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ABSTRACT

Two methods for aiding workers to realize success in their job search process were investigated in the present study. These approaches involved the use of computerized systems for matching workers and employers for interviews that supposedly were mutually satisfying. The two approaches are identified as first generation and second generation computerized systems and differ in their level of sophistication for identifying "best" vs. "acceptable" interview pairings of workers and jobs, with the latter system incorporating the features of the former system plus additional inputs and outputs for evaluating interview quality. The subjects were persons seeking professional employment in the public schools. It appeared that for the procedure followed in this study, the second generation system did not substantially improve the results obtained from the first generation system. Several issues associated with this finding are discussed. (Author)

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A BEHAVIORAL-DECISION THEORETIC APPROACH FOR COMPUTERIZED MAN-JOB MATCHING SYSTEMS

by

David L. Ford, Jr.

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A Behavioral-Decision Theoretic Approach for Computerized Man-Job Matching Systems[1,2]

The labor market is very dynamic in nature and there is a continuous flow of workers into and out of the labor force. Even within the labor force there is a steady change from the employed status to the unemployed status and vice versa. Among the categories of workers that contribute to an increase in the size of the unemployed labor force, persons who have just entered the labor force but have not yet found jobs contribute the largest proportion.

In his review of the literature, Dalal (1969) synthesized eight major factors that affect the ability of a worker to find employment:

1. availability of jobs in the labor market and the level of economic activity.
2. the availability of information on the labor market.
3. the worker's age, sex and race.
4. the worker's skill and education.
5. the worker's financial resources and family responsibilities.
6. the worker's aspiration level.
7. the worker's motivation.
8. the worker's occupational and geographical mobility.

These factors are not independent of each other. They are closely related and the complicated nature of their relationship makes the study of the job search problem more difficult. While all of the above factors play an important part in determining a worker's search behavior, perhaps the second factor plays a much more important role than one would anticipate.

The relationship between the number of information channels used and the success in finding a job has been shown to be positive (Sheppard and Belitsky, 1966). Sometimes workers tend to confuse the lack of availability of jobs with the lack of information on the jobs. The study by Sheppard and Belitsky showed that about 85% of the unemployed blue collar workers registered with the employment service in Erie, Pennsylvania used as sources of information about jobs the employment service, company hiring gate, friends and relatives, and newspaper advertisements. This finding is consistent with the findings of an earlier study by Parnes (1954) on blue collar workers concerning sources of information about jobs.

Mayers and Shultz (1951) note that for most of the workers successful in finding new jobs after layoff, there was a lack of alternatives to compare. The workers' behavior seemed to be a rational adaptation of the circumstances as they saw them. Wilcock and Franke (1963) reported that displaced workers who had been laid off did not have detailed knowledge of the local labor markets. The workers did not know if the jobs for which they might qualify were few or plentiful. Their perception of the job market, however vague or distorted, influenced the ways in which they looked for jobs.

Given that most workers involved in the job search process lack detailed information which would enable them to better utilize their time and effort, the field is fertile for the use of a system which would greatly enhance the job search capability of the individual workers and, at the same time, be of use to prospective employers seeking certain types of workers. It seems plausible that an emploment service, either public or private, could be of tremendous potential use in this area, particularly if their operations involve a computerized system for evaluating job requirements and worker qualifications. One of the primary tasks of employment services is the determination and recommendation of those interviews between job candidates and employers with job openings that are likely to result in mutually satisfying employment agreements (Holt and Huber, 1969). The computer can effectively consider an enormous amount of information in a very short period of time.

In fact, the application of computer technology to the area of labor market placement problems has received increased attention over the past several years, with broader and better utilization of the computer in this area envisioned in the not too distant future.[3] However, the effectiveness of such operating systems has not sufficiently been delineated to complement the current enthusiasm concerning their use.

The outgrowth of further empirical research effort in this area, however, could be the use by the computer of decision models approximating those of the persons involved which would allow it to consider an abundance of information about many alternative jobs and candidates, theoretically resulting in interview pairings which would be better than those that would result from manual file searches. In addition, Holt and Huber suggest that "the optimum distribution of effort among computers and people should enable each of the candidates to concentrate time consuming interviews on a relatively small number of promising vacancies, and each of the employers similarly to interview a relatively small number of promising candidates" (Holt and Huber, 1969, p. 574).

Indeed, the interest of both the employer and the job candidate would be served due to the fact that work organizations are interested in better understanding the process of organizational choice to achieve more optimal results from their recruiting activities, particularly those concerning college students. There is also a concern for helping the prospective employee to understand his organization choice process so that he can more effectively choose from among the job opportunities which are desirable to him. In the present-day labor market, employers are faced as much with the problem of successfully recruiting from the restricted supply of available technical, professional, and skilled persons as they once were with selecting these same types from a relatively more abundant supply. For this reason, a more thorough understanding of the organizational choice process, from the point of view of the individual in the process of selecting an organization, is necessary.

On reviewing the industrial social psychological literature, one finds that the impetus to the study of the organizational choice process came with Vroom's (1964) presentation of a theory of preferences and choices among outcomes. According to Vroom, the force in the direction of a particular decision is a function of the sum of the multiplicative combination of the valences of decision outcomes (goal objects) and the expectancy that a particular decision will lead to the occurrence of the outcome, where "the valence of an outcome to a person is a monotonically increasing function of the algebraic sum of the products of the valences of all other outcomes and his conceptions of its instrumentality for the attainment of these outcomes" (Vroom, 1964, p. 17).

Pieters, Hundert, and Beer (1968) utilized Vroom's formulation in predicting acceptors and rejectors of a single company's job offer. An index of attractiveness of the chosen and rejected company offers were calculated by summing the products of valence of job goals and "attractiveness" of the companies on those job goals. In 86% of the cases the "index of attractiveness" (sum of products in importance and attractiveness) was higher for the accepted than for the rejected organization. This study thus provides support for Vroom's instrumentality-goal proposition of the relationship between job preferences and work goals.

Similar results were obtained in a study of job preference prediction by Huber, Daneshgar, and Ford (1971) in which a model incorporating the sum of the products of importance of a job factor times the individual's utility or satisfaction with some level of that factor relative to the other levels of the same factor was shown to be a more consistent predictor of job preference than was an unweighted model. However, just the opposite of this result was found by Sheard (1970) who used a simpler model involving only the sum of the instrumentality ratings of job factors.

One possible explanation for the failure of the instrumentality-valence-goal model to provide improved prediction over the simpler instrumentality sum suggested in the Sheard (1970) study is that the goals of the subjects involved (who were college students) were not well enough established and integrated by the individuals to provide a meaningful influence upon preference among types of organizations. This could also be an explanation for the Huber, et.al. (1971) and Pieters, et.al. (1968) studies. It may be that this phenomenon of importance of work goals failing to influence overall valence for jobs is not unique to college students who are considering prospective types of organizations in which to work. The criterion measure in the Sheard (1970) study was anticipated job satisfaction by working in particular types of organizations. One of the criterion measures in the Huber, et.al. (1971) study was perceived satisfaction with a teaching job having certain characteristics. In a study by Ewen (1967) an eight point measure of the importance of the components of the job were multiplied by satisfaction with those components. Correlations between the weighted and unweighted totals correlated .99 with each other. The weighting procedure did not provide an improvement over the sum of the satisfactions with the job. A similar finding is reported by Mikes and Hulin (1968). In this study the prediction of turnover of female office employees was not improved by the inclusion of importance as a multiplier of satisfaction with elements of the job. All these research findings imply that further tests of the instrumentality goal hypothesis under similar conditions in an organizational context is needed before greater agreement among researchers can be obtained.

Admittedly, the relationship between job candidates' perceptions of the inducements offered by the prospective employers and their expectations of rewards to be derived from the job itself need further investigation. The correspondence between the individual's need set and the organization's reinforcer system (satisfaction) is an integral part of a theoretical framework by Darwis, England, and Lofquist (1964) which attempts to explain and ultimately predict an individual's adjustment to the work place.

They posit that work adjustment is a function of employee satisfaction as well as satisfactoriness, which they define as the organization's evaluation of the individual's work behavior in terms of performance. Satisfactoriness is assumed to be a function of the correspondence between the requirements imposed by the task on the job and the abilities possessed by the employee (Schwab and Cummings, 1970). Empirical testing of this hypotnesis with newly hired workers would possibly add insight into the man-job matching problem.

These detailed introductory remarks have served to illustrate and emphasize the number and complexity of items which have to be considered in order to effect a "good" match between the job and the worker. The considerations of both parties involved and their relationships suggest a need for an efficient method of coping with the decisions involved in effecting as near an optimal man-job match as possible. Inevitably, our friend the computer appears as a potential mechanism for "making order out of what is taken to be the chaos of fractionalized and informal flows of information about jobs and job seekers" (Kellog, 1967, p. 71). Yet, one must not become too overly optimistic about the effect that a computerized man-job matching system can have. Indeed, Huber and Ullman(1973) discuss a number of shortcomings associated with several functioning job bank systems. Even though the computerized system would be an improvement over a manual type operation, one disadvantage of the computerized system is that it results in a considerable information loss at the same time. Four descriptions are needed for the computer system: (1) a description of the candidate's qualifications, (2) a description of the employer's requirements in terms of candidate qualifications, (3) a description of the job characteristics, and (4) a description of the candidate's requirements in terms of job characteristics. Information is usually lost in coding these descriptions for input into the computer, e.g., new data is represented by a number which could also represent other data, exceptions cannot be coded, and the information used is updated only periodically. In a sense, information is also lost in that the system output is coded in binary form, i.e., all acceptable interviews are communicated to the parties involved or the agency as being **equally** satisfactory, but in fact, some acceptable interviews are better than others in terms of the decision-maker's requirements.

A major improvement, which can be introduced in order to aoivd the information lost by identifying interviews as simply acceptable or unacceptable, is the computation of a measure of interview merit which is presumably monotonically related to (1) the probability of a job offer, (2) the probability of a job acceptance given an offer, or (3) some function of these two probabilities. For each candidate-job pairing for which the minimum requirements of both parties are satisfied, a measure of merit is developed which indicates to the computer, employment counselor, or the parties themselves the relative fruitfulness of the potential job interviews.

Conceptually, then, an optimal approach to the computerized man job matching problem involves the use of functional estimates of satisfactions (measured in terms of the candidate's evaluation of the job) and productivities (measured in terms of the employer's assessment of the candidate) and of probabilities of job offers and acceptances in the matching programs. Several attempts at making these concepts operational have been undertaken (e.g., see Ford, Huber, and Gustafson, 1972; Huber, et.al. 1971; Huber and Falkner, 1969) but much more research is needed before significant breakthroughs in the optimum allocation of personnel is realized. The present study reflects an attempt to develop a computer-assisted interview listing system for use by consultants and placement counselors of a placement service. The study involved the design of an experiment with control elements to investigate two alternative methods for providing these interview listings. The two approaches are labeled as first generation and second generation computerized systems for identification purposes in the present study. The independent variables of interest in the study were the levels of (a) mathematical-computer programs, (b) measures of potential interview effectiveness, i.e., methods of estimating probabilities and utilities associated with a proposed interview, and the interaction of (a) and (b) with regard to a variety of dependent variables such as length of job search, cost of system operations, perceived candidate satisfactions, etc. Job choice behavior and job search behavior of the subjects were observed and were used as indicators of the performance effectiveness of the two systems involved. Of particular interest is the improvement, if any, of the second generation system performance over the first generation system.

Since research of this type is in its early stages, this study must be considered exploratory and its findings tentative. The single hypothesis for the study, then, was that the performance of the second generation system would be significantly better than the performance of the first generation system with regard to the dependent variables studied.

EXPERIMENTAL METHOD

Subjects: The experimental subjects were all seeking professional employment in the public schools. All 85 subjects were inexperienced persons just completing their bachelors or masters degrees and were seeking their first teaching jobs. All of the subjects were registered with the teacher placement bureau of a large university. The number of persons originally contacted were 200, but only 125 returned the first questionnaire described below and only 85 returned both a correctly completed first questionnaire and took a new teaching job. Some of the subjects went into graduate schools, entered the military services, or did not take jobs for other reasons not reported. The original 200 subjects contacted were assigned to control and experimental groups of 100 subjects each and were used with the first generation and second generation systems, respectively. Of the 85 subjects used in the study, 40 were control subjects and 45 were experimental subjects.

Experimental Setting: Except for the differences in the first and second generation computerized matching systems to be described below, in all other respects the operations of the teacher placement bureau were utilized in both systems. Basically, the operations of the placement bureau involved the use of computers to make over 2000 placements a year for both recent and non-recent graduates of the university. Each year over 5000 students and alumni, of which some 3200 are active registrants, use this particular bureau's services and over 2000 administrators seek advice and help. Over 100,000 vacancies per year from all over the world have been reported in recent years and some 24,000 sets of credentials containing personal data and references on the candidates registered have been sent out, which gives some idea of the size of the operation involved. An IBM 360 computer was used to suggest "acceptable" interviews to a consultant who then made final interview recommendations by adding or deleting interviews from the computer listings as appropriate. On the basis of the computer listings, employers received nomination notices indicating those candidates who met the minimum requirements for the jobs they had been matched.[4] The candidates then made arrangements for actual interviews with the employers.

Among the purposes of the teacher placement bureau, as stated in a recent annual report, were the following:

"1. To register, interview, and counsel with individuals seeking employment in the education profession and to recommend them to appropriate employers.

2. To process job vacancies reported so that they may be categorized and distributed to interested and qualified job applicants as expeditiously as possible.

3. To act as liason or 'broker' between the job seeker and employer and to attempt to assure, whenever possible, that each position is filled with the best candidate available and that each candidate receives maximal opportunity commensurate with his ability."[5]

Internally, it was difficult to measure objectively to what degree the above functions were performed effectively and efficiently by the bureau.

As a party external to the placement bureau operations, this author attempted to objectively ascertain how effective the functions were being performed and to recommend, when possible, ways to provide the placement consultants with a more useful computer output. The study reported here is the result of part of that effort. It was hypothesized that the possible payoffs associated with the performance variables shown in Table 1 would accrue from the experimental or second generation computerized system. That is, the differences in performance of the two systems would be in the directions indicated in Table 1.

Insert Table 1 Here

Procedure: Two types of information were obtained from the subjects using questionnaires. The first type of information was obtained during the initial stages of the subjects' job search, shortly after their registration with the teacher placement bureau. This information concerned the likelihood of job acceptance which they ascribed to the individual levels of the job factors shown in Table 2. This information served as inputs to the second generation system. The second type of information was obtained after the subjects had terminated their job search process. It concerned the subjects' perceived satisfactions with the job they had accepted and the service provided them by the placement bureau. This information served as the measures of performance against which the two systems were evaluated. Not all of the subjects who returned the first questionnaire returned the second.

Insert Table 2 Here

The first type of information was obtained by having each subject estimate for each level of each factor shown in Table 1 the posterior odds ratio, $P(A \mid C_{mn})/P(R \mid C_{mn})$, in favor of their accepting a job if it was characterized by the nth factor at the mth level alone, where $P(A \mid C_{mn})$ and $P(R \mid C_{mn})$ are the posterior probabilities of accepting and rejecting, respectively, an alternative given that it has characteristic C_{mn}. Subjects also estimated their prior odds in favor of acceptance vs. rejection of a job offer, i.e., $P(A)/P(R)$.

The second type of information was obtained by having each subject evaluate, in terms of percent satisfaction, the job offer which he actually accepted and the service he received from the placement bureau in helping him find the type of job he desired. These measures were recorded on a 0 - 100 scale.

The first type of information was used as inputs to the Bayesian Odds Model, equation (1) (Ford, et.al., 1972), to predict the job choices of the candidates.

$$\frac{P(A \mid C_j)}{P(R \mid C_j)} = \prod_{n=1}^{5} \left[\frac{P(C_{mn} \mid A)}{P(C_{mn} \mid R)} \right] \left[\frac{P(A)}{P(R)} \right], \quad (1)$$

where $\dot{C}_j$ represents a particular five-element job profile or subset of the possible 26 C_{mn} factor levels shown in Table 2 for the jth job. Ideally, one would expect the posterior odds ratio $P(A \mid \dot{C}_j)/P(R \mid \dot{C}_j)$, to be highest for the job actually chosen by a candidate from among the alternatives available to him. Equation (1) served as an integral part of the second generation system. The posterior odds ration, $P(A \mid \dot{C}_j)/P(R \mid \dot{C}_j)$, was converted into an index of interview quality for a proposed interview pairing between a candidate and employer by recovering the posterior probability of job acceptance, $P(A \mid \dot{C}_j)$, denoted here as the subject's propensity to accept a job, from the odds ratio as shown in equation (2). This information or index of interview quality, which was based on the candidate's own preference model as described to us in the questionnaire he completed, was made available to the experimental subjects involved with the second-generation system.

$$P(A \mid \dot{C}_j) = \frac{1}{1 + \left[P(R \mid C_{mn})/P(A \mid C_{mn})\right]} \qquad (2)$$

Both computerized systems in the present study were essentially sequential file search systems. The first generation or control system had been used by the placement bureau with which the subjects were registered and was such that job files and candidate files were searched to find "acceptable" matches between jobs and candidates. The second generation or experimental system went a bit further in that it attempted to determine the 'quality' of the matches resulting from the control system.

This additional data concerning the quality of a particular match was forwarded to each experimental subject which enabled him to do additional screening of the jobs referred to him, hopefully increasing the likelihood of him finding the "best" jobs rather than mere "acceptable" ones, based on the implicit importance of the job factors to the candidate himself.

RESULTS

Job search and job choice behavior of the subjects were observed and used to determine how well each of the two computerized systems effectively served the needs of the job candidates registered with the teacher placement bureau. Quantitative measures of the variables in Table 1 are compared for both systems in Table 3. The comparisons between the mean values of particular performance measures for both systems were made using t-tests (cf. DuBois, 1965). Significance levels given refer to either a one-tailed or two-tailed distribution, depending on the nature of the comparison. When other tests were used, that fact is indicated and the tests are described.

Insert Table 3 Here

As seen from Table 3, two of the six between-system comparisons are in the hypothesized direction in favor of the second generation system, namely, variables 2 and 5. The remaining variables show results in the opposite direction. However, in none of the comparisons are the absolute magnitudes of the values significantly different from each other. In fact, the hypothesis that there was no difference between the outcomes of the two systems with respect to the first four performance variables could not be rejected even at the .10 level of significance using a t-test for comparison. In addition, the percentage values for the last two performance variables shown in Table 3 do not differ significantly, even at the .10 level, when the two systems are compared using a Chi Square test for two independent samples (Siegel, 1956).

Examination of the results within the systems reveals that the subjects' mean satisfaction with the jobs they actually accepted was significantly higher than their mean satisfaction with the service they received from the placement bureau (p .01 for the second generation system and p .05 for the first generation system).

With respect to the percentage of vacancy notices resulting in contacts, it cannot help but be disappointing that for the subjects used in this study, irrespective of the system with which they were involved, less than eight percent of the vacancy notices which were mailed to the subjects resulted in contacts, either in the way of scheduling an interview with the employer or actually applying for the particular job. While the percentage was slightly higher for the second generation system, the anticipated larger percentage for this system did not result. One possible explanation could be that subjects involved with the second generation system made little use, if any, of the additional information at their disposal concerning the jobs with which they were matched. If the additional information indicated that the index of quality for some of the jobs was below some subjective cutoff point in the subject's mind, this would perhaps prevent him from further pursuing these alternatives which would, in turn, result in fewer contacts for the second generation subjects, whereas the subjects involved with the first generation system would probably pursue each alternative available to them since they did not have the additional data to help them initially screen their alternatives.

Of the reasons reported by the subjects for not being interested in a particular job, location accounted for 72% of the reasons in the first generation system and 82% of the reasons in the second generation system. This finding is interesting in that when the subjects registered with the bureau they were allowed to specify up to four preferences for specific locations if they had any. Since supposedly the matching algorithm considered the minimum requirements specified by the candidate and the employer, the fact that such a large percentage of the lack-of-interest reasons is attributed to location is certainly unexpected and out of line. Of course, if an individual did not specify any location preference, he received pairings from all parts of the country which met all other requirements. Yet, even many of these subjects indicated lack of interest due to location which implies a preference of some sort that was not specified earlier.

One of the questions that has to be answered is whether the slight improvement in performance of the second generation system over the first generation system in the two areas where it occurred was worth the costs involved. Expenditures for computer time and other miscellaneous costs associated with the first generation system amounted to approximately $1250. For the time period during which the data was collected (approximately 6 months), the second generation system required approximately 80 manhours for design and setup, and approximately 250 manhours of operating time. The second generation system operating costs over and above those for the first generation system, thus amounted to approximately $1,850, including manpower costs, with only a very slight increase in perceived satisfaction of the jobs taken by the subjects. If an increase in satisfaction, however, slight, or a decrease in search time on the part of the subjects, however slight, is deemed desirable, then perhaps the costs of the second generation system can be justified. However, this determination is one which requires further analysis and implies certain policy decisions which this author was in no position to make. We therefore draw no strong conclusions along these lines at this time. Certain other factors which might have contributed to the results obtained are discussed below.

DISCUSSION

Each year many thousands of college graduates begin their work careers. Many others, e.g., high school seniors, vocational school and technical program graduates, enter the labor force as well. The organization they join is determined by mutual agreement between the organization and the graduate. The organization seeks to find the best person for the job and the individual seeks to find the organization in which he feels his needs will best be satisfied. Through a complex market composed of a supply of workers and the organizations' demands for their services, individuals are matched with jobs. This study has focused upon how this matching process might be effected more efficiently through the use of computerized matching systems rather than manual processes. While researchers have traditionally focused on the process by which an organization determines which of several applicants is best suited for the job, comparatively little attention in the way of empirical investigation has been given to studying the nature of the process by which an individual determines the organization with which he will accept employment. This process has been termed "organizational choice behavior" (Vroom, 1966). The focus of this study was a computerized approach to the job search and job choice behavior of new teachers and their perceived satisfactions with their new job resulting from their search efforts, given that they had offers for jobs with which they had been matched.

An individual's assessment of the consequences following from the selection of a particular job is subjectively determined by his value system. The extent to which the person gets the outputs he wants in the proportions he wants them constitutes the level of occupational utility, which is equivalent with the psychologist's "job satisfaction" (Kaldor and Zytowski, 1969). Thus, the level of occupational utility is a function of a set of variables which the person believes to be relevant to his choice. The person's most preferred job should be that which he expects will give him the most of what he wants-that one which maximizes his occupational utility function.

An intuitively satisfying proposition is one which suggests that an individual's job search activity will terminate with him accepting a job for which he has the highest probability or propensity to accept, given no other overriding factors. This idea is consistent with the maximization of occupational utility premise. The fact that the proportion of subjects in the present study who chose jobs for which the predicted propensity of acceptance was the highest among the alternatives available to them was moderately greater than half for first generation system subjects and scarcely greater than half for subjects used with the second generation system does not appear to substantiate this proposition, however, if one were to expect considerably more than half the subjects to choose jobs for which their propensity of acceptance was highest.

While a number of the subjects chose jobs for which the predicted propensity of acceptance was not the highest, the range of the subjects' expressed perceived satisfactions with their chosen jobs ranged from [illegible]0% to 100% for the first generation subjects and 55% to 100% for the second generation subjects, with the mean satisfactions being 86% and 88%, respectively. This might suggest that some of the subjects experienced what Festinger (1968) terms post-decisional cognitive-dissonance reduction in which they more favorably evaluated their choice which, known to them, was not the best job which they might have had if certain factors had not entered the picture. However, on closer examination of the data, interesting sex differences were apparent, whereby female subjects in both groups tended to evaluate their chosen jobs more favorably than did males. These differences in stated job satisfactions were not significant nor were within-sex comparisons between the experimental and control subjects with respect to satisfaction with the chosen job. The same pattern was apparent with respect to subjects' stated satisfaction with the service provided by the placement bureau. Thus, it appears males might have been more critical in their job search process. Other field conditions or factors which might have had an adverse effect on the results of the present study are comparable to those we have experienced in earlier studies (cf. Huber, et. al., 1971; Ford, et. al., 1972):

1. The job hunt and interview experiences of the subjects, between the time that they completed our first questionnaire and the time that they actually accepted jobs. might have modified the subjective odds estimates of these candidates. The average time elapsed was three months, due primarily to the fact that they typically did not make their choices until shortly before the end of the academic year, rather than due to a lack of availability of job alternatives. This could be seen in the failure of the second generation system subjects to take jobs significantly sooner than did the first generation system subjects even though the former had information concerning the quality of the particular job match.

2. There was less than a one-to-one correspondence between the job desired and the job obtained. Although it was not possible to empirically test this hypothesis, it certainly seems probable that some of the subjects were not offered the jobs which they desired, either because the positions were filled before they could apply or because they made a poor impression at the interview, or for other unknown reasons.

3. Admittedly, a number of job choices were dictated by a rather overriding criterion which was not included in the predictive probability

model. An example criterion which applies to some candidates, which was especially true of a good number of married or engaged female subjects, is that they had to take a job in the community where their spouse took his job, which may or may not have been the most desirable locality or opportunity for that particular subject.

It appears that several important issues remain unanswered by the results of this study. First, do these subjects maintain their initial preferences into the actual decision process when they choose a job from those positions which are available to them? We have suggested that possibly they do not, in some cases. Second, the results do not provide an indication of the degree to which they envision employment in general as capable of satisfying their goals. Third, given that at times the job hunt process of the individuals is erratic and not stable, particularly with respect to their preference models, is it possible to infer this as a possible cause for the lack of substantial improvement in performance of the second generation system over the first generation system? Fourth, is the cost of development of more sophisticated computerized systems warranted in light of the results obtained in the present study? Given the exploratory nature of the present study, we are hesitant to extrapolate these results beyond the sample of subjects used here. Therefore, we do not draw any strong conclusions with respect to these issues but do feel there is an urgent need for further investigation and empirical research along these lines.

Footnotes

1. This study was supported in part by a grant from the Ford Foundation for a sutdy of the dynamics of the labor market

2. The author is indebted to Robert G. Heideman and his staff at the University of Wisconsin Teacher Placement Bureau for his cooperation and assistance.

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3. Davies (1969) suggests application to the employment of the disadvantaged worker. Huber and Ullman (1973) have reported on operating systems designed for this purpose and Huber and Falkner (1969) provide a more extensive report on the effectiveness of computerized systems in general, with a discussion of the application of research findings to future system design.

4. The subjects were notified, in most cases, only of jobs which met their minimum requirements, e.g., if a subject desired only a high school job he was not notified of jobs at any other level.

5. Annual Report, University of Wisconsin Teacher Placement Bureau, Madison, Wisconsin, 1968, p. 2.

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TABLE 1

Performance Variables

Variables of Interest	How Measured	Hypothesized Possible Payoffs
1. Length of job search	Date of job acceptance minus date of file activation	Decrease in length of job search
2. Expressed satisfaction with job chosen	Survey	Increase in satisfaction with chosen job
3. Expressed satisfaction with placement service	Survey	Increase in satisfaction with service provided by placement bureau
4. Quality of recommended interviews	Derived from predicted propensity of job acceptance	More optimal man-job match with higher prepensities of acceptance
5. Percentage of vacancy notices resulting in contacts	Ratio of returned notices with appropriate boxes checked to total number of vacancy notices mailed	Increase in the number of notices resulting in contacts
6. Percentage of subjects taking jobs with highest predicted propensity of acceptance	Ratio of number of subjects accepting jobs with highest propensity to total number of subjects	Imporved system effectiveness

TABLE 2

THE FACTORS USED IN THE QUESTIONNAIRES AND THEIR RESPECTIVE LEVELS

FACTORS	
1. Type of Position:	teaching, research, administrative,[a] coaching, special services.
2. Level of Position:	elementary, junior high, high school.
3. Size of Community:	less than 10,000; between 10,000-1000,000; between 1000,000-400,000; greater than 400,000.
4. Location:	region, state, section of state and city different from desired; state, section of state and city different from desired; section of state and city different from desired; city different from desired; region, state, section of state and city all correspond to desires.
5. Salary:	$6,000 to $14,000 in $1,000 increments.

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[a] Administrative positions were not included in the questionnaires of the inexperienced candidates, as these subjects were not qualified for administrative positions

TABLE 3

OUTCOMES OF PERFORMANCE MEASURES FOR COMPUTERIZED SYSTEMS

Performance Measure	1st Generation System (Control)	2nd Generation System (Experimental)
1. Mean length of job search (wks)	22.50 (n=40)	22.42 (n=45)
2. Mean satisfaction with chosen job (Percent)	86 (n=32)[a]	88 (n=32)
3. Mean satisfaction with placement service(percent)	67 (n=32)	62 (n=32)
4. Mean predicted porpensity of job acceptance	.68 (n=40)	.65 (n=45)
5. Percentage of vacancy notices resulting in contacts	7.15%	7.90%
6. Percentage of subjects taking jobs with highest predicted probability of acceptance	64%	53.4%

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[a] The difference in sample size is attributed to those persons who did not return the second questionnaire used in the study.

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