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DEVIANCY FROM THE NORMS OF SCIENCE: The Effects of Anomie and Alienation in the Academic Profession

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Anomie Theory, as formulated by Robert K. Merton, has been posited as a possible explanatory framework for deviancy from the norms of science. *Anomie* is the inability of some individuals to achieve excessively emphasized group goals through adherence to group norms. This study tests Anomie Theory by using alienation from the reward system of academic disciplines as an operationalization of this theory. Findings suggest support for Anomie Theory as an explanation for deviancy from the norms of communality, disinterestedness, and universalism. Implications for such topics as the use of norms as interpretative devices and the ambivalence of academics over compliance with dominant and subsidiary (counter-norms) are discussed. Implications for professional practice are also offered.

Understanding deviancy from the norms of science is of fundamental importance, as the norms of science are mechanisms of informal social control in the academic profession (Merton, 1942, 1973; Braxton, 1986). The functionalist perspective holds that larger society grants professional autonomy to professions that control the work of its members in the interests of their clients (Goode; 1969); hence, mechanisms of social control are of importance given the claims to professional autonomy made by the academic profession (Clark, 1963; Kadish, 1972).[1]

The four norms of science, which function as a set, are as follows:

Communality. This norm prescribes that the findings of research must be made public, because such findings are the property of the research community. However, the individual scientist should receive recognition or esteem for such findings by the scientific community in exchange for his or her contribution. In specific terms, secrecy is prohibited, and the failure to give appropriate recognition to a scholar is scorned.

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Disinterestedness. This norm prohibits the individual from doing research for the primary purpose of gaining recognition from one's colleagues as well as gaining prestige and financial reward from the lay community (Rothman, 1972; Stehr, 1978). Put differently, research for the purpose of advancing knowledge is the favored motive for research role performance.

Organized Skepticism. This norm ordains that no knowledge claim or research finding should be accepted without an assessment based on empirical and logical criteria. In other words, judgment should be suspended until the essential evidence has been obtained (Zuckerman, 1988). Thus, a critical stance toward scholarly contributions should be held by the individual and the community of scholars alike.

Universalism. This norm holds that the findings of research must be assessed on the basis of scientific merit rather than on the basis of such particularistic criteria as race, nationality, social class, institutional affiliation, or doctoral origin. This norm also decrees that scientific careers and recognition for research contributions should be predicated on merit or talent rather than on particularistic considerations.

According to Merton (1942, 1973), these four norms are derived from the goals and methods of science.[2] Thus, it can be contended that conformity to these norms augments the goal of science: the advancement of knowledge. If the academic discipline (Schein, 1972) is the client of the academic profession, then compliance with the norms of science is in the best interest of the client of the academic profession: the knowledge base of an academic discipline. Thus, understanding deviancy from the norms of science is of fundamental importance not only for our understanding of social control in the academic profession, but also for the protection of the autonomy granted to the academic profession by the lay public, an autonomy currently under scrutiny given the public perception that scientific wrongdoing is on the increase (Broad and Wade, 1982).

Anomie Theory has been advanced as one possible explanation to account for deviancy from the norms of science (Zuckerman, 1988). This theory holds that social groups develop goals for which members of the group aspire to achieve (Merton, 1968). Coupled with such goals are regulations, or norms, which prescribe the appropriate conduct for the pursuit of these goals. When excessive emphasis is placed on the achievement of the goals of a particular group, individuals deviate from such social norms when they perceive that they are unable to achieve group goals through socially legitimate means. The inability of some individuals to achieve highly prized group goals through adherence to group norms has been termed *anomie* by Merton. Anomie is a condition of the social structure of such groups.

For individuals who have been misled to believe that they are capable of achieving group goals, anomie induces a sense of injustice which, in turn, leads

to alienation (Cloward and Ohlin, 1960). It is alienation that produces deviancy from social norms, which are functional to the achievement of group goals.

These formulations can be extended to the academic profession that has as its goal the advancement of knowledge. Academics are socialized to place a high value on this goal through the doctoral socialization process as the norms, values, and attitudes of research are inculcated through this process (Hagstrom, 1965; Merton, Reader, and Kendall, 1957; Cole and Cole, 1973). Consequently, academics come to hold the view that the most meritorious behavior of an academic man or woman is the performance of significant research (Ladd, 1979).

The advancement of knowledge in an academic discipline—the achievement of group goals—is certified by colleagues through the recognition they bestow on individuals who are assessed as having made contributions to the advancement of knowledge through their research role performance. Put differently, high standing in an academic discipline is accorded to those individuals who have made contributions to the advancement of knowledge in a particular academic field. According to the norm of universalism, such recognition is predicated on the merit of an individual's scholarly work to the advancement of knowledge. This set of beliefs concerning the reward system in science is acquired by academics through the doctoral socialization process (Hagstrom, 1965; Cole and Cole, 1973). Moreover, academics also are socialized to expect that compliance with the norms of science is rewarded by the community of an academic discipline (Merton, 1942, 1973).

The excessive emphasis placed on originality in contributions to knowledge and on peer recognition that creates a strain toward anomie in the academic profession (Zuckerman, 1988) is indexed in the fact that some individuals will not receive recognition from their colleagues for their scholarly contributions. To elaborate, colleague recognition takes such forms as election to associational office, appointment to governmental advisory panels, and appointment to journal editorial boards (Braxton, 1986). Such forms of recognition are bestowed on only a few individual academics. Moreover, colleague recognition for scholarly contributions can also be manifested through reference and citation (Braxton and Bayer, 1986). To Merton (1973), citations are the primary mechanisms of reward. However, the likelihood that any single scholarly work will be cited more than once is low (Braxton and Bayer, 1986). Another indicator of colleague recognition or stature in a discipline is the extent to which an individual receives external research grant support (Hackett, 1990). However, the competition for grant support from such federal agencies as the National Science Foundation and the National Institutes of Health is acute (Chubin and Hackett, 1990). Thus, anomie exists in the academic profession.

Individuals who experience the effects of anomie come to believe that high standing and success in one's academic discipline are based primarily on crite-

ria other than merit. This belief, in turn, induces in the individual academic a sense of alienation from the reward system of the individual's academic discipline. This sense of alienation induces deviancy from the norms of science. Conversely, individuals who do not feel alienated from the reward systems of their discipline conform to the norms of science. From these formulations the following hypothesis is derived: The greater an individual's feeling of alienation from the reward system of his or her academic discipline, the greater the likelihood that such an individual will deviate from the norms of science.

METHOD

Data Source

The 1977 Survey of the American Professoriate conducted by Ladd and Lipset was the data source for this inquiry. Although this survey is somewhat dated, it is the only national survey of faculty that contained an extensive set of items addressing the Mertonian norms of science. These items were developed by Harriet Zuckerman and Robert Merton (Ladd and Lipset, 1978).

Faculty at 158 colleges and universities in the United States were selected to take part in the Ladd and Lipset survey. Equal proportions of faculty were selected from each of the five categories of colleges and universities delineated in *A Classification of Institutions of Higher Education* (Carnegie Commission on Higher Education, 1972).

Of the 8,697 surveys distributed, 4,383 faculty responded, yielding a response rate of 51.7 percent. Analyses conducted by Ladd and Lipset (1978) indicate that the obtained sample is representative of the population of faculty in the five types of colleges and universities categorized in the Carnegie Classification of Institutions.

Of the 4,383 faculty respondents to the Ladd and Lipset Survey, 81 percent were male and 19 percent were female (Ladd and Lipset, 1978). In terms of academic rank, 43 percent of the respondents were either assistant professors or instructors, 25 percent of these individuals were associate professors, and 32 percent were professors. Moreover, 73 percent of the survey respondents held their academic appointments at public institutions of higher education whereas 27 percent of these respondents held their appointments at private institutions. Further information on the institutional affiliations of these survey respondents indicates that 42 percent held their appointments at universities, 40 percent at four-year colleges, and 19 percent at two-year colleges.

A subset of 857 faculty members is used herein. This subset was composed of faculty meeting the following criteria: are currently active in scholarly or creative activity; designated their primary field of research activity to be in biology, chemistry, economics, physics, political science, psychology, or soci-

ology (control for discipline; see below); and hold a full-time appointment at a four-year college or university (control for institutional research emphasis; see below).

Research Design

The research design was composed of one independent variable, two control variables, and four dependent variables. Alienation was the variable of interest in this study. The measure of alienation was a composite of responses to six items on the Ladd-Lipset survey concerning the allocation of success in academic disciplines. These six items suggest a system of rewards in the form of colleague recognition and evaluation for grants predicated on unmeritocratic factors. Put differently, these items tap a set of beliefs suggesting that the allocation of research grants and high standing in an academic discipline are rooted in factors other than merit. These six items are exhibited in Table 1. A four-point scale was given to respond to each of these items: 1 = strongly agree; 4 = strongly disagree. The Cronbach alpha estimate of internal consistency reliability for this variable was $r = .65$.

Institutional emphasis on research and academic discipline were the two control variables included in this research. These variables were introduced as control variables, as both of these variables have been found to influence faculty compliance with the norms of science (Braxton, 1986, 1989). Institutional emphasis on research was measured by assigning scale values depicting varying degrees of emphasis on research activity to the following four combined Carnegie categories: research universities I and II (scale value = 4), doctoral-granting universities I and II (scale value = 3), comprehensive colleges and universities I and II (scale value = 2), and liberal arts colleges I and II (scale value = 1). The justification for assigning these scale values was the extent to which faculty in each of these categories of institutions publish their research and scholarship (Ladd, 1979).

The seven academic disciplines represented in the sample of this inquiry were classified as being either a natural science or a social science. This classification follows the findings of research on disciplinary differences in faculty conformity to the norms of science reviewed by Braxton (1986). Biology, chemistry, and physics were classified as natural sciences (scale value = 1) whereas economics, political science, psychology, and sociology were categorized as social sciences (scale value = 0).

Deviancy from each of the four norms of science comprised the dependent variables used—deviancy from the norm of communality, deviancy from the norm of disinterestedness, deviancy from the norm of organized skepticism, and deviancy from the norm of universalism. Each of these four variables was a composite of specific normative statements included in the Ladd and Lipset

TABLE 1. Definition of Variables

A. *Alienation*

The variable was composed of the following six items:

1. Eminent scientists and scholars are more likely to receive research grants than others who submit proposals of about the same quality.
2. The "peer review" system of evaluating proposals for research grants is, by and large, unfair; it greatly favors members of the "old boy network."
3. The top people in my field are successful because they are more effective "operators" than others.
4. The top people in my field are successful because they have had many advantages.
5. The top people in my field are successful because they are effective promoters of their careers.
6. The top people in my field are successful because they have had sponsors who helped them get off to a good start.

B. Normative statements categorized by the Mertonian Norm of Science are represented. These statements were used to construct the four measures of norm deviancy.

Communality

[1] "In general, scientists and scholars are unjustified in keeping their research findings secret";

[2] "Scientists and scholars have the obligation to acknowledge intellectual property by pertinent citations and references"; and

[3] "Scientists and scholars should be willing to inform others investigating similar problems about their work in progress."

Disinterestedness

"Scientists and scholars should prefer critical evaluation by competent peers to public acclaim."

Organized Skepticism

[1] "Scientists and scholars should critically examine others' contributions that they are using in their own work";

[2] "Scientists and scholars should be skeptical even about their own research findings until competent peers have evaluated them";

[3] "Scientists and scholars have an obligation to present available evidence that contradicts their hypotheses";

[4] "No matter how deeply persuaded scientists and scholars may be that their ideas are sound, they must take account of critical appraisals of these ideas by competent peers"; and

[5] "Scientists and scholars ought to question their findings if these cannot be independently reproduced by any others in the field."

Universalism

[1] "The acceptance or nonacceptance of scientific and scholarly contributions should be judged on the evidence and not on the social characteristics [such as race or sex] of the authors";

[2] "The standing accorded scientists and scholars in their fields should depend on the quality and extent of their contributions, not on their personal or social characteristics."

survey. These statements were categorized according to the appropriate norm of science and are exhibited in Table 1. For each of these normative statements, respondents were asked to indicate the extent to which they act in accord with each behavior (1 = almost always acts in accord, 2 = sometimes, and 3 = rarely). Using these composite scores, individuals who indicated that they act in accord either sometimes or rarely with any one of the specific behaviors were scored as deviant from that particular norm (value of score = 2), whereas individuals who indicated that they almost always act in accord with each of the specific behaviors were classified as not deviating from that particular norm (value of score = 1).

Statistical Design

Hierarchical linear multiple regression was the statistical procedure used to test the general hypothesis of this inquiry. To test this hypothesis, four equations were solved, one for each of the four norms of science. Each of these equations entailed regressing deviancy from the focal norm of science on academic discipline, institutional emphasis on research, and alienation. Given this inquiry's large sample size ($n = 857$), the .01 level of statistical significance was used to reduce the probability of committing Type I errors.

FINDINGS

Means and standard deviations are exhibited in Table 2, and zero-order intercorrelations for this inquiry's variables are shown in Table 3. Summary statistics from each of the four regression equations solved are displayed in Table 4.[3]

Deviancy from the Norm of Communality

Alienation ($b = -.114$, $p < .01$) has a moderate influence on deviancy from the norm of communality above and beyond the effects of institutional emphasis on research and academic discipline. Thus, the greater an individual's sense of alienation from the reward system of one's academic discipline, the more likely he or she is to deviate from the norm of communality. However, neither academic discipline nor institutional emphasis on research exert a statistically significant effect on deviancy from the norm of communality.[4]

Deviancy from the Norm of Disinterestedness

Deviancy from the norm of disinterestedness is mildly affected by feelings of alienation from the reward system of one's academic discipline ($b = -.133$, $p < .0001$). As feelings of alienation increase, the likelihood of deviancy from the norm of disinterestedness also increases. Moreover, institutional emphasis

TABLE 2. Means and Standard Deviations for Variables

Variables	Mean	Standard Deviation
Control Variables		
1. Emphasis on Research	3.70	0.70
2. Academic Discipline	1.43	0.49
Independent Variable		
3. Alienation	2.05	0.45
Dependent Variables		
4. Deviancy from Communality	1.38	0.49
5. Deviancy from Disinterestedness	1.18	0.39
6. Deviancy from Organized Skepticism	1.67	0.47
7. Deviancy from Universalism	1.20	0.40

on research ($b = -.059$, $p < .01$) and academic discipline ($b = -.093$, $p < .01$) have statistically significant effects on deviancy from this particular norm of science. As the institutional emphasis on research increases, the less likely an individual academic is to deviate from the norm of disinterestedness. In more specific terms, the effect of academic discipline indicates that social scientists are somewhat more likely to deviate from the norm of disinterestedness than are natural scientists.[5]

Deviancy from the Norm of Organized Skepticism

As indicated by the summary statistics displayed in Table 4, the regression equation solved is not statistically significant. Thus, support for the hypothesis of this inquiry is not provided.

TABLE 3. Zero-Order Correlations for Variables

Variables	1	2	3	4	5	6	7
Control Variables							
1. Emphasis on Research							
2. Academic Discipline	00*						
Independent Variable							
3. Alienation	12	11					
Dependent Variables							
4. Deviancy from Communality	−02	04	−10				
5. Deviancy from Disinterestedness	−13	−15	−18	16			
6. Deviancy from Organized Skepticism	−02	−07	−07	32	20		
7. Deviancy from Universalism	−04	−07	−14	14	30	25	

Note: Decimals for the correlation coefficients are omitted.
*Value of r is less the .01.

TABLE 4. Regression of Deviancy from the Four Norms of Science on the Control Variables and Independent Variables

	Deviancy Communality	Deviancy Disinterestedness	Deviancy Organized Skepticism	Deviancy Universalism
Emphasis on Research	.016	− .105*	− .008	− .012
	(.011)	(−.059)	(−.006)	(−.007)
Academic Discipline	.065	− .121**	− .057	− .046
	(.064)	(−.094)	(−.054)	(−.037)
Alienation	− .106*	− .156**	− .059	− .134
	(−.114)	(−.133)	(−.062)	(−.118)
Constant	1.48	1.81	1.89	1.52
R^2 (adjusted)	.010*	.055**	.004	.018*

Note: Metric coefficients are in parentheses.
*p .01
**p .0001.

Deviancy from the Norm of Universalism

Alienation from the reward system of one's academic discipline ($b = -.118$, $p < .0001$) exerts a moderate statistically significant effect on deviancy from the norm of universalism. The more alienated an individual academic feels from the reward system of his or her academic discipline, the more likely such an individual is to deviate from this norm of science. However, the two control variables—institutional emphasis on research and academic discipline—do not have statistically reliable influences on deviancy from this particular norm of science.[6]

DISCUSSION AND CONCLUSIONS

The findings and conclusions are tempered by the following principal limitation to this study: The four measures of individual deviancy from each of the four norms of science were self-reports and were not independently captured measures of behavior. Although the social desirability of an individual not reporting deviancy may have influenced the responses of some individuals, self-reports generally produce higher rates of deviance than do official records (Reiss, 1973). Moreover, Zuckerman (1977) contends that more systematic data can be generated through self-reports than from official statistics. Furthermore, the questions asked regarding deviancy from the norms of science pertain to behaviors less severe than fraud or plagiarism (Zuckerman, 1977). Consequently, academics would be more likely to provide more accurate reports of

their own deviancy from the type of normative statements used herein than if they were asked to report their own acts of fraud or plagiarism.

Some support for Anomie Theory as an explanation for deviancy from the norms of science is provided by the findings of this study. With the exception of the norm of organized skepticism, alienation from the reward system of an academic discipline influences deviancy from scientific norms.

There are two possible explanations for the failure of alienation to exert a statistically reliable effect on deviancy from the norm of organized skepticism. One possible explanation has its roots in the foci of the various norms of science. Although the four norms of science are functional to the advancement of knowledge, the norms of communality and universalism also ordain appropriate and inappropriate behavior concerning relationships among colleagues (Braxton, 1986). In contrast, compliance with the norm of organized skepticism is instrumental to the advancement of knowledge and does not serve as a guide to relationships among colleagues. As rewards are meted out by one's colleagues, then alienation from this allocation process leads to deviancy from those norms—communality and universalism—that guide relationships among colleagues. Because colleague relationships are not governed by the norm of organized skepticism, alienation does not influence noncompliance with this norm.

The second explication pertains to deviancy from the norm of disinterestedness. This norm is instrumental to the advancement of knowledge by prescribing or proscribing the underlying motives of scientists for conducting research. According to Rothman (1972) and Stehr (1978), this norm prohibits doing research to attain prestige or financial gain from the lay community. Thus, reward and recognition for research also pertain to this particular norm. It is this dimension of the norm of disinterestedness that is plumbed in this study. If a scientist is alienated from the reward structure of his or her academic discipline, then such an individual may turn instead to the lay public for recognition. Once again, nonconformity with the norm of organized skepticism is not accounted for by these formulations, as the norm of organized skepticism pertains solely to the advancement of knowledge. These two explanations provide some theoretical support for the somewhat mild empirical backing given to Anomie Theory in this inquiry.

Although alienation from the reward system of an academic discipline may serve to help explain deviancy from the type of normative transgressions—norms of communality, disinterestedness, and universalism—used in this inquiry, this construct may not explain more egregious forms of scientific impropriety such as fraud, plagiarism, data "cooking," and data "trimming." Instead, the perception that one is unable to make original contributions to knowledge that win high status among one's colleagues may be a more powerful force on such misconduct than alienation from the reward system as measured in this

study. To elaborate, originality in research is highly valued in science (Merton, 1973; Hagstrom, 1965; Gaston, 1971; Zuckerman, 1988). For a contribution to be judged as original, some important dimension of the phenomena under investigation is identified and demonstrated for the first time (Gaston, 1971).

Anomie obtains in the academic profession because some scholars are unable to make an original contribution to the knowledge base of their academic discipline regardless of the extent to which they adhere to the norms of science. Consequently, an individual academic scientist who believes that he or she is unable to make original contributions to knowledge may commit fraud, cook or trim data, or plagiarize. Although such an individual may feel alienated from the reward system of his or her academic discipline, and such feelings lead to deviancy from scientific norms as stated in this study, it is the perceived inability to make original contributions that leads to more severe forms of misconduct than the type of normative transgressions used in this study. A test of this formulation of Anomie Theory awaits further research.

Given the current increased pressure to publish and receive external funding for research experienced by academics (Bowen and Schuster, 1986; Hackett, 1990), alienation might exert a stronger effect on deviancy from the three norms of science than observed herein if this study were replicated. Thus, replication of the current study is urged. Moreover, such a replication should seek to obviate some of the limitations of the current inquiry. For example, independently derived measures of individual conformity to each of the norms of science should be used. Such independently derived measures might take the form of departmental colleague reports of the extent to which focal individuals comply with the norms of science. Independent measures of deviancy from the norms of science might also be constructed from incidents of misconduct adjudicated by university academic affairs officers, department chairpersons, and institutional review committees. Although such measures might be difficult to obtain, more reliable indicators of individual conformity to the norms of science would be obtained. If such research were to replicate the findings of this study, then additional and more robust support for Anomie Theory would be provided.

The findings of this study also have implications for two theoretical issues related to the norms of science. These two issues are the use of norms as interpretive resources by scientists (Mulkay, 1980) and the ambivalence scientists experience between norms and counternorms (Merton, 1973; Mitroff, 1974). Implications for the interpretative use of norms are conveyed in terms of the following possible practical application of this study's findings: Deviancy can be reduced to some degree if alienation from the reward systems of academic disciplines is diminished.

This proposition seems, on the surface, to be rather straightforward: Deviancy from the norms of communality, disinterestedness, and universalism can

be reduced if standing in an academic field and grants are awarded on the basis of merit. However, merit—norm of universalism—can be used as an interpretative device by both one's colleagues and by the offending individual to justify action (Mulkay, 1980). From the offending individual's vantage point, one can regard his or her own work to be both original and of substantial value to the advancement of knowledge. Thus, if one's colleagues do not bestow the recognition such an individual believes should be forthcoming, then such an individual comes to view the reward and recognition system as being nonmeritocratic. Consequently, such an individual comes to believe that he or she is justified in deviating from scientific norms. "If my colleagues don't play by the rules, then why should I."

In contrast, the consensus of the members of an academic discipline may be that merit has been applied to assessing the contributions of the offending individual and that high standing is not warranted. Therefore, the meaning of merit is variously interpreted by individual scientists. This assertion is borne out by research indicating that both universalism and particularism play a role in the process of allocation of recognition in the natural and social sciences (Braxton, 1986; Lightfield, 1971; Cole and Cole, 1973; Cole 1978). Thus, both the disciplinary community and the offending individual use norms to justify their own action. Put another way, alienation may be a mediating factor in the use of norms as cultural resources. Future research focusing on this contention is urged.

In addition, alienation may also influence conformity to such counternorms as solitariness (counter to communality), interestedness (counter to disinterestedness), and particularism (counter to universalism) identified by Mitroff (1974). If an individual is not complying with the "dominant" norms of science, then such an individual may be adhering to the "subsidiary" or counternorms of science cataloged by Mitroff (1974). Thus, alienation may be a factor that influences the ascendancy of one set of norms over another, a fundamental question that has been raised by Mitroff (1974). Research should also be conducted to test this inference derived from this study's pattern of findings.

Implications for professional practice may also be derived from the findings of this inquiry. Although anomie is a structural condition of the academic profession, some institutional and disciplinary association policies might be developed that would not only reduce the consequences of anomie for some academic professionals, but would also diminish their feelings of alienation from the reward structures of the academic disciplines. At the institutional level, faculty tenure and promotion committees and academic administrators might reduce the emphasis placed on the ability of an individual to secure external grant support for research as a criterion for tenure and promotion. Such committees might also reduce the weight given to citations in tenure and promotion deliberations. Of course, the task with both of these suggestions is to maintain

appropriate and rigorous standards for tenure and promotion, while reducing to some degree the dysfunctional consequences of these criteria for social control in the academic profession.

At both a disciplinary associational and public policy level, modifications in the peer review system might also be enacted that would attenuate the effects of anomie and alienation in the academic profession. Chubin and Hackett (1990) suggest some changes in the peer review system. The first of their suggestions is that funding agencies and journal editors should permit principal investigators and authors to write a rejoinder to reviews of their work before a publication or award decision is made. Chubin and Hackett (1990) contend that the enactment of this suggestion would transform the peer review process into a dialogue between the reviewers and the author or principal investigator. As a consequence of this dialogue, both reviewer and author misunderstandings or errors in judgment could be ameliorated. Feelings of alienation would, in turn, be diminished to some degree.

Chubin and Hackett (1990) also suggest that reviewers or referees should sign their reviews. They assert that this change would not only hold reviewers publicly accountable for their reviews, but reviewers would also be recognized for the quality of their reviews. This suggestion might increase the degree to which universalism operates in the peer review process, and as a consequence, feelings of alienation experienced by individual academics might also be lessened.

The findings of this study and the above suggestions for future research serve to increase our understanding of the mechanisms of social control in the academic profession. By gaining a conceptual handle on deviancy from the norms of science, we come to understand more fully the efficacy of norms as mechanisms of informal social control. Such an understanding is of some significance to the preservation of autonomy granted by the lay public to the academic profession, an autonomy that is currently under siege given the public attention being focused on scientific misconduct (Chubin and Hackett, 1990).

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NOTES

1. Functionalist and power theories are two broad categories of perspectives on professions described by Abbott (1988). Abbott states that the power theories of Johnson (1972), Freidson (1970a, 1970b), Berlant (1975), and Larson (1977) question the functionalist view that professions are self-regulating and worthy of trust by clients and larger society. Taken together these power theories suggest that professions are concerned with dominance, autonomy, and monopoly rather than the ideal of service.

2. Merton's formulations concerning the norms of science have not been without criticism. Mulkay's (1976, 1979, 1980) criticisms are of particular significance, as he asserts that the norms of science are best regarded as an ideology rather than as a dominant, binding code. Put differently, he argues that the norms of science are a set of vocabularies used by elite scientists to evaluate, justify, and describe the professional behavior of scientists to the lay public. These vocabularies are used to gain special political status and to preserve autonomy in research (1976). In a latter critique, Mulkay (1979, 1980) contends that the norms of science are used by scientists to negotiate meanings for both their own behavior and the behavior of their colleagues in various social situations. Thus, norms are socially negotiated rather than being a dominant code in science.

   Zuckerman (1988), however, submits that it is theoretically unsound and misleading to dispense with the norms of science, as she argues that they are instrumental to the advancement of knowledge and are binding on scientists. She notes that the social significance of norms are reflected in the moral indignation expressed by scientists when such norms are violated. Thus, she concludes that norms are "at a great distance from merely ideological statements designed to defend the autonomy of science and from mere rationalization of action offered after the fact" (1988, p. 517).

   Consequently, the question of whether the norms of science are institutionalized in the community of science remains an open question for scholars to pursue. This inquiry is conducted with this perspective in mind.
3. An inspection of the zero-order correlations among the control and independent variable indicates that multicollinarity does not pose a problem to the interpretation of the regression coefficients obtained.
4. The assumption of additivity was tested by introducing interaction terms into the regression equation that included the two control variables and the measure of alienation. These three interaction terms were cross-products of alienation and academic discipline, alienation and institutional research emphasis, and academic discipline and institutional research emphasis. These interaction terms were found not to be statistically significant. Thus, the assumption of additivity is supported.
5. To test the assumption of additivity, the same three interaction terms were introduced into the regression equation following the two control variables and alienation. These terms were found not to be statistically significant, thereby supporting the assumption of additivity.
6. The three interaction terms, described in note 4, were introduced into the regression equation following the two control variables and alienation. The assumption of additivity was supported, as none of the interaction terms were found to be statistically significant.

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