

THE UNIT OF ANALYSIS IN SOCIAL MOBILITY RESEARCH: BRINGING TIME INTO THE ANALYSIS OF MOBILITY TABLES*

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This paper focuses, first, on the conceptual flaws inherent in conventional "standard mobility tables." Standard mobility tables completely ignore the timing of social mobility, and cannot control for the sojourn time at each occupational event. They ignore the unfolding of diverse career paths in one's lifetime and over generations. Cumulative mobility tables, which lately have been lauded by some researchers as a cure for such flaws in standard mobility tables, also suffer from conceptual difficulty, in that they confuse person and event as a unit of analysis in mobility tables. The main argument in this paper is that in order to overcome such flaws, we should incorporate the dimension of time in mobility tables. As one conceptually sound and practically simple solution, the paper suggests constructing person-year mobility tables. Using life history data from Korean National Migration Survey, the paper compares the three kinds of mobility tables, and discusses the merits of analyzing person-year mobility tables within the broader context of dynamic models for social mobility study.

INTRODUCTION

Questions about patterns and processes of individual socioeconomic attainment and social mobility have been, and still are at the center of sociological inquiry. Such questions, when posed by those who conceive the structure of social inequality as being composed by discrete groups of people or positions, have usually been studied within the context of mobility table analysis. The history of modern sociological inquiries on intergenerational transmission of advantage/disadvantage, and on career processes of individuals, strongly shows the central position of mobility tables in social mobility research.¹

Recently, however, the very nature of the problem with the measurement

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¹For the major empirical works on social mobility, see Rogoff (1953), Glass (1954), Lipset and Bendix (1959), Hauser *et al.* (1975a; 1975b), Goldthorpe (1980), and Erikson and Goldthorpe (1987a, b). All these works base their discussion on mobility table analyses.

of social mobility, the mounting critiques of the previous approaches toward mobility table analysis, and the availability of the alternative, life-history kind of mobility data, lead us to question the validity of previous approaches on conceptualizing occupational mobility itself. At this moment, the field of social mobility study as a whole is at a critical juncture.

It is the purpose of this paper that I get back to the very base of any empirical research, and discuss the question which urgently needs to be answered particularly in the current conceptual crisis of mobility research; namely, what should be the appropriate unit of analysis for the substantively meaningful study of mobility experiences at the individual level and of the patterns of class formation over time at the societal level?

CONCEPTUAL RECONSTRUCTION OF MOBILITY TABLES

Standard Mobility Tables or Cumulative Mobility Tables?

The conventional mobility study, whether it addresses intergenerational or intragenerational mobility, typically involves the analyses of so called standard mobility tables, which contain counts of persons, each of whom is represented in the table with a combination of origin and destination occupations. This conventional wisdom about conceptualizing and analyzing mobility data, and also about data gathering, has been, especially in recent times, seriously questioned by many critiques.

The critiques that have been advanced against analyzing standard mobility tables can be sorted into three points. First, standard mobility tables cannot control for the time dimension of the mobility events, that is, when the mobility event took place—in other words, when the occupation of a certain occupational position started. Second, as a related but conceptually separate point, standard mobility tables cannot control for the duration of the occupational events. In order to be able to completely understand the time dimension, including the duration, of the event, we should be given information on both when the occupational event started and ended. Standard mobility tables fail to do so. Third, standard mobility tables present a distorted picture of mobility by ignoring the series of career mobility events within one's lifetime or across two generation's lifetime.

In his seminal paper, Duncan (1966) argued against the interpretation of origin marginals² of intergenerational mobility tables as representing the occupational structures at any particular time of fathers' generation, focusing on the demographic notion that since it is impossible to tell when it

²In intergenerational mobility, origin occupations pertain to fathers' generation.

exactly was that fathers held the occupational positions that are reported in the mobility table, origin marginals of the table do not characterize the occupational structure at any point in time.

“...the transformations that occur via a *succession of cohorts* cannot, for basic demographic reasons, be equated to the product of a *procession of generations*... It is, therefore, the basic fallacy to suppose that the father-son mobility table provides in effect two samples in time...the intergenerational mobility table can tell us less about how occupational structures are transformed in the course of economic development than we had hoped” (Duncan 1966).

Such criticism applies to the intragenerational mobility tables as well. In standard intragenerational mobility tables, the origin positions represent the first occupational positions the individuals held in their career, and the time points of such events of occupational holdings are scattered around within a range of large width in terms of historical time. Hence in intragenerational mobility tables, as in intergenerational mobility tables, the origin marginals do not represent the occupational structure at any particularly specifiable point in time.

Another well-received criticism was advanced by Sørensen (1986). He maintained that in the standard intergenerational mobility table, *career processes* of two generations are aggregated, making it unclear of what is being depicted by origin and destination. Goldthorpe (1980) also noted that standard mobility tables necessarily depict the process of mobility only in very broad terms; the details of individual lifetime class trajectories are uncertain in the tables. In the same spirit, Featherman and Selbee (1988) found that the standard mobility table brings about the effect of smoothing the career mobility pattern, because it contains only a summary or averaged representation of each individual's class trajectory over the life course. Sørensen forcefully argued that,

“Career processes and the basic coordinates of the mobility process are confounded in the mobility tables...The basic information in the mobility table does not tell about when and where the movement started and when and where it ended... The result is that the typical mobility table aggregates career mobility processes for two generations spanning a large part of the century” (Sørensen 1986).

In effect, Sørensen questions the validity of research findings based on the standard mobility tables, arguing that such mobility tables do not contain information on mobility events which have taken place between the two temporally remote life events that are represented in mobility tables as origin and destination occupations.

According to Sørensen the standard mobility table, by aggregating career mobility processes (for two generations), contains the data which is extremely difficult to interpret not only from the point of view of individual experiences but also of societal experiences. From the point of view of the individual experience, the table cannot show "when" and "where" the individual mobility trajectories begin and end. From the view point of societal experiences, the structural effects on individual mobility as represented by the marginal distribution of the standard table represent only some kind of "average" for the period of several decades in which the events represented in the table will have occurred.

Not only do standard mobility tables ignore all the mobility events in between the "origin" and "destination" events, but also they do not deliver the necessary basic information on the "origin" and "destination" occupations. According to Sørensen, an adequate theory of mobility should utilize the basic coordinates of mobility, which are "when and where" the movement started and ended. Mobility tables do not convey information on the basic coordinates of mobility, even those of origin and destination.

Sørensen's argument leads us to the conclusion that more serious attention should be given to the collection and analysis of life-course data on mobility. Only then, we will be able to genuinely understand not only the patterns of mobility between occupational positions, but also the processes which generate these patterns.

Sharing Sørensen's criticism, a number of researchers recently produced empirical studies based on a different conception of mobility, utilizing longitudinal or life history data, than the one in standard mobility tables (father's-son's last, or son's first-last position). Most notably, Featherman and Selbee (1988) and Mayer *et al.* (1989) recently proposed that we should shift the unit of analysis from persons in standard mobility tables to class events, which give us "cumulative mobility tables".³ As an alternative to the

³It is worth noting, however, that they were not the first to turn the attention to the cumulative mobility table. Working with the job history data gathered in 1949 in Oakland area, Lipset and Bendix (1959) proposed the same kind of tabulation, though they did not name them cumulative mobility tables.

"...Since we have data on every job which the sample's members can remember holding for more than three months, ...in order to obtain an overall picture of the actual shifts between occupations, ...we have examined the 5,171 actual job changes reported by the respondents" (Bendix and Lipset 1959, p. 164).

Unlike Featherman and Selbee, however, Lipset and Bendix pay attention also to the amount of time spent in each of the occupational positions ever held by the respondents. The lack of attention to the time spent in each occupations in the study of Featherman and Selbee (1988) is one of the problems that their approach entails. This point will be discussed in depth later.

standard mobility table, they construct a mobility table that gives a full account of all events of immobility and mobility over the period spanned by the first to the last class mobility table. The counts in this cumulative mobility table represent the sum of all the class events, from the first to the last class, for each person's career. Cumulative mobility table replaces as the unit of analysis persons with class events, which take place every time a person moves from one class to another. They write,

"...For mobility research, class events are arrayed by origin and destination, with each person contributing as many class-to-class transition counts or events as are contained within the worker's class history. In the aggregate, the cumulation of class events encompasses a total and dynamically unfolding picture of the class structure and formative processes. Each frame of this motion picture is taken each time a class event occurs" (Featherman and Selbee 1988, p. 248).

Both Featherman and Selbee (1988) and Mayer *et al.* (1989) showed that the patterns of mobility and immobility we find in cumulative mobility tables are quite different from the patterns we find in standard mobility tables of the same data. Featherman and Selbee (1988) found (1) that the standard (first-last) mobility table shows larger structural effects because it brackets the career mobility trajectory of each individual, and (2) that the standard (first-last) mobility table tends to show low propensities for mobility between virtually all the classes, while the cumulative mobility table shows a more varied pattern in the propensity for classes to exchange members. Similarly, Mayer *et al.* (1989) found that the analyses of standard mobility tables show Germany and Norway to be remarkably similar, despite their respective histories which suggest that there should be notable differences. However, they found that the analyses of cumulative mobility tables show considerable differences in the outflow patterns between Germany and Norway: the class structure in Norway appears to be much more open and permeable. To sum up, "the (standard and cumulative) tables present very different pictures of structural and exchange mobility," (Featherman and Selbee 1988, p.258) and "first-class/last-class tables provide at best partial insights into career dynamics" (Mayer *et al.* 1989, p. 234). In effect, these researchers correctly pointed out that we should question the validity of research findings based on standard mobility tables.

Findings based on cumulative mobility tables give us a more accurate description of the actual mobility patterns than those based on standard mobility tables do. They no longer suffer from the fact that they ignore the mobility events which take place in between "origin" and "destination" classes.

But is it true that cumulative mobility tables accommodate both aspects of "when" and "where" of mobility processes, as in the spirit of Sørensen's argument? Is it the best way to summarize as much information, essentially relevant to mobility processes, as possible in a simple tabular form? My argument which follows is that cumulative mobility tables do achieve a satisfactory goal in terms of grasping "where" aspects of mobility, but give a very poor, even distorted, picture of "when" aspects of mobility. I will clarify this point in the following.

In terms of conceptual matter, all these positive claims about studying the cumulative mobility tables instead of standard mobility tables are rooted in the shift of the unit of analysis from a person, as in the standard tables, to a class event, as in the cumulative tables. Indeed, the most significant difference between these two tables (and the supposed merit of the latter over the former) is the replacement of a person with a class event as the unit of analysis. A class event in this context is defined as any single or a series of consecutive occupational holdings which do not involve the crossing over of the class boundaries.⁴ A class event, by definition, can be of any length in time. As a corollary, class mobility or class transition is defined as any occupational movement from origin states to destination states that involves the crossing over of the boundaries between any two of the broadly defined occupational class categories.⁵

However, at the very center of the problem with the cumulative mobility table constructed following Featherman and Selbee (1988) and Mayer *et al.* (1989) lies the notion of class event as a unit of analysis. It is one thing to argue the conceptual advantage of changing the unit of analysis, but it is another to correctly implement it in actual analysis setting. One of the typical symptoms of the problem in cumulative mobility tables is that, supposedly with cumulative counts of class events as entries in each cell, it is not at all clear how to interpret the observations in the diagonal cells. In fact, in essence, the problem is due to the fact that the cumulative mobility table contains two different and conceptually irreconcilable kinds of counts as entries in its cells; the counts of class mobility in off-diagonal cells and the counts of persons⁶-i.e. stayer- who have been staying within an occupational class category for widely varied and unspecified span of time⁷

⁴Featherman and Selbee's (1988) definition is the following. "Class event... takes place every time an individual moves from one class to another, no matter how briefly."

⁵Note at the same time, however, that occupational mobility at any level within each class is not treated as a separate class event. As such, in many cases each of the class events may actually contain and conceal a series of occupational mobility.

⁶This is precisely what they argue they are against.

in diagonal cells. Thus, while they argue that the unit of analysis in cumulative mobility tables is the class event, their cumulative mobility tables tell different stories.

The problem is that the concept of class events should have a clear notion of the beginning and ending of it. Beginning and ending of any class event can be marked only by any combination of three kinds of labor market behavior of each individual: moving in and out of the labor market itself, and occupational transition that involves the crossing over of any class boundaries. Now let us look where the counts in each cell in cumulative mobility tables really come from. In the off-diagonal cells of cumulative mobility tables, the entry is the count of class events, with clear information about where each count began and where it ended. Then, what do the entries in the diagonal cells encompass? They consist of all the right-censored cases; (1) the number of people who stayed within an occupational class and never moved across occupational classes,⁸ and (2) the number of people who moved across occupational classes but were not moving at the time of survey. Here the counts are not the class events with a clear notion of the beginning and ending. If it is, it is an unfinished kind. In fact, we can think of these counts as the counts of persons-i.e. stayer- rather than of class events.⁹

By having two conceptually different kinds of counts as entries in off-diagonal and diagonal cells, cumulative mobility tables suffer from the inherent contradiction within the table. There is no limit in how large the counts can be in the off-diagonal cells: each person contributes as many times as they have experienced moving across the class boundaries in their work lives. In contrast, there is a clear limit in how large the entries in the diagonal cells can be: they can be at maximum as large as the number of respondents in the survey, for each person cannot contribute more than once, regardless of their work history, including the number of class events

⁷I must add that it is not clear in the cumulative mobility table how long a time each of this "stayer" counts stands for. This is another source of problem with the cumulative mobility table. I will discuss this point later in this chapter.

⁸This includes both people who never changed jobs and people who changed jobs, regardless of how many times, but always within the broad category of occupational class.

⁹Both Featherman and Selbee (1988) and Mayer *et al.* (1989) seem to have been aware of this conceptual inconsistency of their approach. Featherman and Selbee's solution to this problem seems to be to limit the diagonal counts only to those who never had any class mobility. But on what ground would they justify their solution? It is not at all clear. Mayer *et al.* (1989) seem to be acutely aware of this problem, and in fact do mention this point. "We shift from the number of persons to the number of class transitions plus the number of stayer" (p. 234). Nevertheless, they go on with analyzing the tables as if there is no such problem.

they have had, and the duration at current class positions.

The counts in the diagonal cells, as such, should not be interpreted in the same manner as their counterparts in the off-diagonal cells, because they do not involve any crossing over of the occupational class boundaries, and hence do not qualify themselves as class events. According to Featherman and Selbee (1988, p. 248), class event is something "...that takes place every time an individual moves from one class to another, no matter how briefly." By this definition, the counts in diagonal cells do not reflect class events. So Featherman and Selbee (1988, p. 252) are incorrect when they say "the counts in this table, the cumulative mobility table, represent the sum of all the class events, from first to last class, for each person's life history."

Person-Year Mobility Table

The proponents of using cumulative mobility tables to study structural career mobility patterns were correct in arguing that standard mobility tables present at best a distorted picture of the mobility pattern by aggregating the career mobility processes and ignoring the whole time dimension of persons's life-courses. They maintained that "in the aggregate, the cumulation of class events encompasses a total and dynamically unfolding picture of the class structure and formative processes" (Featherman and Selbee 1988, p. 248). Their operationalization of the unit of analysis was not quite correct, however, resulting in conceptually contradicting entries in diagonal and off-diagonal cells of the table. The problems with the cumulative mobility table, I argue, boil down to a lack of rigor and consistency in using the *time* dimension in defining the class events.

In fact, what cumulative mobility tables show is the cumulation of class events across people's life-course without any notion of natural time. When we introduce the continuum of time, we can see that any one of the class events in the off-diagonal cells of the cumulative tables is actually nothing but an incident that has to be anchored in the context of time to be properly accounted for. And the exact timing of each event and the amount of time spent in each class is completely unknown in cumulative mobility tables. Without somehow accounting for the timing of each event and standardizing the length of time which it took before each transition occurred, the meaning of the class events is not quite identical in each of the moves.

The problem of ignoring the time dimension is equally or more serious with the counts in the diagonal cells. These are the so called "stayer" counts.

Stayer in the cumulative mobility tables are in fact the right-censored observations. They are the ones who happened to be occupying the same job of a certain class at the time of observation. Without controlling for time, there is no way we can tell how long a time each of the counts in the diagonal cells stands for. Furthermore, without controlling for time, it is really hard to argue that "the counts on the main diagonal represent the stable core of each class" (Featherman and Selbee 1987, p. 248).

Another serious difficulty in interpreting cumulative mobility tables is that the marginals in these tables absolutely do not yield any substantively meaningful interpretation. They do not show a distribution of occupational class positions at the time of survey, which the standard mobility tables are able to do, nor do they yield "each frame of...a total and dynamically unfolding picture of class structure and formative processes" (Featherman and Selbee 1988, p. 248) at any point during this process.

The only solution to this problem is to introduce the time dimension into the mobility table itself. This is made possible by reintroducing persons into the table, not by dismissing persons as the cumulative tables do. However, unlike the proponents of standard mobility tables, we have to consider every occupational class move in the entire career of each person, and set them within the framework of time. Now, the task becomes how to accommodate information on origin, destination, and time into a simple tabular form. In fact, the task is to incorporate not only "where", but the other of the two basic coordinates of mobility that Sørensen (1986) suggested, "when" as well.

To do that, we need to introduce the continuum of time in the analysis, and conceptualize each person as being in a state of constant motion within the occupational structure as they travel along the continuum of time. This is possible only when we regard "staying" as a part of "moving". In this conceptualization, the observed event of *job mobility* takes place only after the stay within a certain job passes a certain threshold. Likewise, the observed event of *occupational mobility* takes place only after the stay within a certain occupation passes a threshold. In the same way, the observed event of *class mobility* takes place only after the stay within a certain class passes the threshold. As such, the observation of events is conditional on the level of categorization. At any level, an individual is observed to be staying until the event conditional on the level of categorization takes place.¹⁰ Hence, it should be the case that if we cut a cross-section of this dynamic process of

¹⁰The point is that mobility at different levels of work structure involves thresholds of different levels.

career mobility and class formation, we should be able to see exactly in which state each person is located.

One very practical problem arises in locating the states of each individuals in the framework of time: namely, what should be the unit of time? How fine should it be? How small a unit of time do we need in studying occupational mobility patterns? Unlike the purely conceptual *world of time*, where the unit of time is infinitely small, in practice we need to limit the fineness of the measurement of time. There is no absolutely correct answer to this question. However, given the nature of the event of our substantive interest, a year seems to be an appropriate unit of time to record people's occupational states and movement. Two kinds of rationale are behind this choice. First, it is extremely rare that an individual experiences more than one class mobility (not job mobility) event within a year.¹¹ Hence, we do not need a finer time unit than a year. Secondly, data usually do not support the finer time unit than a year. This is mainly due to (1) usual circumstantial limit of resources in the procedure of data gathering, and (2) the risk of relying too heavily on and expecting too much from people's memory, unless the observation is done every week or every month, which again is unrealistic due to resource limitations.

To sum up, I argue that we can overcome the problems we face in both standard mobility tables and cumulative mobility tables by framing both the location and movement of *persons* within the occupational structure in the context of natural and historical *time*. And the appropriate unit of time is a year. This approach yields a table in which a unit of analysis is the *person-year*.

In a person-year mobility table, each count in both diagonal and off-diagonal cells represents an occupational state in which a person is during a given year. That is, we can make a separate mobility table for each year over the whole time span of our study. In this yearly mobility table, the unit will be person. And this yearly mobility table would be a cross-sectional feature of the dynamic historical process of occupational mobility and class formation.

By constructing the yearly mobility table with persons as units of analysis for each of the years within the time period of our study, we will be able to easily control the level of our analysis. By collapsing the yearly mobility tables over some criterion, we will get a person-year mobility table. In a

¹¹Consider the fact that we are interested in the occupational class mobility, where occupational class is fairly broadly defined. While it is true that multiple job mobility years are observed frequently, most of such multiple job mobility events are within each occupational class.

yearly mobility table, every person who was in the sample under study, and hence whose occupational location was known to the researchers, will contribute once and only once to the counts in the table. In generating the person-year mobility table by collapsing a number of yearly mobility tables over some extended period of years, each person will contribute exactly as many times as he or she was observed in the sample. If the data we are dealing with came from a panel study, each person in the panel will contribute as many times as the number of years he or she has been in the panel. If the data we are analyzing is from a retrospective longitudinal survey, like the KNMS data,¹² each person in the data contributes as many times as his or her age at the time of survey dictates.¹³

With person-year mobility tables acquired by collapsing the yearly mobility tables over the certain historical periods of time, we will be able to see and compare the mobility patterns of different historical periods. By collapsing them over certain age groups, we will be able to see and compare the mobility patterns of different age groups of people. By collapsing them over certain groups of people who share the time of critical events in their lives such as birth or entry into the labor market, we will be able to see and compare the mobility patterns of different cohort groups. Finally, by collapsing them over both all the people and years we have in the data set, we will get the aggregate of all the occupational mobility experiences of population under study.

As such, person-year mobility tables not only enable us to overcome an incomplete set of information, contained in the standard and cumulative mobility tables, but also to facilitate comparative studies of mobility patterns in different segments of population, and/or over time.

DATA AND VARIABLES

*KNMS Data*¹⁴

The data used in this paper are retrospectively collected life history

¹²KNMS is the data set that will be used in this paper to illustrate the three kinds of mobility tables. The details about the data set will be given in the following section.

¹³To be more exact, in life history data, each of the sample contributes as many times as his or her age at the time of survey minus predetermined set-out age of information gathering in each survey design. The unit of time, though, is arbitrary in some sense; we chose it to be a year for practical convenience of tabulating and interpreting the numbers.

For example, KNMS survey collected information only on those years since age 14. Hence, in this study a person who was 34 years of age at the time of survey is counted 20 times in a person-year mobility table.

¹⁴For more detailed description of data, see Kim (1993).

survey data from the Korean National Migration Survey (hereafter, KNMS). The survey was conducted in 1983 on a national sample of 8,707 men and women, aged 14-64.

Since the sampling was biased toward the vicinity of the Capital city, Seoul, for the purpose of migration study, we applied a correction scheme. The data were weighted by the 1983 estimates based on the joint distribution of sex, age, and residential areas¹⁵ intrapolated from 1980 and 1985 Census figures. After applying weights, the data yield distributional characteristics comparable to 1983 estimates on other major variables of our primary interests, such as occupation and employment status.

The retrospectively gathered life history data cover a triangular-shaped space in the Lexis diagram, as in Figure 1. Since the data contain all information on the occupational careers of individuals, we can identify the occupational position of any individual in every year in his/her life between age 14 and 64. This detailed information permits us to construct not only the conventional standard mobility table of "first job-current job" kind, but also the cumulative mobility table and person-year mobility table as well.

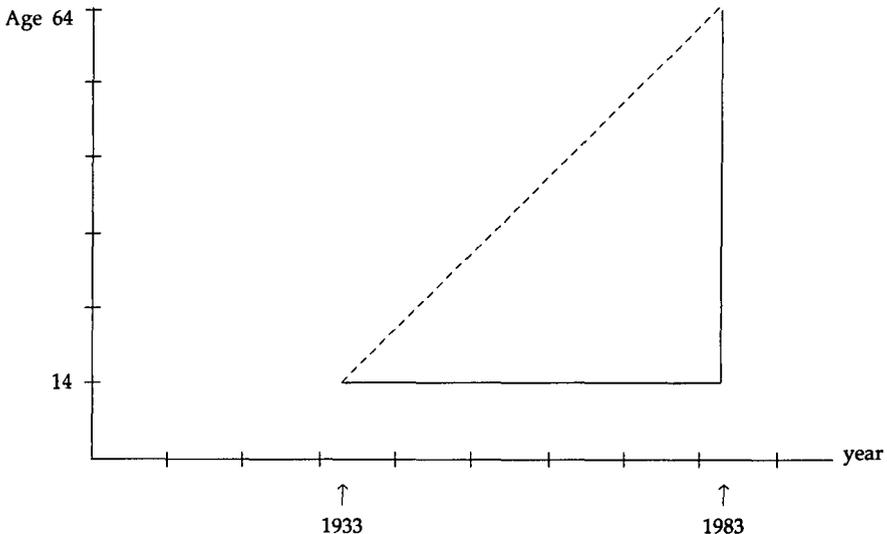


FIGURE 1. THE PROFILE OF KNMS DATA

¹⁵"Residential area" variable has been constructed by a combination of metropolitan/city/rural distinction and Capital area distinction.

Occupational Classes

The analysis is anchored on occupations as a set of six distinct groups: the Upper Nonmanual, the Lower Nonmanual, the Self-Employed, the Manual, the Farmers, and the Not Working.¹⁶ The grouping is done first by the criterion of currently working or not. The fact that 'Not Working' category is included in the analysis reflect the conception of 'Not Working' as a distinct social position that deserves closer analysis. The second criterion of occupational grouping roughly corresponds to the primary vs. the secondary and tertiary industries in the context of Fisher-Clark industry classification. This criterion identifies Farmers as a distinct group from others.

The third criterion is whether one works for wage or for own-account. This criterion distinguishes the self-employed, unpaid family workers, and

TABLE 1. OCCUPATIONAL COMPOSITION OF CLASSES

Employment Status	Occupations	Class Locations
Employer Self-Employed Employee	Professional & Technical Administrator & Manager	Upper Nonmanual (UNM)
Employee	Clerical Sales	Lower Nonmanual (LNM)
Employer Self-Employed Unpaid Family Worker	Except Agri, Prof & Tech	Self-Employed (SEM)
Employee	Service Production Worker Transportation	Manual (MAN)
All	Agriculture	Farmer (FAR)
Unemployed (Seeking Work) Unemployed (Not Seeking Work) Household Work Retired or Sick No Response		Not Working (NW)
Student Military Personnel (Drafted)		Excluded from the Sample

¹⁶Any occupational mobility from and into the 'Not Working' category will be omitted in the mobility table analysis.

employers from the employees. This group in a practical sense roughly corresponds to the *Petite Bourgeoisie* in typical class analysts' terms. The fourth criterion identifies manual labor contrasted to nonmanual labor. The fifth criterion distinguishes the professional and managerial occupations from the routine nonmanual ones.

The resulting six-category occupational class scheme¹⁷ is quite comparable with other occupational groupings or class scheme which have been widely put to use. For instance, it is easily reduced to three-class (nonmanual, manual, and farm) model which has been popular in comparative mobility research. Also, it corresponds without any difficulty to the so-called EGP class scheme (see Erikson, Goldthorpe, and Portocarero 1979).

FINDINGS

In an earlier section, I discussed the inherent conceptual and operational flaws and contradictions in the standard mobility tables and cumulative mobility tables, and why and how both kinds of tables deliver distorted pictures of the dynamic processes and structural patterns of individual occupational mobility. Then, I argued that by shifting our attention to the person-year mobility tables, we will be able to overcome such conceptual shortcomings.

In this part of the paper, I will present and compare the three kinds of tables that we discussed. The standard mobility table and the cumulative mobility table indeed show different pictures and images of mobility patterns. This has already been shown about the U.S. by both Featherman and Selbee (1988) and about European countries-Germany and Norway-by Mayer *et al.* (1989). The mobility patterns in Korea depicted by two kinds of tabulation are also quite different from each other, and from the corresponding tables from other countries.

Earlier in this paper, I argued that we should shift our attention to person-year mobility tables to study career mobility patterns. Would the patterns shown by the person-year table differ from those delivered by other tables? If so, in what aspects and to what degree are they different? Does the picture they provide yield itself to a substantively meaningful interpretation? To answer these questions, let us compare the three pictures of career occupational mobility patterns, each shown by the standard mobility table, cumulative mobility table, and person-year mobility table, respectively.

¹⁷See Table 1 for the details of the classification scheme.

Basic Description of Three Tables

Table 2 is a standard mobility table based on all persons¹⁸ in the KNMS data set. It is a cross-classification of all the respondents' occupations held at the time of survey, which is in 1983, and the occupations at their first jobs. It is worth noting that the time elapsed¹⁹ between the "origin" occupation and the "destination" occupation is an "unknown", for in the table it is not specifiable when each individual began to hold the origin occupation.

Table 3 is a cumulative mobility table based on the entire collection of class events²⁰ in KNMS data set. It is claimed to be a cross-classification of origin class and destination class for all the occupational mobility events that involved the crossing of the class boundaries. As we discussed, however, it turns out that the table contains counts of class events in the off-diagonal cells, and counts of stayer in the diagonal cells. Also note that the time elapsed²¹ between the "origin" occupation and "destination"

TABLE 2. STANDARD MOBILITY TABLE FOR ENTIRE SAMPLE

Origin <i>yr t - α^a</i>	Destination (year <i>t</i>)					Total
	UNM	LNМ	SEM	MAN	FAR	
UNM	203 (75.7)	18 (6.7)	30 (11.0)	11 (4.3)	6 (2.3)	269 (6.2)
LNМ	50 (7.0)	418 (58.8)	147 (20.7)	56 (7.9)	40 (5.6)	711 (16.5)
SEM	7 (1.7)	18 (4.4)	317 (75.7)	52 (7.9)	24 (5.6)	419 (9.7)
MAN	22 (1.8)	46 (3.8)	229 (18.8)	804 (66.0)	117 (9.6)	1218 (28.3)
FAR	18 (1.1)	62 (3.7)	212 (12.5)	335 (19.8)	1064 (62.9)	1691 (39.3)
Total	300 (7.0)	563 (13.1)	935 (21.7)	1,259 (29.2)	1,251 (29.1)	4,307 (100.0)

Note: Numbers in parentheses are outflow percentages, except for marginals.

a: α varies from person to person, and is unknown.

¹⁸I excluded those who were not working at the time of survey. This category of people includes those who never held a job.

¹⁹It is denoted as α in Table 2.

²⁰I excluded the events that originated in and/or ended in "Not Working" category. That is, the table contains only those events that involves "from a working position to another working position" movements.

TABLE 3. CUMULATIVE MOBILITY TABLE FOR ENTIRE SAMPLE

Origin yr $t - \beta^a$	Destination (year t)					Total
	UNM	LNM	SEM	MAN	FAR	
UNM	234 (70.5)	40 (12.0)	27 (8.1)	19 (4.3)	6 (5.7)	332 (5.9)
LNM	60 (7.4)	433 (52.9)	164 (20.0)	56 (7.9)	104 (12.7)	819 (14.4)
SEM	25 (2.4)	45 (4.2)	499 (70.2)	52 (7.9)	162 (15.3)	1,061 (18.7)
MAN	24 (1.5)	81 (5.0)	344 (21.4)	804 (66.0)	1,177 (58.7)	1,611 (28.4)
FAR	13 (0.7)	101 (5.5)	172 (9.3)	335 (19.8)	446 (24.1)	1,852 (32.6)
Total	357 (6.3)	700 (12.3)	1,452 (25.6)	1,259 (29.2)	1,676 (29.5)	5,675 (100.0)

Note: Numbers in parentheses are outflow percentages, except for marginals.

α : β varies from event to event, and is unknown.

occupation is an "unknown" in cumulative mobility tables as well.

Table 4 is a person-year mobility table based on the same data as the previous two. It contains the counts of the observed yearly movement of people. Unlike the other two tables, the time elapsed between the "origin" and "destination" occupations is fixed to be one year, thus enabling us to control for the duration of the occupational event, which is a necessary element in order for us to be able to discuss the process of mobility in terms of probability.

Total Number of Cases

In Table 2, the total number of cases ($n = 4,307$) is identical to the number of people in the survey who had ever held a job and also held one at the time of survey, reflecting the fact that the unit of analysis in this standard mobility table is people. Each and every individual in the sample contributed once and only once to the total number of cases in this table. In Table 3, unlike in Table 2, the total number of cases ($n = 5,675$) is bigger than the actual number of people observed: the counts reflect the number of events, not persons. Some of the people have contributed only once,²² while others have contributed more than once²³ to the counts of total events in

²¹It is denoted as β in Table 3.

TABLE 4. PERSON-YEAR MOBILITY TABLE FOR ENTIRE SAMPLE

Origin yr $t - 1$	Destination (year t)					Total
	UNM	LNM	SEM	MAN	FAR	
UNM	3,602 (97.4)	40 (1.1)	27 (0.7)	19 (0.5)	12 (0.3)	332 (4.9)
LNM	61 (0.8)	7,365 (95.0)	164 (2.1)	104 (1.3)	57 (0.7)	819 (10.2)
SEM	25 (0.2)	45 (0.4)	10,444 (97.1)	162 (1.5)	84 (0.8)	1,061 (14.2)
MAN	24 (0.1)	81 (0.5)	344 (2.0)	16,208 (96.1)	217 (1.3)	1,611 (22.2)
FAR	13 (0.0)	101 (0.3)	172 (0.5)	446 (1.2)	36,045 (98.0)	1,852 (48.5)
Total	3,724 (4.9)	7,632 (10.1)	11,151 (14.7)	16,939 (22.3)	36,414 (48.0)	5,675 (100.0)

Note: Numbers in parentheses are outflow percentages, except for marginals.

this cumulative table.

In the person-year mobility table, Table 4, the total number of observations ($n = 75,860$) is much bigger than in the other two tables. This is due to the fact that we introduced the dimension of time into the table by standardizing the time unit of observation to a year. In this table, each person contributes as many times as the number of years he or she has been observed holding a job in their life time.

Interpreting the Row Marginals

Let us turn our attention to the marginal distributions in each of the tables. Let us first look at the row marginals, the distribution of the origin occupations of the observations in each of the tables. In Table 2, which is a standard mobility table based on the entire sample in KNMS survey, the row marginals show the number of people who began their working careers in each of the occupational classes. For instance, from Table 2, we can tell that about two-fifths (1,691 out of 4,307, or 39.3%) of the people started their

²²These are the people who are staying in the occupational class of their first job at least until the time of the survey. However, we cannot tell how long these people will have stayed in their first class location, because these are the right-censored observations.

²³Each person can contribute as many times as he or she has experienced any kinds of across-the-class-boundaries occupational mobility, plus one, for right-censored case of immobility in one of the diagonal cells.

careers as Farmers. Also, we can see that the second largest occupational class for beginning careers in the sample surveyed in 1983, was the Manual Workers category (28.3%). The least frequently used occupational career entry for the sample in KNMS was the Upper Nonmanual occupations. Only 6.2% of the sample started their careers in Upper Nonmanual occupations.

In the cumulative mobility table, however, it is not at all clear how to interpret the counts on either the origin or destination marginals. It is hard to substantively interpret the marginals in cumulative tables. It is due to that fact that the counts in the cumulative mobility table lack any notion of time whatsoever. For instance, the row marginal for the origin class of Self-Employed in Table 3 shows the counts of 1,061, or 18.7%. What does this number represent? The only interpretation possible is that 18.7% of all the class events originated in the Self-Employed class. Now what does this really tell us in a substantive sense? Without any information on the time dimension of the events, such as when the event happened and how long it took for the event to be completed, the marginals alone do not tell us anything substantively meaningful. In fact, one may even say that it presents a distorted picture of mobility patterns.

Do we gain any advantage by studying person-year tables instead of cumulative tables? The person-year mobility table presents a more accurate picture of reality than standard tables by containing the counts of all the class events of life time in the table. Also, it corrects the problem of the cumulative tables by introducing the time dimension into the table; its unit of analysis is a fixed span of time, relatively detailed but not too fine to limit the practicality of research. In a yearly mobility table, the row marginal would tell us the exact distribution of people at the beginning of each observation period, which is a year. However, since person-year tables such as Table 4 are acquired by collapsing several of the single-yearly tables over the extended period of time, the row marginals in these tables do not yield a clear-cut interpretation as the single-yearly tables would. Still they can be meaningfully interpreted as reflecting the average of cumulated yearly observations of where people were at the beginning of each observation unit — i.e., each year in the occupational class structure during the period of time under study.

To see this point more clearly, let us compare the row marginals of the Farmers class in three tables. As we saw earlier, the standard mobility table tells us that 39.3% of the people surveyed in 1983 started their worklives as Farmers. The cumulative mobility table provides us with a figure of 32.6%, the substantive meaning of which, however, is not at all clear. Table 4, the

person-year mobility table, gives us a figure of 48.5%. So, we find that 48.5% of the person-year started in the Farmers. Now remember the table contains the yearly observations of people's locations within the occupational class structure for the fifty-year period of 1934-1983. Also remember that more than 80% of the Korean population were in the agricultural sector in 1930, and that it has been in constant decline down to about 28% in 1990. In the context of this historical experience in Korea, we can easily see that the figure of 48.5%, given by the person-year mobility table, is suggestive of the average size of the Farmers class reflected in the lifetime experiences of the people over this fifty-year period of time covered in the KNMS data.

Interpreting the Column Marginals

Now let us turn our attention to the column marginals in each of the tables. Column marginals in mobility tables refer to the distribution of each of the observations in terms of their destination (or, in most cases, current) occupations. However, the problem is with what the destination occupations in each of the mobility tables stand for.

In standard mobility tables, such as Table 1, column marginals stand for the number of observations in the sample who ended their working career, or were observed at the time of survey to be, in each of the occupational groups. For instance, in Table 2, we can tell that 29% of our sample were observed to be (or, ended their careers as) Farmers.

In cumulative mobility tables, not only row marginals as we discussed in the previous section, but also the column marginals carry substantively questionable meaning. It is due to the fact that the counts in cumulative mobility tables lack any notion of time at all, as we discussed with row marginals.

Person-year mobility tables, on the other hand, provide us with a much clearer picture of destination occupations, because the counts in the tables carry the time dimension in them. For example, since the time unit in Table 4 is standardized to be one year, the column marginals in Table 4 carry the information on both destination occupations and the time point of each observation.

Since Table 4 is a collapsed version of fifty yearly mobility tables, we can see the pattern of changes in the size of each occupational group on average, by comparing the size of corresponding occupational groups between row (origin, year $t-1$) marginals and column (destination, year t) marginals. However, since the standardized unit of time, a year, is relatively small, the differences between corresponding row and column marginal distributions

are only small. Still, we can see that the Lower Nonmanual and the Manual classes have been growing, while the Farmers and the Self-Employed classes have been shrinking during this fifty-year period of industrialization in Korea.

Interpreting Diagonal Cells

Now let us turn our attention to the diagonal cells in each of these three tables. As we discussed earlier, the counts in the diagonal cells in each of the three tables represent different conceptualizations of mobility/immobility. Hence it is natural that the size and proportion of the counts in the diagonal cells are different from each other in the three tables.

To begin with, we will take a look at the standard mobility table in Table 2. This table shows that 65.1% (2,806 out of 4,307 persons) of the respondents in 1983 are in the same occupational categories in which they started their working careers. On these counts, the interpretation by a typical analysis of the standard mobility table would be that 65.1% of the respondents are career "stayers" and 34.9% of the respondents are career "movers" between the two time points of the first job and the current job. However, note that the table does not contain any information about the occupational positions that each person may have occupied in between the two points in time. This makes it hard to accept the observations in the diagonal cells as career "stayers", and to identify all the observations in the off-diagonal cells equally under the same label of career "movers". I will discuss this point in a more detail.

First, it is very likely that a person was observed to be a stayer just because he or she happened to be observed at the time of survey in the same class in which he or she had taken a first job, even though he or she had held a job in several other occupational classes in between those two time points. Given that the size of the diagonal cells, i.e. of stayers, could be largely dependent on the chance variation stemming from the particular stage of their respective careers in which individuals happened to be observed,²⁴ it is easy to see why it does not make much substantive sense to interpret the counts in the diagonal cells as stayers. Second, just like we should not interpret the observations in diagonal cells as stayers for we do not know about the career processes in between "origin" and "destination" occupations, we also should not regard the observations in off-diagonal

²⁴People do move around the occupational class structure, and the movements are not random, which causes a serious trouble in the conventional wisdom of lumping altogether the diagonal counts in standard mobility tables and regarding them as "stayers".

cells all the same as "movers". It is certain that they are movers, in the sense that they obviously have moved out from their "origin" occupations, but we do not know what kind of different processes each of the observation represents in terms of career mobility. In this lack of information, it is quite questionable to treat all the off-diagonal observations equally as "movers".

Now let us look at the image of mobility/immobility pattern contained in the cumulative mobility tables. The cumulative mobility table, Table 3, shows that about 61.3% (3,477 out of 5,675 events) of the observed counts are the events of immobility. When compared with the standard table, we can see that the cumulative table suggests a picture of more mobile people and more fluid society than the standard table does. However, as we discussed earlier, the counts in diagonal cells of the cumulative mobility tables are not compatible with those in off-diagonal cells within the same table. Accordingly, the counts in the diagonal cells of cumulative mobility tables do not yield any substantively meaningful interpretation.

On the other hand, the person-year mobility table, Table 4, contains much bigger counts of immobility in the diagonal cells. In this table, each of the 97.1 % (73,664 out of 75,860) of the total counts represents a person staying within a certain occupational class during a period of one year. The difference in the total number of observations in the cumulative table and the person-year table is due to the standardization of the unit of time in the latter table. The standardization of the unit of time is also behind the huge diagonal cells observed in person-year mobility table. Each person observed to be immobile and counted only once in the diagonal cells of the cumulative table is now counted as many times as the number of years he or she has been staying in that class. This results in the huge numbers in the diagonal cells.

Substantively, too, the shifts in the unit of analysis among person (in the case of standard mobility tables), class event (in the case of cumulative mobility tables), and person-year result in different pictures of mobility patterns, which are to be seen in each of the three tables. In the standard mobility table, the proportions of the immobile observations depicted by the outflow from the origin classes show that the classes with the least mobile persons are the Upper Nonmanual class and the Self-Employed class, followed by Manual Working class, Farmers, and Lower Nonmanual class, in that order.

However, in the cumulative table, we see that the people in Farmers class are less mobile than those in Manual Working class. Moreover, in the person-year mobility table, people in Farmers class are found to be less mobile than those in any other classes. That is, these three tables deliver

pictures of mobility patterns which are quite different from each other.

To sum up, not only the counts themselves but also the interpretation of them are quite different in each of the three tables. In fact, it is argued that the counts in the diagonal cells of both standard and cumulative tables are conceptually flawed; only by standardizing the time span of all the career moves of individuals, as in person-year mobility tables, can we get the truly meaningful and interpretable picture of mobility/immobility.

Interpreting Off-diagonal Cells

Each of the observed counts in the off-diagonal cells in three different mobility tables stands for different kinds of events. An observation in the standard mobility table stands for one person being found in a class different from the one that he or she began his/her working career in. An observation in the cumulative mobility table stands for one event of individual's move from one occupational class position into another. An observation in the person-year mobility table stands for one person experiencing occupational mobility across the class boundary during a fixed period of time, a year.

Now, note that the counts in the off-diagonal cells in both the cumulative table and person-year mobility table are different from their counterparts in standard mobility table, where they are bigger in most of the cells. However, those cells in the cumulative table and the person-year table share identical counts of events: unlike the standard mobility table, they contain the counts of all the class mobility events in people's lives.

For instance, in standard mobility table, only 18 persons with the origin of Upper Nonmanual class are observed to have moved to the Lower Nonmanual class, whereas as many as 30 persons are observed to have moved to the Self-Employed class. That is, in the standard mobility table, the path between the Upper Nonmanual class and the Self-Employed class seems to be more open than the one between the Upper Nonmanual class and the Lower Nonmanual class. In both the cumulative mobility table and person-year mobility table, however, the picture is exactly the opposite: more people (40 to 27) are observed to have moved from the Upper Nonmanual class to the Lower Nonmanual class than to the Self-Employed class.

This is due to the fact that cumulative mobility tables and person-year mobility tables take all the mobility events during individuals' entire careers, while standard mobility tables do not. By not doing so, standard mobility tables cannot encompass the image of mobility patterns attributed

to different characters of occupational mobility in different stages of individuals' life courses. For instance, the reason that standard mobility tables and both cumulative and person-year mobility tables convey different pictures regarding mobility from the Upper Nonmanual to the Lower Nonmanual or the Self-employed class is because the patterns of such mobility events are strongly related to the age of individuals who are experiencing the mobility, and the nature of mobility events: mobility events from the Upper Nonmanual to the Lower Nonmanual are relatively concentrated in earlier stages of life when compared to the events to the Self-Employed, and mobility events to the Self-Employed are more likely to be terminal moves than to the Lower Nonmanual class.

Interpreting Mobility Patterns

In an earlier part of this paper, I argued that by introducing the time dimension into the mobility table, we can see a more substantively meaningful mobility pattern in the person-year mobility table than in other kinds of mobility tables. One of the most important advantages of standardizing the time span over each of the unit of analysis to generate the person-year table is that we will be able to interpret the outflow patterns as *transition rates*. This is not plausible in other two tables, because they lack the key component of the transition rates, namely, the standardized time span for each observation.

Hence, unlike with the other two tables, it is possible to say that for a person who is currently in the Manual Workers class the chance of moving into Upper Nonmanual class within the next year is very slim at .001, whereas the chance to move into the Lower Nonmanual class is a little bit bigger at .005. For the same person, the chance to move into Farmers class within one year is .013, whereas that into Self-Employed class is bigger than that at .02. Altogether, the chance to move out of the Manual Working class within the next year is only about .039. The chance to stay within the same class within the next year, however, is as large as .961.

Summary

In this section, I showed the differences in three kinds of mobility tables. We have seen that some of the numbers which we find in standard tables or in cumulative tables do not yield a substantively meaningful interpretation. Also the pictures of career mobility delivered by each of the three tables appear to be different enough to warrant an assertion that we should question the validity of the findings from mobility research based on

standard mobility table of cumulative mobility table. These findings point out the necessity to shift our attention to person-year mobility tables.

MOBILITY TABLES AND EVENT HISTORY MODELS

To this point, I presented a critical review of mobility analyses based on standard mobility tables or cumulative mobility tables. In this section, I will briefly discuss how the conceptual flaws in cumulative mobility tables inhibits the substantively meaningful interpretation not only of the observed mobility patterns in the tables, but also of the relative mobility patterns based on log-linear analysis of the tables. Especially, I will discuss the implications of the conceptual flaws in the context of formal models.

I have argued that the essence of the problem with mobility analysis using cumulative mobility tables is that there is a conceptual discrepancy between counts in diagonal cells and off-diagonal cells in cumulative mobility tables, and that each count in the table, which is argued by the proponents to represent a mobility event, carries no information about time.

To understand what cumulative mobility tables try to represent, and how and where they go wrong, we need to understand that cumulative mobility tables are products of the effort to analyze the occupational mobility data in the context of dynamic models, event history analytic techniques, in particular. Featherman and Selbee (1988) explicitly display their intention that their work with a cumulative mobility table will be extended within the context of event history analysis. In fact, it seems that the proponents of the cumulative mobility table approach were thinking of the cumulative mobility table approach as a way of linking growing body of knowledge on event history analytic methods and conventional mobility table analysis.

Their awareness of the necessity of the link was sound, but their approach seems to have been incorrect. To understand the point, let us introduce the continuous-time event history analytic models²⁵ in "competing risks" situation. Suppose there are m different kinds of events ($j = 1, \dots, m$), and let J be a random variable indicating which of the m events occurs. The hazard rate for event j is then defined as

$$(1) \quad \lambda_j(t) = \lim_{\Delta t \rightarrow 0} \text{Prob}(t \leq T < t + \Delta t, J = j | T \geq t) / \Delta t$$

Overall hazard rate is,

$$(2) \quad \lambda(t) = \sum_j \lambda_j(t)$$

²⁵For detailed discussion of the event history analytic methods, see Allison (1984), Blossfeld *et al.* (1988) or Yamaguchi (1991).

Type-specific hazard rate for event j in (1) is equal to the hazard rate-times the conditional transition probability, P_j .

$$(3) \quad \lambda_j(t) = \lambda(t)m_j(t)$$

where $\sum_j m_j(t) = 1$.

The conditional probability, $m_j(t)$, is the probability, given that an event has occurred at time t , that it is of type j . Conditional transition probability $m_j(t)$ is the probability conditional upon leaving a state, while type-specific hazard rate carries the time conception with it by being relative to two points in time $-t$ and $t + \Delta t$.

Type-specific hazard rate can be expressed and estimated in two ways (see Hachen 1988). The first is to directly estimate the type-specific rates themselves, as in (1). The second is to estimate the overall hazard rate and conditional probabilities separately, and express the type-specific hazard rate as a product of overall hazard rate and conditional transition probability, as in (3).

Now, given the above discussion on type-specific hazard rates and different ways of expressing them, we can see where the cumulative mobility table analysis go wrong. Analysis based on cumulative mobility tables estimates only a set of conditional transition probabilities, $m_j(t)$, by applying log-linear models on mobility tables which have counts of mobility events in their cells, but with no information about time dimension of each event. Cumulative mobility tables, although allowing the estimation of a set of conditional transition probabilities, do not enable the researcher to estimate the other quantity, overall hazard rate $\lambda(t)$, which is necessary to get the type-specific hazard rate $\lambda_j(t)$. However, the quantity of our interest is not $m_j(t)$, but $\lambda_j(t)$. So, log-linear analyses based on cumulative mobility tables are incorrect, because they are not dealing with type-specific hazard rate, but only with conditional transition probabilities.

In contrast to the cumulative mobility tables, person-year mobility tables proposed in this study yield a direct estimate of $\lambda_j(t)$ in discrete-time framework (see Kim 1993).

SUMMARY AND CONCLUSION

This paper set out to accomplish two objectives. The first was to propose a new conceptual scheme to summarize in simple tabular form the rich information contained in the longitudinal or retrospectively collected life history data for the study of social mobility. The other was to illustrate the advantage of new conceptualization of mobility processes within the

context of the experiences of Korean society.

The paper argued that both standard mobility tables and cumulative mobility tables present distorted pictures of mobility patterns. Standard mobility tables are flawed in that career processes (of two generations, in the case of intergenerational mobility) are aggregated in them, making it unclear what is being depicted by origin and destination (Sørensen 1986). Recently, several researchers have proposed shifting the unit of analysis from persons to class events and using cumulative mobility tables in place of the standard mobility tables. I argued, however, that cumulative mobility tables also present an incorrect picture of mobility patterns due to the conceptual inconsistency in them regarding time dimension of mobility. For example, the counts depicted in diagonal cells of cumulative mobility tables are erroneously defined and hence cannot be given a meaningful interpretation. It was shown formally as well that the mobility patterns based on log-linear analysis of the cumulative mobility tables are incorrect, because the log-linear analysis of the cumulative mobility table can only get a set of transition probabilities conditional upon leaving a state.

As an alternative, I argued that a better way to summarize the information necessary for the investigation of mobility patterns is to incorporate both time and agent (person) of mobility into the analyses. The resulting tables, person-year mobility tables, serve nicely as bases for the interpretation of the mobility patterns and processes as probabilistically determined. Also, in contrast to the statistical analysis of cumulative mobility tables, log-linear analysis of person-year mobility tables proposed in this paper can correctly incorporate the time dimension of the mobility events into the models, thus yielding a set of type-specific hazard rates (see, for example, Kim 1993). In this way, person-year mobility tables will serve as useful bases for analysis within the framework of stochastic models, which is the direction the field of social mobility study as a whole should be headed in.

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