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Creativity in the Sciences

Brains are our greatest resource, but we use them ineffectively. Most men and women develop only a small fraction—perhaps 10 percent—of their potential. Often one sees individuals do in a week, when inspired, what requires months at their customary pace. Discovery of means of utilizing talent more fully is perhaps the most important scientific advance that could be made at this time.

The creative individual must have a liberal portion of three qualities: mental capacity, judgment, and motivation. By mental capacity is meant something related to intelligence quotient, but something not precisely measured by any of the standard tests. Almost all creative scientists probably have I.Q.'s of 130 or above. Mental capacity is, of course, largely genetically controlled. Judgment is an important characteristic in a scientist. In research one is continually faced with multiple choices as to what experiment to do next and how to do it. The effort that goes into a sterile experiment can be as great as that which goes into an illuminating one. Some gifted individuals have a knack for selecting the most fruitful approach. The quality of judgment is also probably genetically controlled, but the individual can improve his endowment with experience, and he can tap the wisdom of others. I have noted even gifted individuals checking their estimate of a situation in discussions with their colleagues. Motivation is the factor in creativity which is most subject to change by one's surroundings. It is also an essential component, for without it the best minds accomplish little. With adequate motivation comes the self-control necessary for tapping one's resources.

Creative effort differs from most other activities in that it generally requires unusual discipline. People in other walks of life can go for long periods without exerting much self-control. No foreman can successfully direct a creative scientist in detail how to cerebrate or tell him what move to make next. The judgment and initiative must stem from the individual. He must do the necessary thinking, and if he is to be truly creative he must think deeply and organize himself and his activities. If he fails to exercise proper self-discipline, this deficiency is not obvious to others immediately. He may appear for work as usual, follow his accustomed routines, attend seminars, read the literature, and give the appearance of creative effort. But this activity may be only a facade if his mind is elsewhere.

Related to the need for self-discipline are qualities of patience, courage, and willingness to take the punishment of disappointment. In the present era of science there is pressure to build extensive bibliographies. The certain way of doing this is to carry on research which is merely a small extension of what is already known. Under these circumstances the scientist is not forced to think deeply, yet he feels some security as a contributor to science. Little in the way of creativity comes out of such procedure. The path of courage lies in choosing a difficult but fundamental problem and working at it even though the walls of confusion seem insurmountable. The person who undertakes such a task must be capable of living with disappointment. He must be able to cope with the unhappiness that follows the failure of what seemed to be promising approaches. Even after an extended period of apparently fruitless work, he must be capable of summoning the necessary stamina to continue his efforts. The inner resources which permit the creative person to continue after repeated failure can stem only from deep motivation.—P.H.A.

This editorial is based on an address given at the New York University Conference on Education for Creativity in the Sciences, 13–15 June 1963.