Scientists and Their Psychological World

A study of the research scientist

by Bernice T. Eiduson

I came to study the research scientist via a study of artists. For many years I have worked as a clinical psychologist in a psychiatric clinic whose patient load was heavily sprinkled with writers, artists, musicians, and actors. These people sought psychiatric help for a number of reasons — marital difficulties, depression, sexual problems, phobias — and, after professional contact, I became familiar with the kind of psychological demands that creative fields make on an individual who goes into them. I became interested in studying these artists as a group.

It seemed to me that it would take persons of a specific type of personality structure to go into the kinds of work that value such characteristics as originality and talent, that insist upon perseverance and inner strength in the face of neglect, disinterest, and misunderstanding. And I therefore undertook a study of the personality structure of persons in the arts.

Obviously, a group of persons in the arts that comes to a psychiatric clinic for help might be labeled a neurotic group, so I couldn't use the patient group as the sole group of subjects on which conclusions about the personalities of artists could be based. I was afraid, too, that using patients as subjects might unwittingly reinforce the old stereotype that neurosis was a necessary ingredient for creative endeavor. So, to overcome this difficulty, I drew upon a second group of artists comparable to the first, except that none of these people had sought psychiatric help, nor did their personal histories or personality pictures show any grossly pathological features.

Then, as a third step, I selected another control group of persons that had selected fields of business such as sales, accounting, or corporate management, and decided to subject these people to the same clinical experimental procedures that had been administered to the artists. I thought this might show which characteristics that defined persons in the arts were different from those that defined persons in other vocational fields.

I chose individuals in business for this third group not because work in business is necessarily uncreative; the growth and development of American industry would certainly attest to the inventiveness and creativity there. But business fields, unlike the creative fields of the arts, do not state first and foremost that originality and creative talent are the most prized and highly valued characteristics, the sine qua non for making any mark at all.

This study turned out to be very successful in being able to differentiate the persons in the arts from the persons in the fields of business. In fact, a significant difference emerged in 32 of the 50 variables that I studied. Incidentally, the study also struck a death blow at the old neurotic-artist theme, for investigation showed that the neurotic features in the group of artists that had sought psychiatric help were not those that were

bound up in the characteristics that identified the artist as a creative person.

Now, simply because the variables identifying the artist from the non-artist appeared to be so clear-cut, the next logical question was whether these same characteristics applied only to persons who had gone into the fields of the arts, or whether they cut across single vocational fields and could be said to characterize persons in other creative fields as well – the sciences, for example. If this were borne out, I thought it might be possible to say that such traits identified all persons who go into creative fields, irrespective of the particular work.

So, as the next step, I asked a group of research scientists, all men working in the fields of the natural sciences at university or academic installations, to participate in the same experimental procedures that had been administered to the artists and businessmen. Forty scientists agreed to do this, and thus the present study.

Though I will limit this report to the findings on the research scientists, comparative data on the artists and businessmen is available and has been published.

Selection of subjects

The subject group of scientists was made up of 40 male Caucasians ranging in age from 28 to 65, their average age being 41.7. They were all on the staffs of universities or academic installations on the West Coast. Six were in physics, six in earth and soil sciences, twelve in chemistry, and sixteen in biology and zoology. They averaged fifteen years in science beyond the PhD degree.

The selection of subjects was based exclusively on choice of vocation. I purposely did not use success as the criterion for inclusion in the study because it seemed to me that the motivation and personal dynamics that lead to choice of work in the sciences is very much the same for the person who is successful as for the one who gets little outward recognition for his abilities and efforts. The definition of success in science is extremely difficult to establish, and as dependent on almost as many variables in the sociology of the scientific world as is the establishment of artistic success in the world of music, painting, or the theater. Yet my group was very impressive as far as scientific reputation is concerned; about half had been nominated to the National Academy of Sciences and two were Nobel Prize winners.

Each scientist was administered two psychological tests: the Rorschach test of personality diagnosis and the Murray Thematic Apperception test. And each scientist was interviewed intensively. I studied the men from five different points of view. First, I investigated their developmental histories and their backgrounds, to see what, if any, experiences and relationships in early life were common to the group. Secondly, I investigated their adult personality structure, their emotional behavior patterns and their motivations, particularly around work. A third focus of study was related to the ways they thought and perceived, their styles of thinking. I was interested here in how the intellectual capacities that have identified scientists get expressed, and whether their thinking is marked by the originality, flexibility, and scope it is commonly supposed to have.

The final two areas of study focussed on the socio-psychological aspects, the focus being on the individual scientist in relation to a group. Here I looked at the self-images of research scientists, which reflect their identities as members of the profession and allow outsiders to see them as a single, and in some respects uniform, body of men. I compared the notions they have about themselves as scientists with their ideal pictures of what scientists *should* be like. Finally, I turned to how the fact of being a researcher affects the non-scientific aspects of a man's life, the part he plays as a family member, as a member of the community, and his patterns of work and play.

Biographical data

Of course, I can't hope to give all the results of this study here, so I have singled out a few areas. Let me turn first to the biographical data. Some of my men were European-bred and some raised in America; some were under 40 and some over. I had thought that this would make for a range of difference among the men which would be more notable than the similarities, and this certainly was the case. This was true when men were divided according to geographical area, the occupational backgrounds of their fathers, religious affiliations, socio-economic statuses, and all such factual data.

Furthermore, it came out that, in those instances where certain experiences and background factors were overtly similar among the men, a further look at the implications or meanings to the men, as far as their going into science was concerned, showed surprising variability. Here are descriptions of two of the three scientists'

fathers who were in scientific work themselves.

The father of one man, a chemistry professor in a large university in this country, was at home only in his laboratory. His son said of him:

> He was a sort of an American-type man, all mild and beaten down by his wife. The only thing he was independent about was his work. He was mild, good-tempered, and logical and clear — a very good teacher. All my relationships with him were in the laboratory and going to school. I had him as a teacher in two classes, for example, and here he was completely different from relationships at home. That's probably one of the reasons I became a scientist. Looking at it in retrospect, I think when I saw my father in the laboratory, I thought: This is a good way to be independent, to be a scientist.

Another scientist's father scarcely told his son anything about his work. This man says:

> I don't know whether my father kept his work from me deliberately or not, but it must have been deliberate because I knew nothing about it. There were no attempts to interest me in any scientific things. It wasn't that he kept any secrets from us; it was just that he didn't fit very well. He was an embittered man. He had started his career in chemistry, and this had been interrupted by war. He left, became discouraged, and always thereafter remained withdrawn and depressed. He'd sit without talking for long periods of time, and would keep himself apart.

There was only one father in our group who wanted his son to be a scientist above all else, and he devoted himself exclusively to the task of making him one:

> My mother tells me that before I was born, my father told her that if he had a son he would be a scientist, and he did it not by telling me I had to be a scientist, but by showing me all kinds of things: how ants work, what the moon was like, telling me all kinds of stuff — not telling me I ought to be a scientist, but how interesting everything was. And now that I am older and I can look back on the way he understood things, he understood science the way few of us do.
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> He was not a scientist but he had a feel for it. He knew the insects and what they did, but he didn't know the names of any of them. He didn't know the names of the stars or of this and that constellation, but he did know that stars were great big balls of gas. He would explain them, and he would say: 'What difference does it make what name you give to a star. In Germany it's one name, and the Martians will call it another.' So he would concentrate on the theme and not the way you describe it. In other words, my father had a completely scientific mind.
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> When I was little, the first game I used to play was after dinner. He had bought a lot of bathroom tiles of different colors. He'd set them up vertically on a highchair, and put them up very patiently. And when he got them all in a line, then I had the fun of pushing them all down—one on top of the other —and down they would go. This is the way it would start, but there was a method in this game. He played the game with me every night and after a while the game changed and became a little more complicated. It had to be a white tile and a blue, a white and a blue — so we had to be more careful. Then two whites and a blue, two whites and a blue. And I would want to put down two blues and there would be some excitement, and my mother would say: 'Look at that poor child putting down two blues.'
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> What was the idea of the game? Well, the idea was to get me interested in patterns and relationships. And that was the best he could do for a child that couldn't even talk, you see. And that got me quite a mathematical mind, because pretty soon I got quite good at that: two blues and a white, three blues and a white — very complicated things. And the funny thing is that this is the most important feature that I remember about my father: He looked at everything in the same way; it was as rational as possible. He looked at everything in terms of what was real and unreal about it, and I realized what was just talk and what was behind it.

Common denominators

Because the diversity of attitudes and experiences among the men was so great, relatively few common denominators emerged in the background material. However, those that did emerge emphasized some features that seemed to be continuous threads with the personality and cognitive data that emerged independently. The common denominators in backgrounds were these: First of all, the group was one in which excellent intellectual abilities existed. These were often recognized early, and subsequently led to gratifying experiences and relationships. For most men, excellent natural endowment was given encouragement by experiences that tended to place a premium on intellectual activity, and thus helped to crystallize these over-valued activities into later vocational choice and performance.

Secondly, almost all these scientists experienced

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periods of isolation, either stimulated by personal needs or forced by physical and psychological circumstances. The interesting thing about this is not the fact of isolation itself, but that during these times they turned to their own resources for solace and amusement, experimented with their abilities and extended them. They became comfortable about being by themselves, and interested in using these periods to indulge in fantasy, work on problems, read, and so forth.

Another common denominator was that almost half of the men in the group were fatherless, the father dying early or working away from home, or remaining so aloof and non-supportive that the son scarcely knew him.

Mothers were identified more with achievement, but generally relationships with family members were of a fragile and tenuous quality, and not too many scientists look back on their parents and siblings with warm and positive feelings.

Fourth, these men turned away from their families at some time, usually during adolescence and when they started college; some even cut off all but the most superficial ties and then went off on their own.

And fifth, the social histories exploded the myth of the all-important teacher or the absolutely essential chemistry set as crucial for stimulating an early interest in science.

What does this kind of diversity in background mean as to the kind of personality structure that these men developed as adults? The data here show that, despite our stereotypes, the scientist cannot be encased in any neatly drawn personality mold. The study dismissed all those hypotheses that had referred to scientists as falling into one diagnostic category rather than another – as, for example, schizoid or compulsive. It showed that all scientists were not fixated on any particular psychosexual level. They do not use one particular kind of defense mechanism. They do not have certain kinds of conflicts. They are not given to mood swings. They are not ridden by ambivalence, nor are they particularly passive, or bisexual.

The characteristics that emerge

The characteristics that do emerge are these: First of all, there is a strong emotional investment in intellectual activities and interests, and evidence that much of the scientist's feeling about himself as an adult is derived from the fact that he is in work that places a premium on the intellectual. With the scientist's feeling of self tied up so much in work, it is not surprising to see also that intellectual activities become the stage upon which the passions get spent and the gamut of emotions is revealed.

A second major personality characteristic is emotional constriction and control. Constriction refers to the narrowness of emotional response, and is contrasted with what we might call, in psychology, lability or over-reaction. But it is quite different from withdrawal or isolation, and refers more to restriction or channelization of the way most emotions get expressed. An integral part of the stereotype of the scientist has referred to his withdrawal or isolation and loneliness, but from my empirical study this is an incorrect conception, and one derived more from the fact that the scientist is generally in an isolated setting.

Anxieties and fears

A third common characteristic is the way the scientists handle their anxieties and fears. Generally, they are free from free-floating anxiety, so that they show very little symptomatic tension or anxiety. They have anxiety, but this comes out not so much in consciously-felt disturbance or discomfort. Instead, scientists tend to make relatively constant adjustment efforts in the face of problems or conflicts, and these tend to keep his anxieties under control.

Psychological data bring out very clearly the content of the anxieties that scientists have, and the way some of these are displaced onto the work situation; and how, in turn, work activates and reactivates certain anxieties that they have had. Interestingly enough, while scientific work serves to assuage anxiety for some scientists, who perceive science as rational, with built-in controls, others see science as irrational and a hotbed of potential dangers. For some it is the sanctuary, the haven, the retreat from competition, while for others it is a socially-accepted way of being rebellious and aggressive.

A fourth major personality characteristic of scientists is sensitivity. From the tests, it turns out that sensitivity gets expressed in a number of ways. First of all, scientists are responsive to sensory experience data. They seek out subtle and delicate impressions. In relationships, they have a capacity for sensuous gratification, are

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quite aware of their own motivations and internal environment. They are also aware of the motivations of others, but to a lesser degree.

A fifth common denominator in personality is narcissism. Oliver La Farge has said that the scientific life is shaped by the feeling that the ends must be good not for oneself, but for all mankind, and that the scientist must be able to set aside personal advantage, comfort, and glory in his developing effort to make progress.

But what one sees in these personality pictures is not selflessness on the one hand, nor selfishness on the other. In their overinvolvement in work, in their fantasies about omnipotence, in their anticipated accomplishments, in their minimality of interest in others who cannot further their own ends or goals, the scientists are self-oriented. Yet their gratifications come as much from what they contribute socially, and to the fund of knowledge, as from personal gains. In fact, the latter seem in many ways to be neglected.

Thinking and perceptual styles

While the scientists shared very few personality characteristics in common, there was one way in which they were very similar, and here the degree of similarity turned out to be so striking that it becomes evident that the model of the research scientist is certainly defined in this area. This is the area of cognition, of thinking and perceptual styles, the principles along which they organize and structure their thinking. Here we find a group of men all oriented or set in the same way; towards the new, the different, the unhackneyed; to making new perceptions out of old hat; to new ways of seeing what they have to see, and new ways of describing their experiences. Their interests point to the theoretical and abstract rather than the practical and realistic. They accept reality, but see it in a way different from others. They can tolerate ambiguities in the perceptual area. They can loosen and relax controls in thinking without feeling disorganized.

But there is one finding that I think deserves special mention in this context, and that is that the thinking of the scientists was not particularly flexible or mobile. On the contrary, we find that it tends to be quite patterned and rigid, that scientists work more originally in structured rather than unstructured situations, and that they prefer the bounds and limitations that reality sets.

Of all the data I have accumulated about the creative processes in these men, let me merely say here that none of the scientists leaves discovery completely to chance. They seem to have developed ways of working on problems and thinking about them which for them are potentially fruitful, so that the flying guesses, the original thoughts and the "inspirations" do not come out of soil that has merely lain fallow. I could make a nice little handbook of helpful hints to eager young scientists that some of the more experienced men have passed on to me. Like: "Lucky accidents don't happen to dead cows." Or: "The better intuition a person has, the more you find out he is full of facts." Or "Delbruck's Principle of Limited Sloppiness: You should be sloppy enough so that the unexpected happens, but not so sloppy that you cannot figure out what has happened after it's happened."

I was interested to note, too, that in describing their own creative processes, these men, who are trained in the objective, rational, and logical, showed a high degree of respect for the irrational and the unconscious. They were also insightful into the psychological conditions that seem to stimulate performance in the scientific field and to inhibit it. However, I must also add that when they try to apply these insights to students whose creativity they have to predict in advance, they tend to retreat into looking to attributes that they can point to operationally.

Self-images

To turn very briefly to the self-images: Here I explored what makes a scientist feel like a scientist, where his feelings of identity with other scientists come from. It seems quite surprising to me that scientists as a group seem to be caught up in the same stereotype that the public holds about them, or perhaps put more properly, that scientists seem to have been drawn into science by some of the same fantasies and stereotypes that the public holds. For example, they see themselves as intellectuals, as discoverers of new worlds – worlds which they not only create but which they then proceed to live in. Their work is propelled primarily, they think, by pressing inner drives, so that the majority scorn "impure" motivations, such as the desire for recognition, or exhibitionism, or personal aggrandizement, or pragmatic reward – unless these characteristics are inescapable concomitants of devotion to the

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search for truth. Happiness and fulfillment rest primarily in their satisfactions at work, with routine drudgery and administrative problems played down as interferences. In fact, for these men, rigor, persistence, and discipline have all become institutionalized in their morality code as values in themselves, and therefore the 9-to-5 gentleman scientist is looked down upon as the laggard who is bound to be unproductive.

There is evidence, however, that differences in the way science is being practiced today are being accompanied by certain differences in the identifications that scientists have with other scientists. An example of this changing trend is the researcher's shying away from identification with the "great but maladjusted" or "eccentric" scientist. Reverence for forefathers whose outstanding minds were sometimes housed in very peculiar and odd personalities still exists, and yet the newer scientists seem consciously to be dissociating themselves from peculiar and difficult associates or students, knowing full well that they may be thus shunting themselves off from some very creative workers in their own laboratory. These men nowadays prefer to depend for progress on well-organized, smooth-running, large-scale operations, whose stability demands the minimum of interpersonal relationships, especially disturbed ones.

Sciencemanship

Another change comes in the new interest in "putting breakthroughs across." While many of these men still stress that the motivation behind science is the gaining of understanding and knowledge, without concern for its immediate application, they feel that the fruits of their search can be more readily taken advantage of if they adopt what I call the skills of sciencemanship. Some think that manipulation of success in science is a natural sequence if you realistically acknowledge that the same gamut of motivations that is found in other people is found in scientists too – jealousies, competitions, desires to please superiors. But some scientists feel that such Madison-Avenue manipulation is inappropriate to science, and they blame this development on the new corporate structure of science, which they hold responsible for the invasion of the business ethic.

Perhaps it is an inevitable development that, once the notions of success in the business world to some extent invade the scientific, then some of the same tools that promote success in one field are sought after in another. But if the facile and the easily-smoothed-over, and such behavioral techniques as the persuasion by personal manipulation do become acceptable to the scientific community, will they eventually prove compatible to scientific work? Or will the rebellion against the traditional, and the break away from the fixed, and the questioning of the taken-for-granted – all of those aspects which characterize science – really be destroyed?

Taking on a group identity

Of course, all the personality characteristics I have discussed do not play an equal part in the scientists' adjustment. The self-images provide a good example of how certain aspects of personality dominate and even becloud others. A great deal of evidence in these data suggests that the self-images scientists hold deny some of the diversity in background and personality that actually exists among the men, masking these differences and making all scientists appear outwardly more alike than they actually are.

In looking into this further, some evidence in the data suggests that certain individual psychodynamic features in these men encourage group camouflage, and there are also some sociological factors that reinforce and strengthen the tendency to take on the group identity.

Some of the data on the life styles of the men reveal how they let certain patterns, like the university model, become the model for their way of living, salary expectations, and so on, when in some ways this academic model is inappropriate to them. And there are data that point to the fact that the self-identities of the men have even tended to narrow down severely the way scientists function intellectually, so that the growing concern that Snow, Holton, and others have expressed about the dissociation of scientists from the larger intellectual community seems well taken. The most curious phenomenon of all, however, is that by taking on some of the self-images so completely and adapting his life accordingly, the scientist unwillingly perpetuates the very stereotypes about himself which cause so much general concern. This makes for an image of the scientist that is very difficult for today's youngsters to identify with, and contributes to the problem of recruiting young people into science.