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Review Article

# Applying Simonton's Definition to Japanese Creativity in Cross-Cultural Analysis

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All measurement begins by defining a concept and making it operational[1]; however, current theories and measurement methods of creativity often lack cultural universality[2]. There is a significant absence of standardized, culturally specific tools, beginning with a cross-cultural definition of creativity that assesses diverse creative expressions without excessively relying on Western perspectives[3]. Therefore, crafting a definition that encompasses the characteristics of creativity for both Western and Eastern cultures, especially East Asians, is complex and challenging[4], yet necessary as it serves as a foundational step for subsequent measures and comparisons within and between different cultures.

This study introduces a novel approach to analyzing Japanese creativity by applying Simonton[5][6]'s definition and formula, which assesses creativity through the multiplicative interaction of novelty, utility, and surprise. By contextualizing Japanese creativity within its rich cultural and philosophical traditions—namely Shinto, Buddhism, and Confucianism—this paper highlights how these elements collectively foster a unique form of creativity that blends incremental innovation with significant global impacts, such as contributions to Nobel Prizes, Japan's substantial global influence in intellectual property, and its consistent production of high-impact scholarly works. This challenges the common stereotypes about Asian educational systems that emphasize rote learning and, together with Confucianism, confront creativity. Instead, it reveals a complex interaction of cultural factors that cultivate a distinctive type of creativity in Japan (and possibly in East Asia in general), deeply integrated with societal values and traditions.

The findings from this paper suggest that the adapted formula for Japanese creativity based on Simonton's model would be expressed as $C = a_1 \times N \times a_2 \times U \times a_3 \times S$ (where C is creativity, N represents novelty/originality, U represents utility, and S represents surprise; $a1 + a2 + a3 = 1$; and $a_2 > a_3 > a_1$),

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highlighting a preference for utility in harmony with cultural values, followed by surprise and originality. Applying Simonton's framework as the initial step provides a foundation for a comprehensive, culturally nuanced tool for measuring creativity, which can be particularly beneficial in comparative studies of creativity across different cultures, especially between Western and Eastern (Asian) societies.

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# I. Introduction

Japan's consistently high performance in international assessments such as PISA (Programme for International Student Assessment) and TIMSS (Trends in International Mathematics and Science Study) [7] can be attributed to several factors, including educational policies, teaching methodologies, learning styles, and cultural attitudes toward education. One explanation for these rankings is that Japan, along with several other East Asian economies, places excessive emphasis on rote memorization and standardized testing[8], with entrance examinations for high schools and particularly university admissions in Japan being likened to "Examination Hell"[9]. This serves as a basis to argue that Japan's education system does not foster creative human resources, as Takayama[10] has highlighted several biases related to this topic. Numerous studies also indicate that Confucian culture may be one of the factors inhibiting creativity by placing too much importance on obedience, collectivism, and not valuing individualism[11](Fielding, 1997; Kim & Michael, 1995; Ng, 2001; Rudowicz & Ng, 2003; Kim, 2005, 2007, 2009: as cited in [12]). However, the actual creative achievements of Japanese generations over the past several decades present a more vibrant picture, which can be summarized in several points as follows:

## 1.1. Japan's Dominance in Global Patent Registrations and Per Capita Innovation

The World Intellectual Property Organization ranks the top 10 patent offices globally, with China, the United States, and Japan consistently holding the top three positions from 2013 to 2022[13]. However, a closer examination of these numbers reveals that when the total number of patents in each country's office is adjusted for population size[14], Japan leads in per capita innovation among these three major patenting nations. Specifically, Japan has 0.025 patents per person, compared to 0.018 for the United States and 0.009 for China.
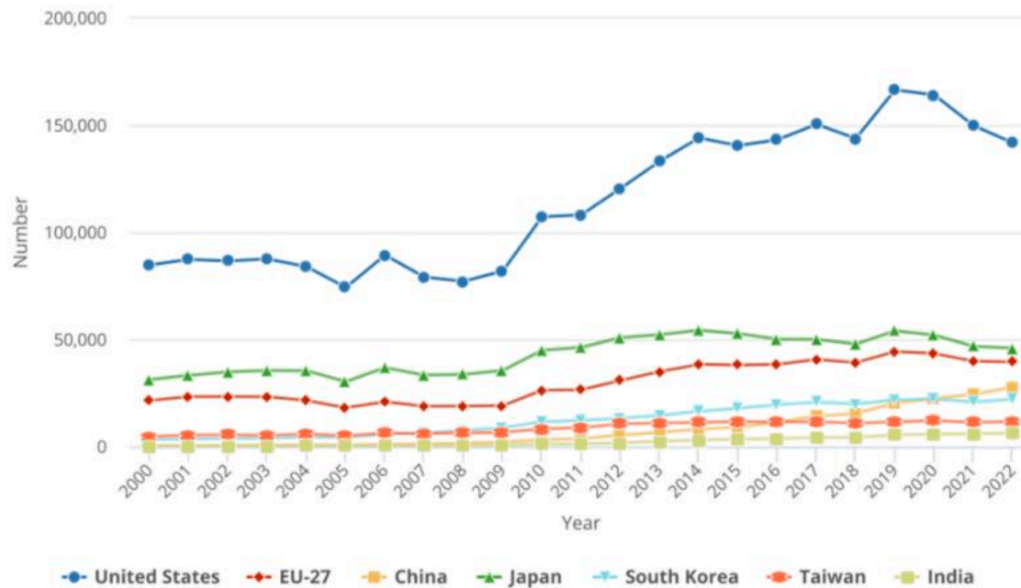
Figure 1. *USPTO utility patents granted to inventors, by selected region, country, or economy: 2000–22*[15]

In 2022, foreign entities were granted rights to 53% of utility patents issued by the USPTO (The United States Patent and Trademark Office), reflecting an increase from 44% in 2000 (Figure 1). Over the past two decades, Japan has consistently contributed the highest number of foreign inventors to these patents[15].

## 1.2. Japan's Notable Contributions to Nobel Laureates Over the Past Two Decades

Since 2000, Japan has produced 19 Nobel laureates, placing it second only to the United States. Most of these laureates were recognized for achievements made during the 1980s and 1990s[16].

|  | 1901-1990 | 1991-2000 | 2001-2015 | Total |
|---|---|---|---|---|
| USA | 156 | 39 | 55 | 250 |
| UK | 65 | 3 | 10 | 78 |
| Germany | 58 | 5 | 6 | 69 |
| France | 22 | 3 | 6 | 31 |
| Japan | 5 | 1 | 15 | 21 |

**Table 1.** *Nobel laureates per country (natural sciences)*[17]

Focusing on the period from 2001 to 2015 in the natural sciences and conducting calculations based on the population in 2015, Japan′s standing relative to the leading United States was not significantly distant (Table 1). Specifically, there was one Nobel laureate per 8.5 million Japanese citizens compared to one per 5.8 million Americans. Furthermore, a notable statistic highlights that immigrants have been awarded 40% of the Nobel Prizes won by Americans in Physics, Chemistry, and Medicine since 2000, and 36% since 1901. In 2023 alone, immigrants won 4 out of 6 U.S. Nobel Prizes in Physics, Chemistry, and Medicine[18]. This indicates that if considering only native-born individuals, Japan′s number of Nobel laureates in the natural sciences could be considered the world′s highest.

## 1.3. Statistics on Japan's Scientific Publications

Using data from the Scopus database, which compiles global publications in Science and Engineering from peer-reviewed journals and conference papers, the National Science Board (U.S.) presents a table ranking countries and economies by publication output in 2018. In this ranking, Japan holds the fifth position, following China, the United States, Germany, and India[19]. However, when adjusted for population, Japan ranks third in publication output per capita, trailing only Germany and the United States.

Another statistic[20] also confirms the aforementioned ranking by showing that the total number of scientific publications in the natural sciences field from Japan from 1982 to 1998 consistently ranked 2nd, 3rd, or 4th, following the United States, Germany, and China.

## 1.4. Global Perception of Japanese Creativity

A StrategyOne survey[21] of 5,000 adults (1,000 each from the US, UK, Germany, France, and Japan) conducted from March 30 to April 9, 2012, asked participants which country they felt was the most creative. Japan ranked #1, with 36% of respondents selecting it. However, the report also found that Japanese respondents were less inclined to identify their nation as creative, indicating a potential gap between global perceptions of Japanese creativity and the way the Japanese view their own creative identity.
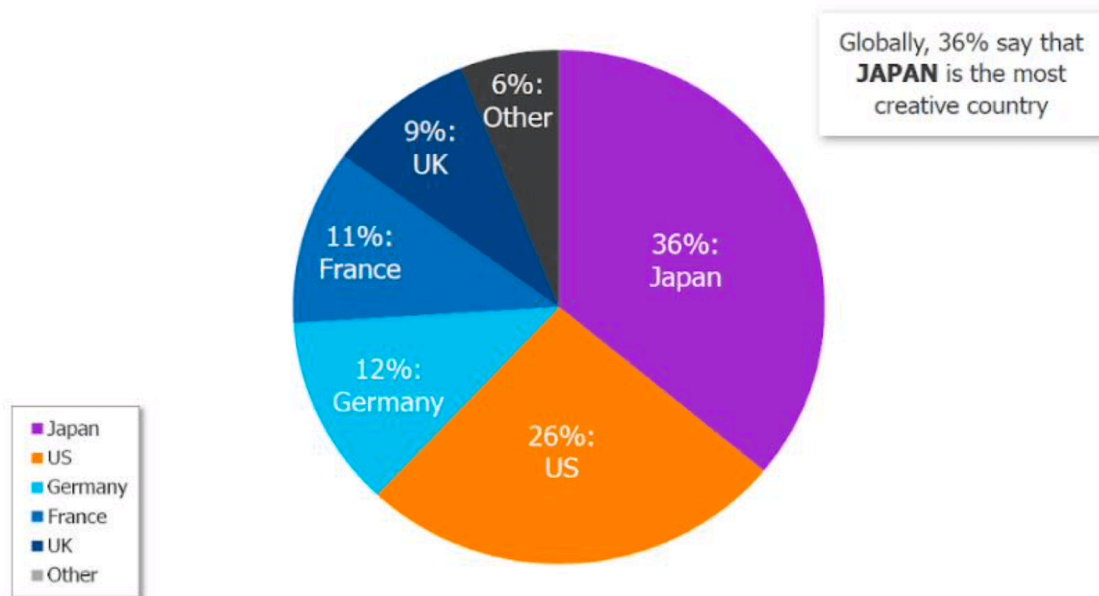


**Figure 2.** *Global Survey Result: Japan Ranked as the Most Creative Country* [21].

Although 'Examination Hell' was discussed as early as the first half of the 20th century[9], Japan's creativity can be traced not only to the post-World War II "Japanese Miracle" but also back to the Meiji Restoration and even earlier periods. Furthermore, Japan's creative achievements are evident in various domains that are difficult to quantify, such as commercial products, art, tea ceremonies, and architecture —though a detailed discussion of these lies beyond the scope of this paper.

This raises the research questions: Is there a unique Japanese style of creativity? Can one theoretical framework explain both Western and Eastern creativity, particularly that of Japan? To address these inquiries, we will first explore the core definitions and concepts of creativity, drawing on English-

language literature. Next, we will contrast Western and Eastern perceptions of creativity through several established studies. Finally, we will analyze the characteristics of Japanese creativity and propose an initial application of Simonton's definition of creativity to the Japanese context.

## II. Creativity: Definition(s), East (Asia)–West Difference, and Japanese Characteristics

### 2.1. Definitions of Creativity

#### 2.1.1. The Standard Definition of Creativity: A Bipartite Approach

As the author has pointed out in one of their papers[22], hundreds of scholarly articles emphasize uniqueness/novelty/originality and usefulness/value/appropriateness/effectiveness as the primary components in the conceptualization of creativity[23][22]. In line with this, the *Creativity Research Journal*'s website highlights the 2012 article 'The Standard Definition of Creativity'[24] as its most-cited piece[25]. This is expected, as research often requires a clear definition of creativity, and it was confirmed that '[t]he Standard Definition of Creativity (SDC) points to two requirements for creativity, namely originality and effectiveness' (ibid.).

Therefore, it is unsurprising that the following bipartite definition, considered to have "gained widespread acceptance in scholarly literature"[26], originates from Plucker et al.[23]: "Creativity is the interaction among *aptitude, process, and environment* by which an individual or group produces a *perceptible product* that is both *novel* and *useful* as defined within a *social context*".

PISA (the Programme for International Student Assessment), developed by the Organisation for Economic Co-operation and Development (OECD), also applies the bipartite approach to define creative thinking as "the competence to engage productively in the generation, evaluation, and improvement of ideas that can result in original and effective solutions, advances in knowledge, and impactful expressions of imagination" in the context of assessing the creative thinking skills of 15-year-old students globally[27].

The OECD definition of creative thinking aligns with what Silvia[28] writes: "this novel-and-appropriate definition is in all the textbooks and first paragraphs of articles" (p. 272). However, the widespread use

and, to some extent, popular acceptance of this "standard" definition does not mean it is without issues, which we will address in the following sections.

### 2.1.2. *Variety of Definitions*

It is logical that in a field devoted to studying creativity, numerous researchers have suggested expanded or modified versions of the "Bipartite Approach" definition (uniqueness and usefulness). Several scholars suggest various third criteria, including Amabile's (1983) "heuristic," Boden's (1991) "surprising," and Feldman, Csikszentmihalyi, and Gardner's (1994) "remarkable" (all cited in [29]). Following this trend of exploration, Runco[25] lists additional proposed elements for creativity, such as "value" (Harrington, 2018), "authenticity" (Kharkhurin, 2014), "intentionality"[30] (Runco, 1996, 2007a; Weisberg, 2018), and "surprise"[31] (Bruner, 1962; [5][6]) (all cited in [25]). Together, these contributions highlight the blossoming variety of options for the third criterion of creativity, reflecting the diverse perspectives within the field.

Some scholars have gone further, challenging the second criterion, "utility" (or "value," "effectiveness"), by removing it from the definition of creativity[32] and even substituting it with other elements, such as "satisfying"[33] or "intentionality"[30]. Recently, with the rapid rise of AI and its application across research and education, Runco[25] pointed out that AI may indeed qualify as creative according to the standard definition, but there are compelling reasons to question the creativity of AI. This suggests it may be time to update the definition to include "authenticity" and "intentionality" in order to "distinguish the artificial creativity of computers, which may be original and effective, from human creativity, which is more than just original and effective"[25].

Another approach critiques "the 'standard' definition of creativity as novel and useful" for focusing on creative products, while "creativity is constituted by processes"[34]. They propose that "any process that includes internal attention constrained by a generative goal, often involving other cognitive, perceptual, emotional, or motoric operations" can be considered creative. Even if no product results from the process, it can still qualify as creativity if it meets these criteria. Green et al.[34] also argue that the time is right for a process-based definition of creativity, one that aligns with the science of understanding creativity as a neurocognitive process. To the author of this paper, whether discussing the "standard" definition or an updated one, it must at least fulfill Brandt's[32] assertion that "a definition needs to be all-encompassing" and cannot be confined to a single domain like neuroscience. Hence, one noteworthy point in Green et al.

[34] is their framework, Creativi-Tree, which could open the door to a more comprehensive definition of creativity in the future, incorporating both process and product (see Figure 3).
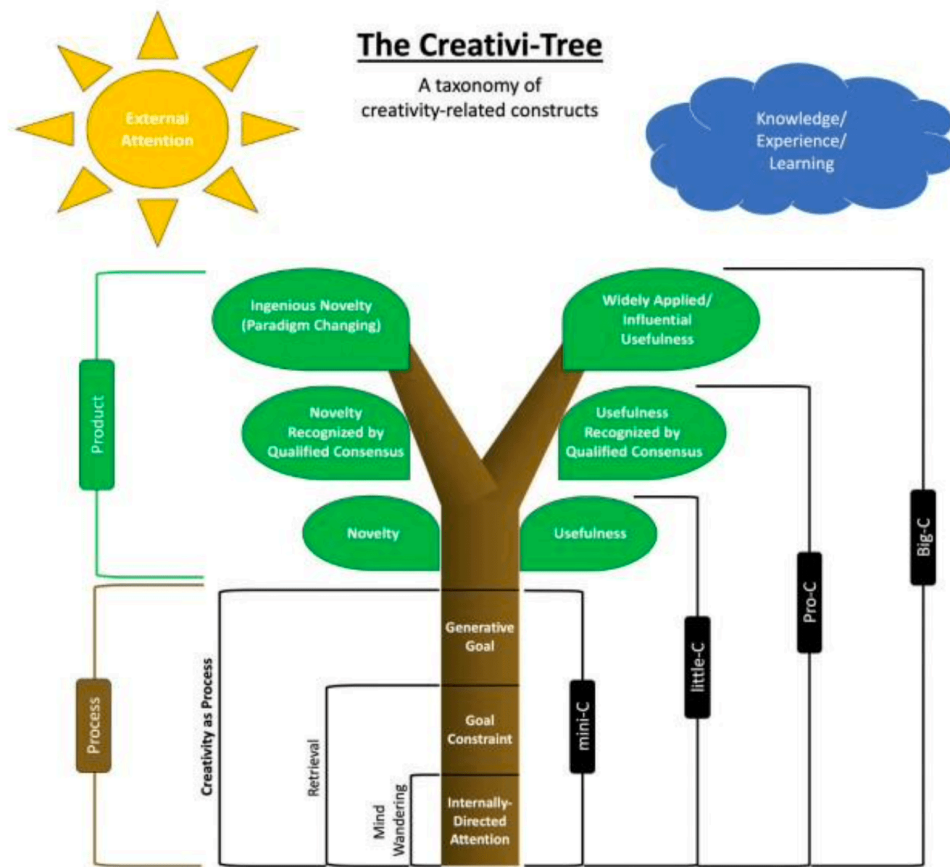


**Figure 3.** *The Creativi-Tree*[34]

*Note*: The Creativi-Tree illustrates how the three criteria of the process definition differentiate creativity from related constructs. The left side shows the minimum creativity-related elements needed for each construct, with processes in the trunk leading to products in the branches. Constructs like mind-wandering share elements but lack goal-directed criteria. Colored brackets differentiate process (attention, goal-related elements) from product (novelty, usefulness). On the right, creative eminence levels (mini-C to Big-C) map onto the tree, while the sun and rain cloud represent external factors that nourish creativity[34].

### 2.1.3. *Simonton's definition*

Simonton[35] defines creativity as "the creativity of a given idea is the joint product of its subjective originality, utility, and surprisingness". He also clarifies[5][36] that the term "joint" implies a multiplicative relationship rather than an additive one, meaning an idea cannot be considered creative if it is commonplace, useless, or obvious. He illustrated this idea with the formula **C = N x U x S**, where N, U, and S represent novelty, utility, and surprise, respectively[6]. A more sophisticated version of this formula accounts for the idea's initial probability (p), its final utility (u), and the creator's prior knowledge of that utility (v). The three parameters form a multiplicative definition of personal creativity: **c = (1- p) u(1 - v)**, where the first factor represents originality, and the third represents surprise, with **$0 \leq c, p, u, v \leq 1$**[37]. It is important to note that Simonton differentiates between "personal creativity" (little c), which is based on the creator's own assessment of originality, usefulness, and surprise, and "consensual creativity" (Big-C), which is validated by experts or an audience within a particular field[38].

As far as we are aware, a notable aspect of this definition is that it is one of **the first** to be **quantitative and multiplicative**, rather than qualitative or additive, based on these three criteria. The formula-based definition represents an advancement on the U.S. Patent and Trademark Office's[39] three criteria for patent approval, which require that an invention be novel, useful, and non-obvious. In a broader historical context, de Bono (1992, p. 3), Kim (1989, p. 9), and Torrance (1988) have also adopted the USPTO's definition of new, useful, and non-obvious to describe creativity (as cited in [29]). Simonton[6] simplifies "non-obvious" by referring to it as "surprise," which has also been included in definitions of creativity by Boden (1991, 2004, in [29]) and even earlier by Bruner (1962, in [25]). Recently, Acar et al.[31] conducted an empirical study involving both experts and non-experts, finding that "surprise could actually be more crucial than value" when assessing creativity.

Nevertheless, at least two[26] of the three co-authors of the widely accepted definition suggest that the three-factor model may be accurate in specific contexts, such as when assessing products for patent protection, but it may not hold true in all cases. They argue that this additional aspect seems to align with the "social context" element discussed in Plucker et al.[23]'s definition. However, this claim might be unconvincing, as creativity often depends on a "social context," which overlooks cases of little-c creativity, where the creator assesses their own work, but it has not yet been recognized by society or experts. Boden[40] distinguished between psychological creativity (P-creativity) and historical creativity (H-creativity). P-creativity involves generating a surprising, valuable idea that is new to the person who

conceived it, while H-creativity refers to an idea that is new and somewhat accepted by humanity at the time it emerges. Many creators, such as Leonardo da Vinci, have experienced this; in his time, his sketches may have been seen as fanciful rather than creative according to the prevailing social context. Thus, creativity does not necessarily depend on the "social context," as suggested by the popular definition.

The inclusion of Simonton's definition in this part serves primarily to contrast it with the standard definition discussed earlier. Simonton's focus on the multiplicative combination of "originality," "utility," and "surprise" (in both lowercase for little-c and uppercase for Big-C creativity, as previously mentioned) offers a comprehensive understanding that encompasses both personal and consensual creativity, independent of immediate social validation. More importantly, by quantifying and using a multiplicative approach, Simonton's model offers a potential way to balance the differences between Eastern and Western concepts of creativity, a point we will explore in detail in the next section. In this framework, each component of creativity—originality, utility, and surprise—can be weighted differently according to cultural context, acknowledging that no single aspect holds the same strength across all cultures. In the section "Applying Simonton's Definition to Japanese Creativity," further explanation will clarify why Simonton's definition is preferred in certain contexts, particularly when analyzing creativity in cultures like Japan.

## 2.2. A Comparative Reflection on Creativity in East Asia and the West

Our approach to analyzing creativity differences between two distinct regions begins with an examination of linguistic aspects of creativity and a cultural comparative analysis, followed by a review of empirical studies in this field. As Fox (1997, as cited in [41]) argues, creative thought would be "impossible" without the linguistic and societal structures and norms embedded in a cultural context. This dual approach—linguistic and cultural—provides a foundation for understanding how creativity is shaped and expressed across diverse regions.

For clarity, this paper specifically focuses on East Asia and the West (Europe and North America), rather than the broader "East," as regions like South Asia and the Middle East warrant further dedicated study. Referring simply to the "East" risks oversimplifying these culturally distinct areas.

## 2.2.1. *Creativity through a Linguistic Lens*

Given the scope of this study, we focus on understanding the concept of creativity through a linguistic lens, specifically analyzing three languages: Chinese, Japanese, and English (with its Latin roots).

### *a. Chinese:*

Most Chinese characters are compounds, composed of meaningful radicals and phonetic elements. These components provide clues about meaning and pronunciation rather than being indivisible symbols or pictograms. Using leading online resources such as Hanziyuan.net, zd.hwxnet.com, and the Cambridge Dictionary, we can analyze the etymology and breakdown of key creativity-related terms in Chinese. Below is a logical table and detailed explanation.

| Term | Character(s) | Components | Meaning |
|---|---|---|---|
| Create/Initiate | 创 (chuàng) | 仓 (warehouse/storage) + 刀 (knife) | Breaking from the old, initiating ideas. |
| Build/Construct | 造 (zào) | 辶 (movement) + 告 (announce) | Making ideas functional, completing the action. |
| Creativity/Creativeness | 创造性 (chuàngzàoxìng) | 创 + 造 + 性 (character) | Creativity as an inherent trait or mindset. |
| Creativity/Creative Power | 创造力 (chuàngzàolì) | 创 + 造 + 力 (power) | Practical ability to generate results. |

**Table 2.** *Creativity-related terms in Chinese.*

From Table 2, we can see that 创 (chuàng), meaning "create" or "initiate," consists of two components: 刀 (dāo, knife), symbolizing cutting away or breaking free from the old, and 仓 (cāng, storage), referring to a warehouse of stored knowledge or resources. Together, 创 conveys the idea of starting something new by breaking away from what is already stored (but not necessarily discarding what has been learned or accumulated). Meanwhile, 造 (zào), meaning "make" or "construct," includes the radical 辶 (chuò, movement), which represents action or progress, and 告 (gào), meaning to announce or proclaim,

implying the completion or communication of the creative act. Therefore, 造 focuses on creating something functional or tangible, stressing that creativity is not just about the end product but also the process or journey—not only about originality but also practical utility. Together, 創 and 造 form the core word 創造 (chuàngzào)—"to create"—capturing the dual nature of creativity (in the Chinese language) by balancing both novel concept and utility execution.

## b. Japanese

According to Jisho.org and the Online Cambridge Dictionary, Japanese expresses creativity through key terms rooted in the Chinese 創造 (chuàngzào), which has just been analyzed. Both terms stem from 創造 (sōzō / そうぞう), meaning create/creation: 創造性 (sōzōsei / そうぞうせい) captures creativity as an inherent trait, while 創造力 (sōzōryoku / そうぞうりょく) emphasizes the practical ability to turn ideas into action, reflecting a balance between originality and utility.

Another Japanese word for creativity is クリエイティビティ (kurieitibiti), a direct borrowing from the English word "creativity," with a pronunciation that closely mirrors the original. This is an example of katakana, which is used in Japanese to transcribe loanwords (gairaigo) from other languages, reflecting the incorporation of foreign concepts into Japanese culture. This alternative way of expressing creativity demonstrates Japan's engagement with global ideas and highlights how these are adapted into domestic industries and discourses.

## c. English

The Oxford Learner's Dictionaries[42] defines creativity as "the use of skill and imagination to produce something new or to produce art," while the Cambridge Dictionary[43] defines it as "the ability to produce or use original and unusual ideas." On the other hand, Merriam-Webster[44] defines it indirectly as "the ability to create" or "the quality of being creative." Tracing its definition of "create," we can see the related meanings are "to bring into existence" or "to make or bring into existence something new." Hence, from the Oxford, Cambridge, and Merriam-Webster dictionaries, we do not see any "utility"/"value"/"usefulness" component in creativity definitions. This serves as evidence for the widespread use and understanding of creativity in (at least) the US and UK, where "creativity" is often associated solely with "novelty" or "originality." Notably, from a linguistic perspective, the concept of "creativity" in Chinese and Japanese is more inclusive, encompassing both novelty and utility, unlike its primary focus on originality in British and American English dictionaries.

According to the etymology from the Oxford English Dictionary[45], "create" comes from the classical Latin *creāt-*, the past participial stem of *creāre*, which meant "to procreate, (of males) to beget, (of females) to give birth, (of God, Nature, etc.) to bring into being, to produce, to bring about, cause, to appoint."

Interestingly, the term *creativity* is relatively new; it "did not exist before 1870"[4], absent even from dictionaries like the 1971 Oxford English Dictionary[46]. Originally associated with divine or natural acts beyond human control, creativity was seen as a passive, God-given phenomenon. Over time, however— particularly after the Enlightenment—it evolved into a concept centered on human inventiveness and agency. This shift reflects a broader transition in Western thought, moving from viewing creativity solely as a divine gift to recognizing it as an active human capability driven by intellect and imagination[46][47].

## 2.2.2. *Creativity through cultural comparison*

Understanding creativity requires grounding it within its social and cultural context, as different cultures may hold distinct conceptions of creativity[48]. Culture, defined as a shared system of values, norms, behaviors, cognitions, and customs, shapes interactions among individuals and their engagement with the physical environment, deeply influencing not only the production of "creative" work but also its reception and recognition[48]. It determines who creates, what is created, and why, impacting both the expression and scope of creativity[49].

Numerous studies over the last two decades have thoroughly compared and contrasted the cross-cultural perspectives on creativity, particularly between the East (Asia) and the West (Europe and the U.S.), including works by Celik and Lubart[4], Ivancovsky et al.[50], Lan and Kaufman[51], Leung et al.[48], Lubart[52], Niu[53], Niu and Sternberg[47], Puccio & Gonzalez[54], Simonton & Ting[55], and Smith[56], among others. Based on Niu[53]'s categorization of comparison points, the table below synthesizes findings from these comparative studies:

| Criteria | West | East Asia | Source |
|---|---|---|---|
| **Main Cultural Concept*** | Western conceptions of creativity emphasize novelty and individual, internal dynamics, such as agency and choice. Creativity is often perceived as a revolutionary act, breaking away from established norms to create something entirely new. | Focuses on appropriateness, usefulness, and the refinement of existing ideas. Creativity is seen as an evolutionary process, tending to connect the new with the old and highlight the social and moral values of creativity. | [4][57][58][59] [41] |
| **Religious Influence*** | Shaped by individualism, democracy, and freedom, stemming from Greco-Roman and Judeo-Christian roots. Creativity is often associated with individual expression, self-reliance, and groundbreaking discoveries. | Heavily influenced by Buddhism, Confucianism, Shinto (particularly in Japan), and Taoism, which emphasize harmony, social order, interconnectedness, and respect for tradition and nature. Creativity is often seen as a means of self-cultivation and contributing to society. It is not about controlling outcomes but about curating and accompanying the flow of life, embracing unlimited evolution over abrupt change. | [48][60][61] [56][41][62] [63] |
| **Individualism vs. Collectivism** | Individualistic perspective, where creativity is often attributed to the unique talents and insights of individuals. Originality and self-expression are highly valued. | Collectivist orientation, where creativity is often a collective endeavor, focused on group harmony and societal benefit. Individuals are encouraged to refine and reinterpret existing ideas rather than seeking radical departures. | [48][58][53] |
| **General vs. Contextual** | While acknowledging contextual factors, Western perspectives often emphasize the generalizable aspects of creativity, focusing on universal principles and | Contextual understanding of creativity, recognizing that creative expression is influenced by social norms and cultural expectations. Appropriateness and usefulness within a given context are highly valued. | [50][53] |

| Criteria | West | East Asia | Source |
|---|---|---|---|
| | cognitive processes that underlie creative thought. | | |
| Novelty vs. Appropriateness | Strong emphasis on novelty and originality, even if it challenges existing conventions. Breakthroughs and paradigm shifts are highly celebrated. | Greater emphasis on appropriateness and usefulness. Creativity is often seen as a process of refining and adapting existing ideas to new contexts. Novelty is valued, but it should not come at the expense of practicality and social harmony. | [50][52][58] [55] |
| Revolution vs. Evolution | Greater emphasis on revolutionary creativity, seeking groundbreaking innovations and disruptive ideas that challenge the status quo. | Preference for evolutionary creativity, building upon and refining existing traditions. Creativity is seen as a gradual process of improvement and adaptation. | [51][59][12] |
| Intrinsic vs. Extrinsic Motivation | Intrinsic motivation, driven by personal expression, curiosity, and the desire to create something new, is a primary driver of creative behavior. | While extrinsic motivators like social recognition and contribution are significant, intrinsic motivation stemming from self-cultivation and mastery of a craft is highly valued. | [48][53][59] [54] |
| Product vs. Process-based* | While recognizing the process, Western perspectives often place a strong emphasis on the final product and its impact on the field. Novelty, usefulness, and impact are key criteria for evaluating creativity. | Emphasis on the process of creation and the journey of self-discovery and refinement. The final product is important, but it is seen as a culmination of a thoughtful and deliberate process. | Anoomou and Formella (2018); [57] [52] |
| Uni-function vs. Multi-function** | Western cultures typically focus on single-purpose applications, emphasizing specialization. | Limited resources in Japan encourage ideas to serve multiple functions, promoting adaptability and versatility. | [64][65] |

| Criteria | West | East Asia | Source |
|---|---|---|---|
| **Cartesian logic vs. Fuzzy logic (or Emotional-intuitive creativity) \*\*** | Western creativity, especially in Germany, is driven by rational, linear, and individualistic thought, symbolized by black-and-white thinking, and is more intellect-based. | Japanese (and Eastern) creativity is more intuitive, shaped by holistic, adaptive thought, and symbolized by shades of gray, and is more consciousness-based. | [60][64][66] [65][67] |

**Table 3.** *Comparative Table of Creativity: West vs. East Asia*

*Note: While the primary comparative criteria are adapted from Niu[53], the elements marked with (\*) and (\*\*) have been added by the author, based on a review of the literature.*

It is important to note that these are general trends, and there is considerable overlap and variation within both Eastern and Western cultures. Furthermore, ongoing globalization and cross-cultural exchange are leading to more fluid and nuanced understandings of creativity. On the other hand, while the mainstream academic discourse synthesizes the differences between the West and East (Asia) as demonstrated in the table we just showed, studies like Paletz and Peng[68] challenge these views through an implicit theory approach. Surveying over 400 students from Japan, China, and the United States, they discovered that appropriateness manipulation had a stronger effect on Americans and Japanese than on Chinese, contradicting the "cultural stereotype" that Americans, unlike East Asians, regard appropriateness as less important to creativity.

Another study by Sundararajan and Raina[66] questions the perceived deficiency of Asians in radical, revolutionary creativity. Their analysis suggests that the issue is not so much collectivism as it is biased sampling in cross-cultural psychology, which often renders non-Western creative phenomena invisible. They argue that cross-cultural comparisons frequently overestimate the influence of social norms on creativity, neglecting the individual's choice in creativity even within collectivist cultures. To provide a more balanced view, they advocate for a matched comparison of revolutionary creativity, drawing on insights from indigenous psychology. Additionally, differences and/or similarities in linguistic

perceptions (as we just analyzed in 2.1) and the varying concepts of revolution across cultures (in the case of Sundararajan and Raina[66]'s study) may also shape distinct views of creativity.

To synthesize this discussion, we might appreciate the notion that the two forms of creative behavior may represent dual aspects of the creative process intrinsic to human nature and cognitive function[4]. In other words, the differences in creativity perception between the East and West, akin to Yin and Yang[65], are interdependent; they coexist, nourish each other, and within Yin, there is Yang, and within Yang, there is Yin. For instance, throughout the modernization process in collectivist societies, the personality profile of Chinese people has increasingly leaned toward individualism, a similar trend observed in Japan[2].

### 2.2.3. *Empirical Comparative Studies*

Empirical comparative studies have shown mixed results in comparative analyses of creativity between Western and Eastern individuals. For example, Torrance and Sato[69] found that Japanese university students, in their own perception, tend to perform better than Americans in both right-brain and left-brain thinking. In contrast, Saeki et al.[11], through a comparative study of 51 American and 54 Japanese college students, observed statistically significantly higher scores among American students on the Torrance Tests of Creative Thinking (TTCT) figural test than their Japanese counterparts. Leung and Wang[70] even highlight studies showing no clear cultural difference in creativity. For example, Nouri et al.[70] found no difference between Singaporean and Israeli participants in generating symbol interpretations, while Van Harpen and Sriraman[70] observed that contextual factors, like curriculum, influenced creativity scores more than cultural background among Chinese and American students.

How should we interpret these mixed results? Notably, a recent study by Barth and Stadtmann[3] offers valuable insights into this discussion. This meta-analysis synthesizes data from 41 studies, covering 221 effect sizes, to examine cross-cultural differences in individual creativity between Western and Eastern cultures. The analysis included countries classified in the "Anglo," "Eastern Europe," "Germanic Europe," "Latin Europe," and "Nordic Europe" GLOBE clusters as "Western" and countries in the "Confucian Asia" cluster as "Eastern." In total, 46 unique Western and 43 unique Eastern samples were analyzed, yielding 68 West–East contrasts. The primary studies, published between 1979 and 2021 (median year 2013), covered divergent thinking and product-based creativity measures. Studies using self-reports, problem-solving assessments, or ratings without task-based measures were excluded. From the 10,418 individuals

investigated (5,113 from Western and 5,305 from Eastern contexts), the average sample age was 20.1 years, with a female representation of 48.1%. The most frequently examined contrasts were "U.S.A. vs. China" (33.8%), followed by comparisons between the U.S.A. and Japan, U.S.A. and Hong Kong, Israel and Japan, and the U.K. and China (8.8% each). A three-level meta-analytic model identified a small-to-medium effect size of g = 0.329, suggesting higher creativity scores among Western individuals.

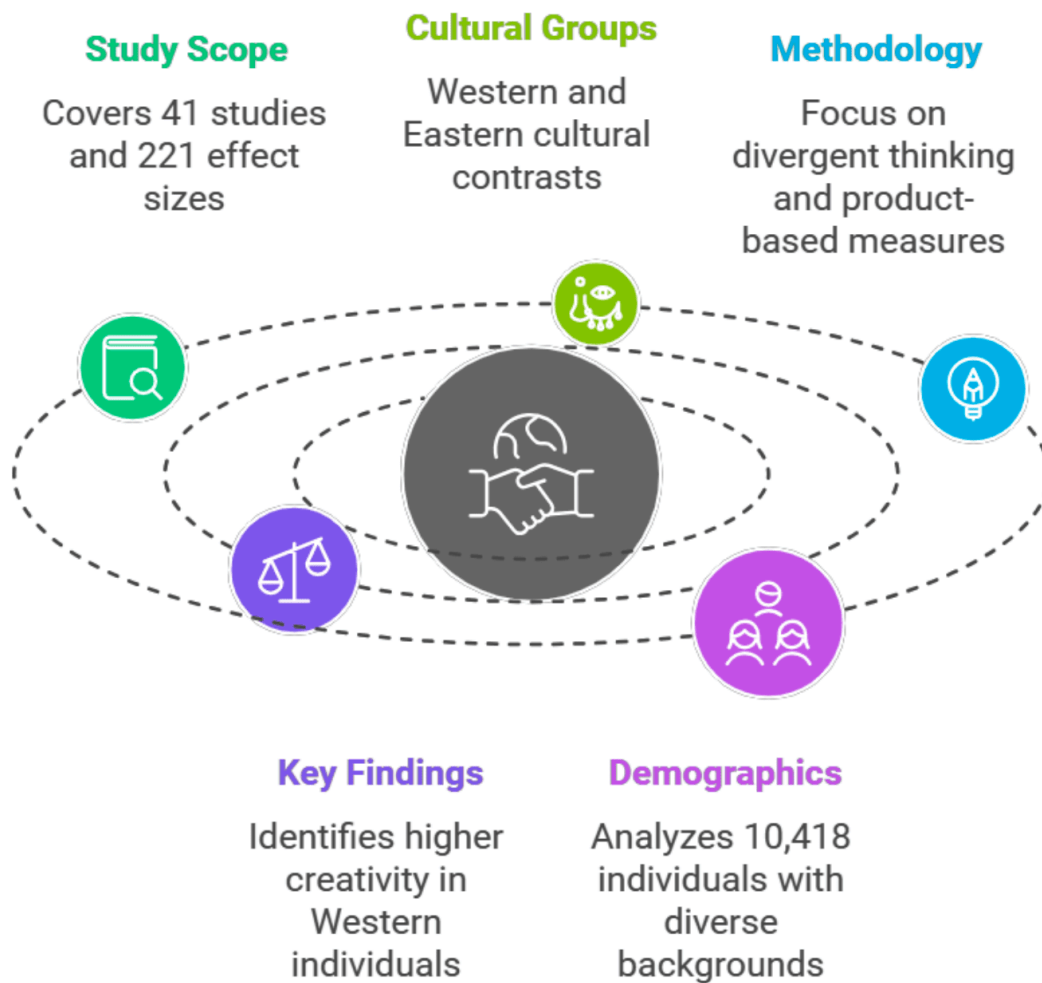## Cross-Cultural Creativity Analysis

**Study Scope**
Covers 41 studies and 221 effect sizes

**Cultural Groups**
Western and Eastern cultural contrasts

**Methodology**
Focus on divergent thinking and product-based measures

**Key Findings**
Identifies higher creativity in Western individuals

**Demographics**
Analyzes 10,418 individuals with diverse backgrounds

**Figure 4.** *Key Points of Meta-Analysis on Cross-Cultural Creativity Differences between Western and Eastern Cultures* (illustrated from the findings of [3])

Noteworthily, the study's conclusions caution that interpreting the "small-to-medium" effect size is complex due to potential cross-cultural assessment biases within the primary research. The observed differences likely result from a combination of genuine creativity variations and biases, particularly from assessment-related factors. Leung and Wang[70] further explain that many creativity tests overlook the appropriateness or usefulness dimension, whereas "greater emphasis on originality"[2], potentially disadvantaging Asian participants. Since most tests are developed in the West[2], Western students are accustomed to their formats, which often prioritize divergent thinking and particularly highlight originality. This familiarity may contribute to their higher scores, suggesting that differences in test results could reflect exposure to these testing formats rather than inherent cultural differences in creativity[70][59]. Additionally, Barth and Stadtmann's[3] meta-analysis found that task framing played a moderating role in cultural creativity differences: test-like tasks favored Western participants, while game-like tasks showed no significant East-West differences. This suggests that with more familiar test formats for Eastern participants, results might be mixed or show minimal differences, challenging clear-cut claims of Western creativity superiority. This underscores the importance of establishing a solid foundation for assessment, where cross-cultural elements are recognized, well-defined, and quantifiable —reaffirming the main objective of this study.

Recent factual data further challenges the traditional perception of Western dominance in creativity, revealing high levels of creative output in Asia. Asia's patent offices account for over two-thirds of global filings for patents, trademarks, and industrial designs, and nearly all utility model applications. From 2011 to 2021, Asia's share of worldwide patent applications surged from 54.6% to 67.6%, underscoring a strong upward trend in the region's creative contributions[71]. Adding to this is the impressive creative performance of Singapore and Korea, which emerged as the highest-performing education systems in the OECD's 2022 PISA creative thinking assessment. In this first-ever global creative thinking assessment, students from Singapore and Korea led among their peers from 64 countries and economies, demonstrated originality and adaptability in solving expressive and familiar problems, such as generating compelling story ideas or designing various approaches for school awareness campaigns[72].

Alongside these metrics are the substantial creative achievements of Japanese generations over recent decades, as mentioned in the Introduction, indicating that creativity strengths may vary by regional context and assessment criteria and suggesting that East-West creative differences may not be as straightforward as traditionally assumed.

## 2.3. Japanese Creativity Characteristics and Simonton's Definition of Creativity in the Context of Japan

### 2.3.1. Japanese Creativity Characteristics

From the characteristics that make Japan a distinctive member within the comparative study of creativity in East Asian culture and the Western world, we will delve deeper to highlight the unique traits of Japanese creativity. Naturally, these traits may appear in other cultures, but in Japan, they emerge with sharper, more clearly defined patterns, as documented in relevant literature and publications. To begin, tracing back through tradition, the roots of traditional Japanese art have embodied aesthetic principles that serve as a foundation for creative expressions in commerce and technology, as illustrated in the following Table 4.

| Traditional Art | Aesthetic Principle | Business Application |
|---|---|---|
| Wood carving (netsuke) | Miniaturization, Animism | Pocket televisions, Video animation |
| Bonsai | Miniaturization, Trained growth | Electronic products, Bioengineering |
| Flower arrangement (ikebana) | Creative forms, Naturalism, Asymmetry | Robot design, Commercial landscaping, Amorphous crystal growth |
| Rock gardens | Reductionism, Aesthetic asymmetry, Meditative space | Home construction, Science city design, Research lab design |
| Architecture | Multi-purpose rooms, Open to nature, Natural materials | Apartment housing, Office complexes, Office interiors |
| Paper folding (origami) | Manual dexterity, Complex 3-D forms | "Transformer" toys, Computer-aided design |
| Hand-sewn juggling balls (otedama) | Aesthetic play | Educational toys |
| Abacus (soroban) | Manual dexterity, Visualization | Calculator keyboards, Computer simulation |
| Chopsticks | Manual dexterity | Robot fingers |
| Folding fans (sensu) | Collapsible space, Aesthetic function | Laptop computer design, Ergonomic furniture |
| Japanese characters (kanji) | Visualization, Image recognition | Fifth-generation computer, Visual scanners |
| Wrapping cloth (furoshiki) | Multi-purpose; compact | Folding solar panels |

**Table 4.** *The Cultural Foundations of Japanese Creativity*[65]

From this table, we can see that each Japanese technological achievement and creative product embodies profound philosophies and traditional Japanese beauty in unique ways. Beneath these foundations of traditional Japanese folk art lies an even deeper influence: religion. Over time, religion has become an

intrinsic cultural foundation, subtly shaping all aspects of Japan's cultural, political, and social models[73][74][75].

According to the Pew Research Center[76], 46% of Japanese adults identify as Buddhist, the largest official religion in Japan, while Shinto is more often seen as a philosophical tradition or "way of life". Shinto centers on the worship of kami (gods or spirits), with 4% identifying Shinto as their religion but 27% feeling a personal connection to it. Additionally, 38% report praying to or showing respect for kami. A notable statistic from Britannica[77] indicates that Shinto, Buddhism, Christianity, and newer religions collectively account for over 150% of the population—a reflection of Japan's accepted pattern of religious plurality, where homage is often paid to both Buddhist and Shinto deities.



**Figure 5.** *Japan religious affiliation*[77]
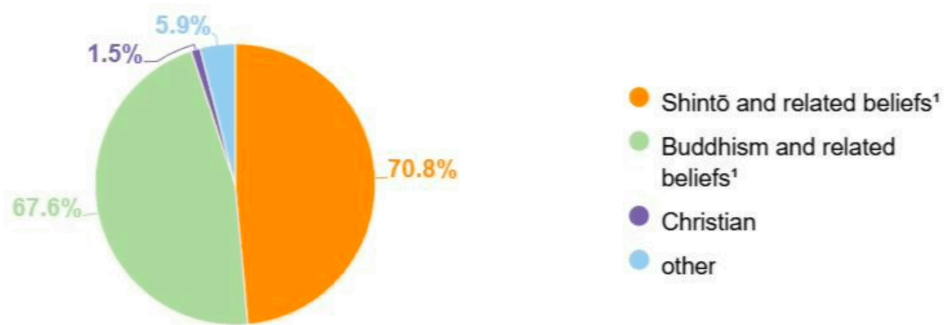
*Note: This figure illustrates an overlap of over 150% of the population, showing many Japanese practicing both Shintoism and Buddhism.*

One important aspect to consider is that Shinto, with its history of over 10,000 years, has blended not only with Buddhism but also with Confucianism, Daoism, and Onmyodō ("the way of yin and yang")[62]. A comprehensive analysis of Shinto within the scope of this study is challenging, so this paper focuses on key characteristics of Shinto and Buddhism (especially their syncretism) and examines their impact on Japanese creativity.

Based on Britannica[77][78], two shared principles emerge:

- *Harmony with Nature and the Cosmos:* Both Shinto and Buddhism emphasize a profound reverence for the natural world and cosmos, viewing all elements of nature as sacred manifestations of spiritual

forces. They encourage living in harmony with the environment, recognizing humans as integral parts of a greater, interconnected whole.

- *Interconnectedness of Existence:* Both traditions teach that all phenomena, beings, and elements of the universe are deeply interconnected and mutually dependent. In Shinto, this is expressed through the concept of kami permeating all aspects of nature, while Buddhism articulates it through the principle of dependent origination (*paticca-samuppada*). This interconnectedness extends beyond tangible "beings" to include all phenomena, underscoring that nothing exists in isolation—not even a "tiny" novel idea. Thus, creativity in Japan (and East Asia) is often seen as a series of small improvements connected to existing ideas, emphasizing gradual evolution over isolated breakthroughs.[63]

On the other hand, a core distinction remains: Kami exists naturally, embodying raw, powerful forces like thunder and water, while Buddha becomes—achieving enlightenment through practice and discipline. Kami "comes" as a powerful presence, counted as a standing "pillar" (hashira), while Buddha "goes" to nirvana, represented as seated (za)[62].

By uniting both the contrasts and shared principles of each tradition, Japan has merged these beliefs into a unique cultural syncretism known as *shinbutsu shūgō* (the blending of Shinto and Buddhism), which has shaped Japanese religious life since Buddhism entered Japan in the 6th century[79][62].

Alongside the parallel influence of these two major religions, Tucker[80] argues that Confucianism in Japan, while it has a religious dimension, primarily impacts the sociopolitical realm, shaping Japanese thought, culture, and governance throughout history. Morishima[65] notes that in Japan, Confucianism emphasizes loyalty, filial piety, friendship, and respect for elders. Viewed as an ethical system rather than a religion, Confucianism discourages individualism and values rational thinking, a perspective that facilitated Japan's swift adoption of Western technology and science after the Meiji Restoration.

If Confucianism is seen as an "invisible box" framing social order, then Japan's creative achievements illustrate an exceptional ability to "Think and Create Inside the Box". Tucker[80] notes that Confucian principles are so deeply embedded in Japanese culture that they appear as inherent aspects of the Japanese mindset, rather than explicitly "Confucian". While any box may seem dark and stifling, beauty can still emerge from within—even shadows hold greatness. "We Easterners create beauty out of nothing by conjuring shadows", wrote Tanizaki Junichiro (1886–1965) in his essay *In Praise of Shadows* [81], an influential classic work on Japanese aesthetics. In this, Tanizaki contrasts the brightly lit environments of the West with the shadowy interiors preferred in traditional Japanese settings, illustrating how the

interplay of light and dark shapes beauty. He encapsulates this philosophy with the quote, "If light is scarce then light is scarce; we will immerse ourselves in the darkness and there discover its own particular beauty", suggesting that Japanese aesthetics creatively thrive within the "box" of limitations, embracing the nuanced beauty of shadows often overlooked by other cultures. In a similar vein, Zong[4], a renowned Chinese artist, remarked, "[w]hile Western art found infinity in the universe, Chinese art uncovered the universe within the boundary". Understanding Japanese—and East Asian—creativity, then, involves recognizing how beauty and meaning arise within that "box"—as the structured confines of Confucian Heritage Culture (CHC). As Simonton and Ting[55] observe, cultural constraints "relate to some of the most basic dimensions of our existence as embodied social and cultural beings". Despite their negative connotation and the widespread use of metaphors that praise blue-sky, outside-the-box thinking, such constraints "are at the heart of creativity"[82]. This aligns with the concept of the "Inner-child"—releasing playful energy through structured spontaneity within each Japanese individual—as one of the three components of Japanese creativity, alongside embracing imperfection ("Perfectly Rejecting Perfection") and evolving through imitation and adaptation ("Next Stage Creative")[83]. Together, these three elements reinforce the idea of Thinking and Creating Inside the Box of social norms and hierarchy, revealing a surprisingly vast space for playfulness, progress, and adaptation—even through activities once looked down upon, such as imitation or tiny incremental improvements.

In conclusion, drawing from Table 4 – *The Cultural Foundations of Japanese Creativity* – and the foregoing analysis, we observe that Japanese creativity is mainly rooted in the integration of Shinto, Buddhism, and Confucianism. These influences collectively shape a unique approach to creativity, emphasizing harmony with nature, gradual improvement, and resourceful optimization within constraints. This synergy aligns closely with Simonton's three components of creativity, demonstrating how originality, utility, and surprise are cultivated through Japanese cultural and philosophical foundations. Accordingly, we can reorganize the core aspects of Japanese creativity based on Simonton's three components of creativity, as outlined in the following table (Table 5).

| Philosophical Influence | Originality (Novelty) | Utility | Surprise |
|---|---|---|---|
| Shinto | Animism and Naturalism: Any new idea must contribute to and connect with animism and naturalism | Harmony with Nature: Design respects and integrates natural surroundings | Subtle surprises in organic growth |
| Buddhism | Interconnectedness of existence: This suggests that nothing is entirely novel. Therefore, creativity is viewed as the discovery of new connections or gradual improvements (Kaizen) within existing frameworks, rather than as revolutionary creation. | Mindfulness and Efficiency: Balanced, meditative spaces and functionality with manual dexterity. | Amaze with the product after long-term evolution and skilled craftsmanship; or a deep awakening, which can be seen as an 'aha' or 'satori' (enlightenment) experience, which involves more emotional–intuitive creativity[60][84][67]. |
| Confucianism | Create Inside the Box: Working creatively within structured frameworks | Miniaturization and Space Efficiency: Compact, multi-functional spaces. | Surprise in achieving optimal function, sometimes with a touch of humor or playful spontaneity, nurtures creativity within constraints[83]. |

**Table 5.** *Japanese Creativity Characteristics: Contributions to Originality (Novelty), Utility, and Surprise*

## 2.3.2. Applying Simonton's definition of creativity to the context of Japan

Many cross-cultural studies have been critiqued for using a "Western" framework to define and measure creativity worldwide[51]. However, since 2010, Simonton (2010) introduced an approach that views creativity as a combination of **novelty (N)** and **usefulness (U)**, allowing for cultural variation. In this model, an idea is creative if it is both original and aligns with its cultural or natural context, represented as C=N×U. Hence, two cultures may be equally creative but differ in their balance of novelty and usefulness. Specifically, as Erez and Nouri (2010, in Simonton & Ting, 2010a) suggest, the more individualistic civilizations of the West may place greater emphasis on novelty (N), while the more

collectivistic civilizations of the East may focus more on usefulness (U), yet both can yield equally creative outcomes. For instance, while non–European cultures may not produce the highly individualistic, novel works typical of the West, they often create works with universal, timeless appeal. Jackson Pollock's *No. 5, 1948* exemplifies the Western emphasis on individuality and novelty, whereas Xu Daoning's Song Dynasty painting *Fishermen's Evening Song* reflects broader aesthetic utility and cultural resonance. Pollock's work is highly novel, while Xu's painting arguably offers greater universal appeal, illustrating how cultural values shape creative expression[55].

As introduced in 1.3, an updated definition of creativity includes **surprise** as an additional component: the formula **C = N x U x S**, where N, U, and S represent novelty, utility, and surprise, respectively[6]. Furthermore, according to Simonton[5], certain criteria may hold more weight than others. For example, the formula for creativity might be revised as $C = a_1 \times N \times a_2 \times U \times a_3 \times S$, where $a_1 + a_2 + a_3 = 1$, and where N represents novelty/originality, U represents utility, and S represents surprise. The weighting factors $a_1$, $a_2$, $a_3$ allow for variation in the importance of each component, with the possibility that "utility is more important than originality or surprise"[5].

This weighting can be culturally tailored, as Acar et al.[31] demonstrated in their study on perceptions of creativity's surprise element among individuals from various backgrounds, majorly from the United States. Using their study's findings, the weights might be $a_1 > a_3 > a_2$, prioritizing originality, then surprise, and finally utility. Conversely, from our analysis in 2.2 and 3.1, an adapted model for Japanese contexts might follow $a_2 > a_3 > a_1$, placing higher emphasis on utility, then surprise, and lastly originality. This approach offers a culturally flexible framework for evaluating creativity, where the exact values of $a_1$, $a_2$, and $a_3$ could be derived from empirical research, enabling creativity assessments to be more inclusive and culturally diverse.

In conclusion, the adapted formula for Japanese creativity based on Simonton's model would be expressed as $C = a_1 \times N \times a_2 \times U \times a_3 \times S$ (where $a_1 + a_2 + a_3 = 1$, and where N represents novelty/originality, U represents utility, S represents surprise, and $a_2 > a_3 > a_1$), highlighting a preference for **utility** in harmony with cultural values, followed by **surprise** and **originality**. This framework provides a comprehensive method to appreciate creativity's cultural nuances, particularly within Japanese contexts.

A key point to highlight again is that while utility is somewhat universally understood, with a stronger emphasis in the East, originality and surprise in Japan are perceived distinctly. Originality emerges through incremental, thoughtful improvements, adding value over time with continuous refinement.

Surprise is appreciated either through skilled craftsmanship and long-term evolution or as a profound 'aha' or 'satori' (enlightenment) experience, which involves more emotional-intuitive creativity[60][84][67]. It is sometimes conveyed with a touch of humor or playful spontaneity, as if an inner child were rebelling within the somewhat strict confines of societal norms[83].



**Figure 6.** *Saving Water and Money with a Toilet Sink Combo*[85]

A clear example of Japanese creativity focused on utility is the clever redesign of water flow within a toilet tank: instead of the refill tube connecting directly to the overflow pipe, it is connected to a sink faucet, with the sink drain leading to the overflow tube (Figure 6). This design, though not new—it dates back to 1956[86]—perfectly embodies the Japanese concept of **kaizen** (continuous improvement) by combining the sink with the toilet flush tank. While modest in originality, it delivers impressive utility and creates a strong impact from a seemingly simple adjustment.

Building on this theme of utility-focused creativity in the toilet sector—one of Japan's most cleanliness-centered areas—is another remarkable example of Japanese ingenuity: the bidet toilet system, or smart toilet solution. The Washlet (Figure 7), for instance, represents one of the world's most advanced and comfortable toilet innovations and stands as a point of pride for Japan. This sophisticated system highlights Japan's commitment not only to functionality but also to elevating daily experiences through practical advancements. Today, the TOTO Washlet from Japan has become a global symbol of luxury washrooms: they are found in prestigious locations worldwide, from the five-star Shangri-La Hotel atop London's Shard to Boeing 777 business class bathrooms and even the Louvre in Paris. By 2015, TOTO

reached 40 million Washlet sales globally, firmly establishing Japan's reputation for high-tech toilets. In the fiscal year ending March 2017, TOTO earned 33.8 billion yen ($311 million) from Washlet sales[87].

The history of the Washlet is just as impressive. According to Adhiutama et al.[88], TOTO's journey began in 1964, when the company imported the Wash Air Seat from the American Bidet Company—a product combining a flush and bidet system, featuring a warm-water spray nozzle, heated seat, and warm air dryer. TOTO then acquired a U.S. patent from Harry M. Umman (registered April 26, 1966). By the late 1970s, TOTO used this patent to develop its own bidet toilet, the Washlet, pioneering a product with advanced electronic controls for water



**Figure 7.** *Japanese Smart Toilet: Music-Playing, Water-Spraying, and More*[87]

heating, seat warming, air drying, and nozzle operation. This journey highlights key characteristics of Japanese innovation: a commitment to learning, kaizen (continuous improvement), and unstoppable creativity—bringing together all elements of novelty, utility, and the surprising comfort that has made the Washlet a global icon.

## 2.4. Discussion

Building on foundational academic definitions of creativity, our analysis explored the differences in creativity between East Asia and Western countries (through both theoretical and empirical

perspectives), as well as the specific characteristics of Japanese creativity. We propose that Simonton's unique definition, with its insightful formula, can be effectively applied to Japanese creativity. Now, we will address two key questions: why Simonton's definition is particularly well-suited for explaining Japanese creativity, and how, even at a basic level, it can be used to assess and compare a Japanese creative idea with a Western creative idea in a scenario with the same requirements and context.

### 2.4.1. Why Simonton's Definition Suits Japanese Creativity

First, even though the Bipartite Approach (originality and utility/value) in defining creativity is widely accepted in academia—especially compared to other definitions—Karwowski[2] strongly argues that creativity tests, whose validity is inherently limited (as they primarily assess originality without adequately accounting for value), may be even less valid outside Western cultures, where creativity is predominantly equated with value (as analyzed in sections 2.2, 2.3, and 3.2).

Second, in cases where novelty and usefulness are emphasized and often combined through simple addition, a counterexample can help clarify potential limitations. Imagine an idea for an ice bag (made of ice) to carry groceries (left side of Figure 8), aimed at keeping food fresh. While this idea might be very novel, possibly scoring the maximum 1 for originality on a 0-to-1 scale, it would score a 0 for usefulness, as it would be heavy and prone to melting on the way home.

Now consider a real-world example from Japan: the AI Rice Fridge (right side of Figure 8), which uses artificial intelligence to constantly monitor and maintain the ideal temperature of 15°C for storing rice, reducing the need for manual adjustments and keeping rice perfectly preserved. This idea, though not highly original (perhaps scoring 0.1 for originality), is extremely useful, potentially scoring 0.9 for usefulness.

**Figure 8.** *Left—Concept of an Ice Bag (generated by Copilot AI); Right—An Innovative Product from Japan* [89]

Using the common approach of summing the two components, utility and originality, may oversimplify the evaluation and result in similar scores for these two ideas. Applying Simonton's multiplicative model, however, provides a clearer differentiation between them.

If we were to simply add these scores, as per the popular definition, both ideas would end up with the same creative value. However, by applying Simonton's multiplicative model, which incorporates novelty, usefulness, and surprise, the creative value of these ideas would differ significantly—with the first idea scoring zero in creativity—providing a more nuanced assessment that more accurately reflects real-world applications.

Indeed, a crucial aspect of Simonton's formula is its interpretation of the "veto power" each of the three factors—novelty, usefulness, and surprise—holds when assessing creativity, meaning that "each criterion exerts veto power over the others"[5]. Simonton explains, "[a]n idea cannot be creative if it has a probability of unity, zero utility, or is completely obvious." Thus, only by applying the multiplicative approach in Simonton's formula does the above duo-example gain a clear distinction: the ice bag idea, despite scoring high for originality, scores zero in creativity due to its lack of utility.

Third, Simonton[6] argues that a three-criterion definition, including surprise, effectively distinguishes truly creative ideas from those that are merely novel and useful but stem from routine applications of existing knowledge or expertise. This perspective aligns with the Japanese (and possibly broader East Asian) view of surprise in creativity, where the ultimate goal of any activity (not just creation) is to achieve "satori"—a state of enlightenment where all prior knowledge becomes redundant. This moment of eureka or awakening, never experienced before, has a simpler, smaller version, such as the surprise

found in humor or the amazement at an extraordinary result achieved through long-term optimization or renovation in Japan (as analyzed in sections 3.1 and 3.2).

Furthermore, as mentioned earlier, Simonton's definition values all three components—novelty, usefulness, and surprise—in two ways: as "personal creativity" (little-c), unique to individual expression, alongside "consensual creativity" (Big-C), validated by experts or an audience within a particular field[38]. The first option, the personal valuing approach, fosters individual creativity independent of societal judgment. For instance, a student's novel idea may not receive high ratings from peers or the community, yet it is respected as a meaningful personal expression. This reflects Japan's approach to nurturing creativity within collective values, as outlined in Japan's 2006 Education Law, which promotes creativity and individuality as inherent traits[90], regardless of external validation.

### 2.4.2. Assessing Creativity: Simonton's Framework in Japanese and Western Contexts

Following the recommendation by Niu & Sternberg[59] to use product-oriented measurement in creativity studies, especially by involving evaluators from different cultures, we could assess and compare a Japanese creative product (or idea) with a Western creative product (or idea) under similar requirements and context by using the three main approaches outlined below.

1. **Personal Valuation**: This approach supports and values all three components—novelty, usefulness, and surprise—as **"personal creativity" (little-c)**, even if it diverges from collective standards, thus fostering creativity within individuals independent of societal judgment.

2. **Hybrid Evaluation Panels**: For cross-cultural comparisons, a panel with 50% Western and 50% Japanese evaluators (who are experts and/or laypeople to compare and contrast) could offer a more inclusive assessment of creativity. By applying culturally adapted weighting criteria—such as Japan's greater emphasis on utility alongside the Western focus more on novelty—such a panel would provide a balanced, culturally sensitive evaluation that accounts for different values associated with originality, utility, and surprise.

3. **AI-Driven Evaluation**: An AI-based evaluation could assess creativity using customized weighting factors to measure originality (against a database of prior solutions), utility (meeting criteria of functionality), and surprise (factoring in reactions from individuals, communities, and/or expert panels). This model would offer an objective, adaptable framework to evaluate creativity across diverse cultural contexts.

Each approach above would involve separately applying Simonton's core formula for creativity, $C = a_1 \times N \times a_2 \times U \times a_3 \times S$ ($a1 + a2 + a3 = 1$), where N represents novelty/originality, U represents utility, and S represents surprise. The weighting factors $a_1$, $a_2$, $a_3$ allow for variation in the importance of each component. As mentioned in 3.2, for Western cultures, the weighting might follow $a_3 > a_1 > a_2$, prioritizing surprise, followed by originality, and then utility. Conversely, based on our analysis in 3.1, an adapted model for Japanese contexts might follow $a_2 > a_3 > a_1$, placing greater emphasis on utility, followed by surprise, and finally originality. This approach establishes a culturally flexible framework for evaluating creativity by allowing specific values for $a_1$, $a_2$, and $a_3$—and their interrelations—to be determined through empirical research, thus making creativity assessments more inclusive and culturally diverse. Additionally, incorporating domain awareness into these assessments can enhance their relevance; for instance, novelty is often more prized in the arts, while practical adaptiveness typically takes precedence in engineering contexts.[6]

## 2.5. Conclusion

This study presents a novel approach to assessing creativity by utilizing and modifying Simonton's[5] [6] framework within the rich context of Japanese cultural and philosophical traditions, specifically Shinto, Buddhism, and Confucianism. These elements not only shape creative expression but also emphasize harmony with nature, respect for tradition, and a continuous improvement ethos, which together cultivate a creativity that is both incremental and revolutionary. This integration offers a distinctive outlook on how creativity is both expressed and cultivated uniquely in Japan, distinguishing it from Western interpretations. Central to this study is the development of a modified model for assessing Japanese creativity, articulated as $C = a_1 \times N \times a_2 \times U \times a_3 \times S$ ($a1 + a2 + a3 = 1$), where N represents novelty/originality, U represents utility, and S represents surprise. The weighting factors $a_1$, $a_2$, $a_3$ allow for variation in the importance of each component, which emphasizes utility in alignment with cultural values, followed by elements of surprise and originality. Rooted in Simonton's theoretical groundwork, this model serves as an essential precursor to creating an extensive tool capable of measuring creativity across diverse cultural landscapes effectively. This innovative methodology fills a critical void in existing creativity theories and measurement techniques, which typically overlook cultural diversity and depend too heavily on Western-centric models.[2][3]

The proposed framework assesses creativity through the dynamics of novelty, utility, and surprise, adjusting these factors to resonate with the cultural priorities of East Asia. It confronts and challenges the

prevailing stereotypes associated with Asian educational systems that emphasize rote learning, uncovering instead a complex blend of cultural, educational, and systemic influences that foster a unique creative identity. This approach not only cultivates creative expression but also bolsters respect for traditions and continuous improvement, advocating for both gradual and radical forms of creativity. It also challenges the perception that the "box" or constraint of the ruling, orderly norm of Confucianism hindered creativity not only in Japan but also in other Confucian Heritage Cultures (CHCs). In contrast, their success in creativity supports the emerging notion that the constraints of interacting with other people and matter are not a hindrance but are integral to the creative process.[91]

## 2.5.1. *Limitations*

The study primarily relies on English-language literature, which potentially limits the depth of understanding of Japanese creativity from a global perspective. This limitation highlights a gap in the study's attempt to fully encapsulate the diverse nuances of creativity, especially those rooted in non-Western contexts.

Furthermore, the constraints of time and the specific methodological framework employed have restricted the thoroughness and scope of the analysis. The reliance on a narrow set of cultural and philosophical traditions—namely Shinto, Buddhism, and Confucianism—may not sufficiently represent the complex interplay of factors influencing creativity in Japan. This approach could limit the study's ability to portray a comprehensive picture of Japanese creativity, suggesting the need for broader methodological approaches in future research to capture a more complete and nuanced understanding of the subject matter.

## 2.5.2. *Future Implications for Research*

- **Development of Measurement Instruments:** Future research should build on the foundational definition and formula provided in this study by further developing measurement instruments that can be specifically tailored to different cultural contexts and domains. Detailed attention should be given to the empirical adjustment of the weighting factors $a_1$, $a_2$, $a_3$ to allow for variation in the importance of each component within each cultural and domain-specific setting. This development will enhance the precision and relevance of creativity assessments, allowing them to more accurately reflect the diverse expressions of creativity found across various cultures.

- **Inclusion of Non-English Sources:** Expanding the scope of research to include non-English sources is critical for capturing a wider array of cultural perspectives. By integrating these sources, researchers can access a broader spectrum of creativity narratives and methodologies, which can lead to a more globally inclusive understanding of creativity and its various manifestations.

- **Broadening Cultural and Philosophical Contexts:** Future research should employ broader methodological approaches that encompass a wider range of Japanese cultural and philosophical influences. This would help in painting a more comprehensive and nuanced picture of Japanese creativity, moving beyond the traditional frameworks to explore emerging and lesser-known influences that may play significant roles in shaping creative outputs.

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## Declarations