

# The Scientific Study of Creativity in Artists

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## ABSTRACT

This paper serves as a summary of a review of literature related to the study of creativity in artists and offers some ideas for further areas of research.

## Author Keywords

Creativity, Creative Cognition, Art

## INTRODUCTION

Much exploration has been done on the topic of creativity from a psychological point of view in past decades. Theories of creativity have been developed in order to aid in the understanding of creativity within the body of scientific knowledge, to facilitate the teaching of creativity in an educational setting and to cultivate creative thinking within organizations. This includes, among other things, the study of design process in architecture, industrial design and computer science. The study of creativity is also approached by philosophers and artists but with somewhat different goals and methods.

With a personal interest in artistic creativity, I became curious about creativity as relates to the process of art making, by artists. Can artistic creativity be understood using scientific methodology? Is artistic creativity different than other types of creativity?

I was struck by the similarities between the description of seeing and assessing in design as described by Schon and Wiggins (1992) and my own artistic process of painting, including incremental evaluation, application of visual judgment, and making corrections based upon predeceasing criteria, or assessing that a new direction and new goals should be pursued.<sup>1</sup> This lead me to formulate some questions as a framework for investigation on the topic of the scientific inquiry of creativity in artists.

*What are the cognitive processes in an artist's creative process?*

*How do artists arrive at constraints they place on the creative process?*

*How do artists express the rules they use to assess?*

*How do artists use visual judgment of incremental results with creative goals?*

*How do artists know when they're done?*

## SOME FUNDAMENTALS OF CREATIVE COGNITION

To explore these questions required a survey of creativity research in general and research conducted on artists and art-making specifically. The cognitive processes of creativity and methods for study and measurement of creativity were surveyed as well as theories of creativity from the perspectives of psychology and of the philosophy of aesthetics. Following that, I revisited the initial questions and, of course, devised some new ones. To create a baseline of understanding of the issues of creativity as studied in art-making, the following topics were surveyed:

- Definitions of Creativity
- Theories of Creativity
- Creativity and Personality
- Methods of Study and Measurement
- Teaching Creativity

## Defining Creativity

Creativity defies simple explanation, but in order for it to be studied or understood in any sense, scientific, aesthetic or practical, a working definition must be defined.

A definition from a dictionary of psychology goes as follows: "Creativity: a term used in the technical literature in basically the same way as in the popular, namely, to refer to mental processes that lead to solutions, ideas, conceptualizations, artistic forms, theories or products that are unique and novel."<sup>2</sup>

Repucci (1960) has organized over sixty definitions of creative problem-solving into six different classifications: Perception, Innovation, Aesthetic, Psychoanalytic, Solution Thinking, and Varia.<sup>3</sup>

Proponents of scientific creativity as an independent form of study believe it to be different from other types of creativity because creativity and innovation in the scientific realm rests upon a significant body of predeceasing technical knowledge.<sup>4</sup>

The characteristics and process of artistic creativity are investigated from a philosophical point of view in a reverent piece by John Hospers (1985).

- Creativity is an act of making, though the art product may or may not be tangible.

- The act of creation utilizes pre-existing materials; the creative act is in the arrangement of those materials, not in bringing them into existence.
- To qualify as creative, the result of a creative process must be considered original, novel or unique, but also worthwhile.

The definition of creativity remains problematic. While definitions often include the words “innovative,” “original,” or “unique,” there are exceptions. The criteria applied to a creative process may be different than those used to judge a creative product. At best, we can create context-specific definitions rather than a single, global definition.

### Theories of Creativity

Research in the cognitive processes have given rise to theories that can be useful in terms of enhancing creativity, either in an educational setting, a research setting or within an organization. For instance, describing the Investment Theory of Creativity, Sternberg (2006) quantifies the elements of creativity in terms of “a confluence of six distinct but interrelated resources: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment.”<sup>5</sup>

Sternberg has put forth several other theories for understanding creativity including Propulsion Theory, Confluence Approach and WICS Approach (Wisdom, Intelligence and Creativity Synthesized).<sup>6</sup>

Research in terms of thinking styles involved in creativity have led to development of models such as Abductive Reasoning, Divergent Thinking, Convergent Thinking, Legislative Thinking Style, Visual Thinking, and Implicit Theories of Creativity<sup>7</sup>

According to Hospers (1985), the artist may be propelled through the creative act, or they may proactively engage in the creative act until their initial concept is realized.<sup>8</sup> Hospers also investigates the germ of creativity – why artists create, where the impulse to create comes from.

In an overview of philosophic theories of the nature of creativity, Hospers contradicts all of them as inadequate as a unifying theory. A purely psychological view, such as identifying the correlation between manic-depressive disorder and artistic expression, does not explain why some works are of enduring value. Theories of determinism in artistic work, are inadequate to capture the cause of creativity, instead Hospers holds to the idea that there is an element of inexplicability to art creation. The idea that creativity is an act of emotional expression confuses the fact that artists feel emotions during the act of creation, and may feel a sense of release at the fruition of the process, but those feelings are understood to accompany the process, not explain it.

Finally, Hospers explores creation as problem-solving, but rejects it as an explanation for the origins of creativity,

citing creative geniuses for whom “inspiration” appears to come upon them without plan and from an unknown source. Judgement, he says, is called into play not at the origin or inspiration of the creative act, but during the execution or exploration of it.

It is interesting to explore art theory of creativity as it addresses the core causes or motives of creativity. Further understanding where creativity comes from may help us refine models for the processes of creativity. Development of the models of creativity by Sternberg and others is instrumental in the development of formulas for creative processes. While some of these models may prove less valuable than others, an area of further inquiry might involve determining how these models might be applied to the act of art-making. While artists do not want to be told what to create, or how to create it, if creativity is approached as a skill to hone, rather than dictates to follow, some interesting results may arise.

### Creativity and Personality

The study of creativity and personality has found some correlations between some personality types as defined in the Myers-Briggs Personality Indicator and high creativity scores as measured in Torrance tests. Artists personalities are found to be characterized as

- intuitive,
- perceiving,
- introverted,
- lacking conformity,
- seeking/expressing meaning,
- change-seeking,
- seeking hidden patterns,
- openness,
- idea oriented,
- liking ambiguity,
- curious, and
- preferring to view goals as hierarchies.<sup>9</sup>

Interestingly, the embodiment of these characteristics inherently resists easy quantification or application of a formulaic approach, the kind of approaches that are so easily supported by systems. Can systems be developed that support these characteristics of creative thought? Systems that support the creative act may be more successful with an understanding of these characteristics of creative thinkers.

### Methods of Study & Measurement

The scientific study of creativity has largely taken place in terms of psychometric measurement, using Torrance Tests for Creativity, Myers-Briggs for Personality Types, and Intelligence tests. Additional study has taken place by conducting case studies of individual artists or longitudinal

studies of groups of artists using interviews, observation, and analysis of works both during and after the completion of a creative exercise.

Given that the scientific method of inquiry may alter the creative act, it is highly problematic to study the act of art-making itself. Even asking an artist to talk out loud during the act of creation will alter the cognitive processes and therefore alter the process and the product. Where creative design is clearly an act of problem-solving, this is not so much of a concern, as the mind is already in a rational state of deduction and problem solving.

### **Teaching Creativity**

Much of the study of creativity has been done with the objective of learning how to encourage or teach creativity within the educational process and how to predict creativity. By understanding the processes of creativity and environments that support it, it is thought that creativity can be fostered.

In his work “Art Practice as Research”, Graeme Sullivan poses a method by which art can be understood and explored through practice. Posing an alternative to the standard art teacher as played within academia, he calls for art practitioners to consider themselves researchers in the studio setting, and include students in the exploration.<sup>10</sup>

### **Philosophy of Creativity: What We Can and Can Not Understand about Creativity in Artists through Scientific Method**

Creativity is prized by artists as being both precious and somewhat mysterious. Some feel that artistic creativity should not be examined too closely lest it be demystified, or, more likely, lest it be mistaken for what science *can* define. Artists are cited as seeking creative freedom, even as they work within self-imposed constraints.<sup>11</sup> Development of a scientifically based formula for creativity could be seen as threatening to creative freedom.

In “The Investigation of Creativity,” Gordon Westland (1969) responds to the resistance some artists and philosophers feel toward the scientific study of creativity, referencing “those who pour scorn on the very idea of applying scientific method to the study of aesthetics and creativity.” Westland clearly differentiates the philosophical study of aesthetics from the scientific study of creativity by pointing out that “the psychologist himself is not... concerned with the making of judgments. His concern is with such things as how other people arrive at judgments, not with whether judgments are “right” or “wrong.” By the same token, his object is, broadly, to investigate how human beings create, not to decide what constitutes creativity.”<sup>12</sup>

On the other hand, developing a philosophical theory of the nature of creativity such as “a theory which attempted to explain the response to a creative work of art”, “would not be verifiable or falsifiable by empirical evidence”<sup>13</sup> and therefore lies outside the realm of scientific inquiry.

Interestingly, in decades following Westland’s essay, the subject of art as experience, i.e. the cognitive processes of viewing and experiencing art, have received some attention in scientific inquiry.

### **ON THE QUESTIONS OF CREATIVITY**

#### ***What are the cognitive processes in an artist’s creative process?***

The study of cognitive processes in artists proves to be problematic, and has not been studied extensively. One exception is an observational case study by Yokochi and Okada (2005) in which they observed an experienced traditional Chinese landscape painter during the course of art-making. In this study they explored image generation over time, constraints and exploration, and the role of body movement during the artist’s activity. The artist, Huot, was found to create his traditional works starting with specific areas (locally) and working outward (globally). More spontaneous works, starting with lines drawn by others, were judged to be more lively, though did not necessarily represent better compositions.<sup>14</sup>

Thinking styles of artists were explored by Gridley (2006). In this study, Gridley provided a survey of recent work comparing intelligence, personality and creativity factors. Artists, he found, were consistently identified as open, lacking conformity, perceiving rather than judging, preferring change, curious, enjoying inventing and developing new ideas and preferring to view goals as hierarchies when solving problems.<sup>15</sup>

In a longitudinal study of decision-making in art by Israeli (1981), 32 artists were studied through personal observation, interviews and analysis of sketchbooks and subsequent gallery and museum exhibitions. Each artist described their process as an exploration of sorts, though the specific areas of exploration were different.

“Although some of the artists studied preferred spontaneity over preparation, most engaged in some form of concrete exploratory operations and decision-making prior to beginning new works, and such decisions made in the course of sketching or even in embryonic states of the works themselves, provided the structural bases upon which later decisions of refinement could be made.”<sup>16</sup>

In a longitudinal study published in 1976 by Getzels and Csikszentmihalyi several relevant topics were studied including prediction of creativity, problem-finding, problem solving and the creative process and what qualities lead to becoming an artist. One key finding posits a relationship between problem finding and success, “despite personal and social obstacles, young artists whose cognitive approach emphasizes problem finding over problem solving are more successful in their creative careers.”<sup>17</sup> Further study of this work, found late in the process is in order.

The act of creativity in design is frequently characterized as problem-solving. Creativity in artists however does not

always involve problem-solving, it also appears to involve impulse, emotion, the ability to be “open” to inspiration, and a healthy dose of the inexplicable. To what extent is the assignment of the “unknown” to the process necessary for the germination of new ideas? Can systems designed to support creativity, innovation, design or problem-finding be done so in a way that doesn’t reduce the creative act to a formula?

### ***How do artists express the rules they use to assess?***

The process of art making can be understood as artists conducting experiments and explorations with various forms. Artists are often able to describe the areas they are investigating, and use artistic terms such as form, abstraction, color, and composition.<sup>18</sup>

In Israeli’s study, artists described their pursuits in terms of form, structure, color, composition, imagery, shape, figure, materials, edge, theory, concept, subject matter, history, both personal and cultural, politics and technique. Many artists were quoted applying specific judgments to their works in progress, sometimes relative to original intentions, sometimes in terms of aesthetic criteria such as color, composition or form, and sometimes in broader terms of “good” and “bad” or whether something was “working” or not.<sup>19</sup>

The role of intention in art making is somewhat ambiguous, with some artists executing a finished piece based upon a carefully constructed design, some artists conducting free form exploration of various media, applying meaning and interpretation after the fact, and some artists using a combination of both methods.

Says traditional Chinese landscape painter Robert Huot, “It takes time before you understand what you do.”<sup>20</sup>

In this fictional account of a painter’s process in the film “Blow Up”, Michelangelo Antonioni may be describing his own creative method in film-making. “They don’t mean anything when I do them. Just a mess. Afterwards I find something to hang onto... then it sorts itself out and adds up.”

### ***How do artists arrive at constraints they place on the creative process?***

With humans developing art forms over millennia, art making has not always been the individual pursuit we understand it to be today. Image making in the form of cave paintings from 15,000 B.C. can still be enjoyed for their aesthetic value and are thought to have been created for spiritual or practical purposes.

Early Western Medieval religious art was created largely anonymously for the purpose of representing concepts within the Judeo-Christian mythos. Cultural conventions and biases formed the artist’s styles, often with artists referring solely upon predeceasing similar art works as definition of the form and subject.

With modern art, artists are liberated to create art purely for the sake of aesthetics. Modern artists can devise constraints from anything, though many choose to work within current trends and styles of art making.

Through recent centuries, artists have expressed the goals for their creative pursuits and theories about art and aesthetics in letters and essays, so it is possible to explore historical, self-reported goals by artists.<sup>21</sup> More recently, as scientific method is applied to the study of creativity in artists, case studies including observation, interviews and analysis have been employed.<sup>22</sup>

Problems of art are studied by artists through art making, and by philosophers and art critics through the study of aesthetics and art theory. Problems of the psychological aspects of creativity are studied in the 21st century by scientists seeking to understand not what the criteria and constraints are used in art making, but how those criteria are arrived at, and what mental processes are used in application of those criteria.

So, the question as originally posed is more an issue of aesthetics, art theory and art practice. The question may be reframed and understood in terms of scientific study if stated thusly: *What are the characteristics of problem-finding in art? How do artists apply their constraints in decision-making?*

### **On the Topic of Decision-making in Art**

To help frame the analysis of decision-making in painting and sculpture, Israeli references Max Wertheimer’s types of productive thinking. “Decision-making in painting and sculpture can be analyzed according to these five types, levels or aspects of creative activity.”<sup>23</sup>

- Application of basic concepts of gestalt theory
- Association theory, conditioning and reinforcement
- Blind trial and error, and randomness
- Emotion, drive, and psychoanalytic aspects
- Social and cultural aspects<sup>24</sup>

An artists’ previous works are also cited as a source of constraints. Having developed constraints, artists may choose to explore these constraints within one work, or over a series of works. “When a painter’s work falls into sequential patterns, be it for a certain sequence of paintings or for the span of an entire career, most (fundamental) decisions have already been hammered out, making it unnecessary to repeat them in the course of going from one painting to another...However, with a change in trend or movement reference, identification or participation, there are bound to be decision changes pertaining to values, aims, methods, techniques and task operations.”<sup>25</sup>

Another reason why prior works may influence future art products is that in order to be successful, artists are encouraged to develop a cohesive, consistent body of work

so that they can establish a reputation with gallery owners and collectors.

### **ADDITIONAL AREAS OF EXPLORATION**

The act of creativity in design is frequently characterized as problem-solving. Creativity in artists however does not always involve problem-solving, it also appears to involve impulse, emotion, the ability to be “open” to inspiration, and a healthy dose of the inexplicable. To what extent is the assignment of the “unknown” to the process necessary for the germination of new ideas? Can systems designed to support creativity, innovation, design or problem-finding be done so in a way that doesn’t reduce the creative act to a formula?

The areas of problem-finding and of judgement in art appear to be ripe for further exploration, with possible application in the understanding of creative cognition and computer augmented design.

At the beginning of this project, I had envisioned creating an online social network in which artists actively creating works of art could post pictures of their work at increments, and create accompanying text entries in which they answer questions about their decisions, judgements, progress, and criteria. This online atelier or creative salon would augment the process of communication about one’s work, and open one’s process up to comments. It would also introduce a factor of discipline and analysis to the process that only a subset of artists would be willing to do, or find valuable.

The posts could be viewed by other artists and by the researcher, and commented upon by other participating artists. From a research point of view, the entries could be quantified, and an element of judgment would have to be introduced. One of the problems with judgment and assessment of creative works in the study of creativity is that it has been largely conducted by novices. Despite good interrater reliability, the relevance and value of creative judgments of works of art made by those outside of the realm of art and aesthetics seems debatable. In the proposed system, the creativity, or relative success of the work would be judged by other, participating artists and this seems to lend credibility to the potential findings.

One of the purposes of conducting a general survey of the study of creativity in artists was to help establish a credible rationale for how a project like this could further the study of creativity. If viewed as a method for studying problem-finding, decision-making and judgment in art making, then I believe the rational exists. To the extent that a new body of data about artistic creativity may help other areas of creative study, all the better. Perhaps, too, the role of the unknown in creativity may be better understood if studied in a realm that appears free of the scientifically motivated desire to quantify everything.

Additionally, I believe that a social network such as this could very well be a valuable educational tool for artists

who wish to understand their own processes more. It is also an opportunity to introduce some findings in creative cognition to practicing artists.

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