Basic Psychological Needs and Creativity in an EFL Context

Brian J. Birdsell
Hirosaki University

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Basic psychological needs (BPNs) have the potential to improve student motivation, learning outcomes, and well-being. These needs include the three established needs of autonomy, competence, and relatedness, alongside the more recently proposed candidate need for novelty. This study explores students' satisfaction and frustration of these needs in an EFL context and how they may predict learner engagement and creative potential in a foreign language. BPNs and engagement were measured using a 34-item questionnaire, and creative potential was measured using divergent, convergent, and metaphorical thinking tasks. Results from regression analyses showed that autonomy, competence, and novelty satisfaction predicted learner engagement, whereas autonomy and competence frustration predicted learner disengagement. As for creativity, although divergent and metaphorical thinking showed significant correlations, the BPNs did not reveal a statistically significant model for creative potential.

基本的心理欲求(BPNs) は、学生のモチベーション、学習成果、ウェルビーイングを向上させる可能性がある。BPNsには、自律性、有能感、関係性という従来から確立されている三つの欲求に加え、近年提案された新たな候補欲求である新規性が含まれる。本研究では、EFL環境におけるこれらのBPNsの満足と不満、そしてBPNsが英語学習者の学習意欲および創造的可能性をどのように予測するかを探る。BPNsと学習意欲は34項目の質問票を用いて測定され、創造的可能性は、発散的思考課題、収束的思考課題、メタファー思考課題を用いて測定された。回帰分析の結果、自律性、有能性、新奇性の満足度は学習意欲を予測し、自律性と有能性の不満は学習者の意欲低下を予測した。創造性に関しては、発散的思考とメタファー思考が有意な相関を示したが、BPNsは創造的可能性を予測する統計的に有意なモデルとはならなかった。

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Learner engagement has been referred to as "the holy grail of learning" (Sinatra et al., 2015, p. 1) because it plays a crucial role in influencing both learning outcomes and overall success. Therefore, understanding the factors that affect learner engagement is a key area of focus for educators. Moreover, creativity has become an essential life skill and positively impacts foreign language learning. The research presented here explores how learner satisfaction and frustration, in relation to basic psychological needs, influence learner engagement and creative potential in EFL.

The outline of this paper is as follows. I first provide a review of the literature on one of self-determination theory's (SDT) mini theories called basic psychological need theory (BPNT) (Ryan & Deci, 2017) and how it has been applied to English as a foreign language (EFL) learning context (Birdsell, 2018a). Additionally, I consider the important role creativity plays in learning a foreign language and ways to measure creative potential. Then, I describe the study and the results from a questionnaire and a set of creative production tasks. Finally, I discuss the results and implications this study has for foreign language education.

Literature Review

Basic Psychological Needs Theory

BPNT posits that humans have three basic psychological needs; when these needs are satisfied the individual experiences optimal motivation, engagement, and well-being (Ryan & Deci, 2017; Vansteenkiste et al., 2020). The first need, autonomy, refers to individuals having ownership of their actions and a sense of volition. This is in contrast to when individuals act from external pressures that control

their behavior. Competence, the second need, refers to the need to feel effective in one's interactions with the environment and to experience opportunities to exercise and expand one's skills. Finally, relatedness refers to the need to feel connected with others and have a sense of belonging within a social community. Conversely, when these needs are thwarted or frustrated, it can lead to negative outcomes such as lower levels of motivation and well-being as well as maladaptive behaviors (e.g., indifference, anxiety).

Researchers have applied BPNT in various contexts, including education, language learning, and organizational settings, to investigate the impact of these basic needs on human functioning and development. Furthermore, these needs have been investigated across multiple cultures, and their universal relevance has been established (Chen et al., 2015), including in Japan (Birdsell, 2018a; Nishimura & Suzuki, 2016).

In the field of EFL, researchers have consistently shown that satisfying these three psychological needs supports language learners' intrinsic motivation, engagement, and learning outcomes (Birdsell, 2018a; Dincer et al., 2019; Noels et al., 2019; Oga-Baldwin et al., 2017). In contrast, the frustration of these needs in a second language, such as the feeling of being controlled, pressured, or isolated, decreases intrinsic motivation and hinders language learning outcomes (Alamer et al., 2023). As BPNT's impact on educational psychology has grown, some researchers have proposed expanding this list to four needs, with the need for novelty as one possible candidate (Bagheri & Milyavskaya, 2020; González-Cutre et al., 2016).

A Candidate Need: The Need for Novelty

The need for novelty refers to the human desire to explore, engage in, and seek out new activities, sensations, situations, and knowledge. Studies have shown that satisfaction of the need for novelty positively predicts autonomous motivation, vitality, life satisfaction, and a sense of meaning in life (Bagheri & Milyavskaya, 2020; Benlahcene et al., 2021; Fernández-Espínola et al., 2020; González-Cutre et al., 2020). In contrast, frustration of this need predicted negative outcomes. Consequently, researchers in the aforementioned studies suggest that the need for novelty may be a valid candidate for inclusion as a basic psychological need, as it demonstrates unique predictive power for various well-being and motivational outcomes, beyond the existing needs in BPNT. The need for novelty has also been tested in an EFL context, where satisfaction of the four basic needs is positively correlated with positive learning outcomes (Birdsell, 2018a).

Learner Engagement

Building on this theoretical framework, the current study examines how the satisfaction and frustration of these needs interact with learner engagement. Learner engagement represents a multidimensional construct encompassing behavioral, cognitive, and affective dimensions (Reeve, 2012). Behavioral engagement refers to active involvement in the learning task, including effort, time investment, and energy invested in the learning event. Affective engagement focuses on learner interest, curiosity, and enthusiasm. Finally, cognitive engagement involves the mental effort and psychological challenge of the learning activity (Benlahcene et al., 2021; Fredricks et al., 2004).

Creativity in the Foreign Language Classroom

A *Google Ngram* search, which tracks language trends based on word frequency in books, shows that usage of the word "creativity" increased by 357% from 1960 to 2018. This reflects the growing interest and importance of this concept in both academic and popular publications.

Creativity is now viewed as an essential higher-order skill linked to success and well-being, and education policies increasingly incorporate it into curricula. Definitions of creativity are numerous but typically include the binary concepts of novelty (i.e., originality, newness, uniqueness) and usefulness (i.e., having meaning) (see Runco & Jaeger, 2012).

In EFL and, more broadly, second language acquisition research, creativity has been shown to increase student motivation and learning performance (Liao et al., 2018), promote cognitive flexibility, which requires students to blend and extend concepts in new and unfamiliar ways (Birdsell, 2019), improve foreign language achievement (Pishghadam et al., 2011), and strengthen problem-solving skills (McDonough et al., 2015).

Finding valid and reliable ways to measure creativity has been one of the major challenges for researchers in this field. Most researchers would agree that they are not measuring creativity per se, but rather something more closely related to creative potential (Runco & Acar, 2012). These types of measurements use a productive task, as opposed to those that use questionnaire data (e.g., creative personality, past creative achievements, creative self-efficacy) (Carson et al., 2005; Karwowski et al., 2018), and often rely on tasks requiring divergent

thinking, convergent thinking, or creative production (e.g., generating a poem, story, or metaphor).

Divergent thinking is a cognitive process of generating multiple and varied ideas or solutions to a problem, rather than providing a single correct answer. A common instrument for measuring divergent thinking is the Alternative Uses Task (AUT), where participants come up with alternative uses for everyday objects like a brick, paperclip, or cardboard box. Responses are then evaluated on criteria like fluency (total number of responses), flexibility (categorically different responses), and originality (uniqueness of the responses).

In contrast, convergent thinking is the cognitive process of finding a single, correct answer or solution to a problem (see Cropley, 2006, for more on convergent thinking). A common task for measuring convergent thinking is a Remote Association Task (RAT). For example, a participant is presented with three seemingly unrelated words (e.g., *aid*, *rubber*, *wagon*) and must identify the single word that connects them (*band*).

A common creative product task asks participants to complete a metaphor (Birdsell, 2018b). Typically, this involves completing a nominal metaphor or an *A is B* metaphor. Participants are given the topic (*A*) and must generate possible sources (*B*) for this topic, then select the most appropriate one and interpret the meaning of their created metaphor.

The Current Study

This study aims to extend previous research by examining the relationship between the three established basic psychological needs and the candidate need for novelty in an EFL context. Additionally, it focuses on creativity in an EFL context by using three distinct tasks measuring different facets of creative potential: convergent thinking, divergent thinking, and metaphorical thinking. The study also identifies how satisfaction or frustration of these psychological needs predicts student engagement with and creative potential in English.

Research Questions (RQs)

RQ1. What is the relationship between the satisfaction and frustration of the four basic psychological needs within an EFL learning context?

RQ2. What is the relationship between three distinct creative potential measurements in an EFL learning context?

RQ3. Does the satisfaction or frustration of the four basic psychological needs predict engagement/disengagement in an EFL learning context?

RQ4. Does the satisfaction or frustration of the four basic psychological needs predict creative potential in an EFL learning context?

Method

Participants

First-year students (N = 135; women = 76, men = 59) at a national university in Japan participated in this study. They were all in advanced English classes, as determined by a university placement test at the start of the year. Based on the instructional materials used for the course, their English proficiency was estimated to be at the B2 level according to the Common European Framework of Reference for Languages (CEFR). Participants came from different faculties, such as Humanities and Social Sciences, Science and Technology, Education, and Agriculture and Life Science, but most of the participants were from the School of Medicine. The research review board at a national university in Japan reviewed and approved this research plan (acceptance number: 0012 (2022)). All students gave informed consent, were provided with information about the purpose of the study, were informed of their right to withdraw from the study at any time, and, after the completion of the study, were provided with results in a follow-up session.

Materials

The Questionnaire

The basic psychological need satisfaction and frustration scale (BPNSFS) items have been translated, tested, and verified in Japanese (Chen et al., 2015; Nishimura & Suzuki, 2016). These items are general and not specific to a context. For example, for "autonomy satisfaction," an item reads, "I feel I have been doing what really interests me." Expanding on this scale, researchers have developed versions for specific contexts like sports (Ng et al., 2011) or work settings (Baard et al., 2004). The study presented here uses a scale that has been previously tested and used in an English language learning context in Japan, referred to as the Japanese version of the *Basic Psychological Need Satisfaction and Frustration Scale with Need for Novelty in an English Learning* context (BPNSFS-EL) (see Birdsell, 2018a). For instance, the above item was changed to, "In English class, I feel like I have been doing what really interests me." The items in Japanese were slightly modified for consistency and accuracy from the original version by a Japanese researcher, at the request of the ethical review board.

The questionnaire contained a total of 24 items. Each need (autonomy, competence, relatedness, and novelty) had three items for need satisfaction and three items for need frustration. The second part contained 10 items: seven related to learner engagement, including cognitive (e.g., "I enjoy the intellectual challenge of learning English"), emotional (e.g., "I find studying English stimulating"), and behavioral (e.g., "I look for ways to use English outside the classroom"); and three reverse-scored items related to learner disengagement (e.g., "I find learning English troublesome"). A Google Form was used for this questionnaire. All items were presented to the participants only in Japanese (the L1 of the participants) and they appeared in random order (see Appendix A for the complete questionnaire).

The Creativity Tasks

The following three short creativity tasks were used in this study to measure creative potential in an EFL context (participants completed these in English, the L2 of the participants):

- ***Alternative Uses Task (AUT)***. Participants completed two alternative uses tasks, one for a PET bottle and the other a cardboard box.
- ***Remote Association Task (RAT)***. Participants completed a 10-item Remote Association Task. For each item, they were presented with three words (for example: Swiss / Cottage / Cake) and had to identify the single word that connects all three (in this case—CHEESE).
- ***Nominal metaphor brainstorming task***. Participants completed a metaphor task consisting of two items ("Creativity is …" and "Life is …"). For each item, they first generated multiple potential vehicles for the metaphor (e.g., "Creativity is a lightning bolt," "Creativity is a plant," "Creativity is rain"). They then selected what they considered the most creative one and provided an interpretation of their chosen metaphor.

Procedure

During Week 2 of a 15-week semester, student participants (N = 135) signed consent forms and completed the two-part questionnaire. In Week 4, participants (N = 133) completed the RAT and AUT tasks, which measured convergent and divergent thinking. In Week 5, participants (N = 118) completed the metaphor task. They had 20 minutes to complete each set of tasks. The discrepancy in participant numbers across the sessions was due to student absence or tardiness on those days.

Procedure for Data Analysis

Statistical analyses were performed using IBM SPSS Statistics for Mac, Version 27.0. Items measuring satisfaction and frustration for each of the four basic psychological needs (autonomy, competence, relatedness, and novelty), as well as engagement and disengagement, were averaged to create composite scores for each construct. This process yielded a total of 10 distinct variables.

As for the RAT task, the 10 items were aggregated into a final score. Results showed that participants had trouble completing this task, with the average score of 2.37 out of 10. The low score is likely due to the added challenge of doing the task in an L2 and the unfamiliarity of the task itself. Additionally, the data were not normally distributed, so they were excluded from the analysis.

For the AUT tasks, four scores were used: fluency, originality, flexibility, and elaboration. The fluency score was the raw number of responses the student provided. The remaining variables (e.g., originality, flexibility, and elaboration) were scored using a large-language model (LLM). The validity of using LLM-based scoring of AUT responses has recently become a research focus, with promising results (e.g., Organisciak et al., 2023). In this study, the researcher used few-shot prompting, providing the LLM (OpenAI's GPT-4-turbo model) with five example evaluations from human judges prior to asking it to evaluate the participants' responses for each variable on a 5-point Likert scale.

For the metaphor task, two scores were used: fluency and creativity. The fluency score was the raw number of responses. To assess metaphor creativity, the researcher again used LLMs to evaluate the responses, an approach that has gained recognition as a reliable and valid method (see DiStefano et al., 2024). It reduces both the time typically required and the subjectivity inherent in traditional assessment methods. However, the study presented here used a unique approach by employing a modified version of the Consensual Assessment Technique (CAT; Amabile, 1982), referred to as an LLM-CAT. Whereas the original CAT relies on human judges evaluating the creative product using set criteria, this study instead utilized three LLMs: Google's Gemini 2.0 Flash, OpenAI's ChatGPT-4, and Anthropic's Claude 3.7 Sonnet. Each LLM received identical instructions to act as an expert judge and evaluate the creativity of metaphors written by student participants. The LLMs were instructed to rate each metaphor on a 5-point Likert scale across

four criteria: (a) semantic distance, (b) originality, (c) meaningfulness, and (d) the capacity to evoke imagery. An overall creativity score was then calculated by averaging the scores from these four criteria. (For the complete verbatim prompts, see Appendix B).

Interrater reliability for the creativity evaluations of both metaphor sets was assessed using two measures: Cronbach's alpha and the Intraclass Correlation Coefficient (ICC). The Cronbach's alpha for the three LLMs' ratings was .84 (LIFE is … metaphor) and .94 (CREATIVITY is … metaphor), indicating good internal consistency among the LLM raters. Additionally, the ICC (average measures) was .77 (LIFE is … metaphor) and .88 (CREATIVITY is … metaphor), both with statistically significant results ($p < .01$), suggesting strong agreement between LLM raters. Ratings from the three LLM evaluators were averaged, then aggregated across both metaphors to produce a final metaphor creativity score.

Results

RQ 1: Descriptive statistics revealed high mean scores for novelty and autonomy satisfaction, and low scores for disengagement, autonomy frustration, and novelty frustration. Across all needs, satisfaction scores were generally higher than frustration scores, with one exception: competence, where frustration scores were higher. This finding corroborates results from an earlier study (Birdsell, 2018a).

Bivariate correlation analysis identified moderate to strong positive correlations among satisfaction needs, as well as among frustration needs. Additionally, moderate to strong negative correlations

Table 1

Means, Standard Deviations, and Correlations among the Variables of BPNSFS-EL and Engagement/Disengagement With Learning English

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
Autonomy S	4.09	0.82		-.50**	.45**	.41**	.59**	-.34**	.48**	-.56**	.72**	-.44**
Autonomy F	2.54	0.93			-.27**	.32**	-.25**	.21*	-.38**	.55**	-.40**	.52**
Relatedness S	3.84	0.90				.66**	.41**	-.27**	.27**	-.47**	.44**	-.27**
Relatedness F	3.28	0.35					.36**	-.11	.15	-.14	.36**	.03
Competence S	3.67	1.00						-.61**	.33**	-.43**	.62**	-.40**
Competence F	3.90	1.10							-.03	.23**	-.31**	.41**
Novelty S	4.63	0.78								-.46**	.46**	-.26**
Novelty F	2.58	0.78									-.45**	.35**
Engagement	4.16	0.94										-.58**
Disengagement	2.02	0.74										

Note. S = Satisfaction; F = Frustration; ** $p < .01$, * $p < .05$

Table 2

Means, Standard Deviations, and Correlations Among the Variables for Creative Potential

Variables	*M*	*SD*	1	2	3	4	5	6
1. AUT Flexibility	4.18	1.69		.91**	.88**	.91**	.23**	.15
2. AUT Originality	3.83	1.42			.92**	.80**	.24*	.12
3. AUT Elaboration	2.38	1.87				.74**	.25**	.23*
4. AUT Fluency	3.80	1.73					.25**	.09
5. MET Fluency	6.44	2.67						.15
6. MET Creativity	6.65	0.95						

Note. $N = 133$ (AUT); $N = 124$ (Metaphor); AUT = Alternative uses task; MET = Metaphor; ** $p < .01$, * $p < .05$

were found between the satisfaction and frustration needs. One exception to this pattern was relatedness frustration, which showed moderately unexpected positive correlations with autonomy satisfaction (r = .41), competence satisfaction (r = .36), and engagement (r = .36) (see Table 1).

RQ 2: A similar analysis was conducted with the creative potential variables (see Table 2). The bivariate correlation analysis revealed positive correlations between the AUT scores (r = .88, .91). AUT fluency, flexibility, originality, and elaboration also showed weak correlation with metaphor fluency. Metaphor creativity only showed a weak correlation with AUT elaboration.

RQ 3: Examination of residual diagnostics confirmed that regression assumptions were met. Therefore, a multiple regression analysis was conducted to examine whether the satisfaction of the four basic psychological needs predicted student engagement. The model explained 59.6% of the variance in student engagement (adjusted R^2 = .60), and was statistically significant, $F(4, 125) = 47.13$, $p < .01$. Three of the four predictor variables significantly contributed to the model. Autonomy was the strongest predictor ($\beta = .43$, $p < .01$), followed by competence ($\beta = .29$, $p < .01$), and novelty ($\beta = .17$, $p = .01$). Relatedness did not significantly predict student engagement ($\beta = .09$, $p > .05$).

A second multiple regression analysis was conducted to examine whether the frustration of the four basic psychological needs predicted student disengagement from English learning. The model explained 37% of the variance in student disengagement (adjusted R^2 = .37), and was statistically significant, $F(4, 125) = 19.23$, $p < .01$. Two of the four predictor variables significantly contributed to the model. Autonomy was the strongest predictor ($\beta = .56$, $p < .01$), followed by competence ($\beta = .26$, $p < .01$).

RQ 4: A linear regression analysis was conducted to examine the relationship between creative potential in English as a foreign language and the satisfaction of the four basic psychological needs in an English learning context. The results of the regression analyses did not reveal a statistically significant model for predicting divergent thinking or metaphorical thinking.

Discussion

In this study, the satisfaction of students' psychological needs predicted student engagement within a Japanese EFL context. Specifically, students who felt they had autonomy, felt competent, and found novel experiences in their learning had higher levels of engagement. However, relatedness did not show similar significance. This study contributes to the growing interest in basic psychological needs (BPN) in an EFL context. For example, Wang (2024) found BPN satisfaction among Chinese students studying English was a contributor to desirable learning outcomes. Additionally, Alamer and Lee (2019) also found BPN satisfaction (autonomy and competence, however, not relatedness) among Saudi EFL students had a positive impact on English GPA scores.

This study also demonstrates the important role novelty plays in student engagement, further supporting research that proposes novelty as a potential fourth psychological need (e.g., Birdsell, 2018a; González-Cutre et al., 2016). Another contribution of this research is the refinement and validation of the *Basic Psychological Need Satisfaction and Frustration Scale with Need for Novelty for the EFL context* (BPNSFS-EL) in Japanese. The BPNSFS-EL provides teachers and researchers with a tool to examine how satisfaction or frustration of these psychological needs affects various behavioral, motivational, and emotional variables in the context of learning EFL.

As for creative potential, the results provide preliminary support that two distinct measurements of creative potential (i.e., divergent thinking and metaphorical thinking) can be used in an EFL context. However, convergent thinking (e.g., remote association task) was problematic for the students, and this is likely due to the broad semantic knowledge required to answer these items correctly. From a practical perspective, these creative potential measurements could be used as learning materials in the EFL classroom to enhance student creativity in English. Finally, this study also demonstrates strong internal consistency among LLMs when measuring creative products, such as metaphor production tasks. This LLM-CAT method has potential and should be further researched as a reliable way to measure the creativity of metaphors and possibly other creative products (e.g., poems, titles to a cartoon strip) commonly used in creativity research.

Conclusion

In summary, providing students with autonomy, fostering their competence, and introducing novelty are pedagogical practices that have the potential to positively impact learner engagement. Future research can continue to explore how satisfying these basic psychological needs can impact other key variables for learning English as a foreign language.

References

Alamer, A., & Lee, J. (2019). A motivational process model explaining L2 Saudi students' achievement of English. *System*, *87*, 102133. https://doi.org/10.1016/j.system.2019.102133

Alamer, A., Morin, A. J., Alrabai, F., & Alharfi, A. (2023). Introducing the Basic Psychological Needs Frustration in Second Language Scale (BPNF-L2): Examining its factor structure and effect on L2 motivation and achievement. *Acta Psychologica*, *240*, 104021. https://doi.org/10.1016/j.actpsy.2023.104021

Amabile, T. M. (1982). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology, 43*(5), 997–1013. https://doi.org/10.1037/0022-3514.43.5.997

Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings. *Journal of Applied Social Psychology, 34*, 2045–2068. https://doi.org/10.1111/j.1559-1816.2004.tb0269.x

Bagheri, L., & Milyavskaya, M. (2020). Novelty–variety as a candidate basic psychological need: New evidence across three studies. *Motivation and Emotion*, *44*, 32-53. https://doi.org/10.1007/s11031-019-09807-4

Benlahcene, A., Kaur, A., & Awang-Hashim, R. (2021). Basic psychological needs satisfaction and student engagement: The importance of novelty satisfaction. *Journal of Applied Research in Higher Education*, *13*(5), 1290–1304. https://doi.org/10.1108/JARHE-06-2020-0157

Birdsell, B. J. (2018a). Understanding students' psychological needs in an English learning context. *Journal of Liberal Arts Development and Practices*, *2*, 1–14. https://hirosaki.repo.nii.ac.jp/records/5266

Birdsell, B. J. (2018b). Conceptual wandering and novelty seeking: Creative metaphor production in an L1 and L2. *Journal of Cognitive Science*, *19*(1), 35–67.

Birdsell, B. J. (2019). Creative cognition: Conceptual blending and expansion in a generative exemplar task. *IAFOR Journal of Psychology and the Behavioral Sciences*, 5(si), 43–62. https://doi.org/10.22492/ijpbs.5.si.03

Carson, S. H., Peterson, J. B., & Higgins, D. M. (2005). Reliability, validity, and factor structure of the creative achievement questionnaire. *Creativity Research Journal*, *17*(1), 37–50. https://doi.org/10.1207/s15326934crj1701_4

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., ... & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, *39*, 216–236. https://doi.org/10.1007/s11031-014-9450-1

Cropley, A. (2006). In praise of convergent thinking. *Creativity Research Journal*, *18*(3), 391–404. https://doi.org/10.1207/s15326934crj1803_13

Dincer, A., Yeşilyurt, S., Noels, K., & Vargas Lascano, D. (2019). Self-determination and classroom engagement of EFL learners: A mixed-methods study of the self-system model of motivational development. *SAGE Open, 9*, 1–15. https://doi.org/10.1177/2158244019853913

DiStefano, P. V., Patterson, J. D., & Beaty, R. E. (2024). Automatic scoring of metaphor creativity with large language models. *Creativity Research Journal*, 1–15. https://doi.org/10.1080/10400419.2024.2326343

Fernández-Espínola, C., Almagro, B. J., Tamayo-Fajardo, J. A., & Sáenz-López, P. (2020). Complementing the self-determination theory with the need for novelty: Motivation and intention to be physically active in physical education students. *Frontiers in Psychology*, *11*, 557592. https://doi.org/10.3389/fpsyg.2020.01535.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of educational research*, *74*(1), 59–109. https://doi.org/10.3102/00346543074001059

González-Cutre, D., Sicilia, A., Sierra, A. C., Ferriz, R., & Hagger, M. S. (2016). Understanding the need for novelty from the perspective of self-determination theory. *Personality and Individual Differences*, *102*, 159–169. https://doi.org/10.1016/j.paid.2016.06.036

González-Cutre, D., Romero-Elías, M., Jiménez-Loaisa, A., Beltrán-Carrillo, V. J., & Hagger, M. S. (2020). Testing the need for novelty as a candidate need in basic psychological needs theory. *Motivation and Emotion*, *44*(2), 295–314. https://doi.org/10.1007/s11031-019-09812-7

Karwowski, M., Lebuda, I., & Wiśniewska, E. (2018). Measuring creative self-efficacy and creative personal identity. *The International Journal of Creativity & Problem Solving*, *28*(1), 45–57.

Liao, Y. H., Chen, Y. L., Chen, H. C., & Chang, Y. L. (2018). Infusing creative pedagogy into an English as a foreign language classroom: Learning performance, creativity, and motivation. *Thinking Skills and Creativity*, *29*, 213–223. https://doi.org/10.1016/j.tsc.2018.07.007

McDonough, K., Crawford, W. J., & Mackey, A. (2015). Creativity and EFL students' language use during a group problem-solving task. *TESOL quarterly*, *49*(1), 188–199. https://www.jstor.org/stable/43893742

Ng, J. Y., Lonsdale, C., & Hodge, K. (2011). The Basic Needs Satisfaction in Sport Scale (BNSSS): Instrument development and initial validity evidence. *Psychology of Sport and Exercise*, *12*(3), 257–264. https://doi.org/10.1016/j.psychsport.2010.10.006

Nishimura, T., & Suzuki, T. (2016). Basic psychological need satisfaction and frustration in Japan: Controlling for the big five personality traits. *Japanese Psychological Research, 58*(4), 320–331. https://doi.org/10.1111/jpr.12131

Noels, K., Lascano, D., & Saumure, K. (2019). The development of self-determination across the language course: Trajectories of motivational change and the dynamic interplay of psychological needs, orientations, and engagement. *Studies in Second Language Acquisition, 41*, 821–851. https://doi.org/10.1017/S0272263118000189

Oga-Baldwin, W. L. Q., Nakata, Y., Parker, P. D., & Ryan, R. M. (2017). Motivating young language learners: A longitudinal model of self-determined motivation in elementary school foreign language classes. *Contemporary Educational Psychology, 49*, 140–150. https://doi.org/10.1016/j.cedpsych.2017.01.010

Organisciak, P., Acar, S., Dumas, D., & Berthiaume, K. (2023). Beyond semantic distance: Automated scoring of divergent thinking greatly improves with large language models. *Thinking Skills and Creativity*, *49*, 101356. https://doi.org/10.1016/j.tsc.2023.101356

Pishghadam, R., Khodadady, E., & Zabihi, R. (2011). Learner creativity in foreign language achievement. *European Journal of Educational Studies*, *3*(3), 465–472.

Reeve, J. (2012). A self-determination theory perspective on student engagement. In S. Christenson, A. Reschly & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 149–172). Springer. https://doi.org/10.1007/978-1-4614-2018-7_7

Runco, M. A., & Acar, S. (2012). Divergent thinking as an indicator of creative potential. *Creativity Research Journal*, *24*(1), 66–75. https://doi.org/10.1080/10400419.2012.652929

Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal*, *24*(1), 92–96. https://doi.org/10.1080/10400419.2012.650092

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.

Sinatra, G. M., Heddy, B. C., & Lombardi, D. (2015). The challenges of defining and measuring student engagement. *Educational Psychologist*, *50*(1), 1–13. https://doi.org/10.1080/00461520.2014.1002924

Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion*, *44*, 1–31. https://doi.org/10.1007/s11031-019-09818-1

Wang, N. (2024). How does basic psychological needs satisfaction contribute to EFL learners' achievement and positive emotions? The mediating role of L2 self-concept. *System*, *123*, 103340. https://doi.org/10.1016/j.system.2024.103340

Brian J. Birdsell received a Ph.D. in Applied Linguistics from the University of Birmingham, UK, and currently is an Associate Professor in the Institute for the Promotion of Higher Education at Hirosaki University. His research interests include metaphor, embodied cognition, creativity, and CLIL.
brian@hirosaki-u.ac.jp

Appendix A

Japanese version of the Basic Psychological Need Satisfaction and Frustration Scale with Need for Novelty in an English Learning context (BPNSFS-EL)

自律性への欲求充足・支援行動 (Autonomy Satisfaction/Support)

1. 自分自身の意思で英語を学習しており、日本語と英語の両方話せる人になりたいと感じている。(I feel I am studying English out of my own choice and desire to become the type of person who can speak more than one language well.)
2. 英語の授業で自分が本当に関心のあることを行なっていると感じている。(In English class, I feel like I have been doing what really interests me.)
3. 英語の授業で自分のアイデアや意見を自由に表現できると感じている。(I feel free to express my ideas and opinions in my English class.)

自律性への欲求不足・阻害行動 (Autonomy Frustration/Hindrance)

4. 英語学習は、一連の義務のように感じている。(English learning feels like a chain of obligations.)
5. 英語の授業で自分がしているほとんどのことは、強制されているものだと感じている。(In English class, most of the things I do feel like "I have to".)
6. 英語の授業で自分が望んでもいないことを、多くさせられていると感じている。(In English class, I feel forced to do many things I wouldn't desire to do.)

関係性への欲求充足・支援行動 (Relatedness Satisfaction/Support)

7. 英語で話す時、グローバルコミュニティと繋がっていると感じる。(I feel connected with the global community when I use English.)
8. 英語で話をする時、その話し相手と親密な関係を築いていると感じている。(I feel close and connected with other English speakers.)
9. 英語の授業で出会った何人かの学生は、私の親しい友人になっている。(Some of the students in my English classes have become close friends of mine.)

関係性への欲求不足・阻害行動 (Relatedness Frustration/Hindrance)

10. 英語の授業で他の学生と親密に関わりたくない。(I don't really mix with other students in my English class.)
11. 英語のグローバルコミュニティから排除されていると感じている。(I feel excluded from the global English-speaking community.)
12. 英語を使う時、深い人間関係を築こうとするが、表面的な関係にしかならない。(I feel that the relationships I have with others in English are just superficial.)

有能感への欲求充足・支援行動 (Competence Satisfaction/Support)

13. 英語を学ぶことに対して、自分は能力があると感じている。(I feel I can successfully learn English.)
14. 世界の人々とのコミュニケーションをするために、自分は英語を使うことができると思っている。(I feel I can successfully use English to communicate with people.)
15. 私は英語を使って色々な活動をできると感じている。(I have the feeling that I can accomplish many tasks/activities using English.)

有能感への欲求不足・阻害行動 (Competence Frustration/Hindrance)

16. 実際に英語の授業で英語を使う能力がないと感じている。(I really don't feel competent using English in English class.)
17. 英語を学ぶことができるかどうかについて自分の能力を疑っている。(I doubt whether I will ever be able to learn English.)
18. 自分の英語能力に自信がない。(I lack confidence with my ability to use English.)

新奇性への欲求充足・支援行動 (Novelty Satisfaction/Support)

19. 英語の授業では、創造力を発揮する機会がある。(In English class, I have the opportunity to be creative.)
20. 英語を学ぶことで、私は新しいものを発見するチャンスがあると感じている。(Learning English, I feel like I have the opportunity to discover new things.)
21. 英語を使う時、新しい感覚を感じている。(I feel new sensations through using English.)

新奇性への欲求不足・阻害行動 (Competence Frustration/Hindrance)

22. 英語の授業のなかでは自分の独創性を育むことはできない。(In English class, I cannot manage to develop my originality.)
23. 私の英語授業のアクティビティは同じようなことばかりだと感じている。I feel that my English class activities are repetitive.)
24. 私は英語を使った新しい取り組みに参加することに消極的である。(I am reluctant to participate in new endeavors that require me to use English.)

10 items about engagement/satisfaction with learning English

1. 私は英語を学ぶという知的な挑戦を楽しんでいる。(I enjoy the intellectual challenge of learning English.)
2. 私は英語の勉強で満足感を得ている。(I get a lot of satisfaction from studying English.)
3. 英語の勉強は刺激的であると思う。(I find studying English stimulating.)
4. 普段、私は英語の勉強にやる気がある。(I find myself usually motivated to study English.)
5. 私は教室の外で英語を使う手段を探している。(I look for ways to use English outside the classroom.)
6. 普段、私は自分で努力して英語の勉強をしている(例:読書をする、音楽を聴く、映画、YouTubeを見る、など)。(I usually make the effort to study English on my own (e.g., reading, listening to music, watching movies, YouTube, etc.))
7. 将来、自分が英語を使うようになると思う(例えば、社交、仕事、旅行など)。(In the future I see myself using English (e.g., socially, for work, or travel, etc.).)
8. 英語は難しくて学べないと思う。(English is too difficult to learn. **)
9. 英語学習は面倒だと思う。(I find learning English troublesome. **)
10. 英語を学ぶのは時間の無駄であると思う。(Learning English is a waste of time. **)

Note. ** Reverse items for disengagement

Note. The questionnaire was administered in Japanese in random order without the four basic psychological needs' headings. English translations of the items are provided for reference purposes.

Appendix B

LLM Prompts for Metaphor Creativity Assessment

Do you understand Consensual Assessment Technique? (LLM response)

I want you to be a judge to measure the creativity of a set of metaphors written by student participants in an experiment. Ok? (LLM response)

Use the following 4 criteria in your measurement: semantic distance (how distantly related are the two concepts), originality (how statistically unique is the metaphor), meaning (does the metaphor make sense), and imagery (does the metaphor evoke imagery and insight). For each of these criteria use a 5-point Likert scale. For example, for originality (5 = highly original and novel to 1 = not at all original). Then, average the 4 criteria together into one final 5-point overall creative score. Ok? (LLM response)

Participants were given the topic "LIFE is ..." and they were asked to complete this metaphor and then provide an interpretation. Ok? (LLM response)

The data from this set should be normally distributed. Ok? (LLM response). (Then the data were provided to the LLM for evaluation).