AN INVESTIGATION OF THE INTERVIEW AS A TECHNIQUE FOR SELECTING AIRCRAFT PILOTS

BY

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AND
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A report on research conducted at The University of Rochester, Harvard University, The Ohio State University, Purdue University, and The University of Michigan, by means of a grant-in-aid from the National Research Council Committee on Selection and Training of Aircraft Pilots from funds provided by the Civil Aeronautics Administration.

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National Research Council

Committee on Selection and Training of Aircraft Pilots

Executive Subcommittee

M. S. Viteles, Chairman

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D. R. Brimhall	H. M. Johnson
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LETTER OF TRANSMITTAL

NATIONAL RESEARCH COUNCIL

2101 Constitution Avenue, Washington, D. C.
Division of Anthropology and Psychology

Committee on Selection and Training of Aircraft Pilots

August 18, 1944

Dr. Dean R. Brimhall
Director, Airman Development Division
Civil Aeronautics Administration
Washington, D. C.

Dear Dr. Brimhall:

Attached is a report entitled An Investigation of the Interview as a Technique for Selecting Aircraft Pilots, by Jack W. Dunlap and Morey J. Wantman. The report is submitted by the Committee on Selection and Training of Aircraft Pilots with the recommendation that it be included in the series of technical reports of the Airman Development Division, Civil Aeronautics Administration.

The interview has long been used as a standard practice in the selection of pilots, in accord with the usual procedures of industrial selection. However, there have been relatively few experimental studies of the interview as compared with investigations of the validity of psychological tests. The experiment described in this report represents an important step in the direction of validating the effectiveness and economy of a procedure which is ordinarily taken for granted.

Cordially yours,

Morris S. Viteles, Chairman
Committee on Selection and
Training of Aircraft Pilots

MSV:pd

rec 9-27-44

EDITORIAL FOREWORD

The investigation of the interview as a technique for selecting aircraft pilots described in this report is the outcome of extended cooperative effort. Members of the Executive Subcommittee of the Committee on Selection and Training of Aircraft Pilots, in particular G. R. Wendt, participated in the design of the study and in the preparation of materials used therein.

The study was conducted under the general direction of Dr. J. W. Dunlap, as Director or Research for the Committee on Selection and Training of Aircraft Pilots, with the aid of Morey J. Wantman, University of Rochester, and of the following local project directors: Dr. R. A. McFarland, Harvard University; Dr. R. Y. Walker, Ohio State University; Dr. E. L. Kelly, Purdue University; and of the project staffs. Apart from contributions by personnel attached to the Committee on Selection and Training of Aircraft Pilots, there was most active and effective cooperation on the part of the following members of the various interview boards, who not only gave generously of their time, but made many valuable suggestions in the development of the study.

Harvard University	Purdue University
Lt. Edward J. Galway	Mr. William J. Giese
Mr. Lester Collins	Mr. Harry Steinmetz
Mr. Ronald Brooks	Mr. Russell Cedars
Ohio State University	**University of Michigan**
Dr. Floyd C. Dockeray	Dr. Urie Bronfenbrenner
Mr. Daniel D. Fulmer	Dr. George Meyer
Mr. John B. Kock	Mr. Raymond Roberts

The Civil Aeronautics Administration not only provided funds for this, as for other investigations sponsored by the Committee on Selection and Training of Aircraft Pilots, but facilitated the investigation, through its regional representatives, by requiring that applicants for Civilian Pilot Training report for the interviews conducted in the course of the investigation.

CONTENTS

SUMMARY

Research of the past quarter century has demonstrated that the uncontrolled interview, given by untrained interviewers, is usually unreliable and approaches zero predictive efficiency. The most recent investigations, however, have shown that training the interviewers and controlling the form and content of the interview tends to increase the reliability of the technique. In the study described in this report, special care was therefore taken along these lines with the hope that any increase in reliability resulting from a more controlled technique would increase the efficiency of the predictions.

Interviewers with varying backgrounds were given a brief indoctrination and were provided with a controlled method of interviewing. They were supplied with a standard form on which an applicant recorded biographical data thought to be pertinent to pilot selection. On the basis of this information furnished by the applicant, together with that obtained by the oral questioning in certain specified 'areas,' the interviewers attempted to predict his future success in learning to fly light planes in the Civilian Pilot Training Program.

The agreement among the interviewers under these conditions was quite high on all scales. The reliability of the interview, in other words, was satisfactory. The results were based on four small samples, the total number of interviews being 208.

A number of criteria were employed to evaluate the predictions of the interviewers. Comparison of the interviewers' rating with the ultimate criterion, "passing" and "failing" primary C.P.T. flight training, showed the predictions to be of little value. The predictions showed little better than chance agreement with actual attrition. To some extent this result was to be anticipated because of the non-critical nature of the training and the many factors which enter into the decision of a flight operator to pass or fail a given student.

The interview as employed on a very small sample did well in predicting certain of the criteria of competence in flying. Indeed, insofar as pilot performance can be measured objectively, the interview reaches levels of prediction which are accepted as having practical significance. Within the limits of the small samples involving the more objective criteria used in this study, the validity of the interviewing technique may be regarded as satisfactory.

Thus, the interview meets the routine tests of scientific acceptability. It fails to have practical justification, however, on a most basic and critical point. The interview, a technique which requires the services of several individuals to obtain a rating for one individual at a time, is very expensive with respect to time, personnel, and money. To be accepted as having practical usefulness in selecting pilots, it must add significantly to the predictive efficiency obtainable by the application of pencil-and-paper tests to whole groups at a time. In the present study the interview fails to do this.

In summary, the application of group pencil-and-paper tests has elsewhere been shown to predict certain criteria of success in learning to fly, and to accomplish this prediction at a moderately high level. Predictions can be made for five hundred men with a total time-expenditure of about two or ten man-hours. Adding an individual interview to this prediction does not increase the efficiency of prediction, although it adds at least 750 man-hours to the time expended. Thus, although the interview shows promise of achieving useful levels of reliability and validity in the selection of pilots, its failure to add to the prediction obtainable by group techniques indicates that its excessive cost in time and money is not justifiable.

AN INVESTIGATION OF THE INTERVIEW AS A TECHNIQUE FOR SELECTING AIRCRAFT PILOTS

INTRODUCTION

It was recognized early in World War I that a strong desire to fly and the courage to attempt it were not sufficient grounds for permitting men to enter flight training. Therefore, a plan for selecting candidates was formulated and psychologists were called upon to participate in this selective process. These early investigators concentrated their efforts on the measurement of psychomotor skills by means of laboratory techniques then available. They also included in their measurements some of the newly developed, but crude, paper-and-pencil tests.

When the Committee on Selection and Training of Aircraft Pilots of the National Research Council began its investigations of the problems of pilot selection it took full advantage of this early work. In addition, the Committee applied to the problem not only new developments in the measurement of psychomotor skills but also rigorous statistical methods for analyzing the results of the various tests. Further, the Committee generously supported the construction of paper-and-pencil tests which could be administered to large groups of individuals simultaneously and in a short period of time. When this last group of instruments was subjected to extensive standardization and validation procedures, some of them proved to be valuable in the selection of aircraft pilots.

The Committee had found that biographical material, secured by means of a paper-and-pencil inventory, supplied valid data for predicting the future success or failure of prospective pilots. This gave added credence to the popular belief that a personal interview with the prospective candidate might elicit certain responses which would prove to be indicative of the candidate's future success in flying. Such factors as the candidate's reactions to various personal questions, his enthusiasm, desire to fly, mannerisms, bearing, general appearance, and reactions to questions concerning his early experiences and background, to mention only a few, could best be appraised in a personal conference. The Committee was fully aware of the shortcomings of the interview, e.g., the high cost in terms of time and personnel, the difficulty in steering an interview along certain predetermined lines, and the unreliability of the resultant ratings. Nevertheless, the interview could not be overlooked as a possible selection device, especially because of the widespread use of the interview as a selection instrument.

The investigation of the interview as a technique for selecting aircraft pilots concerned itself with three factors: The reliability of the ratings of the interviewers, the validity of the ratings and the cost of the interview data relative to predictive data secured by other methods. The term, reliability, is used in this study to mean the agreement between interviewers as to the degree to which a candidate possessed a given trait. By validity is meant the efficiency of the interview in predicting various criteria of flying ability. Granted that it might be possible to develop a method of interviewing which would have satisfactory reliability and

validity, there still remains the question as to whether the contribution of the interview would measurably increase the prediction that could be secured by other instruments.

THE DESIGN OF THE INVESTIGATION

Reliability. Industrial and educational studies have shown repeatedly that the one-man interview is unreliable as indicated by the lack of agreement between two raters in their rating of the same individual. However, studies have shown that, if the number of interviewers is increased, the reliability of the composite of their ratings is measurably higher than the reliability of a single rater. In general, the increase in the reliability of the ratings follows closely the Spearman-Brown function for estimating reliability.

While, on the basis of theoretical considerations, it might have been desirable to use a larger number, it was finally decided to use a board of three interviewers. Although many considerations were involved in this decision, prime consideration was given to the indication that a three-man board of interviewers would be the maximum size group to be used in the future if the techniques proved to be of value.

It was proposed to measure reliability by determining the correlations between the ratings of the interviewers, and to determine the reliability of the composite ratings by means of the Spearman-Brown formula.

Validity. In order to determine the validity of the interview, it was proposed to correlate the composite rating of the three interviewers for each of the scales with each of the various criteria of pilot performance. The candidates for the Civil Aeronautics Administration course in primary flying for the Spring of 1942 were interviewed at four centers. The interview was conducted before the candidate had been accepted for the course. Thus, the candidate was under the impression that the interview was being used for selection and he was, therefore, motivated to create a favorable impression. Each interviewer rated the candidate independently and these ratings were immediately sealed in order to prevent contamination of the criteria by a possible knowledge of the ratings on the part of the instructors,[1] administrative officers, or others.

A variety of criteria was available against which to test the validity of the interview predictions, although not all these criteria were available for all the candidates. The available criteria included pass-fail data, ground school grades, time for Stage A, time for Stage D, total time for the course, instructors' ratings on the Purdue Scale for Rating Pilot Competency at different stages of training, ratings on the Ohio State Flight Inventory, and flight ratings based on motion pictures of flight performance during critical maneuvers.

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[1] One interviewer at Purdue was also a flight instructor. His flight ratings were thus contaminated to the extent that he remembered his interview ratings or tended to react to the subjects during flight training in the same way as during the interview.

These criteria fall into three broad categories: "administrative," "temporal," and "objectified ratings." A brief discussion of these criteria of competence in piloting aircraft is given below:

A. Administrative Criteria.

1. Passing or Failing in Flight-training Course. This criterion is a sine qua non in the practical problem of reducing attrition in pilot training. Unfortunately it is unreliable because of the subjective estimates of student progress by the instructor, the instructor's stereotypes, the unreliability of pass-fail of ground school, changes in administrative policy, changes in student's environmental conditions, etc. Further, the short sample of behavior observed in the flight check by the inspector may or may not be a representative sample of the individual's ability. In addition, a student who failed the ground school course of C.P.T. was not permitted to take the final flight test and was reported as having failed the flight training course.

2. Ground School Grades. This is really an independent criterion and not to be confused with the criteria of competence during flight. It is only slightly related to flying ability. Like the measures referred to above, it is a function not only of the ability of the student, but also of the subjective opinion of the instructor.

B. Temporal Criteria.

1. Total Time for Training.
2. Time for Stage A.
3. Time for Stage D.

The C.P.T. primary course consisted of four stages: A, B, C, and D. These stages normally took 8, 5, 11, and 11 hours, respectively, to complete. Analysis of the records of several thousand students by the staff of the Director of Research for the Committee showed that in Stages B and C combined almost no variability existed — in fact, for practical purposes it can be said that the variability for these stages was zero. Thus, the entire variability in time came in Stages A and D. However, if a student required more than 12 hours before soloing, he was usually "washed out." Since regulations required a minimum of 8 hours dual instruction before solo, the time-range in this stage was only 4 hours. In Stage D, however, students were often given as much as 10 extra hours, and in a few exceptional cases even 12 extra hours, with the result that the variability in total time was almost entirely accounted for by the variability in Stage D.

These time criteria, which on the surface appear to be entirely objective, are in reality highly subjective. Whether or not a student receives extra time depends on the subjective estimate of the instructor as to when the student is ready for "solo," for interim flight checks, and for the final flight check. Extra time is also a function of the instructor's competency as well as of the student's competency. Further, since extra time is given at the expense of the operator, some operators are loath to give additional time, and to the extent that this is true, the range of this criterion has been curtailed. There is one feature of this measure that is worth pointing out, viz., that the instructor usually has a long work sample of the student's ability to fly the plane and bases his

recommendation for "extra time" on a long work sample of performance. Because of this feature, "total time" might be considered superior to the inspector's decision to "pass-fail" on the basis of a relatively short flight check.

C. Objectified Ratings.

1. Purdue Scale for Rating Pilot Competency.[2] The Purdue Scale, developed by E. L. Kelly at Purdue University, requires ratings on a 20-point scale of 14 traits related to flying, such as "Is he inclined to show off while flying a plane?," "How well does he handle the controls?," etc. Item 14 in the scale is an over-all item, "In your opinion, considering skill, emotional stability, judgment, etc., how good an 'all-round pilot' is he likely to become?" A factor analysis of the scale revealed that three major aspects of pilot performance were being measured by this scale, viz., skill, judgment, and emotional control.

This scale was carefully devised after considerable experimentation and has been used in several Committee research projects. The reliability of the scale ratings has not yet been directly studied. In one investigation using a small group of subjects, it was found that Item 14 scale ratings made by the instructor at the time of solo correlated .76 with the Item 14 ratings made at the end of Stage D. A correlation of .34 was obtained between the instructor's rating at the end of Stage D and the rating made by a check pilot on the basis of a Stage D check flight.[3] These correlations, however, are not true reliability coefficients.

2. The Ohio State Flight Inventory.[4] The Ohio State Flight Inventory was developed by H. A. Edgerton and R. Y. Walker at Ohio State University. It is essentially a check list of items descriptive of plane and pilot performance, such as "Altitude constant or varies___degrees," "Slips during entry," "Rudder pressure correct or incorrect," etc. The items are thus descriptions rather than ratings, and identify, for each maneuver, the important characteristics of good and poor flight performance.

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[2] A Scale for Rating Pilot Competency was prepared by E. Lowell Kelly and is printed by the Purdue Research Foundation. It is frequently referred to as the Purdue Rating Scale or the Kelly Rating Scale. See:

Kelly, E. Lowell. The development of "A Scale for Rating Pilot Competency." Washington, D. C.: C.A.A. Division of Research. Report No. 18, July 1943.

[3] Kelly, E. L. and Ewart, E. A preliminary study of certain predictors of success in civilian pilot training. Washington, D. C.: C.A.A. Division of Research. Report No. 7, December 1942.

[4] Early steps in the development of the Ohio State Flight Inventory are described in:

Edgerton, H. A. and Walker, R. Y. Criteria of flight competence. Washington, D. C.: N. R. C. Committee on Selection and Training of Aircraft Pilots, September 1940. (Copy in Committee files.)

Two methods of scoring have been devised for evaluating a flight on the basis of the inventory results:[5]

a. A Summation Score, computed as follows: Each item on the inventory was first scored on a plus or minus basis and these scores added to form maneuver scores. A distribution of these raw maneuver scores was then made separately for each maneuver for a sample group of subjects and scale values of 1 to 5 assigned in terms of the standard deviation of each distribution. The Summation Score for an individual (on the flight as a whole) is the mean of the scale values of the maneuvers included in the flight.

b. A Profile Score, determined as follows: Six raters independently ranked the profiles of maneuver scores for a group of 64 cases. Each rank order was then converted into Hull scale scores and the average scale score obtained.

Intercorrelations among the profile rank orders of the six raters ranged from .55 to .92 with an average intercorrelation of .78. Applying the Spearman-Brown Prophecy Formula to this value would result in an estimated reliability coefficient of .96 for the rank order based on the average scale score of the six raters.

The two methods of scoring (Summation Scores and Profile Scores) give essentially the same results as shown in a study involving 66 cases in which the two sets of scores correlated .93.

3. Pennsylvania Camera Criteria.[6] The Pennsylvania Camera Criteria, developed by M. S. Viteles and A. S. Thompson, are based on photographic recording of flight performance, during which motion photographs are taken of a special instrument panel. The photographs provide information concerning the progress of the plane through the air as revealed by standard flight instruments, such as airspeed indicator, turn and bank indicator, artificial horizon, etc., and concerning the pilot's adjustment of the controls, as revealed by a control movement recorder.

The motion photographs were analyzed during slow motion projection and ratings made as to the excellence of the pilot's performance. The ratings used as criterion data in this study were obtained during a rating procedure in which the two raters read the films independently, jointly reviewed and assigned a joint rating to cases in which a discrepancy of rating had occurred in the independent ratings, repeated the procedure to obtain a second set of ratings, and finally compared the results of the first and second ratings in order to arrive at the Criterion Ratings. This rating procedure was designed to arrive at ratings with as high degree of reliability as possible and representing the best combined judgment of both raters.

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[5] Details on this study of scoring methods are found in the following three reports by R. Y. Walker (copies in Committee files):

Progress Report - Midwest Project. Columbus, Ohio: January, 1943.
Progress Report - Midwest Project. Columbus, Ohio: February 3, 1943 (M-1).
Report on Intercorrelation of Summation Scores. May, 1943 (M-12).

[6] Viteles, Morris S. and Thompson, A. S. An analysis of photographic records of aircraft pilot performance. Washington, D. C.: C.A.A. Division of Research. Report No. 31, July 1944.

A comparison of the two sets of joint ratings revealed a high degree of agreement, as indicated by contingency coefficients of .95 and .86 on two samples.[7]

The subjects in this interviewing study were grouped in two ways on the basis of the photographic analysis: (1) Camera Criterion V, in which the group was divided into three sub-groups — the middle group containing approximately 50% of the cases, and the top and bottom groups containing 25% each, and (2) Camera Criterion VI in which the cases were divided into an upper and lower group in approximately equal proportions.

All three of these rating methods are the outgrowth of the Committee research program and represent attempts to obtain measures of pilot competence less subject to uncontrolled subjective factors which result in unreliability. The Purdue Scale standardizes the rating method, directs the rater's attention to 14 "traits," and provides a graphic scale for recording the ratings. The Ohio State Flight Inventory directs the observer's attention to specific items of performance and provides a convenient record of the observed performance for later scoring or evaluation. The photographic method provides a permanent record of the performance, enabling repeated observations of the same performance by more than one observer. The Purdue Scale attempts to measure all the major aspects of piloting (skill, judgment, and emotional control), the Ohio State Flight Inventory stresses skill and judgment, and the photographic method is restricted largely to skill, as revealed by the flight instruments and the control recorder.

It is apparent that none of the above criteria contains all the desired characteristics of a good criterion. Each has some advantages and each has certain disadvantages. In evaluating the interview it seemed advisable to use as many of these as were available for each of the groups studied.

Independent Validation at Four Schools. Interview boards were set up at four centers in order to check one set of results against each of the others. If only a single board had been used, one could not say whether the results obtained were a function of the interview, or of the particular group of interviewers used. Further, in any one center, it was impossible to secure a sufficient number of cases to make the investigation significant. Finally, it was known that all the criteria would not be available at all centers.

INTERVIEWING METHOD

The Interview. One of the conditions laid down in setting up this investigation was that the interview should be a semi-controlled interview. It was desired that the interview be limited to definite areas which were considered pertinent to flying success. Nine areas were selected after analysis of tests of known validity and after consultation with flight surgeons, psychiatrists familiar with the problems of aviation, and psychologists who had considerable experience in selecting aviators. No limitation was placed on the interviewers as to what they could or could not ask the candidate within the designated areas. In effect this gave

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[7] Viteles, M. S. and Thompson, A. S. Op. cit., pp. 13-23.

all the advantages of the 'free' interview, but controlled the range of material covered.

In order to facilitate the interview, rating scales were prepared for each of the areas. These areas are listed below, and a copy of the scales may be found in Appendix II.

A. Academic Background as Related to Flying
B. Family and Socio-Economic Background as Related to Flying
C. General Social Adjustment as Related to Flying
D. Desire to Fly
E. Hobbies, Diversions, and Outside Activities as Related to Flying
F. Athletic Activities and Coordination
G. Personality as Related to Flying
H. Appearance, Mannerisms, and Physique as Related to Flying
I. Fitness for Flight Training

The Interview Board. Each interview board consisted of three men: A psychologist, a man with experience in selecting personnel, and an aviator. The men composing each of the four boards were given the same basic indoctrination as to the purpose of the investigation, methods of interviewing, and the use of the various aids to the interview.

For each interview, one of the interviewers was designated as the "chief interviewer"; it was his duty to conduct the interview. If he used up the allotted time of 25 minutes, the other interviewers were not permitted to question the candidate. If he did not use all of the time then the other two interviewers were permitted to question the candidate. In an attempt to minimize the influence of any one interviewer, each interviewer, in rotation, acted as "chief interviewer" in successive interviews.

The interviewers were all volunteers. They were enthusiastic about the work and there can be little doubt that they did their work conscientiously.

Aids to the Interview. A manual of directions for conducting the interview was prepared and copies were given to each of the members of the interview boards. The manual contained detailed instructions as to the use of the Aviation Interview Rating Scales and as to the procedures before and after the interview. A set of these directions will be found in Appendix I. In addition, the senior author spent several hours going over the material with each board, and two "practice interviews" were conducted. These interviews were recorded by means of a "Memovox" and the recordings played back to the interview board. The interviews were discussed in detail as to content of questions as well as to type of questions.

It was believed that the interview time should not be used to secure from the interviewee information which could be obtained by a pencil-and-paper instrument. In order to conserve interview time such a set of questions was prepared and printed in the form of the P-H (Personal History) Inventory (see Appendix III). The candidate responded to these questions before the interview began, by recording his answers on a special answer sheet (see Appendix III). At the time of marking the answer sheet the candidate also prepared two carbon copies of his responses, so that each interviewer could have a copy of his replies.

The responses were arranged on the answer sheet so that all the questions concerning a particular area appeared in a particular column. The applicant probably was not aware of this arrangement of the questions since he proceeded from left to right, answering the questions in serial order.

There are five columns on the answer sheet. The upper half of Column 1 deals with the area, Academic Background; the lower half with Hobbies, Diversions, and Outside Activities. The second column contains the responses to items dealing with Family and Socio-Economic Background. The third column is concerned with the questions dealing with General Social Adjustment, and the fourth and fifth columns correspond to the areas, Desire to Fly, and Personality as Related to Flying.

Before the interview began, each interviewer was provided with a copy of the applicant's P-H Answer Sheet. He was allowed to examine this for approximately three minutes and to make notes of any responses which suggested significant leads to be followed during the interview. In order to aid himself in the analysis of the applicant's responses, each interviewer constructed his own stencil for the answer sheet, on which he indicated those responses that in his judgment were unfavorable to success in flight training.

In addition to the answer sheet for the P-H Inventory, each interviewer was provided with a set of the Aviation Interview Rating Scales (see Appendix II) for each candidate. These scales provided the interviewer with a series of words and descriptive phrases which he might check during the interview. The checked terms later furnished the interviewer with a frame of reference from which he could make his rating of the candidate. When the interview was completed, and before the next candidate was brought in, the interviewers rated the candidate on all of the scales. They were instructed not to discuss the candidate before the interview, after the interview, or after the ratings had been made. While it was inevitable that discussion would occur in the case of some candidates, there is considerable reason to believe that this was held to a minimum.

The final scale, "Fitness for Flight Training," was an "over-all" rating. The interviewers were requested to review all of the traits rated and to attempt to make a composite judgment of the candidate's probable success or failure in flight training. They were specifically instructed not to make this an arithmetical average of their previous ratings.

Unknown to the candidates, the entire conversation between the applicant and the interviewers was recorded by means of a concealed microphone and recorder.[8] The recordings were to serve a two-fold purpose: First, they could be replayed later for judges who did not see or know the individuals but who would predict the applicant's success from the conversation only; and second, they would permit analysis of the technique of the several interviewers if marked differences appeared in their abilities to predict success in flight training. Neither of these studies has been carried out at the present writing.

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[8] A Memovox was used for this purpose at two of the boards, and a Rieber recorder at a third board. No equipment was available for the fourth board. Each candidate's interview was recorded on a single side of the record.

Interview Centers. During January and February of 1942, the interviews were given at four schools, each of which had a Civilian Pilot Training Program. The schools were Harvard University, Ohio State University, Purdue University, and the University of Michigan. The number of candidates at any one school was small. While the total number of individuals interviewed (208) was far from sufficient to make the findings definitive, the results should give a clue as to the value of the interview for predicting flight success. The number of men for whom there are criterion data varies from place to place, so that it is necessary to interpret each statistic in terms of its own sample size.

ANALYSIS OF THE DATA

Reliability. The first problem was the determination of the degree of consistency between the ratings of the same subject by the several interviewers. The term "reliability" is used here in the special sense of measuring the degree of agreement between interviewers in rating the individual, and not in the usual sense of agreement of the rater with himself on two successive ratings. The interviewers rated the candidate on each of nine traits on a scale representing a continuum from 1 through 25. The degree of consistency, as measured by the correlation coefficient, is shown for each group of raters, for each of the traits, in Table I.

The mean intercorrelations among the three judges 1, 2, and 3 in each of the four schools are also given for each trait. These mean correlations range from .53 for ratings on "Appearance, Mannerisms, and Physique as Related to Flying," to .70 for the scale, "Desire to Fly." Thus, whatever the different judges were rating, they were in fairly close agreement. The reliability of the average of the three interviewers' ratings was determined by applying the Spearman-Brown formula to the mean intercorrelation between raters. It is well known that by the use of this formula a close approximation can be obtained to the values that would be found if empirical data were available, so that the values in the last column of Table I may be used as expressions of the reliability of the composite of the three interviewers' ratings. These reliabilities range from .77 to .88. While these reliabilities are not as high as one would like for making accurate predictions on individuals, they are sufficiently high to give dependable predictions for groups of individuals.

Inter-relationships among the Traits Rated. The second question to be considered was the degree of relationship among the ratings on the several scales, in order to determine whether the ratings for all scales were a function of "halo" effect or explainable by a single common factor. The intercorrelations between the scales were determined for each interviewer at each of the schools. A representative table is presented as Table II. Tables for all scales appear in Appendix IV. Each table presents, in the line labeled M, the correlations among the means of the three interviewers for each school. It will be observed that the N for the "r's" in this line varies from the N's in the other lines. This variation is occasioned by the fact that substitute interviewers served for an occasional interview. The intercorrelations for single interviewers are based on the total number of interviews conducted by the original interviewers at a given center. In view of the reliabilities of the mean ratings, it was felt that it was justifiable to include the ratings of the substitute interviewers in determining the relationships between the average ratings.

TABLE I

INTERCORRELATIONS BETWEEN INDIVIDUAL INTERVIEWERS ON 9 SCALES OF THE AVIATION INTERVIEW

	r_{12}	r_{13}	r_{23}	Mean Inter-r between Raters	Reliability of the Mean Ratings r_{3III}
Scale A. Academic Background					
Harvard University	.58	.55	.70		
Ohio State University	.69	.64	.64		
Purdue University	.73	.66	.71	.69	.87
University of Michigan	.75	.92	.72		
Scale B. Family & Soc. Bkgrd.					
Harvard University	.54	.55	.60		
Ohio State University	.57	.58	.51		
Purdue University	.56	.67	.53	.57	.80
University of Michigan	.74	.78	.56		
Scale C. Gen. Soc. Adjustment					
Harvard University	.55	.62	.51		
Ohio State University	.52	.59	.38		
Purdue University	.73	.65	.71	.65	.84
University of Michigan	.77	.78	.74		
Scale D. Desire to Fly					
Harvard University	.63	.73	.67		
Ohio State University	.79	.77	.74		
Purdue University	.47	.72	.48	.70	.88
University of Michigan	.82	.84	.79		
Scale E. Hobbies, etc.					
Harvard University	.61	.44	.68		
Ohio State University	.64	.71	.68		
Purdue University	.37	.38	.51	.58	.81
University of Michigan	.66	.65	.60		
Scale F. Athletic Activ.					
Harvard University	.59	.45	.51		
Ohio State University	.45	.59	.66		
Purdue University	.76	.69	.68	.60	.82
University of Michigan	.61	.60	.64		
Scale G. Personality					
Harvard University	.54	.62	.51		
Ohio State University	.46	.65	.63		
Purdue University	.64	.45	.52	.59	.81
University of Michigan	.66	.68	.70		
Scale H. Appearance, etc.					
Harvard University	.39	.53	.53		
Ohio State University	.62	.49	.63		
Purdue University	.45	.41	.55	.53	.77
University of Michigan	.70	.52	.59		
Scale I. Fitness for Fl. Tr.					
Harvard University	.40	.54	.55		
Ohio State University	.71	.68	.75		
Purdue University	.50	.37	.37	.58	.81
University of Michigan	.72	.66	.73		

TABLE II

AVIATION INTERVIEW RATING SCALE DATA

The Intercorrelations Between Academic Background, Scale A, and the Other Scales, by the Interviewers of Each School

	Interviewer	Academic Background A	Family Background B	Social Adjustment C	Desire to Fly D	Hobbies E	Athletics F	Personality G	Physical Appearance H	Fitness for Fl. Training I	Mean Rating	Standard Deviation	N
	1		.40	.55	.33	.59	.19	.45	.45	.56	13.2	4.9	53
	2		.27	.36	.48	.68	.26	.44	.36	.53	9.8	5.9	53
School	3		.27	.29	.47	.46	.33	.30	.25	.54	12.8	4.9	53
I	M		.39	.44	.36	.63	.29	.43	.37	.58	11.9	4.8	75
	1		.43	.63	.71	.71	.36	.62	.66	.82	13.9	5.2	44
	2		.54	.63	.79	.80	.66	.71	.69	.90	13.5	7.1	44
School	3		.61	.62	.53	.57	.41	.60	.51	.59	15.5	4.1	44
II	M		.53	.73	.75	.78	.54	.72	.70	.84	14.2	4.8	44
	1		.59	.30	.45	.42	.26	.29	.06	.43	14.2	3.9	39
	2		.43	.18	.27	.16	-.01	.02	.15	-.01	14.6	4.4	39
School	3		.45	.40	.55	.52	.27	.35	.26	.54	14.0	5.1	39
III	M		.64	.37	.56	.49	.26	.32	.28	.41	14.6	4.0	42
	1		.29	-.04	.28	.53	-.05	.03	-.01	.24	15.4	5.8	47
	2		.61	.50	.39	.48	.17	.52	.44	.56	15.8	5.6	47
School	3		.24	.00	.44	.54	.20	.12	-.06	.30	14.8	4.6	47
IV	M		.42	.15	.36	.61	.17	.27	.16	.39	15.3	5.0	47

Examination of these tables reveals a wide range of degrees of association among the various scales. Because of the difficulty in comprehending such a mass of correlations, these tables have been condensed by taking the 12 correlations in a given column (excluding the correlations between means) and determining the average[9] inter-scale correlation, irrespective of the interviewer. These average correlations are presented in Table III. It must be remembered that a given cell in Table III represents a column in one of the tables in Appendix IV, and that a given row in Table III corresponds to an entire table of correlations, e.g., Table A-2, or A-3, etc.

The last line in Table III gives the average correlation of each scale with all of the other scales. These correlations vary from .41 to .66, indicating a fairly substantial degree of community of function between the various scales. In other words, either "halo" is operating throughout the various ratings, or the scales overlap.

Further examination of Table III clearly indicates the tendency for certain traits to cluster together, namely, "General Social Adjustment," C, "Personality," G, "Appearance, Mannerisms, and Physique," H, and the over-all rating, "Fitness for Flight Training," I. This analysis by inspection is supported by the results of a factor analysis. In Table IV the average correlations given in Table III are repeated and the diagonal values have been filled in with the highest r in each column. The first factor loadings are given in the last line of the table. Examination of these loadings indicates that the over-all rating is highly saturated with the components, "General Social Adjustment," C, "Personality," G, and "Appearance, Mannerisms, and Physique," H. An examination of the first factor residuals (Table V) showed that they all fell within a range of two standard deviations from an r of zero, so that further factoring seemed unnecessary. In other words, a single factor accounts for a major proportion of the intercorrelation found in the scales.

A point of minor interest is the correlation between the interviewer's ratings on Scale I, "Fitness for Flight Training," and the arithmetic mean of the ratings on the other 8 scales by the interviewer. Had the rater not attempted to follow instructions, i.e., had he made the over-all rating an arithmetical average of the first eight scales, then all of these correlations would have had the value, 1.00. These correlations are shown in Table VI. The median correlation is .89 with a range from .80 to .93. This indicates that the interviewers made a composite estimate that was fairly close to the results they would have obtained by arithmetically averaging the separate ratings.

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[9] It is recognized that the averaging of correlations is not strictly proper and that certain distortions of the true correlations may result. However, in this case examination of the means and standard deviations for the different interviewers on the several scales shows them to be fairly comparable. This together with the fact that 12 r's are being averaged probably results in a close approximation of the value that would have been obtained by more rigorous methods of combination. Furthermore, the character of the data is such that more refined statistical procedures do not seem to be justified.

TABLE III

THE MEAN CORRELATION BETWEEN THE SCALES FOR ALL 12 INTERVIEWERS

	A	B	C	D	E	F	G	H	I
A	...	.43	.57	.47	.54	.25	.37	.51	.50
B	.43	...	.61	.45	.51	.25	.55	.51	.56
C	.57	.61	...	.47	.54	.50	.83	.78	.76
D	.47	.45	.47	...	.67	.51	.51	.41	.66
E	.54	.51	.54	.67	...	.39	.56	.49	.56
F	.25	.25	.50	.31	.39	...	.56	.49	.56
G	.37	.55	.83	.51	.56	.56	...	.83	.87
H	.51	.51	.78	.41	.49	.49	.83	...	.77
I	.50	.56	.76	.66	.66	.56	.87	.77	...
Average	.41	.48	.61	.49	.55	.41	.64	.57	.66

TABLE IV

MEAN INTERCORRELATIONS BETWEEN THE NINE SCALES FOR ALL 12 INTERVIEWERS; ALSO THE FIRST FACTOR LOADINGS (Harvard, Purdue, Michigan, Ohio)

	A	B	C	D	E	F	G	H	I	Σ
A	(.54)	.43	.57	.47	.54	.25	.37	.51	.50	3.24
B	.43	(.61)	.61	.45	.51	.25	.55	.51	.56	3.87
C	.57	.61	(.83)	.47	.54	.50	.83	.78	.76	4.86
D	.47	.45	.47	(.67)	.67	.51	.51	.41	.66	3.95
E	.54	.51	.54	.67	(.67)	.39	.56	.49	.66	4.56
F	.25	.25	.50	.31	.39	(.56)	.56	.49	.56	3.31
G	.37	.55	.83	.51	.56	.56	(.87)	.83	.87	5.08
H	.51	.51	.78	.41	.49	.49	.83	(.83)	.77	4.59
I	.50	.56	.76	.66	.66	.56	.87	.77	(.87)	5.34
Σ	3.24	3.87	4.86	3.95	4.56	3.31	5.08	4.59	5.34	38.65
										645
Σd	3.78	4.48	5.69	4.62	5.03	3.87	5.95	5.42	6.21	45.05
										6.711925 $\sqrt{\Sigma\Sigma}$
										.148988 $1/\sqrt{\Sigma\Sigma}$
F_1	.563	.667	.848	.688	.749	.577	.886	.808	.925	6.711

TABLE V

FIRST FACTOR RESIDUALS BASED ON TABLE IV

F_1	.563	.667	.848	.688	.749	.577	.886	.808	.925	6.711	
	A	B	-C	D	E	-F	-G	-H	-I	Σ	
d	.223	.165	.111	.197	.109	.227	.085	.177	.014	1.308	
.563 A	(.145)	.054	+.107	.083	.118	+.075	+.129	+.145	+.021		
.667 B	.054	(.135)	-.044	-.009	.010	+.135	+.041	+.029	+.057		
.848-C	+.107	-.044	(.113)	+.113	+.095	+.011	+.079	+.095	+.024		
.688 D	.083	-.009	+.113	(.155)	.155	+.087	+.100	+.146	-.024		
.749 E	.118	.010	+.095	.155	(.155)	+.042	+.104	+.115	+.033		
.577-F	+.075	+.135	+.011	+.087	+.042	(.135)	+.049	+.024	+.026		
.886-G	+.129	+.041	+.079	+.100	+.104	+.049	(.129)	+.114	+.050		
.808-H	+.145	+.029	+.095	+.146	+.115	+.024	+.114	(.146)	+.023		
.925-I	+.021	+.057	+.024	-.024	+.033	+.026	+.050	+.023	(.057)		
6.711 Σ	+.001	.002	.001	.004	.003	-.002	.003	-.002	.002	.012	1.170
Ch	+.002	.004	-.001	.003	.003	-.002	.004	-.002	.002		

TABLE VI

THE CORRELATION BETWEEN THE MEAN OF THE RATINGS FOR A GIVEN INTERVIEWER ON THE FIRST 8 SCALES AND THE OVER-ALL OR "FITNESS FOR FLIGHT TRAINING" RATING FOR EACH INTERVIEWER

School	Rater	r_{MI}	r_{MI}
Harvard	#1	.80	
	#2	.88	
	#3	.89	
	All Three Raters		.86
Ohio	#1	.90	
	#2	.93	
	#3	.88	
	All Three Raters		.90
Purdue	#1	.86	
	#2	.84	
	#3	.85	
	All Three Raters		.83
Michigan	#1	.89	
	#2	.93	
	#3	.90	
	All Three Raters		.91

The Validity of the Interview. One of the fundamental questions to be answered is: "Can interviewers, as a result of a short conference with a prospective student pilot, predict the individual's likelihood of success in flight training?" The fact that the interviewers can rate a man with considerable agreement from one interviewer to another is interesting, but it is of secondary importance. In this section, the ratings of the interviewers of the applicants on the various traits will be compared with various criteria listed below. It was impossible to secure complete criterion data on all individuals, so the tables are based on varying numbers of cases. Each validity coefficient is accompanied by an indication of the size of the sample on which it was determined.

1. Pass-Fail.
2. Ground school grades.
3. Time for Stage A.
4. Time for Stage D.
5. Time for total course.
6. Purdue Rating Scale, Item No. 14 (Instructor's rating at end of Stage A).
7. Purdue Rating Scale, Item No. 14 (Instructor's rating at end of Stage D).
8. Purdue Rating Scale, Item No. 14 (Check-pilot's rating at end of Stage D).
9. Total Purdue Rating Scale, Stage A.
10. Total Purdue Rating Scale, Stage D.

11. Ohio State Flight Inventory, Summation Score, Stage D.
12. Ohio State Flight Inventory, Profile Score, Stage D.
13. Pennsylvania Camera Criterion V. (Stage D.)
14. Pennsylvania Camera Criterion VI. (Stage D.)

A. Validity Coefficients Based on the Composite Group.

The correlations between the mean of the ratings of the three interviewers on each scale and seven of the criteria are given in Table VII. In arriving at these correlations all available data have been used. This means that all groups of interviewers have been treated as though they were comparable. Later tables will present analysis by schools.

Pass-Fail data were available for 168 cases from the four schools.[10] The validity coefficients of the nine traits against the Pass-Fail criterion range from -.05 to .23 (Row 1 - Table VII). The correlation between the over-all rating for "Fitness for Flight Training" and Pass-Fail was only .17, a value too low for satisfactory prediction.

The second criterion in Table VII is inspectors' marks. These marks were assigned on a percentage scale, of which only 40 points were used. Further, almost all of the ratings were found at 65, 70, 75, 80, and 85, in effect reducing the scale to five points. Different students were rated by different inspectors, so that the ratings are not strictly comparable from one student to another. These marks represent the inspector's evaluation of the student's flight skill as demonstrated in a flight test. These correlations, while somewhat higher than those for the Pass-Fail criterion, are still too low to be of practical value for purposes of prediction.

The correlations of instructors' ratings on the Purdue Rating Scale, Item 14, for Stage A and Stage D, with the ratings by the interviewers on the several traits are given in rows 3 and 4 of Table VII. In general, these correlations are higher than the correlations with the first two criteria. The median correlation between the flight instructor's rating at Stage A and the mean of the interviewers' ratings is .21, while the median correlation at Stage D is .22. The over-all rating, "Fitness for Flight Training," correlated with the instructors' ratings .27 and .25 for Stages A and D, respectively.

While these values are not high, they do indicate that the interviewers were more successful in identifying those individuals who later would be rated as superior or inferior by their flight instructors than would have been expected if their estimates were entirely a matter of chance.

In row 5 of Table VII the correlations between Time for Stage A and the various ratings are given. The median correlation is .09, indicating little or no relationship between interviewers' ratings and this criterion. However, when Time for Stage D is considered it is seen that an entirely different situation exists. The median correlation with this criterion is .33. This higher correlation probably reflects the greater variability found in "Time for Stage D." Since the traits rated have been shown to be correlated, it was to be expected that if one correlated with the criterion, the others

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[10] There were no failures in the Ohio State University group so that the correlations are probably attenuated.

TABLE VII

THE CORRELATIONS BETWEEN THE SEVERAL CRITERIA AND THE MEAN RATING FOR THE THREE INTERVIEWERS FOR EACH OF THE NINE SCALES OF THE INTERVIEW

Criteria	N	Schools	Academic Background A	Family & Soc. Background B	Social Adjustment C	Desire to Fly D	Hobbies Activities E	Athletics F	Personality G	Appearance H	Fitness for Flight Training I
1. Pass - Fail	168	1,2,3 & 4	-.03	.03	.07	.05	.03	.03	.23	.18	.17
2. Inspectors' Marks	109	2, 3 & 4	.03	.11	.14	.10	.11	.15	.12	.11	.11
3. Instructor's Rating Purdue Scale #14, Stage A	123	1, 2, 3	.21	.12	.15	.15	.20	.28	.22	.29	.27
4. Instructor's Rating Purdue Scale #14, Stage D	122	1, 2, 3	.29	.20	.22	.27	.30	.19	.21	.15	.25
5. Time for Stage A	167	1,2, 3 & 4	.06	.09	.05	.14	.18	.08	.07	.10	.15
6. Time for Stage D	105	2, 3 & 4	.30	.21	.38	.35	.25	.44	.30	.39	.36
7. Total Time	159	1, 2, 3 & 4	.12	.15	.33	.21	.21	.32	.29	.29	.28

Note: 1. Schools - 1) Harvard University, 2) Ohio State University, 3) Purdue University, 4) University of Michigan.

2. The correlations for criteria 2, 4, 6, and 7 are attenuated due to the elimination of some men in early stages of training.

3. The positive correlations between time measures (criteria 5, 6, and 7) and ratings indicate that favorable ratings are correlated with short times in training.

would also exhibit correlation with the criterion, and therefore no particular significance can be attached to the fact that this entire group of correlations approaches the minimum level of usefulness for purposes of prediction.

The correlations between the criterion, Total Time, and the interview ratings are given in row 7 of the table. The median correlation is .28. These values lie between those reported for Time for Stage A and Time for Stage D.

It would appear that the interviewers are able to identify in the applicant significant factors which permit them to predict which individuals later will require extra time. Since the group is small at Stage D (N = 105) and the median correlation .33, these results can only be considered as suggestive of the value of the interview. Before they can be considered indicative, the investigation will have to be carried out on other groups.

B. Validity Coefficients Based on the Harvard Group.

In Table VIII are presented the validation data for the Harvard group only. Examination of this table shows that again the Pass-Fail criterion was not predicted by the interviewers. In fact, all the correlations with the criterion are within their sampling errors of zero.

The correlations between "Time for Stage A" and the nine ratings are also all within their sampling errors of zero. This finding is in agreement with the results for the total group (see Table VII).

The correlations between the ratings at the end of Stage A on Item 14 of the Purdue Rating Scale and the nine interview ratings are near zero except for Scales A, D, E, and I. A similar picture is found when the total rating on the Purdue Rating Scale at Stage A is used as the criterion, except that the correlation with Scale I (Fitness for Flight Training) is somewhat smaller.

When instructors' ratings at Stage D are used as a criterion the validity coefficients are somewhat higher, but all the values are too low for purposes of practical prediction, since the highest correlation is only .30.

For the Harvard group the correlations between total time and the nine ratings are low, the range being from .04 to .26. Compared with the corresponding correlations for the total group (see Table VII), they are found to be lower. This variation may indicate nothing more than sampling errors.

C. Validity Coefficients Based on the Purdue Group.

Because the number of cases at Purdue University was quite small (N = 40) the correlations were computed only between the median rating on the overall "Fitness for Flight Training" scale and three of the criteria. These correlations are shown in Table IX.

These correlations are high when compared with those of Tables VII and VIII, and, if dependable, would indicate that the interview has considerable value for predicting future flight performance. Unfortunately, the sample

TABLE VIII

CORRELATIONS BETWEEN SEVEN CRITERIA AND THE MEAN RATINGS FOR EACH OF THE NINE SCALES OF THE INTERVIEW, (FOR THE HARVARD GROUP ONLY).

Criteria	N	Academic Background A	Family & Soc. Background B	General Social Adjustment C	Desire to Fly D	Hobbies and Diversions E	Athletic Ability F	Personality G	Appearance and Mannerisms H	Fitness for Flight Training I
1. Pass-Fail	60	.07	-.02	.07	.06	.22	-.01	-.07	-.09	-.12
2. Time for Stage A	54	.03	-.05	-.03	-.13	-.15	.01	.01	-.08	.07
3. Instructor's Rating Purdue Scale #14, Stage A	49	.21	-.02	.10	.21	.18	.01	.13	.12	.23
4. Instructor's Rating Total Purdue Scale, Stage A	49	.21	.11	-.02	.19	.19	.13	.00	-.03	.14
5. Instructor's Rating Purdue Scale #14, Stage D	51	.21	.15	.16	.28	.27	.09	.16	.05	.30
6. Instructor's Rating Total Purdue Scale, Stage D	49	.22	.22	.13	.25	.26	.27	.08	.06	.23
7. Total Time	53	.04	.11	.19	.21	.26	.05	.11	.18	.13

TABLE IX

CORRELATIONS BETWEEN THE MEDIAN RATING ON THE "FITNESS FOR FLIGHT TRAINING" SCALE AND THREE CRITERIA (N = 40)

(Purdue Group)

Criterion	Correlations with "Fitness for Flight Training" Scale I
1. Instructor's Rating at Stage A, Item 14 of Purdue Scale	.46
2. Instructor's Rating at Stage D, Item 14 of Purdue Scale	.43
3. Check-pilot's rating at end of Stage D, Item 14 of Purdue Scale	.43

is so small that these high values may be attributed to sampling errors. The corresponding correlations for the Harvard group for the first two criteria in Table IX are .23 and .30.

D. Validity Coefficients Based on the Ohio State Group.

The validity coefficients for ten criteria for the Ohio State group are shown in Table X. Two criteria were available at Stage A, namely Time for Stage A (Row 1), and the Purdue Rating Scale, Item 14 (Row 4). Seven of the correlations with Time for Stage A are above .20; only 3 of the correlations with Item 14 are as high as this.

At Stage D, 6 criteria were available for checking the interviewers' predictions. All the ratings by the interviewers correlated with Item 14 of the Purdue Rating Scale (Row 5) in the neighborhood of zero. This is surprising in view of the findings for the Harvard and Purdue groups. This lack of correlation at Ohio State could have resulted from meaningless instructors' ratings or from some unknown characteristics of the interviewers' ratings, or from the smaller N, since there were only 30 cases.

Two of the scales correlated in excess of .20 with the Ohio State Flight Inventory Summation Scores at Stage D (Row 6). When the profile scores were used as a criterion, the same two scales showed correlations of .20 or higher. This similarity was to be anticipated in view of the high correlation between the two methods of scoring the Ohio State Flight Inventory.

Time for Stage D (Row 2) showed only three correlations which were below .20, and these were only slightly below. The correlations of the various scales with the total time for the course (Row 3), however, are uniformly higher than those for Stage A and for Stage D. They are also considerably higher than those noted for the Harvard group (Table VIII). These differences may be, in part, the result of a difference in the practices of the two flight schools with regard to granting extra time.

Correlations between the scales and ground school grades (Row 10) range from .14 to .38. Eight of the correlations are higher than .20.

The remaining correlations in Table X are those between Camera Criteria V and VI and the ratings on the interview scales (Rows 8 and 9). The Camera Criteria are highly intercorrelated, as they merely represent different groupings of the same records. It is to be anticipated, therefore, that the correlations for the two criteria will tend to be similar, except for discrepancies introduced by the use of biserial coefficients of correlation. It will be noted that 7 of the 9 correlations are .30 or above for Camera Criterion VI (a biserial coefficient of correlation). Coefficients for Camera Criteria V, are rather uniformly lower. Seven of them, however, are above .20.[11]

The over-all conclusion drawn from the table of the Ohio State results is that the last six ratings made by the interviewers show positive validity coefficients at a low level, but a level that is useful for the purpose of predicting the measures used as criteria at Stage D and for the total course. In general, this finding is supported by the results from Harvard and Purdue. The fact that the findings are somewhat similar on independent small samples is of significance.

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[11] Editor's Note. Since the correlations between interview ratings and the camera criteria were available for only one sample involving 26 cases, these relationships could not be checked on other samples and can, therefore, be considered only as suggestive.

TABLE X

CORRELATIONS BETWEEN NINE CRITERIA AND THE MEAN RATINGS FOR EACH OF THE NINE SCALES OF THE INTERVIEW. (FOR THE OHIO STATE GROUP ONLY)

Criteria	N	Academic Background A	Family & Soc. Background B	General Soc. Adjustment C	Desire to Fly D	Hobbies and Diversions E	Athletic Ability F	Personality G	Appearance and Mannerisms H	Fitness for Flight Training I
1. Time Stage A	44	.27	.17	.16	.27	.31	.31	.21	.22	.28
2. Time Stage D	42	.16	.19	.33	.29	.19	.31	.49	.42	.36
3. Total Time	42	.31	.29	.40	.45	.37	.48	.59	.50	.48
4. Purdue Sc. Item 14, Stage A	20	-.06	.30	.28	.05	.09	.00	.16	.22	.18
5. Purdue Sc. Item 14, Stage D	30	.08	.10	-.13	.08	.12	-.02	.02	-.04	-.04
6. OSFI Sum. Man. Sc. Stage D	30	-.07	-.23	-.18	.02	.12	.27	.07	-.01	-.04
7. OSFI Flight Profile Stage D	29	-.05	-.25	-.14	.00	.13	.20	.03	.13	-.05
8. Camera Criterion V	26	.25	.02	.13	.23	.30	.41	.40	.36	.35
9. Camera Criterion VI	26	.17	.04	.30	.42	.42	.62	.46	.37	.39
10. Ground School Grades	43	.38	.25	.29	.22	.23	.14	.31	.32	.36

The University of Michigan Group. Due to the paucity of criterion data for the Michigan group, no individual analysis has been made for this group.

E. Validity of Individual Interviewers.

The correlation between the over-all rating "Fitness for Flight Training," by each interviewer and the flight instructor's over-all rating on Item 14 of the Purdue Rating Scale for Stage D was determined for each of the interviewers at Harvard, Purdue, and Ohio State. The resulting correlations are shown in Table XI.

TABLE XI

CORRELATIONS BETWEEN THE OVER-ALL RATING (FITNESS FOR FLIGHT TRAINING) BY INTERVIEWER AND INSTRUCTOR'S OVER-ALL RATING AT THE END OF STAGE D

Interviewer	Harvard	Purdue	Ohio State
1	.19	.25	-.01
2	.30	.19	-.16
3	.42	.39	-.07

Examination of Table XI shows that the correlations for all three interviewers at Ohio State were negative. This situation does not seem reasonable in view of the correlations with instructors' ratings in the other groups, and the positive r's with the camera criteria. This may be a function of the fact that no student at Ohio State failed. The median correlation for the interviewers is .19, which probably is an underestimate of the ability of interviewers to predict instructors' ratings. As would be expected there is considerable variation in the ability of the different interviewers to predict instructors' ratings. This suggests that there is a problem in determining the characteristics of a good interviewer, and in selecting such interviewers.

Relative "Cost" of the Interview. It is not sufficient to show that it is possible to train interviewers to rate applicants for flight training so that the ratings show a high degree of agreement. Nor is it sufficient to show that the ratings of the interviewers have sufficient validity to be of practical value in the problem of selection. Even if it were demonstrated that it is possible to secure "reliable" and "valid" interview predictions, the basic question remains, namely, "To what extent does the interview increase the predictions made by other means?"

In Tables XII through XIV, some data are given for determining the relative cost of the interview as compared with three paper-and-pencil tests: The Biographical Inventory, the Mechanical Comprehension Test, and the P-H Inventory.[12] The relative costs are expressed in terms of the multiple

[12]The final column in each of these tables indicates correlations of other variables with a score derived from the answers to the questions in the P-H Inventory. The scoring key was based on an item analysis of the responses of 1427 C.P.T. trainees who were given the P-H Inventory (but not the interview) in another project sponsored by the Committee on Selection and Training of Aircraft Pilots. Items were correlated with success in primary flight training. Details of the analysis will be presented in a later report in this series.

TABLE XII

THE INTERCORRELATIONS BETWEEN EACH OF THREE CRITERIA AND THE SEVERAL PREDICTIVE MEASURES OF THE HARVARD GROUP (N = 50-69)

		1	2	3	4	5	6
C_1	Pass-Fail	.23	.41	-.07	-.09	-.12	-.16
C_2	Purdue Rating Scale #14, Stage D	.48	.38	.16	.05	.30	.15
C_3	Time, Stage D*	.35	.30	.11	.18	.13	-.15
1.	Biographical Inventory		.38	.25	.15	.36	.19
2.	Mech. Comp. Test			.05	-.04	.10	.11
3.	Personality Rating (Sc. G)				.88	.91	.00
4.	Appearance Rating (Sc. H)					.83	.03
5.	Fitness for Fl. Tr. (Sc. I)						.13
6.	Score on P-H Inventory						

*All correlations with time have been made positive by inverting the time scale.

TABLE XIII

THE INTERCORRELATIONS BETWEEN EACH OF FOUR CRITERIA AND THE SEVERAL PREDICTIVE MEASURES FOR THE OHIO STATE GROUP (N = 26-49)

		1	2	3	4	5	6
C_1	Purdue Rating Scale #14, Stage D	.01	.32	.02	-.04	-.04	.03
C_2	Time at Stage D*	.12	.12	.49	.42	.36	.24
C_3	O.S.U. Profile Score	-.12	.47	.03	.13	-.05	.01
C_4	Penn. Camera Criteria V	-.12	.34	.40	.36	.35	.08
1.	Biographical Inventory		.43	.07	.08	.24	.35
2.	Mech. Comp. Test			-.02	-.01	.09	.47
3.	Personality Rating (Sc. G)				.92	.92	.15
4.	Appearance Rating (Sc. H)					.87	.13
5.	Fitness for Fl. Tr. (Sc. I)						.26
6.	Score on P-H Inventory						

*All correlations with time have been made positive by inverting the scoring time scale.

TABLE XIV

THE INTERCORRELATIONS BETWEEN TWO CRITERIA AND THE SEVERAL PREDICTIVE MEASURES FOR THE PURDUE GROUP (N = 40)

	1	2	3	4
C_1 Purdue Rating Scale #14, Stage D	.27	.30	.43	.27
C_2 Time at Stage D*	.46	.54	.55	.15
1. Personality Rating (Sc. G)		.87	.93	.29
2. Appearance Rating (Sc. H)			.85	.23
3. Fitness for Fl. Tr. (Sc. I)				.35
4. Score on P-H Inventory				

*All correlations with time have been made positive by inverting the time scale.

correlations, since the higher the multiple r the greater the predictive value of the combination of tests. These multiple correlations are summarized in Table XV. In each case the multiple correlation between the criterion and the two paper-and-pencil tests is presented for comparison with the multiple correlation between the criterion and best weighted combination of the Mechanical Comprehension Test and the several interview ratings. Examination of this table shows that in only one (Ohio State University, Time Stage D) case was there a significant increase in the predictive efficiency by use of the interview ratings over that secured by means of the combination of paper-and-pencil tests.

CONCLUSIONS

Subject to the limitations of the small number of cases, and of the discrepancies from school to school, the findings of this study suggest the following tentative conclusions:

1. A controlled interviewing procedure provides "consistent" or "reliable" ratings.

2. Interviewers can predict with some "validity" certain aspects of students' future flight performance, especially that related to success in the later stages of the C.P.T. flight instruction program.

3. The individual interview is an impractical selection technique, since less costly group paper-and-pencil tests predict future performance as well or better and the interview results add little to the total predictive efficiency when combined with such tests.

TABLE XV

THE PREDICTIVE EFFICIENCY EXPRESSED IN TERMS OF MULTIPLE CORRELATIONS OF DIFFERENT COMBINATIONS OF THE PAPER-AND-PENCIL TESTS AND THE INTERVIEW RATING SCALES FOR THE VARIOUS CRITERIA

	HARVARD (N = 50–69)			OHIO STATE UNIVERSITY (N = 26–49)			
Tests and Scales	Pass Fail	Purdue Rating Scale	Time Stage D	Purdue Rating Scale	Time Stage D	O.S.U. Profile Score	Penn. Camera V
B. I.	.23	.48	.35	.01	.12	-.12	-.12
M. C.	.41	.38	.30	.32	.12	.47	.34
M. C. and B. I.	.41	.53	.39	.35	.14	.53	.41
M. C. and "Personality" (Sc. G)	.44	.41	.32	.32	.50	.47	.53
M. C. and "Appearance" (Sc. H)	.42	.39	.36	.32	.43	.49	.50
M. C. and "Fitness" (Sc. I)	.42	.46	.32	.33	.36	.49	.47
M. C. and score on P-H Inventory	.46	.40	.35	.35	.24	.53	.35

APPENDIX I

Directions for the Use of the Aviation Interview Rating Scales

DIRECTIONS FOR THE USE OF THE AVIATION INTERVIEW RATING SCALES

Prepared

by

Leonard S. Kogan
David V. Tiedeman
Morey J. Wantman
Jack W. Dunlap

One of a series of researches conducted under the provisions of a contract between the Civil Aeronautics Administration and the National Research Council.

Committee on Selection and
Training of Aircraft Pilots

Division of Anthropology and Psychology
National Research Council
Washington, D. C.

*Issued at the University of Rochester
January 29, 1942

GENERAL INSTRUCTIONS FOR USE OF THE AVIATION INTERVIEW RATING SCALES

Judgments based on the direct interview have often been criticized, and perhaps justly, for the reason that they seem to be less objective than the "scores" obtained from other measuring implements. However, it is just for this reason that the face-to-face interview may have its advantages, since it may reveal the presence of attributes which defy evaluation by means of paper and pencil instruments.

As an interviewer, you can minimize the subjective nature of the interview by recognizing and avoiding the influence of general prejudices or "conditioned" responses which have been built up in your personal experience. You must place no weight in such things as color of hair and eyes, or facial and cranial configuration, as indicators of personality. Do not fall into the common fallacy of forming a mental picture of a typical individual of a certain race, class, occupation, or social group, and then having pigeonholed various "types," extend to your specific candidate all of the preconceived attributes of that certain race, class, occupation, or social group. Such judgments are usually faulty!

Two other interviewers will sit with you during the interview. Do not let the opinions of the others influence your decisions. Complete agreement among the three opinions is not expected. The ratings of the three interviewers will be used independently at first and possibly may be combined later. Judgments should be based upon the actions and statements of the candidate during the interview. Questions should be designed to evoke responses upon which the required judgments can be based.

The areas in which your judgments are required are those now considered to be pertinent to flying success. These areas are:

A. Academic Background as Related to Flying
B. Family and Socio-Economic Background as Related to Flying
C. General Social Adjustment as Related to Flying
D. Desire to Fly
E. Hobbies, Diversions, and Outside Activities as Related to Flying
F. Athletic Activities and Coordination
G. Personality as Related to Flying
H. Appearance, Mannerisms, and Physique as Related to Flying
I. Fitness for Flight Training

The last scale, FITNESS FOR FLIGHT TRAINING, is a summary scale and indicates the interviewer's prediction of the candidate's future flying success.

Each area appears on a single sheet. Under the name of the area, there is a rating scale consisting of five general descriptive categories (printed in capital letters) ranging from a highly favorable position to a very unfavorable position. The rating scale is further broken down so that a candidate may finally be rated along a scale from 25 through 1 of decreasing favorableness for the specific area under consideration.

The remaining phrases on each page are key items which are to guide the interviewer's questions during the interview. Two types of key items

are present. In one type the phrases are arranged underneath the five general categories and are to be regarded as already ranked along the given scale. In the second type the key items are listed within a red rectangular box in the center of the page. This latter arrangement indicates that the relation of these items to flying success has not yet been determined, and the ranking of these items is up to the discretion of the interviewer. Two of the scales, viz. ACADEMIC BACKGROUND AS RELATED TO FLYING and ATHLETIC ACTIVITIES AND COORDINATION, contain both types of key items.

The interviewer is to check on the line to the left of each item those which apply to the candidate. He may do this (1) from the information obtained from the P-H answer sheet, (2) from his general impressions during the interview, or (3) from the responses of the candidate to specific questions. For the areas in which the key items have already been ranked, these check marks will give the interviewer a graphic picture of the various positions the candidate occupies on the scale. The interviewer can then mentally average these positions to determine the final rank of the candidate along the total scale for that area. The importance attached to any single key item in determining the candidate's final position is up to the interviewer.

In the case of items contained in the boxes, however, the interviewer must decide on the rank of each item along the total scale as well as on its relative importance. For this reason rating the candidates in these areas may prove to be more difficult than rating them on the areas where the positions of the items are indicated.

At the bottom of each page is a space labeled "Explanation of Rating." In this space the interviewer is to give a brief statement explaining his rating and also to add any other pertinent information not covered by the items.

SPECIFIC INSTRUCTIONS FOR EACH AREA

The P-H Inventory answer sheet has been set up in five columns of twenty items each. The first ten items in the first column deal with the area called ACADEMIC BACKGROUND AS RELATED TO FLYING, and the lower half of this column, i.e., the last ten questions, deals with HOBBIES, DIVERSIONS, AND OUTSIDE ACTIVITIES AS RELATED TO FLYING. The second column is concerned with FAMILY AND SOCIO-ECONOMIC BACKGROUND AS RELATED TO FLYING. The answers in the third column deal with GENERAL SOCIAL ADJUSTMENT AS RELATED TO FLYING. The fourth and fifth columns correspond to DESIRE TO FLY and PERSONALITY AS RELATED TO FLYING, respectively.

The interviewer should construct a stencil which is keyed according to his judgment as to which of the two alternatives, "yes" or "no," is favorable to success in flying.

The response to a particular question in a given area may be suggestive of the approach that should be made in the interview to this area. The checks on the answer sheet should be valuable in helping the interviewer to make his final rating for that area.

A. ACADEMIC BACKGROUND AS RELATED TO FLYING

The interviewer should indicate on this chart the date, the time the interview started, and the time the interview was finished. The interviewer, if he is the chief interrogator, should also mark an "X" in the box provided.

Both classified and unclassified items appear in this area. The interviewer, if he sees fit, may re-classify any item which has already been ranked along the scale. He is to check pertinent items, judge their importance, and then rank the candidate accordingly on the total scale. A brief general evaluation of the rating as well as other pertinent information should appear in the "Explanation of Rating."

B. FAMILY AND SOCIO-ECONOMIC BACKGROUND AS RELATED TO FLYING

The relation of family and socio-economic background to flying success is uncertain at this time. Therefore, the items are arranged in random order within the box beneath the scale. The interviewer is to check pertinent items, rank them mentally, judge their importance and then finally use this information to determine the candidate's position on the total scale. A brief general explanation of the rating as well as other pertinent information should appear in the "Explanation of Rating."

C. GENERAL SOCIAL ADJUSTMENT AS RELATED TO FLYING

The items in this area are to be treated in the same manner as those under "B."

D. DESIRE TO FLY

All of the items in this area have been categorized in the light of past experience with pilot selection. The interviewer is to check pertinent items, judge their importance, and then rank the candidate accordingly on the total scale. A brief general evaluation of the rating as well as other pertinent information should appear in the "Explanation of Rating."

E. HOBBIES, DIVERSIONS, AND OUTSIDE ACTIVITIES AS RELATED TO FLYING

This is to be treated in the same manner as "B."

F. ATHLETIC ACTIVITIES AND COORDINATION

The items in this area are to be treated in the same manner as those in "A." In the final rating of the candidate on the total scale, the interviewer should make use of the candidate's responses to the questions at the bottom of the answer sheet for the P-H Inventory.

G. PERSONALITY AS RELATED TO FLYING

This is to be treated in the same manner as "D."

H. APPEARANCE, MANNERISMS, AND PHYSIQUE AS RELATED TO FLYING

This is to be treated in the same manner as "D."

I. FITNESS FOR FLIGHT TRAINING

This scale is the over-all rating made by the interviewer and will constitute his prediction of the candidate's success in flying. It is the crux of the entire interview and any tendencies for the interviewer to make "snap" judgments should be curbed. Consider all aspects of the interview before making your decision.

ACTUAL INTERVIEWING TECHNIQUE

The RECORDER for recording all conversation that occurs during the interview is to be turned on prior to the entry of the interviewee. Both the microphone and the RECORDER are to be hidden from the student.

1. The candidate will answer the P-H Inventory on the specially devised answer sheet, making two carbon copies. Each interviewer will be presented with a copy three minutes before the interview begins.

2. The RECORDER should be checked between interviews to insure its operating satisfactorily.

3. The following physical conditions of the room should be considered:

   a. The interview room should be aired out after each interview.

   b. A chair should be provided for the candidate which is comfortable and would encourage his being at ease.

   c. The interviewers should guard against making unnecessary movements and noises, e.g., kicking the waste basket, as these will be registered by the RECORDER.

   d. A clock in the room would help the interviewers budget their time.

4. One of the three interviewers will be designated to act as an interrogator for the first candidate. He will do all the questioning in the first part of the interview. After he has completed his questioning, if time permits, the two observing interviewers may question the candidate, but they are not to use more than five minutes of the interview time.

   A different interviewer will be designated as chief interrogator for the second candidate. The third interviewer will be designated as chief interrogator for the third candidate. The interviewer who was chief interrogator for the first candidate will be chief interrogator for the fourth candidate. Thus, the interviewers will rotate among themselves the job of being chief interrogator.

5. The interview should not exceed twenty minutes, and fifteen minutes should be the usual time. Plan the use of the fifteen minutes so that you obtain evidence in all areas.

6. Before the candidate is ushered into the interview room by the assistant, the interrogator should say, "It is now-(time of day)-and we are about to interview-(the name of the candidate)." Thus, the RECORDER will note the name of the candidate and the time the interview started.

7. The candidate will be ushered into the interview room by an assistant, who will introduce the candidate and provide each interviewer with (1) a copy of the candidate's answer sheet to the P-H Inventory, and (2) a set of the rating charts for each of the areas described above. Each chart will have on it both the name of the candidate and the name of the rater.

8. The candidate is to be placed directly opposite the interrogator. One of the other interviewers is to be placed at the end of the table to the left of the interrogator, the other at the end of the table to the right of the interrogator.

9. The interview should open in a friendly, easy manner, with a few casual remarks addressed to the candidate to ease tension and promote rapport. The interviewer then continues, basing his questions upon the key items in each area.

10. The various key items may be checked during the course of the interview. However, this should be done inconspicuously, so that the candidate will not be disturbed. Final ratings and "Explanations of Ratings" are to be made after the candidate has left the interview room.

11. Observe closely the candidate's behavior during the entire interview, but not in such a way that he will feel that he is being given the "third degree."

12. Keep alert so that you will not miss any important cues in the candidate's responses to the questions.

13. Above all, avoid jumping at conclusions or judging the candidate during the first few moments of the interview.

14. Do not ask questions which have already been answered in the P-H Inventory unless those are expected to reveal additional pertinent information. For the most part, such a procedure will be found to waste time.

15. When the interview is completed, the chief interrogator should say "It is now-(time of day)-and we have finished interviewing-(the name of the candidate)." Thus, it will be noted on the RECORDER the time the interview is ended.

16. It is likely that those who are interviewed early will inform other candidates of the nature of the interview. Therefore, it is advisable to be flexible in formulating questions so that later candidates do not come into the interview already provided with stock answers.

APPENDIX II

Aviation Interview Rating Scales

AVIATION INTERVIEW RATING SCALES

Prepared

by

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One of a series of researches conducted under the provisions of a contract between the Civil Aeronautics Administration and the National Research Council.

Committee on Selection and
Training of Aircraft Pilots

Divisions of Anthropology and Psychology
National Research Council
Washington, D. C.

*Issued at the University of Rochester
January 29, 1942

Date_____ INTERVIEW CHART

Name of Candidate_____

Name of Rater_____

Time Started_____Finished_____

If also Interrogator place X in box: ☐

A. ACADEMIC BACKGROUND AS RELATED TO FLYING

25	20	15	10	5 1
UNUSUALLY APPROPRIATE BACKGROUND	APPROPRIATE BACKGROUND	AS WELL QUALIFIED TECHNICALLY AS MOST CANDIDATES	BACKGROUND NOT APPROPRIATE	BACKGROUND ENTIRELY UNSUITABLE
___is thoroughly trained; ___had a great deal of related study; ___is well able to grasp technical aspects of aviation;	___had related courses and training;	___has an average record; ___has a smattering of technical education;	___is poorly qualified in related subjects; ___record is weighted on the side of the non-technical;	___background has no relationship to flying;

___major studies were math and science; ___has scientific outlook on things; ___has excellent disciplinary record (punctual, no conflicts with deans, etc.) ___had considerable amount of training in math and science; ___is unusually punctual;	___has good disciplinary record; ___is a dabbler; ___record is weighted on the side of the non-mechanical; ___is somewhat of a disciplinary problem; ___is often late for appointments; ___is rarely punctual;	___training is chiefly in arts, cultural subjects, humanities, social studies; ___has no mathematical and scientific background; ___is a non-conformist; ___is a bookworm; ___is a playboy; ___has no mechanical training of any sort; ___has very poor disciplinary record;

EXPLANATION OF RATING:

_____

_____

_____

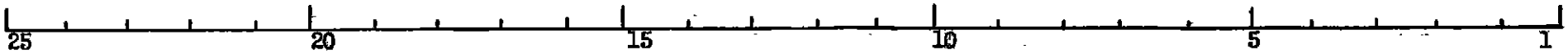
_____

INTERVIEW CHART

Name of Candidate_____

Name of Rater_____

B. FAMILY AND SOCIO-ECONOMIC BACKGROUND AS RELATED TO FLYING



UNUSUALLY SATISFACTORY FLYING	SATISFACTORY FOR FLYING	FAIRLY SATISFACTORY FOR FLYING	UNSATISFACTORY FOR FLYING	VERY UNSATISFACTORY FOR FLYING
___had excellent home life;	___had a "broken" home;	___slight discord in family;		
___had good home life;	___has carried considerable responsibility successfully;	___home was only a house;		
___had fairly satisfactory home life;	___carried some family responsibility;	___family was a well-knit unit;		
___home life was unsatisfactory;	___had no family responsibilities whatsoever;	___childhood was unhappiest period of his life;		
___had very unsatisfactory home life;	___was raised under best conditions;	___family were leaders in community;		
___is proud of his parents;	___economic status of family fluctuated;	___contributed to support of family;		
___family participated in community activities;	___family was financially unstable;	___is proud of his background;		
___family participated in few community activities;	___family impecunious;	___cultural interests dominate family activity;		
___family seldom participated in community affairs;	___had ideal home;	___technical and scientific interests dominate family;		
	___no family unity;			
	___was a spoiled child;			

EXPLANATION OF RATING:

_____

_____

_____

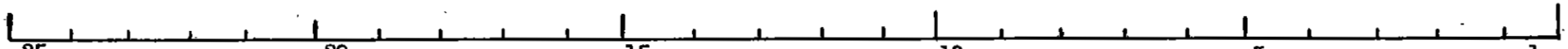
_____

INTERVIEW CHART

Name of Candidate_____

C. GENERAL SOCIAL ADJUSTMENT AS RELATED TO FLYING

Name of Rater_____



25	20	15	10	5	1
ESPECIALLY WELL ADJUSTED	WELL ADJUSTED	FAIRLY WELL ADJUSTED	POORLY ADJUSTED	VERY POORLY ADJUSTED	

____is very popular;	____gets along well with others;	____is a "joiner";
____has many friends;	____is socially like most people;	____is a misfit;
____gets along in most situations;	____is a stay-at-home;	____would make an ideal friend for anyone;
____does not get along with people;	____antagonizes people;	____is an excellent mixer;
____is a "lone wolf";	____is very much interested in group activities	____has antisocial tendencies;
____is sought out by many people		____is out of touch with the world

EXPLANATION OF RATING:

_____

_____

_____

_____

Name of Candidate_____

INTERVIEW CHART

Name of Rater_____

D. DESIRE TO FLY

25	20	15	10	5	1

AN ARDENT, IRREPRESSIBLE DRIVE TO BECOME A FLYER	A STRONG INTEREST IN FLYING	A MILD INTEREST IN FLYING	ONLY A SLIGHT INTEREST IN BECOMING A FLIER	NO FUNDAMENTAL INTEREST IN FLYING
___has a very strong and sincere interest in becoming a flier; ___would rather fly than eat; ___bubbling over with enthusiasm for flying; ___knows a lot about flying already; ___can't wait until he gets in the air; ___heart is set on flying; ___has always wanted to fly	___has a genuine desire to fly; ___wants very much to fly; ___has paid for flying instruction; ___has read widely about aviation	___would like to be a flier; ___is an average candidate; ___has a moderate desire to become a flier	___is nonchalant about flying as a career; ___prefers other things to flying; ___is prompted primarily by money	___has pseudo-interest in becoming a flier; ___is a "draft-dodger"; ___drifted into flying; ___flying is a means to some other end; ___is only curious about flying

EXPLANATION OF RATING:

_____

_____

_____

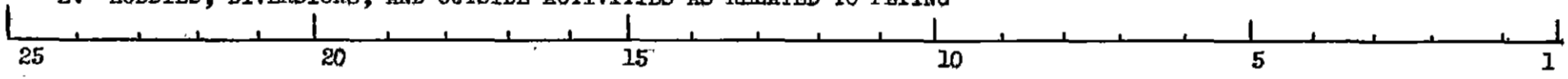
_____

INTERVIEW CHART

Name of Candidate_____

Name of Rater_____

E. HOBBIES, DIVERSIONS, AND OUTSIDE ACTIVITIES AS RELATED TO FLYING



HIGHLY FAVORABLE TO SUCCESS IN FLYING	SOMEWHAT FAVORABLE TO SUCCESS IN FLYING	UNRELATED TO SUCCESS IN FLYING	UNFAVORABLE TO SUCCESS IN FLYING	DETRIMENTAL TO SUCCESS IN FLYING
___has unusually broad interests;	___has broad background of interests;	___has read a good deal of adventure literature;	___has joined a few organizations;	
	___has fairly broad interests;	___has a real interest in model airplanes;	___likes to take chances;	
	___has few interests;	___is extremely interested in "doing things" with his hands;	___is an adventure-seeker;	
	___has no interests;	___is interested in handicraft;	___is a "regular" guy;	
___has a very well-balanced program of hobbies, interests;		___chief hobbies are painting, music, etc.;	___is well adapted;	
	___has average program of hobbies;	___is a "one-tracker";	___is fairly well adjusted;	
	___overemphasizes intellectual hobbies (chess, cross-word puzzles);	___has belonged to many organizations;	___is poorly adjusted	

EXPLANATION OF RATING:

_____

_____

_____

_____

Name of Candidate_____

INTERVIEW CHART

F. ATHLETIC ACTIVITIES AND COORDINATION

Name of Rater_____

VERY ATHLETIC; VERY WELL COORDINATED	A GOOD ATHLETE; WELL COORDINATED	MODERATE PARTICIPATION IN SPORTS; FAIR COORDINATION	LITTLE INTEREST IN SPORTS; POOR COORDINATION	NO PARTICIPATION IN SPORTS; POOR ATHLETE AWKWARD AND CLUMSY
___has engaged in many combative sports; ___is skilled in activities requiring coordination and dexterity; ___has had a well balanced sports program	___follows sports news intently; ___has hobbies requiring action		___has very little knowledge of sports events;	___has little athletic skill; ___avoids sports; ___has no interest in sports

___is very much interested in hunting and fishing;
___plays lacrosse;
___plays handball;
___bowls;
___is a fencer;
___is a gymnast;
___a weight-lifter

Incidental activities that may be noted:

_____

_____

_____

Note: Athletics box on P-H Inventory answer sheet

EXPLANATION OF RATING:

_____

_____

_____

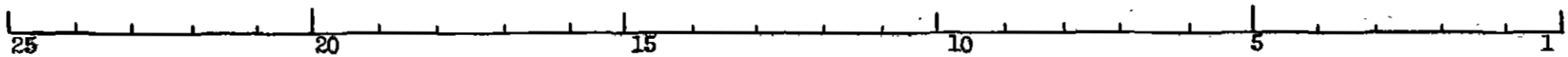
_____

Name of Candidate_____

INTERVIEW CHART

G. PERSONALITY AS RELATED TO FLYING

Name of Rater_____



EXTREMELY WELL-BALANCED AND WELL-ROUNDED	WELL-BALANCED AND WELL-ROUNDED	FAIRLY WELL-BALANCED AND WELL-ROUNDED	NOT WELL-BALANCED	EXCEPTIONALLY POOR PERSONALITY
___is superior; ___is getting the most out of life	___is leading a satisfactory life; ___is frank and sincere in discussing sex; ___is self-confident; ___is methodical and painstaking	___is a run-of-the mill individual; ___is average; ___is verbose	___is inhibited; ___is over-aggressive; ___is inferior; ___is a worrier; ___is careless and impulsive	___is unpredictable; ___is maladjusted; ___is psychopathic; ___is warped; ___thinks he has had an unusual number of disappointments

EXPLANATION OF RATING:

_____

_____

_____

_____

INTERVIEW CHART

Name of Candidate_____

H. APPEARANCE, MANNERISMS, AND PHYSIQUE AS RELATED TO FLYING

Name of Rater_____

25 — 20 — 15 — 10 — 5 — 1

IMPRESSIVE, COMMANDS ADMIRATION	CREATES DISTINCTLY FAVORABLE IMPRESSION	SUITABLE ACCEPTABLE	CREATES RATHER UNFAVORABLE IMPRESSION	UNPREPOSSESSING OR UNSUITABLE
___is well-groomed; ___has superior self-command; ___has a very pleasing manner; ___is very masculine; ___has no undesirable mannerisms; ___is exceptionally well poised	___has pleasing appearance; ___has pleasing manner; ___is well poised; ___has good self-command; ___is at ease	___is fairly well poised; ___has fair self-command; ___has acceptable appearance; ___is an average-looking and acting individual	___has poor appearance; ___is fidgety; ___is nervous; ___is excited; ___is not well-groomed; ___is ill at ease; ___has a tic	___has sloppy appearance (spotty tie, bites nails, dirty collar, etc.) ___is effeminate; ___blushes easily; ___is awkward; ___is childish; ___is ill-kempt; ___is shoddy; ___is "namby-pamby"; ___is affected; ___has irritating mannerisms; ___talks with his hands unduly; ___is a poor physical specimen; ___has a disgusting appearance

EXPLANATION OF RATING:

_____

_____

_____

_____

Name of Candidate _____

INTERVIEW CHART

I. FITNESS FOR FLIGHT TRAINING

Name of Rater _____

25	20	15	10	5	1
ENDORSED WITH ENTHUSIASM	ENDORSED WITH CONFIDENCE	ENDORSED	MIGHT DO WELL. ENDORSED WITH HESITANCE	UNSUITED FOR THIS WORK. NOT ENDORSED.	

In the light of all the evidence regarding this person's history, background, interests, and so forth, rate him on his suitability for flying. Endorse him only if you are convinced that he is a good bet.

APPENDIX III

Sample Questions from P-H Inventory
and
Answer Sheet for P-H Inventory

SAMPLE QUESTIONS FROM PERSONAL HISTORY INVENTORY

1. Were any of the following your favorite subjects in school—English, History, Music, Art, Languages?
2. Were both of your parents living while you were in high school?
3. Did you have many fights with other boys in school?
4. Have you been interested in flying for more than three years?
5. Did your parents approve of your enrolling in aviation?

81. Are you a good diver from a springboard?
82. Did you earn part of your way through high school to college?
83. Do you think "petting" is wrong?

Answer Sheet for P-H INVENTORY

Name..... Age..... Single..... Married.....
Print Last First Initial

Schooling 9, 10, 11, 12, 13, 14, 15, 16, 17 Name of College.....
(circle highest grade)

Major Course in College..... Location of College.....

	Yes	No		Yes	No		Yes	No		Yes	No		Yes	No
1.			2.			3.			4.			5.		
6.			7.			8.			9.			10.		
11.			12.			13.			14.			15.		
16.			17.			18.			19.			20.		
21.			22.			23.			24.			25.		
26.			27.			28.			29.			30.		
31.			32.			33.			34.			35.		
36.			37.			38.			39.			40.		
41.			42.			43.			44.			45.		
46.			47.			48.			49.			50.		
51.			52.			53.			54.			55.		
56.			57.			58.			59.			60.		
61.			62.			63.			64.			65.		
66.			67.			68.			69.			70.		
71.			72.			73.			74.			75.		
76.			77.			78.			79.			80.		
81.			82.			83.			84.			85.		
86.			87.			88.			89.			90.		
91.			92.			93.			94.			95.		
96.			97.			98.			99.			100.		

Sport	Attitude*			Did you go out for this sport in		Did you make the varsity in	
	L	I	D	H. S.	Col.*	H. S.	Col.*
Football							
Basketball							
Baseball							
Soccer							
Rowing							
Track							
Swimming							
Tennis							
Boxing							
Wrestling							

* L = like
I = indifferent
D = dislike

* H. S. = high school
Col. = college

DIRECTIONS FOR USE OF THE ANSWER SHEET WITH THE P-H INVENTORY

There are 100 questions in the P-H Inventory booklet. Answer each question by placing a check mark (√) on the line under the appropriate heading of "yes" or "no" next to the number that corresponds to the number of the question. Note that the question numbers on the answer sheet are arranged *across the page.* At the beginning of each new line of the answer sheet, be sure to check the number of the question in the booklet with the number on the answer sheet. *Do not omit any question.*

When you have finished with the 100 questions in the booklet fill in the information regarding sports at the bottom of the answer sheet by placing check marks in the proper columns. In the first column marked "Attitude," indicate your attitude towards each sport by checking whether you like, dislike, or are indifferent to that sport. In the next two columns indicate your participation in these sports. You may have no marks, one mark, or up to four marks in these last two columns for each sport.

EXAMPLE: (Check marks show how one man filled in this part of the blank)

Sport	Attitude*			Did you go out for this sport in		Did you make the varsity in	
	L	I	D	H. S.	Col.*	H. S.	Col.*
Football	√			√	√	√	
Basketball	√			√	√		√
Baseball	√			√			
Soccer			√				
Rowing		√					
Track	√				√		

* L = like
I = indifferent
D = dislike

* H. S. = high school
Col. = college

This man liked football, went out for it in high school and college, but made the varsity only in high school. He liked baseball, went out for it in high school, but did not make the varsity. He liked track, went out for it in college, but did not make the varsity.

APPENDIX IV

Aviation Interview Rating Scale Data

Tables A-1 to A-9

AVIATION INTERVIEW RATING SCALE DATA

TABLE A-1. The Intercorrelations Between Academic Background, Scale A, and the Other Scales, by the Interviewers of Each School.

		Academic Background A	Family Background B	Social Adjustment C	Desire to Fly D	Hobbies E	Athletics F	Personality G	Physical Appearance H	Fitness for Fl. Training I	Mean	Standard Deviation	N
	1		.40	.55	.33	.59	.19	.45	.45	.56	13.2	4.9	53
	2		.27	.36	.48	.68	.26	.44	.36	.53	9.8	5.9	53
School	3		.27	.29	.47	.46	.33	.30	.25	.54	12.8	4.9	53
1	M		.39	.44	.36	.63	.29	.43	.37	.58	11.9	4.8	75
	1		.43	.63	.71	.71	.36	.62	.66	.82	13.9	5.2	44
	2		.54	.63	.79	.80	.66	.71	.69	.90	13.5	7.1	44
School	3		.61	.62	.53	.57	.41	.60	.51	.59	15.5	4.1	44
2	M		.53	.73	.75	.78	.54	.72	.70	.84	14.2	4.8	44
	1		.59	.30	.45	.42	.26	.29	.06	.43	14.2	3.9	39
	2		.43	.18	.27	.16	-.01	.02	.15	-.01	14.6	4.4	39
School	3		.45	.40	.55	.52	.27	.35	.26	.54	14.0	5.1	39
3	M		.64	.37	.56	.49	.26	.32	.28	.41	14.6	4.0	42
	1		.29	-.04	.28	.53	-.05	.03	-.01	.24	15.4	5.8	47
	2		.61	.50	.39	.48	.17	.52	.44	.56	15.8	5.6	47
School	3		.24	.00	.44	.54	.20	.12	-.06	.30	14.8	4.6	47
4	M		.42	.15	.36	.61	.17	.27	.16	.39	15.3	5.0	47

TABLE A-2. The Intercorrelations Between Family Background, Scale B, and the Other Scales, by the Interviewers in Each School.

		A	B	C	D	E	F	G	H	I			
	1	.40		.61	.35	.46	.33	.46	.49	.36	15.9	3.2	53
	2	.27		.69	.38	.36	.13	.45	.51	.45	16.2	4.2	53
School	3	.27		.61	.46	.54	.38	.59	.39	.53	13.1	4.0	53
1	M	.39		.65	.34	.47	.32	.55	.49	.53	14.8	3.5	75
	1	.43		.74	.52	.46	.43	.68	.57	.57	15.2	3.5	44
	2	.54		.59	.53	.63	.37	.54	.51	.56	16.3	4.9	44
School	3	.61		.73	.54	.49	.42	.69	.64	.74	15.6	2.7	44
2	M	.53		.67	.55	.55	.40	.68	.64	.69	15.7	3.2	44
	1	.59		.33	.30	.58	.31	.40	.41	.49	15.6	4.2	39
	2	.43		.42	.40	.45	.10	.37	.47	.42	16.7	3.4	39
School	3	.45		.46	.47	.56	.12	.34	.21	.41	16.0	4.2	39
3	M	.64		.54	.53	.74	.30	.52	.50	.60	16.4	3.5	42
	1	.29		.59	.39	.30	-.04	.56	.53	.59	15.7	4.2	47
	2	.61		.81	.67	.69	.31	.83	.79	.85	16.3	4.5	47
School	3	.24		.69	.44	.57	.20	.71	.56	.72	15.3	3.4	47
4	M	.42		.76	.57	.61	.26	.79	.72	.79	15.7	3.6	47

AVIATION INTERVIEW RATING SCALE DATA

TABLE A-3. The Intercorrelations Between Social Adjustment, Scale C, and the Other Scales, by the Interviewers of Each School.

		Academic Background A	Family Background B	Social Adjustment C	Desire to Fly D	Hobbies E	Athletics F	Personality G	Physical Appearance H	Fitness for Fl. Training I	Mean	Standard Deviation	N
	1	.55	.61		.42	.70	.48	.81	.78	.65	14.6	3.5	53
	2	.36	.69		.64	.58	.40	.81	.83	.77	16.0	5.3	53
School	3	.29	.61		.58	.45	.61	.87	.73	.71	14.8	4.0	53
1	M	.44	.65		.50	.71	.52	.87	.83	.81	15.4	3.6	75
	1	.63	.74		.60	.58	.46	.81	.80	.78	15.6	4.4	44
	2	.63	.59		.62	.73	.67	.68	.67	.72	17.5	4.9	44
School	3	.62	.73		.60	.49	.49	.81	.80	.75	15.6	2.5	44
2	M	.75	.67		.68	.66	.58	.84	.82	.84	16.1	3.2	44
	1	.30	.35		.14	.48	.69	.79	.61	.79	16.7	5.0	39
	2	.18	.42		.34	.47	.52	.78	.74	.78	15.1	4.9	39
School	3	.40	.46		.43	.58	.59	.91	.82	.72	15.9	5.4	39
3	M	.37	.54		.39	.61	.71	.91	.83	.90	16.1	4.5	42
	1	-.04	.59		.43	.32	.27	.89	.83	.78	14.4	4.6	47
	2	.50	.81		.56	.61	.37	.92	.94	.89	14.5	5.4	47
School	3	.00	.69		.43	.51	.42	.94	.83	.83	14.2	4.1	47
4	M	.15	.76		.54	.56	.44	.95	.93	.88	14.4	4.4	47

TABLE A-4. The Intercorrelations Between Desire To Fly, Scale D, and the Other Scales, by the Interviewers of Each School.

		A	B	C	D	E	F	G	H	I			
	1	.33	.35	.42		.50	.31	.39	.25	.50	10.1	6.3	53
	2	.48	.38	.64		.72	.31	.66	.56	.69	15.0	6.1	53
School	3	.47	.46	.58		.72	.40	.43	.38	.63	13.1	5.6	53
1	M	.36	.34	.50		.74	.36	.51	.43	.66	12.9	5.4	75
	1	.71	.52	.60		.74	.41	.56	.59	.81	12.9	5.7	44
	2	.79	.55	.62		.85	.66	.80	.74	.84	14.7	6.8	44
School	3	.53	.54	.60		.71	.51	.80	.51	.79	14.2	4.4	44
2	M	.75	.55	.68		.82	.59	.77	.69	.86	14.0	5.1	44
	1	.45	.30	.14		.48	.04	.10	-.05	.21	13.6	5.0	39
	2	.27	.40	.34		.47	.07	.38	.41	.55	14.7	3.8	39
School	3	.55	.47	.43		.68	.35	.51	.45	.75	16.2	4.3	39
3	M	.56	.53	.39		.76	.25	.44	.46	.62	15.2	4.1	42
	1	.28	.39	.43		.69	.20	.39	.27	.67	15.8	4.9	47
	2	.39	.67	.56		.82	.25	.60	.55	.74	17.3	5.4	47
School	3	.44	.44	.43		.72	.22	.51	.32	.70	16.3	3.8	47
4	M	.36	.57	.54		.80	.34	.58	.47	.77	16.5	4.5	47

AVIATION INTERVIEW RATING SCALE DATA

TABLE A-5. The Intercorrelations Between Hobbies, Scale E, and the Other Scales, by the Interviewers of Each School.

		Academic Background A	Family Background B	Social Adjustment C	Desire to Fly D	Hobbies E	Athletics F	Personality G	Physical Appearance H	Fitness for Fl. Training I	Mean	Standard Deviation	N
	1	.59	.46	.70	.50		.56	.60	.50	.63	12.5	4.1	55
	2	.68	.36	.58	.72		.56	.65	.55	.65	14.8	5.1	55
School	3	.46	.54	.45	.72		.41	.54	.44	.66	13.3	4.1	55
1	M	.63	.47	.71	.74		.57	.69	.58	.79	13.9	3.8	75
	1	.71	.46	.58	.74		.30	.53	.58	.69	14.1	5.0	44
	2	.80	.65	.73	.85		.69	.77	.69	.85	15.1	6.5	44
School	3	.57	.49	.49	.71		.37	.64	.58	.63	14.9	3.1	44
2	M	.78	.55	.66	.82		.55	.76	.67	.80	14.8	4.4	44
	1	.42	.58	.48	.48		.51	.51	.45	.60	15.9	3.0	39
	2	.16	.45	.47	.47		.14	.42	.43	.59	16.3	4.0	39
School	3	.52	.56	.58	.68		.43	.56	.50	.76	15.4	4.9	39
3	M	.49	.74	.61	.76		.44	.61	.62	.77	16.1	3.2	42
	1	.55	.30	.32	.69		.17	.32	.16	.52	16.5	4.5	47
	2	.48	.69	.61	.82		.19	.64	.61	.72	17.9	4.2	47
School	3	.54	.57	.51	.72		.33	.58	.42	.68	16.7	3.5	47
4	M	.61	.61	.56	.80		.32	.60	.47	.72	17.0	3.5	47

TABLE A-6. The Intercorrelations Between Athletics, Scale F, and the Other Scales, by the Interviewers of Each School.

		A	B	C	D	E	F	G	H	I			
	1	.19	.33	.48	.31	.56		.51	.38	.48	12.8	4.2	55
	2	.26	.13	.40	.31	.56		.55	.47	.55	12.4	5.5	55
School	3	.33	.38	.61	.40	.41		.66	.63	.70	14.1	3.6	55
1	M	.29	.32	.52	.36	.57		.60	.49	.61	13.2	3.6	75
	1	.36	.43	.46	.41	.30		.55	.65	.57	13.6	3.4	44
	2	.66	.37	.67	.66	.69		.78	.71	.74	15.2	5.7	44
School	3	.41	.42	.49	.51	.37		.52	.40	.59	14.9	3.1	44
2	M	.54	.40	.58	.59	.55		.70	.68	.71	14.6	3.4	44
	1	.26	.31	.69	.04	.51		.64	.55	.71	17.2	5.3	39
	2	-.01	.10	.52	.07	.14		.59	.40	.51	15.5	5.9	39
School	3	.27	.12	.59	.35	.43		.58	.55	.60	15.4	4.5	39
3	M	.26	.30	.71	.25	.44		.67	.60	.68	16.5	4.5	42
	1	-.05	-.04	.27	.20	.17		.41	.28	.40	12.6	3.6	47
	2	.17	.31	.37	.25	.19		.44	.43	.45	11.7	4.2	47
School	3	.20	.20	.42	.22	.33		.44	.45	.37	13.2	2.8	47
4	M	.17	.26	.44	.34	.32		.53	.44	.52	12.4	3.1	47

AVIATION INTERVIEW RATING SCALE DATA

TABLE A-7. The Intercorrelations Between Personality, Scale G, and the Other Scales, by the Interviewers of Each School.

		Academic Background A	Family Background B	Social Adjustment C	Desire to Fly D	Hobbies E	Athletics F	Personality G	Physical Appearance H	Fitness for Fl. Training I	Mean	Standard Deviation	N
	1	.45	.46	.81	.39	.60	.51		.77	.85	14.4	4.9	53
	2	.44	.45	.81	.66	.65	.55		.87	.92	14.9	6.0	53
School	3	.30	.59	.87	.43	.54	.66		.77	.86	13.8	5.0	53
1	M	.43	.55	.87	.51	.69	.60		.87	.90	14.3	4.3	75
	1	.62	.68	.81	.56	.53	.55		.83	.83	14.6	5.0	44
	2	.71	.54	.68	.80	.77	.78		.89	.84	15.8	5.7	44
School	3	.60	.69	.81	.80	.64	.52		.78	.90	14.9	3.3	44
2	M	.72	.68	.84	.77	.76	.70		.92	.92	15.0	4.0	44
	1	.29	.40	.79	.10	.51	.64		.75	.91	15.9	5.1	39
	2	.02	.37	.78	.38	.42	.59		.82	.87	16.1	5.7	39
School	3	.35	.34	.91	.51	.56	.58		.90	.79	15.1	5.5	39
3	M	.32	.52	.91	.44	.61	.67		.88	.92	16.0	4.5	42
	1	.03	.56	.89	.39	.32	.41		.87	.84	13.9	4.3	47
	2	.52	.83	.92	.60	.64	.44		.92	.92	12.9	6.4	47
School	3	.12	.71	.94	.51	.58	.44		.85	.90	13.9	4.6	47
4	M	.27	.79	.95	.58	.60	.53		.91	.92	13.7	4.5	47

TABLE A-8. The Intercorrelations Between Physical Appearance, Scale H, and the Other Scales, by the Interviewers of Each School.

		A	B	C	D	E	F	G	H	I			
	1	.45	.49	.78	.25	.50	.38	.77		.68	15.7	4.5	53
	2	.36	.51	.83	.56	.53	.47	.87		.87	13.8	6.0	53
School	3	.25	.39	.73	.38	.44	.63	.77		.75	14.5	4.6	53
1	M	.37	.49	.83	.43	.58	.49	.87		.82	14.7	4.0	75
	1	.66	.57	.80	.59	.58	.65	.83		.83	14.8	5.4	44
	2	.69	.51	.67	.74	.69	.71	.89		.83	16.6	5.0	44
School	3	.51	.64	.80	.51	.58	.40	.78		.73	16.2	3.0	44
2	M	.70	.64	.82	.69	.67	.68	.92		.87	16.0	3.9	44
	1	.06	.41	.61	-.05	.45	.55	.75		.65	17.6	4.3	39
	2	.15	.47	.74	.41	.43	.40	.82		.76	16.1	5.1	39
School	3	.26	.21	.82	.45	.50	.55	.90		.69	14.9	4.7	39
3	M	.28	.50	.83	.46	.62	.60	.88		.84	16.4	3.9	42
	1	-.01	.53	.83	.27	.16	.28	.87		.75	14.6	4.1	47
	2	.44	.79	.94	.55	.61	.43	.92		.90	14.3	5.9	47
School	3	-.06	.56	.83	.32	.42	.45	.85		.75	13.3	3.9	47
4	M	.16	.72	.93	.47	.47	.44	.91		.87	14.1	4.0	47

AVIATION INTERVIEW RATING SCALE DATA

TABLE A-9. The Intercorrelations Between Fitness for Flight Training, Scale I, and the Other Scales, by the Interviewers of Each School.

		Academic Background A	Family Background B	Social Adjustment C	Desire to Fly D	Hobbies E	Athletics F	Personality G	Physical Appearance H	Fitness for Fl. Training I	Mean	Standard Deviation	N
	1	.56	.36	.65	.50	.63	.48	.85	.68		12.3	5.9	53
	2	.53	.45	.77	.69	.65	.55	.92	.87		12.2	6.3	53
School	3	.54	.53	.71	.63	.66	.70	.86	.75		12.3	4.8	53
1	M	.58	.53	.81	.66	.79	.61	.90	.82		12.3	4.7	75
	1	.82	.57	.78	.81	.69	.57	.83	.83		12.0	6.3	44
	2	.90	.56	.72	.84	.85	.74	.84	.83		13.1	7.2	44
School	3	.59	.74	.75	.79	.63	.59	.90	.73		12.1	5.1	44
2	M	.84	.69	.84	.86	.80	.71	.92	.87		12.4	5.6	44
	1	.43	.49	.79	.21	.60	.71	.91	.65		15.0	6.1	39
	2	-.01	.42	.78	.55	.59	.51	.87	.76		15.1	6.3	39
School	3	.54	.41	.72	.75	.76	.60	.79	.69		15.6	5.8	39
3	M	.41	.60	.90	.62	.77	.68	.92	.84		15.6	4.9	42
	1	.24	.59	.78	.67	.52	.40	.84	.75		14.0	4.6	47
	2	.56	.85	.89	.74	.72	.45	.92	.90		14.5	7.0	47
School	3	.30	.72	.83	.70	.68	.37	.90	.75		12.9	4.1	47
4	M	.59	.79	.88	.77	.72	.52	.92	.87		13.8	4.6	47