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PARADIGM UNCERTAINTY, GENDER COMPOSITION AND EARNINGS INEQUALITY IN SCIENTIFIC DISCIPLINES:
A LONGITUDINAL STUDY, 1972-1982

Yehouda Shenhav and Yitchak Haberfeld

ABSTRACT

Employing longitudinal analyses, the authors examine the effects of two structural factors on gender-based earnings inequality within occupational labor markets. The first factor concerned the level of paradigm uncertainty characterizing various scientific occupations, while the second refered to the gender composition of the occupations. The use of scientific fields as units of analysis enabled us to make a finer distinction between occupational labor markets than the three-digit occupational classification usually utilized in labor market studies. In the analysis the authors used two waves (1972 and 1982) from the NSF surveys of American Experienced Scientists and Engineers. The authors found that: (a) having a high proportion of females had a significant negative effect on the average earnings of

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males and of females across scientific disciplines; (b) the effect of salary level on the proportion of females in a discipline was not significant; and (c) uncertainty did not serve as a stratifying mechanism among men and women. The implications of the findings for the study of inequality are discussed.

In recent years it has become apparent that earnings inequality is affected not only by workers' individual characteristics, but also by structural characteristics of labor markets (e.g., Bridges 1980; Farkas and England 1988; Rosenfeld 1983; Semyonov 1988; Spilerman 1986; Tienda, Smith, and Ortiz 1987). Studies of gender-based differences in labor market outcomes have consistently revealed very high levels of occupational segregation (e.g., Albelda 1986; Beller 1985; Bielby and Baron 1986) and have linked such segregation to a substantial earnings inequality between men and women at work (e.g., Treiman and Hartmann 1981; Cain 1986; Pfeffer and Davis-Blake 1987; Blau and Beller 1988; Carlson and Swartz 1988; Haberfeld and Shenhav 1990).

Similarly, inequality has been explained by labor market ecology (e.g., Semyonov 1988), by economic sectors (e.g., Rosenfeld 1983), industries (Hodson and England 1986) and organizational attributes (e.g., Doeringer and Piore 1971; Baron and Bielby 1986; Villemez and Bridges 1988).

Continuing along these lines of research, we investigated two structural characteristics of scientific occupations, which in theory are likely to be associated with gender-based earnings inequality *within* occupational labor markets. The first factor, never before included in studies of wage inequality, concerned the degree of paradigmatic uncertainty characterizing scientific fields. Higher levels of uncertainty were expected to affect the use of particularistic criteria in allocating rewards within occupations. The second characteristic constituted the gender composition of an occupation. This factor was expected to affect inequality in various ways. Economic theory has suggested that as the labor supply provided by a certain group increases, its market value tends to become lower. In contrast, sociological theories have argued that the power of a group grows concomitantly with its proportion. Yet, organizational theory has suggested that occupations which are mainly populated by minority workers are labeled as such and are evaluated according to the prevailing stereotypes.

We examined the effects of paradigmatic uncertainty and gender composition on both the earnings of males and females within scientific labor markets and the overall average salary level of disciplines. Recent studies have demonstrated that occupational level analysis requires a finer distinction among groups than that obtained by the standard classifications. For example, Bielby and Baron (1986) have shown that because of problems of data aggregation, most figures of gender segregation across occupations have highly underestimated the actual level of segregation. Scientific disciplines served as our unit of analysis (see Hargens and Felmlee 1984),[1] providing us with more homogeneous groups of workers than does the standard three-digit occupational coding scheme. Note that over one-hundred scientific disciplines and fields included in our analysis have been aggregated in a conventional three-digit occupational analysis to form fewer than ten categories (US 1977). Moreover, scientists and engineers constitute a relatively homogeneous group regarding educational levels, training, and type of work, thus providing a population for which extraneous factors are conveniently controlled.

THEORETICAL BACKGROUND AND PREVIOUS FINDINGS

The Effect of Paradigm Uncertainty on Earnings Inequality

The first structural characteristic hypothesized to affect earnings inequality between men and women is the level of paradigm uncertainty of a discipline. We first provided a definition of paradigm uncertainty, and we then elaborated on the rationale for linking paradigm uncertainty with earnings inequality.

Zuckerman and Merton (1973a) have suggested that scientific fields differ in their degree of codification, defined as the extent to which a paradigm is systematically developed:

> Codification refers to the consolidation of empirical knowledge into succinct and interdependent theoretical formulations.

They further linked between the degree of codification of knowledge and the level of consensus regarding the importance of scientific performance and contribution to science. In accordance with such a formulation, paradigm uncertainty was defined in this paper as the degree to which there is a high level of consensus on the critical assumptions and basic causal relations that constitute the knowledge base of a discipline. By this definition, a high level of consensus among a discipline's members represents low paradigmatic uncertainty. Cole (1983) has translated the theoretical construct of codification into several interrelated dimensions: development of theory, quantification, cognitive consensus, predictability (ability to use theory to make verifiable predictions), rate of obsolescence (life expectancy of citations) and rate of growth. These dimensions serve below to operationalize the construct into empirical measures.

Indeed, empirical investigations have identified a clear hierarchy among scientific fields with regard to their level of codification (i.e., uncertainty level). Zuckerman and Merton (1973a, 1973b) found that physics and biochemistry were assumed to be highly codified, botany and zoology less so, while anthropology and political sciences were least codified. Rubin (1975, cited in Cole 1983) found that chemists were more likely to blame themselves when receiving low evaluations, while sociologists tended to challenge the validity of the evaluation criteria. Lodahl and Gordon (1972) examined scientists' perceptions regarding the relative degree of paradigm development in seven scientific disciplines. A clear hierarchy emerged: physics, with the highest level of paradigm development, was followed by chemistry, biology, economics, psychology, political science and sociology. In general, math, physics and chemistry were considered to be more developed whereas humanities and the social sciences were thought to be the least developed.

Our hypothesis regarding the effects of paradigmatic uncertainty on earnings inequality was derived from organizational theory, which suggests that organizational decision outcomes are strongly affected by the degree of uncertainty and discensus among members concerning evaluation and performance standards (Thompson and Tuden 1959). That is, when competence and merit are difficult to judge, decision makers rely more upon particularistic standards such as familiarity, social similarity ("homosocial reproduction" as Kanter 1977, has labeled it), tastes and statistically generalized signals in making personnel decisions[2] (Perrow 1972; Pfeffer, Salancik, and Leblebici 1976); this stands in sharp contradiction to the Weberian notion of universalism as a key component of bureaucratic

organization. It is clear that such particularism may carry the most negative outcomes for minority workers. For example, Baron and Newman (1990) have demonstrated that female-dominated jobs are penalized to a greater extent in occupations where work outcomes are most ambiguous.

Several studies have clearly indicated that particularism is more evident in low-paradigm disciplines. This conclusion, however, was not based on a systematic analysis of all disciplines, but rather on a comparison of outcomes in a few selected disciplines (Simon, Clark, and Galway 1967; Hargens 1969; Pfeffer, Salancik, and Leblebici 1976; Pfeffer, Leong, and Strehl 1977).[3] The above discussion leads us to expect that:

Hypothesis 1. The higher the paradigm uncertainty in a discipline, the lower the relative wage level of women while the wage level of men remains unchanged.

An additional hypothesis regarding the effect of paradigmatic uncertainty was derived from the institutional organizational perspective (Meyer and Rowan 1977; DiMaggio and Powell 1983; Tolbert and Zucker 1983), concerning the average status and rewards attained by members of a discipline as a whole. An institutional perspective emphasizes the salience of cultural understandings and symbolic factors rather than of market forces as determinants of organizational behavior (Meyer and Rowan 1977; DiMaggio and Powell 1983). Following this perspective, we suggested that institutional forces and in particular, the level of paradigm uncertainty, strongly affect average wage levels. In other words, collectively held stereotypes of the "validity" of different disciplines result in lower wage levels for all members in ambiguous disciplines. It is important to note that whereas the above theories have dealt with the effect of uncertainty on women's salaries only, the institutional argument maintains that:

Hypothesis 2. The higher the paradigm uncertainty in a discipline, the lower the average wage level for all members of the discipline.

Two dimensions seem to be salient in the measurement of uncertainty in the literature. The first is a perceptual dimension measuring the subjective rank order of disciplines regarding their cognitive stage. The second is based on disciplinary characteristics that are assumed to reflect the level of paradigmatic development such as predictability, rate of obsolescence, development of a theory or rate of growth. It should be noted that the perceptual measure might reflect a socially constructed "truth" which reflects the relative standing of the scientific discipline in terms of power and prestige. This issue will be further discussed below.

Gender Composition and Earnings Inequality

We turn next to the gender composition of the discipline. Numerous studies have shown that the earnings level in an occupation is affected by its gender composition, independent of employees' human capital and job characteristics (England, Farkas, Kilbourne, and Dou 1988; Strober 1984; Hodson and England 1986; Pfeffer and Davis-Blake 1987). Two major theoretical approaches may be discerned in explaining these relationships within occupational labor markets—the "competition" and the "institutional" perspectives.

The "competition" perspective is based on the assumption that majority and minority groups within an occupation (scientific discipline) compete for rewards. The first competitive argument termed "majority power" (Arrow 1972; Blalock 1967) predicts a negative relationship between the proportion of a minority group (women) and its wage level, since an increased proportion of a minority group poses a threat to the majority group (men) within the same occupation (discipline). As a result, members of the majority group (men) act to reduce the wages of the minority group (women).

The "crowding" model (Bergmann 1971; Blau 1972) which is closely related to the "competition" perspective contends that there is an oversupply of women to a relatively narrow range of "female dominated" occupations. Crowded into a few occupations, women receive lower wages as do the men working alongside them (see also, Hodge and Hodge 1965; Snyder and Hudis 1976).

The "institutional" perspective provides a more complex relationship between gender composition and wage level. First, it has a similar prediction to that of the crowding perspective, but for a different reason. It suggests that institutional forces, particularly societal stereotypes of "male" and "female" occupations, determine the effect of gender composition on wage levels (Pfeffer and Davis-Blake 1987). Such forces result in lower wage levels in occupations dominated by women. Men working in these occupations are affected as well, since the occupation is labeled as a "female type" and is paid "accordingly."

In conclusion, the "institutional" and the "competition" perspectives offer similar propositions concerning a negative relationship between female representation and wage levels for both gender groups:

> **Hypothesis 3.** The higher the proportion of women in a discipline, the lower the wage level of both men and women in that discipline.

Second, the labeling of occupations as "female type" leads to the concentration of females in such occupations, both because of women's self-selection and because of administrative assignments made by organizational gatekeepers. Thus, the institutional perspective is unique in entertaining a reverse causal effect, whereby a high wage level in an occupation negatively affects the proportion of women employees. Such an effect is the result of organizational processes by which female workers are channeled to "female type occupations" (Bielby and Baron 1986; Bose and Rossi 1983; Pfeffer and Davis Blake 1987; Strober 1984):

> **Hypothesis 4.** The higher the wage level in a discipline, the lower the proportion of women in the discipline.

In order to avoid confusion, it is necessary to mention another perspective, labelled as the "segregation" perspective, which is relevant only to occupations which are totally segregated. In the realm of science such segregation does not exist. This perspective consists of explanations of different forms of labor market segregation such as: "overflow" (Cutright 1965; Glenn 1964, 1966); "queuing" (Liberson 1980); "dual markets" (Piore 1977; England, Chassie, and McCormack 1982) and "split markets" (Bonacich 1972, 1976). The overflow explanation suggests that an increasing ratio of minority-to-majority workers leads the majority group to "overflow" into higher status and better paying jobs, while larger numbers of minority workers occupy the lower level jobs. According to the queuing explanation members of the minority group are employed in the least desirable occupations in the labor market. An increase in the proportion of the minority group is disadvantageous to its members since it swells the labor supply for the low-end tail of the occupational distribution. The dual labor markets explanation distinguishes between two different sections in the labor market: the primary—with stable, high paying occupations, and the secondary—with insecure, dead-end, low paying occupations. Most workers concentrated in the primary sector belong to the majority group while secondary markets are accessible mainly to the minority group. The split labor market explanation suggests employees rather than employers as the source of segregation. The majority group initiates a division of labor based on group membership according to which its members obtain the better occupations. Since such division of labor is inefficient from the employer's perspective, it develops only in contexts in which employers' control is weak. All these explanations involve separate occupational ladders for majority and minority groups and therefore do not account for interaction between minority and majority workers within an occupation.

Turning to scientific disciplines, it has been shown that women are concentrated in some disciplines and under-represented in others (Fox 1985). They constituted 11.6 percent of the three million scientists and engineers in the U.S. in 1983, an increase of 3.5 percent compared with the 1976 figures (National Science Board 1985, p. 235). Composition figures, however, vary across disciplines. Whereas women constitute almost 24 percent of those engaged in sciences, they are but modestly represented in engineering: 3.2 percent. Among the scientists (who totaled 1.2 million in 1983), women are most likely to be found in psychology (39 percent of those employed in the discipline) and other social sciences (30 percent), mathematical sciences (35 percent), and life sciences (21 percent). They are least likely to be found in the physical and in the environmental sciences (9.75 percent and 15 percent respectively). (See also: McCarthy and Wolfe 1975.) The extent of sex segregation across 13 major categories of scientific disciplines (using the index of dissimilarity Duncan and Duncan 1955) has changed only slightly between 1976 and 1983: 55 percent compared with 50 percent respectively. This measure indicates that 50 percent (55 percent in 1976) of the scientists would be required to change their field in order to equalize the sexual composition of the scientific labor force. These figures are similar

to those found across occupational categories (depending on the type of study and the number of categories. See Albelda 1986; Bielby and Baron 1986; Strober and Lanford 1986).

A few studies have examined the relationship between the gender composition of scientific disciplines (or institutions) and earnings, with inconclusive results. Tolbert (1985) and Toren and Kraus (1987), on the one hand, found that rewards (wages and positions) differentials within organizations between male and female scientists were negatively related to the proportion of women employed by an organization. Fox (1981b) and Barbezat (1987) tested this proposition by means of individual level wage equations and concluded that the effect of the proportion of women in a discipline on both men's and women's salaries was found to be insignificant after controlling for human capital variables. No research has thus far addressed the relationship between gender composition and wage determination using scientific discipline as the unit of analysis. Nor do we know of any study that has monitored these relationships over time, a procedure necessary to detect any reciprocal relationship between gender composition and earnings.

A longitudinal data set constructed by the Bureau of the Census for the National Science Foundation enabled us to study the relationship between gender composition, paradigm uncertainty and salary inequality. The data included labor market information on two large samples of scientists and engineers, one from the 1970s, and the other from the 1980s. These data were used to construct a discipline level data set, while additional information was drawn from complementary documents, as described next.

Estimation Models

The model to be estimated is a lagged dependent model, with scientific disciplines serving as the units of analysis:

$$Y^*_t = z\,Y^*_{t-1} + \underline{X}^*_{t-1}\,\underline{B}^* + f(P)_{t-1} + w(P_t - P_{t-1}) + hU \qquad (1)$$

where Y* is the average salary in the discipline, t represents the year 1982 and t_{t-1} represents the year 1972, z represents the coefficient of the lagged dependent variable, $\underline{X}^*$ is a vector of average individual characteristics in the discipline in 1972, $\underline{B}^*$ is its vector of coefficients, P is the percentage of females in the discipline in 1972, and f is its coefficient. $P_t - P_{t-1}$ is the change in the proportion of females during the investigated period and w is its coefficient. U represents the level of paradigm uncertainty in a discipline and h is its coefficient.

It should be recalled that our propositions maintain that gender-based discrimination exists if paradigm uncertainty affects the salaries of women but not of men, and that discrimination against a discipline exists if uncertainty affects the general salary level in that discipline. Thus, the equation was estimated using the average salary level of males and females separately, as well as the average salary in the discipline as a whole.

As previously mentioned, the literature presents two competing hypotheses regarding the direction of causality in the relationship between gender composition and wages ("competition" versus "institutional" explanations). Hence, we estimated the reversed causal models as well (see Semyonov and Lewin-Epstein 1989, for a similar approach):

$$P_t = mP_{t-1}\ \underline{V}^*_{t-1}\ \underline{Q}^* + lU + kY^*_{t-1} + d(Y^*_t - Y^*_{t-1}) \qquad (2)$$

where m is the coefficient of the lagged dependent variable, V is a vector of discipline characteristics and Q is a vector of their coefficients, U denotes paradigm uncertainty (as in equation 1), k and l represent coefficients. $Y^*_t - Y^*_{t-1}$ is the change in the average salary in a discipline during the investigated period and d is its coefficient.

Data

The data for the present study were derived from four sources:

1. A survey conducted in the 1980's by the U.S Bureau of the Census for the National Science Foundation entitled: *United States Personnel and Funding Sources for Science, Engineering, and Technology: Survey of Natural and Social Scientists and Engineers 1982-1986.* The original sample included 138,080 scientists and engineers. The data base for 1982 (t) is drawn from a sample of 39,775 respondents on whom complete information was available for all variables. Details regarding sample definitions and other explanations can be found in U.S Bureau of the Census (1987).

2. A survey conducted in the 1970's by the U.S Bureau of the Census for the National Science Foundation entitled: *United States Personnel and Funding Sources for Science, Engineering, and Technology: Survey of Natural and Social Scientists and Engineers, 1972-1978.* The original sample included 50,093 scientists and engineers, of whom 13,083 provided complete information on the variables under study. This served us in constructing the 1972 (t-1) data base. Details of sample definitions and other explanations may be found in U.S Bureau of the Census (1979). The longitudinal analyses utilized both the 1972 and the 1982 data sources.

3. The Science Indicators Report presented by the National Science Board (1985). This report is published in accordance with Sec. 4(j) (1) of the National Science Foundation Act of 1950. The report is designed to display quantitative information about U.S. science, engineering and technology. This source was used to determine the level of funding in a discipline and to estimate gender-based segregation measures.

4. A survey of a sample of 53 scientists, half of them from the physical sciences and half from the social sciences, concerning the paradigmatic status of a variety of scientific disciplines. The sample included all full-time, tenure-track faculty in four departments at Tel Aviv University: physics, chemistry, sociology, and political sciences. The survey was used to validate the Lodahl and Gordon (1972) measure of uncertainty. This served as one of the three measures of uncertainty used in this study.

Variables

A discipline level data base was constructed from the individual-level data. Each record represented the characteristics of a single discipline. 101 disciplines (with at least 15 scientists in each) were available for the 1982 data,[4] with 73 overlapping cases for 1972. The reduction in the number of cases is due to a less detailed disciplinary classification in 1972 as compared with 1982. Additionally, in two longitudinal equations the number of cases was reduced to 55. This is due to the sampling procedure in 1972, which resulted in under-representation of females in the 1972 sample and hence a greater number of disciplines with no females.[5]

The dependent variables were the average income in a discipline in 1982 (WAGE82) and the average income of men and of women in this year. The independent variables included the uncertainty measures (UNCERTAINTY1, UNCERTAINTY2 and UNCERTAINTY3—described next), the percentage of women in a discipline in 1972 (% FEMALES 72), and the change in the percentage of females between 1972 and 1982 (% FEMALES CHANGE 72-82).

Several control variables were also used. These variables include the 1972 values of the percentage of scientists in a discipline employed in universities (UNIVERSITY 72), and the percentage of scientists in a discipline employed in the industrial sector (INDUSTRY 72), where the public sector served as the omitted category. We included the sector variables since we expected to find different processes occurring in academic and nonacademic settings owing to differences in mechanisms of reward allocation and to greater opportunities for women and minorities in some sectors (e.g., industry) compared with others (e.g., academia and government) (Haas and Perrucci 1984). The variable indicating the percentage of black scientists (% BLACKS 72) was included in order to control for the effect of another minority group on wage level. Discipline size (measured by the number of employees) (SIZE 72) was included given the prominence of size in organizational literature, and considering the different structural attributes for which it may be a proxy (e.g., opportunity structure, degree of heterogeneity). Finally, the lagged dependent variable (WAGE72) was included to control for wage at the beginning period of the study.

Three different indicators were used to measure "paradigm uncertainty." First, we used Lodahl and Gordon's (1972) instrument, developed to examine scientists' perceptions regarding the relative degree of paradigm development of different disciplines. Lodahl and Gordon collected data from 1161 faculty members located in 80 university departments representing four disciplines (20 departments in each discipline): physics, chemistry, sociology and political science. The comparisons between disciplines included several additional dimensions such as time spent with graduate students, or the number of teaching and research assistants.

Because the original survey refered to only seven disciplines, we replicated the survey, including an extended list of 25 disciplines according to the National Science Foundation (NSF) classification. The instrument was sent to all faculty members in four departments (physics, chemistry, sociology and political science) at Tel Aviv University, and the results were used to assign an uncertainty score

to each discipline included in the analysis. The instrument was formulated as follows:

> Scientific fields are often said to vary in their degree of development or maturity. Whether or not you agree with all of the implications of this statement, it is probably true that in some scientific fields scientists are more uniform in their scientific practice than in others. This is because their field has a larger body of generally accepted theory and agreed-upon methodologies - paradigms upon which to base their present investigations.
>
> Please rank the following fields according to the degree to which you feel there is consensus over paradigms (law, theory, and methodology) within the field (1 = most consensus).

The findings of this survey[6] provided strong confirmation of Lodahl and Gordon's (1972) results. The degree of consensus among the respondents regarding the level of uncertainty was high: irrespective of their own discipline, respondents rated physics higher than chemistry, and the latter higher than biology. Among the social sciences, economics was rated first, followed by political science, psychology and sociology. The ranking of political science and psychology were reversed in comparison to Lodahl and Gordon's findings. Because the inter- departmental reliability coefficient (Cronbach's alpha) was found to be 0.97, we averaged the responses across all disciplines and assigned the weighted average score as the uncertainty measure. Math (which was not included in the original study) was assigned the lowest uncertainty score (5.03), while the humanities received the highest uncertainty score (21.2). This measure was labeled UNCERTAINTY1 in the analyses presented below. It should be emphasized that Lodahl's and Gordon's original measure was made up of only 7 categories. The replicated measure (UNCERTAINTY 1) consisted of 25 categories and was extended to 101 disciplines.

Our second indicator of paradigm uncertainty was Ashar's paradigm index (UNCERTAINTY 2) (Ashar 1987; Ashar and Shapiro 1988). This measure, which was originally calculated for forty disciplines, was extended in the present analysis to 101 disciplines based on similarities among them. It was based on three variables: (a) the length of the chain of prerequisite courses in the field; (b) the average length in pages of dissertations; and (c) the average length (number of words) of dissertation abstracts. The first variable measured the level of knowledge integration in the field, while the other two measured the efficiency of communication in the field. These three variables were originally used by Pfeffer and Moore (1980),[7] and a similar measure was used by Salancik, Staw, and Pondy (1980). Ashar reported that the rank order correlation for the fifteen categories common to Ashar's and Pfeffer and Moore's studies was .86. The rank order correlation between Ashar's measure and Lodahl and Gordon's was .84, and .60 between Ashar's measure and our replication.

The third measure was that developed by Pfeffer and his colleagues (Konrad and Pfeffer 1988; Konrad and Pfeffer, forthcoming; Langton and Pfeffer 1988). They estimated paradigm development using a five item index: (1) the average length of dissertations; (2) the proportion of books to the total number of publications in a field; (3) the perceptions of faculty in each field as to the degree of control they have over the content of their courses; (4) the average rating of the importance of training graduate students; and (5) the average response to a survey assessing the desire for higher admission standards. The reliability coefficient between all items was .85 (Konrad and Pfeffer 1988). The last three items were derived by the researchers from the "Carnegie Commission on Higher Education—Faculty Survey" conducted in 1969, in which responses from approximately 60,000 faculty members were gathered. We correlated this index (UNCERTAINTY 3) with the first measure of uncertainty (UNCERTAINTY 1), obtaining a correlation coefficient of .59 for 16 common fields.

The reader can link these three measures to various dimensions of paradigmatic development (Cole 1983). For example, Lodahl and Gordon (1972) developed a measure corresponding to the "cognitive consensus" dimension in Cole's scheme. Similarly, the proportion of books to total publications corresponded to Cole's "rate of growth" and "rate of obsolescence" dimensions (i.e., the larger the proportion of books-to-articles the slower the development of a paradigm). Also, the average length of dissertations and their abstracts refer to the "quantification" dimension (i.e., disciplines in which ideas are expressed in mathematical language are both more developed and are characterized by shorter dissertations). Finally, the length of the chain of prerequisite courses in a discipline reflects a higher level of "theory development," codification and consensus. Unfortunately, none of the three measures described above (UNCERTAINTY 1,

UNCERTAINTY 2 and UNCERTAINTY 3) fully corresponded to all the theoretical dimensions constituting paradigm development. By using all three scales in our analyses we improved the construct validity of our *measured* uncertainty.

Results

Table 1 presents descriptive statistics of the variables used in the study. The average annual salary in a discipline in 1982 was $ 34,216. Large differences were found between the gender groups ($ 35,958 and $ 28,387 for men and women respectively) and between disciplines (as reflected in the relatively large standard deviation of WAGE82). By 1982 women constituted, on average, 21 percent of a discipline. The correlation coefficients among selected variables are presented in Table 2. A negative correlation was evident between the proportion of women and the wage level of both males and females in a discipline. Another negative correlation was found between the level of uncertainty according to the subjective rank order of disciplines (UNCERTAINTY 1) and wage levels of both gender groups. This measure of uncertainty was also positively correlated with the proportion of women in a discipline (.44). That is, women were more likely to be found in disciplines with less consensus and lower paradigm development. The third measure of uncertainty was also significantly correlated with average women's wages. In general the other two measures of uncertainty did not seem to be significantly related to wages or to the proportion of women.

Before estimating the longitudinal regression models, we tested for possible contamination of the first uncertainty measure (UNCERTAINTY 1) by disciplinary salary levels and/or by gender and race stereotypes held by the respondents. This was necessary since UNCERTAINTY 1 is based on perceptual evaluations of respondents. To check on this, we examined a regression equation in which the uncertainty measure served as a dependent variable. It is crucial to understand that the causal relationship between the "uncertainty" *construct* and wages is not reversible (that is, uncertainty might determine wages but not vice versa). However, the relationship between the *measure* of "uncertainty" (i.e., the operationalization of the construct of uncertainty as measured by UNCERTAINTY 1) and wages could be reciprocal. That is, the perceived rank order of disciplines' uncertainty may be contaminated

Table 1. Summary of Descriptive Statistics: Definitions, Means and Standard Deviations (in parentheses)

Variable	*Definition*	*Mean (SD)*
WAGE 82	Average annual salary in a discipline 1982 (in U.S. Dollars)	33422 (5982)
WAGE 72	Average annual salary in a discipline - 1972 (in U.S. Dollars)	16976 (1734)
CHANGE WAGE 72-82	WAGE 82-WAGE 72	16446 (5100)
WAGE 82 - MALES	Average annual salary paid to men in a discipline - 1982 (in U.S. Dollars)	35391 (5776)
WAGE 82 - FEMALES	Average annual salary paid to females in a discipline - 1982 (in U.S. Dollars)	26912 (4552)
% FEMALES 82	Percent females in a discipline - 1982	.21 (.18)
% FEMALES 72	Percent females in a discipline - 1972	.09 (.14)
CHANGE % FEMALES 72-82	% FEMALES 82 - % FEMALES 72	5.5 (7.7)
% BLACKS 72	Percent blacks in a discipline - 1972	.015 (.027)
SIZE 72	Number of scientists in a discipline - 1982	170.151 (273.194)
GROWTH	Percent change in discipline size during 1976-1982	1.16 (0.17)
UNIVERSITY 72	Percent of scientists in a discipline employed in universities	0.269 (0.213)
INDUSTRY 72	Percent of scientists in a discipline employed in industry	0.404 (0.278)
PUBLIC 72	Percent of scientists in a discipline employed in the public sector	0.327 (0.168)
FUNDS	Federal obligation for basic research in a discipline (in Millions of U.S. Dollars)	1035.30 (993.54)
UNCERTAINTY 1	Lodahl and Gordon's replication of the paradigm development measure	12.63 (4.82)
UNCERTAINTY 2	Ashar's measure of paradigm development	19.1 (32.3)
UNCERTAINTY 3	Pfeffer et al.'s measure of paradigm development	.22 (.54)

by their salary levels. (See Grams and Schwab 1985, for a similar approach.) The estimated equation clearly indicates that the perceived uncertainty score assigned by respondents was affected by salary levels but was unaffected by the percentage of blacks or by the percentage of women in a discipline. Anticipating the possibility

Table 2. Pearson Correlation Coefficients Among Selected Variables Included in the Study

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
1. WAGE82	—	.62*	.38*	.94*	.73*	-.57*	-.58*	-.23*	-.21*	-.16*	.02	-.14	.36*	-.52*	-.07	.14
2. WAGE72		—	.38*	.61*	.50*	-.25*	-.29*	-.05	-.22*	.20*	-.31*	.12	.15	-.25*	-.003	.03
3. WAGE CH			—	.87*	.66*	-.61*	-.58*	-.26*	-.26*	.29*	-.20*	-.38*	.42*	-.44*	-.25*	.12
4. WAGE MALES 82				—	.58*	-.38*	-.34*	-.09	-.16	.19*	.01	-.14	.40*	-.42*	-.11	.10
5. WAGE FEMALES 82					—	-.37*	-.47*	-.21	-.21*	.23*	-.11	-.18	.41*	-.38*	-.18	.25*
6. % FEMALES 82						—	.83*	.61*	.21*	-.17*	-.06	.37*	-.35*	.44*	.13	-.07
7. % FEMALES 72							—	.11	.44*	.03	.05	.41*	-.33*	.66*	.50*	.13
8. % FEMALES CH								—	.13	-.16	.01	.35*	-.36*	.10	-.24*	-.17
9. % BLACKS 82									—	-.12	.31*	-.09	-.11	.03	.36*	-.03
10. SIZE 82										—	.21*	-.23*	.33*	-.12	-.002	.14
11. GROWTH											—	-.12	-.26*	-.57*	-.21*	-.52*
12. UNIVERSITY 82												—	-.49*	.28*	.01	-.14
13. INDUSTRY 82													—	-.18*	.01	.38*
14. UNCERTAINTY I														—	.62*	.59*
15. UNCERTAINTY 2															—	.60*
16. UNCERTAINTY 3																

Notes: n = 63
* $p < .05$
a. Correlations not presented in the table are available from the authors upon request.
b. The coefficients among the uncertainty measures reported in the table are based on 16 disciplines only. Those are the disciplines appearing in *all* the three measures.

of a reciprocal relationship between wages and the operationalization of uncertainty, we decided to estimate the effect of uncertainty on wages by using a two-stage approach (2SLS). In the first stage we estimated an equation in which UNCERTAINTY 1 served as a dependent variable. It required a variable which clearly determined UNCERTAINTY 1 and at the same time was not affected by the level of wages (such a variable is known as an "instrumental variable"). We used "Federal Funding for Basic Research" as our instrumental variable. Federal obligation for basic research by field of science in millions of dollars was taken from the National Science Board (1985, p. 229), and the use of this measure was based on Lodahl and Gordon's (1972) and Pfeffer's (1981, p.123) suggestions. Indeed, this instrument was highly correlated with uncertainty but was not correlated with disciplinary wage level. Then, for each discipline we calculated the value of uncertainty predicted by the regression equation estimated in the first stage. Two different predicted values for each discipline were used. The first was estimated without the proportion of females and used in the equations where the proportion of females was the dependent variable. The other was estimated without the wage variable.[8] These values were then used in models presented in Tables 3 and 4 below.

Table 3 presents regression results of the longitudinal wage models. The first four equations used WAGE 82 as a dependent variable, the next four equations used WAGE MALES 82 as a dependent variable, and the last four equations used WAGE FEMALES 82 as a dependent variable. Each set of four equations used the four alternative measures of uncertainty: the three measures presented above and the predicted value of UNCERTAINTY 1 (in equations 4, 8, and 12).

The findings reveal that the initial income level (WAGE72) as well as the proportion of women (% FEMALES82) affected salary levels in 1982 (WAGE82)—the former positively and the latter negatively. That is, the higher the proportion of females, the lower the average wage level and the wages for both male and female members of a discipline. Changes in the gender composition between 1972 and 1982 did not affect the average wage levels in 1982. There was no significant effect of uncertainty on wages. Also, both sectors, industry and university (relative to the public sector), had a positive significant effect on women's wages.

Table 3. Longitudinal Regression Equations 1972-1982 with Wage 82 as a dependent variable (Standard errors in parenthesis)

	WAGES82 (1)	*WAGES82* (2)	*WAGES82* (3)	*WAGE82*[a] (4)	*WAGE MALES82* (5)	*WAGE MALES82* (6)	WAGE MALES82 (7)	*WAGE*[a] *MALES82* (8)	*WAGE FEMALES82* (9)	*WAGE FEMALES82* (10)	*WAGE FEMALES82* (11)	*WAGE*[a] *FEMALES82* (12)
FEMALES72	-11908.71***	-13162.52***	-14760.77***	-13665.7***	-14433.6*	-20443.4***	-20319.02***	-17132.3**	-8123.1**	-8657.43**	-10360.9***	-12613.5***
	(3808.60)	(3828.15)	(3656.07)	4555.7)	(8288.9)	(7251.02)	(6533.4)	(8432.5)	(3954.1)	(3815.7)	(3670.7)	(4884)
BLACKS72	6490.85	9616.73	6334.54	8709.54	15909.8	13249.4	7056.8	14790.4	-16552.4	-12329.3	-17436.0	-8047.2
	(19755.18)	(19952.85)	(19944.89)	(20143.8)	(26261.6)	(26203.8)	(26441.5)	(26264.8)	(21551.8)	(21383.8)	(21173.7)	(22040.1)
FEMALES CHANGE 72-82	-6042.56	-6376.76	-6320.699	-6371.29	-509.4	-667.5	-182.6	-645.7	-2152.4	-2611.3	-2718.9	-2480.6
	(4223.1)	(4262.18)	(4238.24)	(4287.1)	(5161.7)	(5150.9)	(5103.1)	(5248.6)	(4703.5)	(4684.3)	(4610.1)	(4681.9)
SIZE72	0.228	0.817	1.27	0.958	0.274	1.05	1.06	0.604	0.338	0.637	2.22	2.32
	(1.91)	(1.88)	(1.84)	(2.03)	(2.25)	(2.19)	(2.13)	(2.37)	(2.28)	(2.19)	(2.11)	(2.31)
INDUSTRY[b]	1137.65	1699.193	1228.91	1603.5	-4245.8	864.4	182.79	928.14	8783.5**	9839.2**	7304.4*	10015.3**
	(3094.78)	(3104.972)	(3115.11)	(3201.1)	(50202)	(3505.6)	(3514.25)	(3637.10)	(4152.5)	(4232.8)	(4246.6)	(4252.9)
UNIVERSITY	-3929.60	-3331.999	-2443.82	-3320.9	657.71	-3200.8	-2257.6	-3712.5	6483.8*	7614.1*	8483.7**	8653.7
	(4165.17)	(4179.669)	(4244.36)	(4286.57)	(3557.9)	(4920.8)	(4937.9)	(5059.33)	(4437.9)	(4360.2)	(4344.6)	(4546.1)
WAGE72[c]	1.734***	1.77***	1.694***	1.748***	1.82***	1.79***	1.77***	1.84***	0.297*	0.284*	0.175	0.172
	(.319)	(.327)	(.325)	(0.322)	(0.334)	(0.337)	(0.332)	(0.33)	(0.168)	(0.165)	(0.158)	(0.168)
UNCERTAINTY 1	-735.30				-492.8				-684.8			
	(582.03)				(831.15)				(702.2)			
UNCERTAINTY 2		-636.64				1419.9				-1481.9		
		(1443.44)				(1795.8)				(1663.6)		
UNCERTAINTY 3			530.04				914.63				990.9	
			(554.46)				(654.09)				(651.2)	
UNCERTAINTY 4				-4.147				-9.30				94.28
				(83.44)				(107.5)				(98.03)
Constant	6538.63	6088.098	6807.06	6065.25	5742.6	4726.4	6639.9	5750.6	19385.5	20290.9	20658.7	15982.4
N	73	73	73	73	71	71	71	71	55	55	55	55
R^2	.63	.62	.63	.62	.46	.46	.47	.45	.39	.39	.41	.63

Notes: [a] The predicted value of UNCERTAINTY is used.
[b] The reference category of INDUSTRY and UNIVERSITY is the PUBLIC SECTOR.
[c] WAGE 72 in the equations for males and females wages is the lagged dependent variable for each group.
* $p < .10$
** $p < .05$
*** $p < .01$

Table 4. Longitudinal Regression Equations 1972-1982 with % females as a dependent variable (standard errors in parenthesis)

	% *FEMALES 82* (1)	% *FEMALES 82* (2)	% *FEMALE 82* (3)	% *FEMALES 82* (4)
% FEMALES 72	88.38*	89.298*	88.43*	93.41*
	(11.89)	(11.96)	(11.82)	(12.31)
WAGE 72	0.00015	0.0002	0.0002	0.00008
	(0.0009)	(0.001)	(0.001)	(0.0009)
CHANGE WAGE 72-82	-0.0005	-0.0005	-0.0005	0.0005
	(0.0004)	(0.0004)	(0.0004)	(0.0003)
% BLACKS 82	-27.80	-23.10	-22.98	-38.56
	(62.36)	(59.5)	(59.595)	(60.41)
SIZE 72	-0.0011	-0.001	-0.0008	-0.003
	(.0056)	(.005)	(.005)	(0.006)
GROWTH	0.004	0.0039	0.004	0.005
	(.005)	(.004)	(.005)	(0.004)
INDUSTRY[b]	-7.57	-6.95	-6.75	-9.43
	(9.05)	(8.95)	(9.06)	(9.04)
UNIVERSITY	8.27	8.59	7.92	7.62
	(12.47)	(12.48)	(12.51)	(12.35)
UNCERTAINTY 1	.600			
	(2.18)			
UNCERTAINTY 2		-2.26		
		(4.51)		
UNCERTAINTY 3			-0.59	
			(1.897)	
UNCERTAINTY 4[a]				-0.28
				(0.23)
Constant	19.99	20.10	18.29	40.91
N	73	73	73	73
R^2	.73	.73	.73	.73

Notes: [a] The Predicted value of UNCERTAINTY 1.
[b] The reference category of INDUSTRY and UNIVERSITY is the Public Sector
* $p < .01$

We turn now to the analyses in which the gender composition of a discipline serves as the dependent variable. An examination of Table 4 reveals that the proportion of women in 1972 (% FEMALES72) was positively related to the proportion of women in 1982. The salary change between 1972 and 1982 (CHANGE WAGE 72-82) was negatively related to the proportion of women in 1982, suggesting that disciplines experiencing salary increase were

less likely to increase the proportion of women, but this effect was not statistically significant. Wage level in 1972 (WAGE 72) did not have an effect on the proportion of females. Overall, these results suggest that the demographic composition of a discipline is apt to be highly stable, and not easily influenced by other changes affecting that discipline.

Note that all effects involving the lagged dependent variable in the longitudinal models were significantly different from zero. More importantly, the effect of gender composition on income remained significant across all equations (in Table 3), whereas the effect of salary on gender composition was insignificant as shown in Table 4. We suggested earlier that in addition to a suppressing effect of female representation on income, it is possible that women are channeled into disciplines with lower salaries. This hypothesis was not supported by the results.

It should also be emphasized that none of the uncertainty measures was significant in these models.[9] The lack of significant effects associated with the uncertainty variables is conspicuous and deserves further examination since most studies suggest unequivocally that particularistic judgment of behavior prevails in highly uncertain disciplines. A close examination of the studies reporting relationships between uncertainty and particularistic judgment in scientific disciplines reveals two common features. First, most studies were based on a comparison of only a few disciplines (e.g., Simon, Clark, and Galway 1967; Lodahl and Gordon 1972; Pfeffer, Leong, and Strehl 1977; Pfeffer, Salancik and Leblebici). An exception is Pfeffer and Moore (1980). Second, very few studies employed longitudinal analysis (e.g., Pfeffer, Leong, and Strehl 1977). But more importantly, no study that we know of satisfies both conditions as we do, namely including a large set of disciplines and employing a longitudinal analysis. A remaining interesting question is whether the results obtained here are a direct outcome of these methodological characteristics. For example, what would be the conclusion drawn from cross-sectional, rather than longitudinal, analyses? Table 5 provides a summary of the main cross sectional results conducted for the year 1982.

The first four equations in Table 5 estimated the effect of uncertainty and of the proportion of females on the average wage level in a discipline. The results showed that both the proportion of females and UNCERTAINTY 1, exert a significant negative effect

Table 5. Summary of Cross Sectional Results[a]

	WAGE 82 (1)	*WAGE 82* (2)	*WAGE 82* (3)	*WAGE 82* (4)	*% FEMALES*[b] (5)	*% FEMALES* (6)	*% FEMALES* (7)	*% FEMALES* (8)
% FEMALES 82	-158.2*** (55.1)	-208.9*** (58.5)	-217.5*** (55.8)	-222.9*** (63.9)	—	—	—	—
WAGE 82	—	—	—	—	-.05*** (.02)	-.09*** (.02)	-.07*** (.01)	-.05*** (.01)
UNCERTAINTY 1[c]	-43.5*** (12.7)	—	—	—	4.1* (1.8)	—	—	—
UNCERTAINTY 2	—	-10.0 (10.3)	—	—	—	1.6 (1.9)	—	—
UNCERTAINTY 3	—	—	7.0 (10.2)	—	—	—	1.5 (1.8)	—
UNCERTAINTY 4	—	—	—	4.2 (16.5)	—	—	—	11.3*** (2.2)
N	101	101	101	101	101	101	101	101
R^2	.58	.55	.53	.52	.47	.44	.45	.57

Notes: * p < 10
** p < .05
*** p < .01
[a] The table presents the coefficients for the main independent variables. A full table is available upon request.
[b] Coefficients are multipled by 100.
[c] The predicted value of UNCERTAINTY 1 is used in equating 4 and 8.

on wages. However, none of the other three measures of uncertainty had a similar effect on wages. The next four equations estimated the effect of uncertainty and of wages on the proportion of females. Again, wages and UNCERTAINTY 1 had significant effects on the proportion of females; the first was negative and the other was positive.

This reliance on cross-sectional analyses could lead us to reach two conclusions. The first is that the relationship between wages and the proportion of females might be reciprocal. The second is, that disciplines with low levels of certainty are paid less than disciplines with high levels of certainty (when all other relevant characteristics of disciplines are controlled), and that women are more likely to be clustered in low certainty disciplines which are also the less prestigious ones. Neither of the two conclusions was supported by the better specified longitudinal models presented above. The differences in findings between the longitudinal and the cross-sectional models suggest that we should be careful in generalizing from cross-sectional studies reported in the literature.

DISCUSSION

In this paper we have attempted to analyze the structural conditions that encourage earnings inequality between men and women in scientific disciplines, focusing on two conditions in particular: the degree of paradigm uncertainty, and the proportion of women in a discipline. We hypothesized that paradigmatic uncertainty generates ambiguity regarding performance standards and as a result could give rise to the use of particularistic criteria in rewards allocation. We also hypothesized that the concentration of women in a discipline could widen the wage gap between men and women as predicted by the crowding and by the institutional perspectives.

We have no evidence that paradigmatic uncertainty affects the presence of discriminatory processes in salary allocation. No uncertainty effect was found in any of the longitudinal models that were estimated. Thus Hypotheses 1 and 2 were not supported by the data. The only effect of uncertainty was found in cross-sectional analyses when uncertainty was measured by "perceptual" rank order of disciplinary paradigm development. We suggest that the negative association of this measure with salaries may be attributed to the contamination of this measure by widely held perceptions of disciplinary prestige. That is, UNCERTAINTY 1 is a proxy for disciplinary prestige and the effect of this measure on salaries may simply reflect this prestige rather than anything else. This might also explain the relatively high level of negative association between the funding measure and UNCERTAINTY 1 ($r = -.38$), its negative correlation with wages ($r = -.52$) and with the growth of a discipline ($r = -.57$), as well as its positive association with the proportion of females ($r = .41$). That is, low prestige disciplines (i.e., those that were rated to be low on perceived paradigmatic development) were less likely to obtain funding, have lower wages, and to have higher proportion of females and lower growth rates. Such correlations were not obtained between the other two measures of uncertainty and these variables.

This suggestion was further substantiated by the results obtained when predicted rather than actual values of UNCERTAINTY 1 were used. When the predicted values (i.e., the perceived paradigm development after a possible contamination by the discipline wage level is removed) were used, the effect of UNCERTAINTY 1 on wages disappeared.

These results raise serious doubts about the construct validity of uncertainty measures that are based on perceptual evaluations (e.g. Lodahl and Gordon 1972; Pfeffer, Leong, and Strehl 1977; Pfeffer, Salancik, and Leblebici 1976). As we suggested, it is quite possible that this measure is a proxy for paradigm prestige rather than an indication of cognitive paradigm development. A long tradition of stratification research has pointed out the close association between occupational prestige and salaries (Treiman 1977; Kraus and Hodge 1987), and it seems plausible that our first measure of uncertainty (UNCERTAINTY 1) provides additional confirmation of this connection.[10] It gains further support by the fact that the effect of uncertainty disappears once longitudinal models controlling for salary and salary change were estimated.

As far as gender composition is concerned, we found, on the one hand, that the proportion of women negatively affected the average salary levels in scientific disciplines (thus supporting hypothesis 3). On the other hand, the results do not suggest that low salaries lead to a higher proportion of women (thus, Hypothesis 4 was not supported). This result is in accordance with the "crowding" explanation and with the part of the labeling explanation suggesting

that female type disciplines are labeled as such and thus pay lower salaries. The results did not support the other part of the labeling explanation, namely that women are channeled into low paying disciplines. Note that the proportion of women has a negative effect on the salaries of both women and men working in the same disciplines. This result suggests that men and women working in the same discipline are subject to the same stratifying mechanism, a finding which is in line with the "competition" explanation.

Because our analyses are based on discipline level data, the results should be evaluated independently of the possible presence of discriminatory processes within disciplines. In other words, the effect of gender composition on salaries across disciplines does not rule out the possibility that gender-based salary discrimination against individual female scientists is prevalent within each discipline (irrespective of its gender composition) as well. Similarly, the lack of effect of uncertainty across disciplines does not mean that salary discrimination within disciplines does not exist. It implies that both intra- and inter-disciplinary processes should be considered in explanations of gender-linked earnings differences among scientific workers.

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NOTES

1. The vast majority of inequality studies in science have an individualistic bias (Hargens and Felmlee 1984) in that they study individuals rather than disciplines or fields (Hargens and Hagstrom 1967; Simon, Clark, and Galway 1967; Hargens 1969; Cole and Cole 1973; Cole 1979; Johnson and Stafford 1974; Bayer and Astin 1975; Reskin 1976; Ferber and Kordick 1978; Haas and Perrucci 1984; Fox 1981a; Shenhav and Haberfeld 1988).

2. This assumption prompted Zuckerman and Merton's (1973b) explanation of the lower observed rejection rates for journal articles found in the natural sciences as compared with the social sciences, a pattern that has persisted to the present time (Hargens 1988).

3. It should be noted that Cole (1978), who set out to establish whether individualistic standards govern the allocation of rewards in five different scientific disciplines (biochemistry, chemistry, physics, psychology and sociology) arrived at a different conclusion. He found that the quality of work was perceived as the most important variable in allocating rewards, irrespective of discipline. According to Cole (1983), paradigm uncertainty more aptly describes the state of knowledge of given areas of research rather than general disciplinary differences, with greater uncertainty found at the frontier of a disciplinary research body than at its core.

4. The reduction in the number of cases from the original survey's coding of 135 disciplines is due either to an insufficient number of individuals in a discipline or to the lack of female representation. The remaining 101 cases are subject to selectivity bias since disciplines on the lower tail of the gender distribution are missing. Such selectivity, if it exists, would lead to underestimation of the gender effect.

5. A statistical comparison between the 101 cases and the 55 cases (the lowest number of cases) shows that the average percentages of females within a discipline were .27 and .21 respectively, the average salaries were $ 34,216 and $ 33,519 respectively and the average uncertainty (UNCERTAINTY 1, see description below) score in the reduced sample was 12.6 compared with 13.6 in the full sample. Such selectivity bias might make the rejection of the null hypothesis (that gender composition effect does not exist) more difficult.

6. The results of the survey are as follows:

Maths (5.03)
Computer sciences (5.62)
Physics (5.9)
Electrical engineering (7.15)
Chemical engineering (7.25)
Mechanical engineering (7.43)
Chemistry (7.79)
Aeronautical engineering (8.25)
Astronomy (8.79)
Other engineering fields (9.07)
Geology (9.32)
Atmospheric sciences (11.54)
Zoology and botany (11.69)
Biological sciences (11.75)
Agriculture (12.9)
Medical sciences (13.47)
Economics (16.02)
Political sciences (17.98)
Psychology (18.28)
Philosophy (18.24)
Sociology (18.30)
Education (19.31)
Professional fields (19.69)
History (19.87)
Humanities (20.07)

7. Pfeffer and Moore's (1980) measure had a rank order correlation of .81 with Lodahl and Gordon's (1972) measure.

8. The equations are available from the authors upon request.

9. An interaction effect between the proportion of females in a discipline and its level of uncertainty was also examined and was found to be statistically insignificant.

10. Some might argue that perceptions of scientists in Israel might differ from those of their counterparts in the U.S. Most Israeli scientists however were trained in the West and have established scientific relationships with their Western counterparts. Furthermore, the occupational values held by Israeli researchers and those working in the U.S. and Europe were found to be similar (Goldberg and Kats 1984). Moreover, hierarchies of occupational prestige have proved to remain stable over time, and are very similar in different nations (see: Krause and Hodge 1987).

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PART III

IMPLICATIONS FOR MANAGEMENT PRACTICE AND ORGANIZATIONAL ANLYSIS