Technical Note

Table 3E describes the distribution of so-called "p-values" for the departments responding to the Departmental Profile Survey. The p-values are designed to describe the size of the doctoral full-time women faculty relative to the size of the doctoral full-time faculty for any individual department. They provide a more sensitive indicator than do simple percentages when the number of women in a department is small. Many departments have no women faculty and the percentage *per se* does not then distinguish between a small department with no women faculty and a large department with no women faculty. The p-value does distinguish between these two cases.

Our definition of the p-value is motivated by a probability model. Within a particular survey Group, let θ denote the proportion of doctoral full-time women faculty among all doctoral full-time faculty. For example, $\theta = 0.082$ for Group III (Table 3E). If the characteristics of the faculty within a single department show no systematic differences from the characteristics of all faculty in the survey Group of that department, i.e., if that department looks like a random sample from the faculty in the Group as a whole, then the number of doctoral full-time women faculty in the department should have (approximately) a binomial distribution with parameters θ and N, where N is the number of doctoral full-time faculty in the department. The binomial cumulative distribution function is

$$B(x; N, \theta) = \sum_{k \le x} \binom{n}{k} \theta^k (1-\theta)^{N-k}$$

If there are W women among the doctoral full-time faculty and if one is willing to assume that the department is a random sample from the faculty of the Group, then the probability that there are W or fewer women in a department of the given size is $B(W; N, \theta)$.

The definition of the p-value is motivated by this model. Because of the discrete form of the binomial distribution function, it is important to make a "continuity correction" in defining the p-value so that the value is not positively biased by the inherent right-continuity of the cumulative distribution function. For each department, we define

$$\text{p-value} = [B(W; N,\theta) + B(W^-; N,\theta)]/2,$$

where $B(W^-; N,\theta)$ is the limit from the left of $B(\cdot)$ at W.

If N is not too small, then $B(\cdot; N,\theta)$ is well-approximated by a continuous distribution function. The claim in Section III about the approximate uniform distribution of the p-values within a survey Group then follows from the general result that $F(X)$ is uniformly distributed when X is a random variable with continuous distribution function F.

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