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# PERCEPTIONS OF URBAN LANDSCAPE: A STUDY OF COGNITIVE MAPPING IN AIN BEIDA, ALGERIA

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**ABSTRACT**

The urban landscape of Algerian cities features a mix of traditional and contemporary architectural forms, offering a diverse range of experiences and perspectives. The heterogeneous nature of this terrain motivated us to investigate the cognitive representation of this scenery in the minds of the inhabitants of Ain Beida. The study emphasizes the cognitive map, which manifests as visual representations, such as drawings or images, as well as sensory experiences and memories that are gathered and stored over a period of time. The perception of this mental image varies among individuals and locations. We conducted a comprehensive analysis of the existing literature to precisely identify the category under investigation and select a suitable approach for evaluating, comprehending, and interpreting the urban landscape of the above-mentioned city. An iconographic was employed as a research instrument selected to carry out a comprehensive survey with a sample of the population encompassing various socio-professional groups, with a primary focus on urban stakeholders such as architects, urban planners, and elected officials. The findings revealed a diverse range of mental maps, indicating the unique perspectives of each interviewee on their city.

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## Introduction.

Algeria is a strategically advantageous Mediterranean country located in North Africa. Due to its abundant natural resources and expansive territory, this region has been susceptible to being occupied and invaded by several foreign nations and empires such as the Romans, Ottomans, and Europeans. As a result, these conquerors have influenced the local culture and left a lasting impact on the region's identity. Architecture serves as a method of demonstrating the dominance of the conqueror in a particular area, where they create groupings and colonies with a collective understanding. (Ben Hamouche, 2018). For instance, the central area of Ain Beida was once a colonial village erected on top of Roman remains. It had a well-planned urban layout and consistent architectural style, which Kevin Lynch identifies as significant factors when examining the town's visual representation. (Lynch (1976). Following Algeria's

independence and the subsequent demographic explosion, the indigenous population surpassed the European population in numbers (Ben Hamouche, 2018). This, coupled with rapid urbanization, led to a prevalence of heterogeneity, manifested in urban entities in a state of perpetual construction. This phenomenon has had a detrimental effect on the city's image, resulting in chaos and visual pollution. In such cities, every inhabitant aspires to have a home that suits their lifestyle. (Tjibaou, 2004). Additional elements that have contributed to this predicament include globalization and industrialization, which have involved the use of standardized procedures and materials. The initial iterations of pre-fabricated home developments played a role in the formation of legendary residential areas lacking character or distinctiveness. Contemporary identity is characterized by the fluctuation between acknowledging its own existence and referencing its historical background (Pomerleau, 2009). In addition, the growing prevalence of "alucobond" aluminum cladding in industrial settings has intensified the perceived disorder. This observation prompts us to examine the impact of this urban combination on individuals' recollections. Considering the influence of the factors mentioned above on the quality of the urban landscape as perceived by individuals, it is reasonable to question the suitable methodology for analyzing this phenomenon and gaining a deeper scientific understanding of the lived and felt landscape.One possible method of objectively describing the qualities of urban environment is by utilizing spatial cognition and tools such as the Mind Map to assess sensations.

**From perception to cognition.**

Kevin Lynch views the city as an entity that is perceived by numerous individuals and created by builders, architects, and landscapers on a large scale (Lynch, 1976). The city is a composite of various components that are built upon each other throughout time and generations, implying that it is not static but rather continuously evolving (Haas, 2004). This suggests that the city is not a fixed entity, but rather a product of ongoing construction and development (André, 1987).

According to Heyrem (1992), the city can be compared to a person that has a skeleton and a memory. This means that the city has a physical structure and also retains the experiences, culture, and memories of its inhabitants, which shape how the city is perceived. (Haas, 2004; Ouaret Laajouze, 2019). Every person is part of a distinct sensory realm (Mouzoune, 2005). The landscape can be described as a visual expanse (Boumezoued, 2021). where the information captured by the eye is transformed into an image**.** (Ouaret Laajouze, 2019). Lynch's definition states that all visual stimuli are categorized as sensations. (Lynch (1976). which are characterized by an emotional rather than intellectual representation of an item or place. (André,1987). This means that sensations generate a space that feels more authentic than what is actually being represented, and this space is more constructed than experienced. (Bailly, 2018) . In order to comprehend and examine this landscape as a perceived image, Norberg Schulz asserts that the process of perception commences with vision and culminates with comprehension (Chaney, 2010). However, it depends on sensory input from the five senses to develop an emotional, cognitive, interpretive, and evolutionary understanding (Boumezoued, 2021).

According to Arnheim, thinking is closely related to visual perception. (Chaney, 2010). This connection is facilitated by a mental representation called the "mental map," "cognitive map," or "spatial representation" of a city .(Madani Bousnina ,2016), or any other space that an individual experiences, dreams of, imagines, sees, or perceives. (Fournand, 2003) . The method described by Depeau and Ramadier (2011) is designed to capture both the physical and social aspects of a place. It enables individuals to gather information about their surroundings and use it to create their own mental representation of the area. Tolman introduced the concept of "cognitive map" in 1948 through an experiment involving rats navigating a maze. The rats utilized a learning strategy to develop their own mental representation of the environment, enabling them to navigate effectively. (Chaney ,2010). Urban studies, like other disciplines such as economics, geography, and healthcare, employs the concept of a mental map to examine how individuals perceive and represent their physical surroundings (Haas, 2004). In order to acquire a mental representation of a concept or idea, it is necessary to externalize the information by formulating a question or requesting them to create a visual depiction or illustration on a pre-existing map. This is based on introspection (Haas, 2004) to comprehend cognitive processes (Chaney, 2010). Occasionally, this method is supplemented with a questionnaire to gain a deeper comprehension of individuals' thoughts and perspectives regarding their urban environments. The initial exploration was conducted by Kevin Lynch in his book "The Image of the City," where he examined the urban landscapes of Jersey City, Boston, and Los Angeles. Lynch (1976) identified five distinct

elements of the city: landmarks, nodes, neighborhoods, boundaries, and routes. Another study conducted in the city of Angers corroborated these components. The study involved 86 individuals of all ages who created mental maps, ranging from small communities to larger urban areas, including neighborhoods and cities (Rowntree, 1997). In his study of the city of Tipaza, Khettab examined the predominant features represented on the cognitive maps of the city. These features consisted of 30% landmarks, 40% roads, and the remaining portion represented boundaries (Khettab & Chabbi-Chemrouk, 2017). Landmarks are crucial features that residents depend on to describe a city, area, or location. The case study of Paris, in which 80% of surveyed individuals included the Eiffel Tower and the Seine in their mental images, is highly instructive (Depeau & Ramadier, 2011). In her thesis on the city of Sétif, Bousnina aimed to identify additional factors that could contribute to our understanding of the cognitive mapping technique employed by interviewees. According to Madani Bousnina (2016), residents utilize fragments, morphic structure, and mnemonic spatial referents as methods to create their maps. (Madani Bousnina, 2016) The city center is a prominent feature in the mental map drawings of Tipaza, as indicated by Khettab and Chabbi-Chemrouk (2017). The Saint-Denis promenade workshop featured drawings that included words, physical elements, and emotions as components. (Bailly, 2018). These drawings are commonly examined with youngsters from the town of Garges-lès-Gonesse, whose emotions significantly impact the composition of the drawing (a combination of a frontal and top view) (Depeau & Ramadier, 2011). Age has not been found to have an impact on emotions. For instance, the inhabitants of Vichy rely on their memories to create their cognitive maps (Haas, 2004).

In 1987, a telephone survey was conducted with a sample size of 300 individuals. The population under study was categorized into two groups: residents and non-residents. Residents perceived their city through a favorable lens, whilst non-residents had a tendency to focus on the negative aspects. A city can have multiple representations within a single context (André, 1987). The study conducted in Montenegro examined several categorizations of representations, which were classified into four distinct groups: political, administrative, geographical, and historical cognitive maps (Cattaruzza, 2008).

To summarize, the mental or cognitive map serves as a means of analyzing the city to gain comprehension, interpretation, and examination of its elements. Additionally, it can be utilized as a tool to assist visually impaired individuals in navigating their surroundings by constructing mental maps that include relevant information such as distance, duration, obstacles, and routes (Mouzoune, 2005).

**Methodology.**

This study will use a questionnaire iconographic. We conducted a preliminary survey to a PhD student specializing in architecture and a former administrator from the town of Ain Beida, with the objective of evaluating the concept and understanding. Following this stage, surveys were distributed to 37 individuals representing various socio-professional groups, including architects, landscape architects, urban planners, engineers, technicians, and elected officials from 8 departments (MPA[1], PES [2], SUAC[3], SH[4], GPHC[5], Land Agency, Public Works Agency, Daïra (sub-prefecture) of the Ain Beida commune). Participants were instructed to provide responses to create a cognitive representation of the town of Ain Beida on an A4 paper, without the use of a scale. The previous sketching task was conducted individually, requiring each interviewee to utilize their own imagination to construct a mental map.

**The representation of the urban landscape of Ain Beida.**

Ain Beida is a town in Algeria situated on the elevated plains of eastern Algeria (Bouchemal, 2009). It is positioned at the intersection of the RN10 and RN80 main roads, which connect four significant wilayas on both sides, namely Constantine, Tébessa, Guelma, and Khenchela (Benghadbane & Berkani, 2017). The town has a higher population density compared to other communes in the same wilaya(Benghadbane & Berkani, 2017), with more than 2,000 residents per square kilometer (Bouchemal, 2009).

[1] MPA stands for municipal popular assembly.
2 PES: Public Equipment Subdivision
3 SUAC stands for Subdivision of urban planning, architecture, and construction.
4 SH: Housing subdivision
5 General Population and Housing Census

The settlement's origin may be traced back to a Roman town called Marcimeni, which was established in a grid pattern with fundamental geometric shapes and right angles (Bouchemal, 2009). The core, constructed by the French colonial engineering services, has 131 residences and several diverse institutions including educational, religious, tourism, and administrative establishments (Mazouz & Adad, 2018). The architectural style of the building is distinguished by a uniform European design, which includes features such as aligned bays, symmetrical layout, long windows, the use of cut stone, and ornamental details.

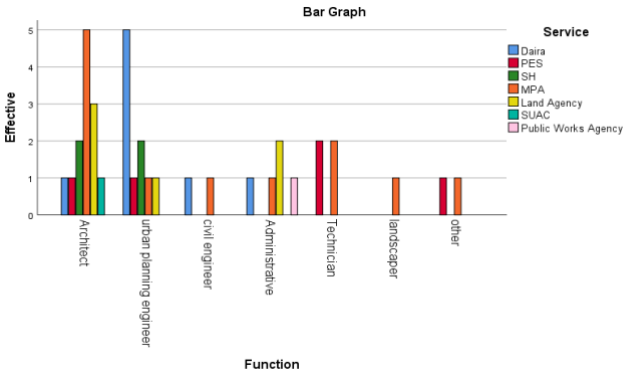
In close proximity to the colonial village, situated in the southeastern region of the town, one will come across dwellings constructed from stone and adobe that are characterized by their unstable nature. The urban growth in this area of the city commenced following the removal of the ancient residences, resulting in the establishment of districts characterized by inward-facing dwellings (Zaouia, Murienne, and Savary) (Bouchemal, 2009). Following independence, the city experienced urban expansion in its northeastern and southeastern regions with the development of residential areas, while the western half saw the establishment of ZHUNs and an industrial zone (Mazouz & Adad, 2018).

As the city expanded, it preserved the remnants left behind by previous civilizations. Subsequently, globalization led to the development of a diverse and varied architectural style in the urban landscape of this city.

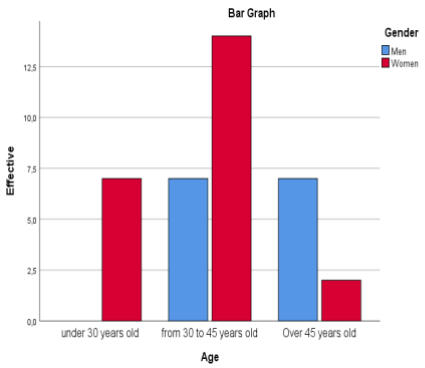
**The Urban landscape of the city of Ain Beida.**

The names urban landscape, urban space, and built environment all refer to the same concept: a living space where the primary interaction is between the individual and their surroundings. (Faburel, Geisler, & Manola, 2014) According to Amos Rapoport, this relationship is a mechanism that relies on the observation and use of the other senses in the environment (Merdji, 2010). This mechanism represents the unique perception of individuals (Santiago, 2007), who are the mobile elements in the city, while the stable elements are the buildings created by architects, landscapers, and urban planners. (Lynch, 1976)

In order to assess the public's opinions on this urban product, we conducted a survey with 37 individuals who are residents of Ain Beida. These individuals come from various socio-professional backgrounds and are spread across different departments of the commune, including MPA, PES, SUAC, SH, GPHC, Land Agency, Public Works Agency, and Daïra (sub-prefecture) (refer to graph 01). The survey consisted of 14 men and 23 women of different age groups, with the majority falling between the ages of 30 and 45 (refer to graph 02). Architects and urban planners were the most prevalent professions, accounting for 27% and 35% respectively. (Refer to graph 01).




*Graph 1. Distribution of people in the various facilities of the Ain Beida commune.*




*Graph 2. Personal information of selected socio-professional category (age, gender).*

**Mental map of the town of Ain Beida.**

Mouzoune (2005) in his research defines a mental map as a visual depiction that encompasses a person's knowledge and past encounters. The subjective method restricts the connection between an individual and their surroundings (Depeau & Ramadier, 2011), enabling them to express their perception of their surroundings through their sensations, emotions, and

recollections. Alternatively, it might be described as a discerning method of addressing urban areas (Boumezoued, 2021). A cognitive map, also referred to as spatial memory, is a term used to describe the mental representation of spatial information (Haas, 2004).

To acquire this spatial result, the recommended approach is to express knowledge through the act of sketching, which is essentially a mental process (Haas, 2004). We opted to implement this approach in the chosen city by administering a visual questionnaire to individuals belonging to the same socio-professional group that we previously studied. We instructed them to create a cognitive representation of the city on an A4 sheet of paper, without the use of a scale or ruler. The objective was to examine and comprehend the geography and visual representation of this urban area.

To gain insight into someone's cognitive processes, you may pose this inquiry to an individual or a collective (Chaney, 2010). The diversity of concepts gives rise to the formation of numerous orphic structures. The latter enumerates all the constituent pieces of the drawing (Madani Bousnina, 2016).

Four individuals out of the total of thirty-seven participants who were questioned refused to create drawings because they believed that the city's shape was not accurately defined and that the absence of recognizable landmarks made it difficult to represent the city effectively.

Using a schema to describe the city enables respondents to represent their city using various morphic structures, adapting fragments and information to enhance the clarity of their illustrations. Building upon Appleyard's (1970) and Madani Bousnina's (2016) research on the formation of the mental map, our objective was to analyze its morphic structure. To achieve this, we categorized the spatial presentations and examined the approaches used by individuals in their work. Displayed above are mind maps created by individuals from various socio-professional backgrounds. In cognitive map 26 , the respondent utilized three morphic structures to depict the city as a task that is separated into two axes and a central center (Refer to Fig 01). Cognitive map number 07 illustrates the latter, which is penetrated by a central axis , intersection with node and surrounded by buildings that create an urban fabric (Refer to Fig 02). Map 11 likewise unambiguously represents the latter (Refer to Fig 03).Map number 14 displays a central core, encompassed by annotations that indicate the location (Refer to Fig 04). It should be noted that the design of a mental map is derived from the amalgamation of one or more morphic structures.

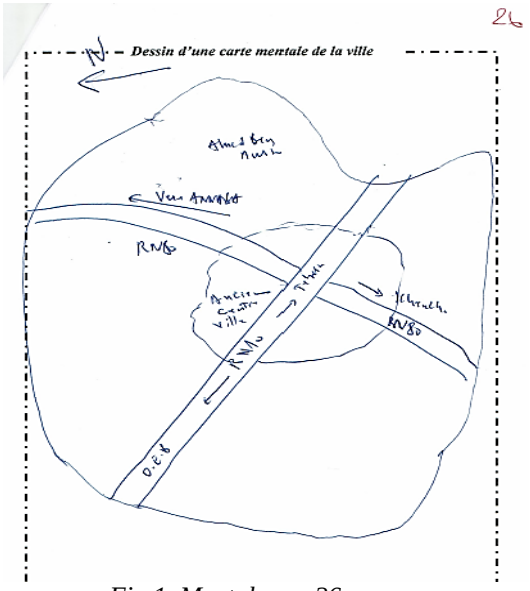



*Fig 1. Mental map 26.*

*By the director of public works, Ain Beida , the drawing presented as a spot, axial and centrality*

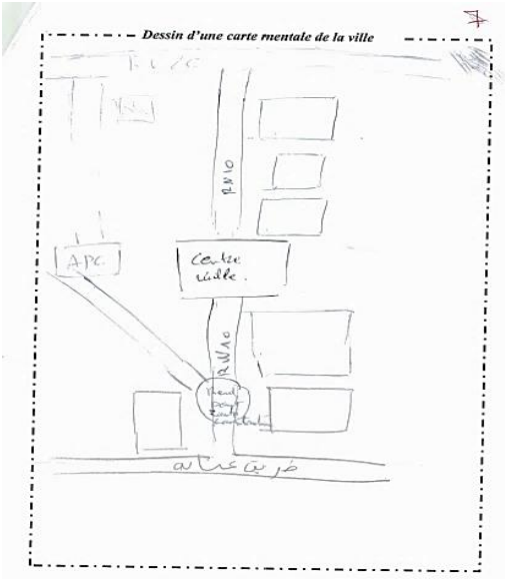



*Fig. 2. Mental map 7.*

*By an urban planning engineer at the Daïra of Ain Beida , the drawing presented as a centrality,*

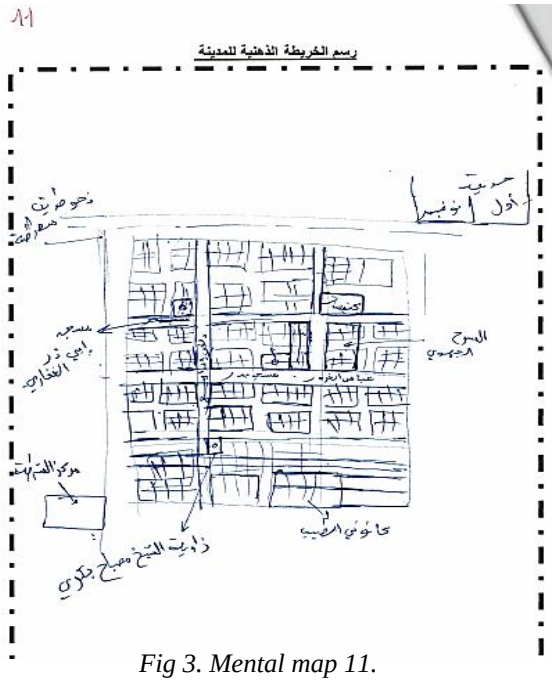



*Fig 3. Mental map 11.*

*By a state housing and urban planning engineer at the PES service the drawing presented as a fabric form*

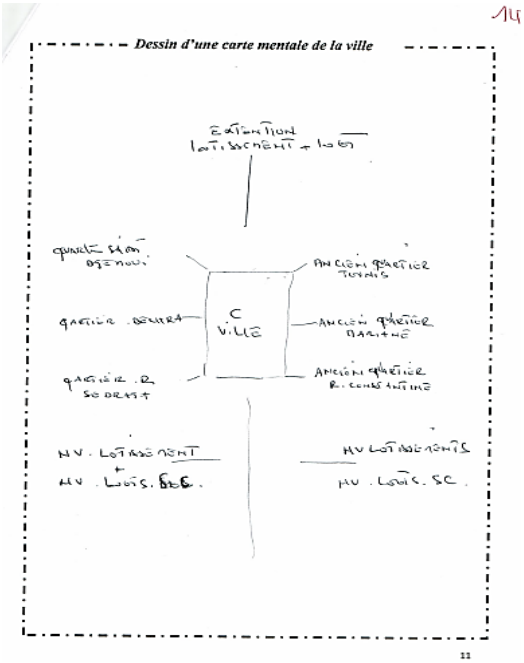
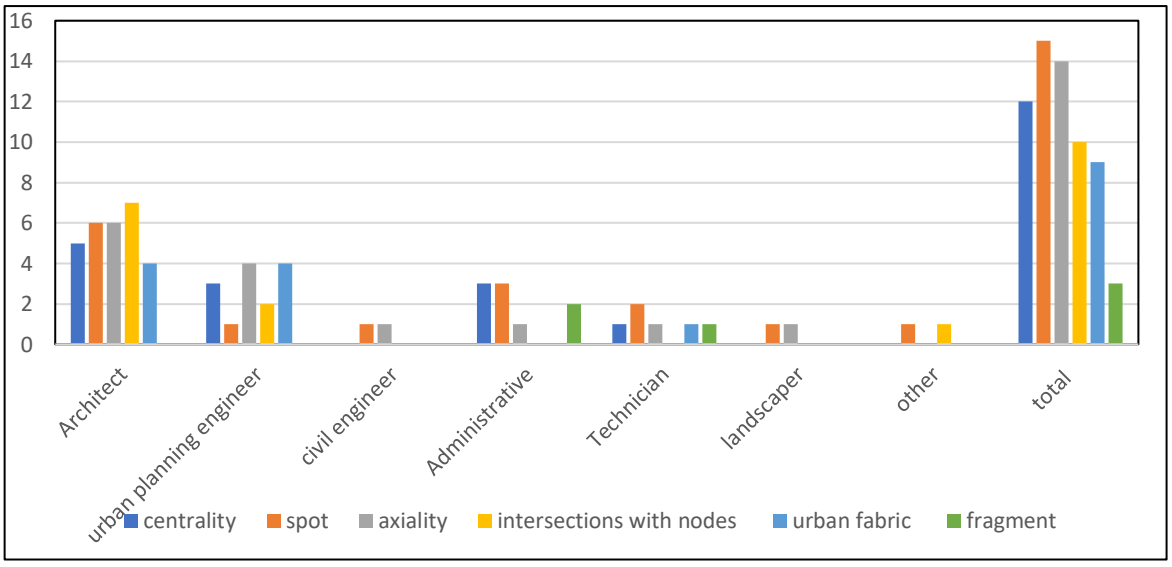



*Fig 4. Mental map 14.*

*By an urban planning technician at PES service the drawing presented as a centrality and fragment form*

Architects predominantly utilized drawing techniques that emphasized centrality, spot, axiality, and intersections with nodes. Four architects specifically opted for presenting their work through the concept of urban fabric. Similarly, urban planning engineers also employed the idea of fabric to show their map, while incorporating centrality, spot, axiality, and intersections with nodes. While individuals lacking drawing skills or map representation knowledge utilized fragments, administrators and technicians employed this technique to elucidate their concepts. The total show that spot , axiality and centrality morphic structures are the most frequently used by the interviewers. (Refer to graph 3.)




*Graph 3. The relationship between morphic structure and function.*

**The spatial topology of mental maps.**

After analyzing and understanding the cognitive maps drawn by the interviewees, we present a new drawing technique consisting of seven forms of representation of the city on a map, where perception differs from one person to another. The forms are classified from micro to macro, where each person sees the image of his or her city from a different angle, as a whole or as a slice of the city.

**1 / the city as a whole:**

**Shape (O):** the city as a mass, drawn as an empty geometric or organic form, with no details or information about the representation.

**Shape (OK):** the city is presented as a divided mass with axes forming slices; most drawings show the intersection of the axes as the heart of the city.

**Shape (BOK):** this is the most detailed representation of the city, in the form of named physical elements chained together with axes in a defined space or zone, either a representation of the whole city or a piece of it.

**Shape (OB):** a pin-shaped mass with names of physical elements to mark the space.

**2 / The city as a slice:**

**Shape (BK):** the city is presented in the form of named and drawn physical elements, linked with axes.

**Shape (B):** this shape presents a set of annotations of the city's physical components.

**Shape (K):** the city center and traffic circles are the result of intersecting axes.

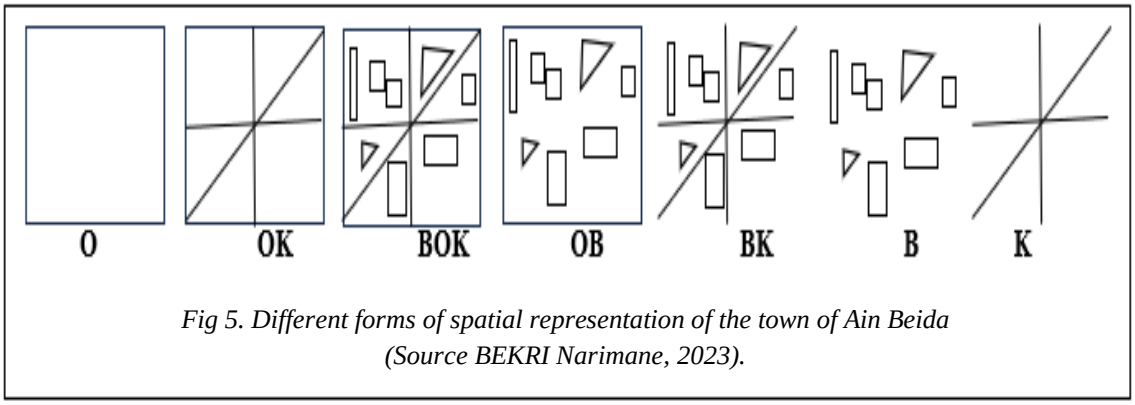
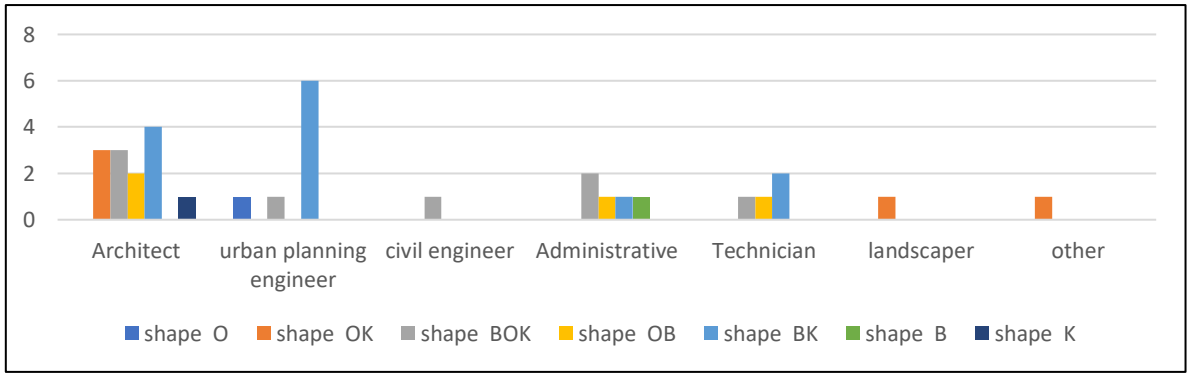



*Fig 5. Different forms of spatial representation of the town of Ain Beida (Source BEKRI Narimane, 2023).*

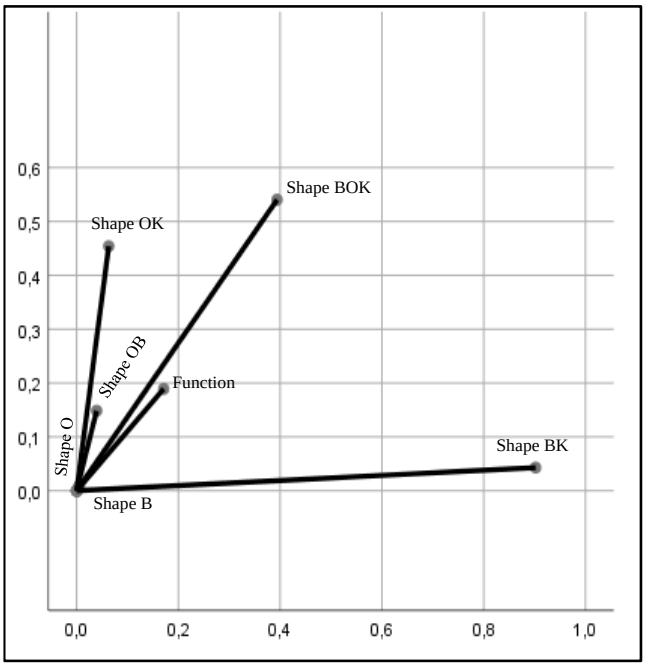



*Graph 4. Classification of forms of representation according to the vision of the interviewers.*

The spatial shapes that are most commonly employed are those that incorporate axes in their representations, specifically the BK, BOK, and OK shapes in increasing order. These axes are the primary features that are deeply ingrained in people's minds, which is why their maps are structured around them. .(Refer to graph 04.)

The BOK form exhibits a robust correlation with function, as nearly one out of every three individuals from each socio-professional category opt to depict the city in this manner, providing a comprehensive and elucidated representation. .(Refer to graph 05.)

Architects selected multiple forms of representation, including OK, BOK, OB, BK, and K. On the other hand, most urban planners opted for the BK form, along with the O and BOK forms. Civil engineers chose the latter option. Administrators choose to depict their towns using forms that include annotations of physical elements (BOK, OB, BK, B). Similarly, technicians who chose shapes such as BOK, OB, and BK also utilized annotations to enhance comprehension and facilitate the identification of certain locations and landmarks. Landscape architects and other professionals were drawn to the distinctive shape of Ain Beida, which may be described as a mass divided by two axes, namely RN10 and RN80. The intersection of these two national roads is considered the central hub of the town. (Refer to graph 04.)




*Graph 5. correlation between choice of spatial representation form and function.*

**Graphic annotations.**

Almost all depictions utilize annotations to improve readability, with most of them adopting asserted designations. The initial stage in comprehending the significance of the designated locations involved consolidating the various graphic annotations. These locations include the November 1st garden, commonly referred to as downtown Garden, Jnina[1] the Square, the Magenta Garden. The Abbes Laghrour boulevard, also known as Roud Essaymine[2]. The Ennahda cinema, also known as Cinema Chenni. The Ennasr cinema, known as Cinema Le Phare, and the shopping center, commonly known as the Galleries or Monoprix.

Upon categorizing the cognitive and unified maps into smaller groupings, we provide a selection of the graphical annotations referenced in the table below. When discussing communities and public services, people commonly refer to roads and facilities, but nodes and monuments are rarely addressed. (Refer to table 01.) Kevin Lynch's classification of the city consists of several component parts, such as facilities, public services, monuments (referred to as landmarks), neighborhoods, roadways, nodes, and boundaries.

[1] The term "claimed name" denotes a garden or a green spot that is enclosed

[2] The name in question pertains to a wide street or narrow passage

Table 1. Some graphic annotations mentioned on the mental maps City of Ain Beida.

| Citation | Route | Facility | Neighborhood | Public Service | Monument | Nodes | Other |
|---|---|---|---|---|---|---|---|
| Name | Constantine Road Annaba Road Meskiana Road Khenchela Road Beriche Road Boulevard Abbes Laghrour Boulevard 1 Novembre Etc | Industrial Zone Zerdani Salah Hospital The university center The swimming pool Post office November 1 Nursery Etc | Downtown Ahmed Ben Moussa neighborhood AADL[1] Housing HLM[2] Elkahina subdivision Elhamlaoua ia Tunis district Etc | Pine forest Garden of Meskiana road Garden 1 November Stairs Kabech bus station Graveyard Station Place of martyrs Etc | White Mare Status | Roundabout Constantine road | Pos A[3] Chaos POS 1 POS B2 POS North City boundary Etc |
| N | **81** | **112** | **37** | **14** | **3** | **2** | **10** |

**The collective map of the town of Ain Beida.**

Define as collective image or common mental representation (Lynch, 1976). The collective map is a representation that combines individual and cognitive viewpoints (Haas, 2004) or a social system that overlays individual maps (Chaney, 2010) onto a single map or visual document that shows the overall image of the group. Every person experiences, envisions, or dreamt about a physical environment they inhabit (Fournand, 2003). The map above illustrates the overlay of all spatial representations provided by the interviewees. The majority of the mentioned elements are situated in the town center, organized as neighborhoods (such as the colonial chekerboard, Murienne Neighborhood, and Zaouïa Neighborhood). These include various educational institutions (such as Kanouni Tayeb School, Ibn Sina Middle School, and Abd El Hamid Abbabsa Highschool), administrative facilities (MPA, Daïra, Post office), religious establishments (Si Mosbah Bekri mosque, El Atik mosque), security facilities, commercial establishments, and cultural facilities (such as Ennahda cinema and Ennaser cinema). Additionally, there are boulevards and shopping roads (such as Abbes Laghrour Boulevard and Delfi Ibrahim Boulevard). However, other parts of the city receive less attention from the interviewees. North of the town, interviewees refer to several notable locations including the Bourahli villas and structures, the university center, the cemetery, the Elmostakbal district, the Ahmed Ben Moussa area, and the Belle-vue neighborhood. In the southern direction, the Sidi Jmouai neighborhood, the Salah Zerdani hospital, a sports facility, many educational institutions (Kouchari School, Fadli Middle School, Paramedical School), and an administrative facility (NEMA[4] ) are mentioned. The high school, stadium, and swimming pool are situated in the Elkahina and Elhamlaouia neighborhoods, which are located in the eastern section of the town. The western section of the town includes the industrial area, the mosque, the El Ahram neighborhood, and the pine forest. ( refer to Fig 06 and 07 )

Kevin Lynch's perceptual analysis categorizes the bulk of the above items into five groups and places them in the center of the city. Lynch has identified several physical components that enhance the comprehension of the urban environment: roads , landmarks, nodes , boundaries and neighborhoods .

[1] French acronym means, National agency for housing improvement and development
[2] French acronym means, low-cost housing
[3] POS ; acronym of Soil use plan
[4] is an acronym that stands for the National Employment Agency

These elements have a significant impact on how the city's image is perceived (Lynch, 1976).

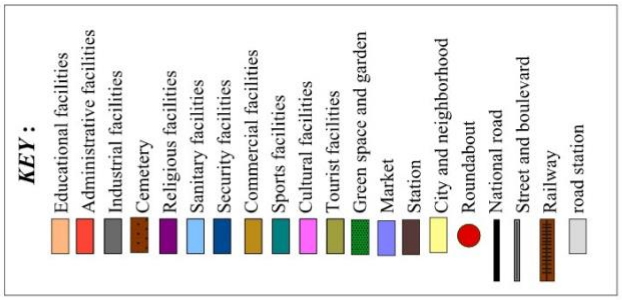



Fig 07 : Legend for the various compements ( Source: BEKRI Narimane.2023 , Produced by ArchiCAD )

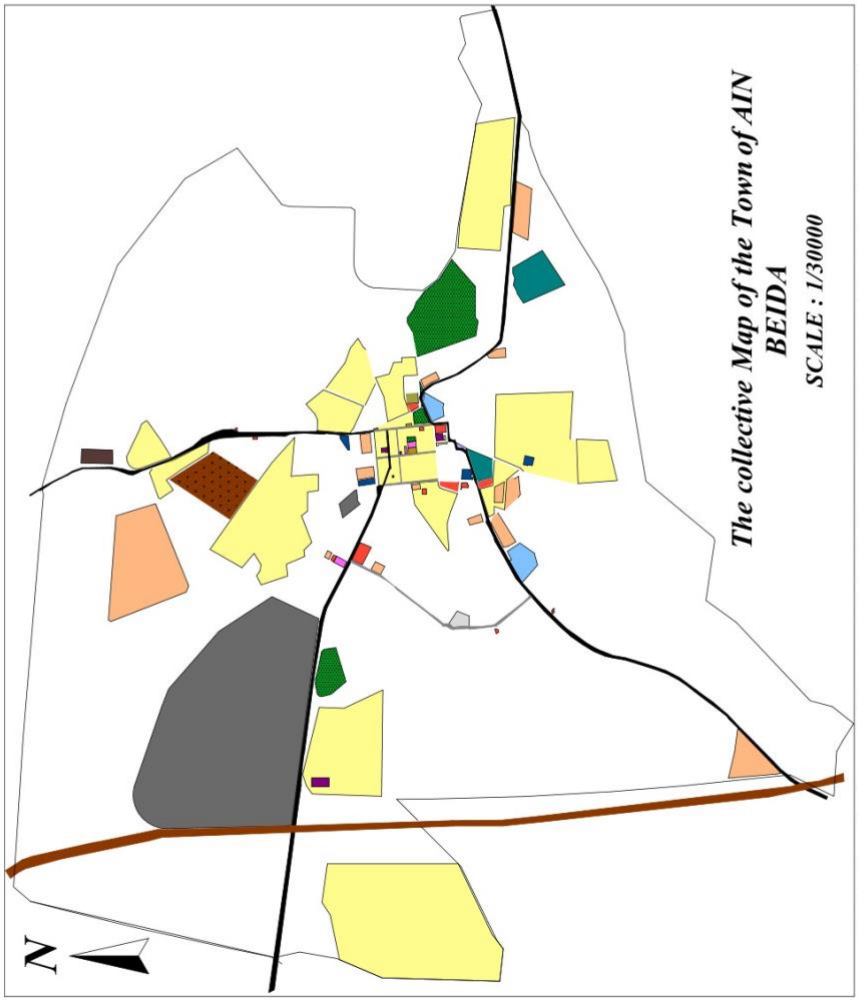



Fig 06 : The collective map of the town of Ain Beida ( Source: BEKRI Narimane.2023 , Produced by ArchiCAD )

**Conclusion.**

The interpretation and perception of the urban landscape of Ain Beida vary among individuals, based on their distinct socio-professional backgrounds, including architects, urban planners, technicians, engineers, and elected officials of the city. The visual questionnaire unveiled an additional aspect of the city: cognitive maps depicting various morphic structures. Each map encompasses a collection of knowledge about the city, etched into the participants' minds, aiding them in creating coherent and comprehensible representations of their maps. The city's shape, limits, principal axes (the RN10 and RN80 trunk highways), physical elements, and the town center, which is present in almost all the designs, converge to create an intersection of axes. This junction represents an urban fabric and includes annotations.

Architects and urban planners have chosen to depict their city using various morphic structures, including centrality, axiality, spot, urban fabric, and intersection with nodes. By employing semiology, we have created spatial configurations that classify individuals' cognitive perspectives into two distinct groups: the initial group perceives the city as a unified entity (O, OK, OB, BOK), whereas the second group perceives it as a constituent part (B, K, BK). Each category encompasses one or more geometric principles to aid in the process of drawing. Annotating physical characteristics on maps served as a means of identifying and visualizing familiar areas, and the categorization of these areas led to the establishment of the five constituents of a city as defined by Kevin Lynch (roads , boundaries, nodes, neighborhoods, and landmarks). The outcome of consolidating all these parts onto a solitary map is the collective map, where the central area of the city has gathered the majority of the specified components, while the other ones are distributed over the four edges of Ain Beida city.

Ultimately, the graphic of the questionnaire depicted the elements of this environment and provided insights into how to organize a city based on the expertise of professionals in the fields of architecture and urban planning.

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