LAB DYNAMICS

MANAGEMENT SKILLS FOR SCIENTISTS

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COLD SPRING HARBOR LABORATORY PRESS
Cold Spring Harbor, New York

Lab Dynamics: Management Skills for Scientists

Published by Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York
Printed in India

Publisher and Acquisitions Editor	John Inglis
Development Manager	Jan Argentine
Project Coordinator	Joan Ebert
Book Designer and Production Manager	Denise Weiss
Production Editor	Rena Steuer
Desktop Editor	Susan Schaefer
Cover Designer	Michael Albano

Front cover: Background image, Photodisc Red/Getty Images. Bottom image, www. comstock.com/.

Library of Congress Cataloging-in-Publication Data

Cohen, Carl M.
Lab dynamics : management skills for scientists / Carl M. Cohen and Suzanne L. Cohen.
p. cm.
Includes bibliographical references and index.
ISBN 0-87969-741-5 (hardcover : alk. paper)
1. Science--Management. 2. Technology--Management. 3. Scientists--Relations. 4. Organizational behavior. I. Cohen, Suzanne L. II. Title.
Q180.55.M3C63 2005
506'.8--dc22

2004030956

10 9 8 7 6 5 4 3 2 1

All World Wide Web addresses were accurate at the time of printing.

All Cold Spring Harbor Laboratory Press publications may be ordered directly from Cold Spring Harbor Laboratory Press, 500 Sunnyside Boulevard, Woodbury, New York 11797-2924. Phone: 1-800-843-4388 in Continental U.S. and Canada. All other locations: (516) 422-4100. FAX: (516) 422-4097. E-mail: cshpress@cshl.edu. For a complete catalog of Cold Spring Harbor Laboratory Press publications, visit our World Wide Web Site http://www.cshlpress.com/

LAB DYNAMICS

MANAGEMENT SKILLS FOR SCIENTISTS

For Zoë and Phoebe

Preface

This is a book for scientists and technical professionals about surviving and succeeding in the organizations and groups in which they work. It is also for science managers and executives who want to know how best to manage scientists. If you work with scientists, this book can provide you with a better understanding of the world in which they live and the challenges that they face.

Practical advice and exercises show scientists and science managers how to interact with others in ways that improve their effectiveness and increase their productivity. The book also shows how to apply improved self-awareness and interpersonal skills to specific problems that science professionals encounter every day. If you are a scientist, the skills that you learn will enable you to better identify, focus on, and achieve your objectives. You will become more productive in your job and more successful at what you do, whether your field is molecular biology or astrophysics.

Unless you have well-developed self-awareness and interpersonal skills, all the management tools in the universe will not be of much use to you. If you are a scientist, chances are that your self-awareness and interpersonal skills are not as well developed as your technical skills; this limitation can impede your work. We provide concepts, concrete tools, and exercises that will help you to improve these skills. Our approach is designed to aid you in overcoming the barriers to knowing yourself, what to do, and how to do it.

The book draws heavily on examples and experiences from Carl's 30-year career in science, both in academia and the private sector. It also relies heavily on Suzanne's long career as a psychologist and clinician and her insights into people in general and scientists in particular. Our suggestions and guidelines work. They are all based on techniques that we have tried and used ourselves, and that we have helped others use.

A note on voice: Many of the anecdotes and experiences in the book come from Carl's career and are written in the first person. Thus, in the following, "I" refers to Carl.

Acknowledgments

We would like to express our sincere appreciation to the staff of Cold Spring Harbor Laboratory Press. Their enthusiasm, efficiency, and professionalism have made this project a pleasure from the very start. We would especially like to thank John Inglis, Executive Director of the Press, for his unflagging support and for his belief in the importance of this project. Without John's vision, this book might very well still be seeking a home.

We thank our good friend Alice Sapienza who sparked our interest in this theme and whose own book, *Managing Scientists*, was one of our inspirations. Alice also played an important role in helping to develop the workshops in which much of this book's content was first developed. We thank the American Society for Cell Biology (ASCB) and its Women in Cell Biology Committee for their belief in the importance of the themes of the book and for their sponsorship of Carl's workshops at the ASCB annual meeting for many years. We are especially thankful to Elizabeth Marincola, Executive Director of ASCB, who has been a strong supporter of our efforts and, more importantly, a close and valued friend. Indeed, the genesis of this book can be traced to a short essay entitled "Confronting the Social Context of Science," which was published in the monthly ASCB newsletter with much encouragement (and editing) by Elizabeth.

We thank Libby Koponen for her invaluable assistance in the early stages of the project, for her guidance on style, and for her snappy chapter titles as well. We also thank all of Carl's colleagues who have served as the inspiration for many of the case studies in the book. In particular, we thank Marc Charette, Simon Jones, Doug Kalish, and Per Gjorstrup for their input, support, and friendship throughout the project.

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February 2005

Introduction

The interactions of scientists in the workplace are often fascinating to the lay public because they expose the human element of endeavors that would otherwise be suitable only for textbooks. What is so riveting and at the same time paradoxical about these accounts is the immense impact of human interactions on the process and outcome of a scientific project. James Watson's account (Watson 1968) of his and Francis Crick's rivalry with Linus Pauling, their acquisition of data from and interaction with Rosalind Franklin, and their amusing and fruitful interactions with one another have been eagerly read by scientists and laymen alike. Stories about the effects of rivalries, collaborations, and relationships on the daily conduct of science, which is often imagined to be a purely rational and intellectual endeavor, are endlessly fascinating.

Despite the lively debates and discussion generated by Watson's book, little if any analysis has focused on whether the working relationships among the various protagonists could have been more productive. In this book we have tried to fill that void and, by doing so, show that there are ways to train scientists and run science organizations that improve the conduct of science, facilitate communications, and maximize productivity.

Science training programs are designed to impart technical skills and scientific knowledge to their trainees. The fact that these same programs provide no training in management or interpersonal skills sends trainees the implicit message that these skills are largely irrelevant in science. In this sense, educational institutions have two characteristics in common with most science- and technology-based organizations: (1) a single-minded focus on technology and (2) a lack of appreciation for the importance of social and interpersonal skills.

Among scientists in all fields of specialization is a strongly held belief that if you just get the science right, everything else will fall into place or become irrelevant. Yet experience shows that this belief is false. Analyses of the chemical industry (Perrow 1993), the space program (Vaughan 1996), and military campaigns (Cohen and Gooch 1991) highlight the central role that human interactions and group dynamics have in their success or failure. It has been proposed that the principal reason military commanders fail to learn from military disasters is the tendency of analysts to focus exclusively on technical and logistical explanations for failure (Cohen and Gooch 1991). This narrow focus betrays a naïve indifference to the importance of human interactions and communication and to the individual and organizational characteristics that foster them.

Efforts to train scientists and science managers to function beyond the lab bench often focus on project management, running meetings, doing performance reviews, and team building. Although scientists are efficient at learning the nuts and bolts of manage-

ment—Gantt charts, work plans, etc.—mastery of these skills cannot compensate for poor self-awareness and a paucity of empathy. Without these and other personal and interpersonal skills, managerial functions will be implemented in a mechanical fashion, without heed to individual, interpersonal, or group nuances. Managing in this way makes no more sense than driving a car blindfolded: You may know how to manipulate all the mechanical controls and levers, but you are dangerously blind to context and feedback.

Interpersonal skills can be taught. For some, the abilities to relate productively, to notice how others respond to you, and to forge both personal and professional bonds come naturally. For others, and this includes many science and technical professionals, these skills are not an integral part of their personalities. Fortunately, you do not need to change your personality to become interpersonally savvy.

Interpersonal skills comprise a set of behaviors and responses that can be learned. Such learning can and should be part of the professional education of scientists. In the chapters that follow, I provide examples from my own career, illustrating how adopting some of these skills has influenced my development as a scientist, mentor, and leader.

My experience with the workshops that I have run shows that scientists are eager to learn the skills presented in this book. I have also found that the best way to learn them is to try them, and use them. Despite the fact that many scientists are initially reluctant to test new skills in role-playing exercises, their experimental nature quickly takes over. Most are ultimately convinced by the data—their own improvement as negotiators during the course of the workshop. For scientists, data rule!

It takes practice and skill to be able to observe yourself, capture what you experience, and view your behavior, body language, and facial expressions as others do. It also takes skill to attend to how others act and react to you. These skills include new ways of listening—in a manner of speaking, listening between the lines. The first section of this book describes how to acquire these skills or to improve on those you already have.

The first three chapters of the book provide a set of core skills and concepts that serve as the foundation for much of what follows. Chapter 1 provides you with the opportunity to examine your behavior in the scientific workplace in light of what is known about scientists in general. Two self-assessment exercises help you to discover which facets of self-awareness and interpersonal skills that you need to work on. Chapter 2 offers guidelines and exercises for developing or improving these skills. We teach you to become an active observer of yourself and others, and how that informs you of your feelings, helps you to choose appropriate behaviors, and enables you to assess the effectiveness of new behaviors. Chapter 3 shows how to apply your skills of self-observation, self-management, and observation in the context of negotiation. This chapter presents a framework for using these skills to guide you through the difficult situations you encounter every day. We also show you that learning and practicing negotiation is one of the best ways to acquire and improve your interpersonal skills and put them into practice.

The second section of the book teaches you to apply your new skills and powers of observation to three interpersonal domains: with employees, with peers, and with bosses. Chapter 4 offers methods for improving your effectiveness as a manager or leader of other scientists, and alerts you to the most common problems when managing teams of scientists. Chapter 5 shows you how to use these same skills when dealing with your boss. There we illustrate the most common problems that scientists have with their bosses and the most effective ways of handling them. Finally, in Chapter 6, we show that

improving your ability to recognize and deal with conflict, along with practicing the skills you learned in previous chapters, will improve your ability to interact productively with peers.

The final section of the book addresses special management problems associated with the organizations in which scientists work and study. Chapter 7 describes how trainees and mentors can use self-awareness, observation, and interpersonal skills to survive in and improve the academic training experience. Chapter 8 shows how these same skills, as well as an understanding of the unique challenges that accompany the transition from academia, can improve the productivity of scientists in the private sector. Finally, Chapter 9 provides a review of the skills we have presented using an extended case study. This last chapter also suggests ways in which you can use the concepts and tools we have introduced to improve the practice of science and productivity in your own organization.

At the end of each chapter, we provide exercises and experiments designed to help you acquire and practice the skills that we present. In some cases, the exercises are in the form of experiments that allow you to use and evaluate the effectiveness of new behaviors. Use the ones that work for you.

If you believe that there is more to leading in science than intimidation, more to interacting with your peers than jockeying for advantage, and more to working with your boss than being defensive, you will find this book valuable. If you believe this but haven't a clue as to how to change your behavior, read on. The skills that you will learn will enable you to better identify, focus on, and achieve your objectives, making you more productive and effective. Finally, and perhaps most important, you will learn to accomplish all of this in a way that promotes openness and trust in your interactions with others.

REFERENCES

Cohen E.A. and Gooch J. 1991. *Military Misfortunes. The Anatomy of Failure in War*. Vintage/Random House, New York.

Perrow C. 1993. *Normal Accidents: Living with High-risk Technologies*, 3rd edition. Princeton University Press, New Jersey.

Vaughan D. 1996. *The Challenger Launch Decision: Risky Technology, Culture, and Deviance at NASA*. University of Chicago Press, Illinois.

Watson J.D. 1968. *The Double Helix: A Personal Account of the Discovery of the Structure of DNA*. Atheneum, New York.

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CHAPTER 1

People Who Do Science: Who They Are and Who They Can Be

In terms of behavior patterns, affect and even some intellectual matters, we know more about alcoholics, Christians and criminals than we do about the psychology of the scientist.
MAHONEY (1979)

We are all familiar with the stereotypes of scientists portrayed in movies, television, and paperback thrillers as aloof, arrogant, intense, and distracted. Each of us is, of course, much more complex and nuanced than such simplistic characterizations, but like most stereotypes, these all have a kernel of truth in them. Scientists as a group do have personality characteristics that distinguish them from, say, social workers as a group. Although you may not share every one of these characteristics or the others discussed below, you likely share some of them. Much of this book focuses on helping you to discover which of these characteristics you share and anticipating how they may affect your behavior as well as your effectiveness as a scientist.

Many of the exercises that we present at the end of this and subsequent chapters focus on helping you to improve your interpersonal awareness and self-awareness. We focus on these two characteristics in particular because we know from personal experience that these represent areas in which many scientists are weak. We have also supplemented our personal experiences with a review of the psychological literature pertaining to the personality characteristics of scientists. Our objective in presenting this information is to help you notice and identify in yourself some of the traits that have been noted in others. As you read the following sections, take note of those characteristics that sound or feel familiar, or that others may have noted that you display. At the end of the chapter, we provide a brief questionnaire to help you to identify some of these characteristics of which you may not already be aware.

TECHNICAL PROFESSIONALS ARE DIFFERENT

The Tea Bag Company exercise

Applying the stereotypes mentioned above to all scientists seems, and certainly is, both crude and extreme. But before we dismiss such categorization out of hand, perhaps we should ask just how much truth there is to these and other popular notions of scientists as a group. The following story recounts how I first became convinced of the presence of many of these characteristics in myself.

A number of years ago, when I first became interested in improving my management skills, I took a course at the Harvard University Extension School. The course was entitled "Understanding Your Management Style," and it was taught by Robert Benfari, who had written a book of the same title (Benfari 1991). The course was intended to give students some insight, from a psychological perspective, into how they approached the tasks inherent in managing. I enrolled in this course largely because nothing else about management was offered in a time slot that was convenient for me.

During the first couple of classes, Dr. Benfari spoke at some length about "personality types" and the utility of assigning people into one of 16 categories using the Myers-Briggs Type Indicator (MBTI) inventory, a widely used and much studied psychological instrument (Briggs Myers and Myers 1995). In fact, we had taken this inventory during the first class, but had not seen the results yet. Being a scientist and a skeptic, I spent a lot of time arguing that such categorization was artificial, simplistic, and without validity.

Our third meeting consisted of an in-class exercise. Dr. Benfari read our names from a list that he had prepared, and in so doing divided us into four or five groups. He told us that within our groups we were to come up with a plan to address and solve an organizational problem that he would pose for us. He had also assigned one student from each group to observe how the group went about its task, without participating. He referred to the exercise as the "Tea Bag Company" exercise.

Each group was to put itself in the role of senior managers of Tea Bag Company, Inc. As managers, we had just learned from our sales and marketing department that our sales were down catastrophically over the last two quarters. Our task was to determine a solution to this problem. We would have 45 minutes to work on the problem within our groups, and then each group would report to the class on what they had decided to do.

Within my group, several members immediately suggested that we convene near the white board so that we could use it to organize our strategy. We did so, effectively preventing any other group from accessing the board. Within a few minutes, my group was intensely involved. Members were interrupting each other, talking in loud voices, and grabbing the marker from one another to write on the board. We all agreed that we needed to take an analytical approach to the problem. We mapped out a marketing survey to determine whether consumers' tastes had changed. We allocated resources for analytical testing of our tea bags to see if quality had slipped. We crafted a backup plan to move into coffee, if that seemed prudent. We were really very efficient and logical, and completed our task easily within the allotted time.

After the 45 minutes, Dr. Benfari reconvened the class, instructing us to report one group at a time. My group was asked to report first. One of us outlined the series of log-

ical steps we took and how we focused on objective measures of success and economic outcomes. The observer accurately described our deliberations as being lively and competitive, and noted that we all jockeyed for board time, interrupted one another, and spoke more than we listened. This was not suprising to our group; it was how we behaved all the time.

Dr. Benfari then asked the second group to report. The spokesperson for that group said that the group's primary concern was the welfare of the employees of the Tea Bag Company. The group believed that since the problem was so acute, a plan should be in place to ensure that if the company were to go under, the employees would be provided for; they would have adequate outplacement services, and health benefits would continue for as long as possible. They also scheduled an emergency stockholders meeting to allay the concerns of the company's investors. They did start to deal with how to address and fix the sales problem, but had not progressed very far when their time ran out.

I recall listening to this presentation and thinking that these people must have landed in corporate America from the Moon. I was baffled by their approach. I was further baffled when the observer assigned to that group reported that the discussion had been quiet and respectful. The observer said that group members waited for one another to finish speaking before speaking themselves, and that one member of the group had gone out and brought back sodas for the whole group during their discussion.

After the other groups reported, it became clear that a very wide spectrum of approaches had been taken. But none was so remarkably different from my group as that of the second group that had reported.

When all of the reports had been delivered, Professor Benfari told us that he had composed the groups using our personality types as determined from the MBTI inventory that we had taken during the first class. He said that my group was dominated by "NTJ" personalities, which in Myers Briggs jargon stands for intuitive, thinking, and judging. We do not need to go into the arcana of the Myers Briggs categories; suffice it to say that NTJ people are the typical scientist types (for a more detailed discussion of MBTI types and how they relate to a chosen profession, see Tieger and Barron-Tieger 1992), who have a tendency to be highly intuitive (N), analytical and logical (thinking: T), and can be very judgmental (J).

The second group in the class was composed largely of members determined to be "NFP"—or close to it. NFP stands for intuitive (N), feeling (F), and perceiving (P). NFP people are highly relational and outgoing, and use their feelings to come to conclusions (intuitive). They react to the world in a feeling mode, rather than a thinking or analytical one. In other words, they are in many ways the exact opposite of the NTJs.

I was completely dumbstruck by this revelation. None of us had known the basis on which we were placed into our respective groups. We all went about working on our task in ways that came naturally to us and we behaved precisely as the MBTI would have predicted.

People really are different, and they are different in ways that can be described and measured. As much as I hate generalities and categorization, I know that I and many of my scientist colleagues are NTJs or STJs. The "S" ("sensing") suggests that some of us have a more data-driven way of coming to conclusions, compared with the Ns, who are more intuitive. And I also know that we work in ways that are different from how NFPs and many others work. I became a believer in the MBTI, not as a diagnostic or classifica-

tion tool, which is how it is typically used, but as a tool for insight into myself. Do not be fooled into thinking that just because the MBTI can identify people who share behavioral characteristics that it should be relied on to choose a profession or direct others into a profession. As has been amply noted, most recently by Annie Murphy Paul in her book *The Cult of Personality: How Personality Tests Are Leading Us to Miseducate Our Children, Mismanage Our Companies, and Misunderstand Ourselves* (Paul 2004), the predictive value of these tests is overrated and the tests themselves overused.

We refer to the MBTI only for the purpose of illustrating that scientists as a group are superb at focusing on tasks, but less attuned to the interpersonal. To go about managing scientists without taking into account who they are as people, and how their personalities differ from other types of people, is like trying to train a pack of tigers using a training manual meant for parakeets.

What research shows about the personalities of scientists

The Tea Bag story suggests that scientists and technical professionals share certain behavioral characteristics. In the following section we review a few of the studies that have attempted to identify these characteristics. Despite the fact that the quote at the beginning of this chapter suggests that there is a paucity of such data, the data that exist are revealing.

The opening quote was cited in a comprehensive review of the psychology of science and scientists by Feist and Gorman (1998). This review contains references to more than 150 scholarly publications relating in one way or another to the psychological characteristics of scientific and technical professionals. The following is a list adapted from that article, and compiled from the literature of experimental psychology, that compares the personalities of scientists to those of nonscientists.

Compared to nonscientists, scientists are

- More conscientious and orderly
- More dominant, driven, or achievement oriented
- More independent and less sociable
- More emotionally stable or impulse controlled

A bit more intriguing is the summary in the same article of the differences in personality between "eminent" and "less eminent" and "creative" and "less creative" scientists (let us not obsess here over how eminence and creativity were quantified). According to the article, compared to less eminent and less creative scientists, eminent and creative scientists are more

- Dominant, arrogant, self-confident, or hostile
- Autonomous, independent, or introverted
- Driven, ambitious, or achievement oriented
- Open and flexible in thought and behavior

Beginning to get the picture? Of course, there is always the issue of cause and effect. Does a career in science promote arrogant, antisocial behavior, or does science attract

those who already have a tendency to exhibit these characteristics? Feist and Gorman take the safe middle road and suggest a bidirectional interaction between personality and science.

In another publication, Greene (1976) reported that "The psychological problems most frequently encountered with...scientists stem from (a) communications difficulties, (b) confusion about the role of the expert, (c) emotional and interpersonal needs, and (d) failure experiences."

In a study of 99 academic researchers (all full professors), Feist (1994) concluded that "[eminent scientists]...were rated by observers as more exploitative, more fastidious, more deceitful, less giving, and less sensitive to the demands of others... . In sum, complex thinkers about research are influential in their discipline and are well cited, but are considered by observers to be neither warm nor sociable."

Finally, in a study of 100 technical project team leaders (in unspecified technical areas) Gemmill and Wilemon (1997) listed the top ways in which scientific and technical project team leaders misread events within project teams. These leaders

- Were unaware of interpersonal conflict among members of the team
- Were unaware of hidden agendas on the part of team members
- Did not understand the motivation and needs of team members
- Were unaware of expectations of team members
- Did not listen carefully to team discussion
- Misread lack of argument as agreement
- Interpreted conflict as unhealthy when it was actually constructive
- Misread team members' ability to work together as a team

So, at the considerable risk of overgeneralization, the data suggest that as a group, science and technical professionals are poorly attuned to the dynamics of their interactions with others and to the needs and feelings of those around them.

WHY YOU SHOULD PAY ATTENTION TO YOUR PERSONALITY

If the only consequences of exhibiting some or all of the traits mentioned above were that you might be viewed as being aloof and uncaring, you might be excused for having little or no motivation to take note of them in yourself. However, the consequences of such traits and the behaviors they engender can be far more profound, even to the point of being dire. Let us examine some hypothetical consequences in the science workplace of a few of the personality traits identified in the studies cited above. These brief vignettes outlining the consequences of behaviors, which were found to be common among scientists, are based on actual cases.

String together enough outcomes like those listed below and before you know it, the people in your group, company, or organization are confused and alienated, projects are foundering more often than they should, and decisions are being made for other than scientific reasons.

Trait	Consequence
Dominant, driven, or achievement oriented	You forge ahead on projects with your own ideas, listening politely but usually failing to take into account the suggestions or objections of colleagues or employees. Most of the time, this works well because you know more than they do. But the one time that you do not, you continue to follow your own agenda and end up spending millions of dollars on a failed project that you should have abandoned two years ago.
Arrogant or hostile	Of course you are arrogant: You are the smartest, most accomplished scientist in the company. But when it comes time to seek the support of others for a controversial new technology that you want to acquire, you find yourself isolated and without support. The technology is actually just what your company needs, but because you have created enemies with your arrogance, you cannot get anyone else to agree with you. The company suffers and so do you.
Introverted	Paying attention to other people is a distraction. It takes you away from your work. Moreover, it is hard, and you figure that people are complicated and unpredictable. You fail to notice that, over time, people are excluding you from their informal discussions because you would rather be in your office analyzing data. The result is that you do not hear about the new project until the formal announcement is made, by which time all the team leaders have been selected. You wonder why you were left out.
Less sensitive to the needs or demands of others	You figure that just like you, everyone has their own agenda, and it is pretty hard to figure out what that agenda is. You have always felt that people complain all the time—it is only natural. One day your senior and most valuable postdoc announces that she is leaving in three weeks for a job in industry where the salary is higher and the advancement prospects are better. You recall that over the past several months, she has been asking you about a salary increase and whether you would support her for a faculty position, but you kept putting her off. Now you are faced with the prospect of a major setback in your most important research project.
Unaware of interpersonal conflict among members of the team	You hired Alice and gave her the same project as Axel because you thought that competition would drive them both to work harder. The result was that Axel hoards reagents and signs up for equipment time that he does not need to prevent Alice from getting the better of him. Others in the lab mention the brewing conflict, but you shrug it off with the comment that the competition will make each of them stronger. Three months later, Alice goes to human resources and files a sexual harassment complaint against Axel. The resulting turmoil sets both of them, and the lab, back a year.
Unaware of hidden agendas on the part of team members	You are trying to decide on the appropriate version of a recombinant protein with which to go into production. The director of protein expression has been arguing vehemently for version 2C, whereas others in the group believe that several other variants are more appropriate. You believe that everyone is arguing the case for each variant on its merits. Months later, you learn that the reason the director was arguing for 2C had nothing to do with its scientific merits: He had prematurely anticipateded the use of 2C and had his group produce several grams of it. Had you known this, you might have reassured him that you would have been happy to sacrifice the produced 2C in favor of making the best choice.