

CHANGES IN AREA MEASURES OF DAILY ACTIVITY SPACES DUE TO CHANGE IN RESIDENCE ACCORDING TO MOBILE POSITIONING DATA

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People have always been interested in their location in space, the environment they live in and where they are concentrated. Migration is one of the main effecting processes. In addition, during recent decades questions have emerged about the places that people visit daily, how they move and what are the distances? Thereat residential location choice directs the way we use space and where we spend time and travel. Therefore these two phenomena – migration and everyday mobility – are closely linked, and it is important to understand their impact on one another. In addition to that, the classical definition of migration, which is changing the place of residence over a certain spatial unit for a longer period, does not describe (due to the increasing mobility both on a physical and virtual level) the variety that is included in changing our place of residence.

Previously the connections between changing place of residence and everyday mobility have been more thoroughly looked at in the context of movements taking place between the workplace and place of residence, but research has not focused on the wider activity space, that also includes the activities and movements that are part of leisure time. One reason for this has been the lack of relevant data that would enable studying spatial patterns of people over a longer perspective and comparing it from the point of view of changing the place of residence. Today we have a possibility to use a new source of data for this – passive mobile phone positioning data.¹ Using a passive mobile phone positioning database enables the description of long term movements, like migration, and short term movements, like everyday mobility. Additionally, it enables the connection of those different levels of movements together. This makes it possible to be more dynamic when trying to understand the migration event, as in addition to a change of residence it is possible to follow the accompanying changes in the daily activity space of an individual.

Basically, the positioning database is a massive database of location data that is based on the locations of anonymous phone users in the network of mobile phone operator EMT. Based on the number of these locations it is possible to determine an individual's physical presence in space and time, which in turn makes describing the space-time mobility of people and finding patterns in those movements possible. Huge work has been done by the people in the mobility lab of the geography department of Tartu University² and spin-off enterprise Positium LBS³, who have developed the anchor point model, that enables to map individual's most important everyday locations, i.e. anchor points. Thereat it is possible to distinguish likely places of residence from other visited places. Earlier, the mobility lab in Tartu University has used passive mobile positioning data to study the seasonal variability of a population and concrete time periods (for example big events), to describe tourists visits to Estonia and to and from travelling, etc.

1. Ahas R, Siim S, Järv O, Saluveer E, Tiru M (2010) Using mobile positioning data to model locations meaningful to users of mobile phones. *Journal of Urban Technology* 17(1): pp. 3-27.

2. More info: mobilitylab.ut.ee

3. More info: positium.ee

The aim of my master thesis was to give an estimation on the size of activity spaces of Estonians who have different social-demographic characteristics and whose residences are located on different levels of the settlement hierarchy, and to observe if and how the change of residence affects the size of their activity spaces. In addition to that I compared the activity spaces of those who change their place of residence and those who don't. For estimating the changes in people's daily central gravity point⁴, i.e. the location of home, I developed a methodology that would enable to look at changes in place of residence based on the available database⁵, i.e. the location of home.

Understanding the size of the activity space gives an evaluation of how are places that are important to people situated and what are the distances they are willing and forced to travel in visiting them. One of the main results of my thesis was that the activity spaces of those who have not changed place of residence are generally smaller than those who have, this might indicate that those who do change place of residence are also more mobile daily. Men and Estonians (compared to other nationalities living in Estonia) have bigger activity spaces, activity space becomes smaller with ageing. People who live in bigger cities generally have a smaller activity space than people living in the countryside, at the same time the differences were not that big amongst those who have changed place of residence in connection with living in the city or in the hinterland. The change in residence did not have an effect on the size of an activity space. This means that there was not a clear trend when after changing the place of residence the size of an activity space would definitely increase or diminish. But looking at a concrete direction, then when moving to the city from a distance of more than 30 km would make the activity space smaller and vice versa, when moving out of town it would increase.

In addition to understanding the spatial mobility of people this knowledge could help in making local political decisions and enable the provision of better services. With a growing physical mobility, environmental questions emerge – maybe it would be somehow possible to direct people's movements and make them more optimal, so that we could burden the environment less.

Many new and interesting questions and themes, that require further research and elaboration in order to understand the connections between change in residence and the development of activity space came out when writing the thesis. But all in all, the database has potential and combining it with other methods would enable a deeper understanding of the behaviour of people in space and time.

4. Roseman CC (1971)
Migration as a spatial and temporal process. Annals of the Association of American Geographers 61(3):
pp. 589-598.

5. *Ibid.*