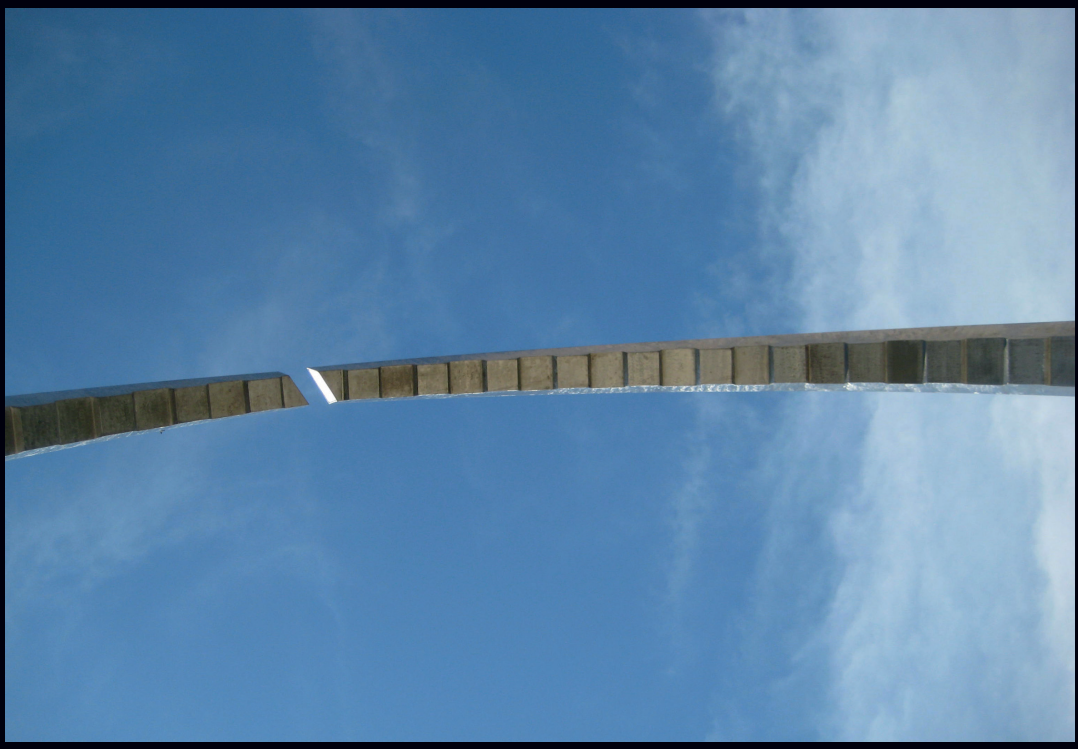
Peter Lang



natur, wissenschaft und die künste  nature, science et les arts  nature, science and the arts

Sixto Castro & Alfredo Marcos (eds.)

# The Paths of Creation

## Creativity in Science and Art

**The Paths of Creation** explores the idea of creativity both in science and in art. The editors have collected papers from different philosophers working on philosophy of science and aesthetics to show that the creative processes of science and art share identical procedures: metaphor, ruled method, analogy, abduction, similarity. They are both surrounded by emotions, contain inspirations, proceed through revolutions that maintain some kind of continuity, and have a long common history in which no one worried about whether something was science or art. The purpose of this volume is to show that there are no different rationalities applied to science and art, but the same human reason developing in different forms to create not just different disciplines, but different worlds as well.

**Sixto Castro** is Professor of Aesthetics at the University of Valladolid, Spain. He works mainly on Philosophy of Art and Philosophy of Religion.

**Alfredo Marcos** is full Professor of Philosophy of Science at the University of Valladolid, Spain. He works mainly on general Philosophy of Science, of Biology and of Information and Aristotelian Studies.

# The Paths of Creation

natur, wissenschaft und die künste
nature, science et les arts
nature, science and the arts

Volume 9



PETER LANG
Bern · Berlin · Bruxelles · Frankfurt am Main · New York · Oxford · Wien

Sixto Castro & Alfredo Marcos (eds.)

# The Paths of Creation

## Creativity in Science and Art

PETER LANG
Bern · Berlin · Bruxelles · Frankfurt am Main · New York · Oxford · Wien

**Bibliographic information published by die Deutsche Nationalbibliothek**
Die Deutsche Nationalbibliothek lists this publication in the Deutsche National-bibliografie; detailed bibliographic data is available on the Internet at ‹http://dnb.d-nb.de›.

British Library Cataloguing-in-Publication Data: A catalogue record for this book is available from The British Library, Great Britain

Library of Congress Cataloging-in-Publication Data

The paths of creation : creativity in science and art / Sixto Castro & Alfredo Marcos (eds.).
p. cm. -- (Natur, Wissenschaft und die Künste = Nature, science et les arts nature = Science and the arts ; v. 9)
Includes bibliographical references.
ISBN 978-3-03-430511-2
1. Creative ability. 2. Creative thinking. 3. Art and science. 4. Science--Philosophy. 5. Aesthetics. 6. Art--Philosophy. I. Castro, Sixto J. (Sixto José) II. Marcos, Alfredo.
B105.C74P38 2011
153.3'5--dc23

2011041139

Cover design: Thomas Jaberg, Peter Lang AG

ISBN 978-3-0343-0511-2 E-ISBN 978-3-0351-0307-6


Hochfeldstrasse 32, CH-3012 Bern, Switzerland
info@peterlang.com, www.peterlang.com



Printed in Switzerland

# Table of Contents

## Part II. Thematic Spheres of Creativity



## Part III. Historical Moments of Creativity

# Acknowledgements

"Art and Science" is a research group at the University of Valladolid (Spain) with connexions with other researchers from Spain, Mexico, Brazil, USA, Argentina and France. Our group has spent years working to establish a relationship between both fields. As a result of our research, we have organized roundtables, workshops and international meetings (Valencia, 2009), and have edited a previous book entitled *Arte y ciencia: mundos convergentes* (Plaza y Valdés, 2010), which has been published simultaneously in Spain and Mexico. The present book is the result of the research activities of the group in collaboration with colleagues from other universities. We want to express our deep gratitude to all our colleagues who have contributed to this volume, as well as to Sudabee Lotfian for his invaluable help in correcting English language and to Caroline Schopfer for her careful editing job. We also thank the University of Valladolid support for the research group. And we thank as well the Regional Government of Castilla y León for financial support through the research project 18ILBM99.

# Introduction

ALFREDO MARCOS and SIXTO J. CASTRO

One of the hallmarks of modernity is the search for autonomy. Nation states emerge, independent from the papacy and the empire, and within them, the classical division of powers appears. Individual subjects are also demanding their autonomy from political power. They become autonomous citizens. This enlargement of autonomy occurred in the sphere of culture as well. Human reason, allegedly, abandoned its reliance on tradition and authority and became an autonomous entity. We can cite Thomas Aquinas as an early precedent of this process. He affirmed the autonomy of philosophy in relation to theology. Three centuries later, Galileo sought the autonomy of science and Machiavelli advocated for the autonomy of political reason. In the eighteenth century some British economists spoke in favour of the autonomy of economy and, in the nineteenth century, the banner of "art for art's sake" was held up. Many authors, such as Weber and Habermas, think that modernity is characterized precisely by the autonomy of the three major areas within the sphere of culture. Immanuel Kant was the one who established more clearly the autonomy of science, morality and art.

The goal of autonomy is fulfilled in many areas during modern times. This success was perhaps even excessive. There was in many ways too much autonomy. The different states soon lifted customs and tariffs, hampered the movement of people and the goods traffic. They engaged also into endless conflicts and wars, without any possible arbitration. Citizens ended up regretting the loneliness and isolation, the lack of communication and of solidarity, even in the midst of the urban crowd. The human subject itself was split into different social roles. A new disease – what Bertrand Russell called "the schizophrenia of modern man" – made its appearance. He was also diagnosed the malaise in the culture, to use Freud's words. The excessive separation of the two cultures, the rift between arts and sciences is seen today as an authentic cultural pathology.

Postmodern world loves autonomy, but rejects over-autonomy. Nowadays we are seeking a fair compromise. We want to preserve modern achievements in the line of autonomy, but we want to offset the excesses and to heal diseases as well. The autonomy of the states is compensated by international agencies, through alliances and treatises. For example, the process of European integration can be seen in this

light as a postmodern enterprise. The same applies to the ideas of solidarity and dependence, which have a growing presence in the social legislation of many states. In a similar way, we can think about the concept of reconciliation of work and family life. The notions of system, link, network, web, etc. are typical postmodern concepts that emphasize the need for connections, the need to compensate the excesses of autonomy. In the sphere of culture, scholars usually speak about interdisciplinary. This fact clearly highlights the need to reconnect the various fields of culture.

The relationship between art and science has to be thought within this historical horizon. There was a moment of excessive autonomy. From a positivistic mentality, it was believed that art and science were opposite. Each one was located at one of the two opposed poles of the sphere of culture. They were characterized by mutual contrast. Art is born from imagination, science from observation and calculation. Art uses metaphors, science uses the literal language. A subjective vision predominates in art, while science is always ruled by the object. Science is the paradigm of rationality, but art moves into the realm of the irrational, emotional and dreamlike. Science is about the universal, art about the individual. Science derives into technical implementation, while art is only for aesthetic enjoyment. In short: art creates, science discovers.

This simplistic view is inadequate and exaggerated. We want to balance the excesses. Art and science are, and should be, two different and autonomous entities, of course. However, between them there are multiple connections that must be recognized and studied, and even encouraged. Parallels and overlaps are very common. In architecture, design, naturalistic painting, in the documentary films, in medical imaging and in many other similar disciplines there is as much science as art, as much truth as beauty. In addition, the mediation of computational tools is nowadays the same in both fields. Science and art can help each other in many aspects. Science can learn from art and vice versa. There exist common problems. For example, the traditional problem of demarcation in science is very similar to the problem of the definition of what art is. The dynamics of scientific theories have much in common, as taught by Thomas Kuhn, with the succession of artistic styles. The identification of a stable reference throughout the history is as problematic for the word “science” as for the word “art”. In science there are as many aesthetic values at work as epistemic values in art. And in both domains we can frequently detect the presence of moral and practical values. These common grounds are nowadays so vast that they became virtually inapproachable in a single volume. Therefore, we decided to focus this book only on one of the possible common topics: creativity. Both art and science are human products. So, the kind of creativity at stake here cannot be absolute creation. Creativity in art and science is not a creation *ex nihilo*, but always from precedents.

However, this fact does not contradict the truth that through art and science real innovations come into the universe, entities that did not exist before.

Nowadays we appreciate the rational, epistemic and universal aspects of art. In the same way as we question science's rational purity, we note that in scientific activity, creativity and imagination emerge, and the presence of metaphors in scientific texts is a fact. In view of this new situation, partly produced by philosophical reflection itself, traditional divisions in philosophical analysis seem to be inappropriate. Philosophy of science and philosophy of art have also gained a common ground, they complement each other, and they have much to learn from one another. Both philosophy of science and aesthetics have much to gain from a comparative study that brings together the philosophical view on art and on science. Traditional "toolboxes", both analytical and hermeneutic, are useful to reflect on science and on art. This comparative study is the main aim of this book. Moreover, this approach will contribute to outline a common human path to creativity.

Our progress thus far has led us to be convinced of the validity of the thesis we introduce in this book: that there is a common human rationality in both scientific and artistic creative practices. That rationality is present not only in the justification of scientific theories, but also in their creation. It is not a rigid rationality, as was commonly thought some time ago, but a flexible one. In the same way, artistic creation is not born out of an irrational source; rather, this same prudential rationality is at work in it. This common human rationality, then, establishes a bridge between artistic and scientific creativity.

The book is organized in three parts. The first one explores the different procedures of creativity. We introduce here the basic problem of whether there are regular creative procedures or creativity is a human aspect impossible to reduce to rules. So, we explore the possible procedures, ranging from the supposedly most regulated ones to the most refractory to rules, that is, we move from hard to soft procedures, including methods as such, abductive reasoning, analogy, metaphor, common sense and the role of imagination and emotions.

Sixto J. Castro argues in chapter 2 that in any human practice there are rules that build it and that ultimately define it. Changing rules means changing a practice, and thus the proposal that one should not follow a rule is nothing but imposing a rule that prohibits following rules, which is a performative contradiction: excluding rules requires a rule, and it is not possible to get out of that circle, as human practices are what they are primarily not due to their origins, but they are constituted by its method. The anomic fallacy is, thus, a secularization of the Thomist idea that only he who gives the rule to himself, or rather, whose very being is rule, cannot be judged according to that rule. To develop this idea the chapter follows Wittgenstein's distinction between constitutive and regulative rules.

Rules, of course, may be integrated into a method. Sergio Menna gives us in chapter 3 a general introduction to the methods of scientific creativity, in order to show their characteristics, problems and possibilities. To this end, the author begins by presenting the main criticisms that have been directed against them throughout the history of the philosophy of science, and concludes by showing the main arguments in favour of an inferential method for scientific creativity.

Among these methods we can found ampliative inferences such as abduction. This topic is approached by Eduardo de Bustos in chapter 4. If art and science are viewed under the general prism of problem-solving theory, one can compare the functions that the ecological and cognitive constraints on the abductive inferential processes fulfil. Moreover, we can defend the cognitive continuum principle, contending that the cognitive elaborations (common, artistic, scientific…), that are considered the core of human creativity, are not the outcome of specific or particular capabilities or skills, but of general ones, manifest and conformed during the evolution, and in similar relationships with the social, cultural and historical contexts in which they appear.

Analogy counts among the ampliative inferences as well. In chapter 5 Mauricio Beuchot explores the relationships between analogy and certain ideas which have been very fruitful in the philosophy of science. These include metaphor, model, paradigm and abduction. The relationship between metaphor and scientific models has been studied, for example, by Max Black. The link between paradigm and analogy, through iconicity, has been considered by Wittgenstein and Thomas Kuhn. The connection between Charles S. Peirce's abduction and analogy is just being studied. The chapter relates all these notions, as the study of such relationships will be a very enlightening and fruitful exploration within the philosophy of science, which today makes wide use of these concepts.

Both science and arts exhibit also other creative resources far away from the pure methodological rules, such as common sense and heuristics. Ambrosio Velasco reflects on contemporary philosophy of science (Duhem, Polanyi, Popper, Kuhn) and on philosophical hermeneutics (Gadamer). In chapter 6, he argues that common sense and heuristics are two essential dimensions of science and the arts that may be useful in order to put forward a new idea of rationality that promotes a unified culture, against the predominant separation of science, arts, ethics and politics. The core of this alternative concept of rationality, common to science and the arts, is a dialectical tension between creative innovation (heuristics) and consensus (common sense) that is continuously and provisionally resolved by prudential judgment.

If one aims at studying the notion of creativity in science and art, metaphors seem another promising topic to focus on. In particular, chapter 7 deals with the nature and function of metaphors in biology. Here Xavier Donato and Alfonso Arroyo

relate the notion of metaphor to those of model and idealization. This allows them to relate metaphors to creativity in science. Their paper argues that an analysis of scientific metaphors based on the notion of idealization provides us with an explanation of the many epistemic and heuristic virtues scientific metaphors exhibit in the development of theories and in the application of models. This is exemplified with a case-study taken from the biological sciences: the case of the self-nonself in immunology.

The aim of chapter 8 is to retrieve Poincaré and Dewey's ideas on human creativity in order to emphasize their notably cogency in the current context of creativity studies. Ana Rosa Pérez Ransanz and Cristina di Gregori's text holds that Dewey's theory of experience provides an especially well suited philosophical framework to analyze the complex and multifaceted nature of human creativity. As well as allowing Poincaré's description of the creative process to be re-valued, it is consistent with numerous recent empirical studies on creative processes. Finally, they argue that the mystery that still surrounds the creativity phenomenon – especially in fine arts – arises from a poor understanding of emotions, and it vanishes when emotions' vital cognitive functions are understood.

The Second part is focused on scientific and artistic creativity, especially on particular disciplines and objects. We analyze the special characteristics of creativity in artistic and scientific disciplines such as mathematics, painting, physics and poetry. We also explore the peculiar traits of creativity in relation to some very important objects. Sometimes the outcome of our creative procedures can be nature itself. So, we can see nature, or a part of it, as created by science and art. On the other hand, similarity could be described as the most immediate product of our creative activity. As we do science or art we are really performing the creative discovery of similarities.

Every mathematical creator, according to Javier de Lorenzo, intends to produce *good* mathematics. The groundwork laid down by a mathematical creator is axiological, and within it lies the aesthetic. Hence, it becomes reasonable to ask whether it is also beautiful or ugly, elegant or tasteless mathematics. In opposition to the philosophical views of Hilbert and Bourbaki, and following the path opened by Poincaré, chapter 9 argues that there are different mathematical styles, different criteria to assess values in mathematical creations and to emphasize the historical and experiential dimensions of mathematical practices. Mathematical creativity, in its different phases or stages, is supported by three pillars: talent, hard work, and enlightenment or inspiration. Furthermore, there is a will-to-style, and also pleasure in discovering beauty and harmony.

Luciano Boi and Lorraine Verner also deal with creativity in mathematics, specifically in knot theory, and its connexion with painting. Knot theory is a beautiful theory, from the mathematical as well as from the aesthetic point of view. Its roots go

back to the ancient civilizations. During Renaissance, knots and interlaces become a model for representing the entanglement of nature and art by means of complex geometric forms. The connection between knots and nature reappeared at the end of 19th century thanks to the vortex theory. Since then, knot theory has developed in the most important branches of mathematics and physics. Around the sixties, some artists start to explore the aesthetic properties of knots and other topological objects. They create a new and interesting field of art in which nature, science, culture and human creation appear to be profoundly intertwined. Chapter 10 presents some of these developments and highlights the intimate link between mathematics and art, both viewed as forms of creation.

Alberto Rojo focuses on the relationship between creativity in both physics and poetry. If, with Wittgenstein, we believe that "the limits of my language are the limits of my world", it is through poetry and metaphor that those limits are stretched and even dissolved. Chapter 11 presents some examples where the poetic imagination anticipates and inspires scientific discoveries, initial artifices of the poetic imagination that were later anthologized into a scientific synthesis of reality. The text discuss some author's favourite examples: Dante and the curvature of space, Edgar Allan Poe and Olber's paradox, Einstein and the suspension of disbelief and Jorge Luis Borges and the idea of parallel universes.

Fernando Calderón and María Teresa Calderón, in chapter 12, invite us to see nature itself as a product of human creativity. In 18th century the mountain was still a place to be discovered. It was then that the great mountain ranges of Europe – especially the Alps – became a "new world", and therefore a place that demanded some specific language to name it. It was an extraordinary challenge to describe not only precise details but also the previously unknown emotions experienced by the pioneers. Both men of arts and men of science declared their impotence, as the mountain denounced the handicaps of language: the horizontal sequential dimension of language failed when confronted vertical world. Rousseau and Horace-Bénédict de Saussure deserve a separate mention. The former showed the mountain to the reader and talked about the beautiful in his literary writings; the latter took the reader to the most unique summits of the Alps and talked about the sublime in his scientific writings. From then on these two aesthetic categories – the beautiful and the sublime – adapted to and became part of this (re)creation of the mountain.

Chapter 13 closes this second part dealing with the question of similarity as a creative discovery. It deals also with the connected notions of identity and difference. At first sight, and using common sense, the value of similarity for science and art is evident. Nevertheless, Nelson Goodman drastically restricts and relativizes the philosophical importance of similarity. But without similarity the sphere of culture is at risk of annihilation, and the joint thought of identity and difference becomes impos-

sible. So, Alfredo Marcos' text attempts to reinstate similarity as a triadic relationship, following Aristotle's and Peirce's inspiration, where the creativity of the human subject is indispensable, but an objective pole still remains.

The third part of the present book adopts a historical approach to the problem of creativity. We start by challenging the traditional thesis that history of science exhibits a continuity which is absent in the history of art. Actually, creative leaps are present in both. The rest of this third part is devoted to the historical view of artistic and scientific creativity in middle age, modern and contemporary philosophy.

Chapter 14 discusses creativity, continuity and discontinuity in science and in art by drawing parallels between Kuhn and Gombrich. The author, J. C. Pinto de Oliveira, seeks to show that, while the idea of cumulative progress in the history of science, as well as in the history of art, was abandoned as a new historiography, sensitive to ruptures, emerged, this does not imply the denial of all continuity. On the contrary, continuity is a necessary condition for the identification of a revolutionary rupture. However, continuity in this context is not a logical continuity, but rather a more complex theoretical and historical relation.

Ricardo Piñero focuses on medieval creativity through the study of the work of Isidoro de Sevilla. This important intellectual – as he is presented in chapter 15 – was the author of one of the most influential works of all times: the *Etymologiae*. In its twenty books we find a compendium of all secular and religious knowledge of his time. It was extraordinarily well disseminated, and so it became a widely used reference manual. The whole hermeneutic project starts from the Isidorian conviction that the primitive and essential nature of the things can be found in the etymology of the names. Thus, language itself becomes an art of genetic investigation. This link between things and words, *res et verba*, between real world and linguistic creations, unfolds a whole horizon of possibilities from which the theory of art, aesthetics and sciences in general were to benefit very positively, both methodologically and conceptually.

"Modernity" – as Joseph Margolis states – seems to collect the most notable changes and innovations of history that fall, broadly, within the span of mid-eighteenth century Europe and the close of the twentieth century, in fact, the closest, culturally most familiar neighbouring age to our own. Chapter 16 suggests that "creativity" is itself an artifact of cultural history, in the sense that human agents are themselves hybrid artifacts of cultural transformation. The idea here is that the theory of creativity is, first of all, restricted to the human – to the reflexive, deliberate and intentional, purposive, significant and significative activity of the human will: above all, to what is expressive of the sensibilities of selves reflecting their absorption of the collective energies of their own transformative culture.

Finally, Vicente Sanfélix deals with the contemporary idea of creativity. There is a seductive image of science. According to this view, science consists basically in solving problems. And since both solving problems is a creative activity, and science has solved so many problems and transformed our way of life so intensively and extensively with its technical applications, science seems to be an activity as eminently creative as artistic activity. However, Ludwig Wittgenstein, to whose comprehension of the cultural significance of science and technology is devoted this last chapter, had thoughts which oppose that dominant image and give his philosophy a dimension of social criticism which is initially unsuspected.

# Part I.
# Creative Procedures

# Creative Rules and the Anomic Fallacy

SIXTO J. CASTRO

Smokey, this is not 'Nam. This is bowling. There are rules.
Walter Sobchak, *The great Lebowski*

## 1. The Anomic Fallacy

Many artists say they do not follow rules but only their own subjectivity, understood as an anomic, unregulated source that originates any other reality. However, in Kantian terms, one might say that they are unable to give an account of the rules they have been following, which is something quite different. In the *Critique of Judgement,* Kant states that genius is not subject to rules, even though he is slightly more precise: genius is subject only to the rules nature imposes upon it. This is a key issue. One cannot defend the non-existence of rules. Any human practice has rules that shape it and that ultimately define it. Changing the rules means changing the practice, thus proposing that one should not follow a rule is nothing but to impose yet another rule that prohibits the following of rules, which is a performative contradiction. Given that the very exclusion of the rules requires a rule, it becomes impossible to escape the cycle, for human practices are what they are primarily due to method, and not to origin; as Gilbert Ryle demonstrated when he defeated what he called the "intellectualist legend"[1].

This idea of a regulated nature applies to all human practices. Even zombies, so prevalent in modern philosophy, cannot evade this requirement. What differentiates them from their human counterparts is the consciousness of qualia. However, to be considered zombies, indistinguishable from humans in action, they must also act in their practices according to rules. Angels too. Aquinas touches on this when he examines the possibility of whether angels can sin. Sinning is violating a rule. Thus, if angels have not set down the rules themselves, they can indeed sin. Only God cannot sin, because He cannot break the rule that is Himself:

1 Cf. Gilbert Ryle, *The concept of Mind,* New York, Barnes & Noble, 1949, pp. 30–32.

> Sinning is nothing else than a deviation from that rectitude which an act ought to have; whether we speak of sin in nature, art, or morals. That act alone, the rule of which is the very virtue of the agent, can never fall short of rectitude. Were the craftsman's hand the rule itself engraving, he could not engrave the wood otherwise than rightly; but if the rightness of engraving be judged by another rule, then the engraving may be right or faulty. Now the Divine will is the sole rule of God's act, because it is not referred to any higher end. But every created will has rectitude of act so far only as it is regulated according to the Divine will, to which the last end is to be referred: as every desire of a subordinate ought to be regulated by the will of his superior […]; Thus only in the Divine will can there be no sin; whereas there can be sin in the will of every creature; considering the conditions of its nature.[2]

Hence, whenever anyone performs actions which he or she believes *ought to be done*, they are following rules. Zombies – not philosophical ones, but those found in popular horror movies – do not believe they have to eat human flesh, and therefore have no reason to act. Their pursuit of fresh brains cannot be considered a true practice, unlike science and art, which are constituted by rules. In the case of art, the appeal to rules is even more evident, because, unlike science, it is more difficult to determine what the expected outcome of art is. If something can not be considered art in a teleological or pragmatic sense, it must be regarded as art in virtue of its regular structure.

When discussing rules, one must reference the work of Wittgenstein. As the Cambridge thinker said: "the rules of harmony […] expressed the way people wanted chords to follow – their wishes crystallized in these rules (the word 'wishes' is much too vague). All the greatest composers wrote in accordance with them" (LC I 16).[3] Rules, thus, embody an artistic practice and constitute creative activity. Their not being sufficient to achieve a brilliant and great artwork does not mean they are not necessary. If there are no rules, one cannot judge the practice, which is judged, by definition, according to rules. Which rules have been applied? Have they been applied correctly? Have the rules been subverted? Has the artist created new rules, recognizable in the practice? Any practice opens up a space for rules, *i.e.,* any practice involving repetition (of its elements or of the global practice as such) is intrinsically regulated. According to Wittgenstein, aesthetic judgement itself is a regulated judgement: "If I hadn't learnt the rules, I wouldn't be able to make the aesthetic judgement. In learning the rules, you get a more and more refined judgement. Learning the rules actually changes your judgement." (LC I, 15).

---

2 *Suma. Theol.* I, q. 63, a. 1.

3 Wittgenstein's works cited: LC: *Lectures and Conversations in Aesthetics, Psychology and Religious Belief,* University of California Press, 1987; PI: *Philosophical Investigations,* translated by G. E. M. Anscombe, Malden-Oxford, 1999, 2nd ed.; PG: *Philosophical Grammar,* edited by Rush Rhees, translated by Anthony Kenny, Oxford, Blackwell, 1993; PO: *Philosophical Occasions 1912–1951,* Indianapolis, In., Hackett, 1993.

Thus rules not only play a key role in our reception and criticism of artworks, but also, and perhaps especially, in the creation of the works themselves. It is not only that the writing of a sonnet or the composition of a fugue are to be done following rules, but that the very attempt to do away with a rule involves establishing a new one to replace the first. If one withdraws the rules of harmony in music, it becomes necessary to establish a new set of rules at least as complex as the former, which makes it impossible for a composition to be received or perceived as the result of tonal design. If one writes poetry in free verse, one must establish rules to prevent consonances, rhyme or whatever. If one abandons a scientific paradigm, the rules of scientific practice change, seeing as eventually a paradigm is constituted by rules that determine what the subjects to be researched are. Similarly, a system of moral or religious beliefs involves a series of rules that allow the drawing up of theoretical or practical conclusions based on certain principles.

Robert J. Stenberg holds that, according to the investment theory, creativity requires a confluence of six distinct but interrelated resources: "intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment"[4]. Concerning knowledge, one needs to know enough about a field to move it forward and, in case there are some dead ends, one must be able to use knowledge, especially that of rules, in order to solve problems as they were solved in the past, if possible. That means one must use past knowledge that at some point can be disposed of. Yet, in order to do so one must know the rules.

Historical approaches to the definition of art emphasize the narrative character of the definition itself.[5] This narrative must account for rules which constitute practice and, if it be the case, for the reasons why an artist may have to change the rules of that practice. This ultimately means he or she must settle into a world so far created by those rules he or she plans to change. Thus, rules *can* be changed, but the regulated nature of human practices is inescapable. If there are no *nomos,* there are no nomads. This is clear, for example, in the analysis of play Hans Georg Gadamer makes in *Truth and Method*. Playing is possible – not constrained – by the rules that give it its constitutive freedom. This is easy to grasp, e.g., in choreographies. Few things convey more sense of freedom than a well performed choreography, but being subject to rules is a condition of that freedom (including the improvisation that may take place within in), since rules, constitutive rules of dance, unify and enable that dance. Recognizing that there are a number of coordinated and synchronic movements allows us to intuit, with no margin of error, that rules are being followed, that

4 Robert J. Sternberg, "Creating a Vision of Creativity: The First 25 Years", *Psychology of Aesthetics, Creativity, and the Arts,* 2006, Vol. S, n. 1, p. 6.

5 See Nöel Carroll, *Beyond Aesthetics. Philosophical Essays,* Cambridge, Cambridge University Press, 2001, pp. 63–156.

is, that the dance is not an anomic movement of each of the dancers. In the same way, when one hears somebody praying the Hail Mary in Russian, even though one cannot speak Russian one knows they are following rules upon hearing the familiar cadence.

Thus, rules are prerequisite for artistic judgement and creation, and may be either transparent or hidden. For the Kantian genius, they were hidden. The non-Kantian genius (e.g., Edgar Allan Poe) is fully aware of them. The ribs of a Gothic arch, which rule the vault (a rail or track, in Wittgensteinian sense), may either be visible, and therefore a defining and decorative element, or they may be hidden.

In his *Thoughts,* Pascal stated that

> […] those who judge of a work by rule are in regard to others as those who have a watch are in regard to others. One says, 'It is two hours ago'; the other says, 'It is only three-quarters of an hour'. I look at my watch, and say to the one, 'You are weary', and to the other, 'Time gallops with you'; for it is only an hour and a half ago, and I laugh at those who tell me that time goes slowly with me, and that I judge by imagination. They do not know that I judge by my watch.[6]

Is the rule like the watch but with regard to time? The rule does not capture the essence of the work, but it is a condition of the possibility of judgement. What the artwork or its merits are cannot be deduced without further disregard for rule-following. A rule or a set of rules can be applied in a correct manner, but that does not mean that one has created a great or an aesthetically successful work of art. Notwithstanding, when we judge we are actually assuming the rule or rules that govern the practice. A rule-less judgement is not possible, since judgements presuppose constitutive rules. This marks then, a difference between rules of human activity that can be violated, and regularities in nature which cannot; since if they were violated, they wouldn't be counted as natural regularities (except in the case of divine intervention, in which case the deity is the only who can manage to change them). Violating the rules of human practice can lead to the changing of these rules, but that is not a necessary outcome. A violation of the rules of nature would lead, necessarily – in absence of a god who can suspend them – to their replacement and the loss of their status among regularities.

Natural phenomena are what they are regardless of the knowledge of the explanatory principles that describe them. A human phenomenon like art is mostly constituted by human rules and human beings who know how to follow these rules. We do not need to have scientific knowledge of gravity in order to play football or to dance; gravity exerts its effect independently of our knowledge of the law that describes it. The knowledge of the latter is peripheral to the game or the dance. Gravity does not constitute sport, but it does shape it. When we play football we simply rely

6 Blaise Pascal, *Thoughts,* translated by W. F. Trotter. Vol. XLVIII, Part 1. The Harvard Classics, New York, P.F. Collier & Son, 1909–14; Bartleby.com, 2001.www.bartleby.com/48/1/I, 5.

on the fact that balls will act in a certain way when they are kicked with a certain force and in a certain direction. As a result, one can play football without knowing the law of gravity. But knowledge of the rules of football is internal, for they constitute it; without knowing them, we do not play football.

Similarly, the ability to understand and respond properly to a work of art depends, at least in part, of our knowing many internal rules, such as the distinction between fiction and non-fiction, the different genres, currents, etc. And the rules that govern football, like those that govern art, are explainable. What Kant meant when he referred to genius, was not the impossibility of explaining cultural practices. However, we must concede that many of the post-Kantians interpret it in this sense; this may be because Kant used a secularized conception of divine inspiration for his idea of genius: nature (organic, not mechanical as it was in the *Critic of Pure Reason)* takes the place of the muses. This is precisely what made Kant such an appealing figure to the Romantics, though even the most romantic among the Romantics followed rules (as was the case with hermeneutical prejudices) to create.

The anomic fallacy is, thus, a secularization of the Thomist idea that only the one who gives out the rules, or rather, whose very being is rule, cannot be judged according to that rule. It is not possible to judge Don Quixote as Quixote from an external perspective. We can judge him from other parameters, but not as "being Quixote", because he is the rule of being Quixote. Actually, he or she who gives the rule to himself or herself does not *follow* rules, but establishes rules. This secularization, in some way, is powerfully worked on by Kant in the *Critic of Judgement* – though it was before seen in the work of many Renaissance authors of the Neoplatonic tradition – where he develops the mentioned theory of genius, whose works serve as models or paradigms. Genius is god on earth.

Now then, from the nineteenth century onward, artists envisage themselves, in religious terms, as quasi-divine beings, and this divinity also involves giving themselves the rule or rather, being the embodiment of the rule. Avant-garde artists, such as Malevich, consider themselves to be creating their works out of nothing, *i.e.,* they postulate an absolute freedom of choice that confers meanings or externalizes their ideas (following a Neoplatonic model), their unconsciousness (not regulated itself): nothing precedes the creative act, but the new reality is the result of a "pure" action that is the origin and source of the artwork, a action *non regulata* that, without further ado, becomes *regulans*, establishing a set of rules the consecrate or destroy the paradigm or style. This leads to the Wittgensteinian problem of private language, where every artist makes art that "says" something just to himself or herself. In this case, the standard of correctness disappears: "One would like to say: whatever is going to seem right to me is right. And that only means that here we can't talk about

'right'" (PI 258). Thus, the anomic fallacy is a secularization of the thesis of the divine as *causa sui.*

## 2. Constitutive and Regulative Rules

In his analysis of rules, Wittgenstein identifies a number of questions that have become classic when addressing the role of rules in the aesthetic realm.[7] In LC I, 15 he refers to the example of a tailor who knows how to follow the rules. Here, Wittgenstein uses the world rule in the sense John Searle has called regulative, not in the constitutive sense. Constitutive rules take the form of: X [an activity/person/entity] counts as Y [an artworld/artist/artwork] under conditions Z; possessing the concept of *artist* or *artwork* requires the capacity to understand and apply such rules. Regulative rules, on the other hand, govern how the coat (or the artwork) is made, but they do not affect its being a coat (or fugue or an Elizabethan sonnet) instead of a pair of trousers (or a Romantic ode).

When Wittgenstein says in LC I, 16 that great composers did not change all the rules, he seems to be using the word in the constitutive sense. Though he gives no reason for saying that not all the rules were changed, it may occur that we could not recognize and classify the artefacts as art if all the rules that govern its production had been changed. At least some of the rules must remain constant. Thus, the rules Wittgenstein seems to have in mind at this point are constitutive rather than regulative. Since rules of art arise from what people want, like, enjoy or value (LC I, 16), these will be rules produced to ensure the survival of the thing valued by a given culture during a given age. Thus, Wittgenstein seems to accept that regulative rules guiding the artistic practice can change, and that such changes can be creative, but he does not seem to think the same thing regarding constitutive rules. He says that "one wouldn't talk of appreciating the *tremendous* things in art", since with them "the entire game is different" (LC I, 23).

This points to another fundamental aspect of rules in art: they make valuation possible. A work is well done (from the aesthetic point of view) if it follows the rules that are supposed to constitute it. Anomie simply means that it is impossible to evaluate a work. It is entirely possible that this is what some works of art purport, that is to say, that they seek to go beyond good and evil, but that does not mean, to

7 David Novitz, "Rules, Creativity and Pictures: Wittgenstein's *Lectures on aesthetics"* in Peter Lewis (ed.), *Wittgenstein, Aesthetics and Philosophy,* Aldershot, Ashgate, 2003, p. 57.

paraphrase Nietzsche, they can go beyond being good or bad works of art. And nobody can blame us for choosing good art. Not even the methodical anarchy advocated by some scientific theorists can affect this thesis. Such anarchy refers not to the result, which may be better or worse, but to the election (not elimination) of the rules that constitute that practice. In this way of understanding rules there is a clear dependence on the Aristotelian notions of *téchne* and poetics. *Téchne* is the set of (constitutive) rules ordered to a purpose, whether of making ships, sculptures or tragedies. *Poetics* are the regulative rules that would lead one to write a good tragedy (and perhaps to build a good ship).

Wittgenstein claims that it is possible to develop a "feeling for the rules" (LC I, 15) in light of which the critic, and presumably the artist, can determine what deviations from the rules will work, or in his words, will be aesthetically successful. There is no reason to think that this feeling cannot apply both to regulative rules and to constitutive ones. It is true that some constitutive rules should remain constant, otherwise we could not see the resulting artifact as a work of art, but it seems unlikely that many of them will remain untouched over time. The transformations from Elizabethan poetry to the Romantic, from Renaissance naturalism to Impressionism, from Mannerist sculpture to the Cubist and so on, involved radical changes in many, perhaps most, of the existing constitutive rules for the construction of the relevant categories of art. Nevertheless, they ended up being generally regarded as aesthetically successful. Such a process can be narrated, constructing a historical narrative that shows how some decisions follow from certain situations and aesthetically consistent choices. That is because an artform is a set of rules that stipulate when a work of said artform is possible and allowed. Defending the lack of rules means declaring the impossibility of establishing a standard of correction within the artistic practice. Those rules need only determine, for any particular artform, *what* an object that is presented as such is, that is to say, if it is indeed a work of art pertaining to that artform. Wittgenstein believed that to apply a rule is to exercise normative judgement.

Saul Kripke[8] has offered an argument inspired by Wittgenstein's writings on rule-following (PI, 138–242, especially 201–202). Whenever a speaker uses a word with the same meaning, and in the same way as he or she used it on a previous occasion, there must be some reason for such a use that is not reducible to his or her inner mental state. There must be a reality related to this common use that would cause other members of the community to speak in the same manner or which would lead them to consider this way of speaking to be correct. For something to be meaningful, it must be governed by rules that ensure the possibility of recurrence. Such a thing does not happen only in the practice of using language, but in all human practice,

8 Cf. S. Kripke, *Wittgenstein on Rules and Private Language,* Oxford, Basil Blackwell, 1982.

including autotelic ones, that is, those which are depleted in themselves; such as the case with playing, which is constituted of a set of rules, which are conditions of possibility that enable the development of play. While art does not always have a translatable semantic meaning (it can have it or not, but art as such is not reducible to the semantic component, whether present or not), being a competent artist or a connoisseur involves at least having a minimum understanding of these rules, so that the action performed can be seen as connected to what the art history calls art. The definition of art cannot be anything but historical, stemming as it does from within the very same history of art in the form of a narrative.

Thus, rules determine the structure of a practice. In science, for example, rules determine what is evidence of what (though these are rules that cannot be tested themselves). In the aesthetic realm rules also determine what practice is considered artistic, successful, failed, etc., since making art is fundamentally a practice that, in order to be recognized as such, must follow constitutive rules.

Regulative rules can lead to a change of constitutive rules, and in that way practice can be radically transformed. Indeed, one of the characteristics of a creator is the ability to change the rules successfully. T. I. Lubart and R.J. Sternberg proposed an "investment" theory of creativity. According to this theory, creative people are those able to "buy low and sell high" in the realm of ideas, that is, pursuing ideas that are unknown or out of favour but that have growth potential. Often, when these ideas are first presented, they encounter resistance. The creative individual persists in the face of this resistance, and eventually sells high, moving on to the next new, or unpopular idea.[9] In fact, the idea of "author", as Ortega states it, is related to "*auctor*", the one who conquers new lands.[10] But this change of rules cannot be understood in terms of a revolutionary paradigm shift. Art is rather a practice that silences its rules for whatever reason, but there is always that link with previous art. Thus, Johann Christian Bach's music breaks with his father, Johann Sebastian Bach's, but they have much more in common than it seems, at least from a distant temporal perspective. Are there, then, paradigmatic breakthroughs in art? There are many constitutive rules which at first remain untouched and only over time, after many variations, can also

9 See R. J. Sternberg & T. I. Lubart, "An investment theory of creativity and its development", *Human Development* 34 (1991) 1–31; R. J. Sternberg, & T. I. Lubart, *Defying the crowd: Cultivating creativity in a culture of conformity,* New York, Free Press, 1995; D. L. Rubenson & M. A. Runco, "The psychoeconomic approach to creativity", *New Ideas in Psychology* 10 (1992) 131–147; P. A. Frensch & R. J. Sternberg. "Expertise and intelligent thinking: When is it worse to know better?", in R. J. Sternberg (ed.), *Advances in the psychology of human intelligence,* Hillsdale, NJ, Lawrence Erlbaum Associates, 1989, Vol. 5, pp. 157–188

10 José Ortega y Gasset, *La deshumanización del arte,* in *Obras completas,* Madrid, Revista de Occidente, 1962, 5ª ed., vol. III, p. 371.

transform themselves. Consequently art history is best understood in terms of analogies than of ruptures.

## 3. What is it like to Follow a Rule?

The only criterion that can help us decide whether one is following a rule or not is the entire language game to which the rule belongs, making the games of language conceptually previous to its rules. A language game is defined by its rules. Any of its rules can only be understood in the context of the entire game and not by reference to an inner world of experiences.[11] The criteria for following a rule do not rely on the experiences that one has in following it, but on the whole complex of activities that form part of the act of following a rule, that is, on language games.[12] However, given that the same rule can be followed in different ways, the criterion to ensure that a rule is being followed in the same way time after time cannot be itself a rule. It must ultimately depend on our actions, giving rise to what Wittgenstein called intransitive understanding (cf. *Philosophical Grammar*.) It is a sort of understanding that is an integral part of being a competent user of language, but which cannot be expressed by language.[13] Thus, the established set of practices is what guarantees that a principle, a law, a concept, in short, everything Wittgenstein called a rule, applies in the same way again and again, from one person to another. Mastery in the application of that rule is only acquired through practice. The issue is, therefore, that if we consider that art is essentially a practice, the individual who does not know the rules that constitute it (*i.e.,* Danto's *Artworld,* or Dickie's *Art Circle*) could not be considered an artist. Inspiration alone is not enough for the genius, as Kant noted in the *Critic of Judgement* (genius without rules leads to nonsense).

We are thus faced with one of the key Wittgensteinian problems, specifically, what constitutes following a rule and how we can know that a rule is being followed. In *Philosophical Investigations* there is a critique of the view that understanding and rule-following are mental processes and that the ability to follow a rule is a mental state. Here Wittgenstein criticizes his own early view relegating rules to the phenomenological world and in this way capturing by analysis the experience of the

11 Cf J. Hintikka, "Rules, Games and Experiences: Wittgenstein's Discussion of Rule-Following in the Light of his Development", *Revue Internationale de Philosophie* XLIII/168 (1989) 284.

12 Cf. *Ibid.,* 295.

13 Cf. K. S. Johannsessen, *Rule Following, Intransitive Understanding and Tacit Knowledge,* in H. Høibraaten (ed.), *Essays in Pragmatic Philosophy,* Oslo, Norwegian University Press, 1990, p. 118.