Differences in the Vocational Interests of Research and Development Managers versus Technical Specialists

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This study compared the occupational interests of a sample of research and development managers and technical specialists. The samples were matched to be similar with regard to age, educational area, educational level, occupational tenure, and proportions engaged in research versus development. Discriminant analysis on the general occupational themes and basic interest scales of the Strong–Campbell Interest Inventory indicated the social, enterprising, and conventional areas predicted managerial group membership, whereas the artistic area predicted technical specialist membership. This was discussed in terms of career systems in research and development organizations. © 1985 Academic Press, Inc.

In recent years, the issues of staffing, counseling, and placement of scientific and engineering personnel in research and development (R&D) settings has received renewed attention from organizational policy makers as well as behavioral scientists (Badawy, 1975, 1982; Mossholder, Dewhirst, & Arvey, 1981; Roberts & Fusfeld, 1981). As Mossholder et al. (1981) suggest, the demand for R&D personnel is expected to be strong through the 1980s and the salience of this group in our economy makes them a population deserving increased attention from behavioral scientists. Public opinion has also changed recently, and now an estimated two thirds of the American public believes government funds for research and development should be sizably increased (Norman, 1983).

For the organization, the economic costs of personnel misallocation, while difficult to quantify, are estimated to be high. At the individual level Zaleznik, Dalton, and Barnes (1970) documented the dysfunctions which obtain to R&D personnel whose ego interests (values as measured by the Allport–Vernon–Lindzey Study of Values) were incongruent with their work role. In their study of an R&D organization Zaleznik et al.

(1970) note the following:

> In today's knowledge-oriented organizations it is commonplace for the trained
> specialist . . . to confront the choice of continuing a career as a specialist or
> shifting into management. For some, the choice is clearcut. For others the choice
> may be difficult, and once made, a source of continuing ambivalence. (p. 3)

There were two types of ambivalent individuals, and associated personal difficulties, for the subjects noted in the above quote. One type was the technical specialist who was more dominated by economic rather than theoretical values, and the other was the R&D manager whose theoretical values overshadowed the economic values. The fundamental issue in the Zaleznik et al. (1970) study was the correspondence between the interests of the individual and the demands of the occupational role. This general question of person–role congruence has been addressed in R&D organizations primarily by studying personality differences between managers and specialists. Several studies noted below will summarize these major findings, particularly those which are relevant to the measures used in the present research. However, these comments are not a comprehensive review of all the work done on the differential psychology of the two groups. Furthermore, some researchers have used groups which included both scientists and engineers, and others have studied scientists and engineers separately as has been recommended by Kerr, Von Glinow, and Schriesheim (1977) and Badawy (1975).

Taguiri (1965), for instance, found that science managers had stronger economic and political values than did scientists. Analogously, engineering managers have been shown to score higher on dominance and social ascendance factors than engineers (Brown, Grant, & Patton, 1981; Harlow, 1973). And a similar pattern has emerged from life history research in which engineering and science managers report being more athletic, forceful, gregarious, and confident in social settings than their technical counterparts (Albright & Glennon, 1961; Chaney & Owens, 1964; Klimoski, 1973).

Three studies which combined scientists and engineers are also worth noting. Schein, McKelvey, Peters, and Thomas (1965) studied scientists and engineers in a research section of NASA, and found those with a managerial orientation to be more interested in responsibility, influence, and interpersonal relations. Those with a technical orientation were more task oriented and socially passive. In this particular study, however, not all whose who were classified as having a managerial orientation were actually doing supervisory or managerial work. As an aside, managerial orientation was associated with a development job, whereas a technical orientation correlated with a research job. In a related vein, Mossholder et al. (1981) reported that development personnel scored significantly higher than research personnel on the Strong Vocational Interest Blank

(SVIB) scales pertaining to technical supervision, recreational leadership, and medical service and were also significantly higher on the Adjective Check List dominance scale. In the present study we therefore attempted to equalize the proportions of researchers and developers in the two comparison groups. Finally, Rosen, Billings, and Turney (1976) reported that managers scored higher than specialists on a composite managerial interest scale constructed by summing the production manager, army officer, and air force officer occupational scales of the Strong Vocational Interest Blank. This particular measure is heavily saturated with an interest in realistic, pragmatic, and mechanical activities, however, and does not reflect a heavy interest in economic or enterprising activities. In the same study, the authors found specialists to be higher than managers on a composite science interest scale constructed by summing the mathematician, chemist, engineer, physicist, and architect occupational scales.

No studies could be found in the literature which assessed R&D personnel with the 1981 revision of the Strong–Campbell Interest Inventory (Campbell & Hansen, 1981). One major difference between the Strong–Campbell Interest Inventory (SCII) and the SVIB is that the SCII scales the six Holland themes in Holland's (1973) hexagonal model, and categorizes the 23 basic interest scales using Holland's framework. Hansen and Johansson (1972) and Campbell and Holland (1972) did the major psychometric work necessary for this change, which found its way onto the inventory in the middle and late 1970s.

The purpose of the present study, then, was to determine if the Holland themes and basic interest scales could discriminate between R&D managers and technical specialists. No formal hypotheses were formed, but rather, an exploratory search for differences in the interest patterns of managers and specialists was carried out, both of whom had made well-differentiated career choices. An attempt was also made to interpret the structure underlying the observed differences.

Method

Subjects

The subjects were a sample of 110 R&D managers and a comparison sample of 55 technical specialists. Managers will be referred to as MGRs and technical specialists as TSs. All members of each sample were male.

The mean age for MGRs was 39.1 years, and the mean age for TSs was 38.4. Both samples were approximately 60% scientists or PhD engineers, and 40% engineers with less than PhD training. The mean MGR educational level was 18.8 years, and for TSs, it was 18.0. All persons in each sample had at least a bachelor's degree in science or engineering. Educational background was segmented into four broad categories with respective MGR and TS percentages as follows: category 1, physicists and chemists—32, 35% (physicists and chemists were combined, since

they score very similarly on occupational interest scales); category 2, electrical, mechanical, and chemical engineers—40, 40%; category 3, mathematics and computer science—10, 14%; category 4, miscellaneous (i.e., materials science, biology, geology)—18, 11%. Approximately 70% of both samples were classed as doing development work, and 30% as research. Finally, the mean occupational tenure of each group was 15 years for MGRs and 14.3 for TSs. Of the 15 years for MGRs, the mean was 6.9 in managerial roles.

Only respondents who reported being "satisfied" or "very satisfied" with their occupational role were used in the analysis. Also, an individual was classed as technical or managerial only if his present position and future aspirations were consistent. That is, TSs who reported managerial aspirations were not used (there were no "reverse" cases of MGRs aspiring to switch to a technical track). Finally, an individual had to have a minimum of 2 years experience in the appropriate job position to be classed as either TS or MGR.

Questionnaire packets were distributed to MGRs and TSs in seven R&D organizations through the directors of research and development in consultation with the senior author.

For the MGRs, 143 were sent questionnaire packets, and 110 (77%) usable responses were returned. For the TSs, 87 were sent packets, and 55 (63%) usable cases were obtained. The samples were constructed using a two-stage process which is described below under Procedure. Questionnaires were returned directly to the authors, and sponsoring organizations did not know which individuals responded.

Instruments

All respondents were given the 1981 SCII, a background questionnaire, and a letter explaining the purpose of the project. They were also given the option in the cover letter of completing the questionnaires at home or work, but we did not ask which site they chose.

The SCII scales Holland's (1973) six general occupational themes of Realistic, Investigative, Artistic, Social, Enterprising, and Conventional, as well as 23 basic interest scales which include areas such as Nature, Agriculture, Mathematics, Teaching, Public Speaking, and Office Practice. Each basic interest scale is categorized as belonging to a particular Holland theme category. In addition the SCII contains 162 specific occupational scales and several administrative indexes such as introversion–extroversion and academic comfort.

The background questionnaire requested present job position, including the extent to which it was a research or development position. In addition, a short job history, age, education, job satisfaction, and the individual's future aspirations for a technical or managerial career path were assessed.

Procedure

A two-step process was used to obtain a sample of MGRs which matched the sample of TSs. First, data were collected on both MGRs and TSs from the R&D departments of two firms, primarily in high-energy physics, electronics, and semiconductor fields. In this first step, 30 usable responses of 43 possible (69%) were obtained for MGRs, and 55 from a possible 87 (63%) were obtained for TSs. The MGRs were also approximately 10 years older on average than the TSs.

In the second step, the MGR sample was expanded to 110 by selecting additional MGRs from five additional firms in the physics, electronics, and semiconductor fields. The expansion of the MGR sample for this study was done so that the final group would match the TS sample with respect to average age, research versus development proportions, educational level, and area of training. In short, an attempt was made to construct comparable samples for analysis purposes. The logic of this sampling was an explicit attempt to allow the occupational roles of MGR and TS to be the organizing influence, even though it was carried out across different organizations. Expanding the MGR sample was a "quiet" and economical process. We worked with the directors of R&D to target 100 MGRs who would create a comparable group for comparison to the TS sample. Cooperation was solicited through personalized memos, and 80 (80%) of the target group responded; the final MGR sample was thus the sum of 30 and 80, the number responding at each step.

Analyses of Data

The analysis consisted of two linear discriminant function analyses, one on the Holland themes and a second on the basic interest scales. First, Holland's six theme scores for each group were averaged and compared using Hotelling's T^2 statistic. Since there were significant correlations among variables, it was appropriate to test for the degree of profile separation using the multivariate extension of the univariate t test. This was followed by linear discriminant analysis in an effort to interpret the underlying data structure in the tradition of Cooley and Lohnes (1971) and Borgen and Seling (1978).

Second, since the Holland themes demonstrated significant departure for the two groups, all 23 basic interest scales were entered in a stepwise discriminant analysis where the significance level for retaining a variable was set at .05. For each discriminant analysis, the function was applied to the original data to examine how well it classified the original respondents. While this is hardly as useful as extending the function to a new sample, it gives another index of discrimination power which is more graphic than the eigenvalues and canonical correlation.

The occupational scales and administrative indices were not included in the analysis because we were searching for structure. Occupational

scales capture considerable complexity about the individual, and are not designed to reflect unidimensional constructs as are the Holland themes and basic interest scales. Our point of view was that utilizing concepts which were explicitly constructed using cluster analytic techniques would assist in the interpretation of latent data structure.

RESULTS

Table 1 shows the overall discriminant analysis for the Holland themes and the final result of a stepwise procedure for the basic interest scales. All 23 basic interest scales were entered in a backward stepwise discriminant analysis and scales were retained only if the statistical significance of their discriminant weight was at or below the .05 level. In the two-group case, the discriminant weights are proportional to regression coefficients and can be used for interpretation along with the loadings (although not in the same precise sense as regression coefficients). The loadings are correlations between each variable and the linear discriminant compound and can be interpreted much like a "factor" in factor analysis. The weights are sensitive to collinearity in the predictor variables, whereas the loadings are less sensitive to these intercorrelations. Thus somewhat more importance will be attached to the loadings than the discriminant weights in interpreting the data structure.

In reference to the Holland themes in Table 1, the discriminant analysis indicates a significant amount of variation is being carried forward from the predictor variables into the group membership variable, $\omega^2 = .17$; $\chi^2(6, N = 165) = 29.1$; Wilk's $\Lambda = .83$, $p < .01$. The group centroids

TABLE 1
Discriminant Analysis for Holland Themes and Basic Interest Scales

	Discriminant weights	Loading	p
Holland themes[a]			
Realistic	− .29	.60	.18
Investigative	.15	.28	.51
Artistic	− .47	− .19	.03
Social	.74	.76	.004
Enterprising	.18	.66	.50
Conventional	.45	.73	.09
Basic interest scales[b]			
Agriculture	.27	.24	.03
Art	− .46	− .30	.0005
Athletics	.28	.50	.05
Public Speaking	.19	.57	.03
Business Management	1.01	.78	.0001
Office Practice	− .51	.05	.001

[a] $\omega^2 = .17$, $\chi^2(6, N = 165) = 29.1$, $p < .001$.
[b] $\omega^2 = .33$, $\chi^2(6, N = 165) = 63.7$, $p < .0001$.

are $-.63$ for the TS group and .31 for the MGRs, $t(163) = 5.69$, $p <$ .01. The group membership variable was represented as 1 for TSs and 2 for MGRs. The loadings in concert with the weights indicate that higher Social and Conventional theme scores count heavily in predicting MGR membership. This is corroborated by Table 2 which shows means for the Holland theme and six basic interest scales. MGRs score approximately 4 and 5 scale units higher, respectively, on the Social and Conventional theme than do TSs.

The mean score for MGRs was also approximately 5 scale units higher than TSs on the Enterprising theme; however, the loading (.66) and weight (.18) for this theme do not provide a consistent picture. The Enterprising (E) theme is correlated with the Conventional (C) and Social (S) themes ($r_{EC} = .62$, $r_{ES} = .51$, $p < .001$), and this makes interpretation of the Enterprising weight difficult. The high loading of the Enterprising theme suggests that it is more important than its weight would indicate in interpreting the function, and hence it should be viewed as influential in the discriminant scheme. Again, the positive loading and weight indicate higher scores on the Enterprising theme are associated with membership in the MGR group. The negative weight on the Realistic theme combined with a positive loading suggests a potential suppressor effect, particularly since the mean scores for the two groups are approximately equal. Inspection of the simple correlations among the group membership (GM)

TABLE 2
Means for Holland Themes and Basic Interest Scales

	Technical specialists ($n = 55$)		R&D managers ($n = 110$)	
	M	SD	M	SD
Holland themes[a]				
Realistic	57.2	10.4	58.5	8.5
Investigative	57.2	6.8	58.7	5.9
Artistic	47.2	10.5	45.5	10.2
Social	38.6	10.1	44.8	8.3
Enterprising	44.5	9.5	49.6	8.2
Conventional	45.7	9.4	51.0	7.4
Basic interest scales[b]				
Agriculture	49.2	10.2	52.1	9.3
Art	47.4	10.5	43.8	9.5
Athletics	44.6	10.5	43.8	9.5
Public Speaking	44.1	8.2	50.4	9.6
Business Management	43.6	9.6	52.7	8.1
Office Practice	43.8	7.4	44.1	5.6

[a] Hotelling $T^2 = 32.5$, $p < .01$.
[b] Hotelling $T^2 = 100.3$, $p < .001$.

variable, and the Conventional (C) and Realistic(R) themes indicated the classic suppressor situation wherein R was enhancing C's effect by suppressing irrelevant variance in C ($r_{GM, R} = .07$, $r_{GM, C} = .30$, $r_{C, R} = .41$ where $r > .20$, $p < .01$). Inspection of the partial correlations did not clearly support this suppressor view, however ($r_{GM.C.R} = .30$, $r_{GM.R.C} = -.06$). One would have expected the partialled relation between GM and R to be larger in absolute value than the simple correlation if the suppressor condition obtained.

The Artistic theme consistently reflects a negative sign, which indicates higher scores are related to membership in the TS group than the MGR group, and inspection of the means shown in Table 2 indicates that TSs scored higher on average than MGRs (M = 47.2 versus M = 45.5). The Investigative theme had a low positive impact in that higher scores were somewhat related to MGR group membership.

In summarizing the results for the Holland themes, then, the discriminant function could be labeled as an "artistic versus managerial" interest factor. The weights, loadings, and mean differences clearly indicate R&D managers are higher on the Social, Enterprising, and Conventional themes, whereas technical specialists obtain higher scores on the Artistic theme. The Social, Enterprising, and Conventional themes will be treated as important differentiators of the groups even though the weight on the Enterprising and Conventional themes did not reach statistical significance at the traditional .05 level. There is moderate collinearity among these variables which confounds estimates of statistical significance. Furthermore, as Campbell and Hansen (1981, p. 27) point out, 3-point differences on sample sizes of 30 or more are indicative of behavioral differences between groups, and thus have practical significance.

With regard to the stepwise discriminant analysis of the basic interest scales, Table 1 indicates a scale was retained from each Holland theme area except Investigative (with two scales being retained from the Enterprising area). The six basic interest scales comprising the final result of the stepwise procedure have a canonical correlation of .33, which represents considerably more discrimination than was contained in the Holland themes ($\omega^2 = .17$). The discriminant centroids were $-.98$ and .49 for the TS and MGR groups, respectively, $t(163) = 8.9$, $p < .01$. These centroids also indicate more separation power is contained in the six basic interest scales shown in Table 1 than in the Holland themes.

When the weights and loadings are taken in concert, the clear and consistent discriminators are Art and Business Management. Consistent with results from the Holland themes, TSs obtain significantly higher scores on the art scale while MGRs obtain significantly higher scores on the Business Management scale. Since the six basic interest scales were selected in a stepwise process, all the relationships noted below are statistically significant. Higher scores on the Agriculture (AG), Athletic

(ATH), and Public Speaking (PSK) scales are also associated with MGR group membership, although for Athletics and Public Speaking the loadings indicate a stronger positive relationship to MGR membership than do the weights. Table 2 also indicates MGRs score considerably higher on the Athletic and Public Speaking scales than do TSs.

With Office Practice, the suppressor variable influence is again indicated, this time by the large negative weight but near zero loading. In addition, inspection of the simple correlations revealed overlap between Office Practice (OPR) and Business Management (BSM), but only Business Management was correlated with Group Membership ($r_{GM,OPR} = .03$, $r_{GM,BSM} = .44$, $r_{BSM,OPR} = .46$). When the effects of Office Practice were partialed out of Business Management, the correlation increased slightly ($r_{GM,BSM \cdot OPR} = .48$). The correlation between Group Membership and Office Practice became significantly negative with Business Management controlled ($r_{GM,OPR \cdot BSM} = -.22$, $p < .01$). This more clearly reflects that Office Practice is suppressing irrelevant variance in Business Management and thereby enhancing the BSM weight in the discriminant function. Thus higher Business Management scores are directly associated with MGR membership, and are indirectly associated to MGR membership through the Office Practice scale. More will be said about this suppressor effect in the discussion.

Overall, this discriminant function has particularly high loadings on Athletics, Public Speaking, and Business Management, while retaining the negative loading on Art. It could tentatively be labeled an "artistic versus ascendance and management" factor where high scores on the Art component are again associated with membership in the TS group. The highest loadings come from variables in the Enterprising (PSK, BSM) and Social (ATH) area, which is relatively consistent with the results for the Holland themes. The scale means are also consistent with these results. R&D managers obtain significantly higher scores on the Public Speaking, Business Management, and Athletic scales, whereas TSs obtain higher scores on the Art interest scale.

While these results capture the significant differences between the groups, they deserve some comment in a broader interpretive sense. What separates the R&D manager from the technical specialist is not an overwhelming interest in Public Speaking, Business Management, and Athletics, but rather an "average" interest level compared to technical specialists who are disinterested in these same areas. That is, the means for R&D managers on Public Speaking, Business Management, and Athletics are very close to the mean values on these scales for Men-in-General. The mean values on the PSK, BSM, and ATH scales for Men-in-General are 52.0, 52.0, and 52.9, respectively (Campbell & Hansen, 1981, p. 36). Applying the Men-in-General interpretive boundaries to all basic interest scale means in Table 2, both groups would be considered

"average" on all scales with the exception that technical specialists would be labeled "moderately low" on PSK, BSM, and ATH.

With regard to the Holland themes, R&D managers scored higher on the Social, Enterprising, and Conventional themes than did technical specialists, and technical specialists scored higher on the Artistic theme than R&D managers. However, using combined sex norms, both groups would be coded as IR in Holland's framework. Utilizing Men-in-General norms would produce a Holland code of IRC for managers and IR for technical specialists (Campbell & Hansen, 1981, p. 31). Thus, while managers and technical specialists differ from each other, they still appear to be scientists and engineers at heart.

Finally, each of the two discriminant functions from Table 1 were applied to the samples to see how well they could classify the original respondents. These results are shown in Table 3. The diagonal elements indicate correctly predicted group membership, whereas the off-diagonal numbers represent errors. A χ^2 statistic for each set of scales was calculated and indicated prediction was better than chance beyond the .001 level in each case. Inspection of Table 3 reveals the six basic interest scales from the stepwise analysis were considerably more accurate predictors of group membership than the Holland themes. For the Holland themes, the total percentage of accurate classifications was 68% (sum of diagonal elements divided by $N = 165$). For the basic interest scales, the comparable figure was 81%. In addition, the percentages of correct classifications for TSs and MGRs were virtually identical to the total correct percentage in each analysis.

Discussion

Thus, the present result indicated that R&D managers scored significantly higher on the Conventional, Enterprising, and Social themes of Holland's

TABLE 3
Cross Tabulation of True and Predicted Group Membership
Using Discriminant Functions

		Predicted	
		Technical	Managerial
Actual	Holland themes		
	Technical	37	18 ($n = 55$)
	Managerial	35	75 ($n = 110$)
		$\chi^2(1, N = 165) = 18.7$**	
Actual	Basic interest scales		
	Technical	45	10 ($n = 55$)
	Managerial	22	88 ($n = 110$)
		$\chi^2(1, N = 165) = 58.1$**	

** $p < .001$.

theory than did technical specialists. Technical specialists, on the other hand, scored significantly higher on the Artistic theme than did managers. In addition, managers scored significantly higher on the Athletic, Public Speaking, and Business Management basic interest scales than did specialists, whereas specialists scored higher on the Art interest scale than did managers. The consistency of these results across both analyses highlight the importance of the Social, Enterprising, and Conventional areas in discriminating between the two groups. While the Artistic theme and Art scale consistently entered the discriminant scheme, these areas did not exhibit particularly large mean differences between the groups, which makes generalization more difficult. The higher Conventional theme scores for managers suggest they are likely to be more responsive to authority and more comfortable in an organizational hierarchy than specialists. Futhermore, the higher Enterprising and Social theme scores for managers indicate they are likely to be more interested in status, persuasion, and developing people than their technical specialist counterparts.

The stepwise discriminant analysis on the basic interest scales refined the generic shape of the differences suggested by the Holland themes. For example, the managers scored much higher on the Business Management scale than did specialists (approximately 9 units on average), which is dramatic indeed, since 9 units is roughly one standard deviation unit for these data. The managers have a "business mind set" relative to the specialists who are notably disinterested in this area. The Public Speaking scale is part of the enterprising domain, and managers again scored higher than specialists. This scale has been associated with progression into management in other research (Bray, Campbell, & Grant, 1974). Particularly important is the ability to make presentations, which is often an exercise in management assessment centers. Office Practice did not show large mean differences, but apparently operates through a suppressor effect. When stripped of its business management component through partial correlation, office practice is more indicative of technical specialist group membership. The "office practice residue" suggests careful observation and systematic exploration, which are consistent with the work of the technical specialists.

The Social area difference is more specifically driven by differences in athletic interest (athletics is a subset of the social theme). That managers scored higher on the Athletic scale than specialists is consistent with Klimoski's (1973) biographical work on the origins of engineering and engineering management interests wherein managers reported more childhood participation in athletics. The athletic area is apparently bound up with a more gregarious, confident psychological posture. The Realistic scale of the Holland theme was difficult to interpret and, given the small mean difference, should probably not be given much weight. The Ag-

ricultural basic interest scale is a subset of the Realistic theme, but again the small mean difference between the groups makes generalization to broader meanings difficult.

In summary, this research is supportive of the view that interests in the Social, Enterprising, and Conventional areas are stronger for the managers than technical specialists. R&D managers appear to augment their basic scientific and technical identity with a managerial interest pattern, whereas technical specialists are more delineated and consistent in Holland's theoretical framework. That is, specialists accept the scientific area, but are more rejecting of managerial interests. R&D managers, however, incorporate the technical/managerial polarity into their interest structure and psychological functioning. Holland's hexagonal model could be separated into two parts: the Realistic, Investigative, and Artistic themes reflect the world of things, ideas, and symbols, whereas the Conventional, Enterprising, and Social themes reflect the world of organizations, management, and people. This is a generic polarity which is difficult for the individual to psychologically integrate, and yet it expresses the very tension which apparently R&D managers can accommodate, since they must operate in both worlds. This polarity is reminiscent of Badawy's (1982) observation that professional and bureaucratic ideologies often clash in research and development organizations, and at least part of this conflict may be due to differences in the personality structures of managers and specialists.

The variables under study here are considered to have remarkable stability over time, particularly after age 25 (Campbell & Hansen, 1981). Thus a practical implication for the management of technical personnel is the assessment and career counseling of individuals faced with the technical/managerial choice point. Holland's framework and the associated SCII scales also have great potential for raising an individual's awareness of the inherent conflict in R&D management. In this sense, assessment and feedback can serve a developmental and educative function for R&D personnel, and assist both organizations and individuals in conceptualizing, clarifying, and coping with the difficulties inherent in staffing job roles in the R&D function. Also, the present research suggests that in selecting and placing technical specialists into managerial roles, the Social, Enterprising, and Conventional themes and associated basic interest scales on the SCII are variables worthy of consideration as part of the decision process. Lastly, Bailyn (1980) has been suggesting for some time that most R&D organizations implicitly have a unitary career systems which biases its members toward managerial careers through rewards, opportunities, and subtle norms which equate career success with movement into managerial positions. To the degree that stable psychological differences are demonstrable and valid for managers and technical specialists, the issue of creating a pluralistic career system which recognizes and

rewards individual differences will continue to be an important challenge in managing R&D organizations.

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