



PROBLEM FINDING,
PROBLEM SOLVING,
AND CREATIVITY

MARK A. RUNCO
EDITOR

**Problem Finding, Problem Solving,
and
Creativity**

edited by

Mark A. Runco



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**Problem Finding, Problem Solving,
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Creativity**

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Dedication

For my father, Raynard Frank Runco, with utmost esteem and affection, and with special appreciation for the nibs, nobs, mashies, and niblicks.

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Preface

Few things are as stimulating as a heated controversy. Voters turn out in droves when a controversial proposition is on the ballot, viewers rush to theaters when a debatable show is on stage, newspaper sales peak when headlines are shocking, and more research is directed at arguable topics than at the mundane. If nothing else, controversies have significant motivational value.

This book was in part motivated by a controversy in the creativity research. This controversy can be described with a question: What is the role of creativity in problem solving? This may seem to be a straightforward question, but it is not. Many individuals studying problem solving tend to look at creativity as merely a special type of problem solving. Conversely, many individuals studying creativity view problem solving as a special type of creative performance.

This book was also motivated by the obvious need for an overview of the research specifically on the problem *finding*. There is a great deal of work on problem finding—including studies of problem construction, problem discovery, problem identification, problem definition, and problem posing—but no overview, and little integration. This volume offers such an overview and integration. In fact, this volume was initially focused specifically on the family of problem-finding skill mentioned above—problem construction, discovery, definition, and so on. However, it does not make much sense to study problem finding independently of problem solving. At least that was my feeling as I planned the book and invited the contributions. For this reason, the charge given to contributors explicitly called for discussion of the relationship between problem solving and creativity, and discussion of the relationship between problem finding and problem solving.

In a fashion fitting of books on creativity, one of the most important criteria guiding the selection of contributors was *diversity*. To adequately describe the research on problem finding, and in the spirit of open-mindedness, I felt it was

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necessary to include all the options. (This was especially true given the controversy mentioned above, with some persons viewing creativity as one type of problem solving, and others viewing problem solving as one type of creativity.) Hence a wide range of perspectives is represented in the five parts of this book.

ORGANIZATION OF THIS VOLUME

Part I contains three chapters: One on category reorganization, one on evaluation, and one on metacognition. These three chapters each emphasize the cognitive skills which are involved in problem solving and creativity, and they each describe original empirical research. Mumford, Reiter-Palmon, and Redmond (Chapter 1) demonstrate that effective problem construction is predictive of the quality and originality of subsequent solutions. They also describe how knowledge, motivation, and the organization and reorganization of categories each play an important role in problem construction.

Runco and Chand (Chapter 2) describe the role of evaluative and valuative skills in creative problem finding and problem solving. Evaluative and valuative skills are rarely given much attention in the literature. Attention is usually directed more to divergent, lateral, and intuitive processes than to critical, selective, and evaluative processes. For this reason, Runco and Chand bring together all of the available work, empirical and theoretical, and argue that evaluative skills are vital to creative problem solving. They also present results from their recent empirical investigations of evaluative skill, problem finding, and metacognition. This last topic leads to the last chapter in this part of the book. In it, Jausovec (Chapter 3) focuses on metacognitive skills, including the planning and monitoring of problem-solving efforts. Jausovec presents five experiments that demonstrate how strongly strategy and metacognition influence problem solving. There are obvious practical implications of this research, especially because Jausovec demonstrates how megacognitive skills can be manipulated.

In a sense, the next three parts of this book contain discussions of domain-specific problem-finding and problem-solving efforts. For example, Part II contains three chapters which focus on problem finding and problem solving in art. This focus should not surprise anyone, given that early work on problem finding involved artists.¹ Additionally, this focus reflects the current state of the field, for the study of unambiguous cases is widely respected, and the study of art extends that logic to an unambiguous domain. Art is an unquestionably creative domain.

¹ I am referring to research from the 1930s, by Katherine Patrick, and from the 1970s, by Jacob Getzels and Mihaly Csikszentmihalyi. That research is discussed throughout the present volume.

Interestingly, Part II emphasizes the extracognitive facets of problem finding and problem solving. This is apparent in Chapter 4, in which Wakefield describes the important role played by affect—and in particular *empathy*—in problem finding and artistic creativity. Wakefield looks specifically at the work of William Faulkner and Vincent van Gogh, and describes empirical findings from his work with “creatively inclined” college students. Kay (Chapter 5) describes a methodology that compares novices and experts. She discusses the fine points of the relevant measurement issues, and she discusses the cognitive theory that supports the use of specific observational approach for the study of problem finding and problem solving. Her work to date is focused on the spatial and transformational skills of visual artists, but the methodology may prove to be useful in various domains.

In the last chapter in this part of the book, Dudek and Cote (Chapter 6) report findings from an investigation which utilized a methodology similar to that suggested by Kay. Perhaps most importantly, Dudek and Cote offer a convincing argument for the distinction between *expertise* and *feeling*. This helps to distinguish between the cognitive and the extracognitive factors alluded to earlier. It also clarifies the rationale for working with experts and unambiguous cases. Dudek and Cote specifically address the issue of domain differences (e.g., art vs. science).

Part III also offers domain specific views, but Chapters 7 through 11 focus on the educational domain. In Chapter 7, Moore suggests that teachers must find and define problems carefully—for the benefit of their students, and for their own satisfaction and success. Moore gives a great deal of attention to factors which influence problem finding and *problem posing*, including social, contextual, and ecological influences. Houtz (Chapter 8) also discusses teaching, and he raises issues involved in mentoring. He offers a compelling argument about the need for active participation by students, and the need for strategic modeling by teachers.

Subotnik and Steiner (Chapter 9) have a great deal to say about mentoring, but their work focuses on an exceptional group of individuals, namely, winners of the Westinghouse Science Talent Search. This is a clearly exceptional group: Five Westinghouse winners have won Nobel Prizes, for example, and eight have received MacArthur Fellowships. Subotnik and Steiner emphasize the mentor's role in helping students (or mentees) develop the skills which are necessary to recognize significant problems and research topics. Hoover and Feldhusen (Chapter 10) also describe research with exceptional individuals. They draw from theories of giftedness and research on the education of gifted children. In their view, problem finding and problem solving in the sciences (and science education) are best characterized as *hypothesis generation* and *hypothesis testing*.

In Part IV, Treffinger, Tallman, and Isaksen (Chapter 11) discuss both education and organizational creativity. They offer an extension of the Parnes-

Osborn creative problem-solving process. Perhaps most important is that the research of Treffinger et al. reflects problem solving in the natural environment. This is one theme found throughout the book, and a topic I shall discuss in the concluding chapter. Basadur (Chapter 12) also extends the Osborn-Parnes paradigm, but he presents a series of models developed to describe the creative process, each of which is directly applicable to organizational settings. Basadur argues that problem finding, problem solving, and solution implementation must all be taken into account, and he describes his efforts for bringing this process into organizations.

Part V contains one chapter. This chapter reviews the themes and issues that are suggested by the preceding chapters. Attention is given to omissions and discrepancies among chapters and theories, as well as suggestions and directions for future work. In the concluding chapter I also take the liberty of exploring topics which were only briefly discussed in the individual chapters. Following my habit and concern for *integration*² in creativity research, I suggest a number of connections between these briefly mentioned topics and earlier research and theory. Perhaps most importantly, in the concluding chapter I return to the controversy mentioned in the first section of the Preface—the issue concerning the relationships among problem finding, problem solving, and creativity.

Before we begin with Chapter 1, I must acknowledge assistance and support I received while preparing this book. I am particularly grateful to the contributors themselves. Each responded creatively to the charge (and problems) I presented (and posed, constructed, and defined), and each helped to give this volume the flavor and punch it needed. I also want to express my gratitude to Kim McCarthy, Michael Piechowski, and Doris Wallace. They were kind enough to read drafts of selected chapters, and each offered a number of useful suggestions. Finally, I want to express my gratitude to Barbara Bernstein and Carol Davidson of Ablex Publishing Corporation. They were enormously helpful with this volume, as they have been with the entire Creativity Book Series.

*Mark A. Runco
La Habra, CA
August 1991*

²This is an issue applied specifically to creativity research in the inaugural editorial of the *Creativity Research Journal*, and more recently in a 1992 comment prepared by M. K. Raina for the same journal. It is, I believe, a pressing issue for this field, as well as one reason for the present volume.

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Part I

1

Problem Construction and Cognition: Applying Problem Representations in Ill-Defined Domains*

*Michael D. Mumford
Roni Reiter-Palmon
Matthew R. Redmond*

Creativity is reflected in the generation of novel, socially valued products. One implication of this definition is that a host of variables influence the nature and ontogeny of the creative act (Mumford & Gustafson, 1988). These variables span a wide range of individual and situational attributes, including knowledge (Simonton, 1984, 1988), basic cognitive processes (Sternberg, 1986b, 1988), aptitudes and abilities (Guilford, 1950; Snow, 1986), personality characteristics (Barron & Harrington, 1981; MacKinnon, 1962; McCrae, 1987), environmental perceptions (Witt & Beorkren, 1989), environmental structure (Pierce &

* We would like to thank Michele Mobley, Lesli Doares, Mary Connelly, Tim Clifton, and Chip Uhlman for their comments concerning earlier drafts of this manuscript. Requests for further information should be sent to Michael D. Mumford, Department of Psychology, George Mason University, Fairfax, VA 22030-4444.