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PERCEIVED VARIATIONS IN WORK STYLE OF THE PROFESSIONAL EMPLOYEE ("ACTUAL" AND "IDEAL") AT NOTS

by

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ABSTRACT. In the spring of 1961, 24 high-level supervisory personnel at NOTS were asked to sort the cards in a Q-sort deck twice; once as descriptive of "the professional employee at NOTS" and again as descriptive of "what you feel the professional employee at NOTS should be." The two perceived "actual" work styles which emerged from the analysis of the data were clearly differentiated and could be clearly defined. Two "ideal" work styles also emerged from the analysis, but they were much less clearly differentiated. The discrepancy between the perceived work style of the "actual" and "ideal" NOTS professional appeared to have potential value as an index of the perceiver's satisfaction with the organization.

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AN ACTIVITY OF THE BUREAU OF NAVAL WEAPONS

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FOREWORD

Since about 1950 there has been an ever-increasing number of studies in the area of creativity. Of particular interest to the nation as a whole and to us here at the Naval Ordnance Test Station (NOTS) have been the studies dealing with the creativity of scientists and engineers. Attention has been directed at many points in the chain—from the criterion problem (how do we identify a creative product, for example) to the early identification and fostering of creative talent.

In the work situation itself at a laboratory such as NOTS, attention may be focused on at least three general areas, and on interactions among these areas: (1) the man and what he brings to the situation, (2) the work environment, and (3) the product.

The study reported here, conducted from 1961 to 1964, is concerned with a general characteristic of the man, i.e., variation in the style in which scientists and engineers perform their work. Since the *subjects were asked to idealize their perception of the work style of* the NOTS scientist or engineer, the results give considerable insight into the value which we place on certain attributes. To the extent that the study does not show agreement on this value system, we can predict difficulty in communication, discrepancies in promotion criteria, and less than an optimum working relationship.

In future studies we will explore the interactions of the characteristic of style with other characteristics of the man, and also with the environment and the product.

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INTRODUCTION

In the spring of 1957, Harrison G. Gough and Donald G. Woodworth developed an instrument that allowed them to conclude "stylistic variations in scientific research methodologies do exist and can be specified" (Ref. 1). The technique used was a self-descriptive Q-sort in which a subject or an observer sorts a considerable number of statements (usually printed one to a card) into categories that represent the degrees to which the statements apply to the subject or to some concept. Each statement thus gets a score indicating relative strength (within the individual or concept) of the quality or trait represented by that statement. The Q-sort technique has been used most extensively in the past in self-descriptive personality inventories (Ref. 2).

The Q-sort set developed by Gough and Woodworth (working with consultants from physics and several engineering fields) consisted of 56 statements for use by a scientist in describing his own work or that of another person. Through an analysis of the self-descriptions of 45 scientists, the authors identified eight stylistic types. Through detailed study of the order of placement of the 56 statements for each of the eight types and through the use of other assessment data available on their 45 subjects, Gough and Woodworth sought for the psychological meaning implicit in each of the types. The names and definitions as given by Gough and Woodworth are presented in Appendix A. In addition to these eight types, three other variables (creativity, modality, and social desirability) developed on the same sample are described.

The Q-sort described above appeared to have potential value in a preliminary study of the work style of scientists and engineers at the Naval Ordnance Test Station (NOTS). However, it was necessary to modify the instrument somewhat, because here at NOTS we have a wide range of scientists and engineers, while Gough and Woodworth in their study were interested in research scientists only.

The study reported here was designed as a pretest of the modified instrument in a different setting—at NOTS, and with different instructions from those employed by Gough and Woodworth. The following questions were asked of the data:

1. Can the modified instrument be used by an observer to describe an "average" NOTS professional employee both as he is ("actual") and as the observer feels he should be ("ideal")?

2. At such a generalized level, are professional employees (both "actual" and "ideal") perceived differently by different observers?

If the answers to the above questions tend to be affirmative, then the following questions can be asked:

3. Assuming that different perceived work styles of "actual" and "ideal" types of NOTS professional employees can be identified, can they be clearly differentiated, and what is their relationship to the stylistic types found by Gough and Woodworth?

4. How different is the perceived work style of "actual" NOTS professionals from the perceived work style of "ideal" NOTS professionals?

5. Can the discrepancy between the perceived work style of the "actual" and the "ideal" NOTS professional be used as an indicator of the perceiver's satisfaction with the organization?

METHOD

Instrument. The test materials consisted of a modified version of the "Research Scientist Q-Sort Deck" developed by Gough and Woodworth (Appendix B). The deck is composed of 56 cards, each having printed on it one of the 56 statements.

Subjects. The sample was composed of the 24 participants in the "Seminar on Supervisory Practices Designed to Increase Creativity" taught at NOTS in the spring of 1961 by Dr. William B. McLean. The participants were high-level supervisory personnel drawn from throughout the activity. Twenty-three of the 24 were physical scientists and engineers and one was an administrator with a social science background.

Administration. Each subject was asked to sort two decks of the 56 cards (one deck at a time) into five stacks of frequencies 5, 12, 22, 12, and 5: one sorting on a continuum from most to least descriptive of "the professional employee at NOTS as he is," i.e., the subject's image of the "actual" NOTS professional; and one sorting on a continuum from most to least descriptive of "what you feel the professional employee at NOTS should be," i.e., the subject's image of the "ideal" NOTS professional. Possible order-of-administration effects were controlled by having half the group sort for "actual" first, while the other half sorted for "ideal" first. The data were collected during the first class meeting of the course.

Analysis. Correlation coefficients were computed between the "actual" Q-sorts for the 24 subjects and the 11 Gough-Woodworth variables (eight work styles and three other characteristics) presented in Appendix A. A similar 35 by 35 correlation matrix was computed using the 24 "ideal" Q-sorts and the same 11 variables. Factor analyses were then performed on the two correlation matrices and the resulting factor matrices were rotated (Ref. 3).

This type of analysis is designed to lead to groupings of subjects who are relatively similar along the dimensions under study–their perceptions of, in one case, the "actual" NOTS professional, and in the other, the "ideal" NOTS professional. In order to define the groupings of subjects emerging from this type of analysis, it is necessary to find either similarities in the reported perceptions of the subjects or similarities between the subjects on other dimensions. In the present study, primary use was made of the former method because additional information on the subjects was limited.

Correlations were also computed between each subject's "actual" and "ideal" Q-sorts. Comparisons were made between average "actual"–"ideal" correlations for subgroupings based on the two factor analyses.

RESULTS

Analysis of "Actual" Q-Sorts. From the analysis of the "actual" Q-sorts, two major groupings emerged. The first was composed of eight subjects ("actual" subgroup 1 or subgroup A_1) and of six of the Gough-Woodworth variables (Zealot, Initiator, Diagnostician, Creativity, Modality, and Social Desirability). In other words, the eight subjects in this grouping were relatively similar in their perceptions of the "actual" NOTS professional, and these perceptions were also similar to the six Gough–Woodworth variables listed above. The second grouping was composed of nine subjects ("actual" subgroup 2 or subgroup A_2) and none of the Gough–Woodworth variables. The remaining seven subjects and five Gough–Woodworth variables did not appear in these two major groupings.

Q-sorts known as "factor-arrays" were established to represent each of the subgroups (Ref. 4 pp., 110-112).[1] The results of the contrast in factor-arrays of the two subgroups are presented in Table 1. Items highlighting the areas of agreement and disagreement between the two groups are each indicated by a brief phrase.

Analysis of "Ideal" Q-Sorts. The procedure followed in analyzing the "ideal" Q-sorts was directly parallel to that described for "actual" Q-sorts. Two major groupings emerged from this analysis, one composed of 17 subjects ("ideal" subgroup I or subgroup I_1) and five of the Gough-Woodworth variables (Zealot, Diagnostician, Creativity, Modality, and Social Desirability). The second major grouping was composed of six subjects ("ideal" subgroup 2 or subgroup I_2) and the Gough-Woodworth type, the Initiator. One subject and five of the Gough-Woodworth variables did not appear in either of the major groupings.

[1] The method used was that recommended by Block and consisted simply of summing, for each item, the item scores over all the individuals in the subgroup. In order to compare the item placement for the two subgroups, the distributions of item sums were "re-Q-ed"; that is, the items were again forced into the original 5, 12, 22, 12, and 5 distribution.

TABLE 1. The "Actual" NOTS Professional

	is perceived as	is not perceived as
By subgroups A_1 and A_2	36. never too busy to "talk shop" 31. liking to talk out his ideas 13. good at developing short cuts 51. flexible and adaptable 50. having a lively sense of curiosity	55. lacking confidence 18. seldom coming up with new ideas 6. easily discouraged
By subgroup A_1 (but not by subgroup A_2)	21. thorough and patient 22. driving, indefatigable worker 27. making effort to "keep up" in his field 19. having high standards 53. having a "sense of destiny" 47. stimulating to other people	14. frequently making errors 48. tending to be sarcastic 9. tending to slight others 16. erratic in his output 44. having strong biases 46. given to bluffing
By subgroup A_2 (but not by subgroup A_1)	16. erratic in his output 44. having strong biases 32. having many ideas turn out to be impractical 38. having knack for improvising 25. being fiercely competitive	3. pursuing details with thoroughness 5. having exceptional facility in mathematical analysis 21. thorough and patient 29. having an orderly approach 7. interested in methodology 33. aware of own limitations 11. neat and orderly 8. preferring elegant solutions

Factor-arrays representative of subgroups I_1 and I_2 were constructed and contrasted as described for the "actual" subgroups above. Items highlighting the areas of agreement and disagreement between the two "ideal" subgroups I_1 and I_2 are presented in Table 2.

TABLE 2. The "Ideal" NOTS Professional

	is perceived as	is not perceived as
By subgroups I_1 and I_2	41. creative, inventive worker 50. having intellectual curiosity 47. stimulating to others 1. reacting quickly to problems 28. creative in anything he tries 51. flexible and adaptable 49. intellectually gifted	55. lacking confidence 18. seldom coming up with new ideas 6. easily discouraged 48. tending to be sarcastic 40. playing his cards "close to the vest" 46. given to bluffing 14. frequently making errors
By subgroup I_1 (but not by subgroup I_2)	29. having an orderly approach 19. having high standards 25. being fiercely competitive	44. having strong biases 2. deficient in basic sources 16. erratic in his output 32. having many ideas turn out to be impractical
By subgroup I_2 (but not by subgroup I_1)	10. liking to play hunches	29. having an orderly approach 3. pursuing details with thoroughness 7. interested in methodology 11. neat and orderly in manner of work 20. having talent for instrumentation problems

"Actual"-"Ideal" Q-Sort Correlations. Correlations were computed for each of the 24 subjects between his perception of the "actual" NOTS professional and his perception of the "ideal" NOTS professional. Additional evidence for the difference found between the perceptions of "actual" subgroups A_1 and A_2 was found in the significant differences[2] in their average "actual"-"ideal" correlations (subgroup A_1, mean $r = 0.70$; subgroup A_2, mean $r = 0.46$; remaining subjects, mean $r = 0.16$). A similar test performed on the means of the "ideal" subgroups (subgroup I_1, mean $r = 0.47$; subgroup I_2, mean $r = 0.39$; remaining subject, $r = 0.19$) showed no significant difference between the "actual"-"ideal" correlations of these groups.

There appears to be a close similarity between the "actual" NOTS professional as perceived by subgroup A_1 and the "ideal" NOTS professional as perceived by subgroup I_1. All eight members of subgroup A_1 were also members of subgroup I_1. The average "actual"-"ideal" Q-sort correlation for these eight subjects was 0.70.

There also appears to be some similarity between the "actual" NOTS professional as perceived by subgroup A_2 and the "ideal" NOTS professional as perceived by subgroup I_2. Of the nine members of subgroup A_2, four were also members of subgroup I_2. The average "actual"-"ideal" correlation (0.55) for these four subjects was somewhat higher than the average (0.39) for the five members of subgroup A_2 who were not also members of subgroup I_2. However, because of the small numbers in these sub-subgroups it was not possible to perform statistical tests of significance on these observed similarities and differences.

"Movers" versus "Nonmovers". A further comparison was made on the "actual"-"ideal" correlations for the "movers" group, i.e., those who, during the 3-year period since the data were collected, had changed job location (either through moving within the organization or through leaving the organization entirely, $n = 9$) and the "non-movers" group, i.e., those who had remained in the same job location ($n = 15$). The average "actual"-"ideal" correlation for "movers" was 0.27 while the average correlation for the "non-movers" was 0.56.[3]

DISCUSSION

Two major groupings clearly emerged from the analysis of the Q-sorts describing the "actual" NOTS professional. The first group of perceptions (subgroup A_1) appeared to be heavily weighted with social desirability, because the Gough-Woodworth Social Desirability variable was included in the first major grouping of people (subgroup A_1) and

[2] Kruskal-Wallis one-way analysis of variance by ranks showed the differences between the subgroup means to be significant at the 0.01 level.

[3] The Mann-Whitney U test showed this difference to be significant at the 0.04 level.

variables.[4] Although the way in which the NOTS professional performs his work as perceived by subgroup A_1 is "socially desirable," this does not mean that it is not a real work style. From a comparison of items differentiating the perceptions of the two "actual" subgroups (see Table 1), subgroup A_1's perception of the NOTS professional emerged as one of a thorough, patient, hardworking employee.

The definition of the second grouping of perceptions of the "actual" NOTS professional (subgroup A_2) was somewhat more difficult. None of the Gough-Woodworth variables showed up in this grouping. However, again from the comparison of the items differentiating the perceptions of subgroups A_1 and A_2, a somewhat clearer picture emerged. Those items more characteristic of the NOTS professional in the opinion of subgroup A_2 were rather negative generally. Subgroup A_2 perceived the NOTS professional as erratic, impatient, and biased. However, although he is not thorough or interested in detail, he is good at coming up with quick solutions.

The rather clear differentiation between the perceptions of subgroups A_1 and A_2 was borne out by the significant difference found between the two subgroups' average "actual"-"ideal" Q-sort correlations. The support comes not from the fact that one subgroup had a higher average correlation than the other, but rather from the fact that the two subgroups differed significantly on this variable.

In the analysis of "ideal" Q-sorts, two major groupings of perceptions also emerged. From Table 2, the comparison of representative factor-arrays for subgroups I_1 and I_2, it is obvious that these two groups were much less clearly differentiated than was true of the subgroups emerging from the analysis of the "actual" Q-sorts. Subgroups I_1 and I_2 agreed on a large number of items as descriptive of the "ideal" NOTS professional, while disagreeing on relatively few.

From the items on which disagreement occurred, the "ideal" NOTS professional as perceived by subgroup I_1 was distinguished by orderliness, competitiveness, lack of bias, and practicality. The perceptions of this subgroup were also heavily weighted with social desirability, again indicated by the appearance of the Gough-Woodworth Social Desirability variable in this grouping.[5]

The image of the "ideal" NOTS professional emerging from the second major grouping of perceptions (subgroup I_2) was one of a man who, although impatient with detail and not orderly, reacts quickly to problems and likes to play hunches. This impression results both from the finding that the Gough-Woodworth variable Type II, the Initiator, was included in the second major grouping and from the comparison of items differentiating the two subgroups.

[4] The fact that five other Gough-Woodworth variables also were included in this grouping can be largely accounted for by the high degree of overlap between the variables used. The five variables have correlations with social desirability ranging from 0.66 to 0.78.

[5] The other four Gough-Woodworth variables appearing in this grouping can again be accounted for by the overlap between the variables.

Again, the finding that the perceptions of the two subgroups emerging from the analysis of the "ideal" Q-sorts were less clearly differentiated than those of the "actual" subgroups was substantiated by the nonsignificant difference between the average "actual"-"ideal" Q-sort correlations of subgroups I_1 and I_2.

From this description of the major groupings of perceptions emerging from the analyses, it is clear that there is a great deal of similarity between the "actual" NOTS professional as seen by subgroup A_1 and the "ideal" NOTS professional as seen by subgroup 1_1. The perceptions of both subgroups were heavily weighted with social desirability and were characterized by such qualities as orderliness and thoroughness. This similarity was also borne out by the high average "actual"-"ideal" correlation of the group of subjects who were members of both subgroups.

There also appears to be some similarity between the second major grouping of perceptions to emerge in each of the analyses. As described above, the "actual" NOTS professional as seen by subgroup A_2 and the "ideal" NOTS professional as seen by subgroup 1_2 were both characterized by impatience and quickness of reaction. Again the relatively high average "actual"-"ideal" correlation of the group of subjects who were members of both subgroups lent support to the observed similarity between the factors.

Although two major perceived work styles emerged from each of the analyses of perception of the "actual" and the "ideal" NOTS professional, and although they have been shown to be similar, one cannot conclude that the work style of the NOTS professional, as perceived by the 24 subjects in this study, is now as they feel it should be. The perceptions of different persons are involved in the major groupings which emerged. For example, considering the first major grouping (the "socially desirable" work style), of the 17 persons who felt the NOTS professional should have that style ideally, only eight saw him as working that way now. Of the nine persons who saw the work style of the "actual" NOTS professional as characterized by impatience and quickness of reaction, only four felt that he should work that way.

One reason for leaving an organization or moving within an organization may be, obviously, dissatisfaction with one's current job or the organization. The finding that "movers" had a lower average "actual"-"ideal" correlation than did "nonmovers" suggests that the discrepancy between the perceived "actual" and "ideal" NOTS professional may be used as an indicator of the perceiver's satisfaction with the organization.

SUMMARY

In the spring of 1961, 24 high-level supervisory personnel were asked to sort twice the cards in a Q-sort deck (modified from Gough and Woodworth's "Research Scientist Q-Sort Deck"), once as descriptive of

"the professional employee at NOTS" and again as descriptive of "what you feel the professional employee at NOTS should be." This was done as a pretest of the instrument. That is, can the modified instrument be used to describe the work style of "the average employee" (both "actual" and "ideal") as a single general style? At such a generalized level are different styles described by different people? The study also sought answers to the following questions: Can the styles be differentiated, and what is their relationship to the stylistic types found by Gough and Woodworth? How different are the perceived work styles of the "actual" and "ideal" NOTS professional? and finally, Can the discrepancy between the perceived work style of the "actual" and "ideal" NOTS professional be used as a satisfaction index?

The data were analyzed primarily by use of correlational and factor-analytic techniques. Two major groupings of perceptions emerged from both the analysis of Q-sorts describing the "actual" NOTS professional and the analysis of Q-sorts describing the "ideal" NOTS professional.

The two perceived "actual" NOTS work styles were clearly differentiated and could be clearly defined. The first style was heavily weighted with social desirability and could be characterized by thoroughness, patience, and hard work. The second "actual" style was more negative generally, characterized by erraticness, impatience, and bias, but also by a facility for coming up with quick solutions.

The two perceived work styles of the "ideal" NOTS employee were much less clearly differentiated. The first "ideal" style was heavily weighted with social desirability and was characterized by orderliness and thoroughness. The second perceived "ideal" style was characterized by quick reactions and liking to play hunches.

The two major "actual" work styles were similar to the two major "ideal" work styles. However, this did not indicate that each of the 24 subjects in this study perceived the "actual" NOTS professional as similar to his perception of the "ideal" NOTS professional. The members of the group who saw the "ideal" NOTS professional as orderly and thorough were not identical to the members of the group who saw the "actual" NOTS professional as thorough, patient, and hardworking. Similarly, the membership of the second " actual" and second "ideal" subgroups was not identical.

A comparison between individuals' "actual"-"ideal" Q-sort correlations was also made. It was found that persons who had left the organization or had moved within the organization since the data had been collected ("movers") had significantly lower correlations (i.e., larger discrepancies) between their perceptions of the "actual" and the "ideal" NOTS professional than did "nonmovers."

The questions asked in this study may then be answered as follows: The modified research-style measuring instrument being studied here can be used by an individual to describe an "average employee." In a group of such descriptions, different work styles are perceived and can

be differentiated. The two perceived work styles of NOTS professionals emerging from the analysis of the "actual" Q-sorts are similar to the two styles emerging from the analysis of the "ideal" Q-sorts. However, since these perceptions were held by different individuals, one can not conclude that the NOTS professional as seen by this group is now as they feel he ideally should be. Finally, assuming that movement away from or within an organization may be due to dissatisfaction with the organization, the discrepancy between the perceived "actual" and "ideal" NOTS professional does appear to have potential value as an index of the perceiver's satisfaction with the organization.

Appendix A

DEFINITIONS OF THE GOUGH-WOODWORTH VARIABLES

Type I: The Zealot. This man is dedicated to research activity; he sees himself as a driving indefatigable researcher, with exceptional mathematical skills and a lively sense of curiosity. He is seen by others as tolerant, serious-minded, and conscientious, but as not getting along easily with others and as not being able to "fit in" readily with others.

Type II: The Initiator. This man reacts quickly to research problems and begins at once to generate ideas; he is stimulating to others and gives freely of his own time; he sees himself as being relatively free of doctrinaire bias—methodological or substantive—and as being a good "team" man. Observers describe him as ambitious, well organized, industrious, a good leader, and efficient. They also characterize him as being relatively free of manifest anxiety, worry, and nervousness.

Type III: The Diagnostician. This man sees himself as a good evaluator, able to diagnose strong and weak points in a program quickly and accurately, and as having a knack for improvising quick solutions in research trouble spots. He does not have strong methodological preferences and biases, and tends not to be harsh or disparaging towards others' mistakes and errors. Observers see him as forceful and self-assured in manner, and as unselfish and free from self-seeking and narcissistic striving.

Type IV: The Scholar. This man is blessed with an exceptional memory, and with an eye for detail and order. However, he is not a research perfectionist nor an endless seeker for ultimates. He does not hesitate to ask help when blocked in his work, and feels that he can adapt his own thinking to that of others. He is well-informed in his field, and is not given to bluffing. Observers describe him as conscientious and thorough and as very dependable, but lacking confidence and decisiveness of judgment.

Type V: The Artificer. This man gives freely of his own time, and enjoys talking shop with researchers. He is aware of his own limitations and does not attempt what he cannot do. He sees himself as having a special facility for taking inchoate or poorly formed ideas of others and fashioning them into workable and significant programs. Observers see him as honest and direct, getting along well with others, and as usually observant and perceptive and responsive to nuances and subtleties in others' behavior.

Type VI: The Esthetician. This man favors analytical over other modes of thinking, and prefers research problems which lend themselves to elegant and formal solutions. His interests are far-ranging, and he tends to become impatient if progress is slow or if emphasis must be put upon orderliness and systematic detail. His own view of experience is primarily an esthetic one. Observers see him as clever and spontaneous, but as undependable and immature, somewhat lacking in patience and industry and indifferent about duties and obligations.

Type VII: The Methodologist. This man is vitally interested in methodological issues and in problems of mathematical analysis and conceptualization. He is open about his own research plans and enjoys talking about them with others. He has little competitive spirit and tends to take a tolerant view of research differences between himself and others. Observers characterize him as a considerate, charitable person, free from undue ambition; at the same time they report a certain moodiness and an occasional tendency toward complicated and difficult behavior.

Type VIII: The Independent. This man eschews "team" efforts, and dislikes and avoids administrative details connected with research work. He is not a driving, energetic research man, although he does have a lively sense of intellectual curiosity. He prefers to think in reference to physical and structural models rather than in analytical and mathematical ways. Observers describe him as active and robust in manner and hard-headed and forthright in judgment. He appears relatively free from worry and self-doubt, but inclined to behave impolitely or abruptly.

Creativity. Based on the average scores of the top third of the 45 research scientists rated on creativity by their supervisors and by themselves.

Modality. Based on the average scores for the entire sample of 45 research scientists.

Social Desirability. Based on a composite of four staff members' ratings of the 56 Q-sort statements for social desirability.

Appendix B

ITEMS IN THE MODIFIED[6] "RESEARCH SCIENTIST Q-SORT DECK"

1. Reacts quickly to (research) problems; immediately generates a great number of ideas.
2. Is somewhat deficient in his command of basic sources and technical literature in the field.
3. Pursues details and ramifications of (research) problems with great thoroughness.
4. His job (research) interests lie within a rather narrow range.
5. Has exceptional facility in mathematical analysis.
6. Easily discouraged; needs help and encouragement to do his best work.
7. Is keenly interested in methodological aspects of his work (research).
8. Prefers to work on problems which lend themselves to elegant and exact solutions.
9. Tends to slight the contributions of others; takes undue credit for himself.
10. Likes to play his hunches in his work (research); is guided by his subjective impressions.
11. Is neat and orderly in his habits and manner of work.
12. Dislikes and avoids administrative details connected with (research) projects.
13. Is good at developing short-cuts and approximation techniques.
14. Frequently makes errors; his work needs to be checked for accuracy.
15. Prefers to work alone; is not a "team" (research) man.
16. Is erratic in his (research) output; varies from work of excellent quality to work of marginal or even inferior worth.
17. Indifferent to the practical implications of his own work (research).
18. Seldom comes up with a really new idea or suggestion.

[6] Modifications to the original Gough-Woodworth items are indicated by enclosing deleted words in parentheses and underlining added words.

19. Has exceptionally high standards of (research) performance for himself as well as for others.
20. Has a special talent for solving instrumentation problems.
21. Is thorough and patient in his approach to job-related (research) issues; does not get upset if progress is slow.
22. Is a driving, indefatigable worker (research man); cannot stop stop working on a problem until it is solved.
23. Is relatively uninformed on most subjects other than his (research) specialty.
24. Good at evaluating research; able to diagnose strong and weak points in a program quickly and accurately.
25. Is fiercely competitive; wants to be the best man in every (research) task that he undertakes.
26. Seeks out the help and advice of other people when he hits a trouble spot in his own work (research).
27. Makes a serious effort to read current publications and to "keep up" on the literature in his field.
28. Is creative in anything he tries, whether in science or not.
29. Has an orderly, well-organized approach to his work (research); plans his projects and activities with great care and precision.
30. Gives freely of his own time and ideas to others (research endeavors) without asking for special credit or recognition.
31. Likes to talk out his (research) ideas and get other people's reaction.
32. Many of his ideas turn out to be impractical.
33. Is aware of his own professional limitations; does not attempt what he cannot do.
34. Has a quick tempo of thought and speech.
35. Prefers to think in analytical and mathematical ways, rather than in terms of physical and structural models.
36. Is never too busy to "talk shop" with other people in his field (researchers).
37. Has an exceptionally good memory.
38. Has a knack for improvising quick solutions in (research) trouble spots.
39. Is a (research) perfectionist; devotes endless attention to matters of design, apparatus, procedure, etc.
40. Plays his cards "close to the vest;" prefers not to tell anyone about his (research) plans until his work is finished.

41. Is a creative and inventive worker (researcher).
42. Is intolerant of metaphysical issues.
43. Is a talented "re-write" man; can take other people's ideas and hunches and fashion them into practical (research) designs and programs.
44. Has strong (research) biases; is vehement in his disapproval of certain methods and procedures.
45. Primarily an "idea man"; prefers to turn his hunches and hypotheses over to someone else for systematic experimentation & analysis.
46. Somewhat given to bluffing; claims to know more than he does.
47. Stimulating to other people; seems to catalyze others into more original and productive endeavor than they would otherwise achieve.
48. Tends to be sarcastic and disparaging in describing the work of others in his field (researchers).
49. Is intellectually gifted.
50. Has a lively sense of intellectual curiosity and inquiringness, a desire to know and to understand.
51. Is flexible and adaptable in his thinking; able to shift and to restructure easily.
52. Takes an esthetic view; is sensitive to matters of form and elegance in research problems.
53. Has a "sense of destiny" with respect to his own (research) career, an inner conviction of the worth and validity of his own efforts.
54. Enjoys philosophical speculation.
55. Lacks confidence, is afraid to strike out in new directions.
56. Subordinates everything to his research and scientific goals; puts scientific values above all others.

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ABSTRACT CARD

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