# THE HISTORY OF SQUARE FORMATION AND PECULIARITIES OF COMPOSITIONAL FORMATION

**Zhora Sagaryan**

*National University of Architecture and Construction of Armenia, Yerevan, RA*

***Abstract:*** *This work delves into the compositional aspects of urban space organization, aiming to provide an overview of the historical development of squares and elucidate the intricacies of their compositional formation through the analysis and comparison of various examples. The article draws upon published materials and employs scientific methods of generalization and analysis. It synthesizes the history of square formation and development while scrutinizing the key characteristics influencing square composition. By examining 40 squares at different times and locations, certain recurring features impacting compositional formation–such as perception of space, degree of enclosure, architectural and compositional imagery, and scale–have been identified. Furthermore, the study identifies additional factors affecting the formation of square composition, the further exploration of which promises to enrich and refine ongoing investigations on the subject matter. The insights gleaned from this study hold relevance for future scholarly endeavors concerning square composition and for researchers with an interest in the study of squares in general.*

***Keywords:*** *square, spatial organization, compositional formation, proportionality, visual perception.*

**Zhora Sagaryan**

E-mail: sagaryanzhora@gmail.com

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## Introduction

Public squares hold significant importance as public spaces within urban environments. They serve as open areas that reflect the identity of cities and the cultural background of communities, acting as hubs for communal gatherings and urban activities since ancient times. As fundamental components of city structures, urban squares contribute significantly to a city's image and prestige [1]. Historically, public spaces have been central to population centers, tailored spatially and functionally to suit the needs of surrounding cities or towns [2]. Throughout history, squares have evolved, undergoing functional and compositional changes from Ancient Greece to the present day. One of the earliest examples of public squares is the Greek Agora, which played a vital role in Greek city life, serving as an open space in the city center for political, social, and economic activities [1]. Greek agoras hosted a variety of gatherings, including political meetings, athletic competitions, theatrical performances, and commercial activities [3]. The next significant period of square development occurred in Ancient Rome with the creation of the Roman Forum, which synthesized elements of the Greek agora and acropolis. Subsequent periods saw the emergence of trade squares in the Middle Ages, predominantly in European countries, followed by the dominance of Italian piazzas during the Renaissance and Baroque periods. The period of classicism also left its mark on square development. The 19th and 20th centuries were pivotal for the compositional and functional evolution of squares, leading to our current era, where squares seem to have lost their primary societal role without clear functional significance. Throughout different historical periods, theorists from Vitruvius to Francis Chin have examined the history and compositional development of squares in their works. Various researchers have dedicated studies to specific types of squares, such as the Greek Agora and Roman Forums. For instance, works by John McK. Camp, Jamieson C. Donati, Flavio Barbini, and others [4-11] have covered the Greek agora, while the Roman forums were first covered by Vitruvius, and notable contributions have been made by David Watkin [9, 12-17].

Additionally, there are various studies on squares from the Middle Ages, the Renaissance, Baroque, Classicism, and the 19th and 20th centuries [1, 4, 8, 9, 18-24]. However, existing research primarily focuses

on the general history, design, and construction of squares, their societal role, and their relationship with surrounding buildings. There is a lack of comprehensive exploration of issues such as square composition, factors influencing spatial organization, and compositional principles, as well as limited research on proportional analysis and comparison of squares from the same or different eras and locations. This study aims to address these gaps by providing a comprehensive overview of the history of square creation and revealing the peculiarities of their compositional formation through analysis and comparison of various examples. The focus of this work is particularly on compositional principles, spatial organization issues, and proportionality factors influencing square formation.

## Materials and Methods

This work has been developed based on material published on the subject, including scholarly articles and books, utilizing scientific methods of generalization and analysis. The first part of the study focuses on the general history of square creation, presenting the evolution of squares across different periods and locations. In the second part, a detailed analysis of typical characteristics influencing square composition is conducted. For this research, 40 squares from various eras and locations were selected for analysis and comparison, resulting in the creation of a relevant Table. The selected squares are chronologically arranged from the 6th century BCE to the 20th century CE and classified according to periods. During the analysis of square composition, three indicators were utilized: a) the ratio of square width to length, b) the ratio of square width to the height of surrounding constructions, and c) the ratio of lengths between open and closed parts of the square's construction perimeter. The examination of these selected squares allowed for the identification of certain characteristics influencing square composition, including the degree of enclosure, architectural and compositional imagery, and scale. Additionally, other characteristics influencing square composition formation were identified, with further study expected to enrich and clarify the research material on the subject. The insights derived from this study are pertinent for future scholarly endeavors concerning square composition and for researchers interested in the broader study of squares.

## Results and Discussion

### Emergence and formation of squares

#### *Agora*

Arguably the most renowned public space of all time, the ancient Greek agora served as the primary public square and meeting place of the town. Initially a marketplace, the agora transcended its commercial function to become a venue for assembly, ceremonies, and spectacles, where economic, political, and cultural activities intertwined, forming an integral platform for the city's social life [4]. Physically, the agora stood as the central node of an ancient Greek city, with significant roads converging here from various directions, facilitating the movement of people, money, goods, and ideas [5]. Agora, serving as both a market and the political center of Greek cities, typically featured a square surrounded by porticos in one or several colonnades [6]. The agora was typically a square or rectangular space [7]. In the 6th century BCE, Athens created its agora as a space for citizen assembly, where orators could address the populace and exchange ideas, reflecting Greek society's democratic principles [8] (Fig.1).

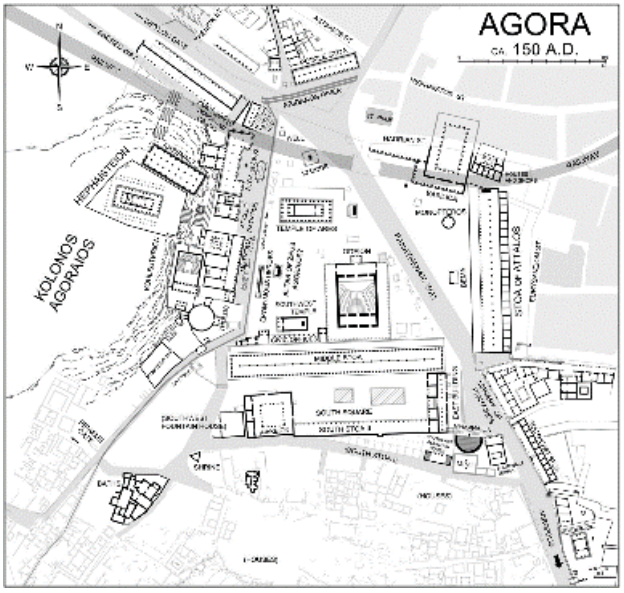



**Fig. 1.** *Plan of the Athenian Agora*

**Table**. Analysis of 40 selected examples

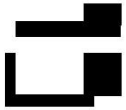
| № | Period | Type of public square | Name of the public square | Plan | The ratio of width to length | The ratio of width to height | Compositional principle | The ratio of the lengths of open and closed sections along the perimeter |
|---|---|---|---|---|---|---|---|---|
| 1. | Ancient Greece | Agora | Agora of Athens, 6th century BCE |  | 1 | 12.09 | asymmetric | 0.51 |
| 2. | | | South Agora of Miletus, 3th century BCE |  | 0.8 | - | symmetric | 0.06 |
| 3. | | | Agora of Priene, 3th century BCE |  | 0.85 | - | asymmetric | 0.14 |
| 4. | Ancient Rome | Forum | Forum Romanum |  | 0.4 | 1.7 | asymmetric | 0.21 |
| 5. | | | Pompeii Forum, 4th century BCE |  | 0.2 | - | asymmetric | 0.28 |
| 6. | | | Ostia Forum, late 6th or early 5th century BCE |  | 0.36 | - | disymmetric | 0.31 |
| 7. | Middle Ages | Medieval market square | Jemaael-Fnaa, Marrakesh, 11th century |  | 0.58 | - | asymmetric | 0.38 |

Table (continued)

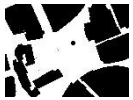
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8. | | | Markt, Leipzig, 12th century |  | 0.43 | 1.6 | asymmetric | 0.28 |
| 9. | | | Grand-Place, Brussels, 12th century |  | 0.61 | 0.7 | asymmetric | 0.13 |
| 10. | | | Old Town Square, Prague, 12th century |  | 0.61 | 0.92 | asymmetric | 0.42 |
| 11. | | - | Piazza della Signoria, Florence, 13th century |  | 0.5 | 0.97 | asymmetric | 0.22 |
| 12. | | - | Piazza del Campo, Siena, 13th and 14th centuries |  | 0.66 | 1.08 | asymmetric | 0.15 |
| 13. | | Medieval market square | Main Square, Kraków,13th century |  | 1 | 2.4 | asymmetric | 0.25 |
| 14. | | Town square | Münsterhof, Zürich, 13th century |  | 0.6 | 1.5 | asymmetric | 0.11 |
| 15. | | Medieval market square | Raekoja plats, Tallinn,14th century |  | 0.83 | 1.02 | asymmetric | 0.24 |
| 16. | | - | Piazza Maggiore,Bologna, 12-15th century |  | 0.49 | 1.19 | asymmetric | 0.24 |
| 17. | | City's main public square | Piazza San Marco, Venice |  | 0.3 | 0.70 | asymmetric | 0.13 |

Table (continued)

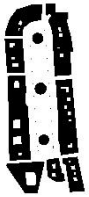
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18. | 16th century | Renaissancesquare | Piazza della Santissima Annunziat,Florence, 16th century |  | 0.85 | 3 | disymmetric | 0.10 |
| 19. | | | Piazza del Campidoglio, Rome, 16th century |  | 0.5 | 1.55 | symmetric | 0.4 |
| 20. | | | Piazza dei Signori, Vicenza, 16 century |  | 0.22 | 0.33 | asymmetric | 0.21 |
| 21. | 17th century | - | Nytorv, Copenhagen, 1610 |  | 0.49 | - | asymmetric | 0.24 |
| 22. | | Baroque square | Saint Peter's Square (Piazza San Pietro), Rome, between 1656 and 1667 |  | 0.7 | 1.4 | symmetric | 0.11 |
| 23. | | | Piazza del Popolo, Rome, 17th century |  | 0.6 | 3.6 | disymmetric | 0.2 |
| 24. | | | Piazza Navona, Rome, 17th century |  | 0.2 | 0.8 | disymmetric | 0.07 |

Table (continued)

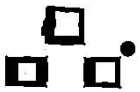
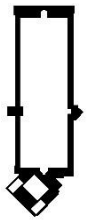
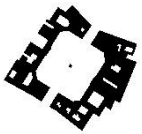
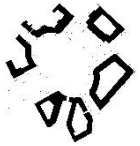
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 25. | | | Piazza San Carlo, Turin, 16-17th century |  | 0.43 | - | disymmetric | 0.15 |
| 26. | | - | Plaza Mayor, Madrid, built between 1617 and 1619 |  | | 1.56 | symmetric | 0 |
| 27. | | - | Registan, Samarkand17th century |  | 0.84 | 1.93 | disymmetric | 0.66 |
| 28. | | - | Naqsh-e Jahan Square, Isfahan,16th and 17th centuries |  | 0.28 | 3.07 | disymmetric | 0 |
| 29. | 18th century | Classicism square | Place Vendôm, Paris,1699 |  | 0.9 | 5 | symmetric | 0.1 |
| 30. | | - | Wright Square, Savannah, 1733 |  | 0.87 | - | asymmetric | 0.59 |
| 31. | | Classicism square | Place de la Concorde, Paris, 1757 |  | 0.6 | 8.58 | disymmetric | 4.66 |
| 32. | | - | Praça do Comércio, Lisbon, 18th century |  | 1 | 5.8 | symmetric | 0.44 |

Table (continued)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 33. | 19th century | - | Palace Square, Saint Petersburg, 18th and 19th centuries |  | 0.87 | 6.5 | disymmetric | 0.47 |
| 34. | | - | Place Charles de Gaulle (Place de l'Étoile), Paris, 1854 |  | 1 | 5.7 | symmetric | 1.73 |
| 35. | | - | Trafalgar Square, London, 19th century |  | 0.75 | 3.5 | disymmetric | 0.64 |
| 36. | | - | George Square,Glasgow, 19th century |  | 0.59 | 6.2 | disymmetric | 0.53 |
| 37. | 20th century | Administrative Square | Republic Square, Yerevan, 20th century |  | 1.1 | 4.8 | disymmetric | 0.44 |
| 38. | | | Three Powers Plaza, Brasília, 1956-1958 |  | 0.48 | 1.47 | asymmetric | 3.99 |
| 39. | | | Nathan Phillips Square, Toronto, 1965 |  | 0.93 | 1.15 | asymmetric | 0.04 |
| 40. | | | Empire State Plaza, Albany, 1965-1976 |  | 0.24 | 0.66 | asymmetric | 1.47 |

Within the city of Athens, three main components defined its urban structure: the acropolis as the ritual and spiritual core, the agora as the economic hub, and the surrounding urban fabric housing small shrines and temples [9]. The vast esplanade of the Athenian agora, encompassed by buildings representing political power and other structures like the Stoa, served as the preferred gathering place for citizens for meetings, assemblies, and markets [10]. The Agora of Athens stands as a testament to the city's rich history, functioning as the focal point of public life. Encircled by buildings on all four sides, the Agora's expansive open square epitomized the essence of the city center [11].

***Roman Forum***

The forum served as a central open space utilized for various purposes, including meetings, markets, political discussions, and demonstrations–a crucial location within the city for exchanging ideas and disseminating news [12]. Vitruvius, the author of *Ten Books on Architecture* in the first century BCE, the sole surviving ancient treatise on the subject, outlined the components of a forum, advocating for the inclusion of money-changers' shops, basilicas, a treasury, a prison, and a senate house [13]. The forum's size needed to be proportional to the number of residents to avoid being overly cramped or appearing empty due to a lack of people. Its width was determined by dividing its length into three parts, with two of these parts serving as the width, creating an oblong shape conducive to public events [14].

The Roman Forum, the nucleus of the Roman Empire and a reference point for the urban development of many classical cities, played a foundational role in classical architecture and the Roman practice of urban planning [15] (Fig.2). Initially, the Forum Magnum, or Forum Romanum, was merely a vacant space, gradually accumulating temples, halls, colonnades, and statues, evolving into the focal point of civic life [16]. According to Mumford (1961), the Roman forum amalgamated elements of both the Greek agora and acropolis, incorporating a wider array of activities, including shrines, temples, halls of justice, and council houses, within a more structured framework [17].

**Fig. 2.** *A view of the Forum Romanum (a painting by Jean Victor Louis Faure)*

***Medieval square***

With the decline of the Roman Empire, a notable transformation occurred in public spaces, influenced by the rising dominance of the church, autonomous city-states, and the burgeoning economic prowess of trade–markets and merchant guilds. These squares became focal points, adorned with significant structures, whether of religious significance, such as cathedrals, or political, such as palaces, town halls, and barracks [8]. In the Middle Ages, this dichotomy between sacred and secular spaces manifested prominently in the public squares of cities, where the realms of the temporal and the divine were clearly demarcated. Notably, in the urban milieu of Italy, distinct principal squares emerged, each tailored to specific functions. For instance, the cathedral square remained distinct from the primary secular square (signoria) and from the marketplace (mercato) [4] (Fig.3). Urban markets played a great role in middle-aged cities' lives. Usually, market squares were located near the cathedral and often adjoined with the cathedral square under the corner. Usually, in addition to the main market square, built up with monumental buildings of guild communities, a town hall,

**Fig. 3.** *The Piazza della Signoria, Florence (a painting by Giuseppe Zocchi)*

a church, and residential buildings of wealthy burghers, there were separate urban spaces for trading meat, fish, hay, firewood, etc. The architecture of market squares constituted a special theme in medieval town planning [18].

***Renaissance square***

The piazza, serving as a meeting place, a stage for religious and civic gatherings, and a hub for markets, typically emerges as one of the most significant focal points in cities, showcasing distinctive and refined architecture. The piazza plays a fundamental role within the irregular and dense urban fabrics of medieval European cities, seamlessly integrating with the surrounding streets where urban life thrives. These piazzas often feature grand temples, erected at the expense of Christianity, such as Christian cathedrals and episcopal palaces.

During the Renaissance, notable interventions, like those carried out by Brunelleschi in the fifteenth century on Piazza della Santissima Annunziata, endowed certain piazzas with remarkable regularity and architectural order [19] (Fig.4). In the warm climate of Italy, citizens frequently spent significant time outdoors in the open piazzas or squares, which served as communal spaces for cities and towns. In larger cities, multiple squares might exist, with some primarily serving as markets and others being associated with adjacent churches [20].

**Fig. 4.** *Piazza della Santissima Annunziata, Florence (a painting by Bernardo Bellotto)*

***Baroque square***

By the late 17th century, the Baroque style had come to define the architectural landscapes of major European capitals–Rome, Paris, London, and Vienna–leaving an indelible mark on their identities. However, this period also witnessed the transformation of numerous medieval structures, as they were renovated with Baroque facades and interiors, reflecting the era's modernizing tendencies [9, 22] (Fig.5). St. Peter's Square, situated in front of Saint Peter's Basilica in Rome, underwent significant changes, including the installation of a four thousand-year-old Egyptian obelisk of red granite in 1568 by Domenico Fontana, an architect and engineer. Originally, the square's layout was quite different, but it was redesigned by Gian Lorenzo Bernini in 1657, almost a century later, with a colonnade envisioned to embrace visitors like the maternal arms of Mother Church. The colonnade frames a large area shaped like an 'ovato tondo,' a round oval with its long axis parallel to the basilica's front [21].

**Fig. 5.** *The Piazza del Popolo, Rome (a painting by Gaspar van Wittel)*

***19th -century square***

During the 19th century, the industrial revolution brought about dramatic changes in urban design and planning. The establishment of extensive railway networks led to a surge in urban populations, spurring the growth of cities. New industrial areas emerged near urban centers, drawing laborers into the cities [10]. In the latter half of the 19th century, squares served as venues for ceremonial processions and the display of

statues, including those honoring reigning monarchs. Additionally, city squares assumed new functions as traffic hubs and green havens. In Paris, a variety of new square shapes emerged, such as the semi-circular Place du Trocadéro, the rectangular yet fragmented Place de la République, and star-shaped layouts with radial vistas like the Place de la Nation and Place Charles de Gaulle (Place de l'Étoile), where the concept of a traffic roundabout was first tested in 1907. These squares differed from their historic predecessors as they were not enclosed; instead, they were expansive, with monumental streets leading into them [8] (Fig.6).

**Fig. 6.** *George's Square, Glasgow (a drawing by John Fleming)*

***20th-century square***

The urban population continued to swell during the 20th century, leading cities to expand, diversify, and fragment (Fig. 7). Private car ownership experienced a rapid surge, resulting in cities increasingly dominated by motor vehicles and restricting pedestrian movement and freedom. In the latter half of the 20th century, many urban squares transformed into bustling crossroads, particularly in developing nations. Changing consumer habits and trends further diminished the use of open public spaces as shopping malls emerged as new hubs of leisure [1]. The ascendancy of automobiles, coupled with the establishment of out-of-town shopping centers and supermarkets, as well as business parks, resulted in many city centers languishing with vacant plots and derelict buildings, rendering them unattractive and, in some cases, hazardous. The decline in the quality of urban life and the use of squares and public spaces persisted, with numerous historic squares repurposed as car parks to accommodate the growing demand for vehicle space, such as the Praça do Comércio in Lisbon or the abandoned Grønttorvet vegetable market space in Copenhagen (later renamed IsraelsPlads) [8].

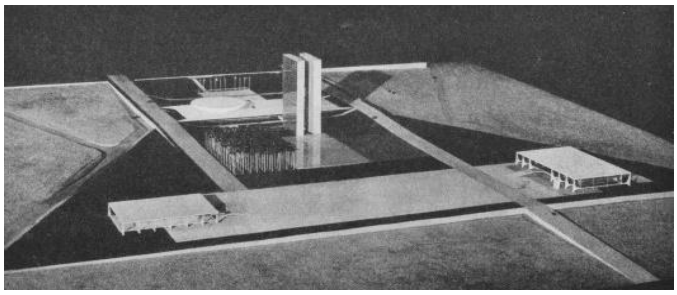


**Fig. 7.** *The Three Powers Plaza Model (Legislative, Executive and Judiciary Powers) presented in the article about Brasília's inauguration (RIBA Journal)*

**Compositional analysis of squares**

In this section, we aim to synthesize the findings from our research on the compositional structure of squares based on the analysis of 40 selected examples. Our analysis focused on identifying typical characteristics that influence the formation of square compositions.

***Compositional principle***

The compositional principle of each square serves as its foundation, dictating its architectural and structural solutions, as well as the layout of the area.

Research shows that approaches to the compositional principles of squares vary. There are symmetrical, dissymmetrical, and asymmetrical compositions. The choice of compositional principle depends on various factors. For instance, the urban development environment has often dictated the principles for many asymmetrical squares, where existing buildings, streets, or parks influenced and shaped the square's compositional framework. Consequently, most medieval commercial squares exhibit asymmetric compositions. However, during the Renaissance, Baroque, and Classicism periods, symmetric squares became more prevalent. Prominent examples of symmetric squares include Rome's Saint Peter's Square and Piazza del Campidoglio, Paris's Place Vendôme and Place Charles de Gaulle, Madrid's Plaza Mayor, and Rome's Caesar Forums. Asymmetric squares include Marrakesh's Jemaael-Fnaa, Prague's Old Town

Square, Siena's Piazza del Campo, Athens' Agora, and Rome's Roman Forum (Forum Romanum), known for their asymmetrical compositions from ancient times. Additionally, squares with dissymmetrical compositions are also common. These compositions are similar to symmetric ones but include certain deviations. Examples include Samarkand's Registan Square, Isfahan's Naqsh-e Jahan Square, Saint Petersburg's Palace Square, and Mexico City's Constitution Square.

***Existence of a dominant feature***

The presence of a dominant feature plays a significant role in shaping the area of a square, influencing its compositional image, as exemplified by Rome's Saint Peter's Square. When a dominant structure surrounds the square, it enhances the sense of enclosure, affecting the relationship between the height of the surrounding development and the width and length of the square.

An analysis of various examples reveals different types of squares depending on the presence of a dominant structure and its relationship to the surrounding development. For example, Piazza San Carlo in Turin and Place Charles de Gaulle (Place de l'Étoile) in Paris feature uniform building heights in their surroundings and prominently defined dominant structures. During the Classical period, squares such as Place Vendôme and Place de la Concorde in Paris were examples with uniform building heights but lacked a prominent central feature. Madrid's Plaza Mayor and St. Petersburg's Palace Square also reflect this approach. Nearly all medieval squares are characterized by surrounding structures of varying heights and a clearly defined dominant element. Examples include Leipzig's Market Square, the Main Market Square in Kraków, Münsterhof in Zurich, Raekoja plats in Tallinn, and Old Town Square in Prague. Ancient examples, such as the Athenian Agora and the Forum of Pompeii, are examples of squares where the surrounding structures vary in height and lack a central dominant feature. Among 20$^{th}$-century examples, the Empire State Plaza in Albany and Nathan Phillips Square in Toronto are marked by such a composition.

***Existence of a Central Element***

In certain squares, central elements such as columns, obelisks, statues, fountains, or triumphal arches also play a significant role in composition. Squares featuring a central column include Paris's Place Vendôme (Vendôme Column), London's Trafalgar Square (Nelson's Column), and Saint Petersburg's Palace Square (Alexander Column). Rome's three Baroque squares–Piazza del Popolo, Saint Peter's Square, and Piazza Navona–are notable for their obelisks, with the latter two squares also featuring fountains on either side of the obelisk. Paris's Place Charles de Gaulle stands out with its central Triumphal Arch. Statues serve as central elements in Madrid's Plaza Mayor (statue of Philip III), Prague's Old Town Square (Jan Hus Memorial), Rome's Capitoline Hill (Equestrian Statue of Marcus Aurelius), and Piazza della Santissima Annunziata (Equestrian Monument of Ferdinando I).

Studies indicate that squares with central elements were prevalent during the Renaissance, Baroque, Classicism, and 19th-century eras. These squares often exhibit symmetrical or dissymmetrical compositions.

***Degree of enclosure***

The degree of enclosure plays a pivotal role in how a square area is perceived. To determine this degree, we found it reasonable to analyze the ratio of the lengths of open and closed sections along the perimeter of the square's development. Naturally, a smaller ratio indicates a more enclosed square.

Based on the degree of enclosure, squares can be categorized into three groups: open, semi-closed, and closed. Squares with a ratio greater than 1.5 are considered open; those with a ratio between 0.5 and 1.5 are semi-closed; and those with a ratio below 0.5 are closed.

Examples of open squares include Paris' Place de la Concorde (ratio: 4.66), which features buildings only in its northern part, and Brazil's Praça dos TrêsPoderes (ratio: 3.99). Semi-closed squares include Registan Square in Samarkand (ratio: 0.66), Wright Square in Savannah (ratio: 0.59), Trafalgar Square in London (ratio: 0.64), George Square in Glasgow (ratio: 0.53), and Empire State Plaza in Albany (ratio: 1.47). Closed

squares include Naqsh-e Jahan Square in Isfahan (ratio: 0) and Madrid's Plaza Mayor (ratio: 0), which are among the most enclosed examples we reviewed. Other closed squares include Siena's Piazza del Campo (ratio: 0.15), Krakow's Main Market Square (ratio: 0.25), Brussels' Grand Place (ratio: 0.13), and Rome's Piazza Navona (ratio: 0.07).

The data suggests that the majority of observed squares belong to the closed or semi-closed type. Yerevan's Republic Square, for instance, falls into the semi-closed category with a ratio of 0.44. However, it's important to note that open squares can present a challenge in terms of perception of space, as they blend into the surrounding urban environment and may not be perceived as distinct areas. Brazil's Praça dos TrêsPoderes, for example, has encountered this issue.

***Proportional relations***

To conduct a proportional analysis of squares, we find it pertinent to consider two indicators:

- The ratio of the square's width to its length (where the smaller dimension is considered the width).
- The ratio of the square's width to the height of surrounding development (if there is a dominant structure, its height is used; otherwise, the height of the tallest structure within the square).

These indicators are crucial for understanding the spatial characteristics of the area. Regarding the first indicator, a ratio closer to one indicates a more balanced square. Examples of squares with ratios close to one, resembling square layouts or nearly equal-sided squares, include Trafalgar Square in London (0.75), Palace Square in Saint Petersburg (0.87), Right Square in Savannah (0.87), Place Vendôme in Paris (0.9), Registan Square in Samarkand (0.84), Piazza della Santissima Annunziata in Florence (0.85), Raekoja plats in Tallinn (0.83), as well as the agoras of Priene (0.85) and Miletus. Squares with smaller ratios, indicating a more elongated shape, include Leipzig's Markt (0.43), Piazza San Marco in Venice (0.3), Piazza Maggiore in Bologna (0.49), Piazza dei Signori in Vicenza (0.22), Nytorv in Copenhagen (0.49), Piazza Navona in Rome (0.2), Piazza San Carlo in Turin (0.43), Naqsh-e Jahan Square in Isfahan (0.28), and Empire State Plaza in Albany (0.24), as well as the forums of Rome (0.4), Pompeii (0.2), and Ostia (0.36). Remarkable squares with a ratio equal to one, forming square layouts, include Main Square in Krakow (1), Praça do Comércio in Lisbon (1), Place Charles de Gaulle in Paris (1), and the Athenian agora (1).

Regarding the second indicator, a larger ratio indicates a more open square area. Squares with larger ratios include Piazza del Popolo in Rome (3.6), Republic Square in Yerevan (4.8), Naqsh-e Jahan Square in Isfahan (3.07), Place Vendôme in Paris (5), Place de la Concorde in Paris (8.58), Praça do Comércio in Lisbon (5.8), Palace Square in Saint Petersburg (6.5), Place Charles de Gaulle in Paris (5.7), George Square in Glasgow (6.2), and the Athenian agora (12.09). Notable squares with smaller ratios include Grand-Place in Brussels (0.7), Old Town Square in Prague (0.92), Piazza della Signoria in Florence (0.97), Piazza San Marco in Venice (0.70), Piazza dei Signori in Vicenza (0.33), Piazza del Campo in Siena (1.08), Münsterhof in Zurich (1.5), Piazza Navona in Rome (0.8), Saint Peter's Square (1.4), Campidoglio Square (1.55), Plaza Mayor in Madrid (1.56), Empire State Plaza in Albany (1.15), Nathan Phillips Square in Toronto (0.66), as well as the Roman Forum (1.7).

***Functional purpose***

Squares have had diverse functional roles. In ancient times, they served as spaces for gatherings, discussions, and trade. Agoras in Priene and Miletus, as well as forums in Pompeii and Ostia, fulfilled such purposes. During the Middle Ages, squares primarily served trade functions, exemplified by places like Jemaa el-Fnaa in Marrakesh, Markt in Leipzig, Main Square in Krakow, and Raekoja plats in Tallinn. In the Renaissance, squares took on more administrative and religious functions, as seen in places like Piazza della Santissima Annunziata, Piazza del Campidoglio in Rome, and Piazza dei Signori in Vicenza. Noteworthy squares from the 20th century include Yerevan's Republic Square and Brasília's Praça dos Três Poderes. The former became the administrative center during the capital's reconstruction, while the latter serves as the

focal point of a newly constructed capital, housing relevant administrative buildings. Naturally, the functional purpose significantly influences a square's architectural and compositional identity. For instance, the intended function often dictates the scale of a square. This explains why squares with administrative and religious purposes tend to be larger in scale, such as Mexico's Constitution Square and Isfahan's Naqsh-e Jahan Square. The functional purpose also greatly influences the selection of architectural solutions and styles.

***The purpose of dominant structures***

Throughout history, the dominant structures within squares have served various purposes. In the Greek agoras and Roman forums of antiquity, these structures were primarily religious or administrative. During the medieval era, dominant structures in trade squares served administrative, religious, and residential functions, such as town halls, cathedrals, and palaces. In Baroque squares, the main structures were often religious, as seen in Saint Peter's Square, Piazza del Popolo, and Piazza Navona. Similarly, during the Renaissance period, religious and administrative buildings predominated, exemplified by places like Piazza della Santissima Annunziata, Piazza San Marco in Venice, and Piazza del Campidoglio in Rome. In the 20th century, the dominant structures in the squares that we have observed have typically served administrative and cultural purposes, as evidenced by landmarks like Three Powers Plaza in Brasília, Nathan Phillips Square in Toronto, and Republic Square in Yerevan. The purpose of the dominant structure significantly influences the composition of the square and contributes to its architectural identity. Certain types of squares consistently feature specific dominant structures, such as cathedrals or basilicas in Roman forums, town halls in medieval trade squares, and churches in Baroque squares.

**Conclusion**

This research aims to provide a comprehensive overview of squares' historical development and to elucidate the intricacies of their compositional formation through the analysis and comparison of various examples.

Studying squares built in 40 different periods and locations, selected to represent the general history of square emergence and compositional formation, has allowed us to identify typical characteristics that influence square composition formation.

These include:

- **Compositional principle**: Depending on the type, this principle plays a fundamental role in architectural and compositional solutions and in the formation of square areas. Various compositional principles have been employed in different historical periods: asymmetric, symmetric, or dissymmetric.
- **Existence of dominant structure**: Squares have been classified into four types based on the existence of a dominant structure and its ratio to the surrounding development:
  **a**. same height surrounding development with a clearly defined structure,
  **b**. same height surrounding development with no clearly defined dominant structure,
  **c**. different heights surrounding development with a clearly defined dominant structure,
  **d**. different heights surrounding development with no clearly defined dominant structure.
  Squares belonging to these types exhibit different compositional designs and area characteristics.
- **Existence of central elements**: Central elements alter the perception of space within a square. They serve a unifying purpose in composition, shaping the square's layout.
- **Degree of enclosure**: This factor significantly influences the perception of a square's environment, categorizing squares into three types:
  **a**. open,
  **b**. semi-closed,
  **c**. closed.
  Squares falling into these categories exhibit distinct compositional formations and perceptions of space.

- **Proportional relations**: Squares were classified into three types based on width and length ratio indicators:
  **a**. condensed,
  **b**. extended,
  **c**. square layout.

  Squares were classified into two types based on the width and height ratio of the surrounding development:
  **a**. with a high ratio, indicating openness,
  **b**. with a low ratio, indicating enclosure.
- **Functional purpose**: This aspect significantly influences a square's architectural and compositional image and scale choice. Squares with administrative and religious purposes tend to have larger scales and stricter or more monumental architectural images.
- **Purpose of dominant structure**: The intended function of a dominant structure greatly influences a square's composition and architectural image, often correlating with the square's purpose.

In conclusion, the study of characteristics influencing square composition demonstrates that each of these factors influences the perception of space of the square, degree of enclosure, architectural and compositional image, scale, and other properties.

We believe that these findings may prove useful for future scholarly works related to square composition issues, as well as for researchers interested in the broader study of squares.

However, we acknowledge that the characteristics presented may not fully encompass all aspects of square composition formation. Future research should address topics such as the perception of space in pedestrian and vehicular movements, the functional structure in modern conditions, and the influence of changes in surrounding urban development environments on composition and perception of space. Exploring these areas will further enrich and clarify our understanding of the peculiarities of square composition formation.

**Conflict of Interest**

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**References**

[1]. M. Z. Memluk, Designing Urban Squares, in: M. Özyavuz (ed.), Advances in Landscape Architecture. Landscape Ecology, 2013. Doi: https://doi.org/10.5772/55826
[2]. Z. Zawawi, M. Itma, Reconciling Users and Public Space-Relationship in Historic Squares: The case of En-Naser Square in Nablus City. Journal of Asian Architecture and Building Engineering, 22 (5), 2023, 3046-3064. Doi: https://doi.org/10.1080/13467581.2023.2172325
[3]. T. Hölscher, Urban Spaces and Central Places: The Greek World, in: Susan E. Alcock, Robin Osborne (eds.), Classical Archaeology. Blackwell Studies in Global Archaeology, 10, 2007, 164-181. Doi: https://doi.org/10.11588/propylaeumdok.00004592
[4]. J.C. Donati, The Greek Agora in its Peloponnesian Context(s), in: D.C. Haggis, C. Antonaccio (eds.), Classical Archaeology in Context: Theory and Practice in Excavation in the Greek World. Walter de Gruyter, 2015, 177-218. Doi: https://doi.org/10.1515/9781934078471-011
[5]. F. Barbini, The Agora and the Forum. Estudo Prévio, 1 (6), 2015. Available at: https://www.estudoprevio.net/flavio-barbini-the-agora-and-the-forum/. Accessed on January 15, 2025.
[6]. N. Xing, K.M. Siu, Historic Definitions of Public Space: Inspiration for High Quality Public Space. International Journal of Humanitites, 7 (11), 2010, 39-56.
[7]. A.C. Sparavigna, Light and Shadows in Bernini's Oval of Saint Peter's Square. PHILICA, 2015, 540.
[8]. A. Madanipour, Public and Private Space of the City. Routledge, London, 2003.
[9]. O. Shuazi, Vseobshchaya istoriya arkhitektury. AST, Moscow, 2022 (in Russian).

[10]. M. Burns, New life in Public Squares. RIBA Publishing, London, 2020.
[11]. F.D.K. Ching, M.M. Jarzombek, V. Prakash, A global History of Architecture. John Wiley & Sons, New Jersey, 2017.
[12]. J. Camp, The Athenian Agora: A short guide. American School of Classical Studies, 2003.
[13]. D. Watkin, The Roman Forum. Wonders of the World. Harvard University Press, Cambridge, 2009.
[14]. Vitruvius, Ten Books on Architecture, Azbuka-Atticus, Moscow, 2023 (in Russian).
[15]. A. Rossi, The Architecture of the City. The Graham Foundation for Advanced Studies in the Fine Arts, Chicago, Illinois, 1982.
[16]. A.D.F. Hamlin, A Text-Book of the History of Architecture. Longmans, Green & Co, New York, 1909.
[17]. T.F. Savarenskaya, Istoriya gradostroitelnogo iskusstva. Rabovladelcheskiy i feodalnyy periody (v. I, Arkhitektura-S), Moscow, 2019 (in Russian).
[18]. C. Anderson, Renaissance Architecture, Renaissance Architecture Oxford History of Art. Oxford University Press, Oxford, 2013.
[19]. J. Jiang, F.D.A. Amaral, The Role of the Oval Piazza in Urban Morphology: Piazza San Pietro and Piazza del Popolo in Rome. Cities in Evolution, Diachronic Transformations of Urban and Rural Settlements, VIII AACCP (Architecture, Archaeology and Contemporary City Planning) Symposium, 2021.
[20]. B. Zeka, The humanistic meaning of urban squares: the case of Çayyolu urban square project: Master thesis, Middle East Technical University, Ankara, 2011.
[21]. M. Strickland, Roman building materials, construction methods, and architecture: The identity of an empire, Master thesis, Clemson University, 2010.

***Zhora Sagaryan**, **researcher (Architecture)** (RA, Yerevan) - National University of Architecture and Construction of Armenia, Lecturer at the Chair of Architectural Design and Design of Architectural Environment, sagaryanzhora@gmail.com*