models had little variance in creativity ratings due to country to predict. Likewise, in the current study, we expected to find that implicit theories mediate the relationship between country and creativity assessments only for “not surprising” and “mass market,” and not for “surprising” and “not mass market,” because we have evidence from Study 1 that Americans and Chinese tend to differ in how they assess the first two but not the last two.

To conduct this analysis, we first analyzed the short implicit theory survey using the Multi-Culture Latent Truth Rater Model. A model with two implicit theories ($DIC_2 = 19,729$) fit the data better than models with one ($DIC_1 = 21,397$) or three ($DIC_3 = 31,576$) implicit theories. We found evidence of a broad and narrow implicit theory as in Studies 1 and 2, and the distribution of those implicit theories was also quite similar: the broad implicit theory was likely held by 26% of US participants ($n = 59$) and 94% of Chinese participants ($n = 206$) and the narrow implicit theory was likely held by 74% of US participants ($n = 166$) and 6% of Chinese participants ($n = 13$). We then used implicit theory endorsement as a mediating variable to explore the two separate interactions, one between country and surprise and the other between country and mass market, that predicted creativity ratings. Both analyses used Hayes’s (2013) PROCESS procedure (model 15, default settings) and show, as expected, that country predicted implicit theory endorsement, $b = 0.65$ ($SE = 0.03$), 95% CI [0.59, 0.71], $p < .001$.

The analysis of the interaction between country and surprise cues, mediated by implicit theory endorsement, found reliable conditional direct effects of country on creativity ratings for both the surprising cue $b = 0.77$ (0.22), [0.32, 1.21] and the unsurprising cue $b = 1.26$ (0.26), [0.75, 1.77]. We found that the implicit theory endorsement by surprise interaction predicted creativity ratings, $b = 0.55$ (.19), [0.17, 0.93], $p < .05$. The conditional indirect effect of country

on creativity ratings through implicit theory endorsement was reliable for the unsurprising cue, $b = 0.75$ (0.27), [0.24, 1.23], but not the surprising cue, $b = 0.04$ (0.17), [-0.30, 0.36].

Turning to the analysis of the interaction between country and mass market cues, mediated by implicit theory endorsement, we found conditional direct effects of country on creativity ratings for both the mass market cue $b = 1.08$ (.26), [0.57, 1.58] and the non-mass market cue $b = 0.97$ (0.33), [0.33, 1.61]. The conditional indirect effect of country on creativity ratings through implicit theory endorsement was reliable for the mass market cue, $b = 0.43$ (0.23), [0.01, 0.86], but not the non-mass market cue, $b = 0.06$ (0.29), [-0.64, 0.51].

Discussion

The findings from Study 3 do not support a multiplicative model but instead an additive model for how cues combine to predict creativity ratings, suggesting that understanding single cues is a reasonable first step for making predictions about creativity assessments. Specifically, the two cues, surprise and mass market, when applied together have independent, additive effects in the directions and with the strength predicted by the implicit theories. US participants are largely reacting to surprise, with a minimal negative influence of the item being for a mass market. The Chinese participants are reacting about equally to surprise and mass market cues: when both are present the item received the highest creativity rating, when one cue was present and the other absent the item received intermediate creativity ratings, and when both were absent the item received the lowest creativity rating. For the Chinese, a surprising non-mass market item was rated as comparably creative as a non-surprising mass market item.

We replicated study 2 and found that implicit theories mediated the relationship between culture and creativity assessments for cues where we expected the US and Chinese to disagree. Because US participants tend to hold narrow implicit theories, they tend to give a harsher

penalties in creativity assessments to cues around a product being not surprising relative to Chinese participants. Because Chinese participants generally hold broad implicit theories, they assessed the mass market cue as a positive indicator of creativity, whereas because American participants generally hold narrow implicit theories, if anything they tended to assess the mass market cue as a negative indicator of creativity.

GENERAL DISCUSSION

Prior theory on creativity and culture proposed that Chinese and US individuals assess creativity differently (Leung et al., 2004; Leung et al., 2011; Lubart, 2010; Morris et al., 2010; Niu et al., 2006), and the current studies represent the strongest supporting evidence to date for this claim. Nearly all the Chinese participants used a broad implicit theory that includes many cues as positive indicators of creativity, whereas most US participants used a narrow implicit theory that draws on just a few cues as positive indicators of creativity. Two experiments affirmed that the implicit theories could predict individuals' creativity assessments. We also found initial evidence of cues having additive effects on individuals' creativity assessments. Thus, the broad and narrow implicit theories predicted individuals' assessments of creative ideas and so enabled the prediction of systematic cultural differences in creativity assessments.

Discoveries

In discovering two distinct implicit theories of creativity that varied both within and across cultures, as well as the specific cues relevant to those implicit theories, we discovered a disconnect between the conceptual definition of creativity employed by creativity scholars and the lay implicit theories of creativity used by participants in China and the US. This disconnect could explain why prior work has not found consistent differences between creativity assessments made by Chinese and Americans (Paletz et al., 2008). The core proposal in prior

work is that people from China and the US will form different creativity assessments because Chinese individuals place less weight on novelty and more weight on usefulness, whereas US individuals place more weight on novelty and less weight on usefulness. This proposal was developed based on four assumptions that follow from using the conceptual definition of creativity used by creativity scholars: creative ideas are novel and useful ideas (George, 2007). The first assumption is that novelty and usefulness are the only cues Chinese and Americans use to assess creativity. Second, usefulness is a uni-dimensional construct, defined as the extent to which the idea has an appropriate function. Third, novelty is a uni-dimensional construct, defined as the extent of the difference the idea represents relative to domain knowledge. Fourth, novelty and usefulness are both positive contributors for both Chinese and Americans' creativity assessments; if all else is equal, more novelty or more usefulness should lead to higher creativity assessments. The current findings are inconsistent with the proposal or the four assumptions.

We found, at best, partial support for the core proposal identified by prior theory and research on culture and creativity. If usefulness is indicated most strongly by the "functional" cue and novelty by the "paradigm shift" cue, then the current studies showed that most US participants tended to consider usefulness to be less important to creativity than novelty and considered usefulness less important than did most Chinese participants. However, Chinese participants did not rate usefulness as more important than novelty. Instead, rather than a description of cultural differences based on differential weighting of novelty and usefulness, a more apt description is that most US adults tend to use a narrower range of cues, perhaps focused around novelty, and most Chinese adults tend to use a wider range of cues to indicate creativity.

Regarding the first assumption that novelty and usefulness are the only cues to creativity, Study 1 found that lay people draw on many additional cues. For example, we found consistent

evidence that cues like happiness, high tech, social interaction, harmony, name brand, mass market, fashionable, social approval, and credibility were used by participants to make creativity assessments. Categorizing all of these cues as types of novelty or usefulness would seem to stretch novelty and usefulness so much as to make either unrecognizable.

Regarding the second assumption that usefulness is a uni-dimensional construct, Study 1 found evidence of a collection of cues arguably concerned with aspects of usefulness. For example, functional, easy to use, and widely useful could be concerned with providing indications of appropriate use. Chinese participants viewed all these cues as comparably and highly relevant to creativity. Yet Americans viewed the cues easy to use and widely useful as less important to creativity assessments than cues around functionality. Consequently, lay beliefs about usefulness appear to be multi-dimensional and the different aspects each cue is drawing out seem to help in predicting cultural differences in creativity assessments.

Regarding the third assumption that novelty is a uni-dimensional construct, Study 1 identified cues beyond paradigm shift, finding that cues like surprise, breakthrough, potential, rare, combination, updates tradition, and repurposing that could be viewed as indicating aspects of novelty and that were interpreted by Americans and Chinese as indicating creativity. Further, the studies showed that most US participants seemed to emphasize paradigm shift and rare more so than combination, updates tradition, and repurposing. Most Chinese participants seemed to emphasize potential more than rare and combination. Thus, it is possible that Americans respond to some kinds of novelty more than Chinese and that Chinese respond to other kinds of novelty more than Americans. Novelty appears to be multi-dimensional.

Regarding the fourth assumption that novelty and usefulness are both positive contributors to creativity assessments, we found that at least some cues related to usefulness did

not contribute positively to US participants' creativity assessments. To the Americans, cues around feasible, observable, and intuitive were seen as *not* important to creativity (and likely to indicate that something is not creative), whereas Chinese viewed that these same usefulness cues as *highly* important to creativity. Hence, we found evidence that the Chinese weight some usefulness cues more positively than Americans do in their creativity assessments, but that Americans and Chinese interpret other usefulness cues in *opposite* ways. This may explain why some studies have found that general ratings of usefulness (e.g., this product is useful) can sometimes be positively (Amabile, 1996; Runco & Charles, 1993) and sometimes be negatively (Rietzschel et al., 2010; Runco et al., 1993) related to creativity assessments. People could be considering a host of cues when told to rate usefulness, some of which are viewed as positively and others of which are viewed as negatively related to creativity.

In summary, our main discovery is that the scholarly conceptual definition of creativity (i.e., novel and useful ideas) differs from lay people's implicit theories of creativity. Further, we discovered that lay people do not all share the same implicit theory of creativity, either within or across cultures. These discoveries provide reasons to rethink foundational issues about creativity and suggest a program of new research.

A new research program for creativity and culture

That individuals hold distinct implicit theories of creativity, including beliefs about rich collections of cues, raises a host of questions. It raises foundational theoretical questions about the scholarly conceptual definition and what creativity is. It raises questions about the routine methods currently used to study creativity. It raises questions about new phenomena regarding creativity that we otherwise might not have considered. It also raises questions about how to advance practice. These questions amount to a new research program for creativity and culture.

New theory

The disconnect between the scholarly conceptual definition of creativity and lay implicit theories of creativity provides reasons to rethink the role of the scholarly conceptual definition of creativity. The scholarly conceptual definition of creativity could provide a standard for scholars to use to evaluate ideas in a consistent fashion across individuals, cultures, and historical time periods. This could help in developing a cumulative body of findings about what scholars assert is creative, provided there is a sound argument for claiming that the scholarly definition (whether based on novelty and usefulness or some revision) offers a valid and reliable conceptualization of what research should be orienting towards because it is consequential and worth fostering. Thus, one possibility for new research would be to build theory supporting the proposal that irrespective of lay implicit theories of creativity, there is a way to assess ideas for their value and impact for innovation. Then research could study this theoretically defined creativity and, separately, study lay implicit theories of creativity that might foster or inhibit the recognition and development of theoretically defined creativity. That is, just like we treat the study of physics, biology, and psychology as being separate from the study of folk physics, folk biology, and folk psychology (Carey, 2009), research could treat creativity and implicit theories of creativity as distinct targets for research.

An alternative possibility is to turn away from a fixed conceptual definition of creativity and instead build a new theoretical account of creativity that relies on lay beliefs. For example, the systems model of creativity proposes that cultural differences in creativity assessments are due to cultural influences on domain knowledge (Csikszentmihalyi, 1999). Nearly all work on creativity and innovation asserts that individuals make creativity assessments solely against the backdrop of domain knowledge. The literature on creative idea recognition indicates that culture

shapes creativity by shaping what people know in a given domain (Hennessey et al., 2010). The innovation literature also argues that a given company culture or environment can shape the domain knowledge that organizational decision-makers use to evaluate whether ideas present novel and valuable opportunities for investment (Ford, Sharfman, & Dean, 2008). Thus, the innovation literature operationalizes product and process novelty as the extent to which they depart from a firm's existing knowledge base (Rosenkopf & McGrath, 2011). The current findings provide evidence that apart from knowledge about the domain there is also a role for knowledge about creativity itself in assessing creativity. Accordingly, new theorizing could develop a revised systems model of creativity that includes the proposition that in addition to shaping domain knowledge, culture can also shape implicit theories about what indicates whether ideas are creative. That is, just as we study the cultural constructions *money* (Searle, 1995), *wine* (Douglas, 1986), *cooperation* (Keller & Loewenstein, 2011), *corporate governance* (Ocasio & Joseph, 2005), and so forth (Loewenstein, Ocasio & Jones, 2012), new theory could start from the premise that creativity is a cultural construction, perhaps fit to some phenomena, but understood using culturally generated interpretations.

Either way, implicit theories of creativity are crucial to study. Idea selection governs which of the ideas that people generate are actually pursued (Campbell, 1960; Staw, 1990). Consumer assessments of creativity are associated with liking products (Amabile, 1996) and finding them to be desirable (Paletz et al., 2008), which presumably are linked to organizational performance. In these cases, it is implicit theories of creativity, not the scholarly conceptual definition of creativity, that are governing choices.

One pressing theoretical (and empirical) issue is whether there is a better way to describe the implicit theories found in the current studies. We grouped cues quite simply, based on

whether they were included in just the narrow implicit theory or also in the broad implicit theory. A further theoretical question to consider is whether it is meaningful to group cues thematically. For example, nearly all of the cues endorsed by the narrow implicit theory (paradigm shift, breakthrough, potential, rare, repurposing, surprise, updates tradition, and combination) could be linked to novelty. One could place the remaining cues into groups as well. For example, cues like functional, ease of use, intuitive, and experiential could reflect concerns around individual benefits or usefulness. Cues like social interaction, social approval, fashionable, and harmony could reflect concerns around collective benefits. Perhaps collective benefits could be seen as a second aspect of usefulness, along with individual benefits. Cues like mass market and name brand could reflect concerns around scale, roughly along the lines of discussions about everyday creativity versus eminent creative achievements (Kaufman & Beghetto, 2009). One possibility for future research is to consider the validity and empirical usefulness of such groupings. However, as intriguing as it is to identify ways to group the cues, there is a deeper theoretical issue to address. Perhaps the groups are themselves products of the implicit theories, rather than being consistent across implicit theories. Exploratory analyses of the Study 1 data found different factor structures for the cues when looking at the US data, the Chinese data, and the combined US and China data. In providing data about cues and leaving our descriptions of the implicit theories as being either broad or narrow, we are not intending to provide a definitive statement but rather we are intending to encourage future research, including theorizing about whether the level of description for describing implicit theories of creativity is with cues, higher-order groupings, or some other way.

One final avenue for new theory is to clarify the link between cultures and implicit theories. The current studies focused on US and China. Other national cultures might support

further implicit theories of creativity. In addition, other sources of culture, such as organizational culture, might also shape people's implicit theories of creativity. For example, *joy* was taken to be a cue to creativity, but it has not been discussed as a contributor to creativity assessments. Yet in strong service cultures such those fostered at Disney or Nordstrom, joy could be a critical cue to creativity, perhaps even more important than paradigm shift or functional. As a second example, *potential* was taken to be a cue to creativity and like joy has not been noted previously as a contributor to creativity assessments. Potential indicates a hopeful view of what further an idea will yield in the future, in contrast to a more limited view of an idea yielding nothing beyond its current results or, worse, a pessimistic view of an idea yielding uncertain or failed possibilities. In strong innovation cultures, potential could be a critical cue to creativity, relative to weak innovation cultures, where potential might be seen as an indicator that ideas are not yet socially approved or credible and so not creative. These questions about the relationship between organizational cultures and creativity assessments are just one example of where distinct implicit theories of creativity might be found, shaped by the distinct culture in which it is found. Other cultures, such as professional cultures or regional cultures might also merit exploration. There might even be within-culture influences, such as types of social positions or social roles, that shape implicit theories of creativity. Considering the possibility of culturally-generated implicit theories of creativity opens up large new theoretical questions for the study of creativity.

New methods

The theoretical stance towards creativity matters for studying creativity. For example, organizational scholars frequently use ratings of creativity from managers (Amabile et al., 2008) and an array of other lay people (Hennessey et al., 2010). Yet these ratings are driven by lay implicit theories of creativity, not the scholarly conceptual definition of creativity. If the goal is

to study the scholarly conceptual definition of creativity, then there is likely a gap between the intent and the research—a construct validity problem. For example, most scholars currently describe novelty as the distinguishing characteristic of creativity (Amabile et al., 2005). Yet people with a broad view of creativity could view an idea as creative even though the idea does not exhibit cues associated with novelty, as found in Studies 2 and 3. In contrast, if the goal is to study lay people's assessments of creativity, then when using lay people to rate creativity it would be useful to ensure that the raters are relying on the same implicit theory of creativity and to identify which implicit theory is in use.

Identifying which cues are in use and so shaping creativity assessments raises new questions for designing creativity research. There are many cues whose influence on creativity is not well understood, but the cues open new possibilities without even going beyond novelty and usefulness. For example, the current findings show that people in different cultures treat different kinds of usefulness as differently related to creativity. Feasibility was seen to positively indicate creativity to most people in China, but negatively indicate creative to most people in the US. Hence, lumping all cues conceptually related to usefulness into a broader usefulness bucket (or defining usefulness narrowly) might mask true differences when determining how people from different cultures incorporate usefulness in their creativity assessments. The cues found in the current studies offer new measurement opportunities for studying how different kinds of novelty and usefulness relate to creativity and for whom. The cues also offer new measurement opportunities for studying issues well beyond novelty and usefulness.

New phenomena

The current studies generated some discoveries that could in turn lead to others. One such discovery was to identify that within each culture – within China and within the US – there was

disagreement about the implicit theory of creativity. About 95% of Chinese participants held a broad implicit theory of creativity and 5% held the narrow implicit theory of creativity, whereas around 75% of US participants held the narrow implicit theory of creativity and 25% of US participants held the broad implicit theory of creativity. Culture is not homogenous or homogeneously endorsed by its members (Morris, Chiu & Liu, 2015). Of particular interest though, the minority holding the non-dominant implicit theory of creativity was larger in the US and smaller in China. This finding is consistent with prior research on cultural tightness-looseness: relative to the US, China has a tighter culture that fosters more agreement and social conformity (Gelfand et al., 2011). This is consequential for creativity. For example, Chua, Roth and Lemoine (2015) found that higher cultural tightness was associated with lower endorsement of foreign ideas. Our results suggest that one reason why could be that there is likely to be a mismatch in implicit theories of creativity between members of a tight culture and non-members. A potential phenomenon to explore then is whether cultural tightness indicates the extent to which implicit theories of creativity are shared within a specific culture.

The consequences of shared and unshared implicit theories of creativity are themselves an opportunity for research. There are, after all, many instances in which creative ideas were not initially recognized within a community. Perhaps one reason why someone would fail to recognize an idea as creative is because the idea was communicated in a way that did not emphasize that it was a “breakthrough,” “paradigm shift,” “surprise,” or strongly conveying another of the cues widely believed to indicate creativity.

Our findings not only point to the potential for miscommunication around creativity, they can also be used to identify what cues are most likely to generate miscommunications and what cultures are most likely to set up conditions in which individuals experience miscommunications.

For example, in a US firm, it is possible that a CEO with a broad implicit theory of creativity might advance a goal of creativity and then select a feasible idea for a mass market. This could then confuse many subordinates if they hold a narrow implicit theory of creativity, as they are likely to have offered rare and surprising ideas and are likely to fail to see the CEO's selection as being creative. Two phenomena to explore here are *rejected ideas* that did not fit the implicit theory of creativity in use by leaders making decisions and *neglected ideas* that did not fit the implicit theory of creativity in use by subordinates and so never offered to leaders. Of course, the most important phenomenon of interest here is how organizations can align the creativity assessments in their innovation process with the implicit theories of their customers.

Shared and unshared implicit theories of creativity not only pose issues within and across organizations but also within and across societies. The case of early stage ideas provides a ready example. If something is a paradigm shift but is not being mass produced, this would likely be seen as highly creative by most Americans, but not as highly creative by most Chinese. For something to be highly creative in the broad implicit theory used by most Chinese, there are more concerns to satisfy. As it is rare for early stage ideas to have accrued social acceptance, social approval, and mass market appeal (Ford & Gioia, 2000; Rao, Chandy, & Prabhu, 2008), it is possible that the broad implicit theory of creativity common in China presents significant challenges to the process of selecting early stage ideas. In contrast, the implicit theory of creativity most common in the US could foster appreciating early stage ideas but cut against ideas already demonstrated to have broad social appeal and acceptance.

These local implications raise still larger implications for the cross-cultural exchange of and development of ideas. Ideas advanced in one culture are not likely to appeal to those from another culture without a shift in the cues one emphasizes. Research might identify ways in

which distinct implicit theories of creativity disrupt an innovation's acceptance through the rejection of ideas seen as creative in one country but not another. Research could further identify ways in which ideas are neglected and not offered across cultures despite the possibility for them to be perceived as more innovative abroad than at home.

New practices

The current findings provide suggestions for practice and so open opportunities for translational research. Most directly, the discovery of distinct implicit theories of creativity provides a new basis for designing effective communications about ideas as well as diagnosing misunderstandings and disagreements over how ideas are assessed. For example, the cues identified in these studies provide specifics that people could use to help them think through how to pitch their ideas to enhance their ideas' perceived creativity. Future work could examine important cultural communities (e.g., venture capital) for the specific cues that tend to indicate creativity in that community. This would help in designing communications to appeal to that community.

The current studies provide more specific guidance than has been available previously for how members of firms operating in the US and China can design, communicate internally about, and market products when working with members of these two countries. For example, emphasizing that a product is fashionable or a name brand will likely diminish US employees' and consumers' views of the product as creative, but likely enhance Chinese employees' and consumers' views of the product as creative.

Turning to miscommunications and misunderstandings, different implicit theories of creative ideas could be a particular problem in groups tasked with selecting creative ideas to implement. Organizations often employ decision-making committees to assess whether ideas,

products, and processes are creative and so deserving of funding or implementing. Committee members could hold different implicit theories of creativity, which can then be a source of conflict. By using the expansive collection of cues to creativity described in the current paper, teams could find it easier to diagnose the reasons behind the differences in their appraisals. By understanding that individuals hold different implicit theories of creative ideas, it could help members to take each others' perspectives and depersonalize disagreements about which ideas are creative.

Limitations and Future Research

Several limitations of the current studies are particularly noteworthy, as they are most likely to open up avenues for future research. One limitation of the current investigation is that it did not provide evidence regarding what explains why the specific content of the particular implicit theories that we found was what it was. Another limitation is the current studies did not provide evidence about what predicts whether individuals within and across countries adhered to one implicit theory or the other. Consequently, future research might examine, for example, what it might be about Chinese culture that supports the broad implicit theory, what it might be about US culture that support the narrow implicit theory, and what it might be about the minorities of individuals in each culture that leads them to hold the non-dominant implicit theory. There is some cultural work indicating a tendency among East Asians towards broader causal attributions and a tendency among Westerners towards narrower causal attributions (e.g., Choi, Nisbett, & Norenzayan, 1999). Perhaps this could help in understanding the content and distribution of the broad and narrow implicit theories of creativity.

A different kind of limitation is that we examined creativity assessments but placed less emphasis on what fosters and hinders the recognition of creative ideas. Much of the creativity

literature has focused on how to foster the generation of creative ideas, with less emphasis on examining how to recognize creative ideas (Mueller et al., 2014). Our findings suggest that it may be fruitful to increase our efforts to study how people recognize creative ideas. For example, we found no evidence that the factors often associated with creative idea generation (such as openness to experience) were related to the implicit theories people hold. It is possible that these are simply null results and further research will find evidence that the factors that shape creative idea generation are indeed related to the implicit theories people use to assess ideas for creativity. Or, it could be that the factors that aid idea generation might be different than or even in conflict with the factors which shape how we recognize creative ideas (Mueller et al., 2012). Hence, building theory about which factors shape creativity assessments and why is critical for theory as well as for guiding practice.

A further limitation is that we examined isolated assessments of creativity by single individuals for single ideas. We did not consider whether individuals hold the same implicit theories of creative ideas over time and across situations. Rising evidence suggests that situational factors can shift people's creativity assessments (Mueller et al., 2012; Mueller et al., 2014). It is possible that situations could shift the implicit theories of creative ideas that people use. It is also possible that situational shifts in creativity assessments can be better understood by examining the cues indicating creativity in the current studies.

In addition to situational effects, there might also be macro-level effects and cumulative effects of implicit theories of creative ideas. This is because there is a relationship between assessing ideas for creativity and generating creative ideas. As a result, there may well be macro-level effects and cumulative effects of different implicit theories of creative ideas if they inculcate different, socially distributed, long-term patterns in idea generation. For example, prior

work has suggested that there is a “liability of newness” such that new ideas tend to lack social approval and legitimacy (Rao et al., 2008) defined as the perception that something is desirable or appropriate within some normative system (Suchman, 1995). Whether this is a culturally specific pattern related to and possibly resulting from the narrow implicit theory of creativity is an open question.

A methodological limitation of the current studies is that they used surveys and online samples. These samples provide broad coverage of working-age adults (ages ranged from 18 to 71) and geographic dispersion (46 of the 50 states plus DC in the USA, 27 of the 34 divisions in China, with regional representation correlated $r > .9$ with regional population). This was appropriate for a study of societal level implicit theories. In our own follow up work, we have found that the short survey used in Studies 2 and 3 shows the same two models in similar proportions as found in Studies 2 and 3 with US undergraduate single-university samples and US single-company employee samples. Still, future studies might make efforts at more closely culturally representative samples as well as consider additional methods of engaging participants and for examining creativity assessments.

It is important to note that these studies focused on creative products. We examined cues people used to describe creative processes in Study 1, but did not see any difference between how our sample of Chinese and Americans described products and processes. While judgments about products are important within and across organizations as well as with consumers, it is possible that studies of proposals or more extensive studies of processes could reveal additional cues and distinct implicit theories.

Studies 2 and 3 examined creativity assessments for explicitly marked cues. It is possible that there is a difference between appraisals based on self-generated judgments, and appraisals

based on judgments formed by others. Individuals frequently make judgments on the basis of cues that others provide, such as reports with others' assessments and products with marketers' claims about their features. Still, individuals also sometimes derive cues for themselves. The challenge when allowing individuals to derive cues for themselves in the current studies is that presenting facts (e.g., raw sales data) without mentioning specific cues opens up the possibility of that different people will derive different cues from the same facts. For example, sales data could indicate any number of cues such that an idea is for a mass-market, proven, fashionable, or has social approval. Nonetheless, a useful task for future research is to examine how descriptions convey cues, as it would allow for a complete accounting of how to get from perceptions and descriptions to cues and then to creativity assessments.

CONCLUSION

The current studies provide a new starting point for studying how individuals assess creative ideas. The studies provide an array of cues to creativity to consider, a new contributor to assessing creative ideas in the form of implicit theories of creativity, and evidence of stark cultural differences in implicit theories and creativity assessments. It appears worthwhile to consider cues to creativity beyond novelty and usefulness. It appears necessary to consider that different individuals can hold sharply different and even opposite views of whether cues indicate creativity. It also appears necessary to consider that individuals are likely to get not just their domain knowledge but also their implicit theories of creativity from their cultures. Much more awaits.

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Table 1. Cue Ideal Values for the Broad and Narrow Views, Study 1

Cue	High levels		Low levels	
	Broad	Narrow	Broad	Narrow
Paradigm Shift	4.78	5.25	3.52	<u>1.73*</u>
Breakthrough	4.79	4.89	3.77	<u>1.70*</u>
Potential	4.97	4.75	<u>2.98</u>	<u>1.64*</u>
Rare	4.27	4.99	3.35	<u>1.54*</u>
Repurposing	4.72	4.29	3.77	<u>1.85*</u>
Surprise	4.71	4.61	<u>2.18</u>	<u>1.43</u>
Artistic	4.83	4.04	<u>2.83</u>	<u>1.62</u>
Updates Tradition	4.47	4.08	<u>3.23</u>	<u>1.60*</u>
Combination	4.31	3.80	3.73	<u>2.13*</u>
Functional	4.91	3.88*	<u>2.09</u>	<u>1.48</u>
Variety	4.68	3.55*	<u>3.18</u>	<u>1.90*</u>
Experiential	4.85	3.28*	<u>2.86</u>	<u>1.75*</u>
High Tech	4.49	3.43*	3.65	<u>2.22*</u>
Joy	4.43	3.28*	<u>1.93</u>	<u>1.48</u>
Social Interaction	4.56	<u>3.14*</u>	<u>2.53</u>	<u>1.73</u>
Ease of Use	5.08	3.39*	<u>2.29</u>	<u>1.73</u>
Wide Use	4.69	3.36*	<u>3.05</u>	<u>1.95*</u>
Intuitive	4.91	<u>2.87*</u>	<u>2.41</u>	<u>2.01</u>
Observable	4.57	<u>2.81*</u>	3.68	3.42
Social Approval	4.71	<u>2.25*</u>	<u>2.33</u>	<u>2.09</u>
Credible	4.69	<u>2.49*</u>	<u>2.63</u>	<u>1.92</u>
Fashionable	4.65	<u>2.71*</u>	<u>2.32</u>	<u>1.83</u>
Harmony	4.86	<u>2.71*</u>	<u>2.06</u>	<u>1.70</u>
Mass Market	4.61	<u>2.13*</u>	<u>2.79</u>	<u>2.13</u>
Name Brand	4.11	<u>1.78*</u>	<u>2.97</u>	<u>2.04*</u>
Feasibility	3.97	<u>2.17*</u>	3.27	<u>2.16*</u>

Bold indicates that the 95% confidence interval falls entirely above 3.5, indicating the cue is considered important for creativity.

Underlined indicates that the 95% confidence interval falls entirely below 3.5, indicating the cue is considered unimportant for creativity.

* indicates that the Broad and Narrow models differ reliably according to a false discovery rate analysis.

Table 2. Mean differences between different and similar cue types by country, Study 2

	China	US
Aggregate of Different Cue Types	5.46 (1.15)	2.94 (1.50) ***
<i>Individual Cues For Different Cue Types</i>		
Intuitive	5.43 (1.16)	3.13 (1.46) ***
Mass Market	5.89 (0.69)	3.26 (1.46) ***
Social Approval	4.93 (1.67)	2.79 (1.44) ***
Aggregate of Similar Cue Types	5.64 (0.88)	4.95 (1.23)
<i>Individual Cues for Similar Cue Types</i>		
Paradigm Shift	5.71 (0.91)	5.47 (0.96)
Potential	5.50 (0.83)	4.53 (1.51) *
Surprise	5.75 (0.97)	5.08 (0.94)

* $p < .05$, *** $p < .001$

Table 3. Descriptives of mean differences in creativity ratings by cue type condition and country, Study 3

	China	US
Surprise & Mass Market	5.71 (0.93) a	4.65 (1.26) cd
Surprise & Not Mass Market	5.29 (1.00) b	5.00 (1.04) bc
Not Surprise & Mass Market	4.95 (1.46) bc	2.52 (1.20) e
Not Surprise & Not Mass Market	4.31 (1.73) d	2.81 (1.23) e

Cells not sharing a letter indicate different levels of rated creativity.

Figure 1: Scree plot (black line) and model fit (gray line) for the two-culture latent truth rater model, Study 1

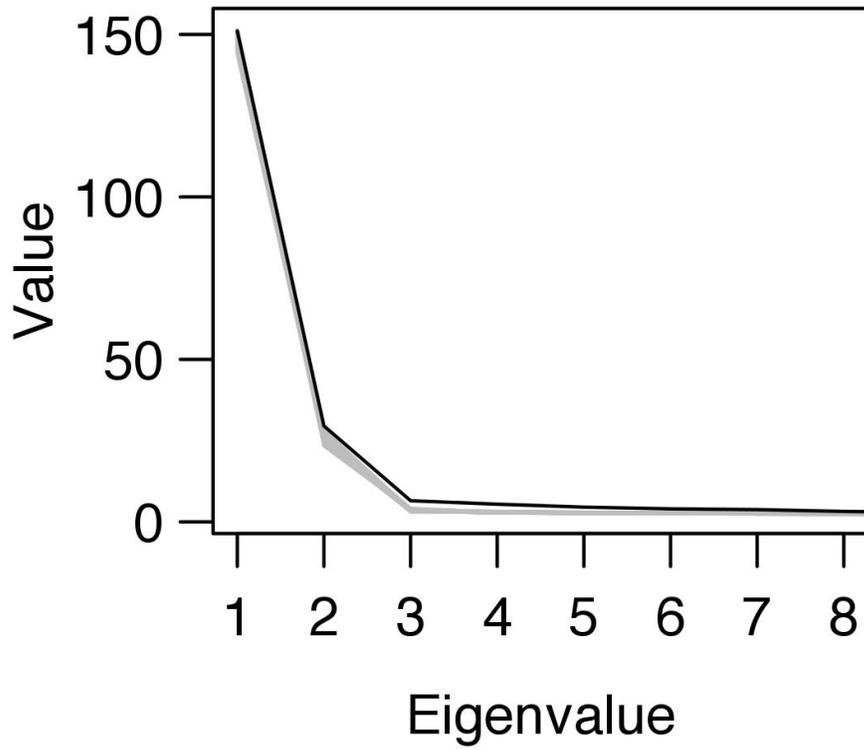
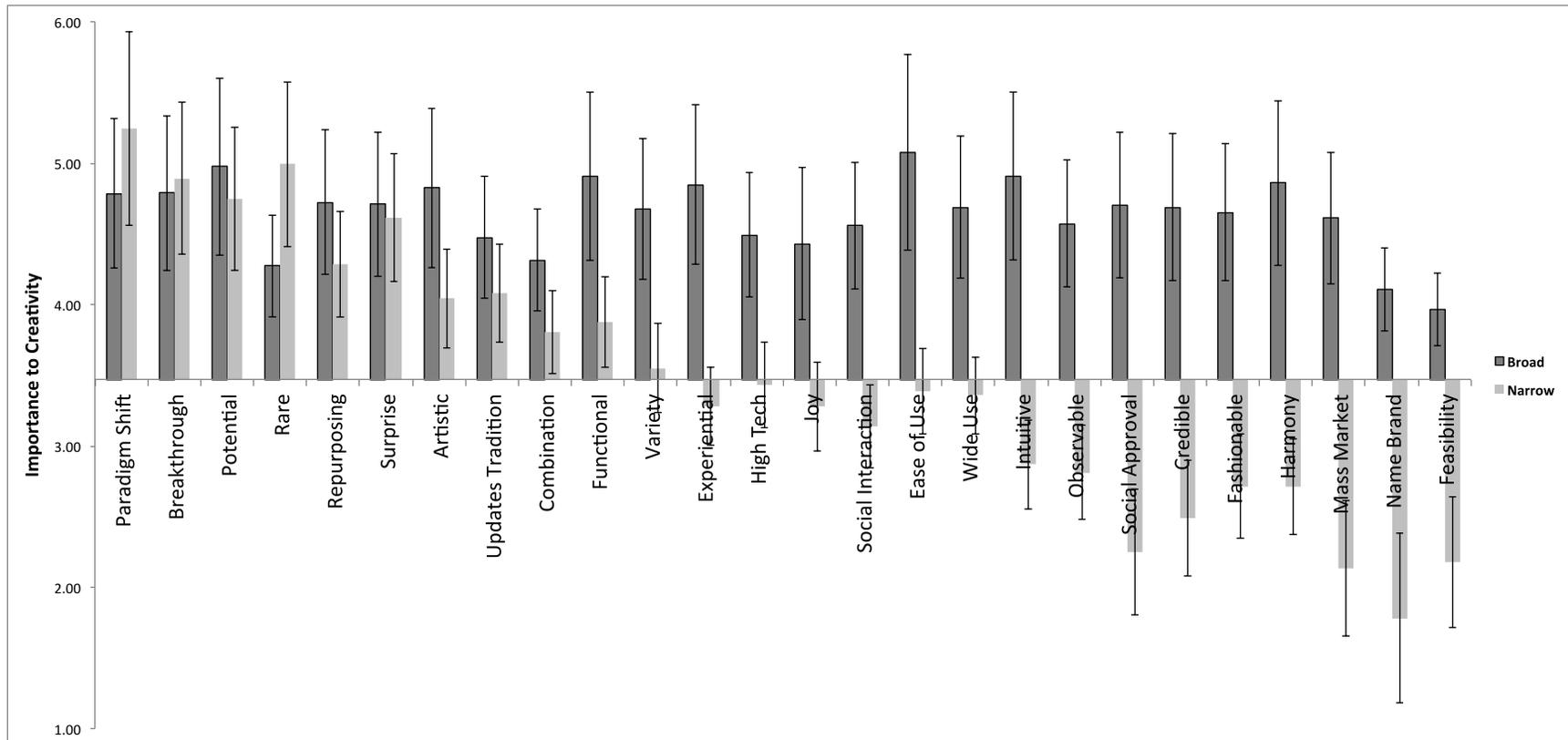


Figure 2: Cue Ideal values (with 95% confidence intervals) for high levels of the cues for the Broad (Dark bars) and Narrow (Light bars) implicit theories, Study 1.



Appendix

To provide additional detail regarding Study 1, we provide the full survey (Table A1) and a brief note on cultural consensus analysis. With the full survey, we give the country means and standard deviations for each item, as well as reliabilities. With respect to cultural consensus analysis, it is worth noting the relationship between the updated version of cultural consensus analysis we used in Study 1 and the original version. The new version adds the means to handle multiple subgroups much more gracefully than the original version. It also usefully addresses scale biases, which the original model did not attempt to do. Still, for the sake of comparison, we analyzed the Study 1 data using the original version of cultural consensus analysis to provide an indication that the new and old versions converge in the main. First, using the original version of cultural consensus analysis, we start by assessing whether we have evidence of a cultural consensus. The ratio of the first factor to the second was 5.35:1, which is greater than the conventional 3:1 threshold. Nearly all (99%) of the cultural competence scores (the first eigenvalue loadings) were positive, with the negative scores being very close to 0 ($< .1$), also indicating cultural consensus. However, the second factor was notably larger than the third (3.92:1 ratio), with no further notable factors, indicating the likely presence of two distinct subgroups (as we found with the new version of the analyses). The second factor loadings were correlated strongly with country ($r = .75$). We note for purposes of comparing the old and new models that the second factor loadings are even more strongly correlated with implicit theory endorsement as derived from the new cultural consensus analysis ($r = .87$). If we split the raw data using the second factor loadings, separating the positive from the negative loadings, we can then generate weighted averages (weighting by the second factor loadings) for the negative and positive loadings groups. We can then aggregate to the level of cues and compare the negative and positive loading groups' cue averages with the cue ideal values for the broad and narrow groups derived from the new analysis. We found that these values are extremely highly correlated ($r = .99$). The large sample size, the large group difference, and the presence of just two groups likely contribute to the ease of finding convergence between the old and new analyses here. With smaller groups and more subgroups, the old version of cultural consensus analysis would be less effective. The convergence between the old and new versions of the analyses in the current case though is notable. It helps to provide assurance that the old and new methods are indicating similar patterns for datasets approachable by both. It is also useful because the older analysis computes quickly (about a second for these data) whereas the newer analyses take much longer to compute (about a day for these data) because of the estimation procedures.

Table A1. Study 1 survey items by cue and level, with country means (SD).

Cue	Level (α)		China	US
Paradigm Shift	High (.71)	People had to think really differently to come up with it	4.68 (1.05)	5.01 (1.10)
		People had to look at the problem in a way that nobody had thought of before	4.69 (0.98)	4.81 (1.18)
		People had to think in a completely new way to come up with it	4.65 (0.98)	4.90 (1.17)
	Low (.83)	People thought in a typical way to generate it	3.49 (1.29)	2.17 (1.38)
		Others have had similar ideas	3.51 (1.21)	1.98 (1.23)
		It follows traditions	3.53 (1.23)	1.85 (1.05)
Breakthrough	High (.70)	It does something you did not think could be done	4.83 (0.92)	4.70 (1.30)
		It succeeds where other items had failed before	4.44 (1.13)	4.35 (1.44)
		Nobody thought it could be done, and yet they did it	4.62 (1.11)	4.73 (1.32)
	Low (.83)	Anyone could think of this	3.82 (1.39)	1.81 (1.14)
		Anyone could make it	3.67 (1.38)	2.07 (1.30)
		It was easy to think of	3.81 (1.28)	2.05 (1.27)
Potential	High (.65)	It opens up many new possibilities	4.75 (1.07)	4.89 (1.23)
		It has great potential to be used in many new ways	5.06 (0.84)	4.50 (1.40)
		It allows you to make many new kinds of things	4.76 (0.85)	4.14 (1.46)
	Low (.79)	There's nothing more you can do with it	3.24 (1.28)	1.94 (1.31)
		It has no use other than what it was intended for	3.19 (1.37)	2.00 (1.20)
		It does not open up new possibilities	3.03 (1.39)	1.61 (1.04)
Rare	High (.56)	You've never seen such a thing before	3.60 (1.25)	4.74 (1.23)
		It is something you don't often see	3.99 (1.22)	4.40 (1.41)
		Nothing else out there is like it	4.82 (0.98)	4.76 (1.36)
	Low (.84)	Many others are similar to it	3.34 (1.27)	1.90 (1.26)
		It has been done before	3.11 (1.22)	1.74 (1.11)
		It is a generic kind of item	3.70 (1.26)	1.73 (1.08)
Repurposing	High (.70)	It applies a solution to a completely different area	4.73 (1.00)	4.15 (1.40)
		It uses something for a new purpose	4.73 (0.98)	4.26 (1.30)
		The idea for it came from a very different category	4.54 (1.05)	3.63 (1.45)
	Low (.79)	It uses the same ideas as other items in the category	3.18 (1.31)	1.72 (1.15)
		It is used for exactly what it was intended for	4.41 (1.08)	2.62 (1.48)
		It uses something in a standard way	3.63 (1.28)	2.16 (1.35)
Surprise	High (.74)	It is very surprising	4.47 (1.11)	4.47 (1.25)
		It is amazing	4.86 (0.97)	4.44 (1.49)
		It is astonishing	4.25 (1.10)	4.27 (1.32)
	Low (.84)	It is boring	2.21 (1.24)	1.57 (1.07)
		It is dull	2.27 (1.24)	1.57 (1.03)
		It is unsurprising	2.68 (1.21)	1.68 (1.01)

Artistic	High (.71)	It is beautiful	4.61 (1.02)	3.45 (1.62)
		It has a good design	4.99 (0.89)	4.34 (1.55)
		It is artistic	4.51 (0.94)	4.11 (1.53)
	Low (.70)	It is ugly	2.36 (1.31)	1.62 (1.01)
		It has a bad design	2.61 (1.35)	1.51 (0.96)
		It has a standard design	4.20 (1.18)	2.07 (1.23)
Updates Tradition	High (.69)	It is a new take on a tradition	4.95 (0.98)	3.85 (1.46)
		It re-imagines a tradition	4.14 (1.20)	3.99 (1.52)
		It is a fresh version of a traditional item	3.87 (1.17)	3.64 (1.48)
	Low (.86)	It is traditional	3.37 (1.17)	1.87 (1.04)
		It is strictly traditional	3.24 (1.29)	1.70 (1.03)
		It is no different from the standard tradition	3.22 (1.29)	1.82 (1.18)
Combination	High (.77)	It combines things that are normally separate	4.46 (1.04)	3.63 (1.42)
		It integrates opposing functions or features	4.24 (1.15)	3.41 (1.51)
		It brings together features from two different things	4.38 (1.05)	3.71 (1.53)
	Low (.73)	It combines two things that are often combined	4.36 (1.07)	2.31 (1.38)
		It does not combine anything	2.89 (1.19)	1.94 (1.11)
		It combines two things that need to be kept separate	4.14 (1.14)	2.44 (1.38)
Functional	High (.74)	It addresses a need	4.77 (1.01)	4.08 (1.56)
		It has an added function	4.65 (1.02)	3.54 (1.48)
		It is widely useful	4.86 (0.90)	3.88 (1.57)
	Low (.85)	It does not work well	2.65 (1.51)	1.62 (1.13)
		It is of low quality	2.55 (1.58)	1.70 (1.12)
		It does not do anything	2.45 (1.51)	1.70 (1.18)
Variety	High (.82)	There are many variations to choose from	4.36 (1.17)	3.15 (1.74)
		It has a variety of options	4.45 (1.04)	3.77 (1.59)
		It has many uses	4.82 (0.88)	3.89 (1.59)
	Low (.75)	It comes in one standard form	3.58 (1.22)	2.08 (1.25)
		There is one version of it, there are no options	3.15 (1.29)	2.27 (1.43)
		It has only one use	2.95 (1.17)	1.89 (1.08)
Experiential	High (.84)	It is hands-on	4.66 (0.95)	3.16 (1.59)
		It is personalized	4.84 (0.96)	3.26 (1.60)
		It is interactive	4.76 (0.83)	3.59 (1.68)
	Low (.76)	It does not help people to express themselves	2.84 (1.24)	1.86 (1.20)
		There is one standard way of using it	3.46 (1.20)	2.05 (1.22)
		It is not interactive	2.58 (1.18)	1.76 (1.03)
High Tech	High (.82)	It uses new technology	4.77 (1.01)	3.78 (1.56)
		It uses sophisticated technology	3.81 (1.20)	3.10 (1.61)
		It is high tech	4.79 (0.98)	3.08 (1.62)
	Low (.64)	It uses existing technology	4.36 (1.16)	2.53 (1.27)
		It uses simple technology	3.94 (1.25)	2.68 (1.49)
		It uses no technology	2.52 (1.27)	2.15 (1.39)

Joy	High (.78)	It is fun	4.74 (1.06)	3.74 (1.64)
		It makes people happy	4.95 (0.88)	3.74 (1.67)
		It is funny	3.08 (1.34)	2.64 (1.49)
	Low (.86)	It is frustrating	2.28 (1.29)	1.67 (1.04)
		It is annoying	2.23 (1.24)	1.51 (0.91)
		It is irritating	2.31 (1.42)	1.46 (0.79)
Social Interaction	High (.84)	It fosters social interaction	4.80 (0.93)	3.01 (1.54)
		It's a conversation piece	4.27 (1.10)	3.48 (1.63)
		It gives people a reason to socialize	4.42 (1.05)	3.04 (1.62)
	Low (.75)	It limits social interaction	2.50 (1.31)	1.68 (0.94)
		It is used by one person at a time	3.01 (1.27)	2.10 (1.27)
		It makes it harder to be social	2.59 (1.27)	1.68 (1.05)
Ease of Use	High (.83)	It is easy to use	4.88 (0.90)	3.29 (1.62)
		It is much simpler to use than the current approach	4.83 (0.95)	3.66 (1.58)
		It makes life easier	5.08 (0.88)	3.82 (1.65)
	Low (.79)	It is hard to use	2.60 (1.40)	1.84 (1.18)
		It is complicated to use	2.95 (1.31)	2.03 (1.19)
		It makes life harder	2.31 (1.42)	1.53 (1.06)
Wide Use	High (.72)	It could be used by anyone	4.60 (1.08)	3.62 (1.61)
		It is for a new audience	4.31 (1.13)	3.34 (1.58)
		Many people might use it	4.81 (0.89)	3.49 (1.59)
	Low (.76)	It is not for a new audience	3.08 (1.15)	1.81 (1.05)
		Few people might use it	3.07 (1.25)	1.95 (1.14)
		it is only for certain people	3.31 (1.18)	2.22 (1.28)
Intuitive	High (.90)	It is simple for people to understand	4.80 (0.99)	3.36 (1.66)
		It is easy to understand	4.76 (0.99)	3.27 (1.57)
		It is easy to explain to someone else	4.67 (0.93)	2.96 (1.59)
	Low (.79)	It is difficult to understand	2.66 (1.34)	1.98 (1.15)
		It is confusing	2.49 (1.26)	1.78 (1.04)
		It is hard to explain	2.67 (1.26)	2.31 (1.35)
Observable	High (.81)	It is concrete	4.55 (0.91)	2.55 (1.40)
		It is tangible	4.32 (1.10)	3.07 (1.50)
		It is something I can touch, hold, or see	4.62 (0.96)	3.41 (1.66)
	Low (.70)	It is abstract	3.26 (1.16)	3.49 (1.61)
		It is theoretical	3.74 (1.22)	2.88 (1.39)
		It is conceptual	3.97 (1.14)	3.62 (1.50)
Social Approval	High (.89)	It is socially acceptable	4.88 (0.93)	2.82 (1.66)
		It does not break any social rules	4.28 (1.25)	2.18 (1.42)
		It is socially appropriate	4.53 (1.08)	2.71 (1.57)
	Low (.77)	It is not socially acceptable	2.78 (1.48)	2.03 (1.19)
		It breaks social rules	2.47 (1.37)	2.51 (1.45)
		It is socially inappropriate	2.67 (1.26)	1.79 (1.06)

Credible	High	It is scientifically tested to work	4.75 (1.00)	3.26 (1.64)
	(.84)	Those who make it have a good reputation	4.82 (1.09)	2.55 (1.59)
		People I know use it	4.11 (1.17)	2.44 (1.49)
		Low	It is untested	2.94 (1.43)
	(.70)	Those who make it have a bad reputation	2.69 (1.59)	1.53 (0.98)
		I don't know anyone who uses it	2.99 (1.28)	2.18 (1.40)
Fashionable		High	It is in fashion	4.56 (1.15)
	(.81)	It is current	4.28 (1.10)	3.52 (1.60)
		It is in style	4.69 (1.00)	2.64 (1.50)
		Low	it is not in fashion	2.53 (1.15)
	(.77)	it is old fashioned	2.32 (1.22)	1.72 (0.98)
		it is not in style	2.44 (1.28)	2.02 (1.25)
Harmony		High	It fosters social harmony	4.88 (1.02)
	(.91)	It helps people get along with each other	4.78 (0.89)	2.88 (1.55)
		It promotes social unity	4.72 (0.99)	2.78 (1.55)
		Low	It causes social conflict	2.46 (1.47)
	(.83)	It causes social difficulties	2.44 (1.49)	1.74 (0.99)
		It diminishes social unity	2.41 (1.33)	1.71 (0.97)
Mass Market		High	It is widely advertised	4.29 (1.14)
	(.90)	It is for a big market	4.67 (1.00)	2.51 (1.52)
		It is for a mass market	4.58 (0.93)	2.53 (1.55)
		Low	It is not widely advertised	2.96 (1.16)
	(.76)	It is not for a big market	2.86 (1.30)	2.15 (1.32)
		It is not for a mass market	2.85 (1.29)	2.26 (1.30)
Name Brand		High	It is a big brand	4.15 (1.32)
	(.94)	It is a brand name	4.01 (1.30)	1.88 (1.09)
		It is a known brand	4.20 (1.27)	2.03 (1.33)
		Low	It is not a brand name	2.99 (1.19)
	(.82)	It is not a known brand	2.99 (1.22)	2.27 (1.39)
		It is not a big brand	3.00 (1.14)	2.12 (1.29)
Feasibility		High	It is easy to make	3.69 (1.39)
	(.81)	It is straightforward to make	4.16 (1.14)	2.62 (1.46)
		It is cheap to make	3.71 (1.25)	2.22 (1.37)
		Low	It is hard to make	3.78 (1.44)
	(.78)	It is complex to make	3.24 (1.20)	2.42 (1.36)
		It is expensive to make	3.29 (1.18)	1.87 (1.16)