CHAPTER 6

Spatial mobility in evolving situations: cross-analysis of the two dynamics

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This chapter re-examines the biographical treatment of spatial mobility, considering it within the framework of a dynamic analysis of context. Location is a decisive factor for life history analysis, because it defines the spatial or social context that influences the other events in an individual's life course.

Several authors since the early 1980s have stressed the importance of contextual factors in explaining migration (Bilsborrow *et al.*, 1984; Findley, 1987; Gardner, 1981; Hugo, 1985; Lindstrom, 1996). In line with their work, we argue that the characteristics of the place of residence constitute a major determining factor in migration, insofar as the opportunities and constraints that shape individual or family decisions are played out at the local scale.

However, contextual analysis becomes particularly complex when the dynamic of the life course is combined with the dynamic of the places where people live. The "life space" concept is replaced in biographical time by an individual system of successive places. As regards migration, the greater the individual's mobility, the more complex the contextual influences. It is also (like the decision to migrate) caught between the influence of earlier places and expectations about future places. In addition, for the sedentary, the context itself may change owing to other peoples' mobility. As Daniel Courgeau (2003) points out, each context has evolved at its own pace, according to time scales that are almost always different from the time scale of individual trajectories. While contextual analyses are now common at the time of survey, so far there has been little in the way of a real dynamic contextual analysis taking into account changes in context.

Analytical comparison between life course transitions and changes in contexts is one way, starting from the individual, to address the question of the

reciprocal relations between mobility and territorial recomposition, settlement patterns. Analysis of individual mobility can be enriched by taking contextual variables into account, these variables themselves changing over time according to a calendar that is not necessarily the same as that of the individual life course. However, it is not enough to model mobility as a dependent variable to be explained, because it is also an endogenous variable that redistributes populations and changes the conditions and causes of mobility. This leads us to consider the dynamics of the place itself, and hence contextual transitions, even for people who stay in one place. These are not new considerations. They were formalised by the Chicago School using the concept of "filtering" to describe the process of decline in American inner cities in connection with households' mobility practices (Park *et al.*, 1925). Nonetheless, the interactions between biographical and contextual dynamics addressed in the studies of filtering are not addressed from the starting point of modelling individual trajectories.

This chapter puts forward various methodological avenues for considering changes of context when analysing individual life courses. Section I discusses how place can be described and how to define contextual transitions for migrants and for sedentary individuals. We then take two complementary perspectives in turn, corresponding to the two main ways research has treated information about place of residence in the individual life course. These are (i) the context of individuals' transitions and (ii) the transitions of individuals' contexts (individuals' spatial trajectories). The discussion will draw on the results of two series of studies that reflect the diversity of current research on spatial mobility and settlement patterns. One concerns internal migration in Burkina Faso, the other residential mobility within the city of Bogotá. Several types of statistical tools and analyses will be used: multilevel models and an analysis of trajectories that incorporates spatial analysis.

1. INDIVIDUALS' LIFE COURSE TRANSITIONS AND HISTORY OF PLACE

For many years, demographic surveys considered place as a simple, inert category. Nevertheless, if one assumes that a person's immediate environment has a contextual influence, one has to consider place as a complex, dynamic category. A number of spatial and temporal scales have to be considered. For example, matching respondents to a place of residence at a given date can be based either on their dwelling or on all the places they habitually frequent. This notion of life space can equally be used in a longitudinal study, as the succession of places frequented by an individual throughout their life. In that case the mobility history is seen as an individual system of successive places.

1.1. The polysemic nature of place

Location is a potential datum, but can be an empty one unless it is accompanied by a description of the place, which is virtually infinite. Other chapters show that the events that define the usual states and statuses in

life course analysis, such as union, childbirth or occupation, are actually very complex. This complexity reaches an extreme when it comes to place.

Apart from strictly morphological analyses of its geometry, a place is only meaningful when it is described. But it can be described in many different ways. It can be described in terms of its relative position within another geographical unit: in a town, for example, it may be city centre, inner city, urban fringe or suburb. It can also be described in terms of certain "objective" features. Examples are type of environment (rural, small town, medium town, major city), population density class, the presence or absence of particular resources (infrastructures, amenities, services, jobs, particular housing types etc.) and the composition of the population in terms of social category. A place can also be described in terms of the individual's own subjective categories, which are linked to the function the place has for that person and their relationship with it and with the other inhabitants. For example, they may mention the presence or absence of friends or relations, or the fact that they frequented the place when they were younger.

In the first place, the location recorded in residential and migration histories supports information that will be introduced in the life course analysis: location is a vector (or intermediate variable) for accessing the characteristics of the residential environment. It would therefore be counter-productive to attempt to pre-establish spatial categories at the time the data is collected. On the other hand, to describe the places lived in, it is essential to record their precise locations (GRAB, 1999). Two important considerations for properly describing the sociospatial dynamics of settlement patterns are (i) taking care in selecting contextual descriptions and (ii) leaving the possibility of making a relevant territorial demarcation later. The territory is considered as a system of places structured by residents' practices, particularly their movements and relationship systems.

Demographic analysis of life event histories has traditionally focused on the "change of residence" event, describing it, at best, in relation to administrative spatial divisions (migration to another district, province, region or country). But all the aspects of place mentioned above could give rise to transitions of state, whether or not the person moves house. Mobility is not reducible to crossing administrative boundaries; it can be considered as a change in relative position within a space described by various characteristics.

The aim is to use the full potential of spatial analysis in studying a person's life course. To study their residential history is to construct not one but several residential trajectories, depending on whether the place of residence is described in terms of environment (availability of public services, etc.), social network or the individual's own history, etc. Thus, every change in the characteristics of the place where the person lives determines a "contextual transition". These transitions form a "contextual trajectory". An individual's spatial trajectory is the combined result of their moves from place to place and of the changes occurring in each place of residence. It is particularly instructive to compare the two components.

1.2. From individual residential histories to contextual transitions

In examining the whole of an individual's residential history, the history of each place of residence should also be considered, i.e. as it was at the time the respondent lived there, not just at the time of the survey. The role of each place should be assessed in relation to the whole of the person's spatial trajectory. The life course and its context interact over time and over successive transitions, but each transition nevertheless has some degree of autonomy. Contexts can change quickly, and at different rates in different places, not only because space is reshaped by the movements of individuals but also due to structural factors. Individuals, by choosing to move, are not the only agents of change in their environment. Even without their moving, contexts may change "under their very feet"[1]. Sometimes those who stay put may benefit from more favourable changes that those who migrate, though this may seem paradoxical when what motivates many migrants is the desire to live in a place that offers better opportunities.

1.2.1. Information systems for sociospatial dynamics

To describe the life context of an individual throughout their life course one must use a range of information sources and make the connections between them. The evolution of a place can be complex. As well as the classic geographical descriptions (spatial position, population, resources) there is each individual's practices with regard to a place (presence or absence of kin) and their representation of it, i.e. their idea of it according to their personal or social values and the stage they are at in their life cycle.

Subjective descriptions of a place will be taken from the life course survey itself, by broadening the scope of the questions about residence and contact circle. Only from the survey can the place be described in terms of features relevant to the person themselves, such as descriptions concerning their residential history (e.g. the place where they lived as a child) or their contact circle (whether they have family members living there or not). But the life course survey only describes part of the population of a place at a given moment. Unless the universe of the life course survey is regarded as a closed population (which is an unrealistic hypothesis in the case of a survey based on a town and, for many countries, just as unrealistic in the case of a national survey), this type of survey only provides biased information about the population of the respondents' place of residence. The "objective" characteristics of the place will be found in the available secondary information sources: census data, national surveys, statistical indicators, etc. Where secondary information is short, a special data gathering exercise may be considered: community surveys in rural areas or local district histories for urban contexts.

How easy it is to link up individuals' migration histories with the histories of the places where they have lived (or still live) depends on the type of mobility being analysed and the amount of information available. The simplest

[1] This particular type of "passive mobility" is discussed in section 1.3.

situation is where a whole trajectory takes place in an area that has been regularly described in statistics. There are generally no major problems in documenting the places involved in inter-city residential trajectories. With international migration on the other hand, describing the places involved may raise particular problems due to the lack of uniformity between the different countries' data gathering. Below we give two examples of such difficulties, from the two studies discussed at greater length further on in the chapter.

The first example comes from studies of migration within Burkina Faso. The contextual information from existing databases was complemented by community surveys. To study the impact of climatic conditions on migration, the history of rainfall in the villages concerned during the period 1970-1998 was reconstituted from the monthly rainfall data recorded by the University of East Anglia (New, Hulme and Jones, 2000, p. 205). These rainfall data are available at the scale of a half-degree of longitude and latitude (i.e. approximately a 55 km square mesh), so that values could be attributed to all the villages mentioned in the event history survey using a geographical information system (GIS) (Henry *et al.*, 2004). Assessing the impact of variations in the economic cycle on urban emigration also led the authors to use several published time series: per capita GDP, per capita calorie intake and human capital indicators (Beauchemin and Schoumaker, 2004).

To analyse the impact of the local development level on migration from villages to major cities in Burkina Faso, the researchers had to gather specific information that was not otherwise available. In 2002 they conducted a retrospective community survey, designed to be linked to the individual life course survey (Schoumaker *et al.*, 2006). These two strands, individual and community, make up the EMIUB survey (*Dynamique migratoire, insertion urbaine et environnement au Burkina Faso*)[2]. Adding up all the localities where any of the 8,644 respondents in the life course survey had lived at any time in the fifty years preceding the survey, the total is 1,703 Burkinabe towns and villages. The community survey was conducted on 600 of them, amounting to 35% of the localities mentioned by respondents, but 90% of residence episodes outside Ouagadougou (Schoumaker *et al.*, 2006). The community questionnaire addressed at the local level a large range of aspects which, according to the literature, can affect migration: administrative and demographic history, natural resources, educational and health services, economic activity, access to land, development associations or projects, etc. Dated information was sought for all these topics: the year the primary school or the dispensary opened, for example. Any periods when services were interrupted were also recorded. All in all, this provides event histories of towns and villages that can be merged with individuals' event histories so as to identify contextual factors in the place of residence that affect the individuals' probability of emigration.

[2] Jointly conducted by the University of Montreal demography department, Ouagadougou University's demography teaching and research unit UERD, and the *Programme Majeur en Population et Développement de Bamako* (CERPOD) see chapter 5, Box 8.

Apart from the EMIUB, few community surveys have been designed to study migration behaviour from both the biographical and the contextual angles. No doubt this is because such surveys are very demanding: they require full dated information on all the localities where the surveyed people have lived. Practically, community surveys cannot make up for the lack of secondary information if the migration trajectories involve too many different places. Today's increasing diversity of migration destinations and increasing complexity of migration trajectories undoubtedly make the task of data collection more difficult.

The second example, the study of intra-urban migration in Bogotá, provides a different perspective. All the places where respondents in the life course survey had lived could be attributed to the same type of geographical entity, the census district. Bogotá is divided into numerous small census districts (600 in 1973), and census microdata, georeferenced by district, are available to researchers. These conditions make it easy to describe the places inhabited over a residential trajectory: respondents' social and urban environments can be described for the entire time they have lived in the city. For the analyses presented in section 3 below, the census information made it possible to work out variables revealing the social make-up of a given neighbourhood, in terms of mean social level and degree of heterogeneity. This is only one type of context description among the many that could be examined from the variables describing the town's population and dwellings.

Use of GISs was mentioned above in connection with processing rainfall data in Burkina Faso. Incorporating census data into GISs is also becoming more frequent. GISs considerably broaden the range of possible uses for all kinds of information: georeferenced statistics (from censuses or other sources) or localised data from life course surveys (series of places where the respondent and their family have lived or now live). The location, either in absolute terms or in terms of distance from the town centre or localised urban resources (work, amenities, etc.), can be integrated into the analysis. More relevant spatial units than the divisions derived from demographic statistics can be developed. GISs also offer possibilities for mapping and spatial analysis. Section 3.1.2 addresses this question briefly. In a GIS, the life course survey becomes an integral part of an information system on sociospatial dynamics.

1.2.2. Analytical challenges

Context varies with time. Its impact is dynamic. It must be matched with the modalities or components of the demographic dynamic. How else can one understand the nature of a complex transition, or define a threshold or the importance of a particular event? How can one examine the stability of a state without referring to the stability of the context?

For the individual, a change of residence is not just a matter of crossing an administrative boundary. Moving house implies a change in each of the local characteristics mentioned above. The spatial trajectory is a succession of places with characteristics, the individual contextual dynamic being

multidimensional. The trajectory is "tracked" through the residential history and described by observing the places, drawing on a variety of sources. This complexity involves several analytical challenges.

What measurements are relevant for understanding residential trajectories? The labour market is probably decisive for long-distance migration, the housing market for intra-urban mobility, the social quality of the neighbourhood is relevant to upward mobility, etc. Nevertheless, the choice of characteristics to consider will often be limited by the data available for the time and place in question.

Secondly, what statistical or analytical treatment is to be applied to these complex trajectories? This paper suggests a few basic possibilities. Because our examination is focused on the long-term life course, we have to give priority to indicators that show a trend over a lifetime but also show its variations in the manner of time series analysis. But one should try to examine the residential stages in detail while conserving the individual's stable characteristics, using multilevel analysis particularly. With robust classification methods, it should be possible to draw up typologies of residential histories using Kohonen maps (Delaunay and Lelièvre, 2006). Mapping (see examples in section 3) and spatial analysis must be used to understand the geographies of individual trajectories and examine changes in territorial composition, environment, settlement patterns and regional development.

1.3. Contextual transitions in sedentary lives: "passive" mobility

Considering contextual transitions in general, particular attention should be paid to those affecting people who do not change their place of residence. This has been called "passive mobility" (Lévy, 2003a). Staying in one place is often associated with passiveness and a rejection of change; it is easy to extend those connotations of immobility to the context as well. But it is a mistake to ignore the changes that affect people who do not move or migrate, since they are exposed to any changes that take place in their neighbourhood. Not moving is not necessarily a sign of passiveness; it may be an active choice if the changes taking place locally bring more satisfaction than would the opportunities available elsewhere.

Some analyses tend to regard space as a stable factor, doubtless because spatial transformations, being diluted in time and space, are not easily perceptible. But this is to ignore the territorial dynamics of some contexts, especially in urban areas, in countries where the pace of demographic change and economic development is rapid. The main expansion of the city of Bogotá took place in the space of one generation: the city and its human inhabitants have been following the same timescale. A wave of immigration, or changes in urban policy, can give sedentary residents the feeling that they have moved even though they have stayed in the same place. Remaining in a neighbourhood where urban regeneration is in full swing requires economic and social capital. Similarly, the decline of a neighbourhood may become unacceptable to its residents even if they are not upwardly mobile.

The classic "filtering" model is the following: inner city areas, which are also the oldest, deteriorate physically simply because there are ageing; the better-off households move out to new districts on the outskirts where they find the housing and environment that match their aspirations; the poorest households are stuck in the inner cities, which may also accommodate low-income newcomers. Park *et al.* (1925) called this process of physical and social decay in the inner city "filtering down". Later, Grigsby (1963) applied this concept to dwellings as distinct from neighbourhoods. Researchers now speak of "filtering" when a household, whose income and aspirations have not changed, finds their dwelling and immediate surroundings change position in their scale of preferences (Leven, 1976) or, more generally, in the social hierarchy of residential positions (Bourne, 1981). This change can occur when the household relocates. Then the household is "actively filtering" (a process which Lévy (2003a, p. 43) refers to as "active mobility"). It can also happen *in situ*, as in the above-mentioned case of a household that stays on in a decaying inner city area. This is "passive filtering", or the "passive mobility" which Lévy observed in households trapped in the big subsidised housing estates built after the Second World War (Lévy, 2003a). These households stayed put while their neighbourhood decayed physically and socially, simply because they did not have the means to move out (Chamboredon and Lemaire, 1970). Conversely, upwardly mobile households moved to areas where the housing better matched their new aspirations (active filtering or active mobility).

This old phenomenon is still a topical issue in Southern cities where the policy is to renovate inner city areas of historical value (Paquette, 2006). The resulting upgrading of the housing stock puts pressure on lower-income households; they move out to less privileged areas, making way for more well-to-do populations. This process is well known under the name of gentrification (Glass, 1963). Only those households that can mobilise social, political and/or financial capital are able to stay on in a neighbourhood that is moving up the social scale. Not moving is a deliberate choice and is not degrading. The context filters the resident population like a sieve whose mesh is shrinking. This process occurred in major Latin American cities over the last decade (Dureau, Lulle and Parias, 1998; Jones and Varley, 1999; Hiernaux-Nicolas, 2003; Rivière d'Arc, 2003; Paquette, 2006). This social process is not limited to urban areas, however. Rural areas may become urbanised as they increasingly take on urban functions, because they are absorbed into a growing metropolis or because they suddenly have the benefit of oil wealth, as has happened in Casanare, Colombia. In that region, studied by Dureau and Florez (2000), change gathered pace with the sudden arrival of immigrants and the increase in the local authorities' resources, though it has since gradually deteriorated because of increased violence. There too, residential immobility was only possible for inhabitants who were upwardly mobile, socially or economically.

These socio-spatial dynamics are well known, but few quantitative studies have brought together individual and contextual histories to test their interactions empirically. Some contextual analyses of migration have been made (Delaunay, 1999; Bruce and Wade, 2001; Shan, 2001) but often, for lack of

data, the analysis remains cross-sectional and/or aggregated to spatial units. In the French context, Lévy (2003b) stresses and demonstrates the value of studying habitat changes and individuals' residential itineraries together. Still data is insufficient in most cases, and so are the methods for exploring the interaction between individual and contextual dynamics. Both are complex dynamics played out in temporal continuity. When event history analyses of residential mobility model the risk of people moving out, they ignore any changes that may be experienced by those who do not move. Observation should make it possible to identify the characteristics of these non-migrants who adapt to their environment using strategies that are probably as complex as those employed by migrants. If we extol the capacity of the mobile to adapt, are we not masking that same capacity in the sedentary?

It is unanimously recognised that due attention to contextual influences is necessary. But for lack of empirical research, the scale of the changes occurring in a population's environment is not adequately measured. Too often, past mobility is modelled in terms of characteristics recorded at the time of the survey. When the trajectories of the context are reconstituted, the extent of change is surprising. In Bogotá, even on the scale of a lifetime, the social composition ratings of urban districts changed radically over the twenty-year observation period. So much so that the gains due to spatial mobility were barely perceptible (see section 3). The radical growth of Burkinabe villages into towns with infrastructure and new opportunities was perhaps even more unexpected.

2. THE CONTEXT OF INDIVIDUAL TRANSITIONS

In this section we consider the contexts in which individual transitions take place and the effect of contextual changes on those transitions. The aim is to situate the individual mobility in the light of the meso- and macro-constraints. The examples below, from Burkina Faso and Côte d'Ivoire, were designed to assess how a context and the changes in it affect the probability that an individual will migrate. The scale of the changes that have occurred in Burkina Faso (see Box 9) fully justify a contextual analysis of migration. Through these two examples we consider two issues raised by the contextual analysis of mobility: the choice of the time scale to measure contextual changes, and the choice of the spatial scale to describe the individuals' environment.

Both studies used the same method of investigation: analysis of retrospective data using discrete-time event history models estimated by logistic regression (Allison, 1995). For each analysis, individual event histories are divided into quarterly (three-month) segments. For each quarter, the models examine the probabilities that a migrations will occur[3]. Individual and contextual variables are introduced into all the models. Apart from characteristics fixed by nature (e.g. gender or ethnic group for the individual, agro-climatic region for

[3] The analyses use different definitions of migration, depending on data availability and the questions asked. We will specify the definition used for each of the analysis when we present them in detail.

context), the variables vary over time (occupation, educational level, etc., for individuals; all community variables for the villages). The standard deviations were corrected to take the sample cluster effect into account (Huber-White coefficient) and no random variable was introduced to measure other possible context effects (heterogeneity not observed at the contextual level).[4]

BOX 9. DYNAMIC SURVEY OF MIGRATION, URBAN INTEGRATION AND ENVIRONMENT IN BURKINA FASO (CERPOD-UERD, 2002)

The community data from the EMIUB survey in Burkina Faso (*Enquête dynamique migratoire, insertion urbaine et environnement*: migration dynamics, urban integration and environment, 2002) show how quickly rural Burkina Faso is changing (Beauchemin and Schoumaker, 2004; Schoumaker *et al.*, 2006). Change here is measured in terms of the spread, between 1960 and 1999, of income-generating activities and amenities of all kinds (public services, infrastructure). It must be stressed that the 600 localities in the survey were not strictly representative of all the country's villages: places where mobility was high, which are usually large towns, were over-represented.

Primary schools, drinking water supply infrastructures (tube wells particularly) and waged farmwork were spreading rapidly over the period in question. This began before the Sankarist revolution of 1984, which has often been presented as having initiated the efforts to develop and provide infrastructure for rural Burkina Faso. Be this as it may, change was rapid. In the twenty years from 1979 to 1999 the proportion of villages possessing a primary school rose from 20% to over 60%. Over the same period, the proportion of villages with access to clean water rose from 10% to nearly 90%. Recently, Burkinabe villages have even had access to modern information and communication technology: cinema and video facilities have been spreading fast and the survey even found Internet cafes in some villages. Clearly, the spread of such amenities is a sign of profound change in rural society, far removed from the conventional image of an unchanging African village.

2.1. The time scale for measuring contextual change

It is no simple matter to measure contextual change. One trivial but unavoidable difficulty is choosing what time scale to use. Even before trying to measure the influence of a contextual change, one must decide what baseline the change is to be measured against. Below we take two examples. One is the impact of climate change on rural out-migration in Burkina Faso, the other is the impact of the business cycle on migration between town and country in

[4] The logistical method used assumes that the events of one three-month period are independent of those of the preceding and following three-month periods. The analysis thus ignores any unobserved crises that occur repeatedly. In other words, dependence at the level of unobservables is not taken into account.

Burkina Faso and Côte d'Ivoire. Both analyses aimed to test the hypothesis that a deterioration in the conditions of households' economic reproduction favours out-migration.

2.1.1. Impact of climate change on rural out-migration in Burkina Faso

As part of a study of the influence of environmental conditions on rural migration to other (rural or urban) parts of Burkina Faso or abroad (Henry *et al.*, 2004), an event history analysis merged individual migration histories with the rainfall records of villages between 1970 and 1998. The aim was to identify the impact if drought on migration[5], a crucial issue in Burkina Faso where rainfed farming predominates, the climate is particularly severe and there is a long tradition of out-migration (Cordell *et al.*, 1996). The drought was considered in terms of both time and space, using the following variables:

- Spatial changes constant over time. For each individual, the climate zone in which they lived was noted (four modalities, according to mean annual precipitation between 1960 and 1998). This variable distinguished the structurally dry regions (the northern most) from the better-watered southern parts of the country.
- A variable that varied over time and indicated, for each year, whether the province where the individual lived was or was not suffering a rainfall deficit at the time. This variable takes account of short-term climate variation; it calls for some reflection about the choice of time scale. What time scale should be taken to assess whether or not there is a rainfall deficit?

To measure climate variation, it seems logical to compare the rainfall situation at a given moment with a long-term trend that is assumed to constitute the "norm". The variable was therefore designed as the ratio between precipitation over a short period (the numerator that is to be determined) and mean annual precipitation over the period 1960-1998 (the denominator that establishes the norm). For the numerator, current year appeared to be too short a period to judge the impact of climate variations on migration. The authors started from the hypothesis (based on qualitative research in Burkina Faso: Lallemand, 1975) that in normal times individuals are able to hold out against drought for two to three years by using up the reserves in the granaries. In the end, the rainfall variable was defined as the ratio between the mean annual rainfall for the three years preceding the current year and the mean annual rainfall for the period 1960 to 1998. Other thresholds were tested, but the results they gave were less robust.

The results show that the impact of rainfall variations on migration largely depends on the type of migration considered (in terms of duration and

[5] In this analysis, it was considered that someone had migrated if he moved to another area for more than three months. A distinction was made between long-term migrations of over two years and temporary migrations of less than two years. The method and the results are set out in detail by Henry, Schoumaker and Beauchemin in their publication of 2004.

destination) and the sex of the migrant[6]. It was found that periods of rainfall deficit do favour migration to other rural areas, but only by men and for periods of less than two years. Rainfall deficit actually had an inhibiting effect on migration to urban destinations. It was correlated with a lower probability of emigration to another country, whether short- or long-term, and a lower probability of women migrating to town long-term. These reduced probabilities are probably due to the fact that drought reduces rural households' economic resources and they can no longer afford to migrate (Findley, 1994). All in all, situations of relative drought do not lead to the areas concerned being abandoned. The structurally drier areas favour most short-term migrations (under two years) but not long-term migrations. In other words, men and women who live in the driest part of Burkina Faso are much more likely to migrate for less than two years than for a longer period.

2.1.2. Impact of the business cycle on urban emigration in Burkina Faso and Côte d'Ivoire

The question of the timescale of contextual change is also raised in research into the impact of the business cycle on the probability of migration between town and country (Beauchemin and Henry, 2004). This comparative study in Burkina Faso and Côte d'Ivoire set out to see whether macro-economic data explain the reduction or stagnation of rural-to-urban migration and the increase in urban-to-rural migration (Beauchemin, 2004)[7]. The contextual effect was sought at the national level. Among other hypotheses, the study tested whether economic recession is an explanatory factor in the increase in urban out-migration.

The contextual variable had to be an annual economic series covering several decades. It would have been best to have distinct variables for the rural and urban settings, but no such variables were available. Early analyses used per capita GDP, but in the end per capita calorie intake (data supplied by the FAO) was preferred, for two reasons. First, in a context where the informal sector accounts for much of the country's real economy and an essential part of household incomes, changes in per capita GDP (which only measures the results of the modern economy) are a very imperfect reflection of the impact of the business cycle on individuals' and households' incomes (Becker and Morrison, 1995). Secondly, it was found that per capita calorie intake gave more significant results than the classic per capita GDP variable. The FAO's online databases do not say how the variable is constructed, and it is clearly based on statistical devices and a large number of hypotheses which ought

[6] Here we present only the results concerning rainfall variables. The model also included individual variables (age, educational level, ethnic group, occupation) and local contextual variables (existence or not of all-weather road, uncleared land, rainwater harvesting methods).

[7] In this analysis, there is migration if an individual changes locality for at least six months (for Burkina Faso those moving to another sub-prefecture were counted; in Côte d'Ivoire, those moving to another département). For details of methods and results see Beauchemin & Schoumaker, 2004b. Available online at http://paa2004.princeton.edu/download.asp?submissionId=40503 (link checked 12/02/2008)

to be spelled out. Another limitation of this variable is that it may change as a result of compositional effects (changes in the different age groups, urbanisation rates, etc.). Nonetheless, it appears to be a good indicator of variations in the business cycle. For 1960-1990, it reflects the same trends as per capita GDP, the only difference being that it fluctuates less sharply. In any case, it is as a proxy for the business cycle that per capita calories intake is used in this analysis, given that if one wanted to find the effect of nutrition on the probability of migration, one would need individual rather than aggregate data. Here, per capita calorie intake is taken as an explanatory contextual variable whose trends at national level indicate improvement, deterioration or stagnation in households' economic conditions.

On what timescale should changes be calculated? Again, it is a plausible hypothesis that an incidental worsening of the situation for just a year has less effect on migration than a lasting deterioration, when people must adopt survival strategies. Rather than choosing a time interval at random, several measurements were taken into account. As a result, for each country a first set of five models studied the probability of a citizen migrating to a rural area. All models included two individual variables (age and sex) and a variable controlling for the period. Each used a different variable to take account of changes in the economic cycle. In the first model, this was the annual rate of change in per capita calorie intake (previous year versus current year). In the second model, it was the mean rate of change of the previous two years. In the third model, the mean rate of change over the previous three years, etc., up to five years.

The results show that the influence of variation in the economic context on urban out-migration varies with the length of the period examined. They partly confirm the hypothesis that the effect on migration is greater when the situation deteriorates over several years than with a short-term deterioration. It was confirmed for Côte d'Ivoire, where the greater the number of years taken into account, the greater and more significant the impact of a reduction in calorie intake. In this case, the idea that economic recession favours urban out-migration is verified, although the multiplier effect is weak. The results for Burkina Faso were less clear-cut. Studying migration in the reverse direction, the impact again varies according to the number of years taken into account. In both countries, the recession had to have lasted a minimum of two years on average for its impact on rural-to-urban migration to be felt.

These examples clearly illustrate the difficulty of measuring the impact of contextual change on individual behaviour. The time factor, unavoidable when one is measuring change, sometimes needs to be introduced into the analysis to identify any effects of delay or accumulation. This makes analysis more complicated (here, for each type of migration event, five models were needed instead of one). Moreover, other indicators could have been used. One disadvantage of using the mean of the rates of change is that it smoothes any volatility in the economic variables. And volatility introduces an uncertainty factor that may in itself encourage mobility, with households preferring to diversify their resources and have more places of residence so as to be

in a better position to confront risks. These examples also fail to take proper account of cyclical or seasonal movements. In short, there is no ideal solution for measuring the impact of contextual change; trial and error is unavoidable.

Nor do these two examples exhaust all the questions about choice of timescale for measuring contextual change. They only consider the choice of reaction time after a climatic or economic event. Whereas the great difficulty with dynamic context analyses is the multiplicity of timescales: life cycle, the seasonal (or biannual) cycle of some migrations, different migration triggers (work, marriage etc.), the medium-term pace of economic prosperity or climate, etc. All these time elements are interwoven.

2.2. Impact of local development level on migration to major towns in Burkina Faso

Another problem for contextual analysis of life courses is what spatial scale to use for describing context. What context should be taken into consideration? Our example here is an analysis designed to assess the impact of the local level of development on the probability of migrating from rural areas or secondary towns to major urban centres in Burkina Faso (Ouagadougou and Bobo-Dioulasso) (Beauchemin and Schoumaker, 2004). It was intended to test whether migration to the big cities can and should be slowed by local development efforts in places people are likely to migrate from – an idea commonly accepted by policy makers in the South (United Nations, 1998). In these analyses, a locality's development level was assessed in terms of the availability of revenue-generating work (agricultural or other), commercial services, infrastructure and amenities.

The changes in local context were measured in terms of changes in individuals' villages of residence. Retrospective community data gathered by the method described in section 1.2.1 provided dichotomic variables that showed, at any given moment, whether a given amenity was available in each settlement. The analysis took into account the fact that a village may not have a school at date t but may have one at $t + 1$. In this way it was possible to measure, for any given moment, whether the availability of different types of facility favoured emigration or not.

The results were striking: in most cases, the effect of the various aspects of rural development was the opposite of what policy-makers expected[8]. For example, all else being equal, the presence of waged farmwork, a health centre or an all-weather road in a village significantly *increased* the probability of a person leaving for Ouagadougou or Bobo-Dioulasso. A combination of different rural development components also tended to foster out-migration: thus, out-migration was twice as high from villages with two types of infrastructure as from those that had none. The presence of four types of infrastructure (all-weather road, electricity, telephone and clean water supply) more than tripled

[8] Here we present only the results for rural areas. For further details see Beauchemin and Schoumaker, 2004b.

the probability of out-migration. All in all, only temporary or permanent markets had a net effect of keeping villagers in their home locality (Beauchemin and Schoumaker, 2004).

Although contrary to policy-makers' expectations, these results are not altogether surprising. They confirm the results of observations obtained by other methods and in other places (Grosse, 1986; Rhoda, 1983; Rondinelli, 1994). All-weather roads favoured out-migration by increasing travel opportunities (Bilsborrow *et al.*, 1985; Lucas, 1997). A family with a monetary income from farmwork can finance the departure for the city of one or more family members (Findley, 1987). Health centres provide better physical fitness for the working population; this frees up some family labour so that a family member can leave if they want (Marcoux, 1990). It is also likely that the presence of sanitation in Burkinabe villages is linked to the activities of migrants' associations (Libercier and Schneider, 1996). Out-migration leads to more such community advances, which show that migration brings reward, which encourages further out-migration.

The question of the influence of the context on the probability of occurrence of a life course event leads to the question of how to define the context to be taken into account. The above example relates to a particular situation: the contexts considered were all single villages. It was implicitly assumed that all the inhabitants of a given village had access to all its work opportunities, infrastructures, etc. But how should one address this question in an urban setting? Access to localised urban resources is never uniformly spread around all population groups in all parts of town. Access depends on the location of the resource within the town, the transport system and the relative mobility of different population groups (Asselin *et al.*, 2005). In this kind of situation, defining the context to take into account is extremely complex. There is no unequivocal answer and one must necessarily modulate the spatial scales to adopt for a dynamic contextual analysis.

Furthermore, the filter of the single, permanent residence that is traditionally used in statistics to link individuals to places introduces an improper simplification, for urban and rural areas alike. Individuals are connected with, frequent and use the places they need for their activities. Their spatial practices are eminently complex and also change during an individual's life. How can research take account of these complex, changeable spatial practices and the characteristics of the places in which the demographic behaviours recorded by life course data take place? How can this variability in spatial practices be incorporated in the models used to analyse the influence of environment on individuals' behaviour?

Modelling contextual changes is a complex task, and concepts must first be clarified and defined. However, this complexity connects with the complexity of individuals' life spaces. To formalise individual transitions one also simplifies the complex reality of residence: at the scale of an individual's residential history, not all life spaces are necessarily taken into account.

3. THE TRANSITIONS OF INDIVIDUALS' CONTEXTS

Places evolve in different ways, generating distinct contextual dynamics for their inhabitants, whether sedentary or migrant. In the short term, this does not seem significant because the resident population experience the same changes in their surroundings. But at the life course level, individuals sees things differently: the place does not necessarily change in the way they expect, or in conformity with their own social trajectory. Change in their environment influences their appreciation of their present and future context. It plays a part in a decision to move; the dynamics of the context shape the individual's experience. Here we consider this point by looking at the trajectories of Bogotá residents.

First, change in the city is described between the censuses of 1973 and 1993, using a detailed spatial division. The analysis then takes the point of view of the individuals who frequent these different spaces with their particular dynamics. Their trajectories within the town, recorded through a life course survey conducted in 1993 (see Box 10) are qualified by the characteristics of the districts lived in, as they move house from one to another.

BOX 10. RECORDING RESIDENTIAL HISTORIES:
BOGOTÁ SURVEY (CEDE-IRD, 1993)

The life course data were gathered in 1993, as part of a survey of 1031 households selected in eleven survey areas, seven in Bogotá proper and four in the outlying communes. The sample is not representative of the city's entire population, or of all its inhabited spaces (Dureau and Florez, 1999). On the other hand, the survey areas do represent the types of settlement present in 1993. The areas were chosen according to four types of criterion: geographical position, social composition of the population, type of housing production and ongoing demographic and spatial dynamics. In each of the eleven areas, a sample of one hundred households was selected using an area-sampling plan stratified in three stages (block, dwelling and household). In each household in the sample, a life course questionnaire was applied to one adult over the age of 18, selected by quota. Thus, 1031 residential histories were recorded. Residential stages within Bogotá were localised using the census districts (for more information see Box 5, Chapter 4).

For the three survey areas referred to in 3.1.2, sample sizes were as follows: 95 residential histories in Perseverancia, 83 in El Nogal and 100 in Soacha. For the data processing in section 3.2., concerning only generations already adult in 1993 and who had spent at least 15 years in Bogotá (250 residential histories out of the 1031 gathered), we only have a very small sample for each area: 39 in Perseverancia, 26 in El Nogal and 23 in Soacha.

Two types of interpretation are put forward. The first describes the changes in socioeconomic settlement patterns for several synthetic indices over two decades, from 1973 to 1993. These changes give an idea of the life space context of certain populations (see 3.1.1). In the dynamic approach we are taking, by "life space" we mean all the places where an individual has lived during his or her life, which is not the usual cross-sectional sense of the term. This life space

can be mapped for a group of people. It can then be compared directly with the city maps of settlement trends or, more precisely, the contextual dynamics connected with settlement (3.1.2). The second interpretation (3.2) takes the viewpoint of the individual whose contextual trajectory is traced, whether apparently endured (if they are sedentary) or active (if they move from one part of town to another).

3.1. Changes in urban contexts and intra-urban residential trajectories

A city is constantly changing as a result of public actions, private investments and residents' mobility. We shall not describe these processes in detail[9], but it is instructive to compare the census maps of changes in the city and the maps of the spaces frequented by certain populations.

The changes in the city's socio-economic settlement patterns between 1973 and 1993 are described for the 600 census districts by a median social condition index (HSC, median of the social condition of households in the neighbourhood). A household's social condition is the ratio between the mean number of years of education of household members aged over 15 and the number of people per room. Its proven correlation with income level gives a social hierarchy (Dureau, Barbary and Lulle, 2004). The HSC and the mean rate of change in the HSC over the period 1973-1993 are calculated by linear regression on two or three available observations[10]. A second index, called the social heterogeneity index, is also calculated for each census district. It is the ratio of the 90th and 10th percentiles of the social condition index of the households in the neighbourhood. This classic measure of income distribution indicates the degree of social inequality among households in a census district; a high value indicates a sharp socio-economic disparity between the poorest tenth and the richest tenth of the neighbourhood's population.

3.1.1. Transitions in urban context: changes in the social composition of neighbourhoods in Bogotá between 1973 and 1993

In 1973 the social geography of Bogotá (Figure 1) contrasted a prosperous northern part and a poor southern part, with the middle classes mainly concentrated in the west and partly to the south of the city centre. This sectoral pattern was combined with a radial pattern, the outer fringes being mainly inhabited by the poorest households except in the west, where there had been extensive building of flats for the middle classes. This distribution pattern was the result of a period of rapid population growth and even more sustained urban expansion from the 1940s to 1970s. From the late 1970s there was little land available and further urban growth was hampered by intensive greenhouse agriculture to the west, steep hillsides to the south, and distances that were becoming prohibitive in a situation where the transport system functioned poorly.

[9] For a more precise description of settlement dynamics in Bogotá see Dureau and Lulle, 1999; Dureau, Barbary and Lulle, 2004.

[10] A few sectors having been created more recently, the estimation is based only on the last two censuses (1985 and 1993). A regression has the advantage of smoothing occasional imperfections in the census inventory to produce a general trend.

FIGURE 1 – HOUSEHOLD SOCIAL CONDITIONS INDEX IN 1973

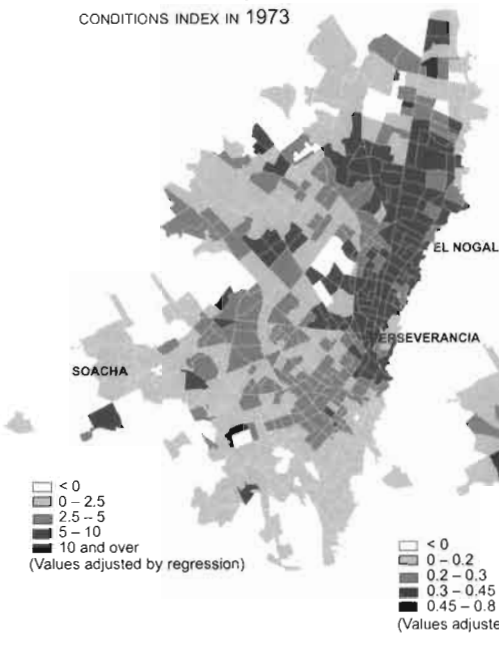


FIGURE 2 – CHANGE IN HOUSEHOLDS' SOCIAL CONDITIONS BETWEEN 1973 AND 1993

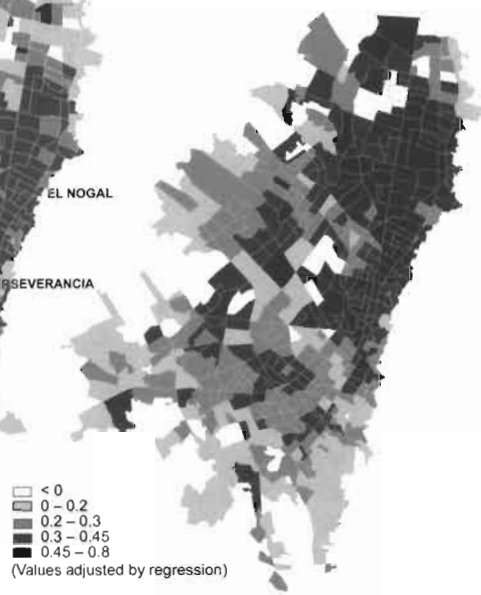
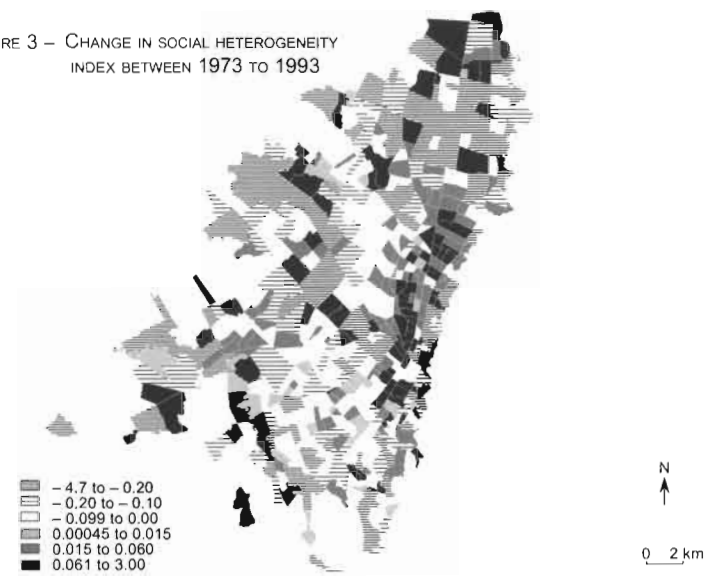


FIGURE 3 – CHANGE IN SOCIAL HETEROGENEITY INDEX BETWEEN 1973 TO 1993



The segregation process of the previous decades seems however to have continued, following the same pattern. The social condition index between 1973 and 1993 (Figure 2) followed broadly the same pattern: the districts that were richest in 1973 made the most substantial advances. The northern districts, wealthiest in 1973, further improved their situation while the poorest (especially the southern fringe) continued to house only the poorest households. However, a close reading of Figures 1 and 2 shows that not all districts followed that rule. Some working-class areas in the north and north-west were gradually colonised by the well-to-do, while on the south-western fringes, where districts became consolidated and the middle classes moved in, the social composition improved very significantly. Some parts of the historic city centre which had been very run-down in 1973 were upgraded in the 1980s with housing developments for the middle classes.

Figure 3 completes the picture, showing the trend in the social heterogeneity of the census districts between 1973 and 1993. In 1973, the map shows several large areas with distinctly different levels of heterogeneity. To the north of centre, an area of homogeneous social composition consists almost exclusively of well-to-do families; areas west and south of the centre, corresponding to the areas of medium social composition in Figure 1, are of medium heterogeneity; and there are areas of high heterogeneity in a strip along the hillsides on the eastern edge of town from north of centre to the southern tip and in the far north and northwest of the town. These north and northwest districts were becoming urbanised in 1973 and subsequently became home to households of very diverse social standing. In the northwest, illegal settlements sprang up at the same time as high-class housing developments, while in the north housing developments took over areas left vacant by earlier working-class urbanisation.

The areas that were most mixed in 1973 were largely those that were most thinly populated at the time and where urbanisation was still under way. The most socially homogeneous areas were the oldest and most densely populated parts of town. This seems to suggest a trend towards a levelling of disparities or, more probably, a change in scale of segregation. Contrasts on a more detailed scale are added to the division into large zones inherited from the period when the city formed. The new districts on the outskirts became more heterogeneous as competition for land increased. Social differentiation crept into the old parts of town. As the city became denser, the segregation process became more complex, with unexpected situations where some districts were shared by clearly distinct social groups (Dureau, Barbary and Lulle, 2004).

The changes in the social heterogeneity of the districts between 1973 and 1993 show up in a fairly clear spatial configuration (Figure 3). The districts north of the centre, which well-to-do households prefer, become more mixed. Conversely, the marked heterogeneity of the north and northwest decreases further and seems to move further north. In 1973 this area was shared between the residents of illegal settlements and the first well-to-do incomers attracted by the quality of the environment around a former village. This pattern

changed, as the illegal settlements were consolidated and large-scale middle-class housing developments sprang up. By 1993 these changes have made the area more homogeneous.

Along the hillsides down the eastern edge of town, areas that were heterogeneous in 1973 have changed in various ways. Districts north of centre have become much more homogeneous with extensive building of apartment blocks for the well-to-do, gradually forcing out the poorer inhabitants. Some areas give perfect illustrations of various stages in the gentrification process. Others, in the Perseverancia survey area, remain very mixed, with the middle and upper classes still cohabiting in the Torres del Parque, built in the early 1980s, and working-class families still occupying Perseverancia's working-class area. In the extreme southeast of the city we find the same trend as in the north, with an increasingly homogeneous social composition.

The above description is too sketchy for a city as complex as Bogotá, but the maps do give an example of contextual change: the changing social composition of urban neighbourhoods. These changes, in a time of rapid population growth and urban expansion, have been as great as the inequalities inherited from the city's history. By the mobility they encourage, contexts vary in mean value and in internal composition depending on their population densities and relative ages. The diversity of contextual dynamics affects residents to differing degrees, a point discussed in the next section.

3.1.2. Contextual trajectories and individual trajectories: a cartographic approach

These changing areas in a city are frequented and inhabited by individuals who choose to live there at one time or another in their lives. Their characteristics, particularly their social characteristics, influence these choices and modify the places lived in.

Residents' trajectories follow a locational rationale revealed by the housing density maps derived from the life course survey, which gives the location and dates of each residential period. The residential histories gathered in 1993 from residents of a given neighbourhood (Box 10) can be used to produce a map of life space in Bogotá in terms of dynamic residential density. We use the life course data to calculate the number of person-years lived in each of the 600 census districts in the town for the population group considered. A first, general way to compare contextual changes and individuals' residential transitions is to compare the maps of social composition (Figures 1 to 3) with the maps of the spaces inhabited by certain groups (Figures 4 to 6).

By way of illustration, three groups of people were chosen according to their district of residence at the time of the survey.

The first district, Perseverancia, just north of the historic city centre, consists of three neighbourhoods: a working-class area built in the 1950s to house the workers at the industrial brewery in small dwellings, mainly rented; La Macarena, a comfortable residential area consisting of a small number of houses dating from the 1940s and still inhabited by well-to-do residents; and

FIGURE 4 – INHABITED URBAN SPACES IN LA PERSEVERANCIA IN 1993

FIGURE 5 – INHABITED URBAN SPACES AT EL NOGAL IN 1993

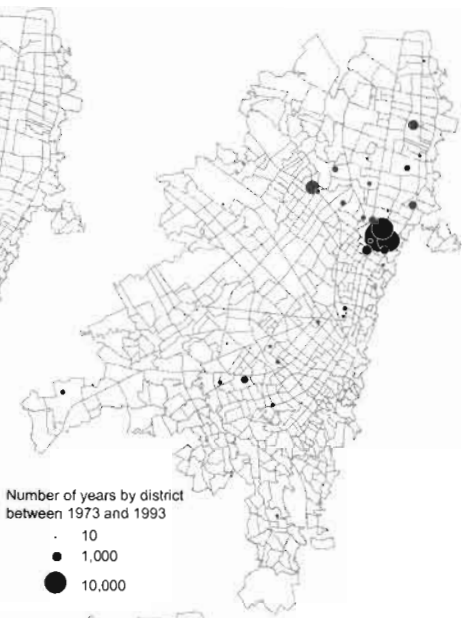


FIGURE 6 – INHABITED URBAN SPACES AT SOACHA IN 1993

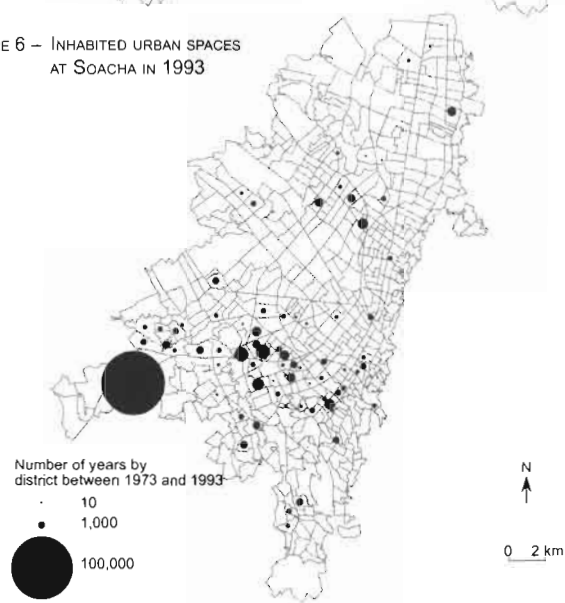
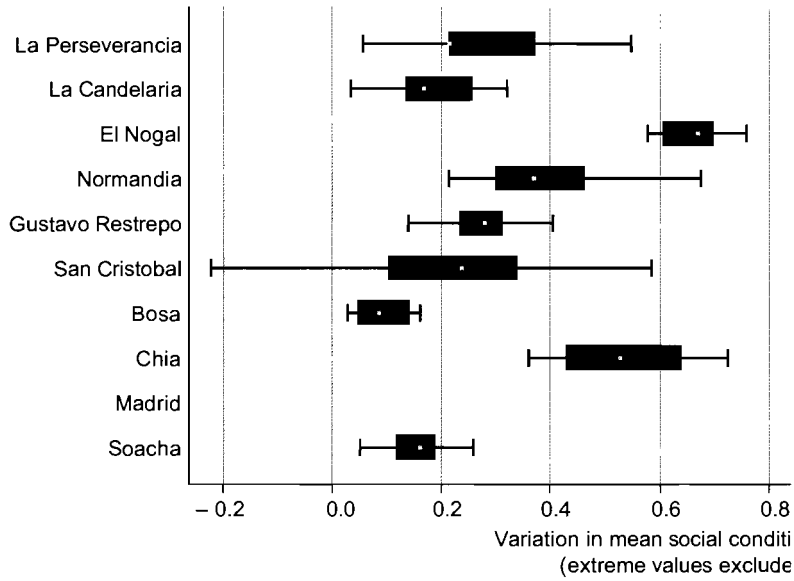
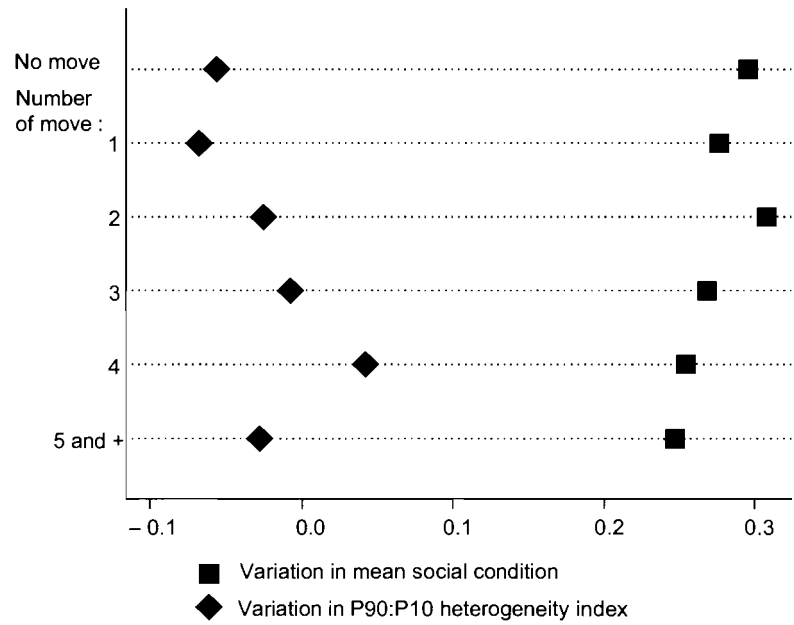


FIGURE 9. INDIVIDUALS' CONTEXTUAL TRAJECTORIES* BY

9a. SURVEY AREA (PLACE OF RESIDENCE IN 1993)



9b. NUMBER OF RESIDENTIAL MOVES



* Both graphs show the linear regression slope of individual context measurements

Source: Mobilité Spatiale à Bogotá survey.

Las Torres del Parque, consisting of apartment buildings occupied by white-collar middle class people attracted by its nearness to the city centre, the universities and cultural venues.

The second district, El Nogal, is typical of the north-of-centre part of town, where Bogotá's well-to-do families live. The first houses were built in the 1940s, big houses whose original occupants, retired now, still live there. In the 1980s blocks of luxury flats started to replace these houses.

Soacha, the third neighbourhood considered here, is in the far southwest of the metropolitan area, beyond the District boundary. It is traditionally an area of illegal settlements, with spontaneous housing development in low-lying areas liable to flooding and climbing up the hillsides to the south. From the late 1980s, gated communities for the middle classes (*conjuntos cerrados*) started to be built in the area.

These districts give a good sample of Bogotá, the age of its buildings, the social compositions of its communities and the changes that took place between 1973 and 1993. Analysing simultaneously the maps of social composition of these neighbourhoods and individual trajectories gives an initial approach to the relationship between contextual and individual trajectories.

Starting with Perseverancia, we see that the residents have not travelled far (Figure 4). The few who have lived elsewhere have come from north of the historic centre, never the south, confirming the cleavage between the north and south inner-ring districts shown in earlier analyses (Dureau, Barbary and Lulle, 2004). However, staying in the same district does not mean immobility: moving from one rented house to another within the working-class estate is common practice. It shows clearly Perseverancia's power to retain its inhabitants (Dureau, 2002), though the district is by no means static. It has seen far more change than the historic city centre, with major development operations throughout its history. Building of detached houses for well-to-do families moving out of the city centre began in the 1940s, while the working class estate and the Torres del Parque are more recent developments. Overall, all three neighbourhoods of Perseverancia moved up the social scale between 1973 and 1993; its social heterogeneity has diminished, but is still strong in 1993 both within and between neighbouring areas (Figure 3).

Nogal does not present the same picture of long-term residence by the same inhabitants. It is more recently settled, and those who were living there in 1993 had come from many more places, including periods of residence much further south in the city (before 1973) or further north or northwest (between 1973 and 1993) (Figure 5). Most had lived in neighbourhoods of high social standing. When they moved, it was always to a place of equally high social standing. Their residential spaces (the places lived in over time) are representative of the continual northward movement of the well-to-do classes since the 1940s. Unlike La Perseverancia, where geographical immobility went hand in hand with upward mobility of the residential context, the Nogal area has changed through the selective spatial mobility of individuals, which has strengthened its respectably middle-class character.

Soacha is different again. It is an example of a recently-settled urban fringe area (settled mainly from the mid-1980s). Respondents' residential histories had therefore mostly taken place outside the area (Figure 6). They reflect the stages in Bogotá's expansion. Before 1973, they are concentrated in the area to the south of the centre. Residential periods between 1973 and 1993 spread out along the axis from just south of the centre to Soacha. The trajectories observed within the sample mainly unfolded in the southern districts, in neighbourhoods that are socially homogeneous and socially modest (or indeed poor, for the most recent and far-from-centre residential periods). Residential periods right on the edge of town provide a more mixed social environment, but these are often temporary stages in areas undergoing settlement or planned urbanisation. More lasting social inequalities can be seen in areas where there is a large-scale influx of residents socially very different from those who live in the existing working-class housing stock. This applies to the *conjuntos cerrados* for middle-class residents that sprang up in Soacha at the end of the period.

These three examples remind us that residential immobility does not necessarily mean that population characteristics do not change. Apart from that point, they raise the more interesting hypothesis that residential immobility in a fast-changing city can provide the opportunity for certain changes that residents would not find by moving. Personal resources limit an individual wishing to move house, reducing the space that is financially accessible to them. Often, they have the further constraint that they need to stay close to their family. They may, for particular reasons, settle in a neighbourhood that they consider to be below their social condition. This was the case with the first well-to-do "pioneers" who settled in the centre and inner-city ring in the 1980s. As the real estate market is severely discriminating, moving to a socially superior area is still the exception. But residents who do not move may reap the benefits of changes in their social context without making any personal investment. This happened to people living in the centre of Bogotá and especially in the inner-city ring. The question of residential mobility is then posed in reverse: what strategies do these residents adopt to stay in their homes when they expect the neighbourhood to move up-market? How do they affect (by redefining them) the plans of the city planners and developers generating the changes in the neighbourhood's social composition? This is a very broad question, but it is particularly relevant to Bogotá over the two decades we have studied, where many rapid changes were taking place.

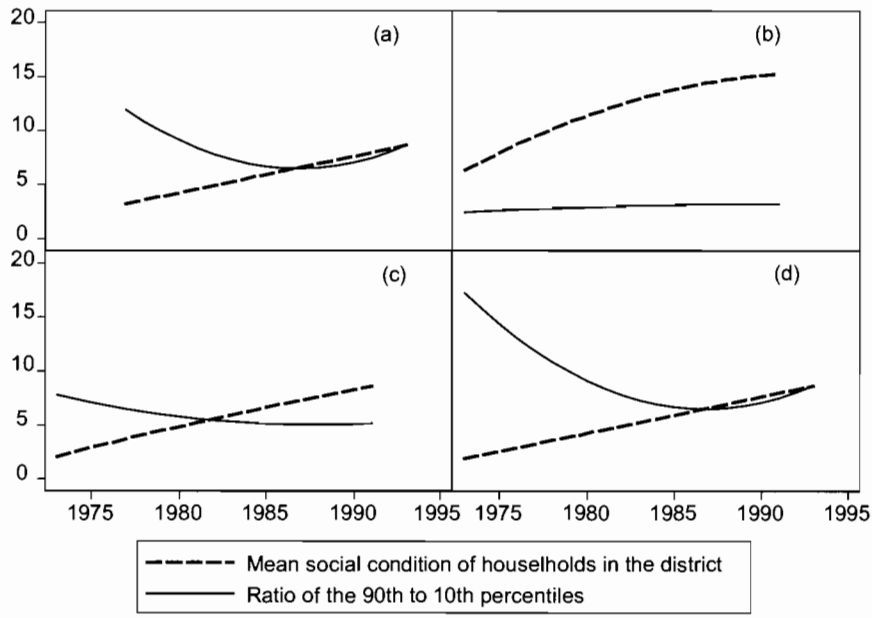
3.2. Individual contextual trajectories

The city-wide perspective above gives an overall interpretation of individual trajectories, but without any statistical validation. It has the disadvantage of addressing only the macro level, not individual histories. For example, to confirm that the well-to-do classes maintain a favourable social context without having to move, one needs to look at individual histories and see how their environments – the neighbourhoods where they live – have changed. Above, we showed how social changes in a census district could be described by the

social condition index and social heterogeneity index for each year between 1973 and 1993. Individuals' successive domiciles within Bogotá were also observed year by year and located by census district. The two data can then be compared to measure individuals' contextual trajectories even during the time they lived in the same dwelling.

In practical terms, this means that in this biographical analysis a period of residence is no longer defined by a start date and end date, and the state or condition is considered stable throughout the period. The contextual changes are integrated into the person's residential history, and their contextual situation is no longer conditioned solely by their spatial mobility. Without moving house a person may be upwardly mobile as regards their social environment, while someone who does move may have to move into a less favourable environment in order to become a home-owner.

FIGURE 7. EXAMPLES OF INDIVIDUAL CONTEXTUAL TRAJECTORY PROFILES



Source: *Mobilité Spatiale à Bogotá* survey.

Figure 7 illustrates this reasoning for four individuals who were neighbours in 1993, taking the two measures of social level of home district set out in section 3.1: social condition index (median HSC/median social condition of households) and social heterogeneity index (ratio between the 90th and 10th percentiles of the HSC) to describe the districts of residence of each individual throughout their life course. At each date, the value of this index is that of the census district in which the person lives. The contextual trajectory (b) is that of a person whose social environment, already favourable at the start of

the period, has improved on average over the twenty years covered by the graph, but with no change in terms of social heterogeneity, which remains weak. Individual (d) has a very different trajectory: a sharp improvement in social environment but also a very sharp increase in the social homogeneity of their environment.

At this exploratory stage we propose several possible data treatments, which could be revised or improved later. It seemed preferable to use only complete trajectories covering the period 1973-1993. This means taking only the older generations (those born before 1955) and only those who have spent almost all the relevant period (more than 15 years) in Bogotá. These criteria selected a small portion of the original sample – 250 of the 1031 life courses collected. This gives a clearer but less representative picture of individuals' contextual trajectories. A number of statistical treatments suggest themselves. The simplest is to calculate parameters summarising each contextual trajectory in terms of one or two indicators of the social environment, to describe it in relation to the individual's other characteristics (mainly sex, education, migration intensity) and area of residence in 1993 (survey area).

It is instructive to compare the social condition index and the social heterogeneity index with the mean number of persons per room. We will not here dwell on the similarities in the way the indices are constructed: the mean number of persons per room is used in the denominator for calculating HSC. A significant point of this comparison is that those who live in less crowded homes also have a more homogeneous social environment (correlation 0.67). In other words, the comfort of the home goes hand in hand with "social comfort", with less tension between the extremes of the social scale. This is slightly less true for the mean social level of the district (correlation -0.52). These similarities between individuals' contextual trajectories seem at first sight to reflect the similarities between districts mentioned in 3.1.1. above. In statistical terms it is perfectly legitimate to think so, if individuals are distributed at random within the city. In that case, their contextual trajectories would, but for one random factor, reflect the geography of the city. But making the same comparison for districts of the town instead of individual trajectories gives a weak correlation (0.25) between heterogeneity index and mean number of persons per room. With due caution[11], this gap between individual contextual trajectory and composition of urban district can be interpreted as being the result of individuals' preferences. The example examined would in this case show that, home comfort being equal, people want to live in a socially homogeneous neighbourhood, i.e. surrounded by people like themselves.

[11] The correlations of aggregate values by spatial unit cannot be interpreted without checking out the perturbation of the (fairly numerous) extreme values, and the influence of the demographic size of the spatial unit. This tends to introduce a high degree of heteroscedasticity, which makes the calculation of covariances uncertain. Moreover, the 250 persons whose contextual trajectories were tracked are not perfectly representative of Bogotá's population.

3.2.1. Contextual trajectories differ according to individuals' characteristics

Those who experience the greatest improvement in their social environment are women, widowers and single persons as opposed to couples (as a general average). Separation sharply penalises people in terms of the trend in their social environment (Figure 8a). Education makes a major difference, with higher education favouring a clear improvement in the social context of the district of residence. The gender gap is wider with respect to the social heterogeneity of the environment (Figure 8b). Women, widowers and single people live through twenty years without the social contrasts in their neighbourhood greatly diminishing. By contrast, couples in unions and people with a university education either move to, or are able to stay in, more socially homogeneous areas.

Because their residents have lived there for a good part of the twenty years preceding the 1993 survey, it is to be expected that the survey areas themselves, selected precisely to illustrate the diversity of Bogotá's neighbourhoods, should explain most of the variation in social level of the spaces frequented by the groups of people interviewed in each area. This is verified by the fact that almost two-thirds of the variance in social level of individuals' residential contexts can be attributed to differences between areas of residence in 1993. Figure 9a shows the extent of variation in contextual social conditions for the residents of ten districts surveyed in 1993. There are wide differences: the residents of El Nogal (and to a lesser extent Chia) enjoyed a fast-improving social context (0.65 and 0.53 points per annum) while people in Soacha found their neighbourhood improving only by 0.07 points. Residents of outlying working class areas like Soacha and especially Bosa found their neighbourhood scarcely changing.

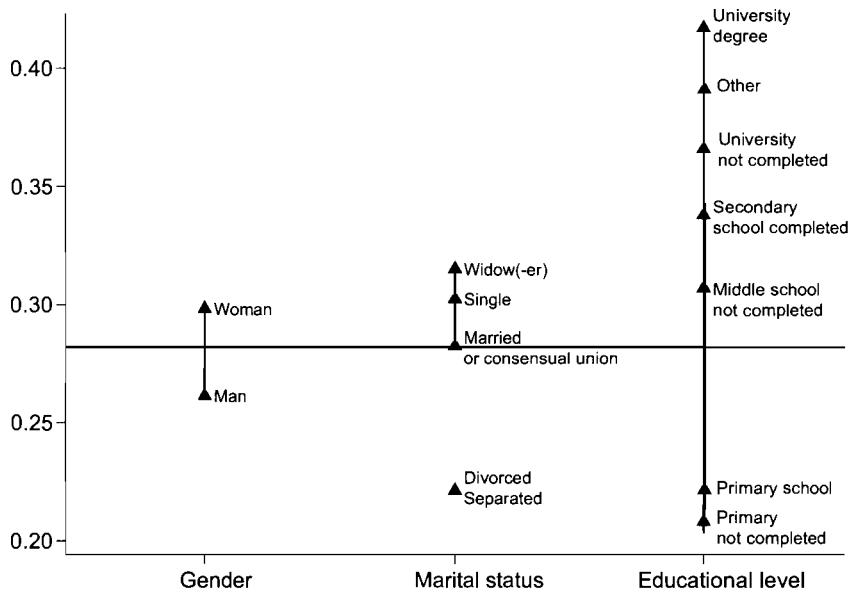
3.2.2. Residential mobility and individual contextual trajectories: complex relationships

It is natural to ask whether residential mobility contributes to individuals' contextual dynamics. People may move in search of a better environment, or because they expect their present neighbourhood to change in ways that do not chime with their social condition. At the same time someone seeking to buy a home may accept one in a neighbourhood they consider socially inferior to their present one in order to benefit from lower real estate prices. On the other hand, someone who does not move may benefit from gentrification of their neighbourhood and contribute to it by their own upward mobility. Alongside these complex relationships is the fact that the social quality of the neighbourhood is not the only reason why people move house.

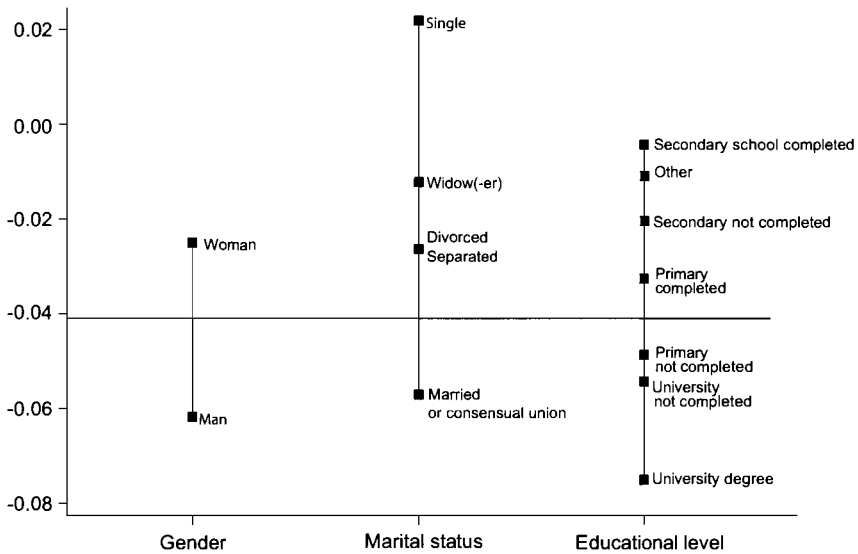
What light do our statistics shed on these relationships? For the contextual trajectories examined, are the results better for the more mobile? Figure 9b compares the itineraries of persons who have not moved with those of persons who have moved once, twice, or 3, 4, 5 or more times, with regard to the two contextual variation indices discussed earlier. It shows less progress

FIGURE 8. INDIVIDUAL CONTEXTUAL TRAJECTORIES BY GENDER, MATRIMONIAL SITUATION AND LEVEL OF EDUCATION

8a. VARIATIONS IN SOCIAL CONDITION INDEX



8b. VARIATIONS IN SOCIAL HETEROGENEITY INDEX



Source: Mobilité Spatiale à Bogotá survey.

in the social composition of the neighbourhood of residence for the most highly mobile, but the pattern is uneven. It is statistically plausible, but too weak to dismiss the hypothesis of a zero value. The same applies to the estimated average social condition of contexts over the period (1985 value, not shown in the graph). Lastly, and broadly, the most highly mobile individuals live in the most socially mixed areas; the social heterogeneity index increases markedly with mobility.

Bearing in mind the maps of trends in these indices in districts of Bogotá (Figures 1 to 3), we can easily imagine that it is not so much the number of residential moves that counts as their spatial characteristics. And these vary widely between the different survey areas (Figures 4 to 6). The parameters of the linear regression between spatial mobility and social context differ between survey zones, but they are rarely significant owing to the small number of observations (Figure 9a). For residents of city centre districts such as Perseverancia, the maps of the areas covered by individual trajectories show that they are limited to a small and socially homogeneous area. So spatial mobility does not have a decisive impact on changes in context. The residential mobility space of the residents of El Nogal is larger and the impact of mobility is greater, but negative. This district is among those where households' social condition improved most, and El Nogal residents who had not moved fared significantly better than those who had.

With our dynamic perspective, the same question can be reversed. Does a major improvement in the social environment of the area encourage people to stay put or to move? The biographical analysis lends itself to this. We can use a semi-parametric Cox regression to examine the covariation between length of stay and variation in social context. The variation of the HSC index is used as a variable independent of duration of stay or risk of moving. Earlier, only the generations that were adults in 1973 and present in Bogotá for at least 15 years were taken into account. Here, the entire life course sample is included – i.e. all residential periods in Bogotá. According to the model's elementary expression, a variation of one unit of variation in the household social condition index (which is three times the mean value!) increases by 30% the likelihood of moving house. This (statistically uncertain) conclusion contradicts the earlier conclusion concerning the impact of spatial mobility on mean contextual trajectories. But this contradiction is removed if we test the regression on the older generations only. In that case, there is a negative association between spatial mobility and the social trend in the contextual trajectory.

Other methods could be envisaged. One option would be to qualify residence periods recorded in the life course survey by a measure of change in the place concerned. The data would be processed using models of duration, to see if moves had been prompted by unfavourable changes in the context (as distinct from undesirable but unchanged social level of the context). This would test the hypothesis that gentrification encourages residents to stay put. This would no doubt be preferable to the method described above, in that it does not require a sample of long trajectories spent in the city. The hierarchical structure of the information (years of individual trajectory) also suggests

making a multilevel analysis capable of modelling time trends as much as individual characteristics.

CONCLUSION

The avenues of investigation described here suggest that research into the interaction between contextual transitions and individual transitions should be continued. This chapter is an attempt to analyse in a new way the reciprocal relations between individual mobility and changes of the contexts in which people live. To demonstrate the need to take into account the context and contextual changes in analysing event histories, we looked at studies of migration in Burkina Faso and residential mobility within the city of Bogotá. This was not a haphazard choice. In these developing territories with short but often turbulent histories, the question of the temporality of places and individuals is raised in a particular way. The history of a place and the lives of individuals often take place on comparable timescales. These examples from Southern countries have an undeniable heuristic value. They provide a great deal of information for deciphering territorial dynamics in the North. Northern and Southern countries alike are changing under the impact of a general shrinking of space-time. This shrinkage changes the terms of the relationship between individuals and their surroundings and makes it all the more important to have a precise analysis of the interactions between life course dynamics and contextual dynamics.

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