

University of Mississippi

eGrove

---

Honors Theses

Honors College (Sally McDonnell Barksdale  
Honors College)

---

Spring 5-2-2021

## How Does Movement Impact Originality in a Divergent Thinking Task?

Molly B. Fontenot  
*University of Mississippi*

Follow this and additional works at: [https://egrove.olemiss.edu/hon\\_thesis](https://egrove.olemiss.edu/hon_thesis)



Part of the [Cognition and Perception Commons](#)

---

### Recommended Citation

Fontenot, Molly B., "How Does Movement Impact Originality in a Divergent Thinking Task?" (2021). *Honors Theses*. 1647.

[https://egrove.olemiss.edu/hon\\_thesis/1647](https://egrove.olemiss.edu/hon_thesis/1647)

This Undergraduate Thesis is brought to you for free and open access by the Honors College (Sally McDonnell Barksdale Honors College) at eGrove. It has been accepted for inclusion in Honors Theses by an authorized administrator of eGrove. For more information, please contact [egrove@olemiss.edu](mailto:egrove@olemiss.edu).

HOW DOES MOVEMENT IMPACT ORIGINALITY IN A DIVERGENT THINKING TASK?

by  
Molly B. Fontenot

A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of  
the requirements of the Sally McDonnell Barksdale Honors College.

Oxford  
May 2021

Approved by

---

Advisor: Dr. Stephanie Miller

---

Reader: Dr. Sarah Moses

---

Reader: Dr. Matthew Reysen

© 2021  
Molly Barron Fontenot  
ALL RIGHTS RESERVED

## ACKNOWLEDGMENTS

I would like to first thank my advisor, Dr. Stephanie Miller, for her unwavering support and encouragement throughout this journey. She was extremely patient, kind, and reassuring, and she always pushed me to continue editing and redrafting during our countless thesis meetings. I also would like to extend my deepest gratitude to Dr. Emily Frith for her incredible progress in this study. My thesis would not have been possible without them. Lastly, I would like to thank my friends and family for always encouraging me to become the very best version of myself.

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

### ABSTRACT

MOLLY BARRON FONTENOT: How Does Movement Impact Originality in a Divergent Thinking Task? (Under the Direction of Stephanie Miller)

Research has suggested that original thought can be affected by movement. However, this research has primarily focused on children, with embodied creativity work lacking in adult populations. This study aimed to examine the impact of movement on the generation of original ideas within divergent thinking tasks in adults. To study this, participants first completed a baseline divergent thinking task asking participants to come up with as many novel uses for a common item. After baseline, participants were randomized into three different testing groups that were encouraged to engage in different types of movement during the divergent thinking task: 1) *meaningful movement*, 2) *meaningless movement*, or 3) *restricted movement*. Originality for participants' responses at baseline and during the movement condition was scored. Overall, all participants marginally improved when movement conditions were added. However, the results suggested that meaningful movement did not significantly improve originality, and meaningless movement had the lowest original responses across baseline and the movement condition, suggesting that not all movement is beneficial to originality.

# MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

## TABLE OF CONTENTS

LIST OF FIGURES.....	vi
INTRODUCTION.....	7
THE PRESENT STUDY.....	12
METHODS.....	13
RESULTS.....	16
DISCUSSION.....	17
CONCLUSION.....	20
REFERENCES.....	21
FIGURES.....	23

LIST OF FIGURES

FIGURE 1 Measure of Subjective Originality Between Movement Manipulation Groups...23

# MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

## **Introduction**

Creativity is generally defined as useful ideas that are imaginative, independent, innovative, and original, thus originality is often highlighted as one of the most widely recognized facets of creativity. Creative thoughts can be seen in something as small as a unique sentence produced in everyday language to something as big as unconventional social and economic progress (Runco & Charles, 1993). Although many factors impact creative thought, several embodied theorists have noted that much of our creative output is based within sensorimotor experiences and comes to possess real, creative meaning through movement (Hostetter & Alibali, 2008). For example, musicians use movement to produce musically creative works, artists use movement to produce novel physical (e.g., dance) or material (e.g., paintings) works of art, and speakers use movement to convey their opinions to the audience. Thus, the study of creative and original works would benefit from the examination of the role of movement in producing original thoughts and ideas. In this present study, I seek to expand the research examining the link between movement and originality by examining the impact of movement in creative thinking.

## **Defining and Measuring Originality in Creative Thought**

The definition of creativity has continually evolved throughout the years, and its conceptualization remains entirely multifaceted and elusive. Several authors define creativity in terms of its element of surprise and its adaptiveness (Runco & Jaeger, 2012). However, most people view creativity as a series of multiple components with originality and practicality at its core. Original ideas are defined as ideas that are innovative, unique, or imaginative. Originality can be viewed as thoughts that are unlikely to be formed by other individuals (Harrington, 1975; Runco & Charles, 1993). In order for ideas to be deemed creative, the respective objects must



## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

also be appropriately constructed for a formidable purpose (i.e., practical) in addition to possessing an original or unique element. Practicality pertains to the object's value in the current market and their reinvention and element of newness in their purpose. For example, consider these two alternative uses for a key:

- (1) Use a key to open something.
- (2) Place a key in a container, and use it as a maraca.

With regard to the definition of creativity, the first example is a common use for a key. There is no element of reinvention in this response. The second example is an alternative use that is bizarre and uncommon. It is unique and possesses an innovative element of newness and intended purpose, and thus would be considered original.

To measure creative thought, researchers have administered a variety of creativity tests that range from extremely specific to extremely broad. Creativity tests measure specific creative processes often within divergent (i.e. exploring multiple solutions for a single stimuli) and convergent thinking tasks (i.e., analyzing a number of different perspectives and converging onto one correct response, Zachopoulou & Makri & Pollatou, 2009). Although both types of tasks have been used in the study of creativity, convergent tasks are limited because they only pose one possible correct solution. For example, with insight problems like the Duncker's Candle Task, the participant is presented with: 1) a box of thumbtacks, 2) a candle, and 3) a book of matches. The participant is then asked to attach the candle to the wall, where the candle will burn without dripping wax on the table or the floor (Isen & Daubman & Nowicki, 1987). The correct response for this task is to empty the box of thumbtacks, nail the box to the wall with the thumbtacks, place the candle inside the box, and light the candle with a match, which is considered a creative response because of its uniqueness and usefulness (Isen & Daubman & Nowicki, 1987).

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

However, this task is limited in response to measuring creativity among individuals because this task poses only one correct solution. Thus, divergent thinking tasks may be better suited for studying individual differences in originality because, unlike convergent tasks, the participants are asked to generate a variety of responses, which allows researchers to analyze a range of differences in the original responses generated across participants.

### **Measuring Originality in Divergent Thinking**

Divergent thinking, on the other hand, presents tasks that assess an individual's ability to generate a number of creative solutions, which typically leads to understanding different levels or individual differences in creativity. Divergent thinking tasks are typically open-ended and require participants to produce a variety of solutions (Harrington, 1975). For example, in the common Alternative Uses Tasks (AUTs), participants are asked to generate a variety of creative ideas for a single object (e.g., think of as many uses as you can for a key). These tasks often instruct participants to "be creative" while generating responses to measure creativity in response to the prompt. The scoring of creative ideas has typically been approached in two different ways: objective scoring and subjective scoring. Objective scoring is perhaps the more traditional and established method for creativity scoring. In this method, scoring is empirically based (i.e., based on the data or generated responses from the prompts) and focuses primarily on the statistical uncommonness of the response. For example, a rater may be asked to measure fluency (i.e., how many responses a participant generates) and the originality of those responses (i.e., how often does that particular response occur) to better understand individual differences in creativity.

Subjective originality scoring is "rater based" and is a relatively new method of creativity scoring that can encompass three aspects of originality through rater training: 1) *remoteness*, 2) *rareness*, and 3) *ingeniousness* (Reiter-Palmon & Forthmann & Barbot, 2019). With subjective

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

scoring, originality is independently judged by several blind raters asked to assign each response a score from one to five on a predetermined scale (i.e., 0's are assigned to bizarre, confused, and poor responses, 1's are used for extremely commonplace answers, 3's, 4's, and 5's are ratings of ascending originality). Once originality scores are administered for each response, an average of all tallied originality scores is recorded.

With subjective scoring, several raters blindly score each participant's response set, which potentially yields a more reliable and detailed creative index opposed to merely identifying a set of unique responses (Silvia, et al., 2008). Because the raters judge each response independently, generating a plethora of responses will not necessarily increase one's average originality score. For example, if participant #1 proposed five ideas with subjective scores (i.e., 1 being least creative to 5 being most creative), of "2," "2," "3," "3," and "2" for each response, this would award participant #1 an overall originality average of 2.4. If participant #2 proposed three ideas with subjective scores of "4," "4," and "3" for each response, this would award participant #2 an overall originality average of 3.7 (even though they generated fewer responses). Thus, generating a variety of responses that are lacking in originality will not increase a participant's overall score. Subjective scoring focuses on the quality rather than quantity of original ideas.

Bizarre, weird, and common responses that slip through the cracks of the objective uniqueness index (e.g., an item that is infrequent but does not make sense in context) should be caught by the raters in subjective scoring. In this method of scoring, a common intended use for a brick like "make a brick path," for example, will always get low scores from raters. Thus, it is important to establish a uniqueness guideline that the raters will continually follow. Several raters should evaluate a participant's responses to avoid any sort of discrimination and to

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

establish reliability. Subjective ratings should be independent of sample size. Creativity is scored by the standards set by raters, not by the frequency of a participant's responses. Thus, the raters' standards ought to be the same regardless of the sample size, so the base rates of subjectively scored creativity should not be artificially inflated or depressed for small and large samples (Silvia, et al. 2013).

### **The Role of Movement in Originality**

Many factors have been studied in terms of what impacts creativity, such as environment, intelligence, and motivation, but a newer area of research emerges from the embodied cognition literature. Embodiment can be defined as the use of physical movement to help problem-solve and reason, describe mental representations of objects, and model and predict behaviors (Wilson, 2002). With regard to creativity research, physical movement could be a driving force that helps elicit and generate more creative responses than a task with limited range of motion. For example, in the divergent thinking AUT, gestural movement may be particularly relevant to improve creative thought. Recall that in this task, participants are asked to "be creative" in generating alternative uses for a particular object. Given that participants verbally generate their creative responses, encouraging gestures to accompany speech may aid participants in using verbal, visual, auditory, and spatial cues. Gestures may emerge from underlying unconscious cognitive processes, such as embodiment linked to language (e.g., a friend waving while saying hello to a new neighbor) and mental imagery (e.g., a small child pointing at a toy to signify his interest) that may aid in participants' responses (Hostetter & Alibali, 2008). For instance, in the AUT, encouraging movement may encourage participants to generate language-related movement to help facilitate creative cognitive thinking and formulating responses in a timely fashion. In a movement manipulation AUT, if the participant was encouraged to gesture and had

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

trouble putting to words uses for a pencil, encouraging movement (e.g., mimicking chopsticks to pretend to eat) might help them generate this more creative response as compared to if language was not encouraged.

Some recent studies have provided empirical evidence for an embodied creativity perspective, suggesting that gestures play a role in the generation of creative responses. For instance, Broaders, Cook, Mitchell & Goldin-Meadow (2007) showed that encouraging children to gesture with their hands increased their ability to produce new and creative solutions to problem solving. Researchers speculated that gesturing while brainstorming helped children realize their previous mistakes to the problems and allowed them to convey previously unexpressed solutions (Broaders & Cook & Mitchell & Goldin-Meadow, 2007). In a study conducted by Kirk and Lewis (2017), children completed two AUTs, with one being a gesture-allowed condition and the other being a movement manipulation AUT (i.e., free to move their hands). Results showed that gesturing was positively correlated with idea generation, and that children who were encouraged to gesture significantly produced more novel uses for objects (Kirk & Lewis, 2017). In contrast, gesturing may also have the ability to hinder performance. Gesturing during tasks that do not lend themselves to gesturing can distract and disrupt a participant's cognitive performance (Cook, 2008). Thus, meaningless movement unrelated to a task may distract a participant from the task at hand and ultimately lead to inhibited original thoughts.

### **The Present Study**

The present study aims to further investigate the impact of movement on originality. I specifically focused on undergraduate students ranging from eighteen to thirty-three years old

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

because very little embodied creativity research exists in adults, especially with this newer measure of subjective originality.

To investigate this research question, originality was measured in two AUT tasks asking participants to generate as many creative responses as possible for everyday objects. The first AUT served as a baseline for all participants and in the second AUT participants were randomly divided into three movement manipulation groups during idea generation: meaningful movement (i.e., coordinating appropriate hand gestures with responses), meaningless movement (i.e., rotating hands in clockwise circles while producing responses), and restricted movement (i.e., both hands placed flat on the desk while producing responses). After responses were recorded, each response was subjectively scored based on its originality, and an overall originality average was tallied for each participant. Thus, my research question focused on whether movement improved originality compared to a baseline and if people are encouraged to use movement to generate more original ideas. I expected to see that participants in the meaningful movement group would increase the most in their generation of original ideas because movement guidelines were not limited. I also expected to see that the generation of original ideas was hindered in the meaningless movement group and in the restricted movement group.

### **Methods**

#### **Participants**

The participants of this study consisted of one hundred and fifty-one University of Mississippi undergraduate and graduate students (64.7% female, 35.3% male) between the ages of eighteen and thirty three. Students were recruited through the online SONA system. In exchange for a one-visit experiment, participants received course credit in their respective

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

psychology course. One participant was excluded from the study due to video malfunction and instruction error.

### **Procedure**

The present work was part of a larger study examining AUT and executive function (EF) tasks. One of four research assistants tested participants individually in a quiet room in a laboratory setting. Upon entry, participants provided formal written consent to participate in the proposed study and to allow a segment of the study to be video-recorded. Next, participants were asked to supply demographic information along with procedural questions, such as grade-point average, handedness, hours slept the night before, and hunger. Participants were randomly assigned to one of three independent embodied movement testing groups: 1) meaningful movement (n=51), 2) meaningless movement (n=50), and 3) restricted movement (n=50). Each participant participated in multiple AUT trials; however, for the purposes of this study, I only analyzed the first two AUT trials, which consisted of a baseline AUT trial along with a movement manipulation AUT trial.

### **Creativity Assessments (AUTs)**

#### **Baseline**

For the first AUT, research assistants encouraged participants to be as creative as possible in their responses. The stimulus items in the experiment were a pencil, key, and shoe. The proposed stimulus items were not physically present. Each participant was read the following general task instructions:

“In this task, I would like you to come up with as many uses for [a \_\_\_\_\_] as possible. You will have three minutes to do so. Please be creative, and come up with ideas that are clever, humorous, original, or interesting. Remember to name as many

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

alternative uses for [a \_\_\_\_\_] as you can and please be as creative as you can while I write down your responses.”

After instructions were given, participants were asked if they understood the directions; if instructions were clearly understood, the experimenter reminded the participant they would have three minutes to think of various alternative uses for the object.

### **Movement Manipulation**

For the second AUT, participants were independently assigned to one of three movement testing groups: meaningful, meaningless, and restricted. After the first AUT concluded, experimenters read participants the general instructions from the baseline AUT, but were also instructed:

“Sometimes people are more creative if they focus carefully on their ideas. One way to increase focus is to [use your hands (meaningful and meaningless movement groups)/remain still (restricted movement group)] while explaining your responses. We would like you to do this. Please be sure to [gesture with your hands (meaningful group)]/move your hands in circles (meaningless movement group)]/ remain as still as possible (restricted movement group)] while thinking of ideas for alternative uses.”

Like the baseline AUT, participants were asked if they clearly understood all instructions. If not, instructions were repeated, and participants received clarification on their questions. Participants were again reminded of the three minute time limit.

### **Originality Scoring**

Originality was scored according to the Subjective Scoring Method (Silvia, 2011), which was accomplished by raters independently evaluating each participants’ originality. For the present study, two raters blindly subjectively scored each participant’s ideas on a 0 to 5 scale and



## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

then calculated average ratings for each AUT trial. For example, if a participant generated four ideas during movement manipulation, with ratings of “3,” “3,” “4,” and “4,” the average subjective originality score for that AUT would be  $14/4 = 3.5$ . When determining the extent of original responses, three factors were considered: 1) *remoteness* (the distance from the intended use of a stimulus) 2) *rareness*, and 3) *ingeniousness*. Ideas that incorporated all three of these components received much higher scores than ideas that only incorporated one or two components.

### Results

**Does Encouraging Movement during an AUT Increase Originality?** A 2 (Time: Time 1/Baseline and Time 2/Movement Manipulation) x 3 (Movement Manipulation Type: Restricted, Meaningless, and Meaningful) mixed ANOVA was conducted on subjective originality score. We originally hypothesized an interaction between time and movement manipulation, specifically that growth or decline from time 1 to time 2 would depend on the specific movement manipulation at time 2. Results did not support this hypothesis,  $F(2,148)=2.34, p=.10, \eta p^2=.03$ . Given that we did not find the predicted interaction we looked at main effects. Results indicated that individuals did not significantly increase from time 1 (baseline) to time 2 (movement manipulation),  $F(1,148)=3.09, p=.08$ , and  $\eta p^2=.02$ , although there was a trend for individuals to increase in originality from time 1 ( $M=2.23, SE=.05$ ) to time 2 ( $M=2.3, SE=.05$ ). Results also indicated that individuals significantly differed by group,  $F(2,148)=3.03, p=.05, \eta p^2=.04$ , see Figure 1. Follow up post hoc comparisons using Fisher’s LSD were conducted to examine possible group differences. Results indicated that there was a significant mean difference of .22,  $SE=.11, p=.05$  between the meaningful and meaningless movement groups across both time 1 and time 2. There was also a significant mean difference of .25,  $SE=.11, p=.03$  between

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

the meaningless and restricted groups across both time 1 and time 2. There was no significant difference between the meaningful movement and restricted movement group, mean difference = .03,  $SE = .11$ , and  $p = .95$ <sup>1</sup>.

### **Discussion**

The purpose of this study was to determine whether movement had a significant effect on the generation of original thoughts. I hypothesized that meaningful movement (i.e., encouraged gesture) would increase original thoughts relative to the baseline because participants were encouraged to supplement their thoughts with action. In addition, I hypothesized that meaningless movement would decrease original thoughts relative to the baseline because the movements were unrelated to the task and were interrupting the participants' thought processes. Finally, I hypothesized that restricted movement would decrease original thoughts relative to the baseline because participants would not benefit from gestures and may be too preoccupied with keeping still. Results suggested that meaningful movement actually did not significantly improve originality performance, and meaningless movement had the lowest original responses when scores were averaged across time 1 and time 2, which suggests that not all movement is beneficial to originality performance. Overall, each participant marginally increased their original responses when movement conditions were added. Thus, each participant improved independently of group selection. When groups were analyzed separately across time 1 and time 2, the meaningless movement groups were worse than the meaningful and restricted groups in both time 1 and time 2.

### **Meaningful Movement**

---

<sup>1</sup> When post hoc tests were conducted with the more conservative Tukey's HSD test, there was only a marginally significant difference between meaningless and restricted movement groups,  $p = .065$ .

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

I originally hypothesized that participants who received meaningful movement instructions would improve significantly from the baseline than participants in the meaningless or restricted groups. However, encouraged gesturing did not lead to improved originality performance. This finding was surprising, as previous research from Kirk and Lewis (2017) found that children significantly produced more creative responses when encouraged to gesture. It is possible that I may have found a different pattern of results in the present study because the movement encouraged in the study may not have actually been considered “meaningful” movement. For instance, participants may have gestured freely (e.g., a participant may have responded that a significant use for a pencil would be to use it as a slingshot; but, instead of pulling his hands back in a slingshot motion, he only freely moved his hands about) instead of coordinating their gesture with their response. Another possible reason for the different pattern of results would be due to the differences in ages. The study done by Kirk and Lewis (2017) was conducted in children, whereas the present study was conducted in young adults. Adults may have benefited less from this manipulation because of its instructive nature. Children may be more intrigued with the study’s interactive tasks and its focus on careful, redundant instruction. To make the task more relative for adults, it may be useful to reduce some of the redundancy present in the AUT trials to increase the participants’ interest levels. It also may be helpful for future work to code the gestures in the meaningful and baseline movement groups to improve the accuracy of the link between gesturing and originality.

### **Meaningless Movement**

I did, however, partially confirm my original hypothesis that meaningless movement may negatively impact AUT performance. More specifically, when participants moved their hands in a clockwise direction, originality performance was lower as compared to the meaningful and

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

restricted movement conditions. However, it is important to note that this was a main effect averaged across time 1/baseline and time 2/movement manipulation, which means that meaningless movement participants did worse at both time points compared to the meaningful movement and restricted movement conditions. It is possible that this suggests meaningless movement unrelated to the participant's thought process may relate to a decrease in performance. However, it is also likely that meaningless movement did not significantly harm originality responses. The meaningless movement group was lower both at time 1/baseline and time 2/movement manipulation, which may suggest that the individuals assigned to this group were just lower in originality in general (despite randomization) because their baseline scores were lower overall. This addition of meaningless movement does provide a novel finding because Kirk and Lewis (2017) only studied children's responses to restricted and meaningful testing conditions. However, future research should focus on not all types of movement, but what the content of the movement is and its relation to thought.

### **Restricted Movement**

Finally, for the restricted movement group, contrary to my hypothesis, originality performance did not significantly decrease from baseline when participants' movement was restricted. I did not expect to find this result because I assumed that participants would be more preoccupied with being asked to keep their hands flat on the table for the entirety of the AUT, which would significantly impact their ability to produce original responses. I also did not expect to find this hypothesis because the restricted condition did not allow gesturing to supplement the participants' thoughts. Previous research from Kirk and Lewis (2017) found that children who were in a restricted testing condition produced less responses than children who were in a gesturing group. To investigate this conclusion further, future studies should study multiple

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

restrictive movement conditions to establish conclusive evidence on whether restricted movement impacts the originality responses or just the amount of responses generated.

### **Conclusion**

In sum, results from the present study were mixed. Although performance showed a trend to increase from baseline when a movement manipulation was encouraged, this increase was not different based on the type of movement encouraged. Thus, meaningful movement did not seem to have a significant impact on the performance of originality scores relative to the other conditions. While adults in the meaningless movement condition performed lower than other groups, their baseline AUT scores were also lower suggesting that this group may have just had lower originality performance to begin with. This research suggests that movement manipulation may affect an individual's aptitude for original ideas, but more work is needed to fully understand how different movements may differentially affect performance.

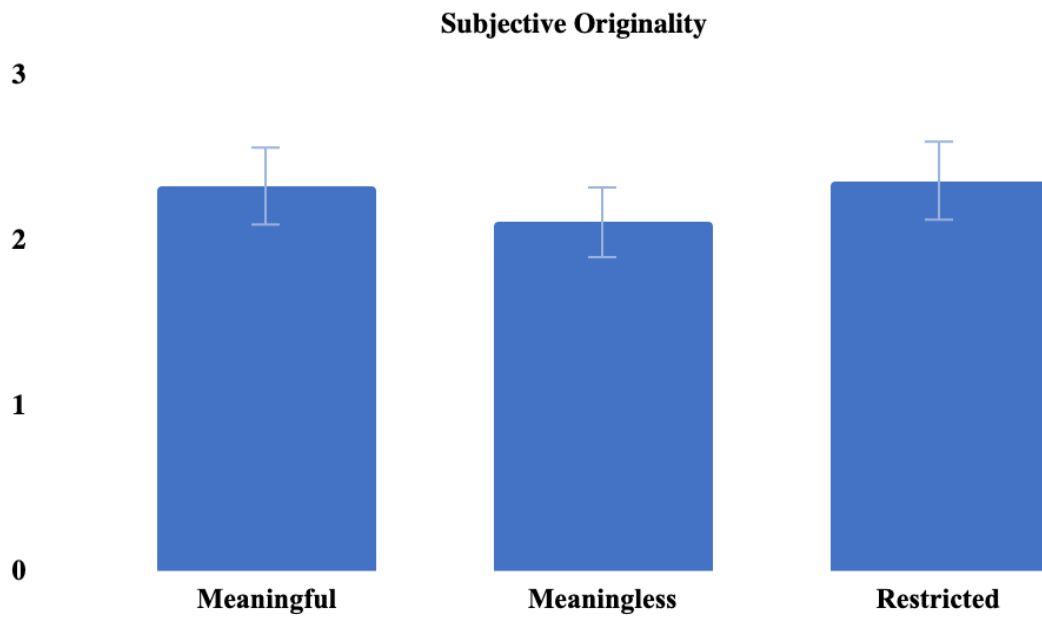
REFERENCES

- Broaders, S. C., Cook, S. W., Mitchell, Z., & Goldin-Meadow, S. (2007). Making children gesture brings out implicit knowledge and leads to learning. *Journal of Experimental Psychology: General*, 136(4), 539-550.
- Cook, S.W., Mitchell, Z., & Goldin-Meadow, S. (2008). Gesturing makes learning last. *Cognition*, 106(2), 1047-1058. <https://doi.org/10.1016/j.cognition.2007.04.010> harrington
- Harrington, D. M. (1975). Effects of Explicit Instructions to “be creative” on the Psychological Meaning of Divergent Thinking Test Scores 1. *Journal of Personality*, 43(3), 434-454.
- Hostetter, A. B., & Alibali, M. W. (2008). Visible Embodiment: Gestures as Simulated Action. *Psychonomic Bulletin & Review*, 15(3), 495-514.
- Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology*, 52(6), 1122–1131.
- Kirk E, & Lewis, C. (2017). Gesture facilitates children’s creative thinking. *Psychological Science*, 28(2):225-232. <https://doi.org/10.1177/0956797616679183>
- Reiter-Palmon, R., Forthmann, B., & Barbot, B (2019). Scoring divergent thinking tests: A review and systematic framework. *Psychology of Aesthetics, Creativity, and the Arts*, 13(2), 144-152.
- Runco, M. & Charles, Robyn (1993). “Judgments of Originality and Appropriateness as Predictors of Creativity. 537-546.
- Runco, M. & Jaeger, G (2012). “The Standard Definition of Creativity.” *Creativity Research Journal*, 24, 92-96.
- Silvia, P. J. (2011). Subjective scoring of divergent thinking: Examining the reliability of unusual uses, instances, and consequences tasks. *Thinking Skills and Creativity*, 6(1), 24-30.

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING

- Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., ... & Richard, C. A. (2008). Assessing Creativity with Divergent Thinking Tasks: Exploring the Reliability and Validity of New Subjective Scoring Methods. *Psychology of Aesthetics, Creativity, and the Arts*, 2(2), 68.
- Silvia, P., Roger, B., Nusbaum, E (2013). "Verbal Fluency and Creativity: General and Specific Contributions of Broad Retrieval Ability (GR) factors to Divergent Thinking." 328-340.
- Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review*, 9(4), 625-636. <https://doi.org/10.3758/BF03196322>
- Zachopoulou, E., Makri, A., & Pollatou E. (2009). Evaluation of Children's Creativity: Psychometric Properties of Torrance's 'Thinking Creatively in Action and Movement' Test, *Early Child Development and Care*, 179:3, 317-328.

## MOVEMENT AND ORIGINALITY IN DIVERGENT THINKING



*Figure 1.* Measure of Subjective Originality between Movement Manipulation Groups