UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

Moderating Effect of Novelty Seeking Trait on the Usefulness Undervaluation Bias in Creative Products Evaluation

Permalink

https://escholarship.org/uc/item/42j0751p

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 46(0)

Authors

Hattori, Eline Aya

Yamakawa, Mayu

Miwa, Kazuhisa

Publication Date

2024

Copyright Information

Peer reviewed

Moderating Effect of Novelty Seeking Trait on the Usefulness Undervaluation Bias in Creative Products Evaluation

Eline Aya Hattori (hattori.eline.aya.j1@s.mail.nagoya-u.ac.jp)
Graduate School of Informatics, Nagoya University
Furo-cho, Chikusa-ku, Nagoya, Aichi, 464-8601, Japan

Mayu Yamakawa (yamakawa.mayu.a4@f.mail.nagoya-u.ac.jp)
Graduate School of Informatics, Nagoya University
Furo-cho, Chikusa-ku, Nagoya, Aichi, 464-8601, Japan

Kazuhisa Miwa (miwa@is.nagoya-u.ac.jp)
Graduate School of Informatics, Nagoya University
Furo-cho, Chikusa-ku, Nagoya, Aichi, 464-8601, Japan

Abstract

The present study examines the effects of novelty seeking (NS) personality trait on the undervaluation of product creativity, specifically the tendency to undervalue the usefulness of novel ideas or products, a bias termed "usefulness undervaluation bias". Creativity is defined by novelty and usefulness, and it has been reported that there is a bias to undervalue the usefulness of novel creations due to uncertainty in judging it. In this study, two studies were conducted to determine whether individuals with high NS are reduced in this bias. Study 1 confirmed that individuals with higher NS rated creativity more positively, consistent with previous findings on openness to experience. Study 2 showed that raters with higher NS were less likely to underrate the usefulness of novel products, suggesting that NS moderates the relationship between perceived novelty and usefulness. These findings indicate that personality trait, especially NS, play an important role in creativity evaluation.

Keywords: creativity evaluation; novelty seeking; usefulness undervaluation; bias; product evaluation

Introduction

Accepting creative products and ideas is important for societies to thrive. However, people surprisingly undervalue the creativity of creative products (Ceh et al., 2022; Mueller et al., 2012) and reject them (Blair & Mumford, 2007), even though they desire them. An important question is how this tendency to undervalue creativity depends on the personality traits of the evaluator. The aim of this study is to identify the personality trait involved in the undervaluation of creativity, based on the cognitive mechanisms that lead to its undervaluation.

The creativity of an object is defined in terms of novelty and usefulness (Runco & Jaeger, 2012). Novelty is the state of being new, original, and unique and is considered an essential aspect of creativity. Usefulness is the fulfillment of the required functions and demands of the creation. A creation is considered creative when it is perceived to be high in both aspects. Among creativity researchers, the more creative an idea or product is, the more supreme it is considered.

However, in the actual process of evaluating ideas or products and deciding whether to select them, the focus is not on how new, original, or unique they are, but rather on how well they provide benefits that meet needs. For example, when faced with selecting the best idea, individuals will pick a solid and reliable idea that seems useful and feasible (Rietzschel et al., 2010). Moreover, novel products are more frequently not realized than less novel products, even if there is an intention to purchase them (Alexander et al., 2008).

Consistent with this, the literature in creativity evaluation has also shown that when the novelty of the rated object is high, its usefulness is rated low; Benedek et al. (2016) investigated whether normatively creative ideas would classify as creative ideas, merely novel ideas, or merely useful ideas. The results showed that creative ideas were most often errors that were classified as merely novel ideas. This indicates that creative ideas that are both novel and useful on higher levels (Runco & Jaeger, 2012) were undervalued in terms of their usefulness. These findings suggest that underlying the rejection of creativity and the tendency to undervalue it is a bias to undervalue usefulness when the novelty of the target object is perceived high. This bias is referred to hereafter as "usefulness undervaluation bias".

Usefulness Undervaluation Bias

This usefulness undervaluation bias can be due to uncertainty in judging the usefulness of novel products or ideas. According to previous studies, judging the usefulness of a novel product or idea can be considered as decision making under uncertainty (Guenther et al., 2021; Mueller et al., 2012). In other words, the novelty of a product or idea leads to uncertainty in judging its usefulness. In fact, it has been shown that the use of novel products has larger prediction errors than those of less novel products (Alexander et al., 2008). In short, novel products may end up being highly useful or less useful, and their predictions are likely to fail.

In addition, previous research suggests that the perceived usefulness of ideas or products tends to be lower when there is uncertainty in judging their usefulness. Given the importance of usefulness in selecting the best ideas

4639

(Rietzschel et al., 2010), adopting novel ideas or products may carry the risk of reduced usefulness due to the uncertainty. Thus, novel ideas are avoided, as are risky ideas (Blair & Mumford, 2007). Moreover, because higher novelty is associated with higher perceived risk (Song & Schwarz, 2009) and correspondingly lower perceived usefulness (Keith et al., 2023), uncertainty and perceived risk in usefulness judgments are suspected to lead to the usefulness undervaluation bias. The same tendency has been reported in studies of risk perception. The higher the perceived risk, the lower the benefit equivalent to usefulness (Alhakami & Slovic, 1994; Finucane et al., 2000).

Novelty Seeking: Personality Trait That Possibly Moderate the Usefulness Undervaluation Bias

Considering that the usefulness undervaluation bias occurs because the novelty of an idea or product leads to uncertainty in usefulness judgments, it is possible that personality trait that are more tolerant to novelty may moderate this bias. Indeed, the creativity evaluation literature has found that individuals with higher openness to experience in the Big Five personality traits moderate undervaluation of creativity (Benedek et al., 2016; Ceh et al., 2022). This suggests that raters openness to experience may moderate the usefulness undervaluation bias, as the tendency to undervalue creativity reflects the bias. However, no study has examined this possibility.

Openness to experience, used in these studies, is one of the Big Five personality trait factors that measures general human personality traits and is related to a variety of personality traits other than the personality trait of novelty orientation (Gocłowska et al., 2019). Therefore, this study deals with novelty seeking (NS), which is a more direct measure of novelty-oriented personality trait (Gocłowska et al., 2019), and examines whether NS moderates the usefulness undervaluation bias.

NS is a novel experience-oriented personality trait. In consumer research, it has been treated as a personality trait that seeks new information in the context of innovation diffusion and is thought to lead to the adoption of new products (Hirschman, 1980). Clinical research has also treated it as a personality trait that seeks new stimuli and has therefore been studied in relation to substance abuse (Wills et al., 1994). Creativity research, on the other hand, has suggested a link to creative generation (Gocłowska et al., 2019; Schweizer, 2006), but has not yet been examined in the context of creativity evaluation.

The possibility that NS moderates the usefulness undervaluation bias can be inferred from previous studies showing an association with risk perception; Wang et al. (2015) provide neuroscientific evidence for the relation between NS and risk perception by examining brain activity. According to them, an individual's NS score, as measured by a self-report questionnaire, was negatively correlated with the activity of brain regions related to risk prediction, as measured during probabilistic decision tasks. On the other hand, NS scores were positively correlated with risk preference as estimated by a computational model based on performance in the decision tasks. Thus, individuals with higher NS were less likely to perceive risk and more likely to prefer risk. Hence, although higher novelty is perceived as risk (Song & Schwarz, 2009), raters with higher NS are less likely to perceive that risk, which may reduce the usefulness undervaluation bias related to risk perception (Keith et al., 2023).

Structure of Present Study

In this study, we conduct two studies to test the possibility that rater NS is a moderator of the usefulness undervaluation bias. In Study 1, we verify whether NS reduces the tendency to underrate creativity, as previous studies have found for openness to experience (Benedek et al., 2016; Ceh et al. 2022). Then, in Study 2, we examine whether NS moderates the usefulness undervaluation bias, which is the focus of the present study. Specifically, the present study examines whether NS moderates the relationship between perceived novelty (as the independent variable) and perceived usefulness (as the dependent variable) of products.
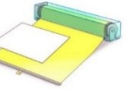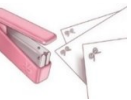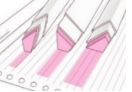
Development of evaluation materials

To directly test the above hypothesis, this study takes product novelty as the independent variable and usefulness as the dependent variable, and examines whether NS moderates the relationship between them. To test this hypothesis, it is necessary to design evaluation materials that contain both high novelty and high usefulness and that are distributed with respect to novelty. This is because we want to examine whether the usefulness of materials that are normatively higher in usefulness is underrated as novelty increases. Furthermore, since previous research has consistently shown that there is a trade-off between novelty and usefulness (Diedrich et al., 2015; Runco & Charles, 1993), we decided to include materials with high novelty and low usefulness.

In detail, this study followed Benedek et al. (2016) in distributing novelty and usefulness such that products with high novelty and usefulness (Product N&U), products with high novelty and low usefulness (Product N), and products with high usefulness and low novelty (Product U). The domain was stationery products, which are familiar products that do not require expert knowledge to rate and naturally lend themselves to ratings based on usefulness.

The three types of products were organized to correspond to stationery categories such as notebooks. The stationery products to be used as Product N&U were selected from ideas that had won an idea contest held by a stationery product company and published on the Internet. In selecting the stationery ideas, we took care to avoid overlapping stationery categories, and we avoided ideas that covered more than one stationery category, as it would be difficult to map the three types of products. To correspond to the stationery products selected here, Product N was generated by the first author and Product U was selected by the authors from stationery products already available on the market. After conducting a preliminary study and excluding Product U, which had low

Table 1: Overview of the evaluation materials. "N&U" represents Novel and Useful products, "N" represents Novel products, and "U" represents Useful products.

stationary category	product types		
	N&U	N	U
paste			
pad			
stapler			
sticky notes			
marker			
notebook			

awareness, and Product N, which had high awareness, the final evaluation set consisted of a total of 18 products in six categories (Table 1).

The evaluation materials included the name of the stationery category, illustrative images of the products, and a description of around three sentences describing the product features so that participants in the rating task could fully understand each product. The illustrated images of the products were drawn by an illustrator so that the images of all the products were consistent. For example, if the stationery category is "paste" and the product is N&U, the description would be "Nozzle paste suitable for detailed work and broader applications. The nozzle angle allows for precise application of glue, and the direction can be changed to achieve thin, straight, or wide coverage".

Study 1

Study 1 was conducted to verify whether NS reduces the tendency to underrate creativity.

Method

Participants One hundred eighty-nine native Japanese speaking participants (54.50 % female, M_{age} = 39.51, SD_{age} = 8.66) were recruited online through Crowd Works, a Japanese crowdsourcing service. Informed consent was obtained from all participants at the beginning of the study,

and they were paid 440 yen as compensation for completing the survey.

Evaluation Sets As mentioned in the section on "Development of evaluation materials", for this series of studies, we developed evaluation materials consisting of 18 stationery products and used them in the evaluation task.

Novelty Seeking We used the scale developed by Gocłowska et al. (2019), translated into Japanese (Cronbach's α = .92), to measure NS. The scale consisted of 14 items, which were responded to on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). Responses to all items were averaged for each participant to obtain a NS score.

Procedure Participants accessed an online survey page through Qualtrics to complete the survey. First, they were asked to rate the creativity of a total of 18 stationery products. The ratings were given on a 5-point Likert scale (1 = *not creative at all* to 5 = *very creative*). The products were presented one at a time in random order, with the stationery category name, product image, and product description always displayed. Participants then completed the NS scale and answered demographic information to complete the survey.

Results

To account for individual differences, we applied a linear mixed model (LMM) with individuals as random effects. Following Bates et al. (2018), we determined the proper structure of the random effects, which resulted in a model with an intercept and a novelty slope. All variables were standardized, and the results showed that NS had a significant positive main effect on creativity ratings (β = 0.08, t = 2.78, p < .01). Thus, the results indicated that individuals with higher NS tended to rate creativity higher.

Summary of Results

Study 1 was conducted to confirm whether raters with higher NS reduced the tendency to underrate creativity. The results of the study showed that the higher the rater's NS, the higher the creativity rating, and thus the tendency to underrate creativity was reduced. This result is consistent with previous studies (Benedek et al., 2016; Ceh et al., 2022), which showed that rater openness to experience reduced the undervaluation of creativity.

Study 2

Study 2 examines whether NS moderates the usefulness undervaluation bias. Specifically, the study was designed to test the hypothesis that higher NS reduces the usefulness undervaluation bias, i.e., the higher the NS, the less likely novel products are to be rated as less useful.

Method

Participants As in Study 1, we recruited 211 native Japanese speaking participants (51.18 % male, M_{age} = 39.89, SD_{age} = 9.02, excluding two non-respondents) online via Crowd Works online. Informed consent was obtained from all participants, and they were paid 440 yen as compensation for completing the survey.

Materials The same evaluation sets and NS scale (Cronbach's α = .92) used in Study 1 were used to determine each NS score.

Procedure Participants accessed an online survey page through Qualtrics to complete the survey. First, they were asked to rate the novelty and usefulness of 18 stationery products. The order in which novelty and usefulness were rated was counterbalanced: after all products were rated on one criterion, the other criterion was addressed and rated on a 5-point Likert scale (1 = *not at all novel/useful* to 5 = *very novel/useful*). The rating page presented in Study 2 was identical to that presented in Study 1, with the addition that the definitions of the rating criteria were always displayed. Novelty was defined as "novelty means being unusual and new," and usefulness was defined as "usefulness means being usable in actual situations." Participants then completed the NS scale and answered demographic information to complete the survey.

Results

Validation of Evaluation Material Design The purpose of the design of the evaluation materials in this study was to distribute the ratings for novelty and usefulness, as shown in
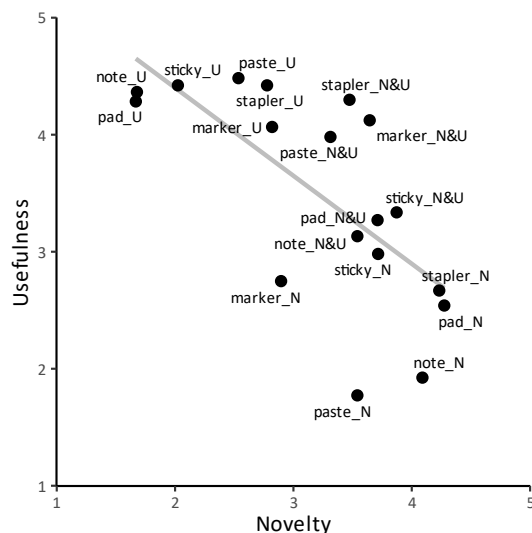

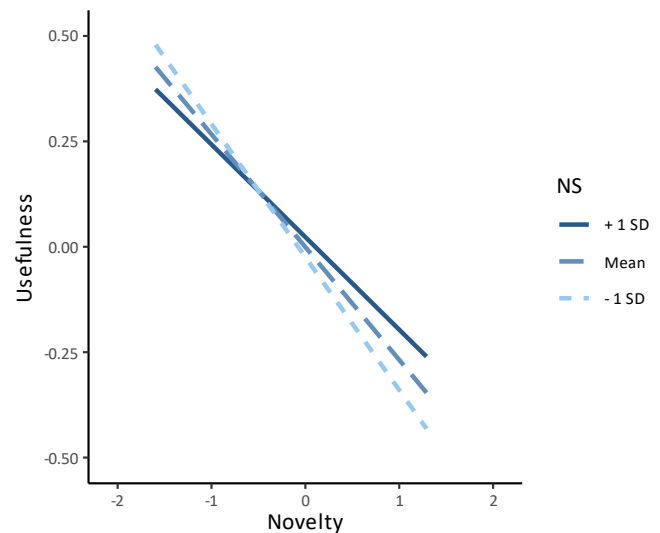Figure 1: A scatter plot of mean ratings of novelty and usefulness.

Figure 2: The interaction plot for usefulness. All variables are standardized.

Figure 1, which confirms that the ratings for product novelty (M = 3.21, SD = 0.82) and usefulness (M = 3.49, SD = 0.90) were distributed within the evaluation materials (n = 18). Note that the negative correlation between novelty and usefulness ratings was significant (r = -.69, p < .01).

Hypothesis Testing To test our hypothesis, we then conducted an analysis using an LMM as in Study 1. The structure of the random effects was determined, which included an intercept and a novelty slope. The standardized fixed effects in our model consisted of usefulness ratings as the dependent variable and novelty ratings, NS, and their interaction as independent variables.

As shown in Figure 2, the main effect of novelty (β = -0.27, t = -11.18, p < .001) and the interaction between novelty and NS was significant (β = 0.05, t = 2.02, p < .05), while the main effect of NS was not (β = 0.02, t = 0.97, p = .33). Thus, we found a tendency for higher novelty ratings to be related to lower usefulness ratings, but this tendency was moderated by NS. To examine the effect of NS in more detail, a Johnson-Neyman moderation analysis was conducted to determine the range of novelty ratings for which the effect of NS was significant. The results showed that the standardized novelty score ranged from -18.75 or lower and 0.68 or higher. In other words, a novelty score of -22.77 or lower and 4.15 or higher. Note that -22.77 cannot be interpreted because the range of possible values for the novelty score is 1 for the minimum value and 5 for the maximum value. Therefore, when the novelty score is higher than 4.15, the tendency to rate the usefulness lower decreases as the NS increases.

Summary of Results

Study 2 was conducted to test the hypothesis of this study, that is, whether higher NS raters reduce the usefulness undervaluation bias. The results showed, first, that the higher

the novelty, the more likely the raters were to rate usefulness lower, a trend consistent with previous studies (Diedrich et al., 2015; Runco & Charles, 1993). Second, the higher the rater's NS, the weaker the tendency to rate usefulness lower as novelty increased, thus reducing the usefulness undervaluation bias. This finding supported the hypothesis of the present study.

Discussion

The present study examined the possibility that the rater's NS may moderate the usefulness undervaluation bias for novel products, which leads to a tendency to underrate creativity. To this end, two studies were conducted. First, in Study 1, we confirmed that raters with higher NS reduced the tendency to underrate creativity. This tendency is consistent with the results of previous studies dealing with openness to experience (Benedek et al., 2016; Ceh et al., 2022). This suggests that NS is related to openness to experience (Gocłowska et al., 2019) and that raters with personality traits oriented towards experiencing novel things may perceive higher levels of creativity in products.

Study 2 then supported the hypothesis by showing that raters with higher NS reduced the usefulness undervaluation bias. This suggests that NS may perceive higher creativity in products because they perceive higher usefulness in novel products. This finding provides empirical evidence for the argument that the tendency to undervalue creativity relates on the undervaluation of usefulness (Benedek et al., 2016; Mueller et al., 2012). Furthermore, this study does not end the discussion with the tendency to undervalue creativity, but for the first time directly examines the usefulness undervaluation bias that may underlie it. This may have implications for the focus of creativity evaluation research. Given that novelty is essential for creativity (Runco & Jaeger, 2012) and that there has been a particular focus on novelty (e.g., Zhou et al., 2017), we emphasize the importance of also focusing on usefulness evaluations when studying creativity evaluations.

The fact that rater NS is a moderator of usefulness undervaluation bias implies that usefulness judgments about novel products are uncertain and risky. The reduction in usefulness undervaluation bias for raters with high NS is due to their lower risk perception (Wang et al., 2015). This lower risk perception, especially for higher novelty products that are perceived as risky (Song & Schwarz, 2009), is likely to reduce the corresponding usefulness undervaluation (Keith et al., 2023). If this is the case, then reducing perceived uncertainty and risk may help reduce the usefulness undervaluation bias. Indeed, findings have shown that increasing rater construal levels to avoid focusing on uncertainty reduces the tendency to undervalue creativity (Mueller et al., 2014) and that increasing the content of novel product sales pitches reduces information uncertainty and contributes to funding decisions (Hunter & Cushenbery, 2015).

Moreover, if we compare usefulness judgments of novel products to decision making under uncertainty (Guenther et al., 2021; Mueller et al., 2012), the usefulness undervaluation bias can be explained as a heuristic reflecting an ecologically plausible tendency. It is well known that empirical heuristics are used for decision making under high uncertainty (Kahneman et al., 1982), and it has recently been discussed that creativity judgments may also rely on rules formed by experientially learned information (i.e., lay theory, Loewenstein & Mueller, 2016; Ritter & Rietzschel, 2017). Applying heuristics to decision making under uncertainty may lead to incorrect decisions (i.e., cognitive biases), but in many cases it may lead to the correct decision. The reason is that heuristics reflect ecologically plausible tendencies (e.g., Gigerenzer & Brighton, 2009). The usefulness undervaluation bias may also be a heuristic that reflects an ecologically plausible tendency for more novelty to be less useful. This is because the tendency for more novelty to be less useful is frequently observed in evaluation materials produced by researchers (Diedrich et al., 2015; Runco & Charles, 1993) and is a trade-off constraint that occurs during idea generation (Berg, 2014; Ward, 2007). In future work, the possibility that the usefulness undervaluation bias is a heuristic should be investigated.

References

Alexander, D. L., Lynch, J. G., & Wang, Q. (2008). As time goes by: Do cold feet follow warm intentions for really new versus incrementally new products? *Journal of Marketing Research*, *45*(3), 307–319.

Alhakami, A. S., & Slovic, P. (1994). A Psychological Study of the Inverse Relationship Between Perceived Risk and Perceived Benefit. *Risk Analysis*, *14*(6), 1085–1096.

Bates, D., Kliegl, R., Vasishth, S., & Baayen, H. (2018). *Parsimonious Mixed Models*.

Benedek, M., Nordtvedt, N., Jauk, E., Koschmieder, C., Pretsch, J., Krammer, G., & Neubauer, A. C. (2016). Assessment of creativity evaluation skills: A psychometric investigation in prospective teachers. *Thinking Skills and Creativity*, *21*(May), 75–84.

Berg, J. M. (2014). The primal mark: How the beginning shapes the end in the development of creative ideas. *Organizational Behavior and Human Decision Processes*, *125*(1), 1–17.

Blair, C. S., & Mumford, M. D. (2007). Errors in idea evaluation: Preference for the unoriginal? *Journal of Creative Behavior*, *41*(3), 197–222.

Ceh, S. M., Edelmann, C., Hofer, G., & Benedek, M. (2022). Assessing Raters: What Factors Predict Discernment in Novice Creativity Raters? *Journal of Creative Behavior*, *56*(1), 41–54.

Diedrich, J., Benedek, M., Jauk, E., & Neubauer, A. C. (2015). Are creative ideas novel and useful? *Psychology of Aesthetics, Creativity, and the Arts*, *9*(1), 35–40.

Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, *13*(1), 1–17.

Gigerenzer, G., & Brighton, H. (2009). Homo Heuristicus: Why Biased Minds Make Better Inferences. *Topics in Cognitive Science*, *1*(1), 107–143.

Gocłowska, M. A., Ritter, S. M., Elliot, A. J., & Baas, M. (2019). Novelty seeking is linked to openness and extraversion, and can lead to greater creative performance. *Journal of Personality*, *87*(2), 252–266.

Guenther, A., Eisenbart, B., & Dong, A. (2021). Creativity and successful product concept selection for innovation. *International Journal of Design Creativity and Innovation*, *9*(1), 3–19.

Hirschman, E. C. (1980). Innovativeness, Novelty Seeking, and Consumer Creativity. *Journal of Consumer Research*, *7*(3), 283.

Hunter, S. T., & Cushenbery, L. (2015). Is Being a Jerk Necessary for Originality? Examining the Role of Disagreeableness in the Sharing and Utilization of Original Ideas. *Journal of Business and Psychology*, *30*(4), 621–639.

Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgment under Uncertainty* (D. Kahneman, P. Slovic, & A. Tversky, Eds.). Cambridge University Press.

Keith, M. G., Freier, L. M., Childers, M., Ponce-Pore, I., & Brooks, S. (2023). What Makes an Idea Risky? The Relations between Perceptions of Idea Novelty, Usefulness, and Risk. *The Journal of Creative Behavior*.

Loewenstein, J., & Mueller, J. (2016). Implicit Theories of Creative Ideas: How Culture Guides Creativity Assessments. *Academy of Management Discoveries*, *2*(4), 320–348.

Mueller, J. S., Melwani, S., & Goncalo, J. A. (2012). The bias against creativity: Why people desire but reject creative ideas. *Psychological Science*, *23*(1), 13–17.

Mueller, J. S., Wakslak, C. J., & Krishnan, V. (2014). Construing creativity: The how and why of recognizing creative ideas. *Journal of Experimental Social Psychology*, *51*, 81–87.

Rietzschel, E. F., Nijstad, B. A., & Stroebe, W. (2010). The selection of creative ideas after individual idea generation: Choosing between creativity and impact. *British Journal of Psychology*, *101*(1), 47–68.

Ritter, S. M., & Rietzschel, E. F. (2017). Lay theories of creativity. In *The Science of Lay Theories: How Beliefs Shape Our Cognition, Behavior, and Health*. Springer International Publishing.

Runco, M. A., & Charles, R. E. (1993). Judgments of originality and appropriateness as predictors of creativity. *Personality and Individual Differences*, *15*(5), 537–546.

Runco, M. A., & Jaeger, G. J. (2012). The Standard Definition of Creativity. *Creativity Research Journal*, *24*(1), 92–96.

Schweizer, T. S. (2006). The Psychology of Novelty-Seeking, Creativity and Innovation: Neurocognitive Aspects Within a Work-Psychological Perspective. *Creativity and Innovation Management*, *15*(2), 164–172.

Song, H., & Schwarz, N. (2009). If It's Difficult to Pronounce, It Must Be Risky. *Psychological Science*, *20*(2), 135–138.

Wang, Y., Liu, Y., Yang, L., Gu, F., Li, X., Zha, R., Wei, Z., Pei, Y., Zhang, P., Zhou, Y., & Zhang, X. (2015). Novelty seeking is related to individual risk preference and brain activation associated with risk prediction during decision making. *Scientific Reports*, *5*(1), 10534.

Ward, T. B. (2007). Creative cognition as a window on creativity. *Methods*, *42*(1), 28–37.

Wills, T. A., Vaccaro, D., & Mcnamara, G. (1994). Novelty Seeking, Risk Taking, and Related Constructs as Predictors of Adolescent Substance Use: An Application of Cloninger's Theory. *Journal of Substance Abuse*, *6*, 1–20.

Zhou, J., Wang, X. M., Song, L. J., & Wu, J. (2017). Is it new? Personal and contextual influences on perceptions of novelty and creativity. *Journal of Applied Psychology*, *102*(2), 180–202.