

Attracting Amida-Diyarbakır: Muratorian, Conzenian Urban Morphology and Space syntax, a Methodological Comparison

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Keywords: architecture, urban morphology, urban history

Abstract: The comparative application of different analysis methods to the same urban realm remains today (Whitehand, 2018), as it was 20 years ago (Whitehand, 1997) and (Marzot, 1998), the most interesting experimental field within the discipline of Urban Morphology. Our object of study should be the city and we should apply the tools deriving from the different theories to analyse the different urban contexts, and eventually to question, confirm or further improve those theories. The case study of Amida-Diyarbakır, hence its long formation process, was selected to overlap different urban analyses, belonging to the Muratorian and Conzenian Urban Morphology schools and to the Space Syntax methods: namely, the *axial* analysis, the *orientation* analysis, the *attraction* analysis, and the *nodal* analysis. The reconstruction of the formation process of Diyarbakır's urban organism started from Garden's (1867) description and Gabriel's (1942) interpretations, using the available contemporary cadastral sources to shed some light on the Roman and Byzantine phases of the urban settlement. The research relied also on the scarce but meaningful Latin and Greek primary sources, together with a territorial scale morphological analysis. The main urban polarities, the subsequent fringe belts and the nodal intersections of paths and city walls, together with the evolution of urban types and tissues, all contributed to analyse in depth the attraction phenomenon (Camiz, 2018) in this city. It was possible therefore to individuate a new type of point attractor, the *oblique point attractor* with three diachronic variants: the *non-restructuring* oblique point attractor, the *partially-restructuring* oblique point attractor and the *restructuring* oblique point attractor.

1. Introduction

I started studying Diyarbakır in 2016 when prof. Zülküf Güneli asked me to write a chapter for a forthcoming book about that city. This research was meant to be published there, but unfortunately not being able to complete it, I continued it as a paper for the ISUF 2019 seminar in Nicosia. What happened to Diyarbakır as it was in 2002 (fig. 3) can be seen by comparing this image with the same aerial view in 2018 (fig. 4). Between 2016 and 2017 the government demolished almost half of the historical city's urban tissue. It is most probably one of the biggest demolitions of historical urban tissues ever experienced in history. There is almost no city left, not even the debris of the demolition is there anymore. My approach to the historical study of the city is based

on *documents*, and when these are not available (most likely when considering medieval transformations) on the *urban tissue* considered as an *historical document* itself. But when the physical city is gone how can we study the city if we do not have any more the material documents? This paper proposes an innovative method to outline the growth phases of a city, in absence of meaningful documents. This is based on the assemblage of different *methodological tools* and it was applied to the case study of Diyarbakir or Ahmed or Amida, depending on the pronunciation of its older name. Namely, the fringe belts (Conzen, 1960), (Whitehand, 1967) were here used to outline the

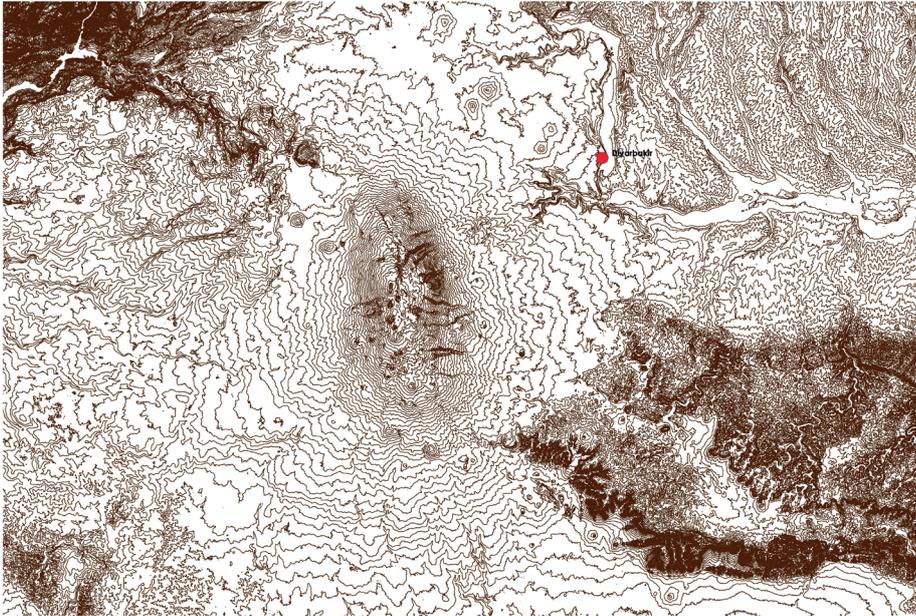


Figure 1. The morphological context of Diyarbakir's urban settlement. SRTM based contour lines, equidistance 25 m., data source: USGS (opendem), QGIS version 2.18.27. Las Palmas de G.C. (Author's drawing, 2019).

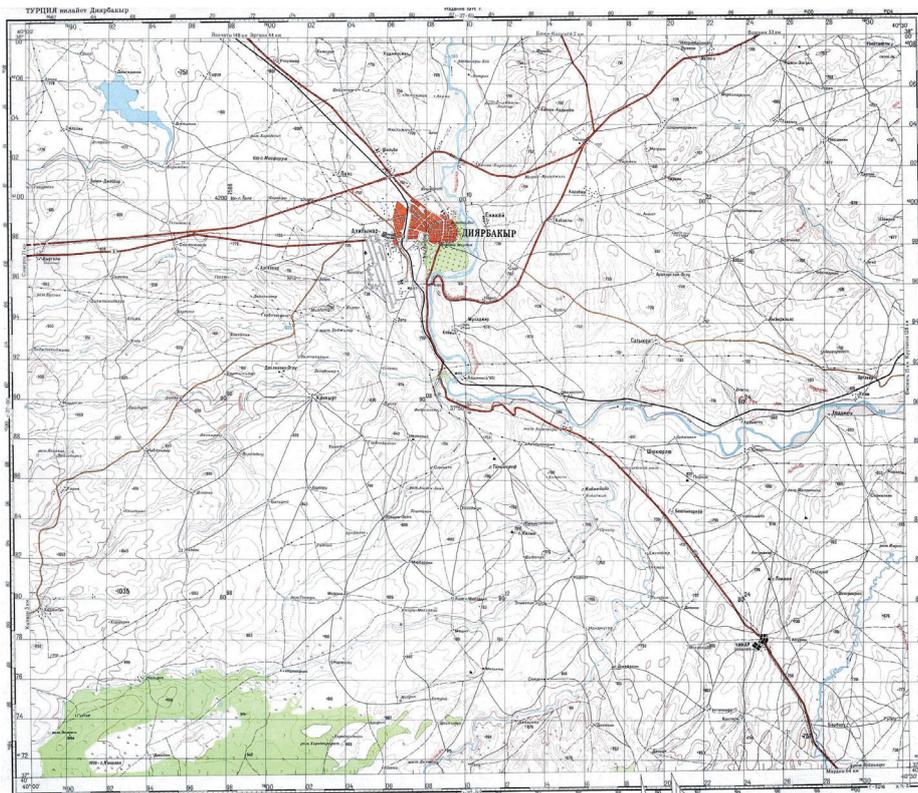


Figure 2. Soviet military topographic map J37-81 of the area of Diyarbakir, scale: 1:100 000 (1968).



Figure 3. The historical centre of Diyarbakir before the demolitions (Google Earth, 2002).



Figure 4. The historical centre of Diyarbakir after the demolitions (Google Earth, 2018).



Figure 5. Tabula Peutingeriana, Österreichische Nationalbibliothek, Wien, Codex Vindobonensis 324 (original 3rd-4th century, XII century copy).

subsequent growth phases of the city, within the space syntax methodology the *axial integration* analysis (Hillier, 2007) was useful to recognise the different urban parts, and as completed with the Muratorian urban tissue *orientation analysis* (Maretto, 2013) and the *limit and centre cyclical inversion* according to the Italian school of Urban Morphology (Caniggia and Maffei, 1979) it created the necessary knowledge base for the application of the *attraction analysis* (Camiz, 2018).

2. Historical phases of the urban organism

Diyarbakır is today in Turkey, along the western side of the Tigris river in an area that used to be the border between the Persian and the Roman Empires. The city is located on the eastern slopes of a large volcano, where a plateau of black basaltic rock was originated by a lava flow. The form and position of the urban settlement is strongly affected by the basaltic shell on which it is sitting and also the planimetric design of the city walls is basically determined by the morphology of the site.

The urban settlements is located at the intersection of two territorial paths, one valley-floor route running parallel to the Tigris river, and another cross-valley route, connecting the Euphrates valley to the Tigris valley and beyond. The urban settlement is polarising the crossing point of these territorial routes, one going roughly North to South along the Tigris, from Harput (Elazığ) to Marvān and the other one from Sanliurfa to Silvan, but the most convenient crossing point of the river does not correspond exactly to the city's location.

The city has Assyrian origins, it first appeared in the writings of Assyrian King Adad Nirari (ca. 1310 -1281 BC) a cuneiform inscription (866 BC) also mentions the orchards of Amedu (Perez 2015, p. 58). The city is furthermore listed in the annals of Assyrian rulers until 705 BC, and in the archives of Armenian king Tiridates II. There was therefore, most probably in the same site of Diyarbakır, a first urban settlement which Gabriel (1942) identified with today's walled citadel. There is a mention of the re-foundation of the city in (305 BC) by *Seleucus Nicator*, one of the generals of Alexander the great in Pseudo Dionysius. "Anno (MDCCXII) 1712°, Seleucus has aedificavit urbes: Antiochiam, et Laodiceam, et Seleuciam, et Apameam, et Edessam, et Halebum; et Amidam mox aedificavit, et Pellam." (Chabot, 1949), even though this same city is not mentioned in other chronicles and therefore the reliability of the source is currently being discussed (Assenat and Perez, 2013). The existence of a city named **Επιφάνεια κατά Τίγριν** is mentioned by Stephan of Byzantium. This place name has been correlated with the Seleucid new foundation of Amida during the reign of Antiochos IV (175-163 BC) by Chaumont (1993, p. 434) and Assenat and Perez, (2013, p. 159). The comparison with other coeval close Hellenistic foundations, such as *Doura Europos*, a Seleucid settlement dating to the II cent. BC which is widely documented (Leriche, 2003) shows several analogies with Amida. It was designed upon an orthogonal street grid delimited by the *falesia* of the Euphrates and 2 *wadi*, and was based on a rectangular block of 35x70 m. The Peutingerian table depicts the territory of the Roman Empire as it was in the II century. There is no place name as Amida, or anything alike, but this does not prove that Amida did not exist at that time, it simply shows that this place name is not mentioned therein.

What seems to be an urban settlement is indicated some 27 miles east of the current position of Diyarbakır, but no name is provided next to it in the map, even though *Coissa* is written on the route leading to it. What appears to correspond to Amida is the station *Ad Tygrem* where 2 different river crossings do resemble the 2 existing bridges across the Tigris north and south of Diyarbakır. The *statio* named *Ad Tygrem* seems to be the literal Latin translation of the Greek name **κατά Τίγριν**. We can therefore tentatively assume that it corresponds to today's location of the city



Figure 6. *Notitia Dignitatum, Dux Mesopotamiae*, Bodleian Library, MS. Canon. Misc. 378, fol. 122r (1436).

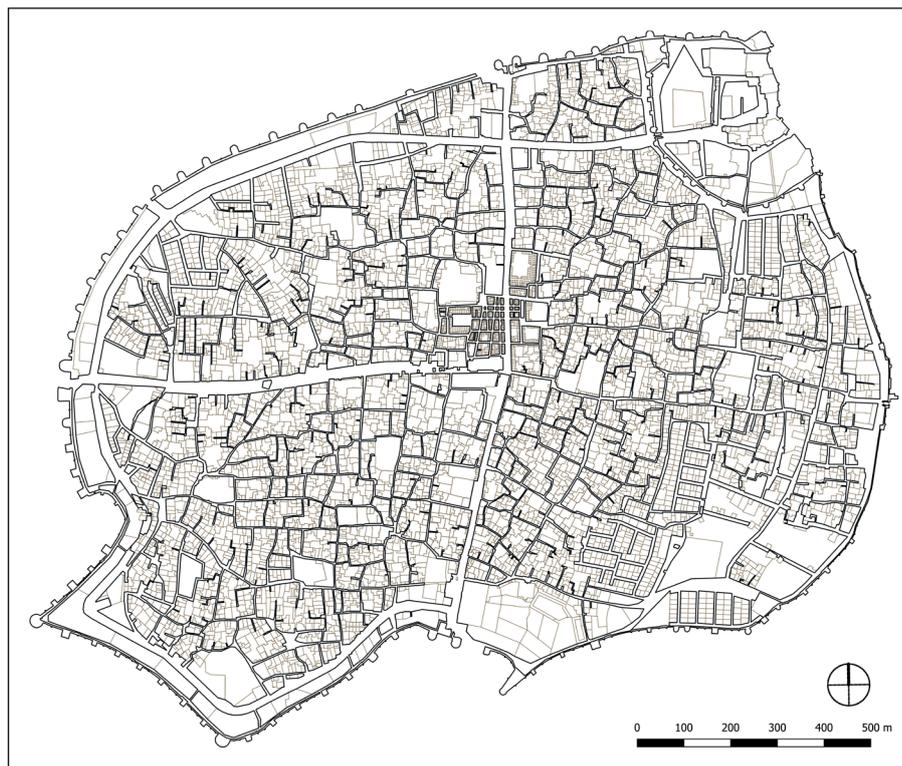


Figure 7. *Diyarbakir's plan*, data source: *Diyarbakir Cadastre, Diyarbakir Municipality, 2017*. QGIS version 2.18.27, Las Palmas de G.C. (Author's drawing, 2019).

and that it somehow certifies the existence of a Hellenistic phase of the urban growth. There is no mention of Amida in the *Itinerarium Antoninii*, and even the route leading from Melitene to *ad tygrem* along which Amida should have been, is not listed therein, nor are any of the stations along it (*Coissa, Colchis, Sardebar* etc.). The route from *Melitene* to *Sardebar* is reported instead in the *Tabula itineraria* edition of the *Tabula Peutingeriana* (Katančić, 1825, p. 237) including the stations of *Coissa, Amida, Ad Tygrem and Sardebar*. The city named Amida appears twice in the illustration of *Dux Mesopotamiae*, in the *Notitia Dignitatum* (figure 6). Surprisingly, there are two cities called Amida, and their positions do not correspond to Diyarbakir as they are both represented on the eastern side of the river Tigris. The location therein represented could have been inaccurately depicted by the drafter at the very edge of an Empire whose border was continuously changing. It is also possible that the duplication of the city is not a mistake: it is reported by Pseudo Zachariah (Greatrex, Phenix, and Horn, 2011, VII, 30) that after taking the city from the Romans in 503 AD the Sassanids deported the population into a new Amida which was founded elsewhere. Eventually the “new Amida” name given to this other urban settlement was later abandoned, or became of lesser importance, but that urban duplication generated some confusion in the geographical location, which is therefore registered by this view as a meaningful mistake. In addition, the shield belonging to the *Legio V Parthica*, based in Amida, is missing in the *Notitia Dignitatum*, as further evidence of a stronghold of uncertain location and military control at that time.

The city was first conquered by the Roman army in 140 BC, by then we should imagine the existence of at least a small Roman fort. On the other hand, certain news is that in 293 A.D. Diocletian moved the fifth Parthian legion to this location, about 4500 infantry men plus cavalry, so is quite obvious that at that time the city underwent a considerable Roman expansion including a *castrum* to accommodate the newly settled soldiers. In 298 Diocletian established the Roman Province of Mesopotamia, and in 314 Constantine the great defined the Diocese of *Oriens* of which Amida was the furthestmost eastern urban settlement, next to the Sassanid border. Sources are somehow confusing for this period reporting several foundations of the same city, but we can reasonably assume that they refer to subsequent urban additions. In 325 Constantine “Aedificavit etiam Amidam civitatem Mesopotamiae” (Pseudo Dyonisios). The new city walls were built the Romans during the principate of Constantius II 324-327 AD. “This city had formerly been a very small one, till Constantius while Caesar, at the same time that he built another town called Antinopolis, surrounded Amida also with strong towers and stout walls, that the people in the neighbourhood might have a safe place of refuge. And he placed there a store of mural engines, making it formidable to the enemy, as he wished it to be called by his own name” (Ammianus Marcellinus, XVIII). In 335 “Et anno 642°, Constantinus filios suos Caesares nuncupavit; Constantinum filium suum natu maximum praefecit locis orientalibus; et is aedificavit Telam Mauzalat in Mesopotamia, quam de suo nomine Constantinopolim appellavit. Aedificavit etiam Amidam civitatem Mesopotamiae” (Pseudo Donsios). In 349 we know of a repopulation of the city from Nisibis, “et omnem populum Nisibis transtulit Amidam Mesopotamiae, et eis moenia aedificavit ad occidentem civitatis” (Pseudo Donsios). In 359 the city was seized and captured by the king of Persia Shapur II (Ammianus Marcellinus). An inscription on the Kharput gate refers to a reconstruction in 375, “Civitas a fundamentis fabricata est”. In 389 during the Hun invasion *castrum Zia, castrum Zia pumilum* and *castrum Ighil* were destroyed, and the population took refuge in Amida (Pseudo Dyonisios). In 418 we have notice of another repopulation “Arzunitis a Romanis populata est. Eo enim anno, descendit ingens exercitus Romanorum, et Arzunitem Persarum populavit, et captivos Amidam adduxit” (Pseudo Dyonisios). Over this urban palimpsest came the Sassanid invasion in 497, “Venit enim Cavades, rex Persarum, e septemtrione die

5a mensis tesrī prioris (oct.), die sabbato, et obsedit Amidam” (Pseudo Dyonisios). Another Persian siege of Amida led by Kawad is reported in 502, until in 503 the Persians entered the city. In 503 the Romans encamped near Amida in order to retake it and after a long siege, in 505 an agreement was signed and the city returned in Roman hands. Justinian rebuilt the city walls in 527, “Urbis Amidae muros, maiorem iuxta ac minorem, qui ob vetustatem iam ruinae proximi videbantur, nova quadam substructione firmavit, itaque urbi securitatem praestitit” (De Aedificiis, II, 3) and we may assume that this is the last Roman phase within the urban structure. The Sassanids captured the city for a third time in 602 and held it for more than twenty years. In 628 the Roman emperor Heraclius recovered Amida, but not for long since in 639 the city was captured by the Arabs. From 990 to 1085 the city was under Marwanid rule and in this period restoration works on the city walls are documented in 1024. In 1085, the Seljuq Turks captured the region from the Marwanids, and settled many Turcomans in the area. In 1183 it was captured by the Ayyubid ruler Saladin and then assigned to the Artuqids vassals. The Mongolian Ilkhanate captured the city in 1259, in 1393 the city was pillaged by Tamerlane. Finally Yavuz Sultan Selim, the Ottoman Emperor, received the city from the Safavids in 1515.

Gabriel (1942) recognized the citadel of Assyrian origin, and a first Roman phase corresponding to the eastern half of the current settlement, which would later be extended in the Constantinian era for the transfer of the population from Nisibis to the new walled enclosure: the Roman expansion of the fourth century would therefore correspond to the settlement of new populations. The two great axes in the Constantinian city, at the intersection of which was the forum, determined the position of the 3 gates in the city walls. The fortifications are attributed to the time of Constantius Clorus with subsequent modifications up to the Justinian's period restoration. During the Ayyubid dynasty, the walls were substantially restored with the insertion of numerous inscriptions in Arabic that were interpreted by many authors

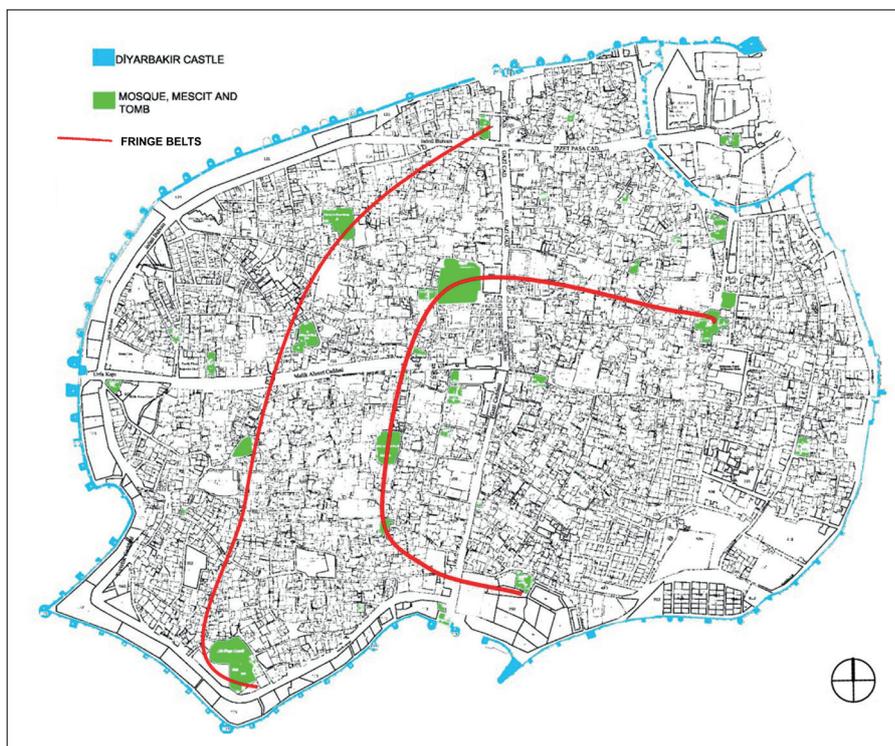


Figure 8. *Specialized buildings and fringe belts, on the Diyarbakir Cadastre, Diyarbakir Municipality, 2017 (Author's drawing, 2019).*



Figure 9. Orientation analysis of urban fabrics, determination of the growth phases. 1) Assyrian citadel; 2), 3) Hellenistic growth phases; 4) Probable area of the castrum of the V Legio Partica, in red possible trace of the Persian siege machine. QGIS version 2.18.27, Las Palmas de G.C. (Author's drawing, 2019).

as related to the construction of the walls, but the structure of the fortification is clearly Roman. The area of the forum at the intersection of the Kardo and Decumanus was transformed into the Ulu Cami, the great mosque, during the Ayyubid period, which, however, as can be seen in the elevation, was built with the reuse of Roman architectural elements. Gabriel has described the evolution of the archaic phases from Assyrian to Median, pre-Hellenistic, as a growth which starts around the Acropolis and enlarges slowly towards the rock formation, determining the control point for one of the paths passing across the river.

3. Methodological note: fringe belts

Within the analytical tools adopted for the understanding of this very complex settlement we considered the *fringe belts* examined upon a municipal cadastral map dating to 2017. By mapping the position of *special buildings* inside the walled core, we hypothesized that these were built outside of the urban tissue where the space was available, when the city was enlarged generating a fringe belt formation. The mosques, some of them were built as churches and later transformed, do show a typical pattern of what looks like a fringe belt formation. In Roman phases of growth of the city, very often the special buildings are built surrounding the former *castrum* perimeter, determining a fragmentary fringe belt. The *hamams* (baths) are also disposed in a belt formation all around the city centre, this has already been noticed by Dağtekin (2013) but probably it is related with the location of the aqueduct, so it is not necessarily proving a phase of growth of the city. The analysis of the urban fabric used the theory of fringe belts, which explains how the concentration of specialized functions occurs mainly at the edge (fringe) of the built urban centre, forming a belt around the city (Whitehand, 1967). For example, during the industrial era the railway stations and the large production industrial plants were usually located on edge of the built up area, but the subsequent growth defined further concentric fringe belts, concentric

rings of specialized functions that allow, almost like the rings of a tree, to date the different phases. In figure 8 the mosques are identified, although some are transformations of previous Christian buildings, which seem to follow an annular configuration. Just as the location of the great imperial specialized functions in other Roman cities also follows the criterion of placing themselves outside the built city, Diyarbakir's mosques also seem to indicate with their annular arrangement the limits of different phases of the city's growth.

4. Axial and orientation analysis

The construction of the axial map of the city of Diyarbakır was done using the Municipal cadastral map of 2017 as a reference: on this axial map several analysis were done. Figure 11.a shows the *axial hh integration*. It possible to note that the northern and southern branches of the *Kardo maximus* indicate a different level of integration, therefore most probably they do not belong to the same urban growth phase. The *axial node count* showed something very similar, and the *axial choice* outlined two different levels of choice on the two branches of the street. The *total connectivity* provided an interesting overall picture, showing one part of the city with a completely different depth level. The analysis of *axial integration* helped us to understand that the axial integration levels of the two branches of the main street are profoundly different. We interpreted this difference as the result of different growth phases of the surrounding urban fabrics, assuming that a part of the street had been made by restructuring an existing fabric (Fig. 11a).

The analysis of the orientation was carried out on the basis of a vector map derived from the current cadastre, (fig. 9) and it showed 3 major prevailing directions. In yellow we recognized a fabric characterized by rectangular blocks (35.50 x 71 m) that we believe correspond to the Hellenistic phase, in green a fabric with almost square blocks (71 x 70 m) that should be dated to the Roman era, and in red a small urban part with a different orientation that could correspond to the plan of a war machine used during the Persian siege in 359 AD. The square shape 71 x 71 m block might be referred as well to the instalment of the fifth *regio Parthica* by Diocletian in 293 AD in this place.

5. Attraction analysis

The analysis of attractors is a new methodology that analyses the diachronic evolution of paths, as deformed by the appearance and disappearance over time of attracting elements within the urban fabric (Camiz, 2018). Attractors and repellers were introduced to explain the behaviour of urban and rural routes in time, as these streets change for the influence of attractors and repellers. Bifurcations are typically the effect of an attractor, the fastest route from A to B is the direct straight line unless there is an attractor, so you need two attractors, one stemming the bifurcation and another one as a second pole. The analysis of the bifurcations within the walled city of Diyarbakır delimited two areas which do not present bifurcations and these are on the 2 opposite sides of the *Kardo Maximus*, suggesting 2 separate castral foundations. On the other hand what is called *diagonalization* by Caniggia and Maffei (1979), was mapped together with the *oblique attraction*, the *double inflection* and the *round shaped attraction* (fig. 12).

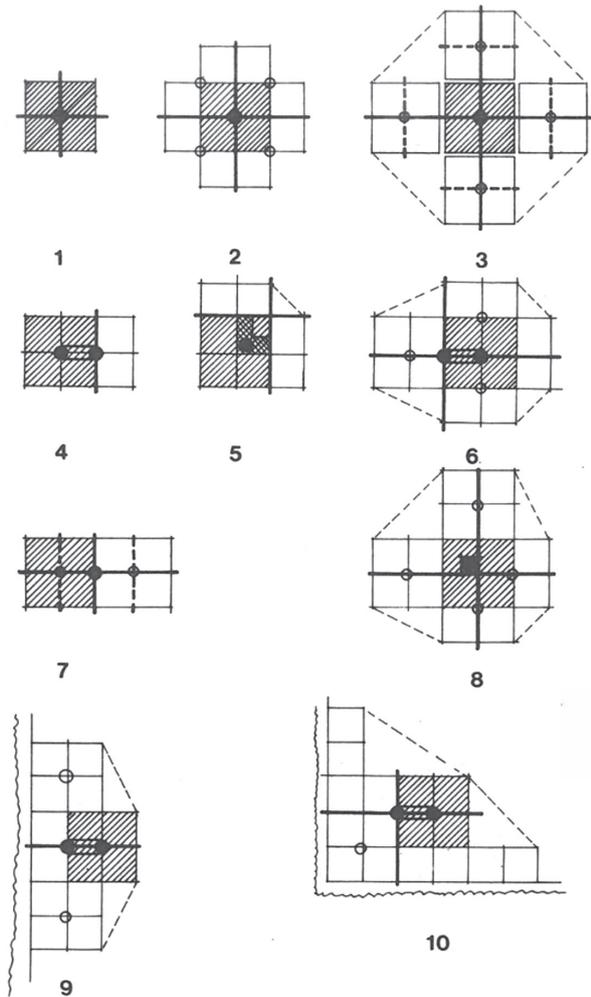


Figure 10. Scheme of alternate hierarchies induced by parallel paths. Behaviour model of an urban supra-module (Caniggia and Maffei, 1979).

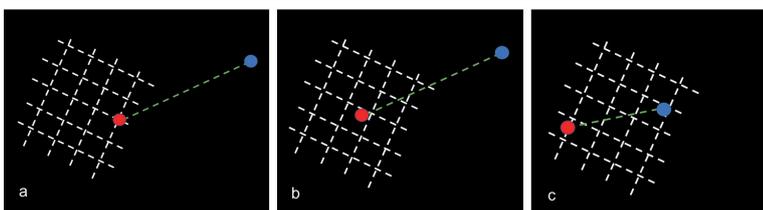


Figure 11. Above: Axial integration hh, DepthmapX 0.6.0 (Author's drawing 2019). Below: Evolution of a planned urban fabric for the action of a point attractor: a) Non-restructuring oblique point attractor; b) Partially restructuring oblique point attractor; c) Restructuring oblique point attractor (Author's drawing, 2019).

The *diagonalization* was introduced (Caniggia and Maffei, 1979) to explain the existence of a diagonal road occupying one block within a planned classical orthogonal grid, interpreting it as the post classical evolution of an empty block formerly occupied by public spaces such as the forum or the agora. In medieval times the decline of political control over public spaces, which people were able to cross walking along the diagonal determining a new route, allowed the infilling of that space with a new urban tissue determined by that diagonal road as a matrix route. We examined the *double inflections* expecting to find some indications on the positions of inner city limits or earlier walled enclosures, but were not able to correlate any of them to existing or former *dividing lines*. We finally introduced the *oblique attraction* which can be defined as follows, within an existing planned orthogonal grid the appearance of new urban poles determines a diagonal route connecting them. In other words the oblique attraction is due to the appearance in medieval times of a *point attractor* external to the Roman orthogonal urban grid, which can be partially restructuring, restructuring or non-restructuring according to whether the new street overlaps or not the pre-existing Roman urban fabric. In Diyarbakir we recognized that the oblique attractions are always identified at their two extreme poles by two large specialized buildings, testifying the insertion outside the network of the founded city of large specialized containers, churches, monasteries, mosques. Special buildings, mosques, churches and monasteries are acting as attractors in the post classical phase of the city and the diagonal route which is connecting them seems to be over-imposed on top of an orthogonal grid. We also mapped *round shaped attractors*, one of which has been correlated by Assénat and Pérez (2012) to the persistence of the *substrata* of an ancient theatre into the urban tissue.

6. Cyclical inversion of limit and centre

The limit centre cyclical inversion has been introduced by Caniggia, understanding that the growth of an urban organism happens with modular additions and every time one urban unit is added to the other, what used to be the limit of that unit becomes the centre of the enlarged settlement. The growth of urban tissues identifies parts that follow one another by growth and what was previously the limit of a part, in the subsequent aggregation becomes the centre, configuring a *cyclical alternation of limits and centres* (Caniggia, Maffei 1979). The Ringstrasse of Vienna is very good example of this process, what used to be the walls, later became the centre of the city.

This evolution of the urban organisms, of hexagonal or square shape in the valley bottom settlement, is modified by the morphological configuration of the territory, so that along a river or on a coast it assumes the shape indicated in the figure (fig. 10), with significant analogies with the Diyarbakir plan. The flow of the Tigris River is not linear, and neither is the basaltic plateau that determines the shape of the fortified enclosure, but Caniggia's theoretical scheme helped us to interpret the growth of the urban fabric. In the position of today's Ulu Cami we could identify one of these *limit-centres*. This seems to be corresponding to the latest Roman *forum* dating to the time of Constantine, in the position of the connection of the two distinct urban units, the Hellenistic foundation, and its enlargement by the addition of a small *castrum* and once more with a change in direction by the addition of a larger *castrum* with the orientation *secundum coeli*, following the North South direction. Following this hypothesis the theoretical and possible limits of those two *castral* foundations were traced.

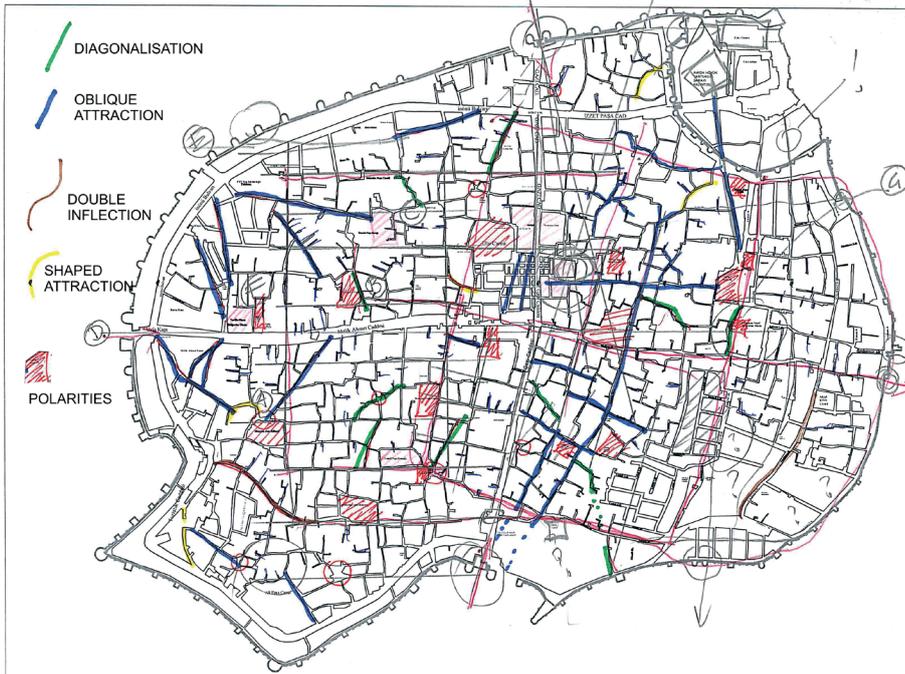


Figure 12. Attraction analysis: diagonalization, oblique attractors, double inflections, shaped attractors, main polarities. On the Diyarbakir Cadastre, Diyarbakir Municipality, 2017 (Author's drawing, 2019).



Figure 13. Left: the urban district of the theatre on a satellite photograph. Right: restitution of the theatre on the modern cadastral plan (Assénat and Pérez, 2012, p. 149).



Figure 14. The Roman walls of Diyarbakir as seen from the countryside (Gabriel, 1942).

7. Conclusions: outlining the urban phases

The comparison with Doura Europos showed the analogy of the blocks measures *per strigas* (35.50 x 71 m) with those in Diyarbakir. We could therefore recognize a first archaic centre of foundation, on the top of the hill, a Hellenistic phase, a subsequent growth towards the west, and at the point of contact between the two units, where before was an urban gate, the forum (fig. 9). By adapting a theoretical scheme to a real situation, we recognized the growth phases, identifying in the part indicated in green (fig. 9) what probably corresponds to the implantation of the *castrum* of the V Legio Partica. This legion had a significant historical importance, being the only legion whose *insignia* is unknown: the *Notitia Dignitatum* reports them all except this one. The city was besieged by the Persians and the legion was completely decimated, so its flag was lost. It was possible therefore to individuate a new type of point attractor, the *oblique point attractor* with three diachronic variants: the *non-restructuring* oblique point attractor, the *partially-restructuring* oblique point attractor and the *restructuring* oblique point attractor. We have shown that considering the city as a material document and by applying in an integrated way the different techniques, the Conzenian analysis, the attractors, the space syntax, and the Muratorian urban morphology, the research was able to reach more advanced conclusions than by studying written documents alone. The *space syntax* tools are effective for the analysis of the current status of the urban environment and the social body by correlating the built form with the “social interactions as spatial events” also they can be used effectively for the comparison of alternative future scenarios. (Hillier, 1999). The urban organism can be understood properly only by considering all the concurrent scales of the urban morphology discipline, *i.e.*

the territorial scale, the urban scale, the urban tissue scale and the building scale. Conzenian and Muratorian analyses are capable of describing the formation processes of cities, urban tissues, territorial organisms and buildings, their integration is therefore of great utility for the reconstruction of the historical phases of the urban organism. They may as well be utilised to determine the future phases as the “continuation of an ongoing process” (Strappa, Carlotti, and Camiz, 2016). The comparison between Conzenian and Muratorian urban morphology and space syntax showed that space syntax is very effective in the analysis of the current status of the urban environment, it can also be used to compare different alternatives for the future, but it is mostly related to the social interaction in the space. On the other hand the urban morphology analyses are capable of describing in detail the formation of the urban organism in time, and are therefore much more useful to determine the past history but also the future growth phases (design) of the urban organism as the continuation of an ongoing process. The assemblage of the different analysis tools is what allowed this research to reach its findings, and might indeed be considered as a resource for future researches.

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