The Presentation of Occupational Self in Science

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I examine the ways in which scientists create and present self-identities. Previous work, in particular research on social stratification in science, has underplayed identity and its contextual variations. I draw upon interviews with scientists who work in two distinct types of American universities, which provides a comparative basis on which to study identities in different contexts of scientific practice. I focus on three aspects of careers, which ground my comparative analysis: commitment, mobility concerns, and the uses of work history.

KEY WORDS: identity; work; science; higher education.

The “social construction of scientific knowledge” is a present preoccupation in sociological studies of science. “Constructionism” consists generally of a line of inquiry that is concerned with the social conditions and processes that selectively shape what comes to count as “scientific” knowledge (for elaboration, consult Shapin 1995 and Zuckerman 1988).

I venture anew: I investigate how scientists construct meaning of themselves. The construction tradition has to-date focused on knowledge, whereas I will focus on scientists—the people who produce the knowledge, regardless of how selective it may be. What we gain, in addition to a new perspective, is an in-depth look at how scientists identify with their work.

Although my undertaking differs in many ways from those in the “constructionist” vein, there are points in common. While one may look at knowledge and another at people, both are inquiring about socially situated circumstances that shape “reality” (Berger and Luckmann 1966). Those in-

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interested in how people create meaning about the natural world should find interest in how people create meaning about themselves and their place in that world.

Scientists were the subject of an older line of inquiry spawned largely by Robert K. Merton and his students. Yet work in this tradition concentrated on matters such as performance patterns, reward systems, and the nature of stratification in science (e.g., Allison, Long, and Krauze 1982; Cole and Cole 1967; Crane 1965, 1969, 1970; Hagstrom 1971; Hargens 1969; Long 1978; Merton 1973a; Zuckerman 1977). It said little about what I will discuss here—identity and the symbolic meanings of work. Moreover, that work was heavily quantitative and rather distant from the interpretative analysis that will guide this inquiry.

Not since Anne’s Roe’s 1952 study, The Making of a Scientist, and Bernice Eisdon’s 1962 work, Scientists: Their Psychological Worlds, have we become acquainted with what scientists’ lives are like. But those works were heavily psychological in perspective. They sought generalizations about the personalities of scientists through psychometric evaluations. However, people—their careers and lives and the social contexts in which they take shape—potentially appeal to broader interests; lives, clearly, are something we all have in common.

BACKGROUND

Identification does not occur in isolation, but is rather socially situated in the environments in which people interact. What is more, different contexts of science provide a comparative basis on which to see how scientists know and show themselves to others. I examine how scientists identify with their work by investigating local contexts of scientific practice. In this instance, contexts refer to academic departments in which scientists work and the universities in which they are housed.

Work on social stratification in science is most germane, since it, too, has been concerned with different contexts or “strata” of scientific practice. The citations above exemplify this work; Cole and Cole’s (1973) Social Stratification in Science provides perhaps the most thorough treatment.

Much of this research has been inspired by Merton’s theory about the normative structure of science ([1942] 1973). According to this theory, science has an “ethos” guided by four norms: universalism, communism, disinterestedness, and organized skepticism. Research on stratification has stemmed from a sustained interest in universalism, which stipulates two related requirements. First, the norm holds that when a scientist contributes to knowledge (primarily through publication), the science community’s as-

essment of the merits of the contribution should not be influenced by personal or social attributes of the contributor. Second, the norm holds that a scientist should be rewarded in ways that are commensurate with the measure of a contribution. Universalism is set apart from particularism, which involves the use of characteristics, such as sex, race, and age, as a basis for assessing contributions and rewards. Illustrated by these many works, researchers have investigated precisely how the reward system in science operates, and what consequences its functioning has on matters such as the job placement of Ph.D. graduates, promotion, tenure, productivity, and recognition (see also Cole 1992, and Long and Fox 1995).

As much as these studies have told us about the process of stratification in science, we know remarkably little about the detailed meaning that makes up “what life is like” on the inside. While the “ethos” of science may speak about the norms and values that guide all scientists in their conduct toward research and researchers, whether or not one is active in research, the “ethos” does not speak about separate norms and values that set apart distinct settings of scientific practice.

While universalism, which emphasizes research productivity, has typically led researchers into the stratification area, a vast portion of the science community is not active in research (Gusten 1973; Zuckerman 1988), and it is improbable to explain their performance solely on the basis of how effectively universalism operates in science. More likely, scientists, like people of other social institutions, display varying commitments. Science may be universal in the scruples it prescribes for its practitioners, but highly particular in the kinds of orientations people develop toward their work.

The remainder of the discussion is organized as follows: I will first explain the method and design of the study. I will then turn to the heart of the empirical analysis, which consists of three facets of careers that surfaced as comparative means to gain leverage on self-identity and work: commitment, mobility concerns, and the uses of work history. Finally, I will conclude by discussing implications for thinking about science as an occupation.

METHOD AND DESIGN

This study is based on interviews with twenty-nine scientists selected at random from a set of physics and chemistry departments at four universities in the United States. These scientists agreed to participate in the study after being contacted first by letter and then by phone. Following the basic fieldwork precept, I conducted as many interviews as were necessary to reach a “saturation” point, that is, until there was sufficient data to address the research questions. The interviews took place in the winter
of 1993, averaged an hour in length, were tape-recorded and subsequently transcribed.

The departments themselves were selected first for convenience: all are at universities in the same geographical area. Further, two of the schools rank in the top quartile of doctoral-granting departments assessed by the National Research Council (NRC) (Jones, Lindzey, & Coggleshall 1982. The ranking of these departments is consistent with the NRC's more recent assessment in Goldenberg, Maher, and Flattau 1995.). The remaining two schools are unranked in physics and chemistry because they do not confer doctoral degrees in these fields and were thus ineligible for the NRC assessments. I selected this grouping of schools in order to compare the interplay between local occupational culture and self-identity.

For comparative purposes, I classify the universities by two types: elite and communitarian. The elite type includes two institutions that place a high premium on research. The communitarian type consists of two institutions that have traditionally placed a strong emphasis on teaching, although the physics and chemistry departments in both schools maintain (non-doctoral) graduate programs in which research plays an important part.

In each of my interviews, I asked scientists about their aspirations in order to see how they orient themselves to their work. Additionally, I asked the scientists about how they perceived their professional standing and about career problems. To help contextualize the accounts, I gathered curricula vitae from the scientists.

COMMITMENT

Commitment to Work Roles

The construction and presentation of an occupational self is accomplished within the settings in which individuals interact (Goffman 1959, 1967; McHugh 1968). We can begin investigating how scientists identify with work by looking at the roles they most often perform and value. In identifying these roles, we map the symbolic boundaries within which these individuals establish meaning about themselves and their work. When through, these boundaries allow us to understand presentations of occupational self that characterize and distinguish one group from another.

The parameters within which elites operate are primarily determined by a focal research role. Teaching and other duties normally occupy subordinate roles and often used to disseminate research:

[Teaching commitments] are important to me but they are taking me away from what I really came into this game to do (physicist, early forties).

Elites emphasize graduate education in their accounts, and thus the teaching roles of greatest significance normally occur in interaction with graduate and post-doctoral students in the lab or other research contexts. Graduate and post-doctoral students and, on rare occasions, undergraduates, represent a crucial supply of inexpensive labor for the advancement of scientists' research.

They have to work on what interests me or else they are fired. In science the faculty pays its students by government grants, so they don't have to worry about salary or anything like that. Since they work with me and since I have certain interests I want to achieve and since they don't know [much as young students], they work. I tell them 'this is the current problem in particle physics and we have a chance of solving it and I would like you, if you want to work with me, to solve this' (physicist, late thirties).

The centrality of the research role dominates images of occupational self among elites. Qualities associated with originality—being on the “cutting edge,” creative, and significant—animate how they would like to be viewed by the wider scientific community.

[I want to be seen] as somebody who has important ideas that you have to pay attention to. I think ideally any scientist would like to be in a situation which I will put this way: When I pick up a journal and look quickly to see what is there and when I look through the list of authors, I know right away that there are some papers I don't have to read. I know who the people are and it won't be important. And there are others whose papers I will turn to right away because the chances are that anything they write has a high probability of being important. I would like to be in that second category (chemist, early sixties).

The research role that elites adopt is highly professionalized, in the sense that all of the scientists received advanced training in specialized areas over extended periods of time and developed expert knowledge. Elites are most often specialists in one or more esoteric sub-fields of their disciplines and were facile in providing arcane references to the territory on which they laid claim.

By contrast, commitment among communitarians is diffused across primarily teaching and applied service roles, and usually secondarily (or not at all) in research.

[I want to be seen] as a good teacher, somebody that has had an impact to make a difference. And that I have seen. I think even my husband recognizes it: we are out at a restaurant or we're out shopping and a former student comes up and tells how much an impact I've made, the fact that I did a little something in a course made the difference. That's my reward—[working with students] and seeing that it has made a difference (chemist, early fifties).

Communitarians showed a long-term commitment to local community and public service roles that require general, rather than specialized, training. These often included roles in promoting local science education at the
primary and secondary levels in which they assumed roles in high school science teacher training and the judging of science fairs.

Whereas originality in work figures prominently in the narratives of elites, *competence* or basic understanding of science is stressed by communitarians. These differences in values and actions correspond to distinct rhetoric about the personal attributes perceived to be most important for success as an elite or communitarian. Communitarians emphasize benevolence which they view as central in their roles as science educators.

[I want to be seen] first of all as a nice person and secondly as someone who is competent, who hasn’t screwed up (physicist, mid-fifties).

There is a wide sense among communitarians that those who are not “friendly,” “helpful,” and “approachable” do not belong. Not only are these qualities embedded in the work culture, they are crucial for structural reasons as well: communitarian institutions have missions, and are heavily dependent on, a stable supply of students who seek personalized attention.

These qualities stand in sharp contrast to interpersonal conditions among elites. Aggression and outward demonstrations of appearing unsympathetic characterize trappings of mobility. Moreover, these characteristics provide a front of personal legitimacy so that the individual (both scientist and student) is perceived by others as a “serious” player. This rhetoric is especially evident in how elites describe their interactions with each other as well as in the values they attempt to instill in students:

As far as career success, there’s the meek versus forceful personalities, [which] I think plays a large part. Pursuing scientific research and getting your ideas not only understood but getting them accepted enough to pursue experiments...There are people I’ve come across who are just too meek that they can never bring themselves to forward their own ideas, and I think they get channeled into something else—into pursuing science along the level of maybe a senior scientist as opposed to a professor, a person who is more or less a minion of someone else. I might comment that in my own experience I consider myself a not terribly forceful person and I was certainly very mild-mannered as an entering graduate student and I attribute to a large degree my rapid success in the field as due to a very gruff thesis advisor who kind of snapped me into playing the game the right way. He was very forceful, very obnoxious, very pushy. He was a person who pushed his students very hard and I guess I kind of reached my breaking point one night in the lab at four in the morning. We had words. Ever since then, actually, we’ve had both a greater respect for each other but also I guess something within me adjusted saying: Okay, this is how you have to play the game (physicist, early forties).

**Commitment to Occupation**

Elites’ careers are patterned by a strong commitment to science as a profession. Their careers consist of more or less continuous movement along a research pathway that entails high degrees of specialization. In other words, elites tend to be *morally committed* to the goals of science as an institution, to the production of certified knowledge (Merton [1942] 1973). Scientific research is valued as an end in itself. This type of commitment operates as a mechanism of social control such that elites both encourage *and* press each other to be productive in research over the course of their careers. Those whose productivity lags significantly or who cease activity in research altogether are often viewed in negative terms, as will be evident in later passages.

By contrast, communitarians demonstrate a *utilitarian commitment* to science. They often see their careers in instrumental terms, as a means to what are usually several practical ends. Although teaching is the main *occupational* role with which communitarians primarily identified, their narratives are also marked by intervening extramural roles that draw commitment outside of science. Families, hobbies, early retirement, and career change occupy prominent positions in communitarians’ narratives.

Chemistry has not been my primary motivation somehow. I think it has been more of a means to an end. I supported and raised my family. I think that's probably my main source of satisfaction or realization, that what I have valued is this incredible success of my family, much more than any of my students. This position has allowed me to raise my family in a way that I think was probably better than if I had to work eight hours a day doing the same things all the time and as a matter of fact lately...I'm really looking forward to retirement. I mean I'm only fifty-five, but I really would like to do something else. I keep telling people that if I could afford to, I'd retire right now. I'd like to study piano and music theory and all that stuff. I think I could do that full time and be very happy as long as I had the money to feel comfortable, and at this point I don't, so that is what keeps me from doing that (chemist, mid-fifties).

Communitarians’ image of science—and their role in it—suggests that work “has a proper place”; work ought to be seen in conjunction with activity in other life domains.

I think after realistically appraising how other people [are], I didn't feel I had that capability in me [to achieve more]. I don't know what I would have had to give up to do it. Would I have had to give up my family life? I didn't want to be here seven days a week, twenty-four hours a day. I have five kids and I feel an obligation, a commitment that I made to my wife that I'd be there (physicist, mid-fifties).

**Commitment as Self-Inscription**

Occupational and non-occupational roles intersect in communitarians’ narratives; elites keep them strictly separate. A further avenue of self-presentation is the vitae or resume. These documents cast additional light on the parameters of occupational life to which members of a group assign
social significance. They allow one to view activity in a career and provide some indication of the areas to which people show commitment.

Elites’ vitae are normally organized into several parts, most of which have some reference to science, especially research. In addition to the person’s name and addresses, and sometimes date and place of birth, marital status, children, citizenship, and military service, the vitae typically include sections on academic appointment and employment histories; areas of professional interest and expertise; honors, awards, memberships; invited and contributed papers; and publications. Elites’ vitae are academic, usually with no references to extra-professional roles or involvement. They are easy to read, even though the technical titles of manuscripts may be inaccessible to outsiders. The relative lack of variation in how they are prepared and presented illustrates a standardization.

Communarians’ vitae follow different patterns, the most striking of which is the inclusion of non-occupational activities. The vitae of a chemist in his mid-fifties read:

Service to the Community: I have managed Little League Baseball, assisted high school students with Westinghouse projects, performed in shows as member of Barbershop Quartet, played trumpet in several Community Bands.

And that of a chemist in his late fifties:

Exhibited photographs in various group shows over the years, most recently by invitation in the show; “Lithuanian Expatriate Photographers” at Vilnius University, Vilnius, Lithuania, November 1989-January 1990, and Siauliai Museum, 1990. As a result of the entries submitted I have been invited to submit a one-man show at my earliest convenience. A selection of the exhibited photographs has been published in the cultural magazine ‘Krantai’.

Over sixty percent of communarians listed extramural activities on their curricula vitae. Parameters of the career were constructed such that non-occupational roles penetrated the traditional occupational boundary. For elites, occupation means vocation; for communarians, it often includes avocations.

Commitment as Pride

Scientists were asked to discuss a particular accomplishment that left them feeling especially proud. They spoke about specific accomplishments in response to a question that was used, quite simply, to conclude the interview on a positive note. Responses to the question, however, added unexpected information about how they view and present themselves. In effect, all respondents were “exposed” to the same “stimulus,” but responses broke along elite/community lines. An occupational-extra-oc-

Occupational Self
cupational axis again surfaces, which is indicative of separate value systems between groups. Elites discussed research, usually in abstruse detail.

To give you one example of satisfaction, in 1972 when I started working on the theory of black holes, it was one problem which had been left open, which I knew before. You have to separate equations governing a problem and this is the Dirac equation in the theory of electrons and nobody ever solved it...I told myself, why not try this problem? Well, I finally had the problem formulated on my desk one afternoon and solved it later that same day. Well, obviously the fact that it had been left unsolved for so many years and you solve it, it gives some satisfaction (physicist, early eighties).

By contrast, communarians invoked non-occupational domains, highlighting again the significance assigned to these roles in their conceptions of self.

To raise six American kids so that all of them get Ph.D’s and are good people. I can’t imagine them taking advantage of somebody. And that’s by far the most important accomplishment I had to do with...If I want to feel self-worth, that’s what I would look at more than anything professionally (chemist, mid-fifties).

Finally, there is the instance of vicarious accomplishment, aspiration channeled through progeny, constituting a kind of extended ego.

I’m proud of my daughter. She’s doing a Ph.D. in physical chemistry at M.I.T. She graduated from the University of Chicago. She was a very bright student. She had a full scholarship at the University of Chicago. So she’s doing a Ph.D. and she’s doing very well and so I’m kind of proud. That is what I didn’t accomplish before, and she will (chemist, mid-sixties).

Table I lists the percentages of elites and communarians who provided professional and/or non-professional examples of accomplishment.

The rhetoric of scientists involved clearly breaks along group lines. Elites may of course accrue a variety of non-professional accomplishments, but they were not inclined to discuss them. What is noteworthy in the narrative and numbers above are the norms operating in each social world that govern the presentation of occupational self. A norm among elites restricts the content of activities and types of roles that can penetrate the career. A norm among communarians allows for a presentation of self in which work plays a co-equal, and sometimes minimal, part.

<table>
<thead>
<tr>
<th>Table I. Type of “Most Proud” Accomplishment by Type of Scientist</th>
<th>Elite</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>80.0%</td>
<td>38.5%</td>
</tr>
<tr>
<td>Non-Work</td>
<td>10.0%</td>
<td>61.5%</td>
</tr>
<tr>
<td>Both</td>
<td>10.0%</td>
<td>0.0%</td>
</tr>
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MOBILITY CONCERNS

Elites are organized by collectively understood symbols of achievement that push and pull them along research paths. The importance of upward mobility among elites stems largely from the value assigned to scientific achievement. Communitarians are organized by symbols of community—most apparent in their master roles as teachers. An ethic of shared responsibility transcends individual mobility preoccupations.

Reference Groups & Interpersonal Dynamics

Achievement among elites is highly age-graded: scientists understood the significance of passing certain markers at points along the career that distinguish successful scientists from their less accomplished peers (e.g., promotions, receipt of awards, honors, election to academies, etc.) (Cole 1979; Neugarten, Moore, and Lowe 1965). Achievement in science is defined among elites in terms of a next attainable career stage and carries with it strong images of forward movement, advancement, and progress. One finds the greatest degree of competition among elites, for one’s identity in this context relies heavily on progressive attainment.

My goals [are to be] an absolute success, having a successful career which means having recognition. I want to eventually enter an academy, to receive awards, basically to be recognized by my fellow scientists as someone who made a significant contribution to his field. You can say that there are long-term and short-term goals. These are my long-term goals. My short-term goal is to get tenure at this university, advancing in my tenure-track position. Then I guess it’s membership to some academy. That would be the next stage. I’m not at the stage of the scientist who wins the Nobel Prize or one of those prestigious prizes (chemist, early thirties).

For the young physical scientists who win them and for others who wish they had, a small set of notable fellowships—the Packard, Sloan, Dreyfus, and Presidential Young Investigator awards—symbolize promise and are thought to propel the career, bringing additional rewards (Merton 1973b). Similar age-graded markers existed for scientists further along in their careers, such as promotion to full professor, elected membership to the National Academy of Sciences or American Academy of Sciences.

Strong sanctions were imposed among elites to elicit scientific achievement over the career, suggesting that scientists who stalled on the research pathway would be stigmatized and isolated by their more committed peers.

We measure a lot of our scientific productivity in terms of published papers. If I have someone I see whose own research is a major part of their, is supposed to be a major part of their occupation but no research is being done, no papers are getting published—that’s certainly not a good thing...I had a case [of someone] a few years back who is now retired. For the last twenty years of his career he did nothing and this can’t remain a secret. Everyone knows about such things. He was, I guess, unhappy about that kind of situation...There wasn’t much one could do. To some extent one can try to encourage a re-ignition and I had an opportunity to try that. In this case I was department chairman...so at the time I did what I could to try to stimulate some activity, but I didn’t have any effect. You’ve got to retire eventually if that’s the way you are (chemist, mid-sixties).

Mobility concerns among communitarians were less pronounced in part because fewer age-graded markers exist in the work they do. Teaching is by and large non-hierarchical (Lortie 1975). Consequently, pathways of mobility are less clear; they are not institutionalized as they are in careers that more closely approximate a research model. Whereas mobility among elites was more or less consistent and predictable, communitarians were more likely to get stuck at intermediate career stages. Nearly one-third of the communitarians over the age of fifty held rank below that of full professor, including one at the rank of assistant professor. Their immobility caused apathy and strong feelings of resignation.

I don’t think I’ll ever become a full professor or get into current physics enough to do that. It’s a knife in the side once in awhile in saying ‘I guess I’ll never do that’ (physicist, mid-fifties).

Elites’ careers are hierarchically ordered such that individuals use members of their birth cohorts as reference groups to assess and form conceptions of their aspirations over their careers.

[My colleagues] see me as someone who is just starting out. I think they realize I’ve gotten off to a relatively slow start compared to some other people...that’s mostly my perception. I know how I’m doing compared to other people. We have a lot of junior people coming through here that we are thinking about hiring, so I can compare myself to those; people who I went to graduate school with who are at other universities now. We have another junior faculty member who is right down the hall who we hired the year after I was hired. He’s off to a very fast start, so I think I have a pretty accurate idea of how I’m doing. I would like my colleagues to see me as someone on their intellectual level, and that’s going to take time. It just takes many years for young people to gain that status. I think they don’t see me as an intellectual equal at this point in my career, and I wouldn’t expect that. They don’t have respect for their junior colleagues like they do for other people in the department. I think they’ve shown me as much respect as they do anyone else at this level, and that’s perfectly fine. I think they respect my ability, my potential, otherwise they would not have hired me (chemist, mid-thirties).

Shifting reference groups can be ascertained from scientists at different career stages. A physicist had by his early eighties won so many awards, including a Nobel Prize, that the personal value attached to them was modestly said to depreciate with their accumulation. The most eminent scientists looked hard for reference groups that contained members of similar status and ability. These tended to be dead scientists—the heroes of the discipline—people whose life and work have been immortalized by a mystical legacy.
When you take some of these honors—for example, I was elected to the Royal
Society when I was thirty-four. Well, I don’t want to pretend that I was not pleased.
I was pleased because what honors represent to me, at least, is that your
contemporaries understand your work, think well enough of you, appreciate it
equal to think you are worthy of that. But after a certain stage, all of these things
mean nothing at all...I don’t have any stature in the following sense. I’m reading
Newton. How do I feel? I feel like a boy standing in the zoo and seeing the lion
for the first time! So you see, in science, there are people so far ahead of you
(physicist, early eighties).

The place where one sees what others have achieved sets achievement
standards (Coleman 1969). Communitarians were more egalitarian with
fewer age-graded distinctions along the career. Elites were more stratified
by age-graded accomplishments, and because scientific achievement is cen-
tral—both for acquiring legitimacy and maintaining it—concerns about mo-
bility were equally paramount.

USES OF WORK HISTORY

Objective Features

Work histories are parts of people’s pasts that continue—in degrees—to
play themselves out in the present. If one is to examine how occupational
selves get constructed, one must take into account the points leading up
to their presentation in the present. Before accounting of the ways in which
scientists use their work histories, though, we must establish their objective
features.

Elites typically followed career paths that involved several related, and
usually uninterrupted, steps. The path included attendance at an elite
graduate school; holding one or two post-doctoral appointments at a re-
search university, normally for two to five years; followed by a faculty ap-
pointment at a research university. The universities in which elites received
their graduate training and held post-doctoral and faculty appointments
tended to overlap, comprising a relatively small scientific community whose
members are in more or less continual interaction and competition with
one another.

Over eighty percent of elites held their first faculty appointments at
the institutions where they presently work. Of the three scientists who held
previous faculty appointments, two held them for two years or less. Only
two elites held post-doctoral positions at government laboratories, and one
of these is closely affiliated with a major research university. A scientist
who took a post-doctoral position at a government lab also held a previous
appointment at a research university. We can conclude that elites tended
to enter and stay at major research universities with little exit from aca-
demic science. The predominant pattern of these careers is orderly and con-
tinuous. Each career stage consisted of a primary commitment to research
which prepared and directed the scientists on an uninterrupted path of
roles in closely allied research organizations.

In contrast to elites, communitarians’ careers were permeable and epi-
sodic. They consisted of several interceding stages in which scientists exited
and re-entered academic science. All of the communitarians received final
graduate degrees and all but one of these degrees were in physics or chem-
istry (the one exception in electrical engineering).

The graduate schools of communitarians comprise a greater spectrum
of prestige, an important factor to weigh in the processes by which sci-
entists are socialized and in the professional self-identities they develop
(Zuckerman 1977). Three of the communitarians held two post-doctoral
appointments, and in all three cases the scientists held appointments in
both academic science and in government. Nearly forty percent of the
communitarians, including three who entered academic science as faculty
members since 1975 (long after the post-doc had become an institution-
alized career stage in science), held no post-doctoral appointments. This
suggests that communitarians followed alternative pathways into academic
positions that did not necessarily include a continuous series of academic
research roles.

Communitarians more often accepted government positions and posi-
tions at academic institutions that are not among the relatively small set
that normally feed people into elite science. What is more, communitarians
tended to exit and re-enter academic science at several points before and
beyond the post-doctoral stage. Almost half of the communitarians left aca-
demic science between graduate school and full-time teaching. Nearly one-
quarter left and re-entered academic science after having assumed full-time
professorial positions.

What accounts for this difference in career patterns? Communitarians
often left academic science for industrial and applied research and con-
sulting positions. A partial list of the places for which communitarians left
academic science includes Proctor and Gamble, GTE, Bell Labs, Gould

Like elites, a majority of communitarians stayed at their present uni-
versities. Almost seventy percent held their first professorial appoint-
ments at the universities where they presently work. Thus, most of the
mobility occurred at points where communitarians exited and re-entered
academic science for government, industrial and other applied science
positions.
Subjective Features

The ways in which academic scientists use their work histories is in large part determined by the type of students with whom they interact (though work history does of course affect future employment). Elites interact predominantly with students seeking specialized research training and the delivery of this training is made possible by the extensive research experience of elites.

The only thing permanent in this building is the faculty, everybody comes and goes. It made me sad because it’s so hard to train [students]: they come in knowing nothing and they go out with a Ph.D. from one of the best places to do this kind of work and take off in their career. It made me sad because by the time they graduate they were so good that we would like to keep them longer. Obviously you can’t. It’s sad but it’s also very gratifying, because you know you’re doing more than something just for your own research. You are actually generating generations of students, generations that can do better science and that’s just fantastic. It’s a major deal in this building to have students graduate (physicist, late thirties).

Communitarians deal primarily with students whose needs encompass general instruction and practical preparation. The diverse work histories of communitarians are used as resources in a distinctly different way: to convey breadth of practical experience. Scientists who had exited academic science for industrial and applied positions served as sources to whom students could turn for information about future employment and training.

A lot of things my students were telling me about them not being prepared to deal with the workplace—I didn’t know what they were talking about until I got out there and saw what these students were expected to do. I realized that they were not being prepared to go out into the workplace. What we were doing was preparing all of the students to go out and get a Ph.D. We were not preparing them for the types of things they would encounter if they decided to get a job. That was the point at which I really became a person opposed to academics and the type of things that are going on in academia...I would like [my colleagues] to respect my experience and my knowledge. I’ve got a background in electrical engineering. I was a university professor, I worked in industry, I had lots of dealings with other people and a lot of varied experience and I think people respect me for that. (physicist, early forties).

In a world of work in which student satisfaction represents a key measure of occupational self-worth, communitarians who possess non-academic credentials typically are held in high esteem by their less worldly colleagues for the range of experience they can call upon in their teaching and advisory roles. Outside experience works as a bonus if not a prerequisite for communitarians, whereas for elites it may possibly be a disqualifier: it is not consonant with career norms and the practice of doing, and moving ahead in, basic research.

Table II. Presentation of Occupational Self by Type of Scientist

<table>
<thead>
<tr>
<th>Career Attribute</th>
<th>Elite</th>
<th>Communitarian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commitment</td>
<td>Concentrated; Focal Role</td>
<td>Diffused; Multiple Roles</td>
</tr>
<tr>
<td>To Work Roles</td>
<td>Strong; Moral</td>
<td>Weak; Utilitarian</td>
</tr>
<tr>
<td>To Occupation</td>
<td>Vocation</td>
<td>Avocation</td>
</tr>
<tr>
<td>As Self-Inception</td>
<td>Work</td>
<td>Work/Family/Leisure</td>
</tr>
<tr>
<td>As Pride</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Mobility Concerns</td>
<td>Cosmopolitan</td>
<td>Local</td>
</tr>
<tr>
<td>Reference Groups</td>
<td>Hierarchical;</td>
<td>Egalitarian;</td>
</tr>
<tr>
<td>Interpersonal Dynamics</td>
<td>Competitive</td>
<td>Cooperative</td>
</tr>
<tr>
<td>Uses of Work History</td>
<td>Continuous</td>
<td>Episodic</td>
</tr>
<tr>
<td>Objective Features</td>
<td>Specialized</td>
<td>General</td>
</tr>
<tr>
<td>Subjective Features</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
knowledge that in turn plays a central part in the living-out of their careers, including training new generations in basic science.

While communitarians stand alongside elites as members of a profession, they live and work in an altogether different world, and invoke a distinctive narrative to account for it. Communitarians show diffused commitment to several work roles, primarily teaching and applied service activities. But when stepping back to see what their commitment to the occupation itself looks like, it appears weak when compared with elites, and is normally cast in utilitarian terms. In self-inscription and in pride, commitment is presented in ways that highlight the importance of non-professional sides of the person.

Their mobility concerns are comparatively low, not necessarily because communitarians lack ambition, but because their primary work roles are largely unstratified: teaching and service careers are for the most part unstaged, and communitarians' self-descriptive rhetoric underscores this stasis of self. Local reference groups and an interpersonal dynamic that is egalitarian and cooperative further indicate the basis of their belonging and purpose.

The work histories of communitarians are episodic and are used to impart a general—and mostly applied—understanding of science. At the same time, these histories are used to introduce students to worlds of science outside of academe, to which most who pursue science will turn for their own employment.

"Constructionists" have shown how scientific knowledge develops within the complexities of place (e.g., Clarke and Fujimura 1992; Jasanoff et al. 1995). As this study has shown, so too with people and how they "make meaning" of their careers. I have provided a contextual argument about careers: the differences in observed patterns arise by virtue of sociocultural dissimilarity between elites and communitarians. These differences are so great in large part because the universities lie at opposite ends of the profession's sociocultural continuum. Additional factors, however, contribute to these differences, among these social and self-selection. Some individuals may be selected and others may "select themselves" for certain environments. In science, selection processes often begin early in life: as we saw in both elites and communitarians, certain types of career stages and their sequencing foretell (and eliminate) certain types of employment.

Graduate school socialization and post-doctoral experiences significantly affect achievement expectations and career norms (Zuckerman 1977), and so one could look at variation in these stages to partly account for subsequent divergences in self-identification in science (Hermanowicz 1998). But at the same time, wide-ringing myths of heroic accomplishment infuse the careers of all scientists (and other professionals) who, regardless of their background, hardly turn completely away from anticipations of grandeur.

Even where selection arises, the larger point is that individuals seek a match between themselves and their environments that is accomplished all along the life course. Identification occurs in social context; careers, from beginning to end, are socially situated, and the people living them out derive the cumulative consequences of their self-identities from the opportunities and constraints that specific contexts spell.

Further, we have been dealing with issues of career that pertain to workers other than physicists and chemists. Thus we would expect to find at least at a general level similar patterns of career experience among other groups of professionals. The development of a match between individuals and their work environments is a central task, as much for executives as for athletes. But if we remain faithful to our contextual view, we would expect also to see significant contrasts among types of workers, contrasts that stem from variation in occupational contexts.

The local context of occupational culture and people's identifications that derive from it clarify how we might think about science, as well as other occupations. In contrast to the normative view discussed at the outset, scientists (and other professionals) rarely conform to a single model of career. The normative perspective does not of course stipulate that all will adhere; by its very name the perspective underscores the ideals toward which incumbents ought to strive.

But it is the premise of the norms—anchored in the advancement of knowledge—that all too easily results in a linear, unitary view of people and their work. Narratives discussed throughout the preceding pages highlight the several ways people identify with their work, only a portion of which complies with the normative view. The long line of research on stratification in science has by-passed the idea that people's commitments and identifications are more varied. Nor should we be drawn to think merely in terms of "cosmopolitan" and "local" identities (Gouldner 1957-58), since work for some scientists, as for others, has no center at all. Moreover, as we have seen, careers vary on more than this dimension.

Instead, science might best be viewed as an organized set of social worlds (cf. Strauss 1978, 1993). Such a view grounds the study of occupations in the interactive environments that produce a social order. In doing so, it respects local systems of meaning. Further, we are able to glean the ways worlds resemble and differ from one another, taking into fuller account similarity as well as variation in careers and self-identity. Ultimately the worlds yield an organized system, in this case, the system of American higher education, in which we are able to speak of elites, communitarians, (and others) who make life passages through the system in different ways. New research in this vein will be especially responsive to qualitative inquiry,
not only because of its concern for meaning-making processes but also because it is territory largely unexplored.

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ENDNOTES

1. To avoid confusion, I will refer to my subjects as “scientists,” rather than separately as physicists and chemists. As stated, my focus will be on context as it pertains to department and institution. Readers in search of a more systematic treatment of differences by field and within fields should see Hargens 1975, Krieger 1992, and Traweek 1992.

2. Other studies have invoked other labels for the subjects they study, such as Caplow and McGee’s (1958) use of “major league,” “minor league,” and “bush league” departments. But this type of classification contributes to the problems spelled out previously: it establishes a linear system of stratification in which all are oriented toward similar goals. As in this case, bush and minor league mates allegedly hope to “make it in the majors,” though in reality this remains an empirical matter. The widely applied Carnegie classification of institutions does not adequately discriminate among types in order to grasp differences in occupational culture (i.e., Cal Tech and the University of Louisiana are both “Research I” institutions, but they likely subject practitioners to such differing conditions that people craft distinct self-identities).

3. Sixteen of the 29 scientists worked in one of the two elite settings, the remaining 13 scientists worked in one of the two communitarian settings. Reflecting a wider pattern of gender representation in the hard sciences, only two of my respondents were female, and both were communitarians. Readers who would like an extended discussion of gender and science should see Sonnett and Holton (1995), who provide the most recent and comprehensive assessment. See also Cole (1979), Hermanowicz (1998), Rostiser (1982, 1995), and Zuckerman, Cole, and Briner (1991).

4. What is more, selection processes are driven by market conditions. When labor competition is keen, as it has been for many years, opportunity for self-selection is minimal; opportunity for social-selection is considerable. Institutions of all types can select highly talented candidates. In such circumstances, adaptive processes wherein individuals come to terms with different environments become prevalent. Thus, even selection occurs in a context with direct individual consequences.

REFERENCES