



The gendered complexity of daily life: Effects of life-course events on changes in activity entropy and tour complexity over time



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ABSTRACT

This paper studies changes in the complexity of activity patterns (measured by Shannon entropy) and trip chaining patterns following life course (and accessibility) related key events from a gender specific perspective. It is theoretically informed by the mobility biographies approach and by gender/travel studies. The data used is the German Mobility Panel (GMP) 1994–2012 in which households and their members are asked three times in three subsequent years to report the trips they made over a week. Changes made from one year to the next are regressed to key events over the life course, cohort effects and period effects, while sociodemographics, residential and workplace spatial context attributes are controlled. A cluster-robust regression approach is used to account for the non-independent character of panel observations. Significant effects were found for some key events, including the birth of a child, entry into the labour market, and changes in spatial context, accessibility and mobility. Some effects differed distinctly between men and women, suggesting that men and women are differently affected by life course events. However, taken overall the associations found, as well as their gender specifics, are rather limited. Hence, key events over the life course seem to be only loosely associated with the complexity of activity and trip patterns.

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Introduction

It has long been argued that women's daily lives are far more complex than men's. The reasoning behind this claim is that women tend to be committed to multiple duties to a greater extent than men; such duties include employment, housework, and caregiving for children, the elderly or other persons in need (MacDonald, 1999). Hence women juggle a multitude of activities over the course of a day, many of which take place out of the home and are thus linked to trip-making. This has substantial consequences for their travel patterns. Firstly, women travel shorter distances than men on average (Crane, 2007; Scheiner, 2010), which may be due to the spatial ties imposed on them by household work and caregiving duties. Secondly, women tend to organise their trips into more complex trip chains than men to gain efficiency in travel patterns (Cao et al., 2008; Islam and Habib, 2012; Paleti et al., 2011; Strathman and Dueker, 1995). Thirdly, more varied activities suggest that women have more complex activity spaces than men, involving more 'anchor points' such as the home, the workplace, or children's school(s) or nursery. Fourthly, complex activity and associated travel patterns may encourage women to use flexible modes of transport such as the car to juggle all their duties (Dobbs, 2005).

On the other hand, this picture is not equally true for all women and men. Couples with children, particularly those with infants, tend to exhibit a strongly traditional division of labour (Grunow et al., 2012), with the husband being the primary wage-earner, while the wife is responsible for the multitude of social and maintenance tasks outlined above. For couples without children the picture is different. They typically show more modern, sometimes close-to-equal patterns of activities (Grunow et al., 2012; Scheiner, 2013). Single households do not exhibit any division of labour at all, but they are nonetheless known to have different activity and trip patterns depending on gender (Taylor and Mauch, 1997).

These considerations suggest that the complexity of activity and travel patterns changes over the life course as an outcome of life course related key events. The most researched example in this respect is the birth of a child which typically goes along with a 're-traditionalisation' of gender roles among couples, even among those who pursued relatively equal work-sharing before (Grunow et al., 2012). The changing travel patterns induced by such key events have been studied in the past decade under the label 'mobility biographies' (Axhausen, 2007; Lanzendorf, 2003; Scheiner, 2007) or 'life course'/life events' approach (Chatterjee et al., 2013; Oakil et al., forthcoming; Sharmeen et al., 2014).

This paper employs this mobility biography approach from a gender perspective using regression modelling. The focus of interest is changes in complexity of activity and travel patterns

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as an outcome of key events. Gender is accounted for by using interaction terms. At the same time, cohort and period effects, state variables and inertia in behaviour are accounted for. Complexity is measured by two variables: an entropy measure of activity patterns and the number of trips per tour as a measure of trip chaining. Both variables are constructed from trip diaries completed for a whole week by a nationwide sample of respondents from Germany. The data span the period from 1994 to 2012. A companion paper (Scheiner, forthcoming(b)) focuses on mode choice changes.

The next section introduces the state of the research. This is followed by a description of the data, the modelling approach and the variables used. Subsequently the results are presented, starting with an overview of cross-sectional figures of complexity, moving on to descriptive analysis of change in complexity, and ending with two regression models of activity pattern entropy and tour complexity. The paper closes with some conclusions for further research.

State of the research – gendered complexity of daily life

Activity patterns

Empirical studies of gender differences in activity patterns are so numerous that they cannot be reviewed here in detail. Most of these studies compare mean values and proportions of time allocation to different activities between men and women (McGinnity and Russell, 2008; Anxo et al., 2007 in a lifecycle perspective). Many also use regression modelling or other more complex techniques to isolate the impact of gender from other factors. Most often they focus on housework (Bianchi et al., 2000; Treas and Drobnic, 2010; Grunow et al., 2012; Farrell et al., 2012 in a review; Mencarini and Sironi, 2012). Employed work is often considered simultaneously (Gershuny and Kan, 2012; McGinnity and Russell, 2008; van der Lippe et al., 2011), while leisure is considered in relatively few studies (Anxo et al., 2007; Hilbrecht, 2009; Milkie et al., 2009).

The general finding is that there is little gender inequality in terms of total workload including paid (employed, marketed) and unpaid (non-marketed, household/family) work (Gille and Marbach, 2004, for Germany). On the other hand, a somewhat higher workload among full-time employed mothers as compared to full-time employed fathers has been found in the US (Milkie et al., 2009). Distinct differences emerge when paid and unpaid works are considered separately, with men taking on disproportionate shares of paid work and women disproportionate shares of unpaid work.

The number and age of children are consistently identified as key impact factors of worksharing, with mothers' family obligations increasing with the number of children, and decreasing with the age of the youngest child (McGinnity and Russell, 2008; Scheiner, 2013).

Gender differences in activity patterns have been observed to converge over time in various countries (Fisher et al., 2007, for the USA, 1965–2003; Gershuny and Kan, 2012, for 12 countries; ca. 1961–2004; Bianchi et al., 2000, for housework in the USA, 1965–1995; Sayer, 2010, for nine countries, ca. 1965–2003). In Germany, time use for unpaid work among men increased over the period 1991/1992 to 2001/2002, and so did time use for paid work among women (Gille and Marbach, 2004). Women's relative overload in terms of unpaid work (odds ratios women/men) consequently declined considerably from factor 1.7 in 1991 to 1.4 in 2001. Nonetheless, gender specifics in the division of work still exist around the world (Baxter, 1997; Sayer, 2010). Virtually no changes could be detected among parents in Germany (Gille and Marbach, 2004). Mothers make a constantly above-average contri-

bution to unpaid work. There may be some self-selection in this finding in that those women and men who maintain more traditional norms may be more likely than others to found a family.

Gender convergence has also been observed in the distributions of activities over the day and the week. This means that women's temporal distribution of activities over the course of a day is becoming more similar to that of men (Fisher et al., 2007).

Measuring complexity in activity or trip patterns is far from straightforward and involves more than considering just the degree of participation in activities or trips. One possibility is to study multitasking, which is mostly defined as performing more than one activity at a given time (see Circella et al., 2012 for discussion). Bianchi et al. (2007) found that married mothers report more frequent multitasking than married fathers, using multitasking as a strategy of time-management to juggle multiple duties. This result was based on self-report and, hence, may be biased by subjective considerations of multitasking. However, there is similar evidence of this gender gap in time use diaries. Gille and Marbach (2004) construct an indicator of turbulence from the variety of activities undertaken during a day, the number of transitions between different activities and multitasking (activities undertaken simultaneously). They find that women's daily lives are considerably more turbulent than men's. Additionally, Offer and Schneider (2011) find that fathers multitask about 35% of their time (sleeping time excluded), compared to 43% for mothers, and the types of multitasking mothers typically perform appear to be more strongly associated with negative affects and stress than those of fathers.

Another way to study complexity would be to focus on fragmentation of activity patterns. Fragmentation means "the disintegration of activities into smaller sets of acts that can then be performed at different times, different locations, or both" (Alexander et al., 2011, 678), which may make activity patterns more burdensome and/or more difficult to schedule. Lenz and Nobis (2007) cluster a sample of German respondents according to their travel, work schedule and use of mobile devices to find out about the level of fragmentation of activities. They find the highest proportion of women in a cluster of 'conventional part-time workers' with little fragmentation. Hubers et al. (2008) study temporal fragmentation in terms of the number of activity episodes in a day. They find more non-daily shopping episodes and fewer leisure episodes for women. Alexander et al. (2011) study a number of different spatial and temporal measures of fragmentation in the Netherlands. The few significant gender differences they find suggest somewhat more fragmentation among men than women.

Spatial and temporal fixity of activities may also contribute to complexity in scheduling. Based on a time-geographic approach in the tradition of Cullen and Godson (1975), Schwanen et al. (2008) find that women coordinate and negotiate more space-time fixity constraints than men. This is not because women consider childcare or maintenance work to be more binding than men, but because they engage in such activities more than men. From trip chain analysis, one may derive similar conclusions (see below).

There are a number of theoretical explanations for such gender differences in complexity. Probably the most important single factor is the increasing female labour force participation that can be observed in various countries (Dustmann, 2005). This shift from the male-breadwinner-and-female-housewife-model to more modern arrangements (Farrell et al., 2012) does not necessarily result in more equal gender relations. As long as men continue to pursue their careers without contributing to filling the gap in caregiving and housework, it rather leads to women's 'double burden' or 'second shift' (Hochschild and Machung, 1989; Milkie et al., 2009).

Gender norms and preferences are also likely to play a substantial role. Taylor and Mauch (1997) show that even in single households women shop more often than men, and trace this finding

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