Psychological and Social Barriers to Women in Science

Limited opportunities for colleague interaction may hamper the scientifically trained woman.

Martha S. White

Talented and educated women with family responsibilities often face special problems of identity and self-esteem when they attempt to continue their professional activity. Although many do so successfully and encounter few problems, others find it more difficult. I first became aware of some special aspects of these problems when I interviewed women scholars at the Radcliffe Institute—women with outstanding intellectual and creative ability who had been awarded fellowships so that they might continue their professional interests on a part-time basis (*1*).

The Institute members were particularly questioned about their feelings of identity as a professional. Did they feel any more professional as a result of their fellowship at the Institute? What made a person feel professional? Had their commitment to their work changed as a result of their Institute experience? At the time, I hypothesized that one outcome of the fellowship, of the opportunity to work deeply and seriously on a project, would be a greater sense of competence. The greater the sense of inner competence, my reasoning went, the greater would be the sense of commitment to future productive work. This proved to be only partially true.

Many indicated that the fellowship program had resulted in a genuine change in their conceptions of themselves as professionals, but their responses suggested that this change was rarely due solely to the opportunity to work on their projects. Although this was important, equally significant was the access to stimulating colleagues, both within and outside the Institute, which the special status conferred by the fellowship made possible. Appraisals of their work by others, coupled with acceptance and recognition by people whose professional opinions were relevant and appropriate, made a significant difference in determining whether a woman felt like a professional, and whether she in turn had a strong sense of commitment to future work.

Challenging interaction with other professionals is frequently as necessary to creative work as is the opportunity for solitude and thought (*2*). Yet comments from many women indicate that it is particularly difficult for them to attain, especially for the woman who seeks reentry. As one woman astutely noted: "Those of us who have interrupted our careers because of children or moving with our husbands across the country have special difficulties. Our departments maintain no ties with us. Often no one knows us, and the articles and books on which we are working may not be published for another three to five years. Meanwhile, if we are to be productive, we need to be professionally involved again."

Although women offer unique qualities to intellectual and creative endeavors, one of the main barriers to women's achievement of excellence and commitment is the expectation that women's career patterns and motivation will be the same as men's. When they are not, there are many phrases ("lost to marriage," "didn't pan out," "dropped out") which indicate the disappointing nature of their acts, the hopelessness of their making choices which are uniquely theirs as women. Many, possessing energy and talent, will choose the same career paths and find great personal satisfaction in meeting the same demands as many men. But others who live life differently and who may choose differently from the traditional career pattern, also have much to offer, and our gain is greater if we can include their talents among those which society and science utilize. Attracted to scholarship and scientific research, they continue on to graduate school or professional school after college because of their deep interest in a field. Many have clear and well-defined plans for a career, while others wish to combine "worthwhile work" with homemaking. Because of their serious intellectual interest and involvement, such women usually do well academically and are excellent students. Yet they find that their interest in learning and in excellence does not receive the same recognition after college or graduate school as it did before unless they determinedly indicate that they plan a full-time uninterrupted career. But clearly the dominant (and in many cases preferred) life pattern for many a highly trained woman still includes multiple roles, dual commitments, and occasional interruptions. If she wishes to continue her professional activity on a flexible or modified schedule, or faces temporal or geographic discontinuities, she is frequently excluded from important aspects of what the sociologists call "socialization into a profession."

Professional Socialization

In the normal course of men's and women's professional careers, only a part of their professional training takes place in college, in graduate or professional schools, or in a training program. Many professions and occupations have periods analogous to that of the medical intern or resident (though these stages are frequently informal and rarely explicitly recognized) during which the individual learns to behave in ways which other people in the field regard as "professional." Such "socialization" usually occurs during graduate school as well as during the first decade of employment after one is launched on a career, and consists of learning the roles, the informal values and attitudes, and the expectations which are an important part of real professional life.

The author is a social psychologist associated with the Adult Development Program, Langley Porter Institute, University of California (San Francisco). The talk was presented at a symposium on Women in Science, Berkeley, California, 22 November 1969, sponsored by Hydrogen Chapter of Iota Sigma Pi, national honorary chemical society for women, and the Women's Bureau, San Francisco Regional Office, Department of Labor.

During this stage of a career, the person not only learns occupational roles and skills, but gains a firmer image of himself as competent and adequate. Appraisals of his work by others permit self-criticism to grow and standards of judgment to develop. Such a sense of competence may come quickly and early for some, but develop slowly and gradually for others. Once a person has this sense of competence and regards himself as a professional, it is probable that he has less need to learn from colleagues and indeed may have greater freedom to diverge from the accepted way of doing things, seeking his own pathway instead. It is this firm sense of professional identity and capability which women, regardless of their ability, may find difficult to achieve, or achieve only at a high personal price.

Many people are unaware of this period of role learning in scholarly, scientific, or academic professions, and fail to realize how important such a stage is, and how lengthy it has become because of the increased complexity of professional life. Everett Hughes, the sociologist, has noted that many still think of professions as they were in the 19th century, although they have vastly changed since then (*3*). Many professions are practiced in complicated organizations, with consequent nuances of status and levels of organization to contend with. There are elaborate social systems in all parts of academic and business life, and purely technical training is rarely enough. The aspiring young scientist must be knowledgeable about many aspects of institutions, journals, professional meetings, methods of obtaining source materials, and funding grant applications. Knowing how to command these technical and institutional facilities requires numerous skills, many unanticipated by the young student. But once gained, such skills often seem very simple in retrospect and even thoughtful professionals forget that they were once not second nature. This is the kind of learning we speak of as "caught," not "taught," and it is a valued by-product of acceptance and challenging association with other professionals.

Sponsorship

Studies of professions and professional identity have also stressed the importance of sponsorship as a device for influencing commitment and affecting the self-image. Referred to by some writers (*4*) as the "protégé system," sponsorship is common to the upper echelons of almost all professions, including the scientific fields. One must be "in" both to learn crucial trade secrets and to advance within the field. Unfortunately a man may be hesitant about encouraging a woman as a protégé. He may be delighted to have her as an assistant, but he may not see her as his successor, or as one who will carry on his ideas, or as a colleague. He may believe that she is less likely to be a good gamble, a risk for him to exert himself for, or that she is financially less dependent upon a job. Because of subtle pressures from his wife, he may temper his publicly expressed enthusiasm or interest. He may fail to introduce her to colleagues or sponsor her for jobs. And as one of Anne Roe's studies of eminent scientists indicated (*5*), the advancement and success of protégés are important to his own feelings of satisfaction in his professional efforts; nonachieving protégés reflect on the sponsor's public and private image.

In addition, sponsorship affects the recognition an individual receives. One might assume (or hope) that excellence and productivity in scientific work is all that is needed for recognition, but in reality ideas are more likely to be accepted if they are promoted or mentioned by eminent sponsors, or if they are the product of joint authorship with a well-known professional, or derive from a well-known laboratory or university. Whether a woman is "sponsored" in these ways will partially determine who reads her work, listens to her reports, or even offers friendly comments on the draft of a paper. Such informal signs of recognition increase motivation, and affect one's subjective feelings of commitment to a field, as well as feelings of professional identity.

Are Women in the Club?

A recent study of women Ph.D.'s (*6*) showed that the full-time employed woman Ph.D. published as much as her male colleagues, and was more likely than the average male scientist to be in research. She was involved in the activities of her professional organization, was sought out as a consultant, and was more likely to be awarded fellowships and be accepted in honorary societies. Despite all this evidence of productivity and commitment, the authors of the study noted that the women often felt left out, and suggested that "the problem which bothers the woman Ph.D., who is a full-time contributor to her profession, is that she is denied many of the informal signs of belonging and recognition. These women report that even on such daily activities as finding someone to have lunch or take a coffee break with, or finding someone with whom she can chew over an idea, or on larger issues such as finding a partner with whom she can share a research interest, the woman Ph.D. has a special and lower status." This exclusion from the informal channels of communication is of particular importance in fast-moving science, where as Sir Alfred Egerton has noted, "of the total information extant, only part is in the literature. Much of it is stored in the many brains of scientists and technologists. We are as dependent on biological storage as on mechanical or library storage." Jessie Bernard astutely comments: "It is this access—the brains of fellow scientists, that may be more limited for women than for men" (*7*).

The need for stimulating colleagues was also attested to in a study by Perrucci of women engineers and scientists (*8*). She found that women were more apt than men to endorse as important the opportunity "to work with colleagues who are interested in the latest developments in their field," and "to associate with other engineers and scientists of recognized ability." Interestingly enough, no differences appeared between men and women of comparable education as to whether they desired challenging work or work involving "people versus things."

The evidence also seems to indicate, however, that in many cases women are reluctant to put themselves forward or to protest their being left out. It is a vicious circle: men indifferent or unaware of excluding women; women insecure and hesitant of intruding. The remedy is not necessarily more individual boldness, but must include new institutional arrangements and programs which do not depend on individual initiative (*9*). However, as the Radcliffe data indicated, such arrangements and programs are not too difficult to achieve.

There have been lone individuals who have flourished on society's neglect and produced great ideas or masterpieces, but this is not characteristic of those in the professions or the majority

of people. For most people, acceptance by others and interaction with challenging groups or organizations are a source of deep personal significance and of creative energy as well. Yet it is this acceptance and this interaction which is often denied, both purposefully and inadvertently, to women, whether they participate full time or on a flexible schedule, whether they remain continuously in the field or seek reentry.

A New Career Concept

Because of their life patterns, many women with scientific training have nonprofessional roles and identifications to which they are deeply committed. They seek an occupational or professional identity which recognizes and takes into account this dual commitment. For women with these values, a new concept of professional "career" may be necessary.

Numerous women, either because of their own inclinations or their personal situations, enjoy and competently manage full-time work and a full-time career. Others, however, seem to be seeking to invent for themselves a new and more varied conception of career, one which has not existed before and for which there are few models or patterns available. They have a full-time commitment, but do not always plan to work on a full-time basis; their lives and where they work are governed to a greater degree by nonoccupational factors. As a result of the smaller size of families, and the shorter span of child-rearing, few of these women see their maternal role as bringing their professional life to an end. They think of themselves as a permanent part of the working force, and regard flexible schedules and part-time work as a necessary part of the solution. Some seem to be seeking an alternative career model which is neither upward moving nor "success-oriented," but which recognizes their commitment to family responsibilities as an important part of their choice. To accommodate this lateral career, or "career of limited ambition," (*10*) they seek to improvise a new professional role which is more differentiated and diversified than the accepted pattern. (I should note parenthetically that this interest in new career patterns is by no means limited to women.) Such an alternative model might be represented schematically by an ascending spiral movement, indicating career choices which are upward in direction, but slowly paced with long horizontal stopovers. Deeper knowledge or more varied experience would be the goals of such a career: not greater status, but greater esteem; not primarily extrinsic rewards, but intrinsic satisfactions (*11*).

Such new models are long overdue. Almost a century of experimentation has been spent in attempting to fit women's career patterns into those followed by most men, and the result has not been phenomenally successful. If such alternative career patterns can gain general recognition, the result may be more productive, creative work. As Epstein (*4*) has so succinctly noted, the barriers to women's advancement and achievement are not merely a function of prejudice or incapacity. The structures of professions, narrow and inflexible as they often are, may create limits which are largely unintended. But groups and colleagues are powerful forces in shaping attitudes and behavior; the institutional settings and social mechanisms which inhibit commitment and identity can also be used to promote change and to encourage different consequences.

Suggestions

What can women do to cope with these barriers and discriminatory practices which intensify the effects of discontinuity in their lives? How can they fully utilize their talents, yet make choices that are suitable to their goals and life-styles? What constructive action can be taken to remedy the inadequate socialization which the current structure of the professions make inevitable for many women?

In overcoming the barriers, the importance of sponsorship and the maintenance of communication with stimulating colleagues should not be underestimated. When a woman has to interrupt her training, graduate study, or employment, she should talk over future alternatives or avenues of return with an adviser, and ask for letters of recommendation which may be used when a return is contemplated. She can seek ways to keep in touch with her department or work group. As one successful woman observed, "She should leave no gap unfilled."

Women with similar fields of interest can often profit by forming or joining other women in associations which provide professional stimulation and motivation, as well as information and access to new opportunities. Such groups can be particularly effective in assisting women who have temporarily retired to return to or keep up with their field. Several studies (*12*) suggest the possibility that women who are more ambitious in the traditional male-career sense may be more stimulated to achieve by the presence of men who are achieving, while women who regard intellectual achievement as part of the feminine role may react more favorably to the presence of capable women colleagues. This at least suggests that many talented younger women might be more encouraged by knowing and observing in the professional role other women who value the feminine family role. Such models are still too often a rarity.

Part-time work has only begun to be utilized effectively. Many men have long known that they are most productive when they engage in a variety of functions, carrying out activities which complement but may have very little immediate relation to each other. Although the initial stages of learning how to accomplish this are not easy, many women are discovering that such juggling can work even in complex and demanding scientific and engineering fields. Pilot projects using women scientists in the federal government have found both a shorter week and shorter day successful (*9*). Enthusiastic women report that they get almost as much done, while employers note that they get more than their money's worth, since there is little wasted time, and important thinking time often comes free. In fields with hard-to-find skills such as data processing, part-time job opportunities may make it easier to recruit employees. An innovation which has been used with great success in education, social work, library work, and medical residencies is to have two women share one job. Thoughtfully and carefully planned, the partnership job has proved not only eminently suitable to the needs of women, but of benefit to employers as well (*13*). Partnership teaching has proved so useful in education that one wonders why it was not thought of before.

Sometimes women create their own part-time opportunities. In the San Francisco area, a group of women biologists found they lacked opportunities for part-time work and for keeping up with their fields while their children

were small. They organized a talent pool, incorporating as an educational group, Natural Science Education Resources. They have since offered a unique series of classes on plants and animals to mothers and their preschool children, served as consultants to teachers and schools, developed new ecology programs, presented adult education courses, and obtained a pilot National Science Foundation grant. Several women have now moved on to other jobs, leaving a vacant place eagerly taken by someone else seeking such a part-time opportunity.

Although all of these part-time approaches serve to prevent technical obsolescence, retraining programs and reentry techniques are also needed. Although some writers counsel noninterruption as the only answer, it seems more realistic to assume that discontinuity will continue to be a fact of life for many women. A woman's interests change between the time she is in college and the point at which she decides to involve herself more deeply again. Fortunately mid-career retraining is becoming mandatory for many scientific fields; if reentry opportunities for women can only be included by companies, universities, and professional societies along with the continuing education programs for full-time professionals, these transitions can be more easily accomplished.

Some women have planned their own transitional reentry programs. One woman chemist talked to a local college professor, and offered to assist him in his laboratory courses during the year in order to bring her knowledge up to date. She proved so capable that he admitted her to advanced seminars, supervised her in tutorial reading, and is now working to retain her in a permanent capacity in the department.

Master's degree programs aimed at updating skills are particularly promising. Rutgers University has had one for mathematicians, and Wellesley College has had a 2-year program for chemists.

Some may raise the question: Aren't women now insisting on the same opportunities as men? Do women want the same opportunities or do they want special opportunities? The answer is simply that they need both. Career commitment takes a variety of forms for women and may increasingly do so for men. Longevity, population pressures, and the explosion of knowledge have created new needs and life stages for us all. If we become obsessed with simply giving women the same opportunities as men (important though this may be), we not only obstruct effective recognition of the differences in women's lives, but may fail to note what is already a trend—more complex educational and occupational patterns for both men and women. Many of the programs and innovations developed to suit women's needs are needed for men as well. They too are feeling the impact of new knowledge, the expectation of intellectual retooling every decade, and the need for part-time refresher courses to up-date proficiency. They too have discovered that interests change after 20 years in a field, that challenge can outweigh security, and that mid-life may bring a desire to shift the focus of a career. And surely we are all learning the lesson that education is most useful when one is most ready for it. Many young students are no longer so eager to cram all their education and professional training into the beginning of their adult years.

While the patterns of women's lives may be more varied, the interruptions more pronounced and profound, and possibly the needs for guidance greater, our attempts to foster a social climate which meets the complex needs of women today may well be pointing the way toward meeting the diverse needs of both the men and women of tomorrow.

Summary

Commitment and creativity in science are not merely a function of an individual's competence or excellence, but are a product of the social environment as well. Acceptance and recognition from significant other people (one's peers and other professionals), and opportunities for stimulating and challenging interaction are essential for developing a strong occupational or professional identiy, and for creating the inner sense of role competence which can lead to greater commitment and productivity in professional work. Unfortunately women, especially those who have experienced interrupted or discontinuous careers, find such opportunities and acceptance difficult to obtain.

The scientific community can foster the professional development and effectiveness of women in science by permitting women more flexible opportunities for professional participation, by being more aware of practices which exclude women on the basis of gender rather than ability, and by separating standards of excellence from time schedules.

Women can help themselves by keeping up contacts with others in their fields, participating in professional groups, becoming familiar with new part-time approaches and reentry skills, creating their own retraining and employment opportunities, and instituting new programs appropriate to their needs.

"Restriction of opportunity not only blights hope; it excludes the person from the chance to acquire the knowledge and skill that would in turn enable him to surmount the barriers to effectiveness" (*14*).

References and Notes

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