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Exploring the difference in sequences of the first life course events among Russian generations

Our paper continues the well-developed concept of the life course[3]. Our predecessors investigated the order and the interrelations between different demographic events, using the most current methods of analysis[4]. Unfortunately, there are few empirical studies, made with current methods, devoted strictly to the life course of Russians[5]. Our paper aims to fulfill this gap and investigates the sequential features of life courses of modern Russian generations.

The sequence of the demographic events is a very indicative parameter of demographic changes. It demonstrates how diversely different generations construct their demographic life course, what they prefer to do first and when. The first demographic events are more interesting than events of

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other orders because all the people usually have at least one of such event. This feature allows comparing different age groups of the population. Moreover, the first demographic events accompany a coming-of-age thus we can see when and how representatives of different generations were becoming adult.

This paper investigates the difference between the Soviet and the post-Soviet Russians in family formation and fertility spheres in the context of the start of an independent life. For our research we used the panel data of Generations and Gender Survey (2004, 2007 and 2011) and the third wave of European Social Survey (2006). We constructed life courses for each generation. Thereupon we analyzed them by Event History Analysis and Sequence Analysis and compared the sequences and the timing of the first events.

Our preliminary results show (Fig. 1 and 2) that the sequence of events of the Soviet generations (respondents who were socialized before 1991) greatly differs from the sequence of the so called post-Soviet generations (respondents who were socialized after 1991). We can see how well-ordered was the sequence of the Soviet generations and how variable it became for the youngest people. We also can notice the change of the first event, which opens the adult life. In the oldest generations it was the job. In the youngest it can be any event.

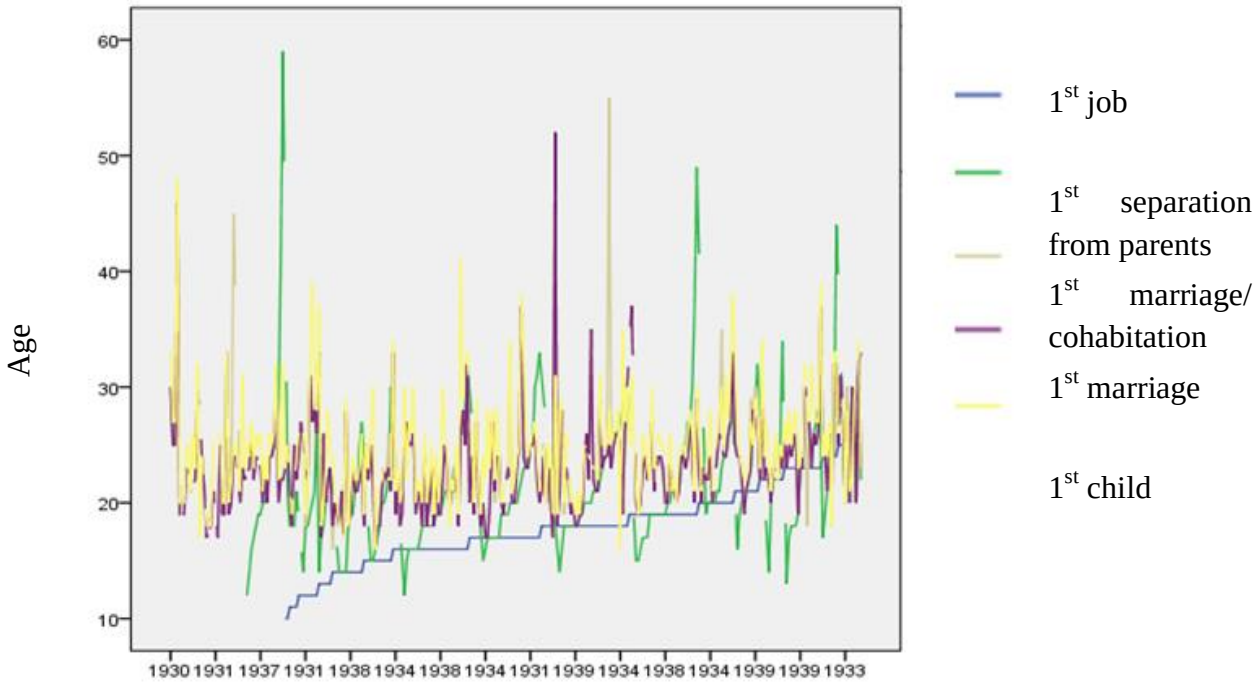

Figure 1. The sequence of events for typical Soviet generation (example of generation of 1930-1939 years of birth)

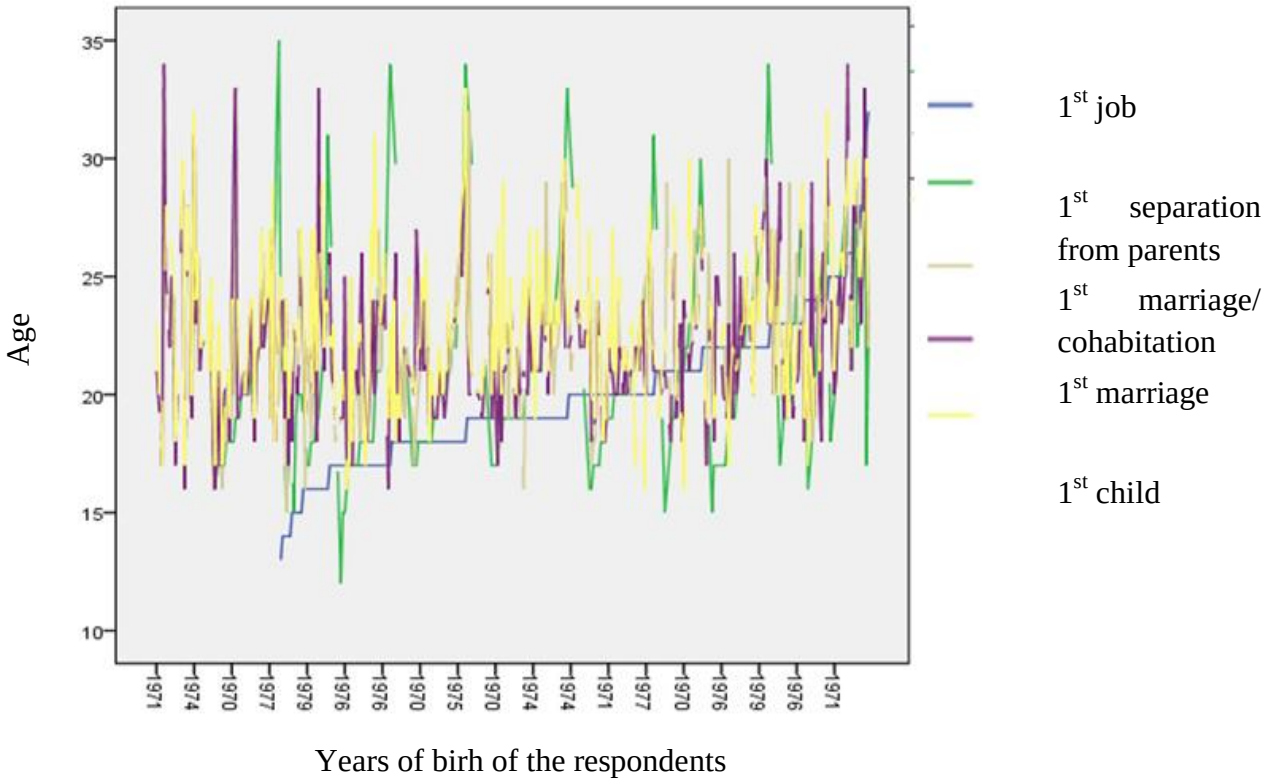

Figure 2. The sequence of events for typical post-Soviet generation (example of generation of 1970-1979 years of birth)

Our Event History Analysis results (Fig. 3) show the difference not only between generations, but also between genders (we analyzed only disrupted marriages and cohabitations).

Probability of preservation of the first marriage after its start

Probability of preservation of the first cohabitation after its start

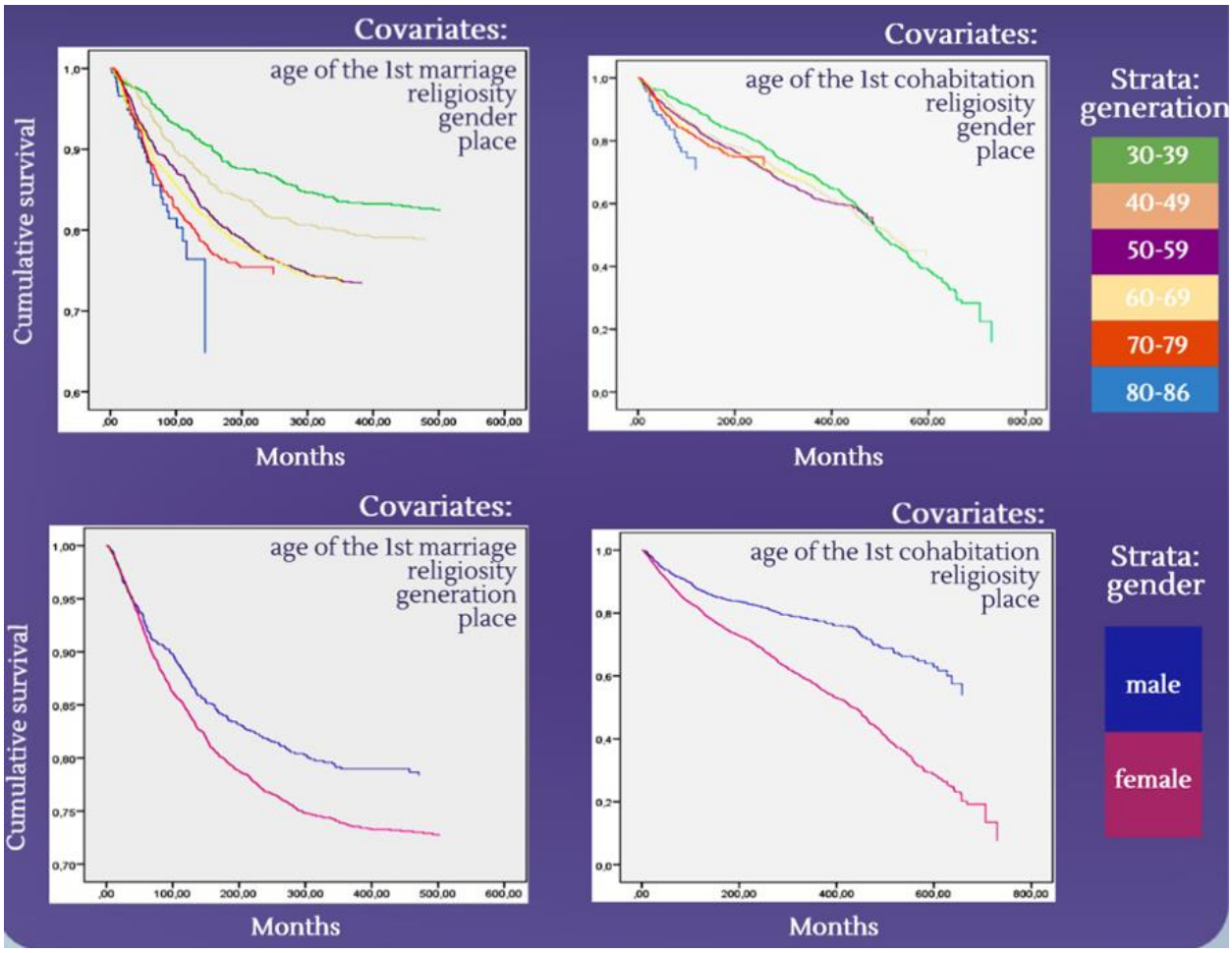

Figure 3. Survival curves (Cox regressions)

The difference between generations is clearly seen for the marriage situation: the older the representative of the generation the stronger was his marriage. However it is not so obvious for cohabitations. The probabilities of preservation of the union are very close among different generations.

The gender distinctions are the same for both types of unions: the women have a higher probability to experience a divorce or a disruption in the first union than the man. In general, cohabitations finish earlier than marriages.

In addition to the traditional sequence plots and statistics we used some techniques from Data Mining and Knowledge Discovery. Namely, Formal Concept Analysis[6], Association Rules Mining and Mining of Frequent Sequences[7].

We used Formal Concept Analysis for discovering and visualization of typical groups of respondents. E.g., below you can see a concept lattice diagram for four attributes in two categories of variables: "gender" and "living place".

[6] Bernhard Ganter and Rudolf Wille Formal Concept Analysis, *Mathematical Foundations*, Springer, 1999.
[7] Jiawei Han, Micheline Kamber Data Mining. *Concepts and Techniques.* (2nd Edition), Morgan Kaufmann Publishers, 2006.

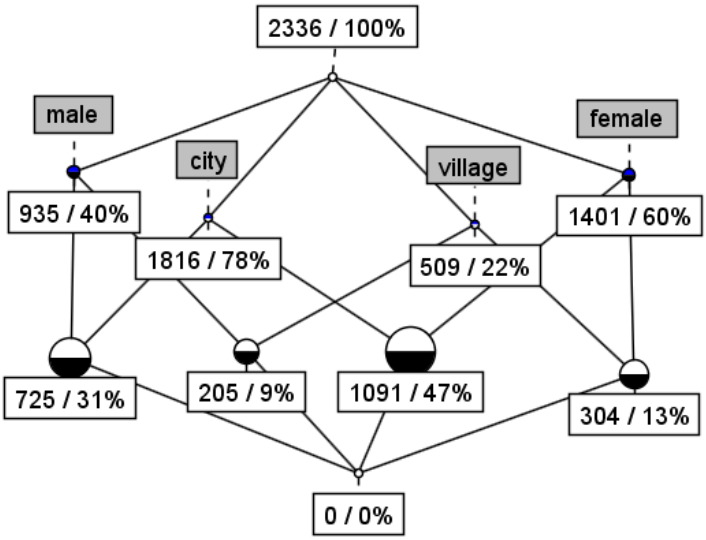

Figure 4. A concept lattice diagram for the whole set of respondents and four attributes

Each node in the diagram, i.e. formal concept, consists of two components, the set of respondents and the sets of their common attributes. For brevity, each node is labeled only by the number of respondents and the attributes. That kind of diagrams can be helpful for the preliminary data structure exploration. We can easily navigate in such a lattice diagram, e.g. we can see that the number of who are female persons and living in some city is equal to 1091, by going down to children node from the nodes with labels female and city. It makes it possible to see all the homogenous groups of users under different common attributes, and as opposed to contingency tables it is applicable to more than two variables at the same time.

Associations between different events and other demographic variables can help to find some typical regularities in human behavior. For examlpe, the rule

< 124 > male Gen7 Ed1 separation1 [96%] => < 119 > child1

says us that the fact "a male person of the oldest generation in the survey with at least a basic level of education, who separated from family not later than at 17 years old" implies the fact "he has a child" in 96%≈119/124 of cases. To build the lattice diagrams and find the rules we used Concept Explorer[8] software, which is freely available on the Internet.

However, to find only the association rules, but not frequent event sequences, is not enough. To answer a typical question, "Which sequence is the most frequent among the surveyed women?", we cannot use standard statistical packages. E.g. by using Sequential Pattern Mining Framework (SMPF) software[9] and Data Filter from Microsoft Excel we extracted and sorted different frequent sequences grouped by gender and compared the number of cases for similar sequences among men and women.

[8] http://conexp.sourceforge.net/
[9] http://www.philippe-fournier-viger.com/spmf/

GENDER	Period 1	Period 2	Period 3	Period 4	Period 5	SUPPORT
gender=1	work	marriage	children			480
gender=0	work	marriage	children			362
gender=1	separation	marriage	children			298
gender=1	work	separation	children			281
gender=0	separation	marriage	children			250
gender=0	work	separation	children			213
gender=1	work	marriage separa	children			156
gender=0	work	separation	marriage			139
gender=1	separation	work	children			125
gender=1	work	separation	marriage			112

Figure 5. Frequent event sequences of length of 3 grouped by gender*

*Support of the sequence in the last table column means the absolute sequence frequency among the respondents in the survey

We performed similar analyses for different groups of respondents and found out the used techniques rather beneficial to reveal hidden regularities in the event sequences tied with other demographic data. The proposed techniques are the set of the ways how to facilitate the analysis of the demographic data.

To conclude, we discovered the striking change of the actual behavior in the demographic sphere. The Russian youth is constructing his life in absolutely new way than their parents and grandparents were. There is no more hurry to live, to make a family and follow old rules. There is a new generation with new values and new behavior. In addition, we applied and suggest using some freely available Data Mining tools for finding hidden regularities in the survey's data in terms of life sequence events and other related demographic attributes.