McDONALD INSTITUTE CONVERSATIONS

Delicate urbanism in context:
Settlement nucleation in pre-Roman Germany

The DAAD Cambridge Symposium

Edited by Simon Stoddart

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with contributions from
Ines Balzer, Manuel Fernández-Götz, Colin Haselgrove, Oliver Nakoinz, Axel G. Posluschny, Gerd Stegmaier, Anthony Snodgrass, Peter Wells, Günther Wieland, Katja Winger and Caroline von Nicolai

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Chapter 7

Quantifying Iron Age urbanism (density and distance)

Oliver Nakoinz (Kiel)

Several concepts of urbanism are currently addressing the specific features of cities. These concepts discuss the differences between rural settlements and cities, and try to establish a definition of cities by developing an outline of the extraordinary properties of urban settlements. This paper aims at measuring urbanism and applying quantitative and mathematical approaches to the phenomenon of urbanism. While the first target, the measurement of urbanism, seems to be self-evident, the application of quantitative and mathematical approaches needs some explanation. Would it not be sufficient to establish a population threshold, just a simple number, for defining cities? This paper discusses advantages and problems of different approaches using the *Heuneburg* as a case study. In doing this, we should be able reach a better understanding of both the *Heuneburg* case and the usage of quantitative approaches in archaeological studies of urbanism.

Quantification

By considering paradigms, that is the relationship between different kinds of data and the diverse ways of using data, we can establish the role of quantitative analysis in the research process. Basically, we can distinguish three types of data in a data set: 1. Structured data, which are connected to a real or artificial phenomenon. The most simple example is the correlation of two variables. The age–size correlation of children might serve as a trivial example, while preferred locations of settlements provide an archaeological application. 2. Individual data, which do not show any significant correlations. One individual in a community might be small during the whole of their life, because of specific diseases, and an arbitrary wager might be the actual cause of the location of a settlement. 3. Finally, we have to mention noise, which is a variation in the data, without structure, and not caused by real phenomena.

These examples show that the classification depends, to a certain degree, on knowledge and theoretical considerations. If we know about the disease, we might judge the case of the small individual, and whether, in fact, it is just an outlier, not individual data, but structured data. In addition, we see that a complete correlation is not very likely, since there is a natural variation amongst children of a certain age.

Noise cannot be used to gain historical knowledge at all. Traditional approaches use structured as well as individual data. Processual archaeology is focussed on structured data, while post-processual archaeology mainly deals with individual data. Individual data require a degree of knowledge about the meaning of the data. In archaeology, at least in prehistoric archaeology, it is not possible to learn about the meaning directly, since we do not know what people are thinking. To a certain degree, assumptions and hunches about this meaning, based on certain theories are plausible as cognitive archaeology shows (Renfrew and Zubrow 1994). The hunches can become informed, when our system of hunches is consistent and, in particular, if the hunches are supported by structures in the data. Structured data, on the other hand, allow us to detect certain patterns and structures without knowing about the meaning. In this case, it is not the content, but the structure of data, which allows an interpretation.

The quantitative analysis itself is nothing but a transformation of the data, which makes patterns and relationships visible, which allow us to answer a research question. The focus of quantitative analyses, is thus on the methodology of data transformation while the analysis of individual data is concentrated on the involvement of theory. This seems to support the idea of different incommensurable paradigms. In fact it does not. The two approaches are rather complementary,

because they deal with different data and answer different questions and hence provide different parts of the whole. Both approaches involve a huge degree of theory and different methods. Approaches dealing with individual data do not require methods for revealing hidden structures inside the data, but methods for extracting information and compiling data.

Both approaches are using four types of theories. It is necessary to distinguish the four types of theories for understanding the confusion which sometimes occurs in discussion. First, we have to mention high level theories, which are our main point of reference when we speak of archaeological theory. High level theories are concerned with the relationships of real world elements such as the relationship of people. All entities are constructed in the sense, that we do not handle the original elements, but symbolic entities and relationships. Low level theories are rather technical, since they deal with the same elements, but rather as part of the construction, than as part of the real world. Data base theory, logic and mathematics are examples. There is a certain connection between the two types of theories which is made up of a third type of theory, middle range theories. Examples are the theory of formation processes and the theory of typology. Middle range theories connect the data to the interpretation. The final type of theories is meta theories which set the frame for all things. Philosophy, research strategies and this paragraph are examples.

While it is true, that the processual approach focuses, up to a certain degree, on method (low level theories) and the post-processual approach focuses on theory (high level theory), from the point of view of research processes (meta theory) both require a balance of objective, data, method and theory and both need to complement each other. Based on these considerations, we can neither agree to the idea of paradigm shift nor to the concept of a war of paradigms. This is of particular important in the case of rather complex topics such as urbanism, where we cannot hope to get significant results with one approach only, covering just half of the problem.

After explaining some basic tenets, which are required for understanding quantitative approaches, we can turn to urbanism. There are many definitions of cities. We use five types of definition: simple quantitative approaches, functional approaches, structural approaches, qualitative approaches and system approaches. The definitions will be applied to the case study of *Heuneburg*. The *Heuneburg*, a so called *princely* seat, a fortified settlement with indicators of Mediterranean imports and surrounded by extraordinary rich graves, is assumed to be the first town north of the Alps (Krausse 2016; Winger this volume). Our purpose is to establish, whether the *Heuneburg* can be considered a town or not. The task is not just to classify the *Heuneburg* as a town or as a rural village, but to understand the mechanism of urbanism. The definition of urbanism and the posing of the question of adherence by the *Heuneburg* to that definition has a heuristic purpose rather than comprising a proper objective.

Simple quantitative approaches

Size is certainly an important factor for urbanism. Eurostat (Eurostat) defines a threshold of 5000 inhabitants. Kurz (2010) also estimates the population of the *Heuneburg* in Ha D1 as 5000 inhabitants and hence, the settlement can be considered, on this criterion, to be a town, at least in Ha D1. However, how should the boundary of the settlement be defined? In principle, we could extend the area of the town and reach any population value we need. This certainly does not make any sense. Density values, therefore, seem to be a better choice than population levels. Density is defined as population by area. Eurostat (Eurostat) provides us with a density threshold of 300 people per sq. km and Demographia (2015) with a value of 400 people per sq. km. If we use the population numbers and maps from Kurz (2010), the density values for the *Heuneburg* are much higher. Density values, give the same result as population values for the *Heuneburg*, namely that the settlement should be considered a town.

Nonetheless, simple quantitative approaches are very problematic. Firstly, the thresholds are arbitrary and without a theoretical foundation. There is no natural threshold and, hence, the classification is without meaning. These approaches can be used for regional comparison, but not for understanding urbanism. Currently, the obviously arbitrary official population thresholds in different countries range between 200 and 50,000 inhabitants (Deuskar 2015) and do not allow the comparison of cities around the world. Secondly, these approaches are just based on descriptions and not connected to processes, functions and structures (Spencer et al. 2015). The problem is an inadequate connection between research objective and method.

Functional approaches

Many definitions are based on functions, in particular economic functions (Smith 1989). They stipulate features such as no agriculture, diversity of activities and specialization. Looking at the *Heuneburg*, we do not get a clear result on these grounds. The *Heuneburg* definitely has agriculture, but the palaeobotanical results (Fischer et al. 2010) indicate, that the *Heuneburg* is a

consumer site rather than a producer site. Specialized crafts can be found at the *Heuneburg*, as apparently indicated by ceramics and metalwork. However, the degree of specialization is rather low according to Modaressi-Therani (2009). Other evidence, supporting or rejecting urbanism can be found, but these also do not produce a clear result, since it is difficult to weight the parameters. The *Heuneburg* seems to have a certain degree of urbanism, which is changing through time, but always lower than one and higher than zero on a scale between zero and one. Although, we have no clear result, this functional approach provides more insights into the mechanisms of urbanism.

Considering the quantitativity of this approach, we have to distinguish two levels. On the first level, the number of grains and or pollen is used for a botanical classification. On this level, the result is based on a system of high level, low level and middle range theories, provided by palaeobotany. The results are individual indicators. On the next level, we would need to combine the different indicators, which also can be done using quantities. On this level, we have a particular problem, which is the lack of theory, in particular middle range theory and meta theory. We just do not know how to weight the indicators. For instance, are agricultural indicators or crafts more important for urbanism? Obviously, we have a problem of connecting theory (high level theory) to methodology (low level theory), meaning an appropriate middle range theory is missing. A solution could be to define different types of urbanism according to different types of indicators.

Structural approaches

Structural approaches consider the relationship between elements, and, in the case of urbanism, between different settlements. In formal terms, a structure is what remains, when the elements are substituted (Tetens 2013, 38–42). Social structures, for instance, are certain persisting rules for relationships, which apply to different sets of individuals. The two main, tightly connected, structural approaches are centrality and urban networks. The term 'central place' was developed by Christaller (1933) in order to circumvent the problems of the term 'town' which was, and still is, heavily loaded with different levels of cultural meaning, mental associations and the ballast of a long tradition of research. Christaller decided just to define the term 'central place' and to develop the concept of centrality, with the aim of understanding why settlements develop particular sizes at certain locations. In the first place, the concept of central places was intended to deliver a functional explanation of the location and size of cities. According to Christaller's concept, centrality is the *relative meaning*, which a settlement obtains by supplying central functions to a specific, well delimited, area surrounding the central place. *Relative meaning* means in this context the amount of supplied central functions in comparison to the population of the place. A place, which supplies only the amount of central functions, which would be predicted from the population size, even if it is a big settlement, is not defined as central. The surrounding area which is supplied is called a complementary area and is a kind of economic territory. Since the whole system is optimized, the distances to the centre, in the same complementary area as the actual central place, are smaller than to all other centres. The concept of Voronoi-graphs applies such optimized structures. The different range of different central functions and goods causes a hierarchy of central places. The structure of the hierarchy is defined by the k-values, which indicate the number of subordinate places of the centrality level n-1 for each centre.

In archaeology, we can distinguish three schools of central place research (Nakoinz 2013b) focussing on different approaches. The first systematic application of central place research in archaeology occurred in Britain. The geographer Peter Haggett and the archaeologists David Clarke transferred some ideas from geography to archaeology amongst which central place theory has to be mentioned (Clarke 1968). According to Haggett's interest in locational theory, the focus was on optimized complementary areas, calculated using Voronoi approaches. This school of central place research was marginalized by the emergence of post-processual archaeology. At a later stage, central place theory was discovered in Scandinavia as a tool to cope with problems in regional research. Finally, central place theory became popular in Germany, but here, central functions are in the focus.

In Scandinavia, and currently in Germany there has been a paradigm shift from central place research to network approaches. The term 'centrality' in social network analysis is completely different from the Christaller approach. A place, controlling the contacts between most other places is most central (betweenness centrality; e. g. Freeman 1977). The network approach and the Christaller approach of centrality provide different organizational structures and hence, we can speak of a paradigm shift in the context of planning, but not in the context of empirical research. Ancient organizational structures and variants of centrality cannot be decided by choosing a theory, but have to been tested. Furthermore, we have to assume both types of structures for each settlements meaning that we are searching for the dominant, not the only existing type of structure.

In the case of *Heuneburg*, I have argued (Nakoinz 2013a), that network centrality is more important than Christaller centrality. This leads to an interpretation of the *Heuneburg* as a gateway and hence a town. The network approach of centrality is also connected to the concept of urban networks (Camagni and Salone 1993). A town is connected to other cities and connects its parts by a network. Transportation, the road system, means of communication, intra- and interurban economic exchange and interaction systems and many other facets are included. The term is not precisely defined, but offers different meanings. On a regional and supra regional level, cooperation and rivalry are driving the development of the whole system as well as the single cities. However, exchange and interaction are also on the intra urban level of this urban network an important driver of economic, social and cultural processes.

Centrality and urban networks are specific structures, which can be used and frequently are in use to optimize the interaction between settlements and the interior of settlements. Both are covering just a part of the phenomenon and hence, the theories are not sufficiently adapted to the objective. The two approaches provide us with the knowledge of how interaction in and between cities was organized, but not with the answer to the question, why these solutions have been applied.

Qualitative approaches

Among the many qualitative approaches, two are most prominent: jurisdictional and lifestyle. The jurisdictional approach is based on the precise law, which is given to a settlement. The medieval town law of Schleswig (Hasse 1880) is just one example. Since legal based definitions of towns are acknowledged to be important in medieval times and since they are usually available in written historic sources, they are the subject of a wide range of historical and geographical urban research, in particular in the nineteenth and early twentieth century. Legal information on prehistoric settlements is usually not available.

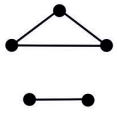
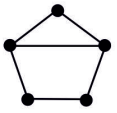
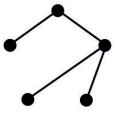
The lifestyle approach (Wirth 1938) is rather focused on the practice of the urban inhabitants rather than on their legal framework. This approach defines a particular behaviour of the inhabitants based on the size and population density of the town. The specific urban way of life includes anonymity, specialization, distant social relations and a high degree of mobility. These parameters can be observed only incompletely, using archaeological information. It is certainly difficult to judge anonymity in prehistory or to compare regional mobility of rural and urban settlements in prehistory. Furthermore, the urban way of life is not restricted to cities, but can also be found in rural settlements up to a certain degree (Gans 1962). Both approaches lack decent middle range theory, which would connect the theoretical assumptions of the two approaches to quantitative or even qualitative archaeological data. Although qualitative considerations are important, they can hardly contribute to an applicable definition of urbanism in prehistory.

System approaches

The final set of approaches discussed in this paper are system based approaches connected to systems theories (von Bertalanffy 1968) and the theory of complex systems (Gell-Mann 1995). A system is a model of a particular research topic, which does not only map the structure, but also the dynamic interrelationships between the different elements. A complex system demonstrates certain behaviours due to non-linear interrelationships. Complex networks show emergence, butterfly effects, path dependency and some other strange properties. Cities can be seen as complex systems (Batty 2005), since the huge number of elements do not exactly behave according to patterns of linear interrelationships. From a system point of view, the dynamic interrelationships of elements and the adaptation to changing conditions are the most relevant features of towns and cities. We can define a town as a settlement where people successfully adapt to the conditions of agglomerations of people, where the town is larger than the mean size of surrounding agglomerations, by taking advantage of the special conditions and coping with the specific problems related to differential size. This definition requires no specific size, no specific functions, no specific organizational structures and no specific way of life. It just states that towns and cities are different from rural settlements, because of their size and means of adaptation to that size. In different conditions, times and regions, the size and the means of adaptation can be different. This approach allows the comparison of towns and cities on a rather abstract level and the exploration of the mechanisms of urbanism.

We will try to apply this concept to the *Heuneburg*. First, however, we have to consider population and complexity. Growing populations of towns and cities cause certain problems. Human beings can only manage a certain number of effective contacts. In this context, effective means a certain intensity of interaction and that the interaction usually results in social, economic or cultural effects. There are different community size thresholds (MacSweeney 2004, Feinman 2011) such as 175 and 375 individuals in a community.

Table 7.1. *The effect of some kinds of complexity reduction on two community size thresholds. Restricting the interactions to groups, neighbours or a hierarchy changes the number of valid interactions of a community. A community without restrictions and 15,312 possible interactions, for instance, reduced the number of interactions to 700 if interaction with only four neighbours is allowed. A hierarchy reduces the number further to 174 which meets approximately the first threshold mentioned in the literature. If we apply the threshold of 175, the community has a maximal size of 175 members and becomes unstable when growing above this threshold. Communities with eight groups, four neighbours or a hierarchy can have 1400, 3828 or 15,400 members. Similar calculations can be done with a threshold of 375.*

				
Methods of complexity reduction (cr)	no cr (n*n)	groups (8)	neighbours (4)	hierarchy
Threshold 175, different methods of complexity reduction (cr)				
Sum of interactions in system	15,312	1914	700	174
Max. size of community based on system interaction	175	1400	3828	15,400
Threshold 375, different methods of complexity reduction (cr)				
Sum of interactions in system	70,312	8789	1500	374
Max. size of community based on system interaction	375	3000	17,578	70,500

Communities exceeding the threshold become unstable or have to apply methods of complexity reduction. Usual methods of complexity reduction are the restriction of the effective contacts to a certain number. It is possible to restrict the effective contacts a) to within-group-connections, b) to neighbours of a certain kind or c) to the edges of a hierarchical network. The last one is the most efficient. The 175 threshold increases to 1400, in the case of a restriction to in-group contacts of eight groups, to 3828 in the case of restricting to four neighbours, and to 15,400 for the hierarchy restriction (Table 7.1). The restriction does not necessarily mean that people are not allowed to talk to each other outside the permitted contact group. It just states that there are cultural rules which make them less effective. Imagine the difference in communication with a) passers-by on the street, b) customers at the supermarket desk, c) with the boss and d) with real friends. In general, the first two types are not assumed to cause serious changes to one's life, while the others can. It is culturally important to act on promises to a friend or conversation with a boss.

If a community exceeds the threshold applicable to the method of complexity reduction in use, the community becomes unstable and a small change can trigger a collapse. According to Kurz (2010), the *Heuneburg* has a population of 5000 in Ha D1 and of 1500 in Ha D2, which would be a serious decrease and even a partial collapse of the settlement. A society, composed of different or even stratified groups would thus experience a sudden instability.

Traditionally, strong hierarchies are assumed for the Hallstatt communities. But how do we know? The assumption of hierarchy is based on the diversity of grave goods, from which a ranking from poor to exceptional rich finds is deduced. From this ranking, a hierarchy is interpreted and from the hierarchy an assignment of subordinates to superior individuals is deduced. If a hierarchy comprises a ranking and an assignment of power, the last deduction is correct. But the deduction from ranking to hierarchy is wrong, since a ranking without assignment of power would be possible and would comprise the existence of different social groups with different social significance but without proper power relations. This interpretative step is obviously a logical error, though it is very frequently made. Hence, while the assumption of hierarchy in Hallstatt society seems very plausible, the hierarchy is in fact very weak. This interpretative problem can be called the hierarchical pit fall. Furthermore, Schumann (2015), although he acknowledges a certain degree of hierarchy, interprets most extraordinary artefacts as indicators of prestige rather than social indicators. Prestige means a claim of power and importance rather than actual power and hence does not indicate hierarchies.

If there is no hierarchy but just a ranking composed of different social groups, then a change in temperature might have triggered the collapse of the *Heuneburg*. The decrease in temperature, occurring at the same time when the collapse occurs seems to be related to the collapse (Fig. 7.1). The temperature could be the trigger of the collapse, while the system properties, the instability of the society, which exceeded the population threshold, would be the actual cause of the collapse. According to this hypothesis, no external

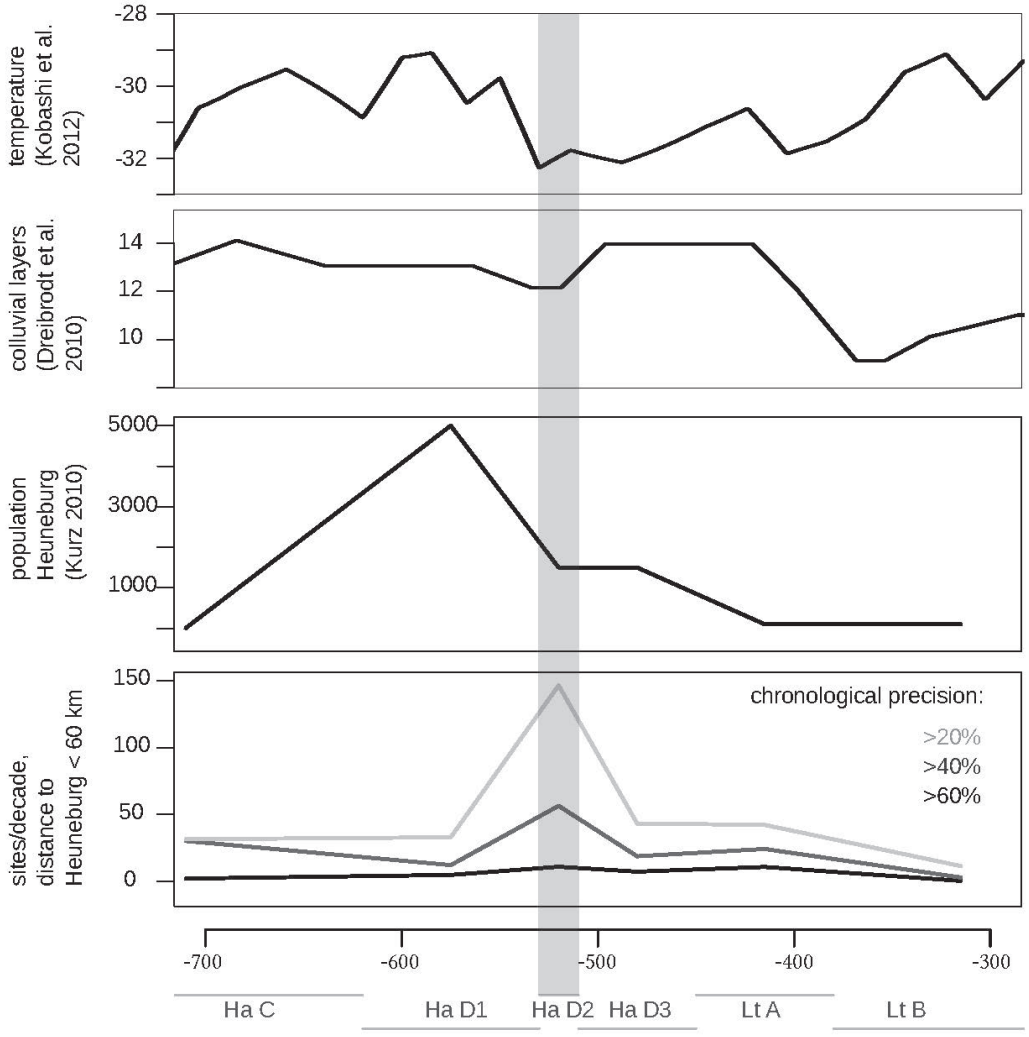


Figure 7.1. *Global temperature, colluvial layers in southwest Germany, the* Heuneburg *population and the number of sites in the* Heuneburg *vicinity in the Early Iron Age are mapped on the same time scale. The phase Ha D2 is marked with grey because all curves show a remarkable behaviour in this time. For the number of sites three degrees of chronological precision are indicated by different grey shades. In the case of 40 per cent, all sites dating to phase with a probability of more than 0.4 are counted.*

forces such as external conflict were needed to explain the collapse (Krausse et al. 2016). If this were true, the *Heuneburg* is not a town, since the adoption of social agglomeration was not successful.

Currently, we cannot prove either the traditional or the new hypothesis. However, with the use of agent based modelling (ABM) (Wurzer et al. 2015; Nakoinz and Knitter 2016, chapter 12) we can investigate, if the new concept works in principle. ABM is a kind of simulation. Like all models, ABMs are simplified mappings of a certain object or original entity used for a certain purpose. Models make some assumptions, have a certain way of using them and have a specific purpose. Simulations are models producing pseudo-empirical data. The model which might be filled or calibrated with some empirical data look like empirical observations, but are produced by the application of certain well-defined rules.

The idea of ABMs is to define some actors with specific rules of behaviour, an environment, in which they act, and a process. In the process, the digital actors implement certain actions according to the rules of behaviour, the environment and other actors. The process steps are repeated in a loop. Our model uses two types of actors, indigenous people and merchants. Both types of actors can move and trade in each step of the loop. While the indigenous have a short range, the merchants can have less restrictions of the distance of

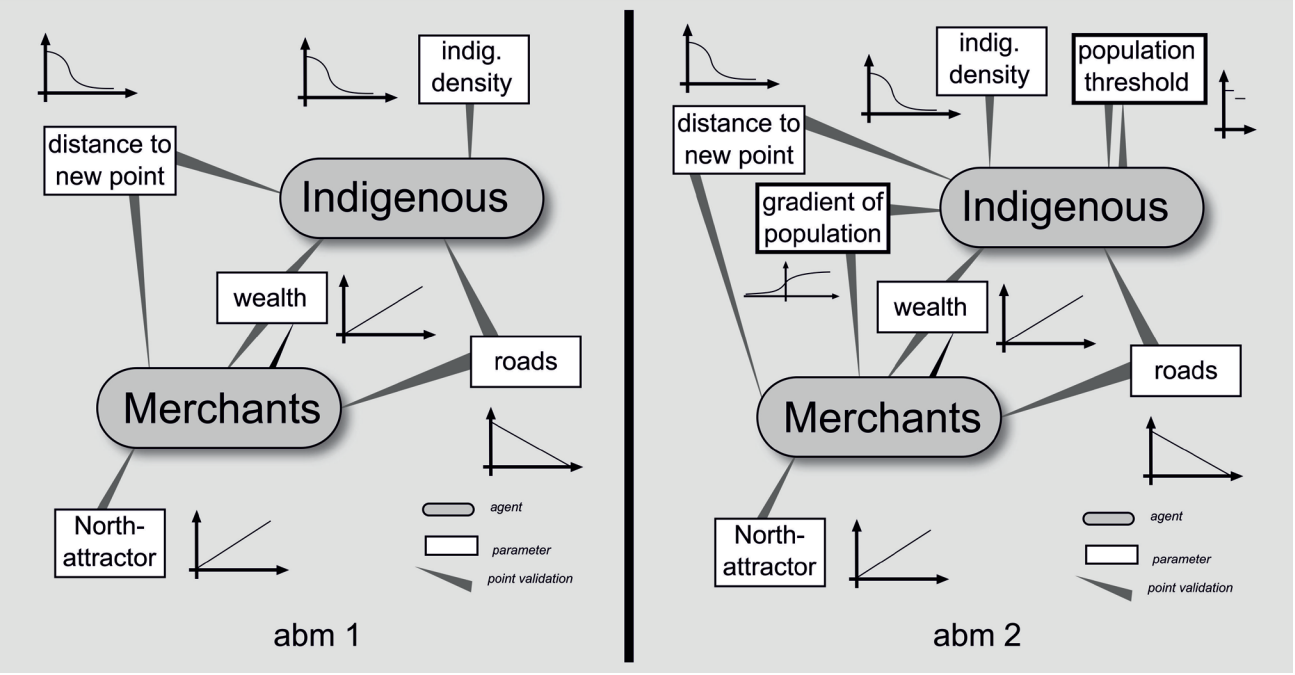


Figure 7.2. *Factors influencing the behaviour of the two types of actors in the two agent based models. In model abm 2 a population threshold is introduced and the population is dependent on the gradient of population. This leads to non-linear behaviour and hence to a certain degree of complexity which is not present in abm1.*

a move, but they are attracted by the north direction (Fig. 7.2). Both are attracted by roads, wealth and the density of indigenous people, but in different ways. This type of model produces rather stable distributions and agglomerations of indigenous people. Up to a certain degree, the resulting pattern can be predicted knowing the rules.

An ABM is much too complicated for just predicting the distribution of agents, when this is also possible with analytical approaches applied to the behaviour rules. The idea of agent based models is that the behaviour of the agents produces a global pattern, which is not predictable on the basis of the behaviour rules. ABM is in particular useful, if the system has some complexity. In our case study, we want to show, that the introduction of certain relationships results in a complex system. We introduce a population threshold and the gradient of population (Fig. 7.2). Growing populations are attracting and vice versa. The population threshold switches the attraction into a repulsion. These slight changes introduce complexity, and result in a dynamic system. Looking at the size of agglomerations, we find, that crises, collapse, recovery and competition are possible (Fig. 7.3). Again, this does

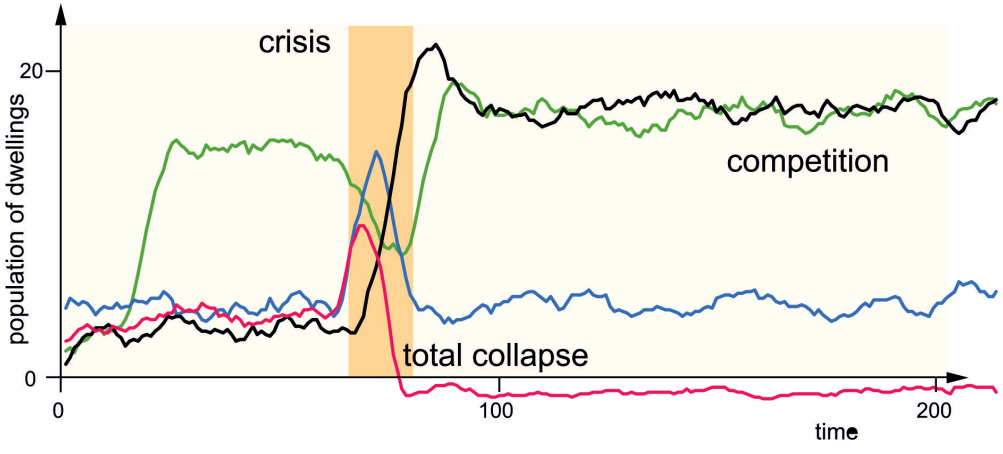


Figure 7.3. *Populations of some settlements and interpretation according to one simulation run of abm 2.*

not prove anything, but does show that a population threshold can lead to a complex system in which a collapse of agglomerations is possible. The simulation shows that the interpretation provided above is a possible scenario

An alternative narrative of *Heuneburg*

Based on these considerations and on other results (Nakoinz 2013a; Nakoinz 2014), we can develop an alternative narrative (Fig. 7.4) for the *Heuneburg*, which does not require external forces in order to explain the partial and the final collapse of the *Heuneburg*. The Hallstatt society in Ha C shows moderate trade and social stratification. When the *Heuneburg* was founded, whether deliberately or by accident at a strategic location, the increasing Mediterranean contacts triggered the nucleation of people at this place. The *Heuneburg* became a network centre, a gateway, which managed the exchange between differently organized spheres to the north and south. The social structure comprised a segmented society with differently ranked groups rather than taking on a proper hierarchy. The *Heuneburg* élites were more successful entrepreneurs than the rulers of larger territories, but they had to demonstrate their success in order to attract more trading partners or merchants to whom they could offer their services. This successful strategy in a successful place attracted more people than the population threshold allowed for in this type of *complexity reduction*. At the transition to Ha D2, the decrease of air temperature lowered the crop yields by a small but significant value. Consequently, the population probably became slightly higher than the carrying capacity over several seasons. The social system managing the level of nucleation became unstable. The organizational structures were not adapted to the size of the agglomeration. Internal tension and civil war led to the burning down of the famous mud brick wall and a demographic flight from the *Heuneburg*. Significant parts of the population moved to rural areas

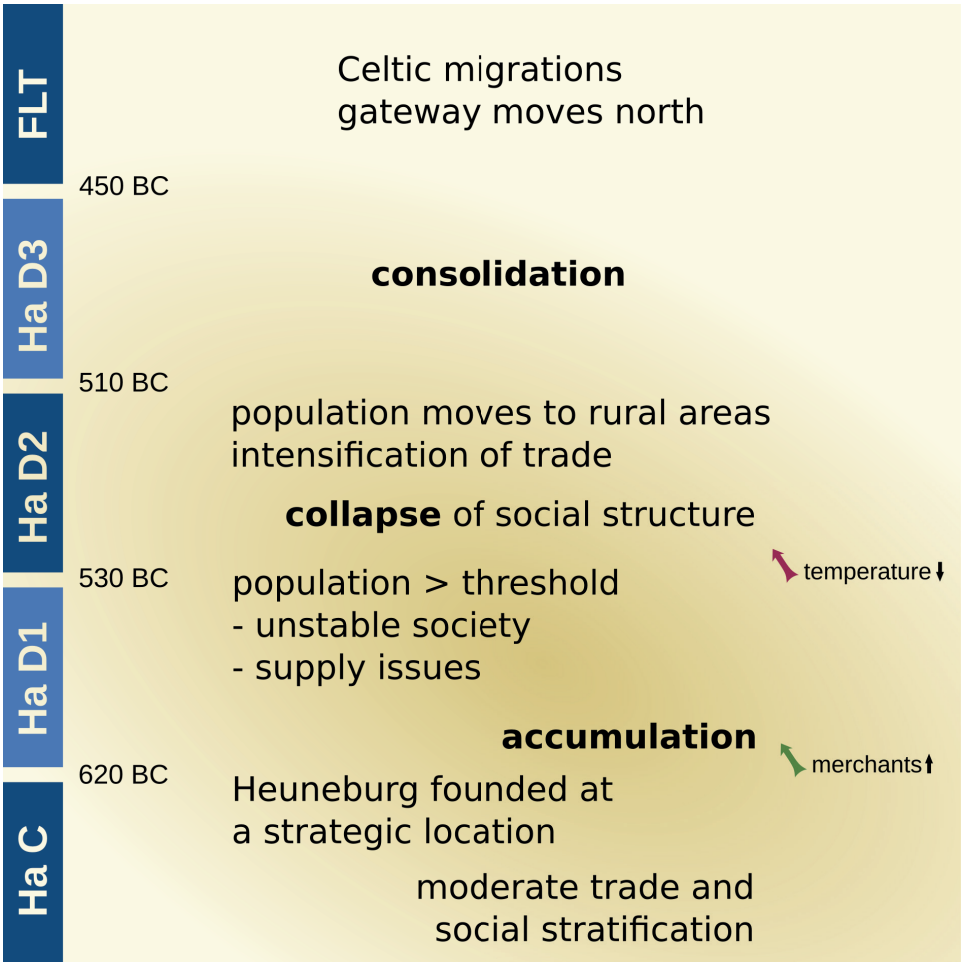


Figure 7.4. *An alternative narrative of the* Heuneburg *development.*

in the surrounding areas of the *Heuneburg*. In terms of population levels, the *Heuneburg* never recovered. However, in Ha D2 the *Heuneburg*, nevertheless, experienced a climax of economic success with the highest degree of trade and wealth in the whole region. In particular, the gateway function of the site produced a significant concentration of visible wealth. It is likely, that, after the collapse a political reorganization took place, which restricted access to the *Heuneburg* and also could have introduced a proper social hierarchy. Even if a change towards a hierarchy took place, the basis of wealth was still a gateway function and was not based on a large territory. A phase of consolidation thus took place immediately after the collapse and during Ha D3. The end of the *Heuneburg*, for this reason, took the form of a silent death rather than a dramatic collapse. In later periods, the contact zone between the two spheres to north and south moved northwards (Brun 1988, Krausse 2008a, Nakoinz 2013a) and the gateway function was lost in this precise location. Finally the *Celtic* migrations removed significant parts of the population from the whole region.

Conclusion

As mentioned above, the town definition and the urbanism test serve rather as a heuristic approach than as a research objective. The objective is to understand the mechanisms of urbanism. Different quantitative approaches provide us with some insights, even if we reject the definitions. In particular, the structural approaches, although they do not cover the whole phenomenon of urbanism explain some of the mechanisms of urbanism.

The result for the *Heuneburg* is that the place is a town according to some indicators and is not a town according to others. Even the last approach, the system approach, which does not consider the *Heuneburg* a proper town, acknowledges that a certain process of urbanization started at the *Heuneburg*, but was not completed. This corresponds to the results of Brun and Chaume, who speak of an unfinished urbanization, based on a completely different set of considerations and definitions (Brun and Chaume 2013). This indicated that we should shift our focus from urbanism as a condition of a settlement and state of a system towards urbanization. Urbanization in this context is not understood only as the emergence of towns, but a continuous process of adaptation, which is characteristic for certain settlements, which we call towns.

It seems to be more appropriate to investigate the different regional and temporal modes and characteristics of the process of urbanization, including the whole range of degrees of urbanism than just to look for the characteristics of cities in contrast to rural villages. Quantitative approaches understood as data transformations and connected to a decent theory help to enlighten the urbanization process. In particular, they allow us to distinguish different modes and degrees of urbanism. A definition of towns and cities, and this is still thought to be a heuristic approach, which in particular focus on the process of urbanization, should be based on system properties instead of specific settlement characteristics. Agglomerations develop specific organizational, social, economic and cultural structures. These structures form an environment, in which the agglomerations gained a degree of stability. Based on these considerations, we can define a town as a settlement where people adapt to the conditions of agglomerations of people by taking advantage of the special conditions and coping with specific problems.