THE NATURE OF HUMAN CREATIVITY

This book provides an overview of the approaches of leading scholars to understanding the nature of creativity, its measurement, its investigation, its development, and its importance to society. The authors are the 24 psychological scientists who are most frequently cited in the four major textbooks on creativity, and they can thus be considered among the most eminent living scholars in the field. Each author discusses how they define creativity, the kinds of questions they have addressed, theories they have proposed, and a description of their research and the most interesting empirical results it has produced. The chapters represent a wide range of substantive and methodological emphases, including psychometric, cognitive, expertise-based, developmental, neuropsychological, cultural, systems, and group-difference approaches. *The Nature of Human Creativity* brings together an incredible diversity of viewpoints, helping students and researchers to see the points of consensus as well as the differences in contemporary perspectives.

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THE NATURE OF HUMAN CREATIVITY

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Foreword

Mihaly Csikszentmihalyi

It is a daunting task to introduce such a magisterial collection written by some of the best scholars on the volume's topic – the elusive and alluring subject of creativity. Writing this foreword is indeed quite a responsibility, as well as being a greatly valued honor. My first article in this area of study was published just over half a century ago, in 1966, as a co-author to my thesis advisor, Jacob W. Getzels. It was entitled "Portrait of the Artist as an Explorer" and appeared in a now defunct journal called *Trans-Action*. Those were years when few psychologists studied creativity, and few schools offered serious programs of study on the topic.

Much has changed since. The arms race between the West and the Soviet Bloc halfway through the last century was at several points focused on the question of which country would be first to launch a vehicle into space, then who would reach the moon first with a human crew, and then who would get close enough to the farthest planets in our solar system to take good pictures of their surfaces.

All of these highly charged political projects needed a great deal of creativity to be completed – from the development of fuels to that of metals that could resist the heat caused by friction at reentry, to the provision of psychologically healthy environments during the long weeks of life under monotonous routines in cramped spaces. The demand for creative solutions to these unprecedented challenges had, as an unintended and unforeseen result, the effect of creating a market for creativity research in psychology. One of the earliest investigators of this topic, J. P. Guilford, was a fighter plane pilot in World War II and developed the first tests of "divergent thinking," which turned out to be good measures of a creative disposition.

From those days in the early 1950s onward, scholarly interest in the creative process has grown by leaps and bounds. It is not my task in this foreword to rehearse all the stages of the progress in this domain, except to say that, in my opinion, it has been a great ride. But I don't want to spend

these lines rehearsing the past, exciting as it has been. Instead, let me comment on the future, and specifically on the future foreshadowed by the contributions to this volume.

The Physiology of Creativity

Although the neurological issues involved in the creative process are an important part of the puzzle, we have made remarkably little headway so far in identifying specific brain areas, or neural pathways, that might be involved in the production of creative ideas – despite the fact that this had been the focus of research by the first modern investigator of creativity, the Italian physician Cesare Lombroso, who, in 1891, published a treatise entitled *The Man of Genius*, which is one of the first attempts to apply modern science to an understanding of creativity. (As is widely known, the good doctor came to the conclusion that creative thinking and mental disorders seem to co-occur at high rates of frequency and tend to appear more frequently in some kinship genealogies than in others, suggesting a strong genetic component to creativity – an issue that has been reappearing in the literature ever since, down to our days.) The neurophysiological approach is unlikely to disappear soon, or ever, from understanding this process; and the chapters in this collection dealing with this issue remind us of the state of the art in this important domain.

The Sociocultural Context

But whether creative ideas appear and become adopted does not depend entirely on what happens within the individual's mind. History has shown that in certain places, at certain times, creativity reaches unprecedented levels, and then it dies out. In Western cultures, creativity blossomed in Egypt, in Greece, in Italy, and then in several European countries – some breaking boundaries in art, or in architecture, or in literature, or in religion, or in science, and sometimes in all of these domains at once. The most credible explanation for these spurts in the development of culture is that the environmental conditions – the economic, religious, social, political, and educational institutions of society – are sometimes well equipped to encourage and support new ideas and their implementation, thereby bestowing recognition and appreciation on the individuals proposing the novelty, and it is these conditions that explain the fact that for many centuries before the current era, so many novel works of art were produced on the tiny island of Milos between 15,000 and 150 BCE, or how Athens

became a center of art much later, or Florence between roughly 1400 and 1550, or Paris in the nineteenth century.

In the present volume, the examination of the sociocultural context is not a central issue, but its effects are often implied in the analysis. Of course, it is impossible for a single volume to do full justice to every relevant perspective, and this should leave ample opportunities for scholars to include this important, and sorely neglected, viewpoint in future works.

Education

The educational perspective has been of long-standing interest to educational scholars, and its importance is well represented in this volume.

For a long time, educational research has been focused on *convergent thinking*, or the traditional patterns of repetition and memorization that for centuries constituted the backbone of scholastic learning. My maternal grandfather in his late seventies would often wake up from his afternoon naps screaming and flailing – his recurrent nightmare being that of having to pass his high school graduation exams that included the memorization of 8,000 lines from the Odyssey, in the original Greek.

I also remember how I learned one of the basic laws of solid geometry, by memorizing a short ditty, which in Hungarian went as follows: *Minden vizbe mártott test, a sújából annyit veszt, amennyi az általa, kiszoritott viz súja*. This ditty in English means "Every object placed in water, will lose as much of its weight, as the weight of the water it displaces." These were memorable learning experiences illustrating convergent thinking. But few teachers, and then often against official educational policy, took the trouble of encouraging divergent thinking in their students.

One example of the latter would be László Rátz, a mathematics teacher in the Lutheran high school of Budapest, active between the two world wars. First, he tacked a page to the classroom wall on which a complex mathematical equation had been written. Then he challenged his students to provide the best proof for the equation within the next thirty days. Some of the students rose to the challenge; among them were Leo Szilárd, Eugene Wigner, Edward Teller, and John von Neumann. Their solution to the problems posed by their teacher were passed along among the students, and after a while, mimeographed copies of the proposed solutions could be bought at newsstands in Budapest. Just one of his students became a Nobel Prize winner in science, but at least half a dozen of them became leaders in their discipline. In the speech he gave when accepting his Nobel Prize, Eugene Wigner reminisced about his teacher with the following words:

"There were many superb teachers at the Lutheran gymnasium. But the greatest was my mathematics teacher László Rátz. Rátz was known not only throughout our gymnasium but also by the church and government hierarchy and among many of the teachers in the country schools. I still keep a photograph of Rátz in my workroom because he had every quality of a miraculous teacher: He loved teaching. He knew the subject and how to kindle interest in it. He imparted the very deepest understanding. Many gymnasium teachers had great skill, but no one could evoke the beauty of the subject like Rátz. Rátz cared deeply about mathematics as a discipline. He took special care to find his better students and to inspire them. Rátz felt so privileged to tutor a phenomenon like [John] von Neumann that he refused any money for it. Who could know that this precocious ten-year-old would someday become a great mathematician? Somehow Rátz knew. And he discovered it very quickly. Rátz was just as nice to me and nearly as devoted as he was to Neumann. Rátz was the only gymnasium teacher to invite me into his home. There were no private lessons. But Rátz lent me many well-chosen books, which I read thoroughly and made sure to return in good condition."

Teachers like Rátz are probably rare in each generation. But their example can be followed and should become a model for every educator: love what you are teaching, love whom you are teaching, and help them to become as good scholars in the discipline as they can be.

Leadership and Business

Throughout history, leaders of society and commerce had to keep their eyes open for new ways to do their business. If they did not, chances were good that they would miss important opportunities and mismanage their jobs. It is true that great empires have thrived on stability and tradition: the Egyptian, the Macedonian, and the empires of Asia for long periods actively discouraged novelty. In the long run, however, no nation and no economic enterprise can prosper without building novelty into its fund of knowledge. Nowadays, creativity, governance, and the economy are so intertwined that it is difficult to imagine being successful in one of these areas without also having developed the other two to a healthy degree.

The study of creativity in the workplace, intensely pursued at the State University of New York at Buffalo, is well represented in this volume by Teresa Amabile's chapter (Chapter 1), as well as by several others. Creativity in governance, or politics, is still a largely unexplored area, even though statesmen clearly differ in their ability to perceive, value, and implement

good new ideas. This again is an area where young scholars could make important new contributions.

Creativity and the Life-span

If I have an area of specialty in psychology, it must be life-span psychology, because that is what I learned in grad school and have taught ever since. That does not mean I know much about the life-span, but it does say that when I am looking at what people think, feel, and do, I tend to look at it from the point of view of changes from birth to death. And this perspective is quite useful also in the understanding – or, at least, in the description – of creativity.

It has often been said that whereas all children are creative, very few adults are. There is some truth in this saying, although it really refers only to small c (everyday) creativity; in fact, exactly the opposite is true for Big C creativity, which is what most people are really interested in. We attribute creativity to children because they often come up with observations and statements that to an adult seem original – when in fact they are unusual due to the children's lack of understanding and express superficial connections between things they do not understand but want to know more about.

Sometimes these insights lead to interesting, almost poetic insights, but this is rarely the child's intent. In this sense, each child recapitulates the development of human understanding: our ancestors similarly created colorful myths to explain how the world was created, how the first man and woman started life, what makes the world go round – myths that can be called creative in that they give us psychological sustenance but that are not true in the sense their claims are usually made. When we took our son Mark to the beach for the first time, as we approached the shores of Lake Michigan, his eyes opened wide, as with a trembling finger he pointed to some of the bathers walking out of the lake to their blankets and beach umbrellas. "Look!" Mark whispered. "Water people!" It was a lovely figure of speech, but Mark did not mean to be poetic; he was just expressing surprise that there were people, apparently, who lived in the lake and only occasionally ventured ashore.

Schooling soon tames such personal attempts at understanding and channels a child's knowledge in the grooves that past thinkers have carved. This, of course, is why humanity has been so successful on this planet. When Sir Isaac Newton was asked how he had been able to see so much further into the nature of stars and galaxies than anyone else, he is said to

have answered, "If I have seen further, it is because I was standing on the shoulders of giants." Of course, one must first want to see. But how far one can see depends on the availability of tall giants with broad shoulders. The danger to be avoided is to encourage only the convergent thinking based on what others have seen and ignore the new insights discovered by adventurous seekers.

Evolution and the Future of the Species

Which brings us to the last perspective that makes creativity such an important subject: it is not just about *now*; it is mainly about the future. The human condition in its present state is nothing to write home about. We have truly evolved in many wonderful ways these past few thousand years, yet, in many ways, we have not used the powers we acquired wisely. When longbows were perfected in England in the fourteenth century, many people in Europe came to believe that this new weapon would usher in the end of the world. Thoughtful people nowadays are worried that nuclear devices, made possible by the greatest scientific creativity of our species, will be the means of our demise. This state of affairs suggests that the most important creative breakthroughs we ought to look forward to might not be in the domain of armaments and warfare but rather in the domain of peaceful coexistence. What can we do to nurture in children an understanding that the world is a complex and fragile place and that its continued existence rests in their hands and in those of the generations yet to come? How can we recognize and implement new ideas in the area of mutual tolerance, of cooperative behavior? These are the kinds of questions that need to be answered for our species to survive. The present volume is an important step in our ability to answer them.

Preface

Creativity is the only way human beings and our society can make any pretense of "moving forward." Creativity has brought us all the major inventions and discoveries of humankind, and it is what has made possible all major contributions in art, music, architecture, literature, science, and many other fields. Without creativity, you're not reading these words – there would have been no printing press or personal computer; the fields of psychology, education, and business would never have developed as academic fields; and our esteemed contributors would not have become renowned scholars with so much to contribute to a discussion of the field.

It is not only at the level of societal progress that creativity has an impact. It plays a key role in our everyday lives. We use our creativity whenever we face new challenges, solve problems, or try to improve the immediate world around us. It is a key ability that helps us express, distract, and entertain ourselves or others. Not everyone can be a creative genius, of course, but anyone can be creative in some way.

Creativity is usually defined as the ability to make contributions that are both novel and task appropriate, often with an added component such as being high quality, surprising, or useful. Beyond this definition, many theories of creativity attempt to account for what it is that makes people creative. Many of these theories have been reviewed in Sternberg (1988, 1999) and Kaufman and Sternberg (2006, 2010, forthcoming).

When the field of human creativity got started, at least as a field in psychological science, it was largely an offshoot of the field of intelligence (Guilford, 1950, 1967, 1968). In Guilford's structure-of-intellect model, creativity (or divergent thinking) was one of several processes of intelligence. Today, however, the fields of human creativity and human intelligence, although related, have become distinct entities. Compendia on intelligence (e.g., Sternberg, 1985a, 2014; Sternberg and Kaufman, 2011) today say

relatively little about creativity. Compendia on creativity (Kaufman and Sternberg, 2006, 2010, forthcoming) may say more about intelligence, but only as a related factor and not as a construct that encompasses creativity. Similarly, teaching for critical thinking can be viewed as including both analytical and creative thinking (see, e.g., Baron and Sternberg, 1987; Sternberg, 1985b). But teaching for creative thinking, which used to be somewhat of a specialized field (e.g., Covington et al., 1974; DeBono, 1973), has gone mainstream (see Beghetto, Kaufman, and Baer, 2014; Gregerson, Snyder, and Kaufman, 2013; Sternberg and Kaufman, forthcoming; Sternberg and Williams, 1996), and efforts to teach for creativity are widespread and international.

There are many different approaches to creativity. As is true in any field, many of these approaches are driven by the very most eminent scholars in the field. This book represents a collection of essays by those very people, as selected by objective means.

Many edited books have chapters chosen on the basis of editors' implicit theories of who matters in the field (or on the basis of the editors' friendships and collaborations). That was not the approach in selecting authors for this volume. In particular, we reviewed everyone cited in four major contemporary volumes on creativity: *Creativity 101*, 2nd ed. (Kaufman, 2016), *The Cambridge Handbook of Creativity* (Kaufman and Sternberg, 2010), *Explaining Creativity*, 2nd ed. (Sawyer, 2012), and *Creativity*, 2nd ed. (Runco, 2014). These books formed the basis for how we chose authors for this volume.

All four books were written for use as textbooks in courses on creativity or related processes such as innovation or insight (Sternberg and Davidson, 1982, 1983). With the assistance of Paul Joseph Barnett, we computed a combined tally of the living authors most frequently cited in these four texts. The resulting list comprises some of the top contemporary contributors to the field of creativity, as determined by textbook citations. We chose the twenty-four top-cited individuals, and amazingly, all of them agreed to write for the book. They comprise the sole (or, in some cases, senior) authors of this book, plus the author of the foreword.

Of course, there are other reasonable ways to choose the top contributors to the field of creativity; but we believe that our procedures produced a set of many of the most eminent scholars in the field. The authors represent a diverse group, ranging widely in their approaches to creativity, in their backgrounds and training, and in the kinds of theories they have produced and data they have collected.

We asked each invitee to write a chapter addressing as many of the following questions as possible, not necessarily in the order given:

1 What is creativity?
2 How is creativity best understood?
3 How is creativity best measured?
4 How is creativity best investigated?
5 What are some of the most interesting empirical results from your own research?
6 What are the sources of individual and group differences in creativity?
7 How is creativity best developed?
8 What are the most important questions about creativity that future research on creativity should address?
9 What is, and what should be, the role of creativity in society?
10 What would you like to be your lasting contribution to the field of creativity?

Authors also were invited to address any other questions that they believed would be of interest to readers.

Although there are a number of books on creativity, few of them explore in a systematic way the range of questions that we posed to our authors, including whether creativity is even a single thing or many things (Sternberg, 2005) and whether it is the same across cultures (Niu and Sternberg, 2003). The book thus comprises some of the most distinguished contributors to the field answering a range of questions that perhaps no other book addresses. The book is not a handbook; authors were not asked to represent a whole field of study. Rather, they were asked to focus on their own work and how it relates to the work of others. A separate handbook will be published shortly by Cambridge University Press (Kaufman and Sternberg, forthcoming).

The main goal of this book is to provide a broad overview of approaches of the leading scholars in the field to understanding the nature of creativity, its measurement, its investigation, its development, and its importance to society. The intended audience for this book is psychologists, cognitive scientists, educators, sociologists, and students in any field interested in creativity. This book is, in a sense, a companion to another book, *The Nature of Human Intelligence* (Sternberg, forthcoming), which used a similar method to choose authors to write on human intelligence.

We believe that there are several reasons to produce this volume at the current time.

First, the book highlights the diversity in points of view of the top scholars in the field. Some scholars still believe that creativity is largely what is measured by tests such as the Torrance Tests. But in this list, we have psychologists representing an extremely wide range of perspectives: cognitive, clinical, cultural, developmental, educational, organizational, personality, psychometric, social, and more. The book thus represents highly diverse views on creativity and shows that although there are some points of consensus about creativity, there are still many differences in perspective.

Second, many of the individuals who write about creativity (especially in the popular press) know little about it, at least from a scientific point of view. It is a field that invites almost anyone who views himself or herself as an expert to propose ideas and suggestions with little or no scientific basis. Sometimes popular experts espouse views that have been specifically disproven as best practice. It can be difficult to pick up a popular magazine without some expert telling you how to improve your creativity. Chances are that the expert has done no research in the field. All of the contributors to this book are top scientists, so the book will help set the field straight in terms of the science of creativity.

Third, a book such as this one can be used as a supplementary text in a course on creativity. Although an instructor might want to use a traditional textbook (e.g., Kaufman, Sawyer, or Runco) as a main volume, an advantage of this book is that the student will be able to learn from the originators of the key contemporary ideas in the field how they think about their work and the field. (An alternative supplement is our *The Cambridge Handbook of Creativity*, 2nd ed. [Kaufman and Sternberg, forthcoming], although the handbook is quite a bit longer than the present volume.)

Fourth, this book is being published exactly thirty years since the edited Sternberg (1988) book on *The Nature of Creativity* was published. That book was similar in goal, but authors for that book were not chosen in a quantifiable or systematic way. Given the rapid rate of progress in the field, that book is obviously out of date. This volume shows just how far the field has progressed since 1988.

Finally, many of the existing textbooks that cover creativity – introductory psychology textbooks, developmental psychology textbooks, educational psychology textbooks, and so on – represent the field of creativity as it existed at the end (or, in some cases, even the middle) of the twentieth century. Many of them are quite out of date. The average textbook may cover early pioneers, such as Guilford or Torrance, but has little to say of the major contributions of the last several decades. We hope that this

volume will offer textbook authors an authoritative and up-to-date basis for updating their texts.

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