Some Characteristics of First-Year and Intermediate Fellowship Applicants Eight to Ten Years Later (1965)

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BRIEF

This report is one of a series based on fellowship selection research, conducted by the Office of Scientific Personnel and supported by the National Science Foundation. One aspect of the fellowship selection research program is the follow-up of former applicants for pre-doctoral fellowships in the sciences, to ascertain the extent of successful completion of graduate education and to obtain on-the-job evaluation of performance in roles in the scientific and technical community. This report covers one block of information obtained by the follow-up of applicants of Graduate fellowships at the first-year and intermediate levels in 1955 and 1956. Information obtained through a questionnaire specifically designed for this purpose is complemented by ratings and other evaluations given by confidential reporters, and by citations of publications from the Science Citation Index. Analogous information had been previously obtained for terminal applicants and the results had been described in earlier reports of this series. Studies based on these data banks are aimed at the development and evaluation of criteria for validating the fellowship selection techniques. Both awardees and non-awardees are included in these studies.

This report describes the sampling used in this study, and gives statistical information regarding responses to major items from the questionnaires returned by the first-year and intermediate groups. Later reports will deal with correlational analysis, the information supplied by confidential reporters, and the citations of publications.

In addition to reporting the sampling statistics and item distribution information obtained with the non-terminal applicants of 1955 and 1956, the present report compares these results with those obtained from the terminal applicants of 1952-3-4. Essentially the same kind of information is abstracted from the follow-up questionnaires in both studies. In general, the results of the two studies are quite similar. Most differences can be attributed to such factors as the following: (1) less academic attrition prior to fellowship application time, resulting in lower average ability and greater heterogeneity; (2) an increase in the time taken to complete graduate study, even allowing for the level differences; this resulted in contact being made somewhat earlier in the subject's career in the present study; (3) changes

in the cultural and scientific milieu in recent years, such as demand and interest shifts, and changes in pay scales.

Both the present study and that previously reported on terminal applicants agree in showing that awardees are more productive, received higher average incomes, are more likely to be academically employed, and are more likely to be involved in research and development activity than are non-awardees. The studies also agree in showing that about one-half of the questionnaire returnees are in academic life; they are primarily engaged in research and/or teaching. About a third of the respondents are in industries; they are mostly engaged in research and development, and/or in administration. About 10-11% of respondents are in government service, mostly engaged in research.

This report also presents information on the rate of attainment of the doctorate degree. Comparisons of those attaining the doctorate with science doctorates in general show that fellowship awardees, and even non-awarded applicants, complete the doctorate at an earlier age and with less BA-PhD time lapse than do recent science doctorates as a group. Additional comparative data on doctorate attainees and science doctorates, are also presented separately for awardees and non-awardees.

The emphasis in this report is primarily descriptive, comparative, and normative of the former fellowship applicants studied. A subsequent report will emphasize on-the-job evaluation of the applicant by others and the validation of selection information against criterion elements abstracted from the follow-up information.

TABLE OF CONTENTS

Subject Index of Tables

*Tables are listed by approximate content rather than by exact title.

**Some tables occur in pairs. The first table presents content by type of employer category and award status; the second table presents content by field.

SOME CHARACTERISTICS OF FIRST-YEAR AND INTERMEDIATE FELLOWSHIP APPLICANTS EIGHT TO TEN YEARS LATER

I. CONTEXT OF THE STUDY AND SCOPE OF THIS REPORT

Since 1952 the National Science Foundation has supported a research program designed to improve the procedures used in evaluating applicants for fellowships. This program was initiated in conjunction with the fellowship operations. In the early years of the program, research emphasis was placed on description and evaluation of applicant groups. After the fellowship program had been in operation for several years, definable groups of former applicants had time to complete graduate education and to begin their roles in the scientific community. At that point emphasis in the research program shifted to follow-up and evaluation of such former applicants on-the-job, in order to determine the validity of selection techniques and to improve them if possible.

The decision to award a science fellowship on the basis of "ability" implies an expectation that the awardee will complete formal graduate education and ultimately make some significant contributions to the national scientific and technical effort. Thus, information obtained by a follow-up study is useful in considering the relevance, reliability, and validity of applicant information provided to the panels, and of the validity of the panel judgements. It also furnishes data on shorter range criteria such as doctorate completion rates and time required to complete the doctorate.

Follow-up studies of former applicants for graduate fellowships have involved three groups. The first group, consisting of 1948-9 applicants in the AEC fellowship program, yielded the earliest follow-up information and provided a basis for testing and improving follow-up procedures in later studies. Information based on this group was presented in Technical Reports #13 and #15. The second study was based on terminal applicants from the first three years of the NSF program, 1952-3-4. Since terminal applicants expect to complete the doctorate during the fellowship year, this group became available for follow-up analysis earlier than other applicants. Data were obtained for this group some six to nine years after the fellowship application year. Descriptive characteristics of the group and distributions on criterion elements were reported in Technical Report #20; further evaluation data and

validity information were presented in Technical Report #22; and characteristics of some criterion composites were presented in Technical Report #23. These three reports, based on the Terminal Study, were concerned with the general problem of criterion development and the validation of selection variables against on-the-job criteria.

The present study is based on the follow-up of 1955 and 1956 applicants who expected to be in their first year of graduate study during the fellowship year, or who had at least one year of graduate study but did not expect to complete a doctorate during the fellowship year, and are therefore "intermediate" between the first-year and terminal level applicants. Sufficient time has elapsed for most applicants in these groups to have completed graduate study and to have begun establishing roles in the scientific community.

The plan of the present study is similar to that used in the Terminal Study and involves three phases. First, the former applicants are contacted by mail and asked to supply information about their career development and current roles in the scientific community. Such information is supplied by filling out the Office of Scientific Personnel Questionnaire for Former Fellowship Candidates, a copy of which form is included as Appendix A of this report. Second, information is sought by means of Confidential Reports completed by persons in a position of recent familiarity with the subject's roles and contributions in the scientific community. This information is primarily in the form of ratings by several judges for each applicant. Third, information from the sources in the first two phases is collated with that available to the panels when the applicants were evaluated for fellowship support, and validity of selection information is determined against criterion elements abstracted from the follow-up information.

The present report is based on the first phase of the study and is primarily focussed on the information supplied by former applicants on returned questionnaires. This will be found in sections III and IV of the report. However, prior to that, the present report characterizes the total follow-up group in terms of major analytic categories, success of contact, and doctorate attainment rates. A later section (V) presents more detailed information on the doctorate-attaining portion of the follow-up group, with comparisons made against the general population of science doctorates.

II. GENERAL CHARACTERISTICS AND SAMPLING OF THE FOLLOW-UP GROUP

From the fellowship application records, basic rosters were developed for persons applying for graduate fellowships at the first-year and intermediate levels in 1955 and 1956. For those who applied in both years, the 1955 application record was taken and the duplicating 1956 application removed. After removal of these duplications, withdrawals, deceased persons, and a few without scores on the Graduate Record Examination, addresses were sought for 3623 persons. Presumably valid addresses were obtained for 3229 persons, leaving 394 in the no-contact group. Since the academic (i.e., panel) field at the time of application and award status are known for all subjects, and the category of employment is reported on the questionnaires for returnees, it is possible to give a fairly detailed account of the 3623 persons in the basic group with respect to these and the return categories.

The primary analytic dimensions are similar to those used in the Terminal Study. The seven academic fields listed in various tables are self-explanatory. The award status was defined in terms of whether or not the subject received an NSF predoctoral award at any time, regardless of the number of such awards or the year in which they were offered. Thus some who received no award in 1955 or 1956, but in another year, are treated as awardees for purposes of analysis. It was originally planned to define employer category in the same six groups used in the Terminal Study: academic, industrial, governmental, self-employed, unemployed, and "other". The first three, or "major" categories were retained intact. However, only 8 returnees were self-employed and were combined with "other". It was also noted that more respondents were reporting that they were still in graduate study (with doctorate completion imminent), in an academic setting, and with no external scientific or technical job. Since this group was not "on-the-job" in the sense used in this study, criterion data on such persons would not be comparable with the rest of the academic group; they were therefore placed in a separate "minor" category.

Successful Contacts and Questionnaire Returns

The disposition of the 3623 persons in the basic follow-up is described in terms of contact success, questionnaire return rates, the employer category reported by returnees, the field, and the award status.

The overall rate of presumed successful mail contact is 89.1%, being 94.2% for awardees and 87.2% for non-awardees. The greater contact success for awardees is noted in all fields and, in terms of quality group, valid addresses were more difficult to obtain for those in groups V and VI, those rated lowest in ability. Informal checks showed no appreciable bias due to contact failure with respect to sex, year of application, or level. In terms of field, some variations in contact success exist. The contact rates (89%) are somewhat lower than those for the terminals (97%).

Return Rates

Within the contact group 2022 usable questionnaires were obtained. On the basis of the 3229 persons in the contact group this corresponds to an overall return rate of 62.6%, or 55.8% of the original 3623 in the basic follow-up group. Contactee-based return rates for each field are presented for awardees, nonawardees, and total applicants in Table 1.

Rate of questionnaire return varies strongly with award status. In the present study, 22% of the basic group were awarded fellowships in the program years involved, and an additional 5% in subsequent years. There were thus 978 out of the total 3623 applicants, or 27% in the awardee group. The return rate for the awardees is 71%; that for the non-awardees is 59%. The overall rate is lower than that for the Terminals (75%) as expected from the smaller proportion of awardees and smaller proportion attaining the doctorate degree. Nonreturnees were recontacted only once, instead of twice as was done with the Terminals. No appreciable differences in return rates were observed by applicant year, level, or sex. For the females, whose overall return rate was 60%, the difference between return rates for awardees (74%) and non-awardees (57%) was greater than that for the males.

Although the absolute return rates are lower for all fields in this study than they were in the Terminal Study, the pattern of return rates by field is similar in the two studies. However, the return rate in engineering is relatively lower in the present study.

Table 1

Contactee-based Return Rates by Field and Award Status

Field	Awardees	Non-awardees	Total, All Applicants
Biology	74.2	60.6	64.4
Chemistry	75.6	61.5	65.4
Engineering	65.8	53.4	56.8
Earth Sciences	78.6	71.8	74.1
Mathematics	65.9	56.5	59.1
Physics	68.6	57.7	60.9
Psychology	77.5	61.9	66.2
Total	71.4	59.2	62.6

Table 2

Distribution of Employer Category by Field in the Returnee Group

Field		Acad.	Ind.	Govt.	Unemp.	Grad. Stud.	Other	Major Groups	Minor Groups	Total
Biology	N	273	32	61	40	9	19	366	68	434
	%	63	7	14	9	2	4	84	16	100
Chemistry	N	169	186	39	22	9	2	394	33	427
	%	40	44	9	5	2	0+	92	8	100
Engineering	N	90	169	29	1	10	8	288	19	307
	%	29	55	9	0+	3	3	94	6	100
Earth Sciences	N	51	43	26	2	0	1	120	3	123
	%	41	35	21	2	0	1	97	3	100
Mathematics	N	108	53	3	6	5	3	164	14	178
	%	61	30	2	3	3	2	92	8	100
Physics	N	227	126	68	11	19	6	421	36	457
	%	50	28	15	2	4	1	92	8	100
Psychology	N	57	8	13	6	4	8	78	18	96
	%	59	8	14	6	4	8	81	19	100
Total	N	975	617	239	88	56	47	1831	191	2022
	%	48.2	30.5	11.8	4.4	2.8	2.3	90.5	9.5	100.0

Although the return rates are primarily a function of award status, it is not necessarily a question of appreciation versus disappointment regarding that status. This is indicated by the return rates in terms of quality group; as in the Terminal Study there exists a pattern of stepwise drops in return rates with decreasing rated ability:

Quality Group	I	II	III	IV	V	VI	Total
Return Rate(%)	72	68	64	59	59	48	62

Employer Categories

The distributions of employer category by field, and for all fields combined, are presented in Table 2. These distributions are similar to those obtained with the terminals, except that there are more "unemployed" females, i.e., housewives and mothers. As with the terminal cases, questionnaire item response data will be presented for those cases in the "major" categories (90%). The award rates within the three major categories are 40% in the academic group, 27% in the industrial group, and 26% in the government group.

In addition to the examination of different return rates as functions of information available on applicants prior to mailout, the nature and extent of bias due to non-returns may be examined by comparing early and late returns. Only small differences in the distributions of early and late returns were found for field, ability level, award status, or year of application, other than that attributed to the fact that more late returns were received from the "unemployed" female group. Those in academic life tended to respond more quickly; also those who applied at the intermediate level responded more quickly than the first-year applicants.

Disposition of the Basic Follow-up Group in Greater Detail

The disposition of the 3623 persons in the basic follow-up group is summarized in more complete detail in Table 3. In addition to general information already presented, sub-totals are shown for the three major categories and for the combined minor categories of employment. The counts for any given row total to the number of questionnaire returnees. Counts are also shown for the non-returnee and noncontacted groups. Also in each row, the counts are converted to percentages of the row total, indicating

Table 3

Disposition of Basic Follow-up Group in Terms of Contact Success, Questionnaire Return, and Employer Category, by Field and Award Status

Field		Employer Category					Return Status		Contact Status		Total
		Academic	Industrial	Governmental	Major	Minor	Return	Nonreturn	Contact	Noncontact	
AWARDEES											
Biology	N	105	6	12	123	15	138	48	186	7	193
	%	54.4	3.1	6.2	63.7	7.8	71.5	24.9	96.4	3.6	100.0
Chemistry	N	71	51	12	134	2	136	44	180	18	198
	%	35.9	25.8	6.1	67.7	1.0	68.7	22.2	90.9	9.1	100.0
Engineering	N	35	52	8	95	5	100	52	152	12	164
	%	21.3	31.7	4.9	57.9	3.0	61.0	31.7	92.7	7.3	100.0
Earth Sciences	N	25	13	5	43	1	44	12	56	3	59
	%	42.4	22.0	8.5	72.8	1.7	74.6	20.3	94.9	5.1	100.0
Mathematics	N	46	9	0	55	1	56	29	85	2	87
	%	52.8	10.3	0.0	63.2	1.1	64.3	33.3	97.7	2.3	100.0
Physics	N	83	35	24	142	11	153	70	223	12	235
	%	35.3	14.9	10.2	60.4	4.7	65.1	29.8	94.9	5.1	100.0
Psychology	N	26	0	2	28	3	31	9	40	2	42
	%	61.9	0.0	4.8	66.6	7.1	73.8	21.4	95.2	4.8	100.0
Total	N	391	166	63	620	38	658	264	922	56	978
	%	40.0	17.0	6.4	63.4	3.9	67.2	27.0	94.2	5.7	100.0
NON-AWARDEES											
Biology	N	168	26	49	243	53	296	192	488	62	550
	%	30.5	4.7	8.9	44.2	9.6	53.8	34.9	88.7	11.3	100.0
Chemistry	N	98	135	27	260	31	291	182	473	98	571
	%	17.2	23.6	4.7	45.5	5.4	51.0	31.9	82.8	17.2	100.0
Engineering	N	55	117	21	193	14	207	181	388	53	441
	%	12.5	26.5	4.8	43.8	3.2	46.9	41.0	88.0	12.0	100.0
Earth Sciences	N	26	30	21	77	2	79	31	110	13	123
	%	21.1	24.4	17.1	62.6	1.6	64.2	25.2	89.4	10.6	100.0
Mathematics	N	62	44	3	109	13	122	94	216	26	242
	%	25.6	18.2	1.2	45.0	5.4	50.4	38.8	89.3	10.7	100.0
Physics	N	144	91	44	279	25	304	223	527	62	589
	%	24.4	15.4	7.5	47.3	4.2	51.6	37.8	89.4	10.5	100.0
Psychology	N	31	8	11	50	15	65	40	105	24	129
	%	24.0	6.2	8.5	38.8	11.6	50.4	31.0	81.4	18.6	100.0
Total	N	584	451	176	1211	153	1364	943	2307	338	2645
	%	22.1	17.0	6.7	45.8	5.8	51.6	35.6	87.2	12.8	100.0
TOTAL, ALL APPLICANTS											
Biology	N	273	32	61	366	68	434	240	674	69	743
	%	36.7	4.3	8.2	49.2	9.1	58.4	32.3	90.7	9.3	100.0
Chemistry	N	169	186	39	394	33	427	226	653	116	769
	%	22.0	24.2	5.1	51.2	4.3	55.5	29.4	84.9	15.1	100.0
Engineering	N	90	169	29	288	19	307	233	540	65	605
	%	14.9	27.9	4.8	47.6	3.1	50.7	38.5	89.2	10.7	100.0
Earth Sciences	N	51	43	26	120	3	123	43	166	16	182
	%	28.0	23.6	14.3	65.9	1.6	67.6	23.6	91.2	8.8	100.0
Mathematics	N	108	53	3	164	14	178	123	301	28	329
	%	32.8	16.1	0.9	49.8	4.3	54.1	37.4	91.5	8.5	100.0
Physics	N	227	126	68	421	36	457	293	750	74	824
	%	27.5	15.3	8.2	51.1	4.4	55.4	35.5	91.0	9.0	100.0
Psychology	N	57	8	13	78	18	96	49	145	26	171
	%	33.3	4.7	7.6	45.6	10.5	56.1	28.7	84.8	15.2	100.0
Total	N	975	617	239	1831	191	2022	1207	3229	394	3623
	%	26.9	17.0	6.6	50.5	5.3	55.8	33.3	89.1	10.9	100.0

the relative dispositions of that portion of the basic group in a given field and award status category. It should be noted that the questionnaire return rates shown in this table are based on the row total, which includes the noncontacted persons in that row. Such return rates are therefore lower than those reported in Table 1.

Age at Follow-up

In order to provide a richer background on the nature of the follow-up group, distributions of the year of birth, and consequently, the age at follow-up were obtained in terms of field, level, award status, and employer category. The matter of age at follow-up for applicants in various analytic categories is relevant to comparison with the terminals of 1952-3-4, previously followed-up and reported. For such a comparison the marginal distributions of age at follow-up by level of applicant are presented below for the present study and for the 2208 terminal applicants of 1952-3-4, for whom the necessary information was available from the basic records in the previously reported Terminal Follow-up Study.

Age at Follow-up Percentage Distributions, by Level

Age at Follow-up	1955-6 First Year		1955-6 Intermediate		1952-3-4 Terminal	
	%	Cum-%	%	Cum-%	%	Cum-%
<29	2.7	2.7	0.1	0.1	0.0	0.0
29	14.5	17.2	0.8	0.9	0.8	0.8
30	36.5	53.7	4.0	4.9	3.0	3.8
31	23.6	77.3	13.7	18.6	9.2	13.0
32	7.0	84.3	19.2	37.8	13.4	26.4
33	4.0	88.3	15.1	52.9	12.8	39.2
34	3.4	91.7	9.8	62.7	13.6	52.8
35	1.9	93.6	7.4	70.1	10.7	63.5
36	2.1	95.7	6.6	76.7	8.8	72.3
37	1.1	96.8	5.6	82.3	8.2	80.5
>37	3.0	99.8	17.6	99.9	19.6	100.1
No. of cases	2131		1492		2208	

The present study, as compared with that on the terminals, obtained information on subjects at an earlier age and earlier stage of career progression, although in both cases information was sought most typically some eight or nine years after fellowship application. Had allowance for this been made in the timing of the present follow-up of first-year and intermediate applicants, some three or four more years of waiting for maturation of more data would have been required.

The age at follow-up is also relevant to comparisons with the generality of science doctorates, whether or not they were fellowship applicants, and to certain items of information supplied by questionnaire returnees. For example, in the present follow-up study, such factors as income and productivity depend on the career progression status of the subject, whether he had finished graduate education, and been on the job long enough to have acquired promotions, publications, citations, and other honors. As presented later in this report, distributions of such factors will be in terms of the major analytic categories. Hence, for the entire follow-up group of 3623 fellowship applicants, distributions of year of birth and age at follow-up are presented on Tables 4 and 5. In Table 4 the distributions are presented in terms of employer category for those who returned questionnaires, and for the nonreturnees, each distribution separately for awardees, non-awardees, and for the total group of applicants. In Table 5, the year of birth and age at follow-up distributions are presented in terms of the academic field in which fellowship application was made, with employer category and questionnaire returnee status combined. In both tables, level and year of application are combined.

Awardees and questionnaire returnees are likely to be somewhat younger than the non-awardees and nonreturnees, respectively. The physicists, chemists, and engineers are likely to be younger and the biologists and psychologists older (at follow-up). A somewhat higher proportion of the older applicants appear to be in academic and governmental situations, but apart from this, age at follow-up appears to be less related to employer category than to such factors as field, sex, and award status.

Table 4

Distributions of Year of Birth and Age at Follow-up Contact, by Employer Category

GROUP		Before 1927	1927	1928	1929	1930	1931	1932	1933	1934	1935	After 1935	Total
		Year of Birth / Age at Follow-up											
		>37	37	36	35	34	33	32	31	30	29	<29	
		AWARDEES											
Academic Employment	N	20	5	8	15	16	35	43	87	94	52	16	391
	%	5.1	1.3	2.0	3.8	4.1	9.0	11.0	22.2	24.0	13.3	4.1	100.0
Industrial Employment	N	1	4	2	6	11	17	19	32	57	15	2	166
	%	.6	2.4	1.2	3.6	6.6	10.2	11.4	19.3	34.3	9.0	1.2	100.0
Governmental Employment	N	7	2	0	2	3	2	10	12	15	9	1	63
	%	11.1	3.2	0.0	3.2	4.8	3.2	15.9	19.0	23.8	14.3	1.6	100.0
Other	N	2	0	2	0	0	2	0	3	20	7	2	38
	%	5.3	0.0	5.3	0.0	0.0	5.3	0.0	7.9	52.6	18.4	5.3	100.0
Returnees	N	30	11	12	23	30	56	72	134	186	83	21	658
	%	4.6	1.7	1.8	3.5	4.6	8.5	10.9	20.4	28.3	12.6	3.2	100.0
Nonreturnees	N	17	6	12	13	18	26	39	75	78	29	7	320
	%	5.3	1.9	3.8	4.1	5.6	8.1	12.2	23.4	24.4	9.1	2.2	100.0
Total	N	47	17	24	36	48	82	111	209	264	112	28	978
	%	4.8	1.7	2.5	3.7	4.9	8.4	11.3	21.4	27.0	11.4	2.9	100.0
		NON-AWARDEES											
Academic Employment	N	89	19	25	24	40	58	70	109	109	34	7	584
	%	15.2	3.3	4.3	4.1	6.8	9.9	12.0	18.7	18.7	5.8	1.2	100.0
Industrial Employment	N	28	15	20	21	30	33	77	95	91	38	3	451
	%	6.2	3.3	4.4	4.7	6.7	7.3	17.1	21.1	20.2	8.4	.7	100.0
Governmental Employment	N	17	10	9	10	9	12	22	26	51	9	1	176
	%	9.7	5.7	5.1	5.7	5.1	6.8	12.5	14.8	29.0	5.1	.6	100.0
Other	N	11	1	3	3	8	7	14	30	52	19	5	153
	%	7.2	.7	2.0	2.0	5.2	4.6	9.2	19.6	34.0	12.4	3.3	100.0
Returnees	N	145	45	57	58	87	110	183	260	303	100	16	1364
	%	10.6	3.3	4.2	4.3	6.4	8.1	13.4	19.1	22.2	7.3	1.2	100.0
Nonreturnees	N	141	45	62	57	84	118	142	239	270	108	15	1281
	%	11.0	3.5	4.8	4.4	6.6	9.2	11.1	18.7	21.1	8.4	1.2	100.0
Total	N	286	90	119	115	171	228	325	499	573	208	31	2645
	%	10.8	3.4	4.5	4.3	6.5	8.6	12.3	18.9	21.7	7.9	1.2	100.0
		TOTAL, ALL APPLICANTS											
Academic Employment	N	109	24	33	39	56	93	113	196	203	86	23	975
	%	11.2	2.5	3.4	4.0	5.7	9.5	11.6	20.1	20.8	8.8	2.4	100.0
Industrial Employment	N	29	19	22	27	41	50	96	127	148	53	5	617
	%	4.7	3.1	3.6	4.4	6.6	8.1	15.6	20.6	24.0	8.6	.8	100.0
Governmental Employment	N	24	12	9	12	12	14	32	38	66	18	2	239
	%	10.0	5.0	3.8	5.0	5.0	5.9	13.4	15.9	27.6	7.5	.8	100.0
Other	N	13	1	5	3	8	9	14	33	72	26	7	191
	%	6.8	.5	2.6	1.6	4.2	4.7	7.3	17.3	37.7	13.6	3.7	100.0
Returnees	N	175	56	69	81	117	166	255	394	489	183	37	2022
	%	8.7	2.8	3.4	4.0	5.8	8.2	12.6	19.5	24.2	9.0	1.8	100.0
Nonreturnees	N	158	51	74	70	102	144	181	314	348	137	22	1601
	%	9.9	3.2	4.6	4.4	6.4	9.0	11.3	19.6	21.7	8.6	1.4	100.0
Total	N	333	107	143	151	219	310	436	708	837	320	59	3623
	%	9.2	3.0	3.9	4.2	6.0	8.6	12.0	19.5	23.1	8.8	1.6	100.0

Table 5

Distributions of Year of Birth and Age at Follow-up Contact, by Field

Group		Year of Birth / Age At Follow-up											Total
		Before 1927	1927	1928	1929	1930	1931	1932	1933	1934	1935	After 1935	
		>37	37	36	35	34	33	32	31	30	29	<29	
AWARDEES													
Biology	N	25	4	8	14	16	21	13	29	39	18	6	193
	%	13.0	2.1	4.1	7.3	8.3	10.9	6.7	15.0	20.2	9.3	3.1	100.0
Chemistry	N	2	0	3	4	5	14	32	49	55	28	6	198
	%	1.0	0.0	1.5	2.1	2.5	7.1	16.2	24.7	27.8	14.1	3.0	100.0
Engineering	N	8	4	5	4	7	11	21	38	50	15	1	164
	%	4.9	2.4	3.0	2.4	4.3	6.7	12.8	23.2	30.5	9.1	.6	100.0
Earth Sciences	N	3	1	3	5	8	10	5	9	13	2	0	59
	%	5.1	1.7	5.1	8.5	13.6	16.9	8.5	15.3	22.0	3.4	0.0	100.0
Mathematics	N	2	1	1	2	3	5	5	18	23	17	10	87
	%	2.3	1.1	1.1	2.3	3.4	5.7	5.7	20.7	26.4	19.5	11.5	100.0
Physics	N	4	5	2	5	6	17	27	58	77	30	4	235
	%	1.7	2.1	.9	2.1	2.6	7.2	11.5	24.7	32.8	12.8	1.7	100.0
Psychology	N	3	2	2	2	3	4	8	8	7	2	1	42
	%	7.1	4.8	4.8	4.8	7.1	9.5	19.0	19.0	16.7	4.8	2.4	100.0
Total	N	47	17	24	36	48	82	111	209	264	112	28	978
	%	4.8	1.7	2.5	3.7	4.9	8.4	11.3	21.4	27.0	11.4	2.9	100.0
NON-AWARDEES													
Biology	N	97	26	38	32	40	56	60	91	82	22	6	550
	%	17.6	4.7	6.9	5.8	7.3	10.2	10.9	16.5	14.9	4.0	1.1	100.0
Chemistry	N	36	11	19	15	39	49	73	131	139	50	9	571
	%	6.3	1.9	3.3	2.6	6.8	8.6	12.8	22.9	24.3	8.8	1.6	100.0
Engineering	N	49	14	19	16	31	34	59	78	111	27	3	441
	%	11.1	3.2	4.3	3.6	7.0	7.7	13.4	17.7	25.2	6.1	.7	100.0
Earth Sciences	N	16	8	10	13	8	17	15	11	18	7	0	123
	%	13.0	6.5	8.1	10.6	6.5	13.8	12.2	8.9	14.6	5.7	0.0	100.0
Mathematics	N	26	8	10	7	14	14	25	39	59	34	6	242
	%	10.7	3.3	4.1	2.9	5.8	5.8	10.3	16.1	24.4	14.0	2.5	100.0
Physics	N	32	12	15	22	28	50	81	131	149	62	7	589
	%	5.4	2.0	2.5	3.7	4.8	8.5	13.8	22.2	25.3	10.5	1.2	100.0
Psychology	N	30	11	8	10	11	8	12	18	15	6	0	129
	%	23.3	8.5	6.2	7.8	8.5	6.2	9.3	13.9	11.6	4.7	0.0	100.0
Total	N	286	90	119	115	171	228	325	499	573	208	31	2645
	%	10.8	3.4	4.5	4.3	6.5	8.6	12.3	18.9	21.7	7.9	1.2	100.0
TOTAL, ALL APPLICANTS													
Biology	N	122	30	46	46	56	77	73	120	121	40	12	743
	%	16.4	4.0	6.2	6.2	7.5	10.3	9.8	16.2	16.3	5.4	1.6	100.0
Chemistry	N	38	11	22	19	44	63	105	180	194	78	15	769
	%	4.9	1.4	2.9	2.5	5.7	8.2	13.6	23.4	25.2	10.1	2.0	100.0
Engineering	N	57	18	24	20	38	45	80	116	161	42	4	605
	%	9.4	3.0	4.0	3.3	6.3	7.4	13.2	19.2	26.6	6.9	.7	100.0
Earth Sciences	N	19	9	13	18	16	27	20	20	31	9	0	182
	%	10.4	4.9	7.1	9.9	8.8	14.8	11.0	11.0	17.0	4.9	0.0	100.0
Mathematics	N	28	9	11	9	17	19	30	57	82	51	16	329
	%	8.5	2.7	3.3	2.7	5.2	5.8	9.1	17.3	24.9	15.5	4.9	100.0
Physics	N	36	17	17	27	34	67	108	189	226	92	11	824
	%	4.4	2.1	2.1	3.3	4.1	8.1	13.1	22.9	27.4	11.2	1.3	100.0
Psychology	N	33	13	10	12	14	12	20	26	22	8	1	171
	%	19.3	7.6	5.8	7.0	8.2	7.0	11.7	15.2	12.9	4.7	.6	100.0
Total	N	333	107	143	151	219	310	436	708	837	320	59	3623
	%	9.2	3.0	3.9	4.2	6.0	8.6	12.0	19.5	23.1	8.8	1.6	100.0

Attainment of the Doctorate Degree

One highly relevant question that may be asked regarding former fellowship applicants is whether or not they complete graduate education as indicated by attainment of a doctorate degree. This information becomes available in time without dependence upon the return of a follow-up questionnaire. Shortly after the present study was initiated, the doctorate attainment rates were obtained for this follow-up group, but prior to removal of withdrawals, deceased, and others not finally included in the contact attempts. These rates were based on doctorate attainment up through 1962 as the doctorate year, and were reported informally to the National Science Foundation. Since that time some former applicants have completed doctorates in 1963 and up through the August production of 1964 doctorates. The proportion of those graduating was still quite large in 1963, but was tapering off in 1964, so that further completions are unlikely to produce serious bias either in completion rates or in validity studies using doctorate completion as a criterion variable. Completion rates were also reported for 1952 applicants at all three levels in Technical Report #18. When allowance is made for the different amounts of time allowed for doctorate completion, in the various reports, they are in good agreement. The counts of those in the present study, who completed a doctorate by early Fall 1964, are presented in Table 6 by employer category and questionnaire return status, and in Table 7 by field. Both tables report rates separately by award status and level. The data in Table 7 are further shown graphically in Figure 1.

Of the 3623 subjects in the basic group, 2158 had completed doctorates for an overall completion rate of 59.6%. The rate is higher for questionnaire returnees and considerably higher for awardees than for non-awardees. As expected, the rate is higher for intermediate than for first-year applicants, as is the difference between awardees and non-awardees within these levels. Among the questionnaire returnees, the higher rates are found in those in academic and governmental employment categories, with more non-doctorates in industry. Among those in the "other" employment are some who attained the doctorate after returning their questionnaires.

Table 6

Frequency and Rate of Doctorate Attainment, All Fields Combined

Group		Awardees			Non-awardees			Total Applicants		
		First year	Inter-mediate	Total	First year	Inter-mediate	Total	First year	Inter-mediate	Total
Academic Employment	Total N	232	159	391	283	301	584	515	460	975
	PhD N	214	146	360	198	254	452	412	400	812
	% PhD	92.2	91.8	92.1	70.0	84.4	77.4	80.0	87.1	83.3
Industrial Employment	Total N	114	52	166	273	178	451	387	230	617
	PhD N	80	48	128	97	133	230	177	181	358
	% PhD	70.2	92.3	77.1	35.5	74.7	51.0	45.7	78.7	58.0
Govern-mental Employment	Total N	38	25	63	104	72	176	142	97	239
	PhD N	24	21	45	47	59	106	71	80	151
	% PhD	63.2	84.0	71.4	45.2	81.9	60.2	50.0	82.5	63.2
Other	Total N	34	4	38	117	36	153	151	40	191
	PhD N	9	3	12	4	13	17	13	16	29
	% PhD	26.5	75.0	31.6	3.4	36.1	11.1	8.6	40.0	15.2
Returnees	Total N	418	240	658	777	587	1364	1195	827	2022
	PhD N	327	218	545	346	459	805	673	677	1350
	% PhD	78.2	90.8	82.8	44.5	78.2	59.0	56.3	81.9	66.8
Nonre-turnees	Total N	204	116	320	732	549	1281	936	665	1601
	PhD N	133	93	226	243	339	582	376	432	808
	% PhD	44.6	80.2	70.6	33.2	61.7	45.4	40.2	65.0	50.5
Total	Total N	622	356	978	1509	1136	2645	2131	1492	3623
	PhD N	460	311	771	589	798	1387	1049	1109	2158
	% PhD	74.0	87.4	78.8	39.0	70.2	52.4	49.2	74.3	59.6

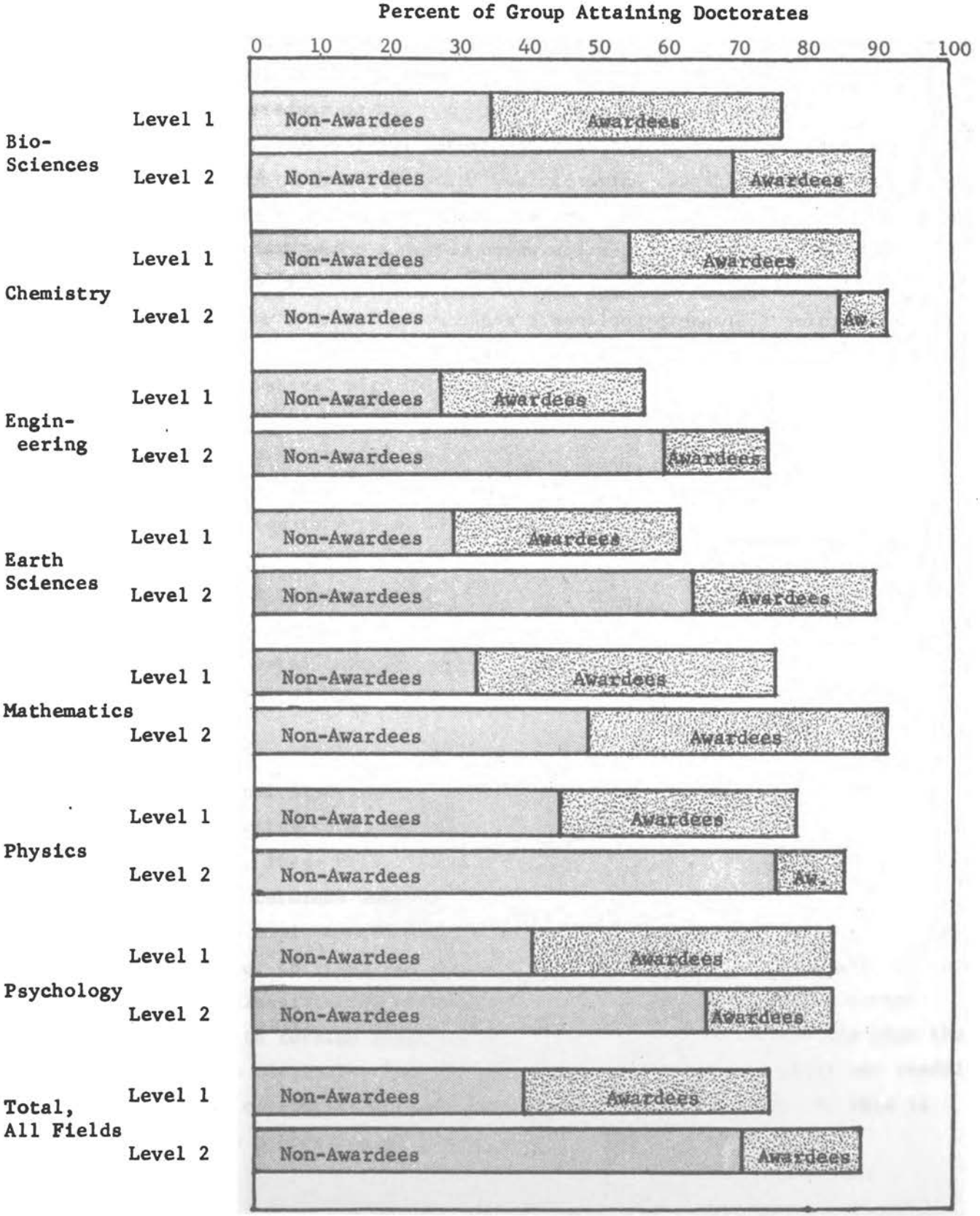
Table 7

Frequency and Rate of Doctorate Attainment by Field, Employer Categories Combined

Panel Field		Awardees First year	Awardees Inter-mediate	Awardees Total	Non-awardees First year	Non-awardees Inter-mediate	Non-awardees Total	Total Applicants First year	Total Applicants Inter-mediate	Total Applicants Total
Biology	Total N	99	94	193	251	299	550	350	393	743
	PhD N	75	84	159	85	205	290	160	289	449
	% PhD	75.8	89.4	82.4	33.9	68.6	52.7	45.7	73.5	60.4
Chemistry	Total N	122	76	198	308	263	571	430	339	769
	PhD N	106	69	175	166	221	387	272	290	562
	% PhD	86.9	90.8	88.4	53.9	84.0	67.8	63.2	85.5	73.1
Engineering	Total N	129	35	164	307	134	441	436	169	605
	PhD N	72	26	98	84	79	163	156	105	261
	% PhD	55.8	74.3	59.8	27.4	59.0	37.0	35.8	62.1	43.1
Earth Sciences	Total N	28	31	59	56	67	123	84	98	182
	PhD N	17	29	46	16	42	58	33	71	104
	% PhD	60.7	93.5	78.0	28.6	62.7	47.2	39.3	72.4	57.1
Mathematics	Total N	64	23	87	159	83	242	223	106	329
	PhD N	48	21	69	51	40	91	99	61	160
	% PhD	75.0	91.3	79.3	32.1	48.2	37.6	44.4	57.5	48.6
Physics	Total N	162	73	235	371	218	589	533	291	824
	PhD N	127	62	189	164	164	328	291	226	517
	% PhD	78.4	84.9	80.4	44.2	75.2	55.7	54.6	77.7	62.7
Psychology	Total N	18	24	42	57	72	129	75	96	171
	PhD N	15	20	35	23	47	70	38	67	105
	% PhD	83.3	83.3	83.3	40.4	65.3	54.3	50.7	69.8	61.4
Total	Total N	622	356	978	1509	1136	2645	2131	1492	3623
	PhD N	460	311	771	589	798	1387	1049	1109	2158
	% PhD	74.0	87.4	78.8	39.0	70.2	52.4	49.2	74.3	59.6

Figure 1

Rate of Doctorate Attainment, Fellowship Applicants of 1955 & 1956



The data source for doctorate completion was the Quality File, which resulted from the collation of the Doctorate Records File with the Cumulative Index, based on NSF Fellowship applications. From the doctorate record portion of this file it is possible to characterize further those 2158 former applicants who had completed a doctorate and to compare them with other science doctorates as reported in NAS-NRC Publication 1142, "Doctorate Production in United States Universities, 1920-1962". Such comparisons were made using either the 1957-1961 science doctorates (including psychology) or with 1960-1961 science doctorates where relevant comparative information was available. Information regarding further characterization of the doctorate-attaining fellowship applicants and comparisons with science doctorates in general are presented in Section V of this report.

III. GENERAL DESCRIPTIVE INFORMATION ABSTRACTED FROM QUESTIONNAIRES

General descriptive information from the questionnaires enables further characterization of the sample with respect to types of institutions employing former fellowship applicants, postdoctoral education, and special employment information. Information more directly relevant to criterion development and validation problems will be presented in subsequent sections.

The same general plan of presentation of questionnaire item information will be used here as was used in the reports on the Terminal Study. The number and fineness of categories in which item response rates are reported is a function of research judgment based on considerations of interest, relevance, statistical significance, and consistency of trends, whether individual rates are significant or not.

Information abstracted from the questionnaires will be presented for those in the major employer categories. Since 26 questionnaires were received after the item counts were obtained, the maximum number of cases for which information will be reported is 1805 rather than 1831, the total number of returnees in the major employer categories. The additional cases are included in later validation phases of the study. On some items, subjects failed to supply the requested information, in which case information will be reported on an "as available" basis.

Employer Categories: Regional Locations and Sub-types

The regional distribution of 1805 questionnaire respondents is presented in Table 8 by category of employer and award status, and also by field of specialization. These distributions are very similar to those for job locations found with the terminal sample.

The three employer categories were sub-divided to obtain further delineation of types of institutions employing former fellowship applicants. Of the 959 subjects classified as being with academic institutions, 28 reported affiliation with foreign institutions, a somewhat higher proportion than that found with the terminals. Some 34 subjects were with institutions not readily codable using categories derived from the USOE Directory, Part 3; this is about the same proportion as found in the Terminal Study.

Reported institutional affiliations for the remaining 897 academic cases were categorized with respect to location, size of student body, type of program, highest level degree offered, and mode of control. With respect to location, all but two of the fifty states (Wyoming and Hawaii) are represented. By size of student body, 29% are with institutions with less than 5000 students, 22% with those in the 5000-10,000 range, another 22% with those in the 10,000-20,000 range, and 27% in institutions with more than 20,000 students. These figures are similar to those found with the terminals, except for an apparent shift toward more employment with the larger institutions. It should be noted, however, that the figures for the present study were based on 1962 enrollments instead of the 1959 enrollments used in the Terminal Study. Rapid growth in some institutions may have shifted classification.

The predominance of PhD-granting institutions employing former fellowship applicants is indicated by a figure of 78%; 13% of the applicants are with institutions granting the Master's as highest degree, and 9% are with sub-baccalaureate and baccalaureate-granting institutions. The large general universities with arts, sciences and professional schools employ 77% of the academic group. Professional and technical schools, the state A & M schools, and institutes of technology employ 7%. The remaining 16% are with the generally small liberal arts and teacher preparatory colleges. Institutions controlled by the states employ 49% of the former applicants now in academic work; those under private, but secular, control employ 39%, and about 11% are in religiously-affiliated institutions. The figures for types of institutions, whether in terms of program, highest degree offered, or type of control, are very similar to those found with the terminals.

Table 8

Regional Distribution of Employers of Questionnaire Returnees, by Employer Category and Award Status, and by Applicant Field of Specialization

Employer Category or Field	Region of Present Employer								
	Award Status	New England	Middle Atlantic	Midwest	South Atlantic	South Central	West	Foreign	Total
Academic	Awardees	16	16	26	8	7	24	3	100
	Non-awardees	13	19	23	13	9	20	3	100
	Total	14	18	24	11	8	22	3	100
Industrial	Awardees	7	36	14	11	4	28	1	100
	Non-awardees	9	32	15	9	8	26	1	100
	Total	9	33	15	9	7	27	1	100
Government	Awardees	8	8	14	33	9	22	6	100
	Non-awardees	5	11	11	38	9	23	4	100
	Total	5	10	12	36	9	23	5	100
Total	Awardees	12	21	22	12	6	25	3	100
	Non-awardees	10	23	18	15	9	23	2	100
	Total	11	22	19	14	8	23	2	100
Biology	Total	10	14	23	17	12	20	3	100
Chemistry	Total	11	27	20	16	7	18	1	100
Engineering	Total	10	19	18	9	5	36	2	100
Earth Sciences	Total	8	13	18	17	15	23	5	100
Mathematics	Total	9	29	20	9	8	24	0	100
Physics	Total	14	24	16	13	7	24	3	100
Psychology	Total	13	14	21	16	4	26	6	100
Total	Total	11	22	19	14	8	23	2	100

Employment by industry was reported by 609 (33.7%) of the questionnaire returnees. The types of industries employing former fellowship applicants are shown in Table 9, with the number and percentage employed in each industrial category. The percentage of those in each industrial category who were awardees is shown in the column at the right. These data show a more marked concentration of former applicants, and especially the awardees, in the "other science" category than was found in the Terminal Study. This category consists largely of smaller science and engineering firms, often involved in work under government contract. Relatively fewer respondents in the present study are employed in the petroleum and major chemical industries than were so employed among the terminal applicants.

Employment by governmental agencies was reported by 237 (13.1%) of the questionnaire returnees. The types of governmental organizations represented are shown in Table 10, with the number and percentage employed in each type. The percentage of awardees among those employed in each type of organization is in the column at the right. By comparison with corresponding data reported by the terminal applicants, shifts may be noted from federal hospitals and clinics, the Department of Defense, and the Department of Agriculture to other federal agencies and to the state governments. The shift in use of former applicants by state governments is especially marked; the percentage of government-employed respondents employed by state governments has nearly doubled from 6.7 to 12.7. In the Terminal Study none of the state-employed respondents were awardees, but in the present study 20% had NSF predoctoral support for graduate study.

The observed shifts within the industrial and governmental employment categories are more likely due to changes in the social and economic milieu in recent years, than to any marked differences in terms of characteristics of the applicant groups (by level). However, the shifts are more marked for awardees, and the average ability of terminal applicants is somewhat higher than that for first-year and intermediate groups.

Additional information regarding employment was given by 12% of the questionnaire returnees. This information consists largely of indications of such roles external to the primary employment as consultants, visiting professors, special lecturers, or medical workers at hospitals, clinics, and laboratories. Some report that the primary employment is in such critical areas as the nuclear and space efforts.

Table 9

Distribution of
Industrial and Business-employed Applicants by Type of Industry (N=609)

Category	Number	Per Cent of Industrial Group	Award Per Cent in Industrial Category
Pharmaceutical	29	4.8	17
Petroleum	51	8.4	22
Major Chemical	115	18.9	24
Aircraft	60	9.9	20
Electrical, Electronic, and Communications	126	20.7	34
Institutes & Foundations	2	0.3	0
Other Science	205	33.7	28
Other Non-science	21	3.4	16
Total	609	100.1	26

Table 10

Distribution of Government-employed Applicants by Agency Category (N=237)

Category	Number	Per Cent of Governmental Group	Award Per Cent in Category
Federal Hospitals and Clinics	3	1.3	33
Military*	36	15.2	28
U.S.Dept. of Agriculture	16	6.8	31
Brookhaven, Oak Ridge and Argonne	31	13.1	59
Other Federal**	121	51.0	27
State Governments	30	12.7	20
Total	237	100.1	27

*Includes civilian employees of the Dept. of Defense

**Includes HEW, AEC Installations, NASA, NBS, Smithsonian, Geodetic and Oceanographic Agencies

Organizational Roles and Activities

The percentage of time reportedly devoted to research, teaching, administration, and other activities was coded and patterns of "% Time" derived in accordance with the coding and pattern definition used in the Terminal Study. Definition of the patterns is as follows:

A- 99-100% time in research and development

B- 60-98% time in research and development with remainder in administration

C- 60-98% time in research and development with remainder in teaching and/or "other"

D- 50-50 split in time between research-development and teaching activities

E- 50% time in research and development with remainder in various combinations of teaching, administration, and "other" activity

F- More than 50% time teaching with some research and development

G- More than 50% time teaching with some administration

H- More than 50% time teaching with remainder in various combinations of research, administration, and "other" activities

I- All other combinations

Approximately 18% of the sample reported some time in the "other" category including such activities as consulting, sales and personnel activities, museum and field work, professional, writing, and editing activities beyond those implicit in the research, teaching, or administration categories.

Distributions of the present subjects on the pattern groups are presented graphically in Figure 2 from data shown in Tables 11 and 12. These distributions are based on the 1768 subjects answering the questionnaire item regarding distribution of time. Differences among the various samples in the functional pattern are most directly related to employer category and award status. Those academically employed are likely to find the teaching function and administrative duties restricting opportunity to do research. Nevertheless, more than 50% of the academic respondents report 50% or more time in research and development, the rate being higher (60%) for awardees. Even in industry and government the awardees report more time in research than do non-awardees. Most of the field differences in functional patterns can be attributed to associated differences in employer category and award rates.

Figure 2

On-The-Job Functions: Percentage Distribution of Time Patterns

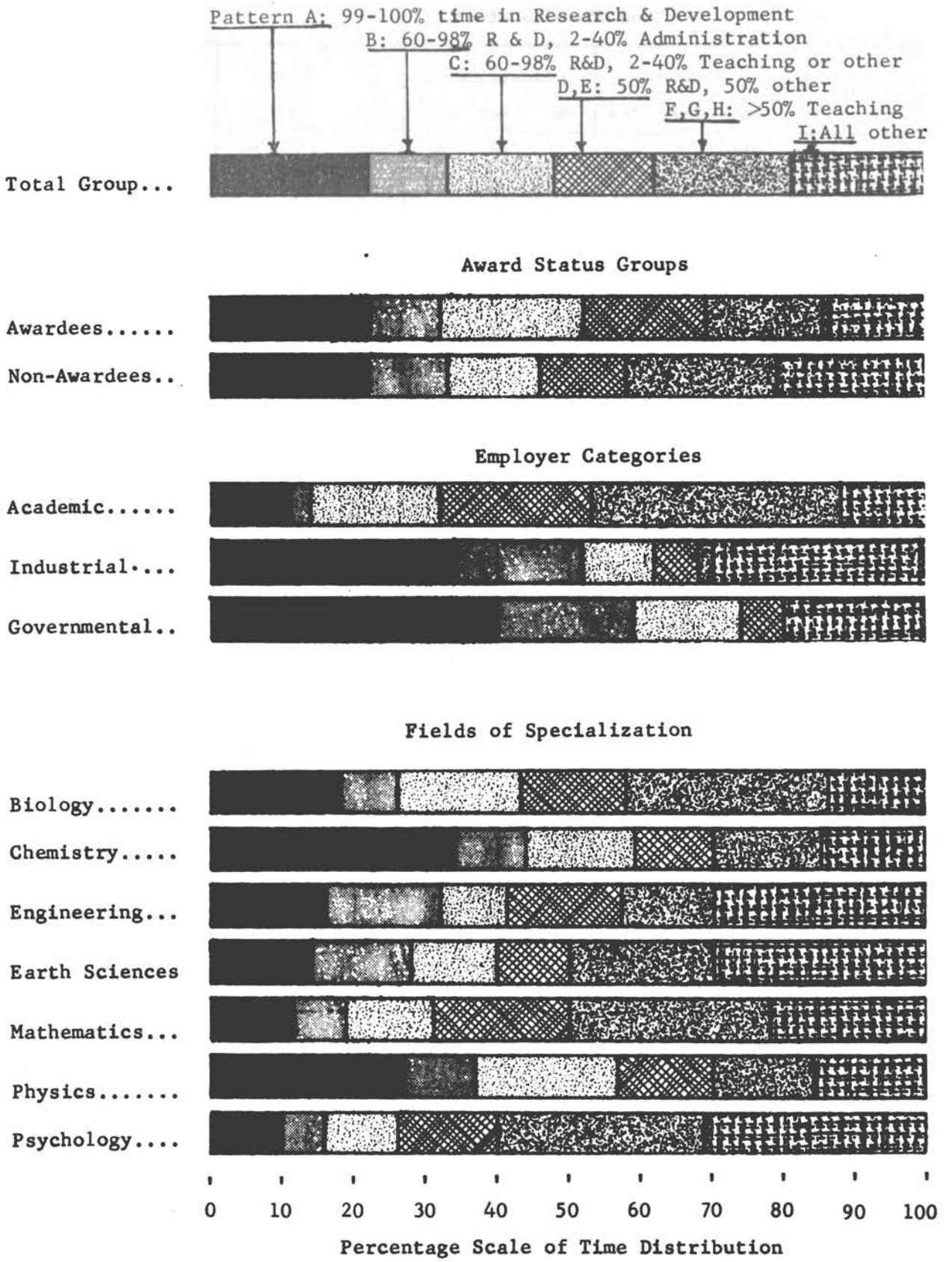


Table 11

Time Pattern Percentage Distribution by Employer Category and Award Status*

Time Distribution Pattern	Academic			Industrial			Government			Total		
	Aw	Non	Tot	Aw	Non	Tot	Aw	Non	Tot	Aw	Non	Tot
A	10	12	11	37	32	34	48	36	40	22	22	22
B	2	4	3	21	19	19	24	17	19	10	11	11
C	25	14	18	13	9	10	13	16	15	20	13	15
D	13	11	12	1	0	0	0	0	0	8	5	6
E	10	8	9	9	5	6	5	6	6	9	7	8
F	8	13	11	0	0	0	0	0	0	5	7	6
G	4	13	10	0	1	1	0	0	0	3	7	5
H	13	15	14	0	0	0	1	0	0	8	7	8
I	15	11	12	19	34	30	10	24	20	15	21	19
Total	100	100	100	100	100	100	100	100	100	100	100	100
No. of cases	355	589	944	160	431	591	63	170	233	578	1190	1768

* Aw = awardees; Non = non-awardees; Tot = total

Table 12

Time Pattern Percentage Distribution, by Field

Time Distribution Patterns	Field of Fellowship Application							
	Bio.	Chem.	Eng'g.	Earth Sci.	Math.	Phys.	Psych.	Total
A	18	33	16	14	12	27	10	22
B	8	11	16	14	7	10	6	11
C	17	15	9	12	12	20	10	15
D	7	4	5	2	13	7	7	6
E	8	7	11	8	6	6	7	8
F	9	6	4	3	8	4	12	6
G	9	3	2	2	12	5	4	5
H	10	6	7	15	8	5	13	8
I	14	15	30	30	22	16	31	19
Total	100	100	100	100	100	100	100	100
No. of Cases	287	465	256	108	178	405	69	1768

Comparison of the time pattern percentage distributions obtained in the present study with those previously obtained with the terminals shows an appreciable increase in the proportion reporting full time in research and development activities. The increase is most marked in the academic and government categories and applies to both awardees and non-awardees. The increase appears in all fields except psychology. There is also an increase in the last, heterogeneous pattern where no one activity predominates. Respondents in the present study report less time in administrative activity than did the terminals.

In interpreting differences in the distributions of reported functions between respondents in this study and the Terminal Study two factors may be noted. First is the continued increase in available support for research and development activity making it more likely that a former applicant in the present study will be active in this function. Second, the present subjects are not as far along in their careers, i.e., more subjects are just out of graduate school, and hence have not acquired as much administrative responsibility. In a study of the career patterns of doctorates, a steady increase in the administrative role was found as a function of time elapsed since doctorate attainment.

Participation in Scientific, Professional, and Technical Societies

Respondents in the present study were asked specifically about election to Sigma Xi, RESA, and membership in AAAS. This was a revision of the procedure used with the terminals, as the open-ended procedure used there generally underestimated the amount of such affiliation, especially for awardees in academic employment. The information obtained in the present study, suing explicit questions on Sigma Xi and RESA elections and membership in the AAAS, is presented in Table 13. This table shows the percentage of the respondent group holding these various types of membership, by employer category and award status, and by field of specialization. With explicit inquiry on the questionnaire, it is found that awardees are more frequently elected to Sigma Xi or RESA than are non-awardees in all employment categories. Membership in the AAAS was counted separately, since it is by subject choice rather than by election. The reported rates of such membership show no systematic differences by employment or award status. In terms of field of specialization, Sigma Xi or RESA election is reported most frequent in biology, chemistry, and physics. Membership in AAAS is more frequently reported in biology, geology, and psychology.

Information on elections to field-oriented scientific honorary societies was also elicited by an explicit question in the present study. Excluding Sigma Xi and RESA elections, which were counted separately, 42% of the respondents reported one or more such elections. The percentage of respondents reporting elections to field-oriented scientific honorary societies is presented in Table 14 in terms of employer category and award status, and by field. Such elections are more frequently reported in engineering and chemistry, which probably accounts for the more frequent reports from the industrially-employed.

Item counts were obtained for the number of national professional society memberships and for local and regional society memberships, excluding those in the AAAS. On this basis membership in one or more national professional societies is reported by 84% of the questionnaire returnees. Only 20% of the respondents report membership in local and regional societies. Affiliation with national professional societies is reported more frequently by those in other employment, by awardees than by non-awardees, and by biologists. Only 7% of the present sample report holding offices in the professional societies.

Table 13

Percentage Distribution of Membership in Sigma Xi, RESA, and AAAS, by Employer Category and Award Status, and by Field

Employer Category or Field	Award Status	Reported Membership: Sigma Xi or RESA only	AAAS only	Sigma Xi or RESA and AAAS	Neither Sigma Xi, RESA, nor AAAS	Total
Academic	Awardees	52	4	27	17	100
	Non-Awardees	44	7	23	26	100
	Total	46	6	25	23	100
Industrial	Awardees	59	4	11	26	100
	Non-Awardees	41	5	10	44	100
	Total	47	4	10	39	100
Government	Awardees	55	6	9	30	100
	Non-Awardees	38	7	14	41	100
	Total	42	7	13	38	100
Total	Awardees	54	4	21	21	100
	Non-Awardees	42	6	17	35	100
	Total	46	5	18	31	100
Biology	Total	33	10	41	16	100
Chemistry	Total	51	4	19	26	100
Engineering	Total	51	2	5	42	100
Earth Sciences	Total	37	10	23	30	100
Mathematics	Total	42	4	6	48	100
Physics	Total	55	4	11	30	100
Psychology	Total	27	11	35	27	100
Total	Total	47	5	18	30	100

Table 14

Election to Scientific Honorary Society by Employer Category and Award Status, and by Field

Employer Category or Field	Award Status	Number of Elections			
		0	1	>1	Total
Academic	Awardees	62	28	10	100
	Non-Awardees	58	28	12	100
	Total	60	28	12	100
Industrial	Awardees	42	36	22	100
	Non-Awardees	56	30	14	100
	Total	52	32	16	100
Government	Awardees	57	37	6	100
	Non-Awardees	67	23	10	100
	Total	64	27	9	100
Total	Awardees	56	31	13	100
	Non-Awardees	59	28	13	100
	Total	58	29	13	100
Biology	Total	68	21	11	100
Chemistry	Total	48	41	11	100
Engineering	Total	27	39	34	100
Earth Sciences	Total	73	23	4	100
Mathematics	Total	74	19	7	100
Physics	Total	69	22	9	100
Psychology	Total	59	37	4	100
Total	Total	58	29	13	100

IV. EVALUATIVE INFORMATION EXTRACTED FROM THE QUESTIONNAIRE

Income

Although reported income is affected by situational and other conditional factors only partially controlled by statistical treatment within field and type of employment, there is reasonable presumption of its relevance as a measure of performance, of willingness to commit talents to the job, of visibility and productivity. The questionnaire asks the subject to report his annual income from scientific and technical sources. In spite of the alleged resistance to divulging one's income, 99% of the terminal sample and 96% of the present sample answered the item. At least two sources of possible error in the reported income variable should be noted. It is neither clear that all reported income is solely from scientific and technical sources, nor that these terms are defined in a uniform way across the sample. Perhaps more serious, especially in the academic group, is the possibility that only academic year incomes were reported. Where this was explicitly stated, the reported value was adjusted to the 12-month basis. Distributions of reported income are presented in Tables 15 and 16.

Clusters of individuals reporting very high incomes are concentrated in the industrial group, especially those in engineering, mathematics, and physics. Median reported income lies within the $11,000 - 11,999 range. However, it is just about $10,000 for the academic group, within the $13,000 - 13,999 range for the industrial group, and just about $11,000 for the government group. In terms of field, it is found that biologists have the lowest median income and engineers the highest. Medians for mathematicians and chemists are similar to the median for the total group, but medians for geologists and psychologists are somewhat lower.

Several of the distributions are not smooth, but show "bumps" representing clusters of individuals in particular role and situational combinations. This is especially true in the field distributions where the subjects are mixed by type of employment.

When the distributions of reported income in the present study are compared with those reported in the Terminal Study, it is found that the present median income is about $1000 higher than that reported by the terminal applicants.

Increases are found in all three employer categories with greater increases in the academic group. This probably represents changes in pay scales rather than in quality of the individuals.

In revising the questionnaire for use in the present study, provision was made for obtaining the date of entry and initial salary on the present job. It is planned to use this information in conjunction with present income to generate a rate of career progress index in a later phase of this study. The distributions of initial salary on present job show patterns with respect to type of employment and field very similar to those found with present income. Differences in initial income between awardees and non-awardees are small or non-existent but appear to become established, or more pronounced as time permits reflection of promotion rates. However, the picture is complicated by possible errors in recalled initial income and by different lengths of time on present job.

Table 15

Percentage Distribution of Reported Income by Employer Category and Award Status*

Income Category	Academic			Industrial			Government			Total		
	Aw	Non	Tot	Aw	Non	Tot	Aw	Non	Tot	Aw	Non	Tot
$16,000 and over	3	3	3	19	19	19	5	2	3	8	9	8
14,000 - 15,999	6	5	5	30	20	22	8	7	7	13	11	12
13,000 - 13,999	4	4	4	18	10	12	16	9	11	9	7	8
12,000 - 12,999	10	8	8	11	17	15	20	16	17	11	12	12
11,000 - 11,999	15	13	14	9	11	10	11	13	12	13	12	12
10,000 - 10,999	19	14	16	4	9	8	22	17	19	15	13	14
9,000 - 9,999	16	14	14	3	4	4	3	12	9	11	10	10
8,000 - 8,999	12	15	14	1	3	2	3	10	8	8	10	9
Less than $8,000	13	19	17	1	4	3	11	12	11	10	12	11
Unreported	2	5	4	4	4	4	2	3	3	3	4	4
Total	100	100	100	100	100	100	100	100	100	100	100	100

* Aw = awardees; Non = non-awardees; T = total

Table 16

Percentage Distribution of Reported Income, by Field

Income Category	Field of Fellowship Applicant							Total
	Biology	Chemistry	Eng'g.	Earth Sci.	Math.	Physics	Psych.	
16,000 and over	1	5	18	6	12	12	1	8
14,000 - 15,999	1	12	20	6	15	13	10	12
13,000 - 13,999	4	10	10	0	7	10	3	8
12,000 - 12,999	8	15	20	7	6	10	10	12
11,000 - 11,999	11	15	8	13	15	13	10	12
10,000 - 10,999	18	12	9	23	12	14	17	14
9,000 - 9,999	14	11	4	19	9	8	13	10
8,000 - 8,999	16	8	3	8	9	10	11	9
Less than $8,000	24	10	4	13	11	7	20	11
Unreported	3	2	5	5	4	4	4	4
Total	100	100	100	100	100	100	100	100

Productivity

An index of the quantity of production is derived from information supplied by the respondent on the questionnaire. This information includes listing of publications, reports, texts, manuals, and patents. Publications in the scientific journals account for well over 90% of the listings. Initial treatment of this information consisted of a simple count of the listed items regardless of length or quality. The questionnaires and the coding of information were then reviewed for evidence of padding, for predominance of the unusual or infrequent type of item, or for other indications of need to adjust the counts. The adjusted counts were converted to the "productivity stanine" scale, developed and used in the Terminal Study. The use of the scale standardized on the terminal group permits a direct comparison, and while less directly relevant to the present group than a separately standardized scale might have been, this basis of comparison retains the high level of production to be expected of those who are more likely to complete graduate study. The question of the quality of production must be answered by other methods, e.g., from ratings and comments by those completing Confidential Report forms on the subject, or by counting reference citations by others. Such quality indices are being obtained in the second phase of the present study and will be included in the validation analyses. Distributions of the index of productivity are presented with means in Tables 17 and 18.

The mean productivity index is higher for awardees than for non-awardees in all three employer categories. In the present study the productivity is greatest in the academic group, followed by the governmental group, with the industrial group lowest. In terms of field the mean productivity is highest in biology and psychology and lowest in mathematics and engineering. In interpreting such results it is necessary to keep in mind the field differences in employer categories, percentage time devoted to research and development leading to tangible production, and publication incentives and practices.

In comparing mean productivity in the present study with that obtained in the Terminal Study, the means are lower in all groups in the present study than those found in the corresponding groups of terminal applicants. This is due to the fact that the present sample consists of younger persons queried at an earlier career stage.

Table 17

Percentage Distribution of Productivity Stanine by Employer and Award Status

Productivity Stanine	Academic			Industrial			Government			Total		
	Aw	Non	Tot	Aw	Non	Tot	Aw	Non	Tot	Aw	Non	Tot
1	4	13	10	10	22	19	8	14	13	6	17	13
2	9	18	15	18	21	20	13	16	15	12	19	16
3	15	14	15	22	16	17	9	13	12	16	14	15
4	18	19	19	16	19	18	23	23	23	18	20	19
5	28	19	22	21	12	14	25	18	20	25	16	19
6	13	8	10	7	6	6	14	8	10	12	7	9
7	7	5	6	6	2	3	6	3	4	7	4	5
8	3	2	2	1	1	1	2	4	3	2	2	2
9	2	2	2	0	1	1	0	1	0	1	1	1
Mean	4.53	3.79	4.03	3.69	3.15	3.29	4.20	3.77	3.83	4.17	3.52	3.79

*Aw - awardees; Non - non-awardees; Tot - total

Table 18

Percentage Distribution of Productivity Stanine, by Field

Productivity Stanine	Field of Fellowship Applicant							
	Biology	Chemistry	Eng'g.	Earth Sci.	Math.	Physics	Psych.	Total
1	10	9	22	9	24	11	16	13
2	12	15	21	15	22	18	9	16
3	12	16	17	15	17	15	14	15
4	19	22	16	20	13	21	16	19
5	21	21	11	23	18	20	24	19
6	13	9	7	13	3	7	13	9
7	7	5	3	3	3	6	4	5
8	4	2	2	2	0	1	3	2
9	3	1	1	0	0	1	1	1
Mean	4.33	3.94	3.22	3.94	3.00	3.77	3.99	3.79

Honors

From the listing of honors received, including prizes and citations for excellence of scientific or technical work, and as reported on the questionnaire, counts were obtained separately for educational honors (Phi Beta Kappa, Cum Laude graduation, etc.) and for those obtained later in relation to scientific or technical achievement. The over-all rates are practically identical with those reported in the Terminal Study. The percentages reporting one or more of each type of honor are presented for the various subsamples in Table 19. In general, both the individual rates and the patterns across the sub-samples are somewhat different from those found in the Terminal Study. These variables are believed to be unreliably reported, possibly as a function of variations in modesty under the open-ended conditions under which the information was sought. There may, however, be real differences, and changes in availability and standards for making various kinds of incentive awards. In any event, the honors information must be used with considerable caution, if at all, in evaluation procedures.

Self- Evaluation

Three 7-point scales are provided on the questionnaire for the subject's self-evaluation in terms of "rate of progress", "career satisfaction", and "attainment of goals". The item was answered by 97% of the respondents and yielded generally symmetrical distributions with good dispersions, which were highly similar to those obtained with the terminal subjects. In view of this similarity, the limited validity found for these scales, and the fact that respondents in the present sample are less experienced on the job, the distributions will not be presented in detail. As compared with the terminals, there is less indication of dissatisfaction, fewer reports of career interruption, and fewer elaborations of dissatisfaction among the present respondents. These differences as well as the differences in types of comments are also a function of the amount of time on-the-job.

Table 19

Per Cent of Returnee Sample Reporting One or More Honors

Employer Category or Field	Award Status	Educational Honors	Other Honors
Academic	Awardees	16	5
	Non-awardees	17	8
	Total	17	7
Industrial	Awardees	16	8
	Non-awardees	15	9
	Total	16	8
Government	Awardees	11	8
	Non-awardees	14	12
	Total	13	11
Total	Awardees	16	6
	Non-awardees	16	9
	Total	16	8
Biology	Total	13	11
Chemistry	Total	18	6
Engineering	Total	29	15
Earth Sciences	Total	19	4
Mathematics	Total	10	5
Physics	Total	11	7
Psychology	Total	16	10
Total	Total	16	8

V. SOME CHARACTERISTICS OF THE DOCTORATE-ATTAINING GROUP

Age at Doctorate and BA-PhD Time Lapse

Doctorate completion rates for subjects included in the present study were presented in Section II of this report. From the doctorate record portion of the Quality File, which file resulted from the collation of the Cumulative Index with the Doctorate Survey Record file, it is possible to characterize further the 2158 former applicants who had completed a doctorate by August of 1964. It is also possible to compare this group in terms of a given item of information to recent science doctorates in general.

The age at doctorate completion and the gross time lapse between baccalaureate and doctorate degrees are presented with appropriate comparative information for science doctorates (including psychology) in Tables 20 and 21. The information is tabulated in terms of employer category and return status in Table 20, and in terms of panel field in Table 21. Both tables present separate results in terms of award status. It may be immediately noticed that doctorate-attaining fellowship applicants complete the doctorate at a younger age than do other scientists, and that they do so with less time lapse from completion of a baccalaureate degree. This is true of both awardees and non-awardees, although it is truer of the awardees. Again there may be noted a difference between awardees and non-awardees of about one year in time required to complete a doctorate. Field differences are typical of those for scientists in general, and are therefore functions of different practices and requirements in the various fields. For example, chemists and physicists complete at an earlier age, but biologists, psychologists, and earth scientists complete at a later age. The standard deviations follow a similar pattern and it may well be that the necessary requirements are more uniformly standard across departments in the older physical sciences than in the life sciences. It is also likely that the few women in these fields tend to be older at the time of doctorate attainment.

Since a few who had not attained a doctorate by August of 1964 may yet do so, the reported means for both age at doctorate and for time lapse may be slightly lower than the ultimate values that will be approached as more time elapses. Although such bias is believed to be small in view of peak attainment in the years 1958 and 1959 with subsequent tapering off of attainment in later

Table 20

Means and Standard Deviations of Age at Doctorate and of BA-PhD Time Lapse, All Fields Combined

Group	AGE AT DOCTORATE			BA-PHD TIME LAPSE		
	Number	Mean	S.D.	Number	Mean	S.D.
All Science Fields	1957-61 SCIENCE DOCTORATES			1960+1961 SCIENCE DOCTORATES		
	26408	31.13	5.26	11621	8.35	--
	1955+1956 AWARDEES			1955+1956 AWARDEES		
Academic Employment	360	27.37	2.69	360	5.53	2.30
Industrial Employment	128	27.14	1.77	128	5.27	1.68
Governmental Employment	45	27.60	2.50	45	5.93	2.04
Other	12	29.17	3.04	12	6.58	1.52
Returnees	545	27.37	2.53	545	5.52	2.14
Nonreturnees	226	28.02	2.92	226	5.83	1.95
Total	771	27.56	2.69	771	5.61	2.36
	1955+1956 NON-AWARDEES			1955+1956 NON-AWARDEES		
Academic Employment	452	29.20	3.94	452	6.78	3.23
Industrial Employment	230	28.10	2.85	230	5.93	2.25
Governmental Employment	106	29.20	3.27	106	6.79	2.57
Other	17	30.12	5.42	17	7.65	4.72
Returnees	805	28.90	3.65	805	6.56	2.96
Nonreturnees	582	29.03	3.60	582	6.65	2.85
Total	1387	28.96	3.61	1387	6.60	2.91
	TOTAL, ALL APPLICANTS			TOTAL, ALL APPLICANTS		
Academic Employment	812	28.39	3.57	812	6.23	2.92
Industrial Employment	358	27.75	2.58	358	5.69	2.08
Governmental Employment	151	28.72	3.14	151	6.54	2.44
Other	29	29.72	4.48	29	7.21	3.67
Returnees	1350	28.29	3.33	1350	6.14	2.71
Nonreturnees	808	28.75	3.46	808	6.42	2.65
Total	2158	28.46	3.37	2158	6.25	2.68

Table 21

Means and Standard Deviations of Age at Doctorate and of BA-PHD Time Lapse

Field	AGE AT DOCTORATE			BA-PHD TIME LAPSE		
	Number	Mean	S.D.	Number	Mean	S.D.
	1957-61 SCIENCE DOCTORATES			1960+1961 SCIENCE DOCTORATES		
Biology	8339	32.01	5.09	3578	8.9	--
Chemistry	5262	29.12	3.93	2244	7.0	--
Engineering	3751	31.07	4.72	1831	8.3	--
Earth Sciences	1106	31.60	5.14	508	8.6	--
Mathematics	1426	30.75	5.23	652	8.6	--
Physics	2624	29.96	3.91	1176	7.6	--
Psychology	3900	32.83	5.98	1632	9.4	--
Total	26408	31.13	5.26	11621	8.35	--
	1955+1956 AWARDEES			1955+1956 AWARDEES		
Biology	159	28.42	3.42	159	6.09	2.84
Chemistry	175	26.41	1.66	175	4.82	1.56
Engineering	98	27.70	2.37	98	5.53	2.09
Earth Sciences	46	28.52	2.69	46	6.13	2.02
Mathematics	69	26.90	2.39	69	5.45	1.78
Physics	189	27.61	1.98	189	5.83	1.61
Psychology	35	28.86	4.22	35	6.11	2.36
Total	771	27.56	2.69	771	5.61	2.10
	1955+1956 NON-AWARDEES			1955+1956 NON-AWARDEES		
Biology	290	30.45	4.45	290	7.50	3.52
Chemistry	387	27.73	3.18	387	5.58	2.46
Engineering	163	29.12	2.97	163	6.64	2.53
Earth Sciences	58	29.53	3.28	58	7.19	3.10
Mathematics	91	29.03	4.14	91	7.00	3.27
Physics	328	28.60	2.64	328	6.63	2.17
Psychology	70	30.24	4.66	70	7.13	4.08
Total	1387	28.96	3.61	1387	6.60	2.91
	TOTAL, ALL APPLICANTS			TOTAL, ALL APPLICANTS		
Biology	449	29.73	4.23	449	7.00	3.36
Chemistry	562	27.32	2.85	562	5.35	2.23
Engineering	261	28.59	2.81	261	6.23	2.42
Earth Sciences	104	29.09	3.00	104	6.72	2.72
Mathematics	160	28.11	3.65	160	6.33	2.83
Physics	517	28.24	2.44	517	6.34	2.01
Psychology	105	29.78	4.55	105	6.79	3.62
Total	2158	28.46	3.37	2158	6.25	2.68

years, bias is likely to be concentrated among non-awardees and the industrially employed. Associated with greater time required to complete a doctorate are not only age at doctorate and time lapse between degrees, but also the number of dependents. The acquisition of dependents is a function of elapsed time, but such acquisition is itself a factor in delaying doctorate completion.

Regional Location of Doctorate Institution

Distributions on the doctorate-attaining fellowship applicants were made of the regional location of the doctorate-granting institution. The detailed distributions by award status are presented in terms of employer category and in terms of field in Tables 22 and 23 in Appendix B. The totals by award status are presented graphically in Figure 3 and the field profiles within each geographic region are shown in Figure 4. These data strongly reflect the regional selectivity then known to exist among fellowship applicants and their ability as rated by the panels. Indeed, knowledge of this situation was one of the factors that led to the initiation of the Cooperative Graduate Fellowship program in 1959, to encourage a more widely distributed participation in the fellowship program. It should be noted that the regional selectivity appears for both awardees and non-awardees and is therefore true to some extent of all applicants, whether due to differential encouragement to apply for fellowships or to applicant alertness to alleged advantages in studying at particular institutions or in particular geographic locations. Nevertheless, the regional selectivity is more marked for awardees in this applicant sample which of course includes only those who in fact attained a doctorate.

Differences in region of doctorate as a function of employer category or questionnaire return status do not appear to be marked, and are attributed to related factors such as field and award status. The pattern of field differences, as revealed in Figure 4, shows the effect of regional selectivity in the fellowship applicant group in contrast to the regional distribution of science doctorates in general (i.e., in terms of the location of the doctorate-granting institution). The difference is most marked for the New England institutions, and that for all fields, and to a lesser extent, the Pacific states.

Figure 3

Region of Doctorate Institution, Fellowship Applicants of 1955 and 1956 as Compared with all Science Doctorates of 1960 and 1961

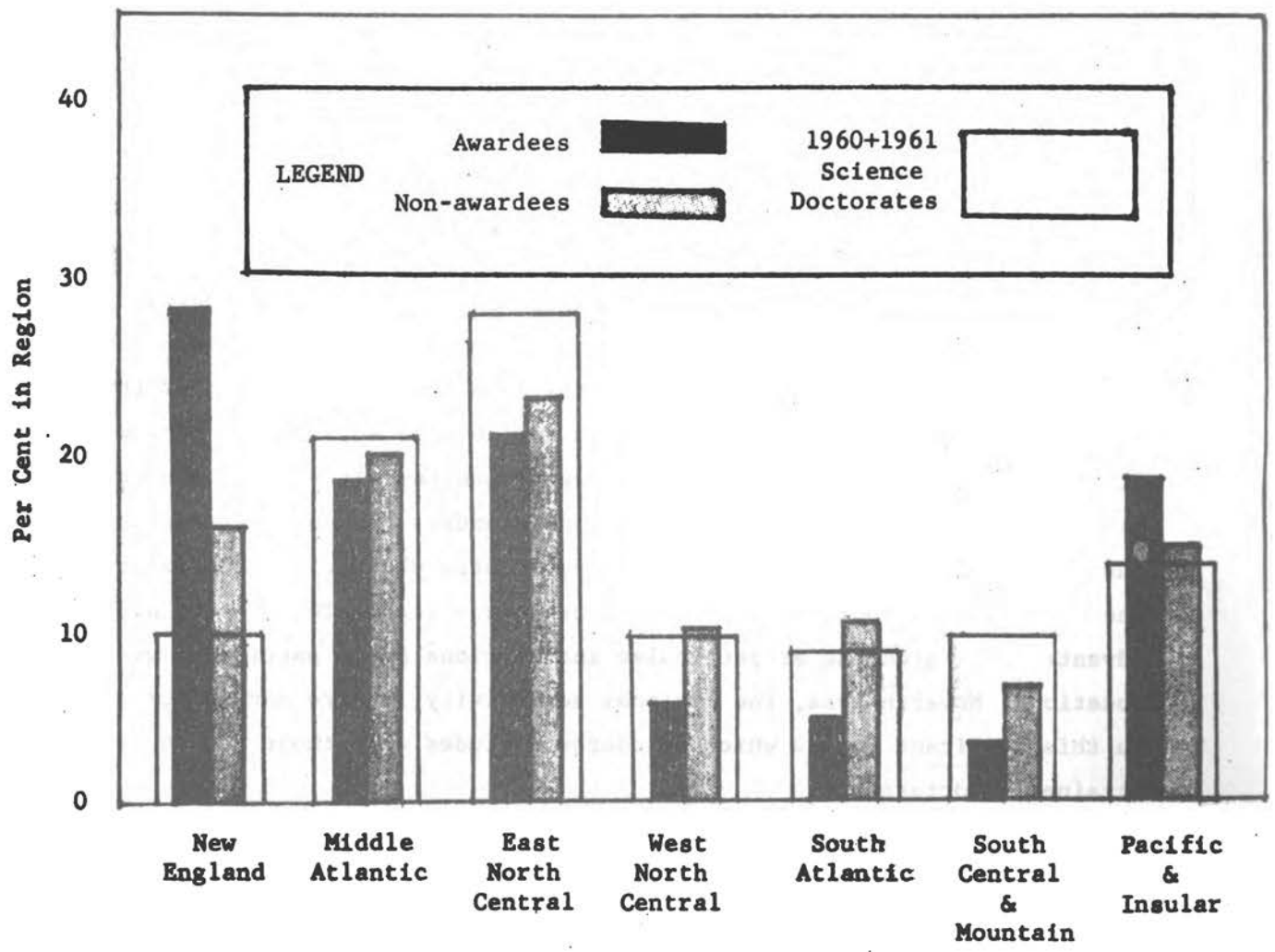
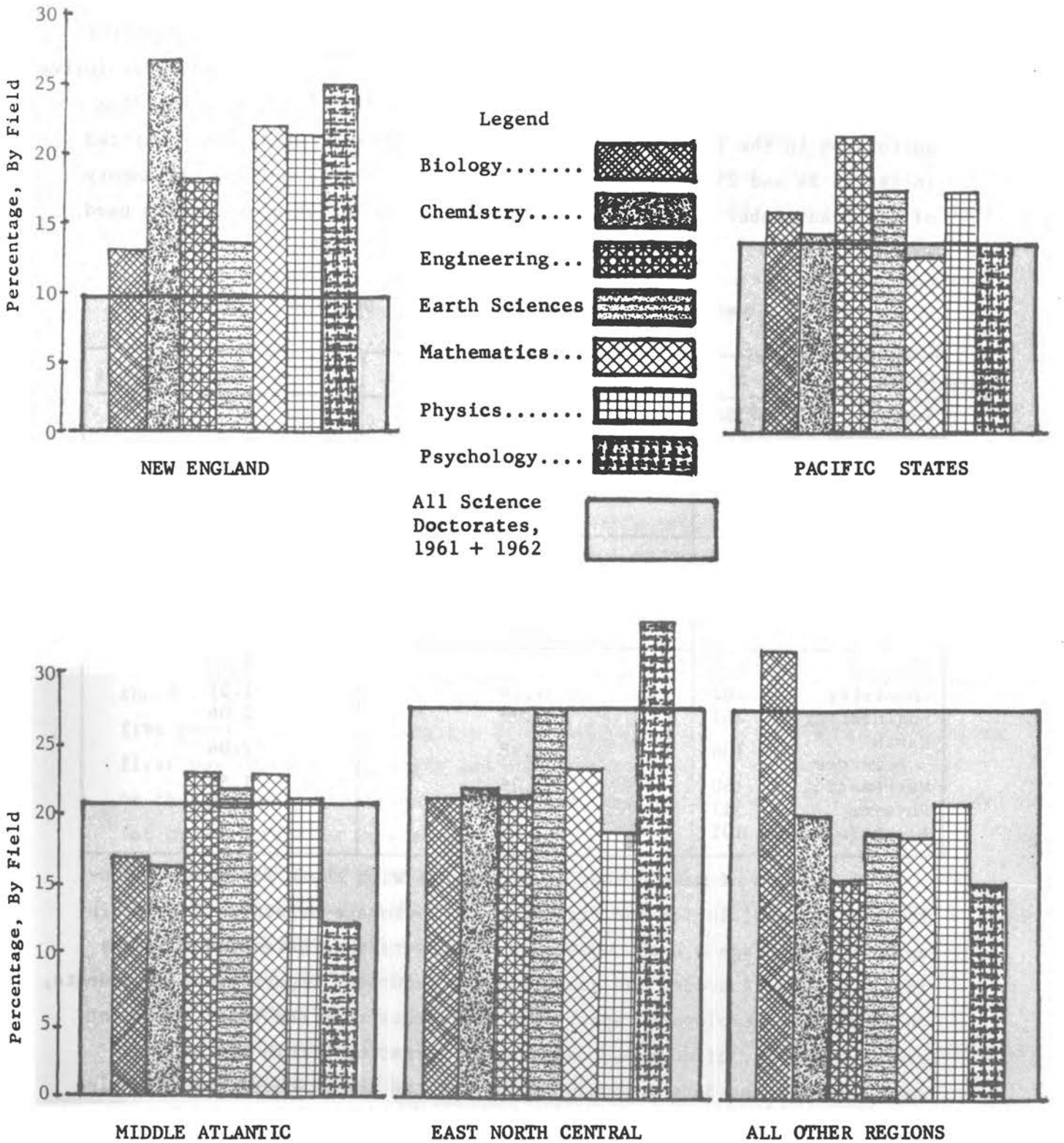


Figure 4

Field Profiles By Geographic Region

NSF Fellowship Applicants Compared To All Science Doctorates 1960-61



Number of Dependents

One of the factors affecting the time required to complete graduate education is the acquisition of family responsibilities. The Doctorate Survey, completed at approximately the time of attainment of the doctoral degree, asks for the number of dependents (in the income tax sense, exclusive of self). The distributions of number of dependents reported by the 2158 doctorates in the fellowship applicant sample of this study are presented in Tables 24 and 25 in Appendix B. The following table presents a summary of the mean number of dependents reported in the analytic categories used in this study.

Mean Number of Dependents Reported by Doctorate Attaining Fellowship Applicants

Group	N	Mean Number of Dependents	1957-61 Science PhD's
Total	2158	1.55	1.79
Academic	812	1.49	--
Industrial	358	1.51	--
Government	151	1.75	--
Other	29	1.23	--
Returnees	1350	1.52	--
Nonreturnees	808	1.60	--
Awardees	771	1.36	--
Non-awardees	1387	1.66	--
Biology	449	1.71	1.95
Chemistry	562	1.25	1.51
Engineering	261	1.99	2.06
Earth Sciences	104	1.98	2.04
Mathematics	160	1.36	1.59
Physics	517	1.49	1.60
Psychology	105	1.33	1.72

Comparison of mean number of dependents with those for science doctorates is possible for the field totals. Doctorate-attaining fellowship applicants average a lesser number of dependents than science doctorates in all fields. Awardees and questionnaire returnees report fewer dependents, and government employees report more dependents than the total applicant group. There is, of course, considerable variation within all of these categories. These data in conjunction with the age-at-doctorate data also reflect the expected relationship between age and number of dependents.

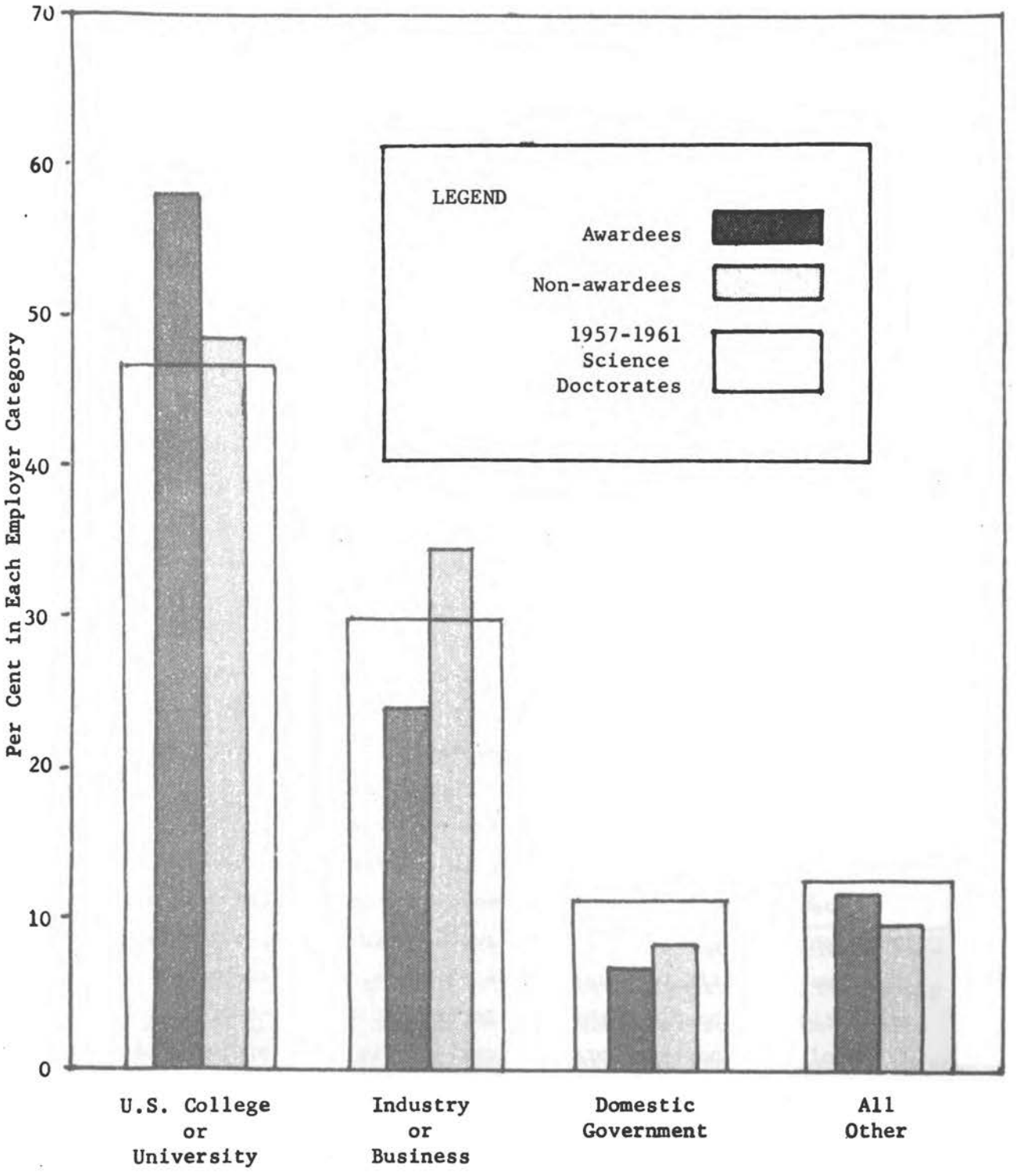
First Post-doctoral Employer

The Doctorate Survey also asks the recent doctorate to indicate his first post-doctoral employer, if known at the time the survey form is completed. This provides several interesting items of information not otherwise available on doctorate-attaining fellowship applicants. The data are presented in Tables 26 and 27 in Appendix B, and the award status summary is presented graphically in Figure 5. The first post-doctoral employer of former fellowship applicants is most likely a college or university, and especially so in the case of awardees. As shown in Figure 5 the fellowship applicant group is more academically oriented than science doctorates in general. Industry, however, employs former applicants in about the same proportion as science doctorates, but disproportionately with respect to award status. Other data from the follow-up questionnaires indicate that there is greater heterogeneity of rated ability in the industrial group, with some of the awardees in the top echelons of industrial research and development and some of the lowest quality applicants, as rated by the panels, in relatively routine technical or sales positions. Figure 5 also shows relatively fewer former fellowship applicants employed by government than science doctorates in general.

The data in Table 26 provide some information on shifts in employer category between the time of completing a doctorate and the time at which the follow-up questionnaire was completed. In most cases this will be within five years after completing the doctorate. In Table 26 the columns represent first post-doctoral employer and the rows the employer category reported on the follow-up questionnaire. It is apparent that there is some net shift for those initially in academic employment to industry and government. These shifts are differential by award status. Thus, a greater proportion of those who shift to industry are awardees; and, less marked, a greater proportion of those who shift to government are non-awardees. The distributions of first post-doctoral employer by field are presented in Table 27. It may be seen that the polarization of non-awardees in industry is most marked for the chemists, but is also appreciable in mathematics and psychology. However, no such polarity is found in engineering.

Figure 5

First Post-Doctoral Employers of Fellowship Applicants of 1955 and 1956 as Compared with all Science Doctorates of 1957-1961



Postdoctoral Education

As in the Terminal Study, the questionnaires were examined for evidence of formal postdoctoral education. The counts were made without reference to location of support of such further education. The over-all rate of those reporting post-doctoral education is 23%, somewhat higher than that found in the Terminal Study. The increase is almost entirely in the academic group, where the rate is 33%. Awardees report postdoctoral education more frequently (30%) than do non-awardees (20%), and do so in all three employment groups, although the difference is very small in the industrial group. Patterns of postdoctoral education by field are similar to those found with the terminals: high for the biomedical group, low for engineering, geology, and mathematics.

VI. A CONCLUDING NOTE

This report covers one block of information obtained by the follow-up of former applicants for Graduate fellowships at the first-year and intermediate levels in 1955 and 1956. The basic information reported is that from the follow-up questionnaire. Information obtained from ratings and other evaluations given by confidential reporters, counts of citations of publications from the Science Citation Index, and validation statistics will be presented in a later report.

The information in the present follow-up study may be compared with that obtained and reported earlier for terminal applicants of 1952-3-4. In general the findings are quite similar; most differences can be attributed to such factors as: (1) an increase in the time taken to complete graduate study, so that our contact was somewhat earlier in the subjects' career, even though some allowance was made for the fact that non-terminals were not as near completion of graduate study; (2) less academic attrition prior to fellowship application time for the non-terminals, resulting in lower average ability and greater heterogeneity; (3) changes in the cultural and scientific milieu in recent years such as demand and interest shifts, and changes in pay scales.

This report also presents information on the rate of attainment of the doctorate degree. For those who have attained the doctorate, some comparisons with the science doctorates in general were made, using data from the Quality File and from the Doctorate Survey. These comparisons show that fellowship applicants, especially awardees, complete the doctorate at an earlier age and with less BA-PhD time lapse than do recent science doctorates in general. The comparisons also show a selective concentration of the geographical region of the doctorate-granting institutions, a smaller number of dependents at doctorate-completion time, and some shift from initial post-doctoral employment from academic to industrial and governmental employment in the early postdoctoral period.

Where this report is primarily descriptive and normative of the former fellowship applicant group studied, the next report will emphasize on-the-job evaluation of the applicant by others and the validation of selection information against criterion elements abstracted from the follow-up information.

Budget Bureau No. 99-R108.1
Approval Expires: November 15, 1964

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

Office of Scientific Personnel Questionnaire for Former Fellowship Candidates

At the request of the National Science Foundation, the Office of Scientific Personnel has undertaken a series of systematic studies designed to improve fellowship selection techniques. One of these studies involves follow-up of former candidates for NSF fellowships. As one of the fellowship candidates during the earliest years of the NSF program, your cooperation is solicited. We will appreciate your candid and complete responses to the questions as asked, and also any elaborations or comments which you wish to add. Please be assured that your answers will be held in confidence, and only statistical summaries will be published or made available to any other office or agency.

Name and Address

If address given is not correct, please make necessary corrections

Social Security Number

			–			–		

Please insert number above

1. EDUCATION

Please indicate below any educational experience since 1955

Institution	Dates	Field	Degrees

2. YOUR PRESENT JOB:

Title | Date of Entry on Job | Initial Salary

Employer's Name and Address

Nature of the work: duties and responsibilities:

If you do not do scientific work yourself, explain how you use scientific knowledge in your work

SUPERVISORY RESPONSIBILITIES: In each category below, enter the maximum number of people for whom you have had direct supervisory responsibility at any time during the past 3 years.

Level of supervisory relationship	None	Cler. Pers.	Sub-Prof. Techn.	BA-Level Scientists or Engnrs.	MA-Level Scientists or Engnrs.	PhD-Level Scientists or Engnrs.	Post-Doct. Fellows
A. Full time employees							
B. Part time employees							

Approximate percentage of time devoted to each type of activity

Research	Teaching	Administration	Other (Explain)

What is your total annual income from scientific and technical activities? Check annual income (in thousands of dollars) from sci-tech. sources.

Under 6	6+	7+	8+	9+	10+	11+	12+	13+	14+	15+	16+	17+	18+

3. OTHER OCCUPATIONAL AND/OR MILITARY EXPERIENCE SINCE 1955

Give job title, employer, duties and responsibilities, etc. as shown under "present job" (if you have had no other job since graduate school days, this space may be used for any other comments or for completing other sections).

4. SCIENTIFIC, TECHNICAL, AND HONORARY SOCIETIES

Are you a member of Sigma Xi and/or RESA?

Are you a member of the AAAS?

Have you been elected to one or more field-oriented honorary societies (e.g., Tau Beta Pi, Psi Chi, Phi Lambda Upsilon, etc.)? If so, please specify:

List any professional societies in which you hold membership, giving grade of membership and offices held, if any:

5. HONORS RECEIVED: If you have received any honors, prizes, or citations for excellence of your scientific or technical work, please list them below.

6. FINANCIAL SUPPORT DURING GRADUATE STUDY: Please list the years in which you held a fellowship (F) or assistantship (A), if any, the approximate amount of support, and whether the assistantship was part or full time, and source of support. For example: 55-56 F $1800 NSF; 54-55 A $900 (½) Univ.

7. NOMINATIONS OF OUTSTANDING YOUNG SCIENTISTS: Please list below the names and addresses of up to four of the outstanding scientists in your general field and in your age group.

8. **PUBLICATIONS:** Please list separately (a) published papers giving titles and references and (b) papers prepared for publication but not yet in print. (See below for other papers)

9. **OTHER PAPERS:** List below (a) number and approximate length of classified or private reports, (b) number of dissertations or non-academic papers of dissertation quality produced by people who report to you, (c) patents, (d) books, and (e) manuals.

10. SKILL REQUIREMENTS AND UTILIZATION

What, if any, kinds of higher mathematics do you use in your work? _____

_____

Does your job require data processing machines and/or computers? (If so, specify type) _____

_____

Does your job require facility in one or more foreign languages? (If so, specify language and degree of facility) _____

_____

Does your job require any knowledge and/or skills not provided in your formal education? (Specify) _____

_____

_____

_____

_____

11. SELF-EVALUATION: How do you evaluate your own achievement to date, as regards (a) rate of progress (b) career satisfaction and (c) attainment of goals sought? Please check the scales below and add whatever comments you feel appropriate.

	Fair		Good		Excellent			Comments
a. Rate of progress.....								_____
b. Career satisfaction.....								_____
c. Attainment of goals....								_____

_____

12. Names and addresses of at least three persons best acquainted with your work to whom we might write for reference reports:

_____

_____

_____

_____

_____

_____

_____

_____

Return to the National Academy of Sciences—National Research Council, Washington, D. C. 20418

Appendix B

Table 22

Frequency and Percentage Distributions of Region of Doctorate, All Fields Combined

GROUP		New England	Middle Atlantic	East N Central	West N Central	South Atlantic	East S Central	West S Central	Moun-tain	Pacific	Foreign	Total
					SCIENCE DOCTORATES OF 1960 & 1961							
All Science Fields	N	1138	2423	3243	1120	983	214	582	322	1596	0	11621
	%	9.8	20.8	27.9	9.6	8.5	1.8	5.0	2.8	13.7	0.0	100.0
					AWARDEES							
Academic Employment	N	96	67	75	21	21	0	8	3	66	3	360
	%	26.7	18.6	20.8	5.8	5.8	0.0	2.2	.8	18.3	.8	100.0
Industrial Employment	N	35	23	27	10	2	0	1	3	27	0	128
	%	27.3	18.0	21.1	7.8	1.6	0.0	.8	2.3	21.1	0.0	100.0
Governmental Employment	N	14	8	8	3	3	0	0	1	8	0	45
	%	31.1	17.8	17.8	6.7	6.7	0.0	0.0	2.2	17.8	0.0	100.0
Other	N	2	3	3	0	1	0	0	0	3	0	12
	%	16.7	25.0	25.0	0.0	8.3	0.0	0.0	0.0	25.0	0.0	100.0
Returnees	N	147	101	113	34	27	0	9	7	104	3	545
	%	27.0	18.5	20.7	6.2	5.0	0.0	1.7	1.3	19.1	.6	100.0
Nonreturnees	N	71	39	49	10	11	2	7	0	37	0	226
	%	31.4	17.3	21.7	4.4	4.9	.9	3.1	0.0	16.3	0.0	100.0
Total	N	218	140	162	44	38	2	16	7	141	3	771
	%	28.3	18.2	21.0	5.7	4.9	.3	2.1	.9	18.3	.4	100.0
					NON-AWARDEES							
Academic Employment	N	61	79	119	46	54	4	13	8	67	1	452
	%	13.5	17.5	26.3	10.2	11.9	.9	2.9	1.8	14.8	.2	100.0
Industrial Employment	N	42	49	50	21	20	4	10	5	29	0	230
	%	18.3	21.3	21.7	9.1	8.7	1.7	4.3	2.2	12.6	0.0	100.0
Governmental Employment	N	18	16	24	9	13	0	3	8	15	0	106
	%	17.0	15.1	22.6	8.5	12.3	0.0	2.8	7.5	14.2	0.0	100.0
Other	N	1	2	4	2	3	0	1	1	3	0	17
	%	5.9	11.8	23.5	11.8	17.6	0.0	5.9	5.9	17.6	0.0	100.0
Returnees	N	122	146	197	78	90	8	27	22	114	1	805
	%	15.2	18.1	24.5	9.7	11.2	1.0	3.4	2.7	14.2	.1	100.0
Nonreturnees	N	98	128	122	58	51	8	18	9	90	0	582
	%	16.8	22.0	21.0	10.0	8.8	1.4	3.1	1.5	15.5	0.0	100.0
Total	N	220	274	319	136	141	16	45	31	204	1	1387
	%	15.9	19.8	23.0	9.8	10.2	1.2	3.2	2.2	14.7	.1	100.0
					TOTAL, ALL APPLICANTS							
Academic Employment	N	157	146	194	67	75	4	21	11	133	4	812
	%	19.3	18.0	23.9	8.3	9.2	.5	2.6	1.4	16.4	.5	100.0
Industrial Employment	N	77	72	77	31	22	4	11	8	56	0	358
	%	21.5	20.1	21.5	8.7	6.1	1.1	3.1	2.2	15.6	0.0	100.0
Governmental Employment	N	32	24	32	12	16	0	3	9	23	0	151
	%	21.2	15.9	21.2	7.9	10.6	0.0	2.0	6.0	15.2	0.0	100.0
Other	N	3	5	7	2	4	0	1	1	6	0	29
	%	10.3	17.2	24.1	6.9	13.8	0.0	3.4	3.4	20.7	0.0	100.0
Returnees	N	269	247	310	112	117	8	36	29	218	4	1350
	%	19.9	18.3	23.0	8.3	8.7	.6	2.7	2.1	16.1	.3	100.0
Nonreturnees	N	169	167	171	68	62	10	25	9	127	0	808
	%	20.9	20.7	21.2	8.4	7.7	1.2	3.1	1.1	15.7	0.0	100.0
Total	N	438	414	481	180	179	18	61	38	345	4	2158
	%	20.3	19.2	22.3	8.3	8.3	.8	2.8	1.8	16.0	.2	100.0

Table 23

Frequency and Percentage Distributions of Region of Doctorate by Field, Employer Categories Combined

Group		New England	Middle Atlantic	East N Central	West N Central	South Atlantic	East S Central	West S Central	Moun-tain	Pacific	Foreign	Total
		SCIENCE DOCTORATES OF 1960+1961										
All Science Fields	N	1138	2423	3243	1120	983	214	582	322	1596	0	11621
	%	9.8	20.8	27.9	9.6	8.5	1.8	5.0	2.8	13.7	0.0	100.0
		AWARDEES										
Biology	N	33	30	22	17	18	0	6	3	28	2	159
	%	20.8	18.9	13.8	10.7	11.3	0.0	3.8	1.9	17.6	1.3	100.0
Chemistry	N	66	19	40	10	5	0	2	0	33	0	175
	%	37.7	10.9	22.9	5.7	2.9	0.0	1.1	0.0	18.9	0.0	100.0
Engineering	N	29	19	18	3	3	0	3	0	23	0	98
	%	29.6	19.4	18.4	3.1	3.1	0.0	3.1	0.0	23.5	0.0	100.0
Earth Sciences	N	7	12	10	2	4	0	0	2	9	0	46
	%	15.2	26.1	21.7	4.3	8.7	0.0	0.0	4.3	19.6	0.0	100.0
Mathematics	N	20	18	15	3	2	0	3	1	7	0	69
	%	29.0	26.1	21.7	4.3	2.9	0.0	4.3	1.4	10.1	0.0	100.0
Physics	N	50	42	39	9	6	2	2	0	38	1	189
	%	26.5	22.2	20.6	4.8	3.2	1.1	1.1	0.0	20.1	.5	100.0
Psychology	N	13	0	18	0	0	0	0	1	3	0	35
	%	37.1	0.0	51.4	0.0	0.0	0.0	0.0	2.9	8.6	0.0	100.0
Total	N	218	140	162	44	38	2	16	7	141	3	771
	%	28.3	18.2	21.0	5.7	4.9	.3	2.1	.9	18.3	.4	100.0
		NON-AWARDEES										
Biology	N	25	47	75	36	33	3	15	13	42	1	290
	%	8.6	16.2	25.9	12.4	11.4	1.0	5.2	4.5	14.5	.3	100.0
Chemistry	N	83	75	85	45	30	4	12	7	46	0	387
	%	21.4	19.4	22.0	11.6	7.8	1.0	3.1	1.8	11.9	0.0	100.0
Engineering	N	18	42	39	16	9	0	4	3	32	0	163
	%	11.0	25.8	23.9	9.8	5.5	0.0	2.5	1.8	19.6	0.0	100.0
Earth Sciences	N	7	11	19	3	4	0	3	2	9	0	58
	%	12.1	19.0	32.8	5.2	6.9	0.0	5.2	3.4	15.5	0.0	100.0
Mathematics	N	15	19	23	6	12	1	2	0	13	0	91
	%	16.5	20.9	25.3	6.6	13.2	1.1	2.2	0.0	14.3	0.0	100.0
Physics	N	59	67	60	28	44	8	8	3	51	0	328
	%	18.0	20.4	18.3	8.5	13.4	2.4	2.4	.9	15.5	0.0	100.0
Psychology	N	13	13	18	2	9	0	1	3	11	0	70
	%	18.6	18.6	25.7	2.9	12.9	0.0	1.4	4.3	15.7	0.0	100.0
Total	N	220	274	319	136	141	16	45	31	204	1	1387
	%	15.9	19.8	23.0	9.8	10.2	1.2	3.2	2.2	14.7	.1	100.0
		TOTAL, ALL APPLICANTS										
Biology	N	58	77	97	53	51	3	21	16	70	3	449
	%	12.9	17.1	21.6	11.8	11.4	.7	4.7	3.6	15.6	.7	100.0
Chemistry	N	149	94	125	55	35	4	14	7	79	0	562
	%	26.5	16.7	22.2	9.8	6.2	.7	2.5	1.2	14.1	0.0	100.0
Engineering	N	47	61	57	19	12	0	7	3	55	0	261
	%	18.0	23.4	21.8	7.3	4.6	0.0	2.7	1.1	21.1	0.0	100.0
Earth Sciences	N	14	23	29	5	8	0	3	4	18	0	104
	%	13.5	22.1	27.9	4.8	7.7	0.0	2.9	3.8	17.3	0.0	100.0
Mathematics	N	35	37	38	9	14	1	5	1	20	0	160
	%	21.9	23.1	23.8	5.6	8.8	.6	3.3	.6	12.5	0.0	100.0
Physics	N	109	109	99	37	50	10	10	3	89	1	517
	%	21.1	21.1	19.1	7.2	9.7	1.9	1.9	.6	17.2	.2	100.0
Psychology	N	26	13	36	2	9	0	1	4	14	0	105
	%	24.8	12.4	34.3	1.9	8.6	0.0	1.0	3.8	13.3	0.0	100.0
Total	N	438	414	481	180	179	18	61	38	345	4	2158
	%	20.3	19.2	22.3	8.3	8.3	.8	2.8	1.8	16.0	.2	100.0

Table 24

Frequency and Percentage Distributions of Number of Dependents by Employer Category, All Fields Combined

Group		NUMBER OF DEPENDENTS 0	1	2	3	4	>4	Unknown	Total	Mean
					AWARDEES					
Academic Employment	N	107	104	69	42	17	4	17	360	1.33
	%	29.7	28.9	19.2	11.7	4.7	1.1	4.7	100.0	
Industrial Employment	N	40	30	24	19	10	1	4	128	1.46
	%	31.2	23.4	18.8	14.8	7.8	.8	3.1	100.0	
Governmental Employment	N	16	9	8	5	4	2	1	45	1.50
	%	35.6	20.0	17.8	11.1	8.9	4.4	2.2	100.0	
Other	N	4	3	1	2	0	0	2	12	1.10
	%	33.3	25.0	8.3	16.7	0.0	0.0	16.7	100.0	
Returnees	N	167	146	102	68	31	7	24	545	1.37
	%	30.6	26.8	18.7	12.5	5.7	1.3	4.4	100.0	
Nonreturnees	N	80	54	36	25	13	6	12	226	1.33
	%	35.4	23.9	15.9	11.1	5.8	2.7	5.3	100.0	
Total	N	247	200	138	93	44	13	36	771	1.36
	%	32.0	25.9	17.9	12.1	5.7	1.7	4.7	100.0	
					NON-AWARDEES					
Academic Employment	N	123	107	68	69	29	21	35	452	1.62
	%	27.2	23.7	15.0	15.3	6.4	4.6	7.7	100.0	
Industrial Employment	N	61	53	52	37	13	3	11	230	1.53
	%	26.5	23.0	22.6	16.1	5.7	1.3	4.8	100.0	
Governmental Employment	N	23	15	22	29	5	3	9	106	1.87
	%	21.7	14.2	20.8	27.4	4.7	2.8	8.5	100.0	
Other	N	8	1	3	2	2	0	1	17	1.31
	%	47.1	5.9	17.6	11.8	11.8	0.0	5.9	100.0	
Returnees	N	215	176	145	137	49	27	56	805	1.62
	%	26.7	21.9	18.0	17.0	6.1	3.4	7.0	100.0	
Nonreturnees	N	127	141	119	85	44	20	46	582	1.71
	%	21.8	24.2	20.4	14.6	7.6	3.4	7.9	100.0	
Total	N	342	317	264	222	93	47	102	1387	1.66
	%	24.7	22.9	19.0	16.0	6.7	3.4	7.4	100.0	
					TOTAL, ALL APPLICANTS					
Academic Employment	N	230	211	137	111	46	25	52	812	1.49
	%	28.3	26.0	16.9	13.7	5.7	3.1	6.4	100.0	
Industrial Employment	N	101	83	76	56	23	4	15	358	1.51
	%	28.2	23.2	21.2	15.6	6.4	1.1	4.2	100.0	
Governmental Employment	N	39	24	30	34	9	5	10	151	1.75
	%	25.8	15.9	19.9	22.5	6.0	3.3	6.6	100.0	
Other	N	12	4	4	4	2	0	3	29	1.23
	%	41.4	13.8	13.8	13.8	6.9	0.0	10.3	100.0	
Returnees	N	382	322	247	205	80	34	80	1350	1.52
	%	28.3	23.9	18.3	15.2	5.9	2.5	5.9	100.0	
Nonreturnees	N	207	195	155	110	57	26	58	808	1.60
	%	25.6	24.1	19.2	13.6	7.1	3.2	7.2	100.0	
Total	N	589	517	402	315	137	60	138	2158	1.55
	%	27.3	24.0	18.6	14.6	6.3	2.8	6.4	100.0	

Appendix B

Table 25

Frequency and Percentage Distributions for Number of Dependents, by Field

Group		NUMBER OF DEPENDENTS 0	1	2	3	4	>4	Unknown	Total	Mean	1957-61 PhD Mean
						AWARDEES					
Biology	N	46	41	25	20	15	3	9	159	1.51	--
	%	28.9	25.8	15.7	12.6	9.4	1.9	5.7	100.0		
Chemistry	N	66	55	30	13	4	1	6	175	1.04	--
	%	37.7	31.4	17.1	7.4	2.3	.6	3.4	100.0		
Engineering	N	29	19	19	18	6	3	4	98	1.61	--
	%	29.6	19.4	19.4	18.4	6.1	3.1	4.1	100.0		
Earth Sciences	N	4	15	11	8	5	0	3	46	1.88	--
	%	8.7	32.6	23.9	17.4	10.9	0.0	6.5	100.0		
Mathematics	N	26	18	11	8	2	0	4	69	1.11	--
	%	37.7	26.1	15.9	11.6	2.9	0.0	5.8	100.0		
Physics	N	62	45	39	22	9	5	7	189	1.38	--
	%	32.8	23.8	20.6	11.6	4.8	2.6	3.7	100.0		
Psychology	N	14	7	3	4	3	1	3	35	1.34	--
	%	40.0	20.0	8.6	11.4	8.6	2.9	8.6	100.0		
Total	N	247	200	138	93	44	13	36	771	1.36	--
	%	32.0	25.9	17.9	12.1	5.7	1.7	4.7	100.0		
						NON-AWARDEES					
Biology	N	65	60	45	51	19	17	33	290	1.82	--
	%	22.4	20.7	15.5	17.6	6.6	5.9	11.4	100.0		
Chemistry	N	110	105	77	49	15	4	27	387	1.35	--
	%	28.4	27.1	19.9	12.7	3.9	1.0	7.0	100.0		
Engineering	N	28	30	33	30	25	12	5	163	2.22	--
	%	17.2	18.4	20.2	18.4	15.3	7.4	3.1	100.0		
Earth Sciences	N	9	11	10	14	6	2	6	58	2.06	--
	%	15.5	19.0	17.2	24.1	10.3	3.4	10.3	100.0		
Mathematics	N	30	14	19	11	5	5	7	91	1.56	--
	%	33.0	15.4	20.9	12.1	5.5	5.5	7.7	100.0		
Physics	N	82	81	62	56	20	5	22	328	1.56	--
	%	25.0	24.7	18.9	17.1	6.1	1.5	6.7	100.0		
Psychology	N	18	16	18	11	3	2	2	70	1.57	--
	%	25.7	22.8	25.7	15.7	4.3	2.9	2.9	100.0		
Total	N	342	317	264	222	93	47	102	1387	1.66	--
	%	24.7	22.9	19.0	16.0	6.7	3.4	7.4	100.0		
						TOTAL, ALL APPLICANTS					
Biology	N	111	101	70	71	34	20	42	449	1.71	1.95
	%	24.7	22.5	15.6	15.8	7.6	4.5	9.4	100.0		
Chemistry	N	176	160	107	62	19	5	33	562	1.25	1.51
	%	31.3	28.5	19.0	11.0	3.4	.9	5.9	100.0		
Engineering	N	57	49	52	48	31	15	9	261	1.99	2.06
	%	21.8	18.8	19.9	18.4	11.9	5.7	3.4	100.0		
Earth Sciences	N	13	26	21	22	11	2	9	104	1.98	2.04
	%	12.5	25.0	20.2	21.2	10.6	1.9	8.7	100.0		
Mathematics	N	56	32	30	19	7	5	11	160	1.36	1.59
	%	35.0	20.0	18.8	11.9	4.4	3.1	6.9	100.0		
Physics	N	144	126	101	78	29	10	29	517	1.49	1.60
	%	27.8	24.4	19.5	15.1	5.6	1.9	5.6	100.0		
Psychology	N	32	23	21	15	6	3	5	105	1.33	1.72
	%	30.5	21.9	20.0	14.3	5.7	2.9	4.8	100.0		
Total	N	589	517	402	315	137	60	138	2158	1.55	1.79
	%	27.3	24.0	18.6	14.6	6.3	2.8	6.4	100.0		

Table 26

Frequency and Percentage Distributions for Category of First Post-doctoral Employer (columns) in Terms of Employer Category Reported on Questionnaire (rows)

Group		U.S. Coll. University	Non-profit	Industry-Business	Domestic Government	Foreign	Other	Unknown	Total
		SCIENCE DOCTORATES of 1957-1961							
All Science Fields	N	8729	798	5640	2109	780	752	7910	26718
	%	32.7	3.0	21.1	7.9	2.9	2.8	29.6	100.0
		AWARDEES							
Academic Employment	N	224	13	16	6	14	5	82	360
	%	62.2	3.6	4.4	1.7	3.9	1.4	22.8	100.0
Industrial Employment	N	21	5	79	2	0	4	17	128
	%	16.4	3.9	61.7	1.6	0.0	3.1	13.3	100.0
Governmental Employment	N	9	2	3	19	1	2	9	45
	%	20.0	4.4	6.7	42.2	2.2	4.4	20.0	100.0
Other	N	4	2	0	0	2	0	4	12
	%	33.3	16.7	0.0	0.0	16.7	0.0	33.3	100.0
Returnees	N	258	22	98	27	17	11	112	545
	%	47.3	4.0	18.0	5.0	3.1	2.0	20.6	100.0
Nonreturnees	N	96	6	47	14	9	6	48	226
	%	42.5	2.7	20.8	6.2	4.0	2.7	21.2	100.0
Total	N	354	28	145	41	26	17	160	771
	%	45.9	3.6	18.8	5.3	3.4	2.2	20.8	100.0
		NON-AWARDEES							
Academic Employment	N	292	11	34	8	20	9	78	452
	%	64.6	2.4	7.5	1.8	4.4	2.0	17.3	100.0
Industrial Employment	N	21	6	161	8	2	3	29	230
	%	9.1	2.6	70.0	3.5	.9	1.3	12.6	100.0
Governmental Employment	N	28	4	9	39	8	7	11	106
	%	26.4	3.8	8.5	36.8	7.5	6.6	10.4	100.0
Other	N	8	1	1	3	0	2	2	17
	%	47.1	5.9	5.9	17.6	0.0	11.8	11.8	100.0
Returnees	N	349	22	205	58	30	21	120	805
	%	43.4	2.7	25.5	7.2	3.7	2.6	14.9	100.0
Nonreturnees	N	214	14	196	36	13	10	99	582
	%	36.8	2.4	33.7	6.2	2.2	1.7	17.0	100.0
Total	N	563	36	401	94	43	31	219	1387
	%	40.6	2.6	28.9	6.8	3.1	2.2	15.8	100.0
		TOTAL, ALL APPLICANTS							
Academic Employment	N	516	24	50	14	34	14	160	812
	%	63.5	3.0	6.2	1.7	4.2	1.7	19.7	100.0
Industrial Employment	N	42	11	240	10	2	7	46	358
	%	11.7	3.1	67.0	2.8	.6	2.0	12.8	100.0
Governmental Employment	N	37	6	12	58	9	9	20	151
	%	24.5	4.0	7.9	38.4	6.0	6.0	13.2	100.0
Other	N	12	3	1	3	2	2	6	29
	%	41.4	10.3	3.4	10.3	6.9	6.9	20.7	100.0
Returnees	N	607	44	303	85	47	32	232	1350
	%	45.0	3.3	22.4	6.3	3.5	2.4	17.2	100.0
Nonreturnees	N	310	20	243	50	22	16	147	808
	%	38.4	2.5	30.1	6.2	2.7	2.0	18.2	100.0
Total	N	917	64	546	135	69	48	379	2158
	%	42.5	3.0	25.3	6.3	3.2	2.2	17.6	100.0

Appendix B

Table 27

Frequency and Percentage Distributions for Category of First Post-doctoral Employer by Field

Group		U.S. Coll. University	Non-profit	Industry-Business	Domestic Government	Foreign	Other	Unknown	Total
		SCIENCE DOCTORATES of 1957-1961							
All Science Fields	N	8729	798	5640	2109	780	752	7910	26718
	%	32.7	3.0	21.1	7.9	2.9	2.8	29.6	100.0
		AWARDEES							
Biology	N	75	6	4	13	5	5	51	159
	%	47.2	3.8	2.5	8.2	3.1	3.1	32.1	100.0
Chemistry	N	61	5	47	5	3	4	50	175
	%	34.9	2.9	26.9	2.9	1.7	2.3	28.6	100.0
Engineering	N	37	6	43	1	1	2	8	98
	%	37.8	6.1	43.9	1.0	1.0	2.0	8.2	100.0
Earth Sciences	N	22	3	12	4	2	0	3	46
	%	47.8	6.5	26.1	8.7	4.3	0.0	6.5	100.0
Mathematics	N	48	0	7	0	4	1	9	69
	%	69.6	0.0	10.1	0.0	5.8	1.4	13.0	100.0
Physics	N	91	6	32	17	8	4	31	189
	%	48.1	3.2	16.9	9.0	4.2	2.1	16.4	100.0
Psychology	N	20	2	0	1	3	1	8	35
	%	57.1	5.7	0.0	2.9	8.6	2.9	22.9	100.0
Total	N	354	28	145	41	26	17	160	771
	%	45.9	3.6	18.8	5.3	3.4	2.2	20.8	100.0
		NON-AWARDEES							
Biology	N	156	6	22	28	10	10	58	290
	%	53.8	2.1	7.6	9.7	3.4	3.4	20.0	100.0
Chemistry	N	87	5	204	12	8	2	69	387
	%	22.5	1.3	52.7	3.1	2.1	.5	17.8	100.0
Engineering	N	66	4	71	5	3	5	9	163
	%	40.5	2.5	43.6	3.1	1.8	3.1	5.5	100.0
Earth Sciences	N	26	1	16	6	1	1	7	58
	%	44.8	1.7	27.6	10.3	1.7	1.7	12.1	100.0
Mathematics	N	49	1	20	3	1	2	15	91
	%	53.8	1.1	22.0	3.3	1.1	2.2	16.5	100.0
Physics	N	144	14	63	34	17	7	49	328
	%	43.9	4.3	19.2	10.4	5.2	2.1	14.9	100.0
Psychology	N	35	5	5	6	3	4	12	70
	%	50.0	7.1	7.1	8.6	4.3	5.7	17.1	100.0
Total	N	563	36	401	94	43	31	219	1387
	%	40.6	2.6	28.9	6.8	3.1	2.2	15.8	100.0
		TOTAL, ALL APPLICANTS							
Biology	N	231	12	26	41	15	15	109	449
	%	51.4	2.7	5.8	9.1	3.3	3.3	24.3	100.0
Chemistry	N	148	10	251	17	11	6	119	562
	%	26.3	1.8	44.7	3.0	2.0	1.1	21.2	100.0
Engineering	N	103	10	114	6	4	7	17	261
	%	39.5	3.8	43.7	2.3	1.5	2.7	6.5	100.0
Earth Sciences	N	48	4	28	10	3	1	10	104
	%	46.2	3.8	26.9	9.6	2.9	1.0	9.6	100.0
Mathematics	N	97	1	27	3	5	3	24	160
	%	60.6	.6	16.8	1.9	3.1	1.9	15.0	100.0
Physics	N	235	20	95	51	25	11	80	517
	%	45.4	3.9	18.4	9.9	4.8	2.1	15.5	100.0
Psychology	N	55	7	5	7	6	5	20	105
	%	52.4	6.7	4.8	6.7	5.7	4.8	19.0	100.0
Total	N	917	64	546	135	69	48	379	2158
	%	42.5	3.0	25.3	6.3	3.2	2.2	17.6	100.0