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SPACE SYNTAX THEORY IDENTIFIES THE ETHICAL REVERSAL TREND OF THE OVERWHELMED MĀDINA OF AL-DJAZA'IR URBAN MORPHOLOGY

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ABSTRACT

A fundamental aspect of well transforming cities into better places is to integrate urban morphology ethics. For centuries, understanding these places has been limited to reductive rules of economic rationality and modern tabula rasa. This study proposes a novel methodology to analyze citywide, isolated urban spaces using Space Syntax method and urban narratives. Through superposition of social ethical rules and behavioral characteristics of the spatial setting, this work aims to expose clear correlations between the ethical design of the city and the behavioral patterns of its users. The ancient city of Al-Djaza'ir Kasbah is a case study that UNESCO classified as a national historic site and a protected sector. According to urban narratives, the French occupation reversed its urban structure. A clear formal antonymy is observed. The ethical diagnostic tool was used to identify and evaluate the ethical trend. The correlation between syntactic measures and ethical principles showed that changes in spatial configuration affect the ethical trend. Intelligibility, integration, and connectivity control the ethical values. Previous urban studies shown that integrated spaces are spaces of organic solidarity. However in this study, urban narratives described segregation. Mapping ethical values revealed anti-values in French colonial urban forms. The results showed that the reversal of the ethical trend of Algerian cities represented one tool of alienating Algerian society. Ultimately, this study suggests a "reversed urbanism" methodology: an evidence-based approach to urban design, planning, and decision-making, in which ethical values are implanted as a foundational design tool for inferring the success rates of ethical urban places.

KEYWORDS: Practical ethics, Ethical trend, Urban morphology, Islamic Mādira, Urban structure, Space Syntax, Accessibility, Kasbah Mādira.

1. INTRODUCTION: THE ETHICAL TREND OF URBAN FORM

Several theoretical and practical studies have addressed the topic of earliest urban form to improve the design of urban form. For instance, the ethics of the built environment is the discipline that strives to transform cities into better places (Stein, 2019; Basta and Moroni, 2013; Curry, 2011; Fisher, 2008; Belmessaoud, 2006, 2012; Canniffe, 2006; Fox, 2002; Harries, 1997; Nash, 1989; Meadows et al., 1972). A well-established city should have four intertwined orders: ecological, economic, formal, and moral. This exploration belongs to urban ethics research. The relationship between society's ethical system and spatial forms provides a better understanding of the conceptual approach to ethical city design by correlating society's moral norms and values with the spatial layout. Thus, the ethical city, in contrast to many other adjectives used to describe our cities, implies an approach to urban development that is about doing the right thing for and by urban citizens.

A review of major studies in this area confirmed that the relationship between formal and moral orders is difficult to delineate (Bess, 1993). The formal city order is what urban designers deal with and think about in their reflections. It addresses the question of the embodiment of the city's moral foundations (Harries, 1997; Bess, 1993; Canniffe, 2006; Belmessaoud, 2006). Ethics is the source of moral order and allows the articulation of a common ethos (Russ, 1994). Furthermore, ethos refers to how human beings exist and dwell in the world (Harries, 1997). In fact, two trends of thought frame this question. The first trend of thought supports environmental determinism. The urban form change from changing ethics and ethics change urban form. This means that ethics and urban form are dynamically interrelated. Both are related to human behavior patterns. Yet, only a few studies focused on the ethical change of urban form (Chan, 2019; Soleimani et al., 2017; Ignatieff, 2014; Golany, 1995). However, this trend remains polemic among researchers. Dating from Greek and Arab scholars (Önal, 2018), the concept of environmental determinism emphasizes linking values of urban forms with:

- social values (Amen and Nia, 2018; Harris, 2010; Heyd, 2008; Montello, 2007; Cicchetti and Cohen, 2006; Haapala, 2003; Bianca, 2000; Golany, 1995; Goode, 1904),
- the rightness of form depending on the fitting degree of its behavioral, social, and cultural context (Moore, 1979; Mintz, 2018),
- urban narratives (Canniffe, 2006),
- interaction between social relations, material forms, and urban experience (Tonkiss, 2005).

Thus, shaping ethical changes requires decision-making and actions based on philosophical principles. Philosophic stances reflect a set of beliefs or ethical principles, and they belong to Meta-ethics, while shaping form actions belong to Normative or Practical ethics (Burton, 2000; Lynch, 1981; Jamieson, 2012). Two interdependent subfields stand out in practical ethics: the professional rules involving the designer's moral obligation (Spector, 2001; Murvin, 1989) and the urban morphology ethics. The latter include the key ethical questions (Chiaradia, 2019; Bell and al., 2001; Watson, 1913; Altman, 1975):

- How and why urban forms are built (descriptive/explanative).
- In what form should we build cities (prescriptive /normative)?
- What are the effects (good or bad) of urban form on humans and living species?

Modifying urban form changes the fundamental ethical values of its moral order. Its ethical trend depends on a core of ethical values advocated by several urban theorists (Belmessaoud, 2006). One consequence of changing the city's moral order is that the inhabitants' moral identity may change. The latter is the distinctive and unique hallmark of social identity (Skubinn & Herzog, 2016; Melvin et al., 1964). Four elements can define an ethical urban design and thus, change ethical values (Canniffe, 2006; Bess, 1993):

1. Patterns define the arrangement of spaces (syntactic properties). Ethical principles are configuration rules that may constrain or influence users' movements.
2. Narratives are an interpretative filter and articulate forms by analogy and meaning. They allow understanding of the city's ethics.
3. Monuments are perceptible landmarks and embody the city's ethics. Influential religious, civic, and political institutions are hallmarks of its moral order. They should be sufficiently strong to limit excessive individualism.
4. Spaces are the container of social activities, and ethical principles provide value to them.

The opposite trend to environmental determinism supports the lack of such a dynamic interaction (Gans, 1967; Hardin, 2009). Yet, excluding such interaction can cause a cultural dichotomy. The major cause is the coexistence of two behavioral models on the same subject (Bourdieu et al., 2004; Côte, 1993). This dichotomy forever disrupts cultural binaries (Hall, 1996) and the existing homogeneities of localized groups (Hermans and Kempen, 1998). It creates injustice and moral suffering (Pharo, 1996; Lazali, 2018). At the same time, social unity comes from the shared understandings provided by the normative structure (Melvin et al., 1964).

Configurational rules are the first concern of urban planning (Kropf, 2005). The physical characteristics underlie the embodiment of the ethical trend through social values. Some urban scholars tackled the structure of space-related to space values from phenomenology (Heidegger, 1962; Merleau-Ponty, 1945; Bollnow, 1963). For instance, their method rests on bodily experiences in urban paths (Lynch, 1981; Norberg-Schulz, 1971). They focused on people's perception and their need for movement and rest. Legibility is the main physical and spatial characteristic of a good city form. Good perception and a sense of belonging result from the formal components of character and structure. The fundamental characteristics create the city's identity. Other studies have found that easy access and path influence citizens' behavior and morality (Soleimani et al., 2017). Similarly, when interpreting cities through their spatial networks, space syntax reveals that cities are foremost spatially constructed as patterns of gradations on the integration-segregation scale (Hillier and Vaughan, 2007; Marcus, 2007; Conroy Dalton, 2007).

The steps of assessing the ethical trend of the urban form are:

1. identifying the moral foundations of the city's ethical principles (monuments),
2. detecting rules of users' movement through the syntactic properties of patterns,
3. interpreting urban forms to find their ethical values through social activities and urban narratives.

The ethical trend explains the dominant orientation of ethical values, and the urban form describes the real space. Dwellers' moral identity determines the pursued ethical values. If these are positive and correspond to society's beliefs, the trend is morally acceptable. If these values are negative and contradict beliefs, the trend is immoral.

The focus of this paper relates to the Medieval Archaeology of the Maghreb Arab-Islamic city (16th century A.D), where the religion of Islam represented a "structuring code," and to the industrial period of the 19th century, when the world experienced a rapid rise of imperialism and colonialism. Studying the medieval period is presented as the historical basis for the legitimization of the Maghreb national struggle and independence (Buresi and Ghourigate, 2013). We limit our study to this period since the dichotomy of urban forms is obvious after the introduction of the occupational urban form. We study urban vestiges as the main index of human behavior of which movement is the basis. Space syntax analysis is a method used to study the users' movement rules through the right of access to space between the individual and society that ethics regulate. This method investigates the connectivity, integration, and intelligibility of the study area through

pedestrian movement. Knowing that a deeply rooted sense of community characterizes the traditional urban structure, Space Syntax approach focuses on the space's properties and the relationships between space and movement patterns. This study focuses primarily on the physical and global configuration of the city given by the urban fabric structure and urban narratives related to the ethical principles underpinning its moral foundations. This study suggests a "reversed urbanism" methodology: an evidence-based approach to urban design, planning, and decision-making, in which we implement ethical values as a foundational design tool for inferring the success rates of ethical urban places. The "reversed urbanism" is a novel method to analyze diverse behavioral patterns in large urban populations and to associate them with urban principles. This work explains a road map for building spatial prediction tools to improve ethical city-design and planning processes. Its main objectives are:

- a) to create an urban syntax underlying the relationship between ethical values and urban principles.
- b) to explore the ethical trend and find the values that partly control the urban structure of this city;
- c) to determine whether the ethical trend can be correlated with the structural properties, urban principles and ethical values of the urban form are examined.
- d) Ultimately, to build an urban syntax that underlies the ethical trend.

This paper focuses on Mādina of Al-Djaza'ir Kasbah (Islamic city) Al-Djaza'ir Kasbah as a case study. UNESCO classified this city, in the World Heritage List of Humanity, as a national historic site in November 1991 and as a protected area in 2003. Kasbah is the name of the Islamic city (or Mādina) of Al-Djazâ'ir (or Algiers). The selected period is from 1830 and 1880, which refers to the time before and after the French occupation. This is a pivotal period for this Mādina. The objective is to reassess the narrative of the structural reversal of its urban structure due to the occupation period.

The questions to be answered are:

- a) Does such a hypothetical ethical reversal exist?
- b) Do the physical changes coincide with the reversal of the authentic ethical trend?
- c) How are the structural properties related to the overall ethical trend of the urban structure?

The methods used are:

- a) physically describing urban forms at the structural level before and after the era of French occupation (studying the characteristics of different urban structures and tracing their continuities and morphological changes).

- b) systematically describing ethical values through the connectivity, integration and intelligibility of cities;
- c) Mapping the continuities and morphological changes for assessing its ethical trend.

The urban literature review fails to explain the conceptual reversal by describing potential morphological differences in their form. Furthermore, it also fails to address the ethical trend issue as well. A theory of culture displaces and biases the question of the ethical tendency of urban form. On the other hand, society's general values lack the obligation embedded in ethics.

Tackled also on the analysis of bodily experience, these studies do not rest on systematic assessments of urban form. The question of ethical trends in urban form should revolve around the relationship between urban form and ethical values. These values are key elements of the ethical trend, and they embed the society's ethical rules. Thus, to better understanding the ethical trend, this research clarifies the meaning of the concept of ethical reversal of urban form and the process by which it occurs. Table 1 illustrates the entire research process of an ethical trend of an urban form.

Table 1. Entire research process of an ethical trend of an urban form.

Ethics		Ethical trend of urban form
Society	Urban Form	Patterns rules of composition
Beliefs	Values	Narratives: interpretative filter
Values	Norms	Public buildings and structures: hallmarks of the moral order
Norms		Valuable social activities
Ethical questions		
Moral identity	How and why we build urban forms.	Dominant values
	In what form should we build cities?	
	What are the effects (good or bad) of urban form?	

2. REVERSAL OF ETHICAL TREND IN URBAN MORPHOLOGY

Nietzsche (1887) was the first philosopher to define ethical reversal as "the reversal of all values". A significant outcome of nihilism was to submit ethics to aesthetics (Dejardin, 2008). This new subordinating role dissociated the urban from its meaning and thus reversed the fundamental values of truth, goodness, and beauty. Ethical reversal can be harmful, being "the study of the worst state of mutation" (Webster's Dictionary) or beneficial (Colley, 2011).

As a result, Postmodernity has liquefied social ties and intensified narcissistic individualism (Bauman, 2000). Using the antonymous principles of the classical ethical trend has created this reversal (Fig. 1). This reversal of values leads to future beliefs (Schlemmer in Harries, 1997). We can interpret the rivalry between socio-centric and egocentric trends (McIntyre, 1981) as an ethical reversal. While Community ethics or Virtue ethics was the basis of designing traditional cities (expression of spiritual values and beliefs intimately linked to the recognized cosmic order of the

world), Utilitarian and Emotivism/Egocentric ethics created modern cities based on tabula rasa (i.e., Bess, 1993; Porphyrios, 1995). The reversing process occurs with the reversal of ethical values, the emergence of anti-values created as virtues, and the transgression of norms (i.e., Chan, 2019; Ignatieff, 2014; Bongelli, 2001; Bédart, 1995). The ethical trend of an urban form may be reversed from top to bottom, with planned values (Philarchein, 2013) serving as the foundation for decision-making and action. However, few researchers have addressed the reversal of the ethical trend with modernity (Kureethadam, 2017; Luke, 2013; Palmer et al., 2014; Birman, 2010; Legeby, 2010; Bauman, 2007; Friedman, 2001; Giddens, 1990).

We can define the ethical reversal issue as the transition from urbanism to acknowledging urban forms' spiritual dimension. In contrast, modern rationality emphasized observable facts while excluding metaphysical considerations on origins or ultimate causes. Postmodernism returned to multiple versus single ethical standards that turned into an ethical cacophony or void (Belmessaoud Boukhalfa, 2019; Bauman, 1992).

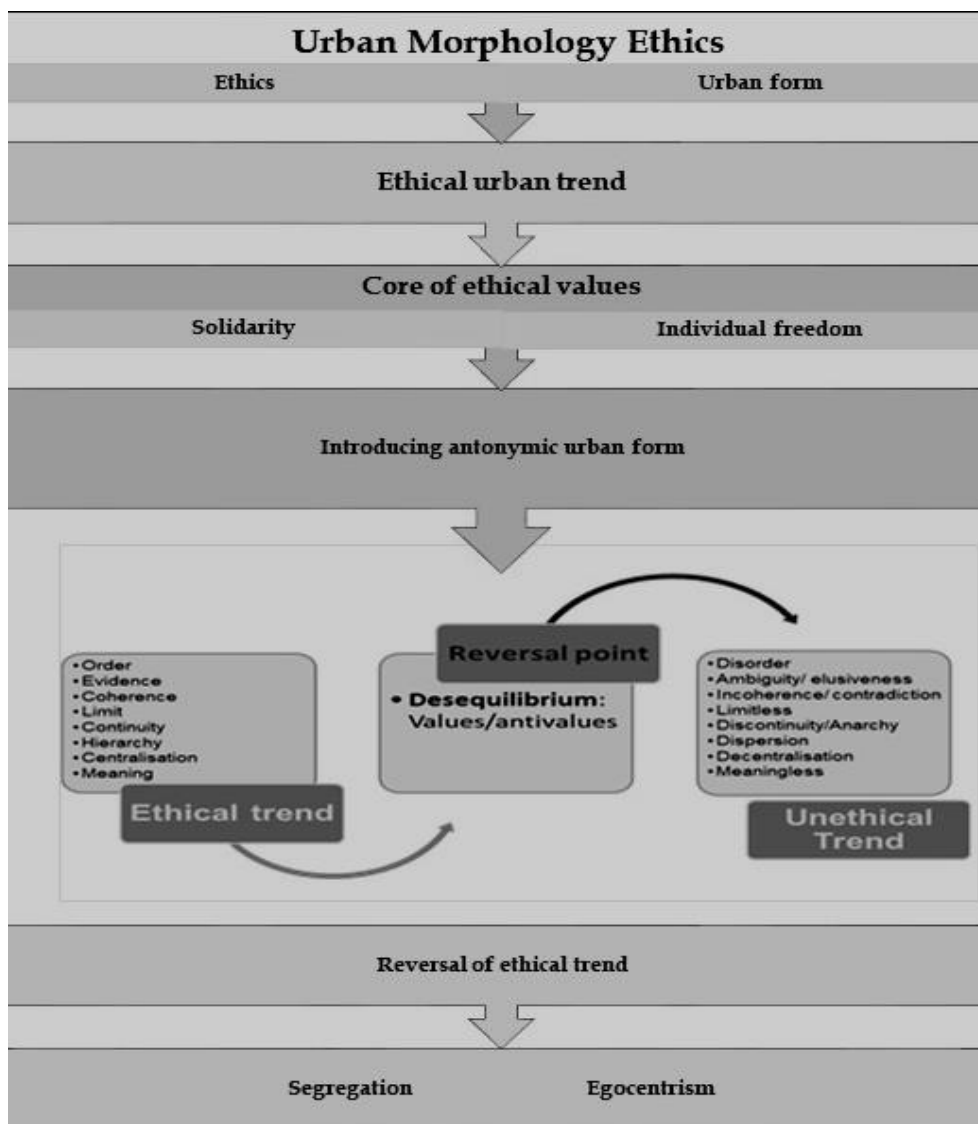


Figure 1. Schematic process of reversing the ethical trend of urban form.

Many studies argued that anti-values characterize modern urban morphology. For instance, some researchers condemned the emergence of anti-values such as egocentrism and segregation (Legeby et al., 2015; Alexander, 2014, 2013; Marcus, 2007; Hiller and Vaughan, 2007; Belmessoud, 2006; Salingaros et al., 2005; Jacob, 1992). Marcus (2007) shows that segregation is inherently spatial, and that space syntax research can inform contemporary housing policy. Critical values like individual freedom and solidarity have emerged in developing sustainable cities (Belmessoud, 2006). The Sustainable Urban Form helps planners in assessing the contribution of different urban forms to sustainability. Identifying the ethical tendency of an urban form allows programming the sustainable ethical values. For example, the urban literature provided evidence that urban segregation has a physical and social meaning. They considered it pathological change and suggested anti-segregation strategies through a configurational morphological

approach (i.e., Legeby, 2010; Legeby et al., 2015; Hiller and Vaughan, 2007). However, they failed to identify them as a process of reversing the ethical trend of urban form. Thus, the reversal of the ethical trend of urban form is under-studied as a fundamental organizational characteristic of the urban structure. On the one hand, we often perceive ethics as an abstract concept. On the other hand, even when considered a pathological change, it is not linked to an ethical crisis.

The following assumptions underpin the preceding lines of thought. On the one hand, the ethical reversal can occur during the selection process of urban form anti-values and involves the designer's virtues or sense of obligation. On the other hand, the ethical reversal can result from the conflict between the dominant values of form and the society's moral principles. These interpretations assume a deterministic relationship between the pattern of the built form and the moral order of cities. Moreover, the first challenge

is that many studies fail to link spatial structure to ethical principles and a broader concept of space/ethics. They do not recognize that social and cultural norms can contain ethical obligations. Yet this concept can create a sensitive relationship between the physical or spatial embodiment of the city and the general orientation of its ethical values.

However, many of these studies fail to recognize that social and cultural norms entail ethical obligations. Based on this definition, a simple sum of repeating parts conceived the overall structure. This arrangement creates a major dilemma since these urban systems do not consider how the parts will be connected. Therefore, at the heart of this research lies the connectivity of morphological elements to form an entity organized according to ethical principles. The second challenge is to identify and evaluate the internal values controlling the ethical tendency by understanding the ethical systems of cities. This concept can create a sensitive relationship between the physical or spatial manifestation and the ethical functions and use of city models. In this sense, certain urban study theories and techniques stem from a physical investigation or interpretation of meaning. Still, neither offers a platform that links them and allows identifying the values of urban form.

3. INTERNAL VALUES CONTROLLING THE ETHICAL TREND

The ethical tendency of the urban form is a contextual construction linked to the moral identity of the society. However, the values of solidarity and individual freedom seem to be the most critical. They often support society's ethics through the dialectic of separation and relationship that describes them (Layden, 2006; Madanipour, 2003). Commonly, modern moral identity emphasizes an individually oriented morality, while traditional moral identity stresses a societally oriented one. To identify the oriented morality of each urban form, we examine the principles of urban ethics related to these values and their graphic indicators in the following section.

3.1. *Ethical principles and spatial indicators of values*

The urban structure describes the physical space, while the fundamental ethical values express the compendium of the moral principles of society that should ensure respect between individuals and society. These approved values change according to preferred behaviors in urban spaces, communication and access distances, and the layout of spaces (Canniffe, 2006). The resulting ethical principles (space laws) affect the control of interpersonal interaction (Goffman, 1963). They shelter the balance between private and

community life (Chermayeff and Alexander, 1963; Moore, 1979); contingent on the degree of connectivity and accessibility that manages ease of movement (Madanipour, 2003). Hall (1966) identified four distances guiding interactions: intimate, personal, social, and public. Therefore, defining these related values varies at least according to three scales (Madanipour, 2003): spatial scale (body, home, neighborhood, and city), degrees of exclusivity and openness (from the most private to the most public), and modes of social encounter and association with space pattern (personal, inter-personal, impersonal). Hence, the two values broadly differ according to the quality of the urban area: private/personal and public/collective.

Solidarity can be divided into utilitarian/organic solidarity and natural/mechanical solidarity. Ibn Khaldûn (1978) considered group solidarity or social cohesion ("assabiyah") to be a prerequisite for the well-being of a community. Primarily, for Durkheim (2012), nomadic or mechanical solidarity is colored by the spirit of togetherness and unity resulting from the sense of shared togetherness, ownership, and responsibility. The adequacy between individuals' behaviors and social values develops community wisdom (society's moral identity) that establishes the basis of a collective consciousness characteristic of pre-modern societies (Halbwachs, 1950). Collective memory works internally between individual members to cooperate. Mechanical solidarity develops in residential spaces through proximity in segregated and dispersed spatial structures (Hillier, 1984). Secondly, "hadhar assabiyah" or organic solidarity (Durkheim, 1912) results from common socialization and protects individual well-being, social coherence, and urban cohesion.

The division of labor, specialization, and agreement on diversity creates the need for the other and, therefore, for organic solidarity in public spaces. Syntactic analyses demonstrated that well-integrated and dense spaces promote organic solidarity for co-presence or proximity (Hillier and Hanson, 1984). In a local-to-global system, the space of organic solidarity is based outside the household and exterior space. In contrast, in a global-to-local system, the space of mechanical solidarity is based outside of households, and the exterior space becomes, therefore, the primary carrier of ideology (Hillier and Hanson, 1984). This spatial configuration allows mutual knowledge and sharing but does not guarantee a mutual community feeling ensured by mechanical solidarity. Progressive corruption and a significant change (transformation of religion or the disappearance of a civilization) threaten organic solidarity (Ibn Khaldûn, 1978). Utilitarian norms, devoid of normative limits on individual freedom, weaken social solidarity and improve egocentrism (Durkheim, 1928, 1962).

The problem of individual freedom is based on the established core idea that one is not free if one is subject to some law, whether legal or moral. However, in spatial ethics, two categories are essential for the proper functioning of spaces and social cohesion. The first is individual freedom (territorial behavior) in the residential area. The second one is collective freedom in the public space, which requires limits on individuals' interactions with others (civil behavior). These limits are necessary for developing common values such as mechanical solidarity. At the general level, ease of access (degree of openness) and degree of intelligibility define collective freedom (or democracy). In terms of orientation, the degree of freedom in self-orientation and navigation, linked to the individual's choice, increases according to legibility through a clear and easy-to-understand image (Carmona et al., 2003). Intimacy syntactically defines individual freedom (Belmessaoud, 2006). Privacy results from form, hierarchy (personal space is deeper), degree of legibility, ease of access, and selective control of access to oneself and interactions with others (visual, auditory, or physical and choice).

3.2. *Solidarity and individual freedom in Islamic ethic*

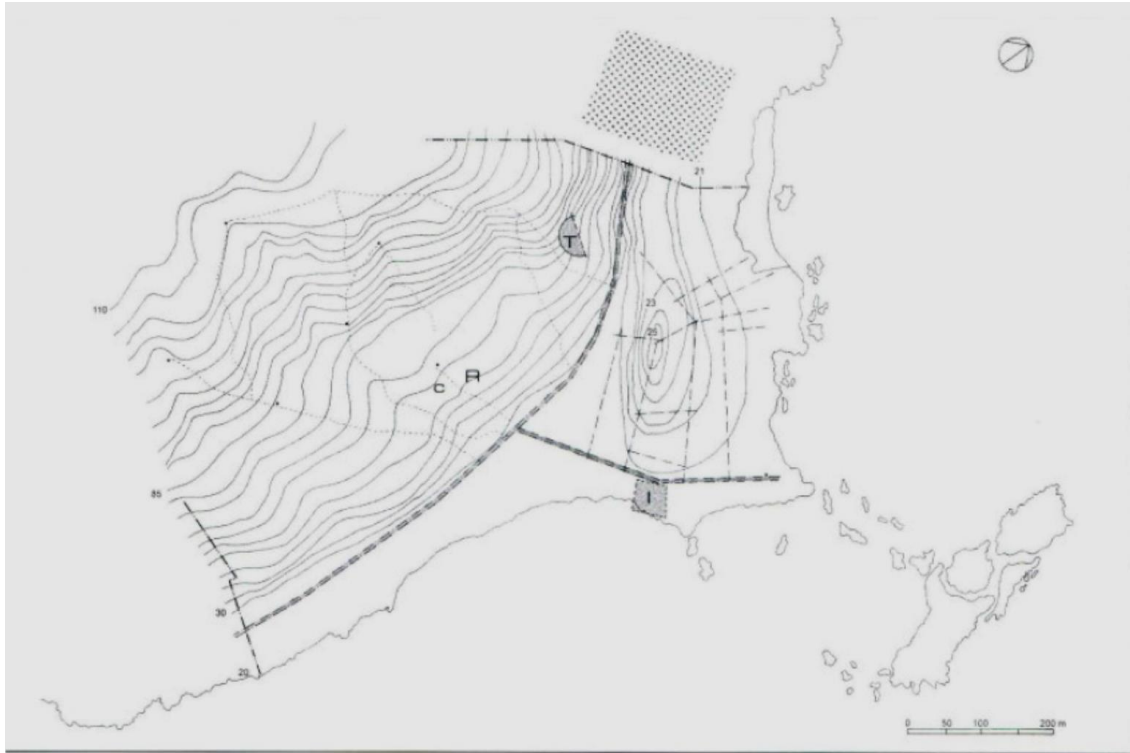
In Surat *Tawba*, Allah advocates founding the structure on piety and acceptance (Surat.9, V.109). The unity principle (Tawhid or oneness of God) governs Islam's hierarchy of values and principles. According to Muslim ethics, the link of faith between believers is the basis of social solidarity. From several verses, the notions of goodwill and solidarity require the community the duty to care for its members. This principle requires each individual to use his/her initiatives to fulfill individual and social responsibilities. Therefore, several studies on Islamic cities sustain compactness and continuity materialize these ethical principles (i.e., Belmessaoud Boukhalifa, 2012; Bahnassi,

2003; Bianca, 2000; Hakim, 1986). All scales incarnate these moral norms.

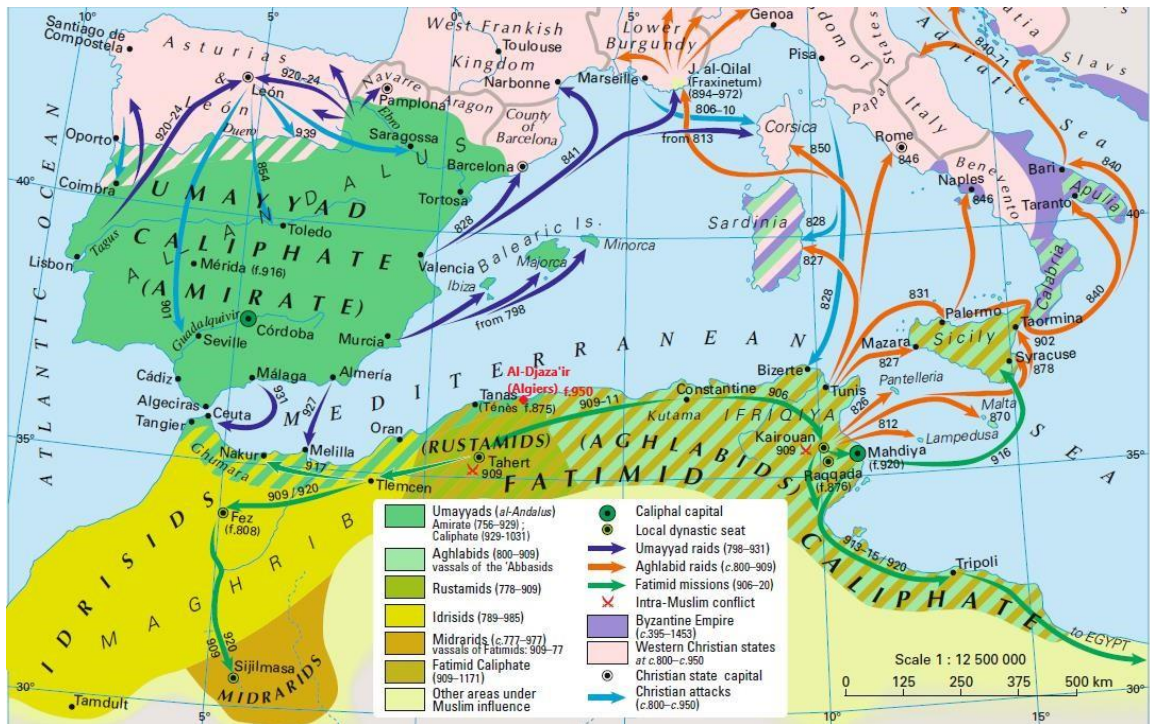
Regarding individual freedom, the believer is free but with limits of respect to self-integrity and others' freedom. These obligations embody the interdiction of violating the right of privacy (harming neighbors), transgression / disorder (*baghy*), and the sacredness (horma) of domestic life. As a result, curved streets allowed easier movement for pedestrians. This flexible configuration avoided conflicts between residential units/sub-units. The latter were autonomous and open to themselves while closed to the outside. The urban configuration respected the supremacy of private development over public development (Bianca, 2000).

4. CASE STUDY AL- DJAZÂ'IR MĀDINA BETWEEN 1830 AND 1880

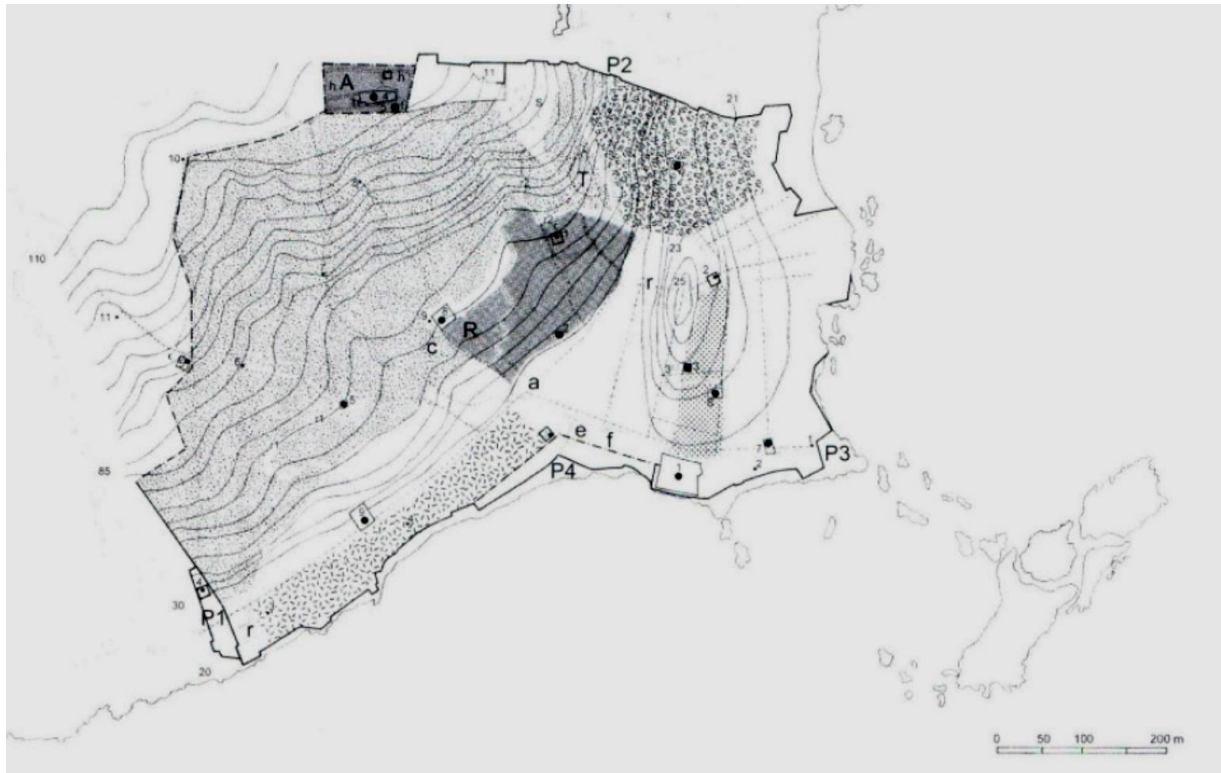
Al- Djazâ'ir or Algiers is the capital of Algeria. Kasbah city represents the historical urban core of Al- Djazâ'ir. The few historical urban narratives confirm that the design principles of the historical city before 1830 fitted Muslim rules and mainly the Maliki rituals (Ibn Khaldûn, 1978; Al-Wansharissi, 1981). The history of the city dates back to the Punic period. A substantial archaeological material, unearthed during fortuitous discoveries, confirms their existence. The foundation of Ekosim dates back to the 4th century BC (Fig. 2a). In 371 A.D., successive invasions, notably the Vandals destroyed the city. For five centuries, the city felt into oblivion. In 950, Emir Bologhine Ibn Ziri (from the Himyaritic *Sanhaji* tribe belonging to *Zirid* dynasty in eastern Algeria and Ifriqiya) rebuilt the city and named it Al-Djazair, in reference to the islets facing the city (Fig. 2b and 2c). The observation of urban form shows a formal continuity until 1830 (Figs 2d and 4). These characteristics suggest the respect of the same ethical heritage.



2a) Roman period (Source: Ihaddadene, 2018)



2b) Situation in the Fatimid Empire (Source: Sluglett et al., 2014)



2c) Arab-Islamic Period: Djaza'ir, respect of the previous Roman Period layout
(Source: Ihaddadene, 2018)



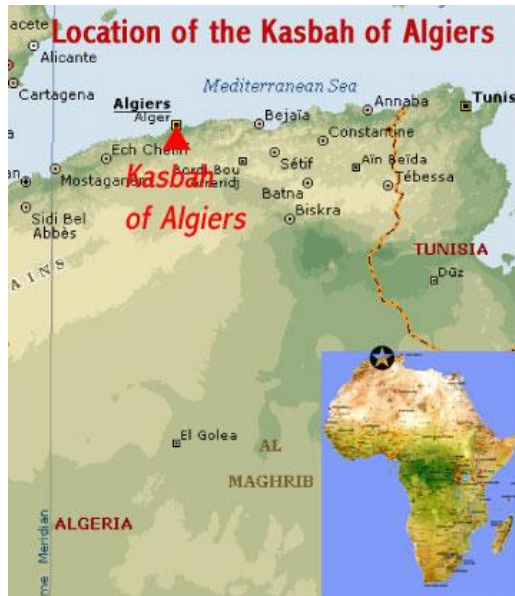
2d) French occupational Period (1848): the obvious dichotomy (Delaroche Plan source: <https://gallica.bnf.fr/ark:/12148/btv1b53029288k>)

Figure 2 (a,b,c,d). Historical situation and evolution of Al-Djaza'ir Mādina (Algiers)

Almost all medieval Islamic cities share a common spatial expression of spirit. The main character of the Arab-Islamic *Mādina* is the right to privacy, which encompasses family and religious life. The Islamic city is divided into two main areas, residential and commercial (Raymond, 1994). The commercial zone is a space of collective and organic solidarity.

Algiers Kasbah is a representative Islamic city. However, its *Mādina* has undergone a radical change

in its formal development. Since the French occupational period, both the urban landscape and the structure of Algerian cities face a real design challenge and revealed many conflicts. Its shape contains two contrasting entities that serve ethical reversal. Concretely, what makes Al-Djazā'ir Kasbah an exceptional case for studying the ethical reversal of urban form is the ability to differentiate the states of urban form at least at two successive chronological points (Fig. 3).



<https://www.africanworldheritagesites.org/cultural-places/fortified-cities-of-the-maghreb/algiers.html>

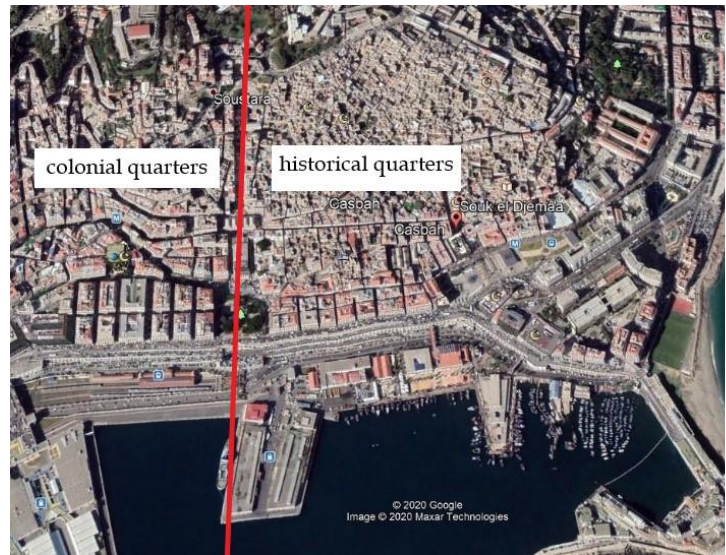


Image courtesy of Google Earth <https://www.lexilogos.com/satellite/alg-ger.htm>



Alley



Fountain



Dead end and vaulted street



Built link



Didouche Mourad Street, previously Michelet Street.



Martyrs Place

Figure 3. Geographical location of Al- Djazā'ir City and the dichotomy in the current urban form.

The traditional maps of Al-Djaza'ir, between 1830 and 1880, represent them (Fig. 4). The historical period and urban narratives are contingent on society's values before 1830. The literature study considers the

urban fabric of the 1830s as authentic, and the 1880 period as the beginning of the French occupational urban fabric propagation.



a. Kasbah map of 1831 (Pelé, 1830 in <http://books.openedition.org/iremam/docannexe/image/3686/img-1.jpg>)



b) 1880 Kasbah map (<http://www.profburp.com>)

Figure 4. Configuration of the selected periods for evaluating the ethical reversal of urban form.

4.1. Urban principles of Al- Djazâ'ir Mādina between 1830 and 1880

4.1.1. Kasbah in 1830

Ottomans built the fortified citadel of Al-Djaza'ir and the traditional quarter in the 16th century A.D. Pelé provided the earliest maps of Al-Djazâ'ir Kasbah in 1830. They indicate that the base of the Kasbah urban form had an organic morphology. In the form of

a sloping fan, the city's shape had the citadel as a summit and the dwellings clusters as a basis. The gravity center was the historic urban core. The streets were pedestrian, hierarchized, and interrupted by stairs. The main streets were close to the main axis and divided into narrower and more sinuous paths. The dead ends led to the houses. The various *sabbats* (created from communicating terraces, they are vaulted passages/rooms bridging the street) and the secondary urban network (communicating terraces of

houses with common walls - *stah* [plural. *sttoh*, sing. *esttah*]) created strong organic links between the two thoroughfares. A network of shopping streets (*zenkat*) gathered artisans in residential areas. The six main gates (Bab Ejdid, Bab Azzoun, Bab el Bahr, Bab el Djezira, Bab El Oued, Bab Ramadan.) connected non-linear thoroughfares (Bab Ejdid, Bab Azzoun, Bab el Bahr (Marine Street), Bab El Oued and Rue de la Kasbah (Rue Sidi-Driss Hamidouche)). The historical center (Marine district) linked these arteries and sustained all vital activities: Political, economic, judicial, cultural, educational and religious activities. The main hallmarks as mosques, schools, administrative services and cafes, urban places (*rahba't*), and *hammams* (baths) were located there. *Suk al Kabir* or *Quayysarya* (great market) and Assayyida Mosque were situated on the Bab Azzoun/Bab El Oued thoroughfares, and the Djamaa al Kabir Mosque on Bab al Bahr Street (Fig. 4a). Many water springs scattered these axes. All these urban spaces were popular meeting places for Algerian society.

This configuration allowed self-orientation for the inhabitants and discouraged strangers from accessing private homes. In that sense, the accessibility principle was developed for Al-Djaza'ir Kasbah (Jordi, 1998). It reflected a range of very strong bipolarities: symbolism compared to functionalism; closed space compared to open space; and curved line compared to a straight line (Côte, 1993). This design is in line with the socio-cultural and religious requirements. According to Islamic ethics' privacy/intimacy principle, Upper Kasbah was reserved for housing and

women, and Lower Kasbah was open to public activities and men.

4.1.2. 1880 occupational period

The French urban design strategy used an orthogonal layout (Raymond, 1994) to overcome the irregularity of Arab streets. Based on the principle of the *civilizing mission*, the urban principles followed reductive rules of economic rationality, modern tabula rasa, and repressive mechanisms (Loos, 1908; Lefèbvre, 1974; Giddens, 1990). The basic characteristics of the French urban fabric are a rigorous functional and human separation, a rigid gridiron of mechanically accessible streets, squares, and diagonals intersecting in circles. The organizational bases favor a monumental treatment of public places, blocks lined with shops, administrative and commercial buildings, and housing differentiated by socio-professional categories. This strategy shifted the new power center to the east. The Rovigo-de la Lyre axis invaded the heart of the residential area (Fig. 4b).

Republic Place supplanted the oldest and most beautiful Al Sayyida Mosque. Boulevards and wider streets enclosed the rest of the *Mādina*. It dismantled the urban fabric and degraded its remaining ancient structure. The historic center has practically disappeared (Raymond, 1981). Only Djama'a Al-Djadic and Dâr' Azîza remained. The changed monuments include St. Philip's Cathedral or Algiers Synagogue (1885) instead of Sidi Al Harbi Mosque 1400 AD) or Ketchaoua Mosque (Fig. 5).

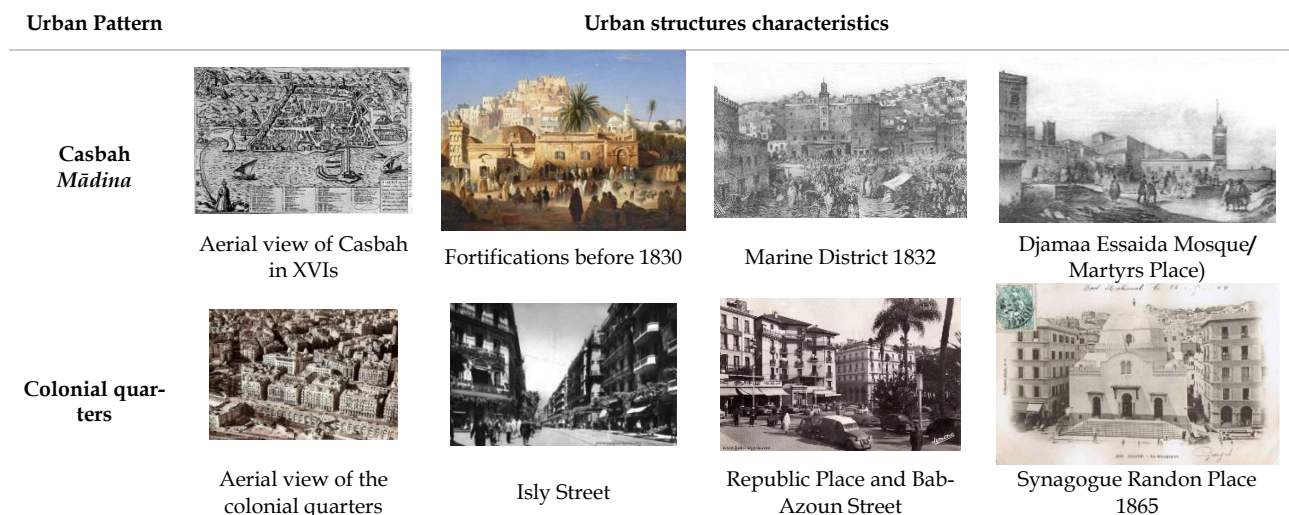


Figure 5. Dichotomous network of Al-Djazâ'ir Kasbah (the two urban fabrics have antonymous principles) showing the premises of ethical reversal.

5. RESEARCH QUESTIONS AND ASSUMPTIONS

The literature review on urban morphology ethics represents an essential framework for studying the

ethical trend of Algerian urban forms. Certain hypotheses or confusions about the moral origin or the ethical nature of the structural reversal of Algerian urban forms and the spatial organization emerge from reading the literature on socio-spatial mutations of

Algerian urban forms. The first hypothesis is that the phenomenon of encrustation of the foreigners' occupational spirit and the feeling of inner loss has consequences on the psyche, the body, and the social tie (Ricoeur in Lazali, 2018; Calvet, 2017; Derrida, 1967). It leads to the loss of references and insensitivity to cultural values (i.e., Boudiaf, 2015; Saoud, 2002).

The traditional and the postcolonial Algerian cities are, sociologically and culturally speaking, a set of different local regions or even neighborhood units. This condition raises the question of whether the social bond has been broken. The hypothesis is that the traditional and postcolonial cities appear to be composed of dissimilar physical fragments linked to each other but not governed by the same dynamics and constraints of the city's overall structure. The formal antonymy is clearly observable. This condition raises the question of whether these observable differences have a relationship with the structure and morphology of quarters and whether these differences bear the imprint of society's moral identity and institutions. This state raises the question of structural reversal concerning the physical and ethical definition of values.

The second hypothesis is that the urban occupation structure reversed the traditional one and reversed society itself (Hall, 1996; Côte; 1993; Said, 1977; Derrida, 1967). This condition underlined the harmful consequences of the French occupation on the urban development and colonized society's social identity (Hadjiri and Osmani, 2004; Çelik, 1997; Eichler, 1977). The harmful reversal happened in 1880 (Thénault, 2014; Guignard, 2017; Belmessaoud, 2010). This condition raises the confusion of structural reversal as the relationship between physical forms and deeply rooted cultural values without addressing moral identity. The confusion stems from the lack of recognition that morphological differences are changes in the moral order of the urban form.

The explanation of the structural reversal has failed to describe the potential morphological differences of their form and address the reversal of its ethical trend. Although the year in which changes occurred was identified, the extent of the transformations or the ethical implications of conflicting syntactic properties were not evaluated. In an important sense, an understanding of the reversal of the ethical trend as being linked to the neighborhood structure of these cities is incomplete without morphological analysis. This condition underlines that conflicting ethical and urban principles affect the ethical trend of the traditional urban structure. Thus, changing the local urban properties of the city alters its ethical trend. A diagnostic method is adopted to inspect the morphology of the reversal of the ethical trend of the city. The most relevant configurational characteristics related to ethical

principles, in which the city appears to differ according to the underlying ethical orders, are examined. This process aims to reveal the internal values controlling the ethical trend and determine whether differences in spatial distributions emerge. We limited our study to the major network.

6. METHOD: ETHICAL DIAGNOSIS

Following the essential research questions, we can express the problem *What differentiates the morphology of the transformations of the city that could be associated with ethical trends? Did the postcolonial structure's reversal reverse the traditional city's ethical trend?* In the beginning, the "hypothetical assumptions" are the existence of a strong and definable urban structure in the traditional city. We based it on the overall concept of "space/ethics" and the relationship between the city's spatial structure and ethical function. This idea is partly shaped by the harmonious appearance of the urban artifact, the coherent pattern of the moral identity of society described in the urban historians' works, and the obvious dichotomy of the postcolonial urban fabric. Establishing a criterion is necessary for the research methodology to respond appropriately. The primary interest of this research is the investigation of the ethical dimension of the spatial and morphological structure of postcolonial Arab Muslim cities by taking Al-Djaza'ir Kasbah as a typical pattern for these cities.

Thus, the adopted methodology must be capable of handling ethical morphological and spatial problems. Ethical diagnosis must be analytical because the urban spatial structure and all urban phenomena are considered a system of interacting elements. Moreover, evaluating ethical cities suggests finding the ethical principles that underlie the urban principles for the formation of cities. Including all of these criteria, the ethical diagnostic must also connect spatial and morphological patterns with societal, ethical principles.

Linking ethics to space defines the logic of space according to the contribution of society's ethics to the evolution of spatial configuration. The spatial nature of society and an ethical dimension of space are developed to create a common platform for the moral identity of society and space.

Space Syntax theory considers space and spatial structure as the fundamental concepts of urbanism. It uses relevant mathematical knowledge to search for the truth in urbanism (Ibn Khaldûn, 1978). This theory admits that spatial arrangement embodies ideas and social norms (Hillier, 1984; Hillier and Vaughan, 2007). This affirmation implies that ethical principles are significant factors of social development. Ethical spatiality is a central concept for interaction in the social functions and activities of the city. Behavior anal-

ysis identifies the variables that control moral behavior through space syntax and urban narratives. Values become “facts scientifically understood” (Harris, 2010). This premise shows that each physical unit of the city develops an interface according to established principles: access rights and circulation between urban units. Hillier found that correlating integration and movement patterns is a reference for predicting human movement patterns. The study adopted Syntax’s theory and method, and urban narratives to investigate the previously raised questions.

6.1. Narrative analysis

Narrative analysis refers to a family of methods for interpreting texts that share a storied form. This method is suitable for interpreting many kinds of texts (Riessman, 2008) and describing human action (Polkinghorne, 1995). The story ties the symbolic to the material (Riessman, 2008). Historical narratives allow identification and comprehension of (Sharp et al., 2019):

4. behavioral patterns and social activities that achieve ethical goals,
5. the quality of assigned spaces,
6. sustained values in social, cultural, and historical contexts.

Thus, the narrative investigation aims at identifying the ethical trend of the study’s areas. Knowledge about the source of society’s moral principles allows verifying the ethical principles underlying the organization of form and thus asserting its authenticity. Space syntax methods primarily consider maps as cultural texts or elementary physical urban transformation indices (Griffiths & Vaughan, 2020).

6.2. Space syntax methods and the graph-based indicators of ethical values

This section highlights some essential indicators that affect the ethical trend of urban form and how changing these indicators may change the controlling ethical values. Space syntax is a theory that uses a set of techniques to describe the spatial configuration of the built environment through three methods: axial map analysis, visual graph analysis, and static activity mapping. However, axial maps are more useful in understanding the behavioral characteristics of the spatial setting (i.e., Hillier, 2007; Bafna, 2003 ;). They are particularly interested in studying archeological and historical urban forms (Belmessoud, 2010; Belmessoud, 2002; Twaissi, 2017; Assassi and Mebarki, 2021; Durgun et al., 2021). They allow for describing and explaining the social logic of space (i.e., Hillier, 1996, 2005). Because social behavior and citizen morality are intertwined, investigating the relationship between the centrality and accessibility of spatial con-

figuration allows addressing the concept of wayfinding according to the ethical logic of space. The most related graph-based indicators are connected to ethical principles of urban space.

6.2.1. Connectivity

This measure is the value of the number of other streets directly connected to a street. It involves variation in global values, such as integration and intelligibility. Its graph shows reliability, communication, and flow. Therefore, it expresses the degree of permeability to private spaces. The number of immediate neighbors directly connected to space assesses connectivity. Every node in the graph represents a single axial line and each edge represents the connection of two lines. The connectivity value is the number of immediate neighbors of the nodes (Jiang et al., 2000) (eq.1).

$$C_i = k \quad (1)$$

where C_i is the connectivity of the i th node and k is the number of immediate neighbors.

High connectivity means low isolation and high accessibility, whereas low connectivity means high isolation and low accessibility. Both connectivity and depth are defined from a topological point of view. The number of steps from a considered node to all other nodes defines the notion of depth. A node is deep if there are many steps separating it from other nodes. By contrast, a node is shallow if only a few steps separate it from other nodes. The total depth of node i is the sum of distance (eq.2)

$$D_i = \sum_{j=1}^n d_{ij} \quad (2)$$

where D_i is the total depth value of the i th node, d_{ij} is the shortest path between the i th and j th nodes

Thus, mean depth is defined by

$$MD_i = D_i / (n-1) \quad (3)$$

Where n is the number of nodes, and MD_i is the mean depth value of i th node.

Depth is an important variable for calculating the integration of a node.

6.2.2. Integration

Integration shows a tendency to correlate very strikingly with the distribution of population within an urban setting. Higher integration values of nodes, therefore, indicate that the node is less deep on an average from all other nodes, or in other words, that it is more integrated into the spatial system (Bafna, 2003). This spatial hierarchy measure evaluates the depth of a space or how many turns one must make in the network using the shortest paths. It is the central criterion for space syntax. Integration is a justified measure to identify the whole system’s street centrality, compactness, and accessibility. Integration can be measured with either Relative Asymmetry (RA) or

Real Relative Asymmetry (RRA) according to the following mathematical formula (4):

$$RA_i = 2(MD_i - 1) / (k - 2) \quad (4)$$

MD is the Mean depth. In axial maps the distance between line i and j is, generally measured by the number of depth steps, i.e. the number of axial lines located on the shortest path joining them. The mean depth of line i in an axial map is defined by the average depth and k the number of spaces in the system for a line or node j and is given by eq. 5

$$MD_i = \sum_{j=1}^k \frac{d_{ij}}{(k-1)} \quad (5)$$

The RA value ranges from 0 to 1. A low value indicates that a space tends to be integrative of the system (allowing proximity and encounter and thus less privacy), and a high value indicates that a space tends to be segregated (allowing fewer encounters because they are located deeper and thus allow a higher degree of privacy). Thus, if it is low, the layout has a symmetry quality, and the spaces are equal in terms of permeability control. RRA (Real Relative Asymmetry or integration) is a more sensitive measure of symmetry or asymmetry, which considers the variation in the number of spaces in an urban layout (Kruger and Vieira, 2012). The RRA is calculated as follows (eq.6):

$$RAA = RA/D_k \quad (6)$$

where D value is the relativised RA.

The space syntax allows generating a city's axial lines map or a selected part of it. This is the map of the 10% most integrated areas and the 10% most segregated areas.

6.2.3. Intelligibility

This measure concerns the relationship between local variables (e.g., connectivity of space) and the global properties (integration) of space within a system. The good correlation $R^2 > 50\%$ illustrates the characteristics of a well-structured and highly orientating district and characterizes public space. The scatter points form a straight line rising at 45 degrees from bottom left to top right while low integration value and lower intelligibility ($R^2 \leq 50$ percentage) is an introverted district. Less intelligibility guarantees a higher degree of privacy by decreasing foreigners' access to neighborhoods.

Linking the main ethical principles and the spatial indicators of the ethical trend with axial graph-based indicators reveals connectivity, integration, and intelligibility as the most relevant properties (Table 2).

Table 2. Graph-based indicators of solidarity and individual freedom values

Ethical Value	Ethical principles	Urban principles	Graph-based indicators
Solidarity	Unity Continuity Proximity Unification Identity	Unity Continuity Enclosure Proximity Compactness/ Cohesion/ link Interdependence Hierarchy Legibility	Integration Connectivity Accessibility Intelligibility
	Preservation of intimacy Privacy Sense of belonging Security The state of being free Capacity to exercise a choice Ease of spatial movement Full access	Hierarchy Distancing device Boundary Privacy/ threshold Accessibility Flexibility Legibility	Segregation Connectivity Control Choice Accessibility Unintelligibility (neighborhood)

The adopted ethical diagnosis identifies the ethical system by analyzing the controlling values of its ethical trend and interpreting its spatial indicators. The procedure should operationalize these values and define them in ethical principles and syntactic properties. The stories describe urban spaces and provide the city's urban history and the ethics underlying its configuration and spatial indicators. They articulate forms by analogy and meaning, allowing us to apprehend the ethical principles of the city (interpretative filter). Space-Syntax physically examines the urban

structure and the graphical indicators of the selected values. In following, Table 3 can summarize the ethical diagnosis of the traditional Arab-Islamic city in selected historical periods: narrative analyses identify both cities' ethics and their historical corpora. The ethical trend is expressed in graphic indicators through the definition of solidarity and individual freedom. A spatial analysis of the properties of the overall structure taken as a "whole" is undertaken by using DepthmapX software.

Table 3. Ethical diagnosis diagram

Data	Measures	Procedures
Descriptive literature	Historic corpora Cities ethics	Narratives
Traditional urban structures	Axial maps analyses	Solidarity Individual freedom Connectivity value Integration value Intelligibility value
Colonial urban structures		Relationship assessments scale

7. ETHICAL TRENDS OF THE CASES STUDY

This section aims at identifying the ethical values that determine the ethical trend of each urban form through narrative analysis and axial maps analysis.

7.1. Narrative analysis

The narrative analysis highlights the ethical principles and the urban elements embodied in the different urban forms of *Mādina*.

7.1.1. Urban principles of Al-Djazâ'ir Kasbah in 1830

We know very little of the city before the Ottoman period. According to Le Tourneau and Bosworth (2007), the Arabs founded the city in the 4th/10th century on the Icozium ruins. Bulugghin ibn Ziri was the founder. Throughout the history of the Berbers, there are no written documents about this culture before the Islamic arrival (*Fatihin*) (El-Ibrahimi, 1972). The design principles of the historical city before 1830 fitted Muslim rules and precisely Maliki rituals (Ibn Khaldûn, 1978; Al-Wansharîssî, 1981). The leading Mosques and Zāwiyah Madrasah institutions preserved Algeria's national identity and were spaces of collective freedom and solidarity (Ladjal and Bensaïd, 2014). Thus, the moral identity of Algerian society is more than 99% Sunni Muslim (Kagda, 1997).

7.1.2. Al-Djazâ'ir Kasbah in 1880

The French occupation was settler colonialism. Scholars consider these unethical principles a unilateral and egoistic enterprise of personal interest carried out by the strongest over the weakest (Çelik, 1997). For Veracini (2010), settler colonialism is a form of colonialism that seeks to replace the original population of the colonized territory with new settler society. "Othering" marginalized groups and *high cultural status* justifying the repression of "latent races" (*races attardées*) were the bases of this amoral method (Ross, 2013; Çelik, 1997). The resulted negative self-image can block memory (Ricoeur in Calvet, 2017). It induced a process of forgetting society's moral identity. The European city has taken the place of the traditional cities, materializing this lack of respect for other cities (Guignard, 2010). The principle of the dichotomy of two faces (the face of "freedom turned towards the metropolis" and the face of "tyranny turned towards its colonies" (Çelik, 1997)) created dual urban entities.

Thus, the study of theoretical ethics revealed the antonymy of the corresponding ethical trends and their controlling values (Table 4). They have a pair of words that have opposite meanings. "Merging" these dualistic ethics illustrates the concept of ethical reversal. In 1830, the urban principles of Al-Djazâ'ir Kasbah were ethical, while the urban principles of the French quarters were unethical.

Table 4. Controlling values of the ethical trends of the dual urban forms

City pattern	Traditional city	Colonial city
Overall principles of urban form	Flexibility Differentiation and supremacy of private-public Organic organization Compactness	Rational organization/ Rigidity Similarity and supremacy of public over private Openness
Solidarity	Continuity/ Unity Meaning	Separation Insignificance
Ethical Value	Introversion Privacy	Extraversion Publicness
Individual freedom	Inaccessibility Flexibility Hierarchy	Excessive accessibility Discontinuity
Ethical principles	Humility Respect and Balance	Arrogance Disrespect and Imbalance
Controlling values	Balanced solidarity/individual freedom	Segregation/Egocentrism

7.2. Axial map analysis

This section examines the spatial configuration maps of Al- Djazá'ir City. Using DepthmapX software (Turner et al., 2017), Space syntax theory converts the urban system into a system of axial lines and analyses the relationships of the urban structure. Therefore, the geometrical simplification of the urban plan analyses the topological aspects of the urban structure. Space Syntax application results of the axial map of the two case studies are presented according to three graphs:

- the intelligibility coefficient depicts the trend curve of the scatter-gram,
- a first axial map with a color index shows the spatial integration value of each line,
- a second axial map with a colored index reveals the position of each line in terms of spatial connectivity value.

The following results are organized according to the clear dichotomy of urban values before and after the urban structures changes. As both values share the same graph-based concepts (Figs 6 to 8), the interpretation of the results is merged to avoid redundancy in presentation and explanation.

7.2.1. Axial intelligibility analysis

Intelligibility indexes the degree to which we can apprehend the system from the spaces that make up it. According to Pearson coefficient R2, the intelligibility value evaluates the core values of the overall network of Al- Djazá'ir city in the 1830-1880 period. The intelligibility value is calculated as 0.26 in 1830 while measured as 0.65 in 1880 (Figs 6a and 6b).

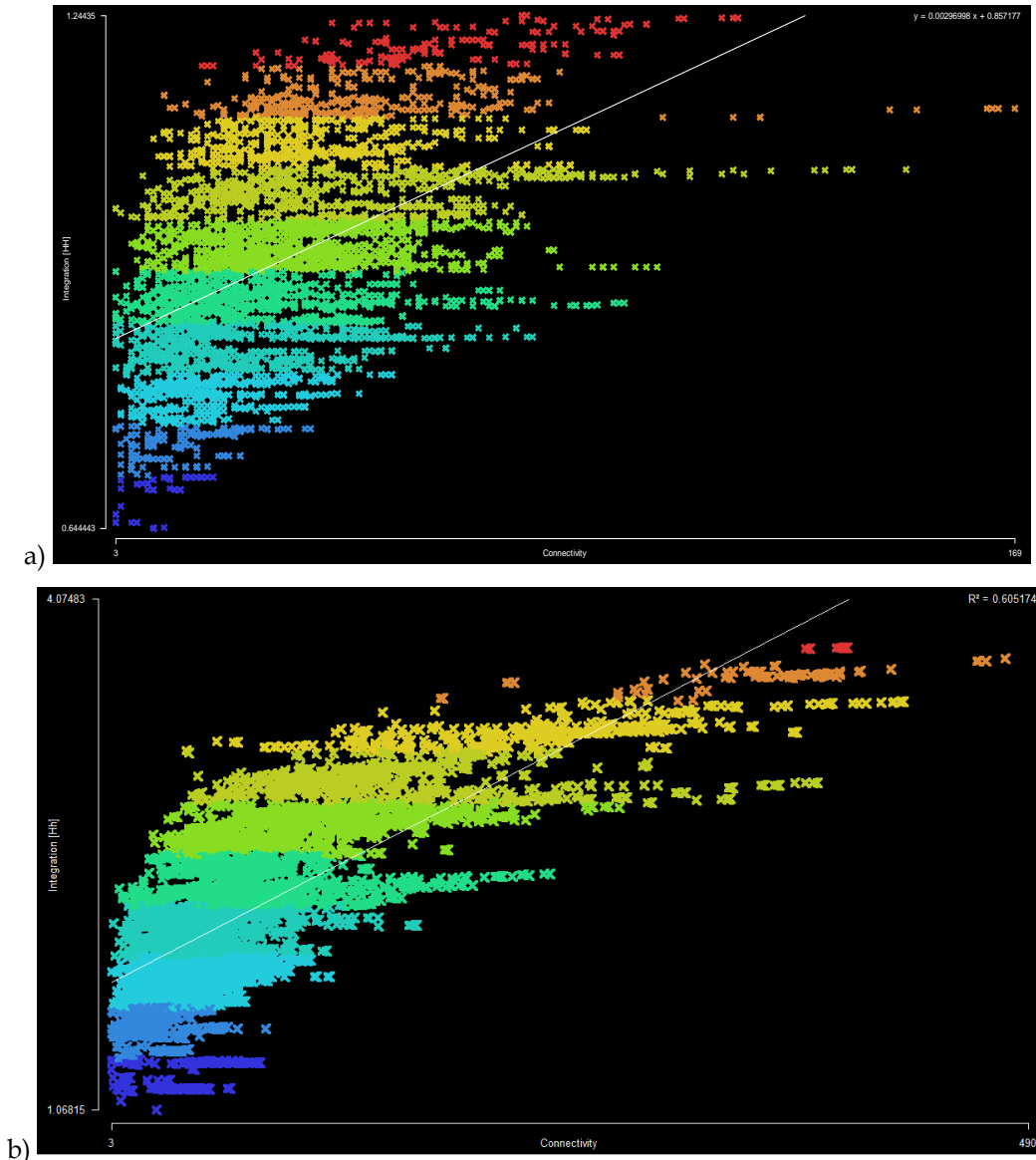


Figure 6. The intelligibility Scattergram of Al- Djazá'ir: a. Intelligibility in 1830. b. Intelligibility in 1880. (Source: Depthmap X open-source software).

The axial map for intelligibility was less than 45% in 1830 and greater than 45% in 1880. Strongly connected and integrated street spaces dominated spaces in 1830 that were significantly higher than the trend line. While in the 1880 map, spaces higher than the trend line are dominated by less connected and integrated street spaces. The significantly integrated and the strongly connected spaces are below the trend line. Narrower, more numerous, and with more changes of direction, the street spaces of *Mādina* generate more integration lines but fewer inside the same street. While those of the French districts, being wider, longer, and rectilinear, generate few but many more inside the same street. These results show the reversal of the trend curve (26% in 1830) towards an ascending trend curve (60.5% in 1880). The value points out that the orientation on the street axis was weak in 1830, while it was higher on the 1880 map.

7.2.2. Integration analysis

Higher integration values carry higher accessibility, higher levels of movement and activities in spaces and thus favor encounters. Integration axial analysis shows the balanced organization of the traditional city spaces and the dichotomous postcolonial ones. Fig. 7 shows the structure of Al-Djaza'ir City in terms of spatial integration values. The method used different colors, from the most integrated (red) to the most segregated (blue). For 1830, the results show a higher

proportion of integrated spaces (red, orange, and yellow) contrasted with segregated spaces (blue and green). The most integrated spaces of the city lie in the Marine district (red). It is the ultimate destination of the principal streets and the connector of the whole structure (Fig. 7a). This district is the main destination for the movement and meeting of inhabitants and foreigners in the city. However, the communication routes expanded the core. They are highlighted as second-rate integrated spaces connecting the urban core to the city gates. Secondary streets connected the urban core to the fortress. Private spaces are not isolated since they are connected to these axes.

For 1880, the results reveal that Isly-Rovigo-la Lyre thoroughfares, Boulevard, and Republic Place are strongly integrated. In contrast, the Kasbah center and Bab Azzoun thoroughfare have become segregated. Synagogue Place and Lyre Street supplanted them. Kasbah Street and the sixth axis turn into segregated areas. Comparing the integration cores shows that the centrality shifted towards the French districts (orange and red). Colonial Streets, boulevards, and places are more integrated, whereas the Marine district and the main thoroughfares have changed into segregated ones (from red to yellow). Djama'a al Kabir, previously less integrated and closer to the inhabitants, becomes highly integrated and paradoxically inaccessible due to the wider ways and Government Place. Moreover, the mosque is segregated from the neighborhood (Fig. 7b).

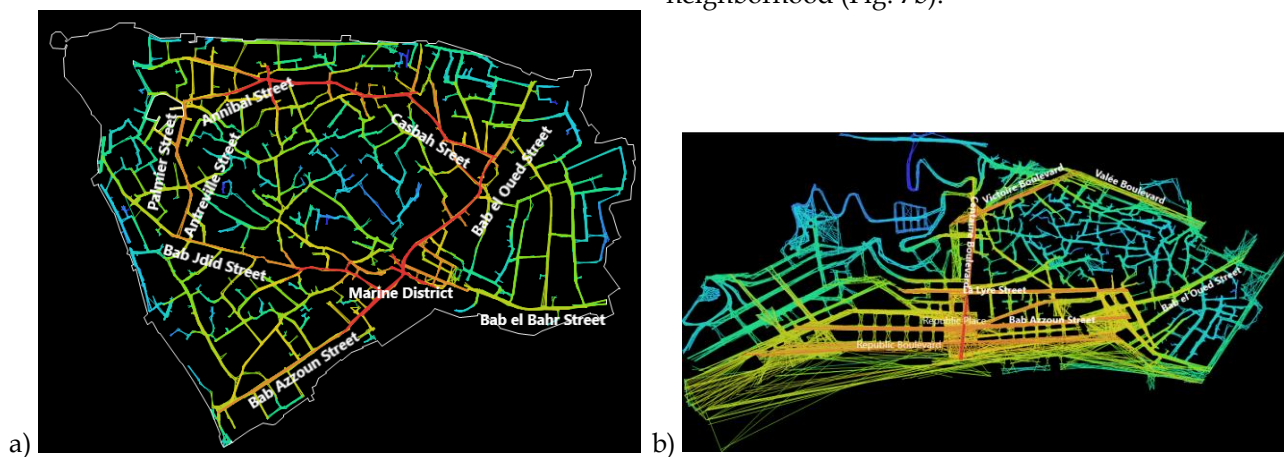


Figure 7. Axial map of Al-Djaza'ir *Mādina*: a. integration 1830. b. integration 1880. (Source: generated using DepthmapX)

7.2.3. Connectivity analysis

The higher connectivity value leads to the strongest influence on the surrounding space and better permeability of the space. The similarities and dissimilarities of the *Mādina* and the colonial quarters are assessed (see Table 4). Overall, compared to the Kasbah, the gridiron pattern of the French quarters' structure is relatively simple. The graph of 1830 shows the gradual and distributed change of the axes' colors:

blue in the dead ends, red and orange in major thoroughfares (Fig. 8a). Thus, the permeability of private spaces is balanced. Yet, the graph of 1880 shows a contrasting color change of the axes. It highlights a peripheral entity in blue and another in red/orange/yellow (Fig. 8b). Accordingly, we can note that permeability increased in 1880. Unexpectedly, the permeability of houses decreased. The Government

Place replaced the Marine district. Some spaces dedicated to habitat disappeared (blue). Others have been reversed from well-connected (green) to disconnected (blue). The main streets' secondary arteries become less connected (green to blue). Formerly dedicated to

craft activities, these spaces became marginalized. Paradoxically, accessibility to residential areas becomes excessive for strangers and highly reduced for privacy. This value turns into segregation.

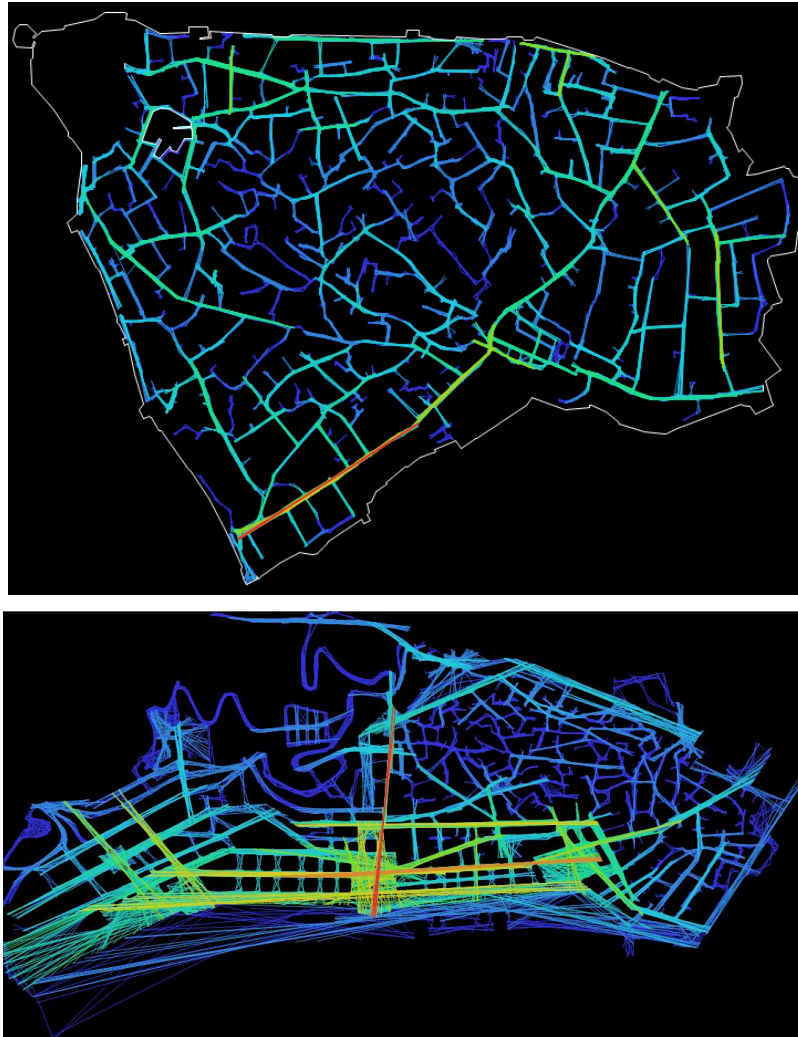


Figure 8. Axial map of Connectivity. a. 1830. b. 1880. (Source: DepthmapX open-source software).

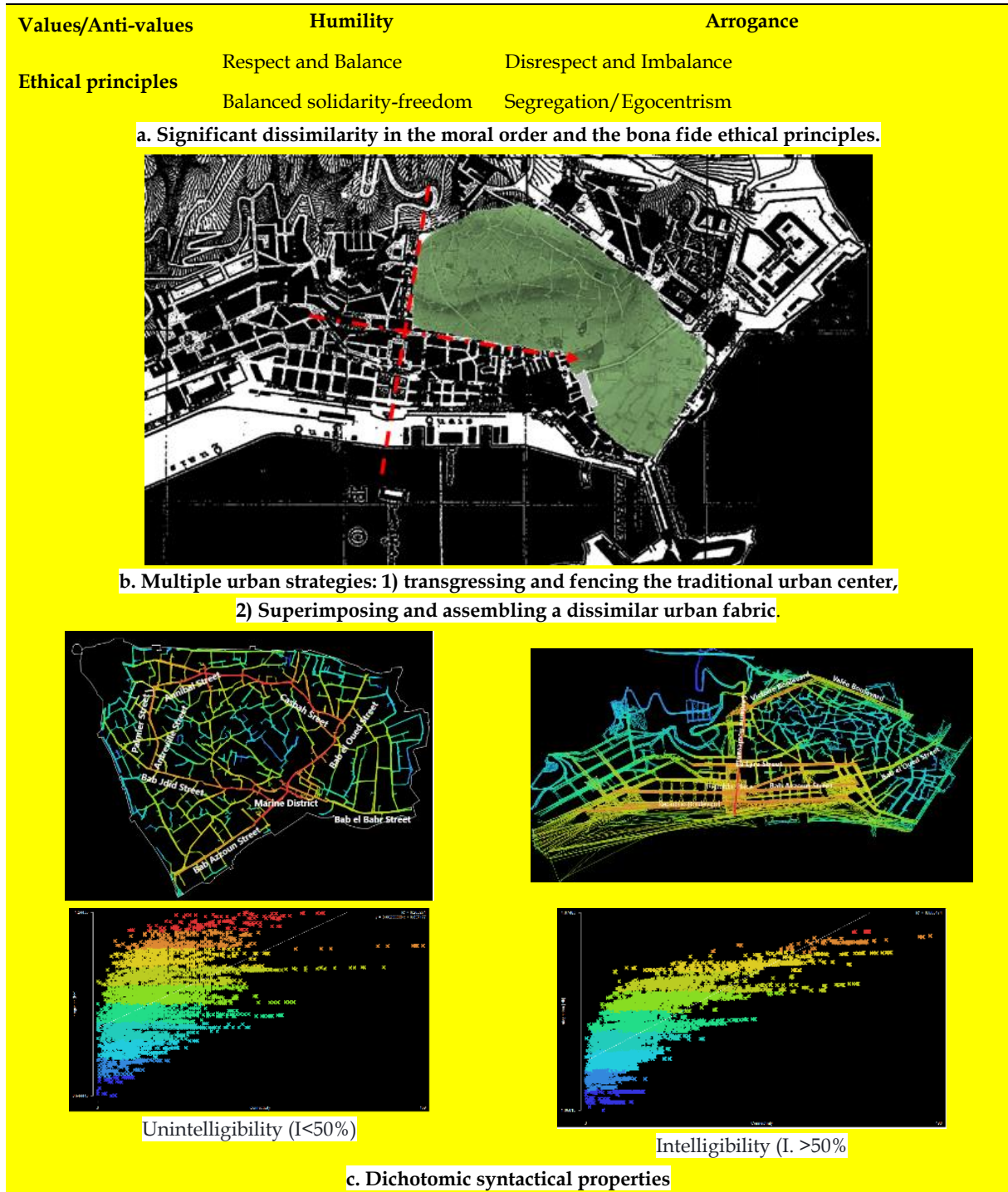
8. DISCUSSION

This study aimed to shed light on the hypothesis that the structural reversal reversed the ethical trend of the Arab-Islamic city. We evaluated the reversal of the ethical trend of Al- Djazâ'ir *Mādīna* as a sample at two chronological points. The ethical analysis examined the validity of the hypothesis that the French urban structure reversed *Mādīna* authentic, ethical urban trend. It tackled two related issues: The first was that contradictory ethical and urban principles reversed the ethical trend of the traditional urban structure. Graph 1 summarizes and highlights the overall process of reversing the ethical trend.

The second was that changing the local syntactical properties of the city altered its ethical trend. Thus, it

was important to know whether the French urban structure reversed the moral order of the historical city. If so, *what their ethical tendencies and dominant ethical values were?*

Furthermore, we used narrative analysis to study urban forms' ethical foundations and Space Syntax to analyze their syntactical properties. Narrative investigations identified the ethical trend of the study's areas. Space Syntax theory underpinned the results taking the society's-space relationship as a single entity. This overview was the basis of modeling and analyzing the urban system. Correlating the spatial configuration rules with moral norms, we identified the controlling ethical values of the two urban systems.



Graph 1. Graphical Highlight: Reversal process of urban ethical trend (Source: author).

The narrative investigation of the theoretical ethics provided some conclusive results: 1) Virtue ethics morally founded the *Mādīna*, and 2) Utilitarianism and Egocentrism created the French districts. Comparing the two meta-ethics revealed the significant contradiction of their moral origin. Islamic ethics sustains the cosmic order, while nihilism and rationalism reject this metaphysical link. The narratives of practical ethics confirmed the antonymy of the ethical and

urban principles. The Islamic ethical foundations provided the Kasbah with an introverted configuration and an ethical inclination towards outward modesty. The introversion fulfills the need for privacy and modesty as the first hallmark of the humility of Muslim design. A relatively uniform façade, introverted spaces, and dense clustering deeply embodied these ethical principles. Yet, French urban principles focused on an extroverted configuration and an unethical trend towards apparent ostentation.

It is important to note that the French urban design isolated the *Mādina* from the rest of the city in terms of structure and form. This reversal suggests the creation of a new immoral ethical trend. Unity, respect for the individual, and the right balance between self-interest and collective interest were the foundations of Islamic ethics. In contrast, self-interest, disrespect for the other, and imbalance between self-interest and collective interest were the bases of the French colonial ethic. These findings showed that utilitarian norms might weaken solidarity and enhance egocentrism.

Regarding values' definition, this conflict was the first sign of the emergence of the anti-values of segregation and egocentrism. Thus, the results required a further explanation from an ethical standpoint to determine whether this new trend was the worst state of mutation. The analysis of these values indicated that the global structure of Kasbah is geared toward a balance between private, community life, and public lives. The global-local strategy of the French spatial system reversed the pre-existing local-global balance of *Mādina* spatial system. Controlled in this way, outdoor spaces lead to inequalities in social relations.

The investigation of Space Syntax yielded some interesting results. The comparison of syntactic graphs revealed changes in properties. They affected both the values of solidarity and individual freedom. The significant contrast was in the trend lines of intelligibility. Intelligibility graphs showed the ethical reversal of the traditional urban structure. The fundamental differences between these trend lines required clarification of this spatial phenomenon. The Kasbah's spatial structure was illegible, with a reduced spatial orientation for foreigners moving through the major thoroughfares. The lower level of axial intelligibility in 1830 resulted from the structure of the circulation system distributed to a lower level of axial connectivity. It protected the inhabitants' privacy from foreigners' intrusion. This condition promotes being together and belonging to social groups (mechanical solidarity), according to Hillier and Hanson (1984)

By contrast, the French spatial structure was more intelligible and, thus, has a high spatial orientation. Moving and accessing the private neighborhood became easier. The analysis of syntactic properties tends to generalize and facilitates movements and exchanges. The high level of axial intelligibility in the 1880 map increased from the structure distributed to a higher level of axial connectivity. In 1880, free and functional movements were characteristic of Utilitarian ethics, which explains the high level of intelligibility. This spatial configuration induces a freer circulation for foreigners but disrupts the natural residents-foreigners interface.

Commonly, we may think that greater intelligibility allows better orientation and promotes individual freedom for foreigners and thus organic solidarity. However, as egocentrism generally drives social and economic affairs, demolishing private quarters increased accessibility. This achievement destroyed hierarchy and broken spatial links. The public space infringed the private space located along these new streets. High intelligibility created excessive segregation and turned personal freedom into seclusion. Moreover, if an intelligible space promotes organic solidarity (interaction), this dynamic space lacks enclosure and allows fewer possibilities for gathering. This ethic converted personal freedom into segregation and reduced mechanical solidarity among the inhabitants. This modification reversed the initial unintelligibility of the traditional urban fabric and destroyed the characteristic balance of the *Mādina*.

Comparing integration cores supported these results. In 1830, Integration analysis showed the hierarchical distribution of movements and encounters. They confirmed the Muslim principle of the private domain's supremacy over the public. Protecting both personal freedom and mechanical solidarity is its ultimate principle. Highly regionalized integration cores tended to be strongly correlated with the urban center and thoroughfares. The Marin district and the major thoroughfares were urban spaces of organic solidarity. Mosques, Zāwiyahs madrasas, and water springs were more mechanical solidarity and collective freedom spaces. Djamaa al Kabir was less integrated and close to the inhabitants. The urban compactness of residential quarters personified both personal freedom and, with the secondary nodes, mechanical solidarity.

In Muslim cities, segregation does not imply a lack of social relations. They are mainly restricted to Suk, workspaces, and ritual spaces. The structure of the integration core showed some significant trends to interlink and form a global structure of the ancient city. These findings suggest that *Mādina* fundamental morphological properties are the relationships between the level of intelligibility, degree of integration, the distributed core, and its close parallel to the hierarchical regional integration of public places. The Marine district, Quayysarya Suk, mosques, and market thoroughfares were among these public spaces (orange and yellow). This occurrence implies that the city's physical structure developed three interfaces: immediate inhabitants-inhabitants, collective inhabitants-inhabitants (for proximate activities and exchanges, access, and circulation between each urban unit), and inhabitants-foreigners (widening exchanges with outsiders).

On the other hand, combining the dual urban patterns showed a significant regionalization of the integration core and strong segregation of the neighborhood districts. This sharp divide between the urban center and the neighborhood districts suggests the loss of the intermediary values of collective freedom and mechanical solidarity described by narratives. These syntactic findings suggested that organic solidarity was higher in 1880 than in 1830. However, narratives described the reverse. This result questions the validity of the Space Syntax as the only method for assessing organic solidarity. They indicated that organic solidarity may possess a spatial logic that deserves further investigation.

In 1880, the core of the Kasbah disappeared, and the Boulevards of La Lyre, Centaure, Victoire, and Vallée shaped a moderately integrated belt around it. Private districts located in alleys and dead ends turned into highly segregated. The imbalance between integration and segregation reduced mechanical solidarity while increasing intimacy and reversing it into segregation. Thus, both collective and individual freedoms changed because of vis-à-vis problems, while streets and places were not meeting points for Muslims. These new extroverted spaces destroyed privacy altered both organic and mechanical solidarity. Djamaa Al-Kabir Mosque has become highly integrated and less accessible because of its larger ways and the Government Place. It has become isolated from the neighborhoods.

Strong integration by extroversion and isolation of public spaces can change how mechanical and organic solidarity is embodied. For instance, the configuration of the church squares, whose aim was to highlight the monuments, does not suit the hallmarks of the ritual spaces of the Muslims, which are humility and the mosque's interior space of as a meeting place. Because monuments represent approved ethics, this event represents a significant shift in ethical trends. The predominance of segregation confirms the unethical principle of the French urban spatial model.

Besides, connectivity analysis of Al-Djaza'ir *Mādina* supported the results of structural reversal via the modification of permeability and hierarchical distributiveness. Increasing connectivity in the Lower Kasbah abolished the spatial hierarchy that supported privacy. It reduced mechanical solidarity as well. High connectivity led to high integration in public spaces at the local level. Meantime, it excluded private spaces. Excessive openness compromised intimacy. It exacerbated personal freedom and reversed it into segregation.

Meanwhile, it undermined spaces for sociability. The traditional urban fabric foundations of the traditional urban fabric were the respect for privacy, the balance between solidarity and individual freedom

values, and the supremacy of private spaces over public spaces. At the same time, French occupation ethics has segregation and egocentrism as anti-values. The predominance of public spaces over private ones and vis-a-vis were the bases of their ethics.

The general theoretical and practical patterns tend to support the hypothesis of the reversal of the ethical trend of the city to another trend. This Islamic city is structured to regionalize the "inhabitant-stranger" interface and globalize the "inhabitant-inhabitant" interface. Conversely, the French quarters are structured to globalize the "inhabitant-stranger" interface. They destroyed the intermediary "inhabitant-inhabitant" collective interface. The configuration of the *Mādina* spaces is based on several integrated axes of distribution and a, better connectivity with the entire urban system, and poor connectivity within the neighborhood districts. Thus, the traditional urban fabric reflects weaker segregation and stronger privacy through deeper and less-connected spaces.

Conversely, in 1880, these spaces turned into more segregated and deepest. The reversed trend line suggests a shift to an opposite state, which represents the reversal of the earlier ethical urban trend. The *Mādina* concretized organic solidarity in the Marine district and mechanical solidarity in residential neighborhoods. This value was embedded around secondary nodes and through the compactness of houses (common walls, vaulted passages, and a secondary urban network of communicating terraces). Thus, the imbalance in 1880 between integration and segregation reduced mechanical solidarity while exaggerating intimacy, reversing it into segregation. These results showed that strong integration could change organic solidarity by extroverted and isolated public spaces. Collective and intimate freedoms have changed because of overlooking buildings and vis-à-vis problems, while streets and places were not the meeting points for the Algerians. This new relationship between interior and exterior spaces destroyed intimacy and altered solidarity. Therefore, the integration results confirmed the reversal of ethics because unethical segregation became the controlling value of the French urban trend.

9. CONCLUSION: TOWARDS CONTEMPORARY ALGERIAN ETHICAL CITIES

The ethical diagnosis of Al-Djaza'ir *Mādina* between 1830 and 1880 corroborated the hypothesis that superimposing the French urban structure on the traditional urban structure has reversed the ethical trend of the city. The theoretical ethical assessment showed that the French urban pattern had antonymous principles to Muslim ethics. Egocentrism and segregation values emerged as signs of a potential ethical reversal.

Practical ethics assessment of the urban fabric in 1830 showed the balanced distribution of integrated public spaces compared to private spaces. According to the space's status this denotes the hierarchical distribution of these values. Personal freedom is concretized in private spaces, and collective freedom, in alleys and proximate mosques. Mechanical solidarity was located in private spaces and secondary nodes, while organic solidarity was located in public spaces in the Marine District and the great mosques.

However, the practical assessment of the French quarters showed an increasing proportion of integrated public spaces compared to private spaces. This diffusion broke down the city structure into two distinctive cores. The bipolarity between the private and the public was exacerbated, and their dialectic was broken with strong segregation into private spaces and organic solidarity into highly integrated spaces. Thus, the pre-existing balance between values of individual freedoms and solidarities has been reversed. In this case, the distribution of ethical values in the Kasbah has become different from Islamic cities. These resulting imbalances excluded and destroyed the traditional Algerian public spaces. They reversed the controlling values of the overall urban fabric's ethical trend. Alteration of its moral order is to be feared. As a result, as space is both the physical embodiment of the city's and society's moral foundations, the reversal of urban principles suggests a reversal of both.

Considering the chaotic urban development of contemporary Algerian cities and the huge number of people involved, the implementation of modern ethics as precepts of the ethical trend of Algerian urban forms may have significant moral implications for Algerian society's moral identity. In other words, the underlying ethical principles of the spatial configuration of the traditional Kasbah *Mādina* represent ethical guidelines for designing Algerian cities. The relationship between society's ethical system and spatial forms provides a better understanding of the conceptual approach to ethical city design by correlating society's moral norms and values with the spatial layout. Creating an abstract concept that fundamentally connects ethics to spatial arrangement underlines the significance of these ideas for design. In this sense, a further study of the *stto*h structure as a secondary network can complete this work.

From such a perspective, we can address the ethical spatial typology that has emerged as a method for

sustaining the social relations' ethical order. This process is feasible through the parallelism between the organization of the society's members and designing the settlement configuration's boundary and the public/semi-public/private hierarchy. This study decomposed the structure of space-related to space ethical principles into variables and spatial indicators of the ethical tendency. Then the challenge is to organize the physical form to fit the 'society's moral identity. This advantage extends to planning the relevant values.

However, designers face problems obtaining tangible knowledge from existing forms that may be connected to ethical parameters. The difficulty arises from the complexity of identifying a link between the tangible embodiment of urban production and the abstract domain of the ethical order. For Arab-Muslim design, this complexity is further compounded by the difficulty of interpreting the Koranic verses (*fikh*) and Hadiths. Thus, to address this issue, we must first overcome problems of description and interpretation. The ethical systems must be described and understood in terms of spatiality, and spatial models must be described in ethical norms (deep structure).

The further problem lies in the difficulty of connecting the core of the ethical principles arising from the moral identity of the inhabitants to the overall structure of form and separating what concerns ethics from traditions and cultural values. Finally, there is the challenge of developing a dynamic design process, in which knowledge gained from the analysis may be integrated into design solutions. As a result, design methods require an ethical system that includes norms for associating urban elements. Neglecting the relevance of the ethical trend of urban form for the city's general structure and movement patterns may be the underlying cause of contemporary urban design problems and ethical crises.

In this study, what is being addressed appears to be a broader issue of retrieving the wisdom embedded in historical forms. The challenges facing designers lie in how to interpret this knowledge and how to reincarnate it in innovative design solutions. In other words, the design challenge seems essentially connected to the problem of describing and ethically interpreting historical forms. The designer has the moral obligation to investigate the morphological features via the lens of ethics to preserve the society's mental health, the common environment and rethink sustainable cities' ethical foundations.

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