

Establishing Typologies for Diverging Career Paths through the Life Course: A Comparison of two Methods

Amelia Román¹, Dimitri Mortelmans² and Leen Heylen³

¹Amsterdam School of International Business (AMSIB), The Netherlands

²Research Centre for Longitudinal and Life Course Studies (CELLO) University of Antwerp, Belgium

³Vonk3, Thomas More University of Applied Sciences, Geel, Belgium

a.a.roman@hva.nl

dimitri.mortelmans@uantwerpen.be

leen.heylen@thomasmore.be

Abstract: Discussions on policy and management initiatives to facilitate individuals throughout working careers take place without sufficient insight into how career paths are changing, how these changes are related to a modernization of life course biographies, and whether this leads to increased labour market transitions. This paper asks how new, flexible labour market patterns can best be analyzed using an empirical, quantitative approach. The data used are from the career module of the Panel Study of Belgian Households (PSBH). This module, completed by almost 4500 respondents consists of retrospective questions tracing lengthy and even entire working life histories. To establish any changes in career patterns over such extended periods of time, we compare two evolving methodologies: Optimal Matching Analysis (OMA) and Latent Class Regression Analysis (LCA). The analyses demonstrate that both methods show promising potential in discerning working life typologies and analyzing sequence trajectories. However, particularities of the methods demonstrate that not all research questions are suitable for each method. The OMA methodology is appropriate when the analysis concentrates on the labour market statuses and is well equipped to make clear and interpretable differentiations if there is relative stability in career paths during the period of observation but not if careers become less stable. Latent Class has the strength of adopting covariates in the clustering allowing for more historically connected types than the other methodology. The clustering is denser and the technique allows for more detailed model fitting controls than OMA. However, when incorporating covariates in a typology, the possibilities of using the typology in later, causal, analyses is somewhat reduced.

Keywords: careers, life course, optimal matching analysis, sequence analysis, cluster analysis

1. Introduction

The latest resurgence of interest for life course frameworks for career research (Eliason, Mortimer, and Vuolo, 2015; McMunn et al, 2015) Robette, Bry, and Lelièvre, 2015) is, for the most part based on the assumption that career patterns are changing due to influences of modern life course biographies. In this manner, deviating from a standard career path is increasingly becoming an option for individuals to combine paid labour with other important life domains. These career detours emerge in diverse labour forms such as part-time jobs, temporary working hour reductions, and labour force time-outs, and are used by individuals to alleviate conflicting time demands throughout careers, especially during the rush hour of working life. Although the classic career path of steady, full-time employment is still the standard, there are grounds for assuming that an increase in the number of career types is occurring under influence of the de-standardization of life course biographies (Pavlopoulos et al, 2014). Are standard full-time working careers becoming less the norm? Is there evidence of an increase in career types exhibiting more transitions from, to, and within different states of activity in the labour market? This exploratory paper asks "How are careers trajectories developing under influence of modern life course biographies?"

As an exploratory paper, we search for evidence of the destandardization of life course biographies as characterized by changing career types and in doing so, we take one step back in the research cycle to assess just what the appropriate instrument is to answer this question. Pavalko, (2015) finds the new methods of sequence analyses essential to applying life course frameworks. Van Wissen (2002) applied the life course framework to organisations using longitudinal analysis of firm demography. According to Hoffman (2015), studies which focus on temporary variations are more short-term oriented. Looking into within person change, and this is the focus of our research, has a long-term focus. The aim of this paper is to evaluate two developing exploratory methods to cluster an individual career path. With the increased availability of longitudinal data, and this is especially the case with register data, the search for appropriate techniques to analyze long data

series has intensified. In career research, longitudinal data can give insight into the development of careers. With the resulting typologies, further analyses can throw light on the life course analysis of career trajectories.

We use the Belgian labour market as a case study for two reasons. First, because the Belgian labour market has a long history of women's labour participation and life course-oriented labour market policy, and secondly because of a unique dataset surveyed among Belgian households covering career histories of more than 4400 individuals. Using this dataset, two techniques are compared: Optimal Matching Analysis (OMA and Latent Class (LCA) regression analysis. The choice for these two methods is because of the increase in their range of applications (Halpin, 2010; Bray, Lanza and Xianming, 2014).

The organization of this paper is as follows. In section 2 life course theory is explained in relation to career trajectories and our hypotheses are formulated. Section 3 presents the data and provides a description of the two methods of analysis. In section 4, the typologies resulting from the analyses using the two methods are compared. In section 5 the typologies are analyzed using a cohort perspective for insight into whether the established career types are new and certain career paths on the decline. Section 6 discusses the implications and the last section (7) summarizes the findings and draws conclusions.

2. Life course theory and its relation to careers

Elder (1998) wrote of social trajectories of work, education, and family that individuals follow throughout their lives. As individuals make their way along these paths, they experience major life events or transitions (leaving school, marriage, the birth of a child). Whether one is able to choose one's path and transitions depends on the possibilities or lack of which available in the social, cultural, and economic environment. According to theoretical insights the process of individualization – where personal choice prevails in the organization of life course biographies – will result in a diversification of life course patterns, the so-called de-standardization of the life course (du Bois-Reymond, 1998; Giddens, 1991). Within these life course patterns, paid labour takes a central but no longer automatically predominant position. The more traditional careers from the breadwinner model (Lewis, 2001; Trappe et al, 2015) of previous generations are losing ground as an increasing number of women enter and remain active participants in the labour market. Since their entrance onto the labour market, women have been the pioneers of intermittent careers and irregular career paths, a factor seen by many social scientists as contributing to earnings inequality (Light and Ureta, 1995; Mertens et al., 1995; Mincer and Ofeck, 1982; Mincer and Polachek, 1974). These irregular career paths create new requirements for combining work with other important life domains such as care, training, and leisure. This is particularly true during the period in the life course when work (through career building) and home (in raising a family) are experienced as conflicting demands in households (Groot and Breedveld, 2004; Lewis, 2006; Moen and Smith, 1986). It is particularly these changes in career paths that are of interest for this paper.

In order to answer our research question, we cluster our data using two techniques to develop career typologies. We then use these to check the historical reality of life course related processes (individualization, emancipation). If a typology is being used in a life course perspective, in what way does it manage to capture already defined historical trends? We use three main developments (Lewis, 2001; 2006) to evaluate the typologies against:

- The breadwinner model dominating from 1950 until the late eighties
- Women re-entering the Belgian labour market in the seventies
- Part-time regulations introduced on the Belgian labour market in the nineties used more by female employees.

Each of these trends has been described recurrently in the literature (Cunningham, 2008; Jansen et al, 2009; McDonald, 2000; Trappe, 2015). We translate these trends into three empirical hypotheses:

1. Older male cohorts should show non-transitional full-time labour. Older female cohorts should show non-transitional non-participation.
2. Female cohorts born between 1950-1959 should be the first to show a labour market (re)entrance.
3. Male and female cohorts born 1960 and later should be more prominently present in career types characterized by part-time labour. This should be more so for women than for men.

3. Data and methods

We start this section with a description of the data used and a general description of the techniques we compare. The aim is to give the reader a non-technical introduction to the philosophy behind the technique and a broad idea of how to use the technique with career sequences.

3.1 The PSBH career module data

The data used for this research is from the Panel Study on Belgian Households (PSBH), a survey originating in 1992 with annual waves following the original 4439 randomly selected households counting 11000 individual members. The survey is conducted using face-to-face interviews. Respondents are adults in private households (16 years or older). All of Belgium is covered with an achieved sample size of 4439 households and a response rate between 85 and 93 percent. The sampling frame is the Postcode Address File of the National Registration Office.

In the 2002 wave of the panel, a special module on careers was included. It was completed by 4453 respondents answering questions on the entire career path starting with the moment that their initial schooling was completed or terminated to their retirement from active labour participation. The PSBH is sampled from the entire Belgian population known to the postal registry, which means that the population is broader than only the population of working age. There are obvious drawbacks to using retrospective data, especially when the survey questions are covering such lengthy periods of time (Manzoni et al, 2010). However, the career module is designed using questions that carefully guide respondents to register their periods of labour participation, inactivity, unemployment, schooling, etc., using major life course events as their historical markers (i.e. marriage, birth of children, etc.).

3.2 Using Optimal Matching Analysis (OMA) to capture career patterns

The first method for analyzing career patterns is Optimal Matching Analysis (OMA) which has its roots in molecular biology and more specifically DNA research. Optimal Matching Algorithms were used to recognize patterns in the DNA and protein sequences. The technique calculates for each pair of sequences how much the second sequence differs from the first. A predefined maximum number of mutations are established whereby those sequences requiring more than that maximum number fall into a new category. The adaptation for the social sciences was pioneered by Abbott (Abbott and Hrycak, 1990).

In terms of our analysis, the employment status of a respondent measured at each point in time forms one sequence that is analyzed as a career path. This is a logical approach to the data because we would like to determine whether there is observable evidence of changing career patterns. A transition is a move from one labour market state to another. Persons who are studying and have not yet entered the labour market are not included. Only one labour market status is possible per year assessed by registering the labour market status for which the most time during that year is spent.

The dependent variable employment status is a nominal variable with nine categories: unemployment, unpaid activity, inactivity due to sickness or handicap, study/training, new part-time job, part-time job, new full-time job, full-time job, and pension.

The OMA technique is based on a number of assumptions that are inherent in the structure of the data. A timeline is assumed with multiple points of measurement t_1, t_2, \dots, t_n . The variable X is measured at every point in time, which results in a range of observations. In this manner, a sequence of observations of variable X at time t is made. This range represents the course or career path for that respondent over the points of measurement of the variable.

The distance between sequence one (respondent 1) and sequence two (respondent 2) is calculated using a transformation measure. This shows the 'cost' of transforming sequence 1 into sequence 2. The transformation is made by inserting, deleting, or substituting elements. Each step entails transformation costs with a deletion or an insertion equalling 1 and a substitution equalling 2. The lower the transformation costs, the more similar the sequences are. This results in a distance or dissimilarity matrix. The matrix is used to establish when the maximum distance has been reached. Once the distance matrix is calculated, the sequences are organized into career typologies using cluster analysis, grouping similar cases (Chan, 1995).

3.3 Latent class analysis for identifying career patterns

Unlike the previous method, Latent Class regression Analysis is from the family of latent structure models (Vermunt, 2004). Latent means that the analysis is directed to look for similarities that are not obvious or immediately discernible. For instance, in much the same way that a factor analysis can establish underlying dimensions that group similar survey questions, latent class establishes underlying similarities in scores, with the aid of covariates to identify like groups.

There are no assumptions concerning the measurement level; both indicator and latent variables can be nominal (Vermunt, 2004). This enables multivariate regression analysis using a nominal dependent variable. This is also important for discerning career patterns as no hierarchy is entered in the model concerning career paths. Determining the correct number of classes in the model is essential because using too many classes makes for an unstable model, while too few classes does injustice to the variety in the data. This is achieved with the help of the log-likelihood values, the BIC (Basic Information Criterion) values and the number of parameters in the estimated models. It is also important to keep an eye on the classification errors which show the rate of incorrect predictions. Latent Class Analysis allows for two types of control variables to be added to the model, predictors or explanatory variables, and covariates for descriptive distributions. The dependent variable is the nominal variable; labour market status with seven categories: schooling, unemployment, nonparticipation, disability, pension, full-time work, and part-time work.

Drawing on our theoretical model, a number of assumptions are now entered in the model. Especially important is how labour patterns are influenced during particular life course stages. Included in the model as an explanatory variable (predictor) is the variable age entered with three categories to reflect major life course stages: younger than 30 years of age, 30 to 49 years of age (time squeeze), and fifty and older. Further, two variables are added as inactive (non-explanatory) covariates to distinguish how personal characteristics are distributed over the classes: gender, cohort. A total of 4453 cases are included in the analysis. The log-likelihood (LL) decreases as the number of classes increase. Two parameters are essential in discerning the best number of latent classes for the model. The first is the BIC (Basic Information Criterion) a parameter derived from the log-likelihood. The second is the classification error that shows the error rate for predicting the class for each respondent. It is necessary to attain a balance between the simplest model and the model that allows for the greatest variety. As long as the BIC value decreases and the classification error does not get too high, increasing the number of classes is justified.

4. Typologies

After this general introduction of the techniques, we now present the results of the analyses. Both techniques lead to a typological description of the career trajectories of the respondents. The software merely produces a clustering of careers in types, clusters or classes. As researchers, we had the task to interpret the clusters and name them.

It becomes clear that the techniques do not lead to the same number of clusters. The OMA leads to an optimum of 17 clusters for which we heavily leaned on our theoretical model. OMA does not cope well with duration. Some cases were directed to a different cluster simply due to longer durations in labour market states. Whereas based on the content of their career path they belonged in another cluster. This is where the theoretical framework was essential for achieving an optimum of clusters. The LCA solution produced 11 classes. From Table 1 we omitted the class "Students". This class was present in both techniques, clustering young respondents who had not yet entered the labour market. Since our aim was to compare career trajectories, we decided not to include them in further analyses. A second remark concerns the total N in the LCA typology. The OMA typology has been estimated using weighted panel data. The LCA typology shows unweighted results.

Table 1: Overview of OMA and LCA career-typologies and univariate distribution

OMA	%	N	LCA	%	n
Stable entrant	7.71	329	Standard career	28.74	1280
Less stable entrant	7.43	317	Early retirement	26.78	1193
Job hopper	4.12	176	Redundancy	8.10	361
Stable full-time	19.99	853	Homemaker	6.96	310
Transitional full-time	11.86	506	The bridge	6.15	274

OMA	%	N	LCA	%	n
Stable part-time	2.18	93	Part-time career	6.10	272
Unstable part-time	9.44	91	Career of unemployment	4.80	214
Stable nonparticipation	9.44	403	Merry widow	4.32	192
Unstable nonparticipation	1.41	60	Midlife career	3.29	147
Unemployment	1.19	51	Burn-out	2.41	107
Sickness or handicap	1.71	73	Multi-tasking	2.34	104
Atypical career	4.40	188			
Insecure career (unemployment)	2.04	87			
Standard career	10.10	431			
Transitional full-time career – retirement	5.65	241			
Atypical longer career - retirement	0.94	40			
Total	100	3939	Total	100	4453

OMA typology

The career module includes respondents who began their career as far back as 1931 making a maximum number of 72 measurements possible (1931-2002). There are also respondents who have only just begun their careers with no more than one or two employment status measurements. A total of 4268 respondents have been included in the analysis resulting in a total of 16 identifiable patterns, which again can be reduced to six major content steered grouping types: [the recently former students (1), the short full-time career (2,3,4), the employment career (5,6,7,8), the career breakers (9,10,11,12) and the completed careers (13,14,15,16)]. To simplify the description, each of the 16 career types has been numbered for which a brief explanation of each of the 16 types will now be given.

1. Stable entrant - This group has only recently joined the labour market actively. This initial entrance has been without any noticeable problems. The majority of this group has found a full-time job rather quickly; others have started their career in a part-time position. The number of transitions is limited to a maximum of one; this is often a transition from one job to the next.
2. Less stable entrant - Although this group has participated a bit longer and working in full-time jobs has a central position, many of these respondents have changed jobs already a few times. Others have exchanged periods of full-time work with periods of unemployment or part-time labour.
3. Job hopper - These respondents change regularly both their jobs and their employment status. Job-hopping is the central theme here. Many of the transitions are from full-time jobs to new full-time positions, but by the very tendency to change so often, the image is one of an unstable career pattern.
4. Stable full-time - These respondents fulfil the transitional career image in which full-time work is the common denominator. Full-time employment is carried out for longer periods and in the same job. Some of these individuals change occasionally; others make the transition to another employment status.
5. Transitional full-time - Just as the previous type, here too, working full-time is dominant with the main difference being that these respondents have a less stable career path. In this group, job transitions are more common. Furthermore, full-time career periods are interspersed with short periods of unemployment, part-time employment, unpaid activity or even periods of illness.
6. Stable part-time - These are the real part-time employees displaying a very stable pattern of part-time employment and only a few transitions.
7. Unstable part-time - This group is quite similar to the previous groups but has a much less stable career path. Although part-time work is the predominant pattern here, it is interchanged with periods of full-time work, unemployment or unpaid labour.
8. Stable nonparticipation - The career path for this group is predominantly unpaid labour revealing quite a stable pattern.
9. Unstable nonparticipation - This group also demonstrates a predominant pattern of unpaid activity but their pattern is much less stable, reflecting periods of nonparticipation interspersed with other kinds of employment such as regular full-time employment and unemployment.
10. Unemployed - These respondents have been unemployed for the major part of their career.
11. Sickness or handicap - These careers are characterized by long periods of illness and disability.

12. Atypical career - A typical atypical career path is characterized by periods of unemployment, unpaid activity, training, and illness and is as diverse as can be imagined. These respondents have experienced just about everything.
13. Insecure career - The insecure career path shows periods of employment that are often interrupted for shorter and longer periods of unemployment and unpaid activity.
14. Standard career - These respondents have followed the traditional career path. After a stable full-time career with few or even no transitions, they retire from the labour market.
15. Transitional full-time – retirement - These respondents have also worked almost their entire career in full-time positions, ending their careers with retirement. Contrary to the previous group, however, they have a more transitional career in which they have changed employment status a few times for periods of unpaid labour, illness or even a period of unemployment.
16. Atypical longer career – retirement - This last group has had a less traditional career considering that periods of full-time employment are not necessarily the main ingredient. Career detours are also dominant in their working life prior to their exit from the labour market for retirement.

LCA typology

The program establishes classes in the analysis in a particular order, and class size gets progressively smaller as the class number rises. The numbers assigned by the program will not be changed. The first task at hand is distinguishing the relevant career types resulting from the analysis using the 11-class model results. Different from the first methodology, LCA allows for the introduction of an age variable. In the table each of the eleven classes are shown with the most common labour market status per age category. By entering an age category as an explanatory variable into the analysis, it is possible to capture life course patterns during the career path that give a more dynamic view of how labour market patterns evolve during careers and throughout life course stages. The resulting eleven career types are now briefly described.

1. Standard career - Class one is the largest, with 29 percent of the population. Individuals belonging to this class are full-time workers throughout their career. The career length is also standard as these types continue working full-time until the actual retirement age.
2. Early retirement - The second type distinguished consists of 27 percent of the population. These are full-time employees who, for the most part, exit the labour market somewhere around age 50 for early retirement. There is no part-time work observed, no unemployment, and only a small (two percent) likelihood of not participating in the labour market during the early years of the career (younger than 30 years of age), probably due to a longer initial educational period.
3. Redundancy - This group is significantly smaller compared to the first two, and consists of only eight percent of the population. They are full-time workers throughout the first two life course stages. Unemployment is the shadow side of this type. It lurks during all the life course stages (10% during the first two stages). At age 50, the unemployment rate of this type jumps to 36%.
4. Homemaker - This group includes seven percent of the population. Only one-fifth of this class starts working full-time before exiting the labour force as nonparticipants. The rest of the group members are the traditional homemakers who do not participate in any form of paid labour during their potential working lives.
5. Bridge group – Three quarters of this class works full-time throughout the first two life course stages with one quarter working part-time. During the last working life phase, one quarter remains working full-time, one quarter remains working part-time and the other half is a mixture of early retirement or disability creating a bridge during this last working phase before retirement age.
6. Part-time career - This class works either full-time or part-time until they are 30 years of age. At this phase, they all switch to working part-time, but do so consistently until reaching retirement age.
7. Career of unemployment - This class is almost five percent of the population. This group is unemployed from the starting point to the end of their career. It is a relatively large group that never effectively enters and participates in the labour market.
8. Well set - The first stage of this classes' working career is either working full-time or nonparticipation. This type represents more than four percent of the population. The second life course stage is nonparticipation. These individuals have exited the labour market as homemaker. For the last phase of their career they opt for early retirement which would indicate that their spouse is somewhat older or has also arranged for early retirement.
9. Midlife career - This group, consisting of more than three percent of the population, starts its career in the midlife phase. The first period is spent by almost half of the group not participating. By the

second life course phase, three quarters of them are working full-time, although six percent can be found in schooling. Just over forty percent is working full-time during the last phase, with the rest already eased into early retirement.

10. Burn-out - This class literally burns itself out. The first life course phase they work full-time. By the time they are 30, half is working full-time and the other half is on disability. By the age of 50, three-fourths of this group is on disability and one-fourth has opted for early retirement.
11. Multi-tasking - This class exhibits great diversity throughout the career. The first phase is either full-time work, nonparticipation or part-time work. At age 30, more than half has opted for part-time work, most likely to accommodate their responsibilities at home. At age 50, they either continue working part-time, exit the labour market as nonparticipants, have taken early retirement, are on disability, or receive unemployment insurance.

5. Comparison of OMA and LCA as career clustering techniques

In the second part of this article, we look more closely to the results of the methods. The aim of the subsequent analyses is attaining insight in the applicability of the techniques in career research. Technically, there is no superiority question vis-à-vis on either of the techniques. Both have been tested extensively and they both have their weaknesses and technical particularities (see previous). We want to compare the results with future analyses in mind. The central research question then becomes: If these typologies are the basis for subsequent analyses, which one is preferable for what kind of analysis?

5.1 OMA career types by gender and cohort

The aim of the subsequent analysis is to verify the three central hypotheses on the descriptive results in Table 1. We start with the classic patterns: the male-breadwinner model whereby men have continual full-time careers and a majority of women exhibit a predominance of nonparticipation. We find an underrepresentation of women in cluster 4 (stable full-time) and cluster 5 (transitional full-time). Here, more men demonstrate stable or transitional full-time career patterns. Also the completed standard career is more often male dominated (15.2 compared to 7.2 %). If we look at the division by cohorts, it is clear that the dominance of the breadwinner model is situated in the oldest three cohorts. Men in these cohorts consistently show high percentages in the stable completed or the stable full-time careers (those not retired). Women are predominant in the stable nonparticipation category. About 20 percent of the oldest two female cohorts show a stable (completed) standard career. Although the career patterns clearly show the breadwinner model, it was not all encompassing for the oldest cohorts.

Table 2: OMA career typology: female and male career patterns by birth cohort (percentages)

	Type	Total	<1930	1930-1939	1940-1949	1950-1959	1960-1969	>1970	N
Female									
Short full-time careers									
1	Stable entrant	8.0	0.0	0.0	0.0	0.3	2.2	48.2	169
2	Less stable entrant	7.8	0.0	0.0	0.0	3.0	17.0	21.9	164
3	Job hoppers	6.0	0.0	0.0	0.3	3.5	17.1	8.9	126
Longer labour careers									
4	Stable full-time	16.2	9.4	5.6	23.8	34.5	16.7	1.6	342
5	Transitional full-time	7.6	0.2	5.9	8.4	16.3	10.2	0.5	160
6	Stable part-time	4.2	0.9	3.5	4.1	5.1	8.4	0.6	88
7	Unstable part-time	4.3	0.5	4.7	8.2	8.1	3.6	0.2	90
Career breakers									
8	Stable nonparticipation	19.0	44.9	39.5	26.2	11.4	4.3	0.2	400
9	Unstable nonparticipation	2.8	2.9	4.0	6.0	3.2	1.4	0.1	59
10	Unemployment	1.4	0.0	0.3	0.7	1.1	2.2	3.6	30
11	Sickness or handicap	1.8	0.7	3.6	4.8	1.6	0.6	0.2	37
Atypical career paths									
12	Atypical career path	7.0	0.0	0.6	2.7	6.6	14.6	12.8	148
13	Insecure career (unemployment)	2.3	0.2	0.6	4.5	5.0	1.7	1.2	49
Completed careers									
14	Standard career	7.2	20.8	22.3	7.7	0.0	0.0	0.0	152
15	Transitional full-time – pension	2.8	9.5	7.2	2.5	0.3	0.0	0.0	59
16	Atypical longer career – pension	1.7	10.0	2.1	0.0	0.0	0.0	0.0	37
	Total (N females)		309	290	302	408	474	326	2109

	Type	Total	<1930	1930-1939	1940-1949	1950-1959	1960-1969	>1970	N
Male									
	Short full-time careers								
1	Stable entrant	8.8	0.0	0.0	0.0	0.4	1.0	57.2	161
2	Less stable entrant	8.3	0.0	0.0	0.0	1.5	23.6	18.7	152
3	Job hoppers	2.8	0.0	0.0	0.3	0.7	8.7	4.3	51
	Longer labour careers								
4	Stable full-time	27.9	3.3	6.9	41.4	53.3	34.8	4.3	510
5	Transitional full-time	18.9	1.5	2.8	28.5	39.4	23.5	0.0	346
6	Stable part-time	0.3	0.4	0.5	0.0	0.5	0.3	0.0	5
7	Unstable part-time	0.1	0.0	0.0	0.0	0.3	0.0	0.0	1
	Career breakers								
8	Stable nonparticipation	0.1	0.0	0.0	0.2	0.0	0.5	0.0	2
9	Unstable nonparticipation	0.1	0.0	0.0	0.0	0.0	0.3	0.0	1
10	Unemployment	1.2	0.6	0.0	0.0	0.3	0.7	5.9	22
11	Sickness or handicap	2.0	1.0	4.5	5.2	1.6	0.2	0.4	36
	Atypical career paths								
12	Atypical career path	2.2	0.0	0.0	0.0	0.5	4.7	6.9	40
13	Insecure career (unemployment)	2.1	0.0	2.0	5.1	1.1	1.8	2.3	38
	Completed careers								
14	Standard career	15.2	60.5	46.3	10.8	0.5	0.0	0.0	279
15	Transitional full-time – pension	9.9	31.4	37.0	8.5	0.0	0.0	0.0	182
16	Atypical longer career – pension	0.2	1.4	0.0	0.0	0.0	0.0	0.0	3
	Total (N males)		230	227	301	392	408	271	1829

The second hypothesis is the female re-entry in the labour market. We hypothesized this evolution should be clearly visible from the 1950-59 cohort onwards. It is difficult to interpret this hypothesis since the 1940-49 cohort starts to retire at the moment of the data collection (2002). There seems a clear break between the female 1940-49 cohort and the previous cohort (5.6 to 23.8 %). However, the completed stable career cluster is exhibiting the opposite shift (22.3 to 7.7 %). If we combine both patterns, we find one third of the Belgian women from the 1940-49 and 1930-39 cohorts that were already participating in the labour market. If we then look at the 1950-59 cohort, we observe an increase in participation to 34.5 percent in the stable career patterns. In addition, we distinguish a sharp increase in the transitional full-time cluster. The OMA typology does in fact capture the re-entry of women in the labour market. This re-entry is further supported by the sharp decrease of the nonparticipation group in the 1950-59 and especially the 1960-69 cohort.

Now, we look at patterns of part-time careers. If we look at male part-time working patterns, we clearly observe the quasi-total absence (0.4 % overall) in part-time regimes. Only women work part-time (about 8.5 % overall). If we look at the division of part-time labour along cohorts, we find no evidence of an increase in part-time work. Furthermore, the 1940-49 and the 1950-59 cohorts show patterns of part-time work as well. The only shift in the 1960-69 cohort is in the stability of part-time work. This is the first cohort where a large share of the women who work part-time succeed in maintaining part-time jobs for a longer period of time. A more particular trend in the 1960-69 cohort is the appearance of uncertainty. A larger share (especially of women) in this cohort demonstrates a-typical career paths. This is an indication of the introduction of periods of unemployment in the career paths. Here, we see an influence of the 1970s oil crisis and the high unemployment rates during the 1980s. The 1960-69 and the 1970 cohort is clearly experiencing this influence as demonstrated in their career patterns.

Table 3: Latent Class career typology: female and male career patterns by birth cohort (percentages)

	Type	Total	<1930	1930-39	1940-49	1950-59	1960-69	>1970	N
Female									
1	Standard career	19.0	5.0	5.0	30.0	40.0	40.0	40.0	443
2	Early retirement	16.0	25.0	21.0	5.0	1.0	0.0	0.0	381
3	Redundancy	7.0	2.0	5.0	9.0	9.0	11.0	19.0	172
4	Homemaker	13.0	2.0	5.0	8.0	13.0	19.0	19.0	305
5	Bridge group	9.0	31.0	30.0	20.0	7.0	3.0	1.0	204
6	Part-time career	11.0	3.0	4.0	9.0	9.0	10.0	11.0	250
7	Career of unemployment	7.0	1.0	1.0	2.0	2.0	4.0	7.0	159
8	Merry widow	8.0	4.0	5.0	8.0	8.0	7.0	0.0	185

	Type	Total	<1930	1930-39	1940-49	1950-59	1960-69	>1970	N
9	Midlife career	4.0	10.0	11.0	3.0	3.0	2.0	0.0	92
10	Burn-out	2.0	16.0	9.0	2.0	3.0	2.0	3.0	56
11	Multi-tasking	4.0	1.0	3.0	4.0	3.0	1.0	1.0	102
	Total (N females)	264	296	339	468	580	402	2349	
Male									
1	Standard career	40.0	12.0	14.0	68.0	82.0	83.0	77.0	837
2	Early retirement	39.0	79.0	71.0	16.0	3.0	0.0	0.0	811
3	Redundancy	9.0	2.0	3.0	5.0	5.0	6.0	10.0	189
4	Homemaker	0.0	0.0	0.0	0.0	1.0	1.0	1.0	5
5	Bridge group	3.0	0.0	0.0	0.0	0.0	0.0	0.0	70
6	Part-time career	1.0	1.0	1.0	2.0	2.0	2.0	2.0	22
7	Career of unemployment	3.0	2.0	2.0	3.0	3.0	6.0	9.0	55
8	Merry widow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8
9	Midlife career	3.0	3.0	4.0	1.0	1.0	1.0	0.0	54
10	Burn-out	2.0	0.0	0.0	0.0	0.0	0.0	0.0	51
11	Multi-tasking	0.0	1.0	4.0	4.0	3.0	1.0	1.0	2
	Total (N males)	203	235	339	461	512	354	2104	

5.2 Latent Class career types by gender and cohort

What can be said about the resulting typologies regarding their gender and cohort distribution? The most obvious statement concerning the gender distribution is the fact that women are so much more diverse than men in their labour market patterns. Coupling this with the information we now have regarding the cohort distribution, we can say that this phenomenon is only increasing with each new generation of women. Only two of the classes are predominantly male (1 and 2). Six classes are predominantly female (5, 6, 7, 8, 9 and 11). Three classes are more or less evenly distributed by gender (3, 4, and 10).

Regarding the first breadwinner's hypothesis we observe a clear male dominance of the first two standard careers of working full-time (class two opting for early retirement) and class one (working through to retirement age) are still very strong although, it is especially older cohorts that are dominant (particularly in early retirement) in this career type. Men work standard careers until they reach retirement age (40%), or if lucky can retire early (39%), or if unlucky are phased out (9%). Men are totally absent from the traditional career of homemaker, the merry widow, and the multi-tasking, and almost absent (only 1%) from the part-time career. LCA also distinguishes approximately 13 percent of women adhering to a traditional career of homemaker. This is not in accordance with the OMA results (which was 19%).

The second hypothesis concerns women's labour re-entry patterns. The midlife career typifies this phenomenon. The hypothesis stated that this should be evident among the 1950-1959 cohort onward. However, contrary to what was expected, LCA clearly demonstrates that the mid-life career women are from the oldest cohorts. Ten and eleven percent of the oldest female cohorts rejoined the labour force in this manner. The cohorts of 1950 and later are predominantly standard full-time careers (40%). Even the 1940-1949 cohort demonstrates a tendency towards standard career types (30%).

The third hypothesis assumes a rise in part-time working patterns. This is clearly evident starting with the 1940-1949 cohort onward. Part-time is also evident in the bridge career type. Here older female cohorts implement part-time work as a way to ease into retirement. In this manner, LCA provided a valuable differentiation in part-time working patterns established in the cohort analysis. Older cohorts use part-time as bridge from work to retirement and younger female cohorts are using part-time as an essential instrument in their work-life balance, an option not available in the past.

6. Discussion

The first observation we need to make is that both techniques could handle the panel data without notable difficulties. In terms of ease of use, LCA is clearly the most accessible technique. OMA requires a two step procedure of calculating a distance matrix and using the matrix in cluster analysis. LCA involves a one-step

procedure whereby both the BIC-measure and the classification error allow for easy model comparison and selection.

OMA clearly showed highly transitional patterns in the research population. Each of the five career type groups identified by this technique revealed one or more highly transitional career paths. Because OMA assesses distance on the basis of labour market status, the stable careers are clearly differentiated from transitional careers. Furthermore, it is important to note that OMA has the tendency to appoint similar patterns that differ in length to different clusters. The five large groups of career types can be differentiated by the length of the career. The reason for this is that the deletion costs for the period that there is no labour market state is, in the case of the shorter career greater. In this manner the distances between two similar careers that only differ in length, is quite a bit more. Using our theoretical framework, we did correct for these inconsistencies by merging those clusters that were similar and only differed in length. This was only possible because a large portion of the careers is relatively stable and OMA differentiates well between stable careers.

A problem with the OMA method in layman's terms is that whether a transition is made from full-time employment to part-time employment at the beginning or at the height of a career, the costs are the same. Another problem with the OMA method is that a transition is equal to any other transition. In this manner, the transaction costs for transitions to unemployment are equal to transitions from unemployment to employment. This method does not allow for hierarchical levels or values. Another important result is the homogeneity of the clusters. Here we find a noticeable difference with the LCA methodology. OMA has more clusters than LCA but the respondents are distributed more homogeneously across the different types. The LCA typology shows a large proportion of people in the first two clusters while number decrease rapidly in the other categories. As a result the more compact typology of LCA may show a stronger typology but loses at the same time a detailed view on the data.

However, the LCA method does use a quite different technology compared to OMA. It is not a simple subtraction, addition or replacement, but LCA allows finer tuning as well as the introduction of covariates to the model. An important plus to LCA was the use of an explanatory variable for the three major life course stages. This added a dynamic dimension to the model where OMA is more static; providing results only for where a person was at that moment. LCA exposed the different labour patterns that were effectively occurring during a particular life course stage.

7. Conclusion

Both the OMA and the Latent Class established a growth in part-time work among younger, female-dominated cohorts, which establishes that part-time work is also a growing phenomenon on the Belgian labour market. Nonparticipation is decreasing as a labour market option in Belgium. The LCA established an increase in the career type of perpetual unemployment, particularly among younger females. This type of career will no doubt continue to be a part of a dynamic market economy. The persistence of the unemployment period within this career type was rather alarming. It would seem that young individuals (three quarters of this class was female) who do not make a successful entry onto the labour market are in danger of remaining unemployed for the duration of their potential working life.

The analysis of sequences has already proved to be a useful methodology to get a grip on career trajectories (Schrerer, 2001). Thus far, the OMA methodology was the most dominant in this type of analyses, despite the criticism (Levine, 2000, Wu, 2000). In this paper, we compared the OMA methodology with the LCA technique. The results show that both techniques have their merit in analyzing sequence trajectories. At the same time, particularities of the methods show that not all research questions are suitable for each method or, not all methods are appropriate for every research question. The OMA methodology is clearly appropriate when the analysis concentrates on the statuses themselves. It is because there is relative stability in career paths that OMA is so well equipped to make clear and interpretable differentiations. If careers do become less stable, OMA will not be a useful methodological tool. In conclusion, the LCA methodology starts with a different perspective on sequences. It has the strength of adopting covariates in the clustering allowing for more historically connected types than the other methodology. The clustering is denser and the technique allows for more detailed model fitting controls than OMA. But the strength can also be a weakness. When incorporating covariates in a typology, the possibilities of using the typology in later, causal, analyses is reduced. All interaction effects need to be tested within the LCA framework which lessens the opportunities to use the

typology in a different context. The classic OMA method and LCA clustering methods provide promising results in the longitudinal analysis of career trajectories. Both have a strong potential for exploratory longitudinal analysis.

References

- Abbot, A. and Hrycak, A. (1990). "Measuring Resemblance in Sequence Data: an Optimal Matching Analysis of Musicians' Careers", *American Journal of Sociology*, Vol 96, No. 1, pp 144-185.
- Bray, B.C., Lanza, S.T. and Xianming T. (2014) "Eliminating Bias in Classify-Analyze Approaches for Latent Class Analysis", in: *Structural Equation Modeling: A Multidisciplinary Journal*, Vol 22, No. 1, pp 1-11.
- Chan, T.W. (1995) "Optimal Matching Analysis: a Methodological Note on Studying Career Mobility", *Work and Occupations*, Vol 22, No. 4, pp 467-490.
- Cunningham, M. (2008) "Changing Attitudes toward the Male Breadwinner, Female Homemaker Family Model: Influences of Women's Employment and Education over the Lifecourse", *Social Forces*, Vol 87, No. 1, pp 299-323.
- Elder, G.H. (1998) "The Life Course as Developmental Theory", *Child Development*, Vol. 69, No. 1 (Feb., 1998), pp. 1-12.
- Eliason, S.R. Mortimer, J.T., and Vuolo, M. (2015) "The Transition to Adulthood: Life Course Structures and Subjective Perceptions", *Social Psychology Quarterly*, Vol 78, No. 3, pp 205-227.
- Halpin, B. (2010) "Optimal Matching Analysis and Life-Course Data: The Importance of Duration", in: *Sociological Methods and Research*, Vol 38, No. 3, pp 365-388.
- Jansen, M. Mortelmans, D., Snoeckx, L. and Johnson, D. (2009) "Repartnering and (Re)employment: Strategies to Cope with the Economic Consequences of Partnership Dissolution", *Journal of Marriage and Family*, Vol 71, No. 5, pp 1271-1293.
- Levine, J.H. (2000) "But What Have You Done for Us Lately?", *Sociological Methods and Research*, Vol 29, No. 1, pp 34-40.
- Lewis, J. (2001) "The Decline of the Male Breadwinner Model: Implications for Work and Care" Social Politics: International Studies in Gender, State & Society, Vol 8, No. 2, pp 152-169.
- Lewis, J. (2006) "Men, Women, Work, Care and Policies", *Journal of European Social Policy*, Vol 11, No. 16, pp 387-392.
- Light, A. & Ureta, M. (1995). "Early-Career Work Experience and Gender Wage Differentials". *Journal of Labor Economics*, Vol 13, No. 1, pp 121-154.
- Manzoni, A., Vermunt, J.K., Luijkkx, R., and Muffels, R. (2010) "Memory Bias in Retrospectively Collected Employment Careers: a Model-based Approach to Correct for Measurement Error" *Sociological Methodology*, Vol 40, pp 39-73.
- Mayer, K.U. (2009) "New Directions in Life Course Research", *Annual Review of Sociology*, Vol 35, pp 413-433.
- McDonald, P. (2000) "Gender Equity, Social Institutions and the Future Of Fertility", *Journal of Population Research*, Vol. 17, No. 1), pp. 1-16.
- McMunn, A., Lacey, R., Worts, D., McDonough, P., Stafford, M., Booker, C., Kumari, M. and Sacker, A. (2015) "De-Standardization and Gender Convergence in Work–Family Life Courses in Great Britain: A Multi-Channel Sequence Analysis", *Advances in Life Course Research*, Vol 26, pp 60-75.
- Mertens, N., J.J. Schippers, J.J. & Siegers, J.J. (1995). "Career Interruptions and Women's Life-time Earnings". *The European Journal of Women's Studies*, Vol 2, pp. 469-491.
- Mincer, J. & Ofek, H. (1982). "Interrupted work careers: depreciation and restoration of human capital". *The Journal of Human Resources*, Vol 17, No. 1, pp 3-24.
- Mincer, J. & Polachek, S. (1974). "Family Investments in Human Capital: Earnings of Women". *The Journal of Political Economy*, Vol 82, No. 2 Part 2, pp. 76-108.
- Pavalko E.K. (2015) "Comment: Bridging the Gap Between Life-course concepts and Methods", *Sociological Methodology*, Vol 45, pp 73-76.
- Pavlopoulos, D., Fouarge, D., Muffels, R., and Vermunt, J.K. (2014) "Who Benefits from a Job Change: The Dwarfs or the Giants?", *European Societies*, Vol 16, pp 299-319.
- Robette, N., Bry, X. and Lelièvre, E. (2015) "A Global Interdependence Approach to Multidimensional Sequence analysis", *Sociological Methodology*, Vol 45, pp 1-44.
- Schrerer, S. (2001) "Early Career Patterns: a Comparison of Great Britain and West Germany", *European Sociological Review*, Vol 17, No. 2, pp 119-144.
- Trappe, H., Pollmann-Schult, M., and Schmitt, C. (2015) "The Rise and Decline of the Male Breadwinner Model: Institutional Underpinnings and Future Expectations", *European Sociological Review*, Vol 31, No. 2, pp 230–242.
- Vermunt, J.K. (2004) "Toepassingen van Latent Klasse analyse in Sociaal Wetenschappelijk Onderzoek", *Sociale Wetenschappen*, Vol 47, pp 2-14.
- Wissen, L.J.G. van, (2002) "Demography of the Firm: A Useful Metaphor?" *European Journal of Population*, Vol 18, No. 3, pp. 263-279.
- Wu, L.L. (2000) "Some Comments on "Sequence Analysis and Optimal Matching Methods in Sociology: Review and Prospect", *Sociological Methods and Research*, Vol 29, No. 1, pp 41-64.