Flow and Creativity

Flow Research Collective

ABSTRACT
Creativity is arguably one of the most important 21st century tools and, similar to flow states, it involves a state of consciousness rather than a discrete set of skills. There are massive opportunities to promote creativity in education, the workplace, and beyond. While it’s generally accepted that creative moments show up in flow, little work has been done to differentiate how creative flow differs from other forms of flow. For instance, to what degree do clear goals and a sense of control differ in open-ended creative experiences when compared with flow experienced in more structured environments (e.g. athletic competitions)? To answer these questions, a survey was distributed across various mailing lists. Participants (n = 613) were randomly assigned to one of two versions. One version primed participants to recall a creative experience when they were in flow and the other primed them to think of an experience when they were not in flow, but also not too cognitively stuck. Results showed a strong positive correlation (P < .001) between flow scores and self-reported creativity. A fine-grained analysis of the characteristics of flow revealed that concentration, the challenge/skills balance, and immediate feedback are highly correlated to flow. Interestingly, clear goals, sense of control, and loss of self-consciousness were not correlated to self-reported creativity, indicating key characteristics of creative flow.

STUDY DESIGN
1. Survey distributed to members of various flow mailing lists
2. Participants were randomized between two versions:
   ○ One included a passage priming participants to think of a creative experience while in flow
   ○ The other used a passage priming participants to think of an experience when they were not in flow but also not too stuck
3. Questions combined Susan Jackson's Flow Short Scale (FSS) with both quantitative and open response questions regarding creativity
4. Regression analysis was performed looking at the relationship between FSS response and self-reported creative moments
5. Natural language in open responses were analyzed

DEFINING CREATIVITY
• Creativity is defined as a recombinatory process where novel information is combined with older ideas to produce something new and useful
• It is subdivided into four dimensions: product (what is produced), process (the creative methodology), personality (the creative personality traits), and press (the environmental conditions)

KEY FINDINGS
• 2159 surveys were started, 613 were completed (358 male, 238 female), and 13 responses were excluded.
• FSS responses for different versions of the survey confirmed the priming was effective. Participants were also more likely to fill out the flow version of the survey:
   ○ Flow priming had a mean of 4.4 and SD 0.4
   ○ Out of flow priming had a mean of 2.9 and SD 0.9
• Creativity scores for those primed to recall a flow experience were 40% higher (mean of 4.2 versus 3.0)
• Regression analysis compared FSS responses to the question “Compared to past experiences, please rate this specific experience on a scale of 1-5 from ‘My Least Creative’ to ‘My Most Creative’”:
   ○ Autotelic experience, challenge/skill balance, transformation of time, and unambiguous feedback all showed strong statistical significance at p ≤ .001
   ○ High concentration and action/awareness merging also showed statistical significance at p ≤ .05
   ○ Interestingly, sense of control, loss of self-consciousness, and action-awareness merging were not statistically significant
• Participants primarily apply their creativity in knowledge work and scholarly activities
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DEMOGRAPHICS

BEHAVIORAL
Regression analysis on flow scores versus self-reported level of creativity relative to other creative experiences

Note: P Values below .05 represent statistical significance and positive coefficients represent a positive correlation

| Coef | P>|t| |
|------|------|
| Intercept | 0.977 | 0.000 |
| I felt I was competent enough to meet the demands of the situation | 0.0797 | 0.061 |
| I did things spontaneously and automatically without having to think | 0.0892 | 0.015 |
| I had a strong sense of what I wanted to do | 0.0244 | 0.495 |
| I had a good idea about how well I was doing while involved in the task/activity | 0.0348 | 0.271 |
| I was completely focused on the task at hand | 0.0852 | 0.034 |
| I had a feeling of total control over what I was doing | 0.0085 | 0.799 |
| I was not worried about what others may have been thinking of me | 0.013 | 0.628 |
| The way time passed seemed to be different from normal | 0.128 | 0.000 |
| I found the experience extremely rewarding | 0.2407 | 0.000 |

**ADDITIONAL FINDINGS**

- Little meaningful information was found in the freeform responses. Other research has used a word counts and other metrics for quantifying creativity of responses. In our study, it was decided to focus the data analysis on the quantitative component data collected. Future studies could consider metrics like these as a proxy for creativity, importance of the experience, etc.

- While questions around various dimensions of creativity were posed, the analysis revealed that the phrasing of the questions, the awareness of participants, or some combination of the two created some limitations on the insights from the data. For instance, questions were asked on the various dimensions of creativity including "[...] I would rate my ability to use seemingly unrelated information in the task at hand as." While this addresses an aspect of creativity, this language was likely incongruent with the participants experience and questions the value of self-reporting when it comes to the often ineffable process of creativity.
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ADDITIONAL RESEARCH CONTEXT

The relevance of creativity in a wide variety of applications is difficult to overstate as it likely represents one of the most important 21st century skills. It’s of central importance to innovating new ideas in the face of global challenges, adapting to an increasingly competitive job and business landscape, enhancing education and human intelligence, and to general life satisfaction. In addition to the cultural relevance explored by authors such as Csikszentmihalyi, Kotler, and Pink, the evolutionary dimension of creativity has been extensively explored by Simonton and others. Finally, much work has been done on characterizing and assessing creativity in the field of psychology and exploring the underlying neurobiology in the field of neuroscience.

The generally accepted definition of creativity focuses on the process of creating something that is both new and useful. Further refinements from researchers such as Sternberg have differentiated what is produced in the creative act from the creative process, personality factors, and environmental conditions. The creative process itself is delineated by Mumford into the construction of a problem, information encoding/gathering, category/concept selection, category combination, and idea evaluation. Much of the research in creativity by Cropley and others has focused on its quantification through various experimental practices such as creative use generation tasks and the 9 dot problem.

More recent research has focused on neural activity associated with creative acts including transient hypofrontality, neural efficiency, and a specific interaction pattern of the default mode network (likely for idea generation) and executive control network (likely for idea validation) as the neural correlates of creativity. This work has been carried out by Limb, Chrysikou, Kaufman, Newberg, and others.

As many of these same neural phenomena are observed in individuals in flow, further research is necessary to compare and contrast creative flow with other flow modalities. In addition to this neural phenomena, the autotelic allure of creative acts, loss of self-consciousness, total absorption, and other characteristics of flow also clearly relate to creative experiences as well. The specifics of these dimensions demand additional research.

INTERPRETATION

- The primary take-away from this study is how the 9 main characteristics of flow differ in creative experiences, leading to a better understanding of divergent versus convergent flow tasks.
- Interestingly, loss of self-consciousness was not a significant component of participant’s creative experiences. This could have to do with default mode activity, which has been correlated to both rumination as well as creativity. While default mode activity decreases in meditation—which shares many similarities to flow—creative flow could possibly involve more default mode activity than convergent flow. It has already been shown in Charles Limb’s work that free-floating attention in improvisation appears to allow for the associations necessary in improvisational states. If creative flow does not actually entail more default mode activity, at the very least it represents more defocused attention than in highly convergent tasks.

NEXT STEPS

- Given the overlap between creativity and flow, much work can be done on the effects of mindsets, habits, environment, personality traits, and other aspects that influence creativity. Assuming that states such as creativity and flow are trainable, there are many opportunities to develop various tools around these ideas aimed at increasing creativity.
- Since this study maps correlations between flow and creativity, the next step would be to determine a causal relationship:
  - Does fostering flow in a controlled context result in additional flow?
  - Do individuals with a high flow lifestyle generally have more creativity in their lives?
  - Do flow activities (e.g. exercise-induced transient hypofrontality in distance running) result in an afterglow effect that improve creativity in the hours afterwards?
- This final point is much more theoretical. One additional interesting avenue of inquiry pertains to the relationship between creative insights and memory consolidation. Specifically, the process of memory has been shown to re-encode memories upon their recollection, making remembering an active recreation of past events rather than the simple retrieval of fixed information. Could the creative insight of flow states be attributed to a similar process in the prefrontal cortex? In other words and given the transient hypofrontality hypothesis of flow states, could the prefrontal cortex becoming more active following a flow experience be responsible for creating novel connections between ideas similar to how re-accessing memories alter the memories themselves?
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**SELECTED SOURCES**

*Seminal Books on Creativity*


*Papers on the neuroscience and quantifying of creativity*


*Measurement tool used*