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Basic Research: The Need for Lateral Movement

The offensive football team huddles and a running play is called for off-tackle. The ball is snapped, the quarterback hands off, and the running back heads for his assignment. But a linebacker has unexpectedly filled the hole—opportunity lies elsewhere. Nevertheless, off-tackle is the play, and the running back dutifully follows orders. He is stopped cold, and yardage and a valuable down are lost. Is this any way to run a football team? Would a fan (not to mention the coach) prefer to watch a running back doggedly following orders or the kind of player, like O. J. Simpson, who sizes up the situation and instinctively moves laterally to take advantage of the opening the linebacker created when he shifted to his off-tackle defensive position? The answer is obvious.

So it is with a university professor carrying out basic research. The public supports him in his quest for knowledge. In turn, he makes his results freely available to the public for use in a myriad of ways. But government bureaucratic controls are increasingly limiting his lateral movement. Each day the researcher finds himself more closely confined to narrow patterns of expenditure and performance, limiting his creativity and contribution to the national good. These limitations are imposed for the highest of purposes—limiting abuse in the spending of public funds. But they limit much more.

A scientist must be free to change research direction according to his instincts or hunches as new opportunities present themselves in the course of his inquiry. But the auditing practices of the federal government today, which are undoubtedly valuable for the procurement of hard goods, are increasingly being applied to the performance of basic research. A researcher will submit a proposal to the federal government outlining a program of activity sometimes 2 years in advance. If he is fortunate enough to obtain funding (few are in today's marketplace), he finds himself enmeshed in a web of controls and budget restrictions. Ostensibly these are to prevent fraud, but most research institutions already have safeguards to protect against this very rare abuse. In reality, the bureaucratic drive for uniformity seems a more likely explanation for the narrow auditing perspective imposed on the scientific researcher.

However, the nature of research requires unfettered lateral movement. The scientist must be free to shift his momentum and move in a totally unexpected direction. Like "The Juice," who has taken his share of licks, the scientist constantly faces the possibility of failure. His ideas, when successful, are usually the breakthroughs that one hears about and that play such an important role in the development of science for mankind. This is where the payoff lies.

It is the same for the running back. If he elects to change his strategy from that set by the quarterback when calling the play, it had better work. His decision is irreversible, and his colleagues, coaches, and fans will ultimately decide whether he made the right decision. So it is with the basic researcher. He operates in a highly competitive environment with many colleagues standing on the sidelines, eager to substitute for him if he falters. If he succeeds, continued funding and intellectual satisfaction are his reward. If he fails, he'd better look for another career.

No one wants a running back who just follows orders. Likewise, government controls that force the researcher into a narrow preordained research pattern guarantee only that he will be forced to run at a solid defensive wall. It may look good to the auditor, but it will not sell to his fans—his colleagues and the public. Let us not fall into the trap of imagining that expenditure along prescribed lines is a way to measure the productivity and performance of a researcher. It is invariably the opposite. Let the researcher choose his "spot" to shoot for. Only the best will make it, and we will all be better off for it.—RAYMOND ORBACH, *Department of Physics, University of California, Los Angeles 90024*