Using Interpolated Curves to Represent and Compare Life Course Patterns

Many sociological research questions concern not just the presence or number of life events, but the patterns formed by those events over time. This presents a technical challenge for researchers, as our arsenal of methods for describing and systematically comparing life course patterns remains somewhat limited. In particular, there is no widely used approach for handling series of life events which not only preserves the timing of events (in continuous time rather than in intervals) and the spacing between events, but also a value associated with each event. For example, health crises may be associated with a value indicating severity, while job changes or marital status changes may be associated with an increase or decrease in income. In this paper, I describe a technique using interpolated curves, which represents a series of discrete, valued life events in a way that allows difference scores to be calculated between subjects, who can then be grouped into clusters by their similarity. Unlike methods based on discrete time intervals, this approach is particularly useful in comparing patterns formed by sparse events recorded in continuous time. Here, I demonstrate this technique using couple-level migration decision patterns, which are assigned values representing the extent to which the resulting job changes, if any, were more beneficial for one spouse than for the other.

Data for this paper is drawn from the Career Decisions Study, a study of 51 married, middle-class dual-earner couples in Upstate New York. Spouses were interviewed separately, producing extensive semi-structured life history reviews. The bulk of the interviews focused on past decisions about whether to move that had occurred when both spouses were in school or in the labor force. Of the 51 couples, 36 reported one or more migration decision that fit this criterion. Each migration decision was coded with a measure of career outcomes for the husband and wife, incorporating change in income or occupational prestige, change of long-term career prospects, a period of

unemployment, and a promotion or loss of a (new) job within six months of implementing the decision. Comparing the spouses' two outcome measures results in the relative career gains score for each couple, in which a score of zero indicates equal gains (or losses), a score over zero indicates more gains (or fewer losses) for the husband, and a score below zero indicates more gains (or fewer losses) for the wife. Consistent with previous findings, decision outcomes more often favored the wife's career than the husband's career. One advantage of this data over studies of observed migration behavior is that detailed information was obtained for decisions which did not result in the couple relocating. Decisions not to move had, on average, better career outcomes for wives than decisions to move.

The essential elements of any life course pattern are the time line and the events placed upon it. To capture the period in which the couple may face joint decisions, decisions are represented on a time line which begins ($x = 0$) at the beginning of the couple's relationship and ends when the period of observation is censored, the year of the interview. The y dimension indicates the relative career gains (RCG) value of each decision, with positive values indicating that the husband experienced higher relative career gains and negative values indicating that the wife experienced higher relative career gains. Each couple's series thus has at least two points, where x equals zero and where x equals the length of the relationship at the time of the interview. Couples reporting career-prioritizing decisions have one additional point for each decision, where x equals the length of the relationship at the time of the decision and y equals the RCG value for the decision.

Constructing these lines requires determining two related elements of the figure: the y value for the beginning and ending points, and the algorithm for interpolating the line linking the points. The most basic form is a simple linear interpolation, with the y value of the beginning and ending points set at zero. Other types of curves may be more

appropriate for theoretical reasons: for example, if the value of the event is expected to exert a constant effect until another event occurs, a step function should be tested.

The next step is to compare curves, calculating a distance score for each pair of couples indicating the extent to which they differ (see Figures 1 and 2 for illustrations of smaller and larger differences between life course patterns). The resulting distances, while not interpretable as absolute values, calculate the specific extent to which certain couples' decision patterns are similar to each other and more different from those of other couples. A cluster analysis on the distance matrix enables a more systematic grouping of couples' patterns on these similarities than could be achieved through visual comparison. These clusters can be used as any other descriptive categorization. For example, I use life course patterns of migration decision outcome to help predict husbands' and wives' later incomes using regression analysis.

Finally, I discuss in this paper how the interpolated curve technique could be used for a variety of other research questions, including those that compare specific pairs of subjects, or require within-subject comparison of life course patterns. Although interpolation is far from a new concept in mathematics, it has not yet (to my knowledge) been applied to the study of life course trajectories in the social sciences. The potential strengths of this technique lie in its conceptual clarity and its applicability to a wide range of life course questions, and it could prove a powerful tool in the arsenal of the life course researcher.

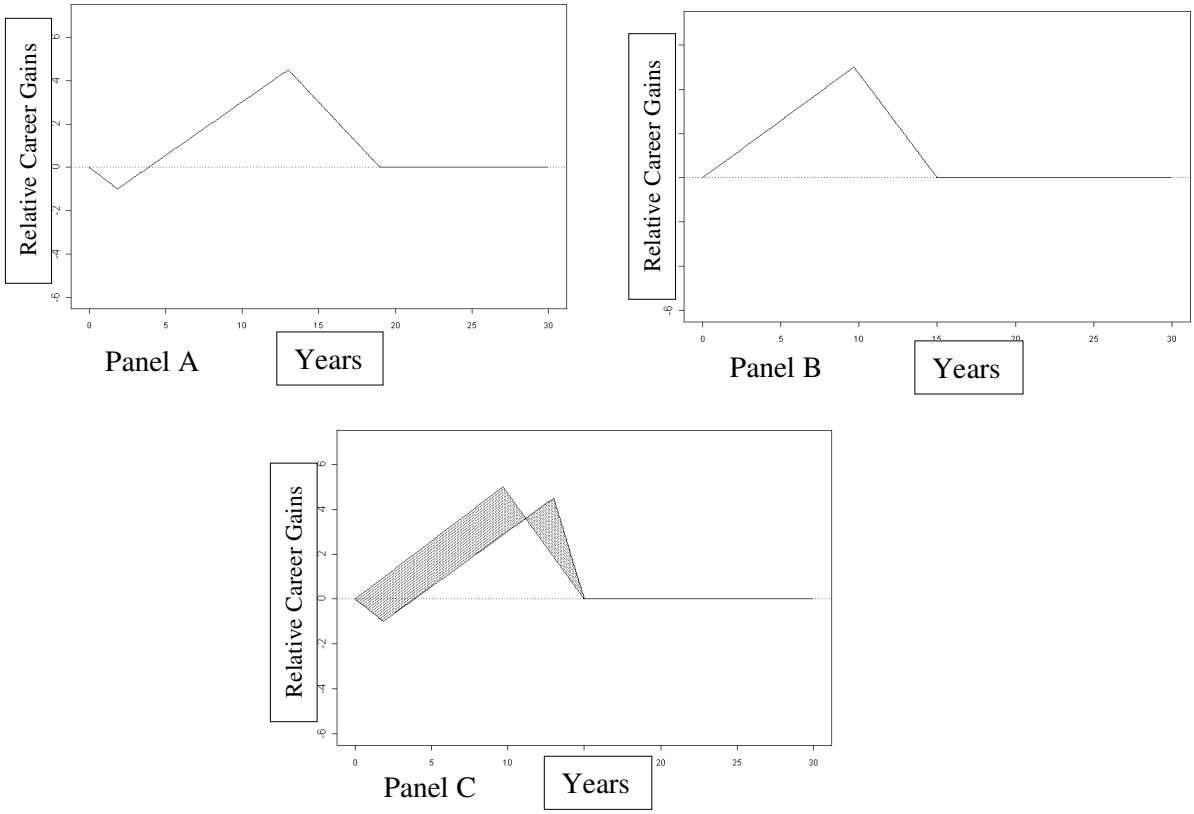

Figure 1. Illustration of a Relatively Small Distance between Two Decision Patterns

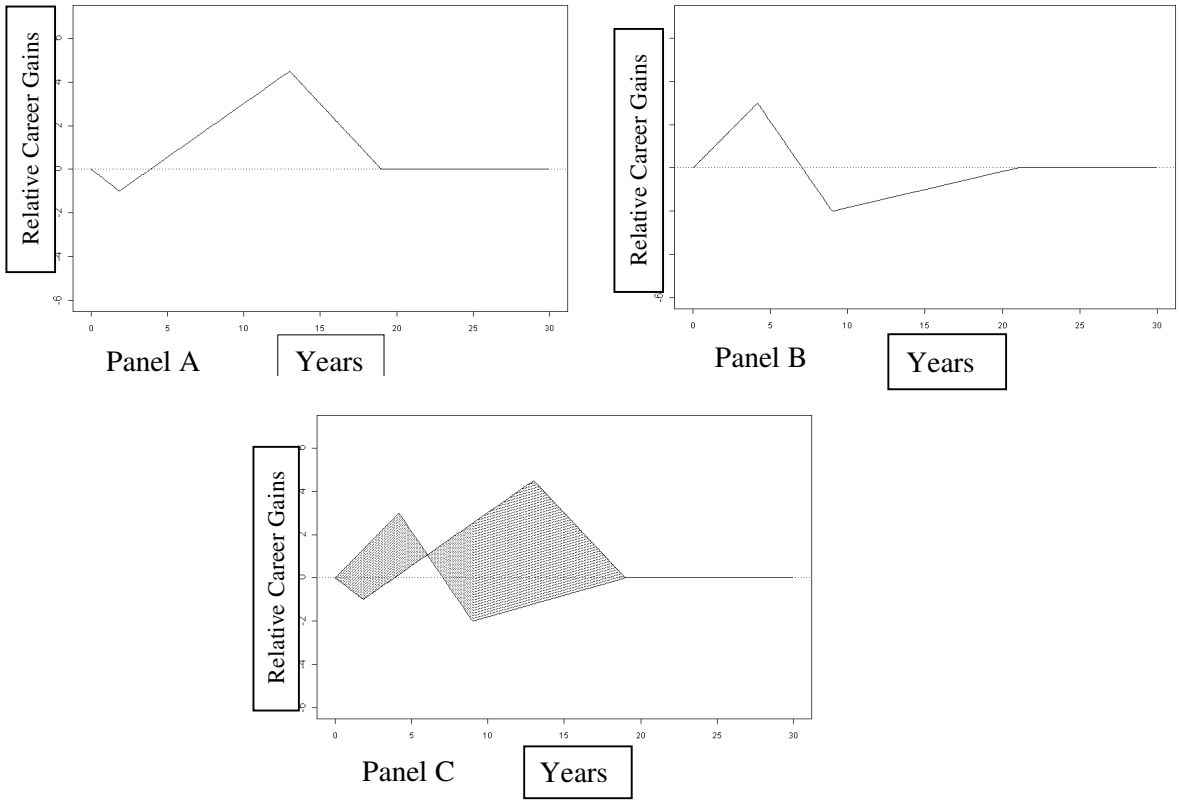

Figure 2. Illustration of a Relatively Large Distance between Two Decision Patterns