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Space and protest:

A tale of two Egyptian squares

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Abstract

Protests and revolts take place in public space. How they can be controlled or how protests develop depend on the physical layout of the built environment. This study reveals the relationship between urban space and protest for two Egyptian squares: Tahrir Square and Rabaa Al-Adawiya in Cairo. For analysis, the research uses space syntax method. The results of this analysis are then compared with descriptions of the protest behaviour.

As it turns out, the spatial properties of Tahrir square seem more effective for protesters to succeed than Rabaa Al-Adawiya. Protesters seem seek spaces with a high degree of accessibility on a local scale as well as on a city-wide scale and a high degree of symbolic value. Furthermore, the number of alternative routes, access points, shorter block lengths, and increased visibility are spatial factors affecting where and how demonstrations take place.

Keywords

Protest behaviour, demonstrations, urban squares, space syntax.

1. Introduction

The Arab world has recently witnessed a revolutionary wave, the Arab spring, of civil uprisings to topple long-term dictatorial regimes. This wave faced violent suppression from authorities as well as from pro-regimes militias. In Egypt in 2011 the police forces and pro-government groups failed to suppress protests in Tahrir Square. Protests continued for 18 days starting with the Day of Anger on the 25th of January and ending with President Hosni Mubarak's resignation on the 11th of February (Smith, 2012). The heaviest violent clashes between protesters and the government occurred on the 28th of January (Known as *ǧumʿat al-ġaḍab*, "Friday of Anger") and between protesters and Mubarak supporters on the night of 2nd of February (known as the Camel Battle). This paper studies the protest behaviour in Tahrir square on January 28, and compares it in detail to some other different square, Rabaa Al-Adawiya.

In late June 2013, the Egyptian military, following the demands of the Tamarod movement[1], ousted the first-freely elected president in Egypt, Mohamed Morsi. This has led to massive protests from pro-Morsi and the Muslim Brotherhood who camped at Rabaa Al-Adawiya and Nahda Squares for several weeks. After efforts to end protests peacefully, security forces raided the two camps. The police and army forces dispersed the two sit-ins within few hours. This paper aims to reflect upon the following questions: Why did civilian resistance succeed in overcoming government violence in Tahrir Square, but not in the square of Rabaa Al-Adawiya? To what extent are revolts and protests affected by the spatial layout of the public spaces? And, finally, how can urban space enhance or limit demonstrations?

2. Literature review

The design of a city is a political phenomenon (Foucault, 1997; Lemanski, 2004; El-Kadi, 2009). Paris was restructured by Baron Haussmann, commissioned by Napoleon III, after the French revolution in 1848. The purpose was to police or "boulevardise" the city to suppress future protests, since the urban fabric of old Paris easily allowed protesters to construct temporary barricades as a revolutionary tactic (Lemanski, 2004). The new design made it more difficult to erect barricades and improved the circulation of government troops (Douglas, 2007).

Khedive Ismail (1863-1879) utilised the Haussmanian model in Egypt and built a new city on a vacant land adjacent to the old city during his reign (ZaaZaa, 2009; Serag, 2013). Ismail aimed only to modernise Cairo to become the "Paris of the Nile". Importantly, he did not destroy the existing urban fabric of the old city as Haussman had done in Paris. Serag (2013) argues that although the Hausmanian logic is embedded in Cairo's CBD (Central Business District), it failed to constrain the civilian protests in 2011. Serag claims that urban planning policies cannot stop protests; that is, when people decide something it comes true. However, according to AlSayyad, the Parisian model was not really applied to Cairo's CBD. Khedive Ismail's goals were more decorative, he argues, than capable of implementing the Haussmanian urban layout (Britt, 2011).

Even though the design of Cairo's Tahrir Square is inspired from the Haussmann's vision, it differs significantly from Paris. First, Tahrir square is not encircled by boulevards, except from one side. Shams (2011) argued that radial streets are not the only access points to the square since there are many pedestrian alleyways that lead to Tahrir as well. These alleyways are inaccessible to cars and thus help protesters flee violence and re-enter Tahrir square. Secondly, the square is in close proximity to the Nile River. Even though its English name suggests otherwise, Tahrir is not a square since it is composed of five or six neighbouring spaces with blurred boundaries. Moreover, twenty-three streets lead to the square. This was not the case in Paris (Britt, 2011; Paraskevas, 2011).

[1] Tamarod is an Egyptian grassroots movement that was founded by five activists on 28 April 2013 to collect signatures against President Mohamed Morsi and force him to call early presidential elections (http://en.wikipedia.org/wiki/Tamarod).

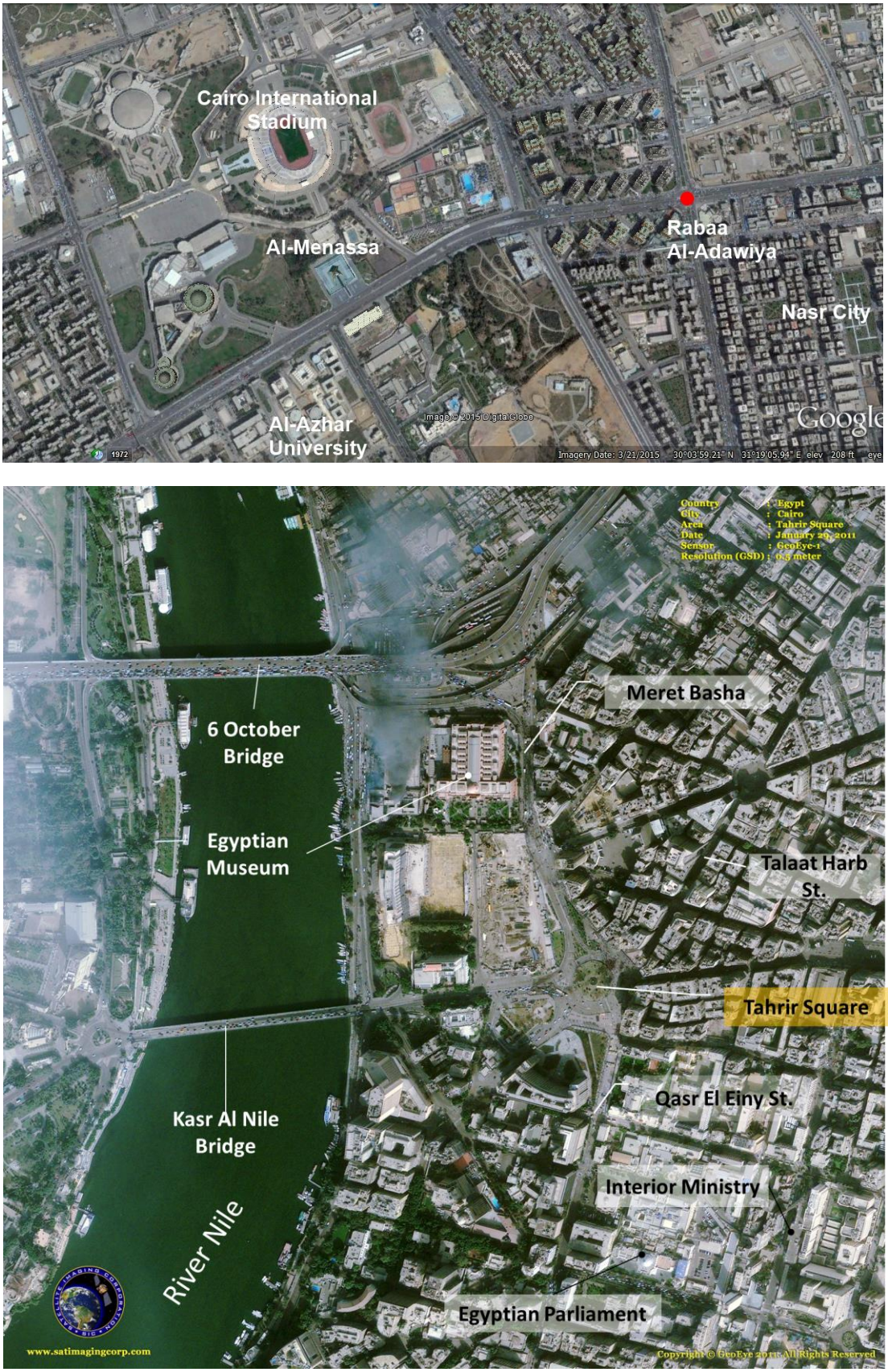


Figure 1: Rabaa Al-Adawiya (top) (Google earth), and Tahrir Square (bottom) (http://www.satimagingcorp.com).

Anonymous organisers distributed a twenty-six page manual entitled "How to Protest Intelligently: Important Information and Tactics" via Facebook and email as they tried to attract protesters and keep them safe. One of the organiser's suggestions was to start non-violent protests in secondary streets and alleyways.

> Starting in the alleys … makes tactical and strategic sense ... Starting small and away from the main protests is a safe way to pool protesters together. It's also about creating an iterative approach to 'strength in numbers' dynamic. As more people crowd the smaller the streets, this gives a sense of momentum and confidence. Starting in alley ways localizes the initiative.
>
> (iRevolution, 2011)

In a similar way, Bayat (2009) analysed the urban features of "Revolution Street" during the Iranian Revolution in 1979, and identified four "socio-spatial" characteristics of "streets of discontent": 1) centrality— spaces that enable building up of considerable number of protesters swiftly such as sites in close proximity of a university campus or a large mosque; 2) proximity— sites that have historical or cultural value; 3) accessibility— the hot spot of mass transportation (e.g. metro lines, taxi, bus, etc.); and 4) flexibility—"a manoeuvrable space where protesters can easily flee from the police" (Bayat, 2009, p. 167-168).

Space Syntax Network (2011) conducted a study on the London protesters/ riots of 2011. The initial findings showed that the majority of verified incidents in north and south London occurred within a 400m "(a five minute walk) of both (a) an established town centre and (b) a large post-war housing estate" (Space Syntax Network, 2011, p. 1; Till, 2012, p. 1). Bill Hillier's work on housing estates argued that "the overly complex spatial layouts these housing estates" were the main reason for riots (Till, 2012, p. 1). Complex layouts lead to poorly-utilized spaces. Till (2012) criticized this interpretation and described it as a deterministic built upon speculation, since some maps indicated that rioters did not conditionally come from neighbouring quarters, but in several cases travelled significant distance from outside their neighbourhood to riot locations (Till, 2012).

Belfast's peace lines between the catholic and protestant areas represent an example of how a reduction of the degree of accessibility affects the reduction of revolts between these religious groups. In his M.Sc. thesis, Ernst More (2010) investigated how these peace lines affect the socio-economic life of the surrounding neighbourhoods. The peace lines consisted of walls located on locally integrated main routes. The spatial effect is a reduction of local integration in the neighbourhoods and the centre of Belfast. The conflict between these religious groups faded away through these physical interventions; however, a side effect was that these peace lines contributed to a low level of economic activities in several neighbourhoods of Belfast (More 2010).

More recently, in a study on space and riots, Al Sayed and Hanna (2013) found that while rioters travel some distance from outside their neighbourhoods, the selected paths to riot sites are determined more by the urban configuration than by other potential factors (e.g. retail or housing estates) (Al Sayed and Hanna, 2013).

In the Egyptian urban context, a few studies (Paraskevas, 2011; Taha et al., 2012; Salama, 2013; Serag, 2013) as well as some architectural and urban planning blogs and newspapers (Britt, 2011; Elshahed, 2011; Shams, 2011, Ezzat, 2013; Rachelquednau, 2013; Al Sayyad, 2014, Ford, 2014) discussed the notion of space and power from an urban design perspective using less sophisticated methods of extensive qualitative description of physical features along with historical reviews of Tahrir Square. However, there are few objective analyses of the spatial parameters of urban space and their relationship to sustaining demonstrations.

As Jacobs (1961) argued, eyes on the street from buildings or porches, ensures control and visibility (Jacobs 1961). In the discourse of protest, surveillance from buildings can help demonstrators by "warning of the onset of violence" (American Friends of Tel Aviv University, 2011). Moreover, narrow streets and alleyways may facilitate protest and revolts in different ways. They can be more

easily barricaded and can constrain the advance of security forces and provide a good starting point for protests, often shielding participants from security forces.

3. Method

This research develops an analytical framework derived from Bayat's criteria of how socio-spatial conditions may facilitate protest locations. The framework is then used to compare the spatial features of Tahrir and Rabaa Al-Adawiya squares and identify those that impacted the outcomes at each site. In-depth interviews, space syntax and descriptive analysis are employed to fill out the items of the developed framework.

First, the symbolic values of the two sites are described. Symbolic values influence where protest can take place. Second, due to time limitations and safety issues, only ten demonstrators from each square were asked to describe in detail how, where, and when the demonstrations took place and how the protesters faced security forces. The behaviour of the demonstrating crowd was registered through documentary movies supplied by the media as well as YouTube videos and media sources. Third, space syntax analyses are used to describe the spatial features of Tahrir and Rabaa Al-Adawiya squares. Global and local measures of integration, choice, node count, as well as step depth and Visibility Graph Analysis (VGA) are all calculated with depthmapX.

4. The symbolic values of Tahrir Square and Rabaa Al-Adawiya

Urban space is a venue where an ideological message can be delivered. Tahrir Square has a significant symbolic value. It is located in close proximity to iconic buildings, and it has been a focal point of demonstrations and popular uprisings. The former English Military Barracks (the current location of the Arab League and the Nile Hilton hotel) was the first landmark established west of the square during the British occupation (1882-1956). Protestors demonstrated against the British colonial presence in 1946, and the police killed Egyptians. Likewise, during King Farouk's era, several anti-government demonstrations erupted ending with the Great Fire of Cairo on 25 January 1952. Shortly thereafter, the Free Officers revolution on 23 July 1952 transformed Egypt from a kingdom (controlled by the British) into a republic (Al Sayyad, 2014). In the 1960s, president Gamal Abdel Nasser changed the name of the square from Al-Ismailia to Tahrir (liberation) to commemorate the independence from the British occupation (Taher, 2012).

Similar to Tahrir, Rabaa Al-Adawiya square in Nasr City consists of elements with military related meanings. The land on which Nasr City (victory city) was established was formerly a military area belonging to the ministry of Defence during the 1950s. The new regime aimed to build a socialist state based on Arab nationalism and cultural and spiritual values. The new ideology was based on anti-colonial trend manifested in the removal of the symbols of the occupation (e.g. the British barracks formerly situated south of Heliopolis). Nasr City exemplifies this ideology (Herzog et al, 2010). Several main monumental symbols can be observed at the gate of Nasr, such as the Cairo International Stadium, the EECA (Egypt Expo and Convention Authority), the military parade ground, and the tomb of Unknown Solider on Al-Nasr Road.

The design of Nasr City is a strict orthogonal grid with large super blocks. The gardens are mostly for public use and maintained by the government. The plots are usually equally shaped (Herzog et al., 2010). These features reflect the policy of the new government, which emphasised social equity.

5. Scenes from Tahrir and Rabaa Al-Adawiya Squares

Tahrir Square

The protest behaviour on 28 January 2011, otherwise known as the Friday of Anger, unfolded as follows: At 1:00 am the Egyptian government suspended internet and mobile phone services. Earlier,

in the previous days, calls for protests were posted through social media, and a number of key mosques and churches were chosen as gathering places from which the protests would begin. These buildings were located in densely populated, working-class districts like Boulaq El-Dakrour and Shubra. After the Friday prayer, people gathered at mosques' entrances and some people started shouting slogans and marching towards the target, Tahrir Square (Serag, 2013). Demonstrators urged citizens watching them from their balconies and windows to join them, leading to ever larger masses of protesters (El-Ghobashy, 2011). The crowds were moving through the city streets to join a crowd of anti-regime protesters who reached Tahrir earlier that day. Around 200,000 people congregated at central Tahrir Square after the Friday prayers. Protesters encountered the security forces located at strategic junctures leading to the Square (Amnesty International, 2011; Shokr, 2011). However, because of the multiple locations from which the protests began, the security forces were disoriented as the various protest groups (El-Ghobashy, 2011).

The protesters outnumbered the police forces and continued marching from various access points towards Tahrir Square. Sounds of gunfire came from the direction of the Egyptian Museum. Police used rubber bullets, tear gas, batons, live ammunition, and water cannons to prevent demonstrators from reaching the Square. Clashes between authorities and protesters were everywhere, especially at the primary access points to the Square such as Kasr Al Nile bridge, 6th October bridge, Qasr El Einy Street, and near the Egyptian Museum. The battle was everywhere and policemen tried to disperse the crowds and to prevent others from joining them (Amnesty International, 2011).

The riot police succeeded in dispersing some people near the Egyptian museum, but protesters regrouped in downtown Cairo's side streets (Amnesty International, 2011). At 5 pm, police and security forces retreated from Tahrir Square and withdrew from all of the streets and squares throughout the country (El-Ghobashy, 2011). By the end of the day, the Egyptian government announced a curfew in Cairo, Alexandria and Suez, and deployed military to assist security forces. The sit-in of Tahrir Square started from that day until the resignation of Mubarak fourteen days later.

Rabaa Al-Adawiya Square

On 28th June 2013, pro-Morsi supporters, mostly members of the Freedom and Justice Party (FJP), camped at Rabaa Al-Adawiya Square. Due to huge numbers of protesters, the sit-in expanded around the traffic hub of the two roads intersecting the square: Al-Nasr Street, starting from Tiba Mall and reaching the military parade ground (the so-called Al-Menassa), and Al-Tayaran Street. There were five major entrances and checkpoints leading to the sit-in— two on Al-Nasr Street, two on Al-Tayaran Street, and one on Anwar al-Mufti Street (HRW, 2014). Lines of bricks torn apart from the pavements as well as sandbags were used to construct makeshift barricades to hinder the movement of police and military troops (Parvaz, 2013). Protesters established tents along the islands and alongside platforms of the two roads.

In the early morning of 14 August 2013, the day of the crackdown, protesters woke up upon hearing gunfire coming from the eastern entrance to the square. Thick clouds of tear gas filled the streets. Armoured personnel carriers (APCs), ground forces, helicopters, and army snipers deployed on top of buildings encircled the sit-in on four sides and created a no-go, buffer distance around the sit-in to separate the demonstrators from the neighbouring areas. The security forces succeeded in cutting off aid to the demonstrators and prevented anyone from going in or out of the square. No one on the outside could join those on the inside and no one on the inside could get out (Selim, et al., 2013).

After establishing the buffer zone, police and army personnel used armoured bulldozers to remove the protesters' tents and makeshift barricades (HRW, 2014). Protesters kept chanting "God is Great" as warnings announced the confrontation by the security forces (Selim, et al., 2013). The protesters did not have sufficient time to leave (HRW, 2014). The security forces, supported by snipers, slowly advanced and attacked the protesters from all entrances to the squares and left no safe passage (Selim, et al., 2013; HRW, 2014).

Security forces shot live ammunition and rubber bullets at retreating protesters (Musings on Maps, 2013; The Atlantic, 2013, HRW, 2014). Some demonstrators with sticks, stones and Molotov cocktails remained on the periphery to hinder advancing forces, while the large mass of protesters retreated to the centre of the square to escape the gunfire (HRW, 2014). However, the square was like an open theatre with no place to hide (Selim, et al., 2013). Within twelve hours, from sunrise to sunset, security forces had decimated the sit-in, and had killed at least 817 protesters during the Rabaa dispersal (HRW, 2014).

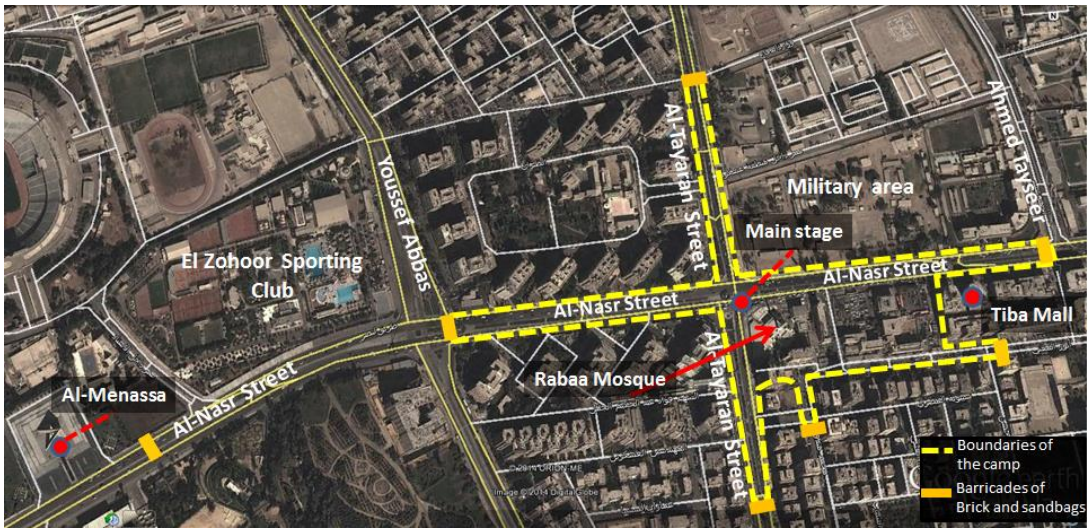


Figure 2: Rabaa Al-Adawiya camp. (Source: authors according to Parvaz, 2013)

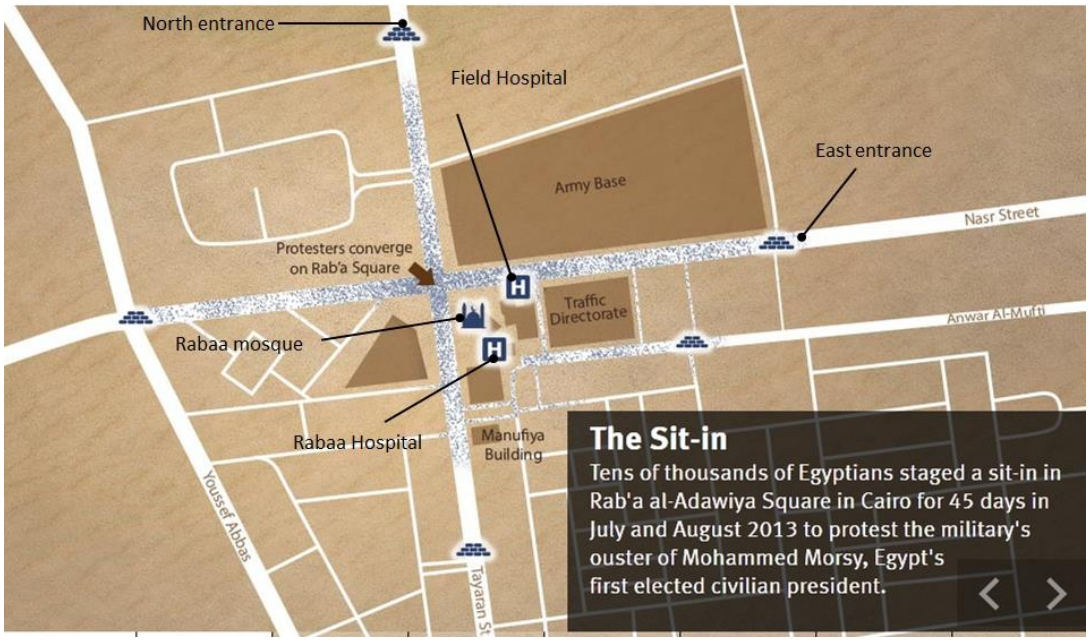


Figure 3: Stages of the battleground of Rabaa Al-Adawiya. (source: http://www.hrw.org/node/128076)

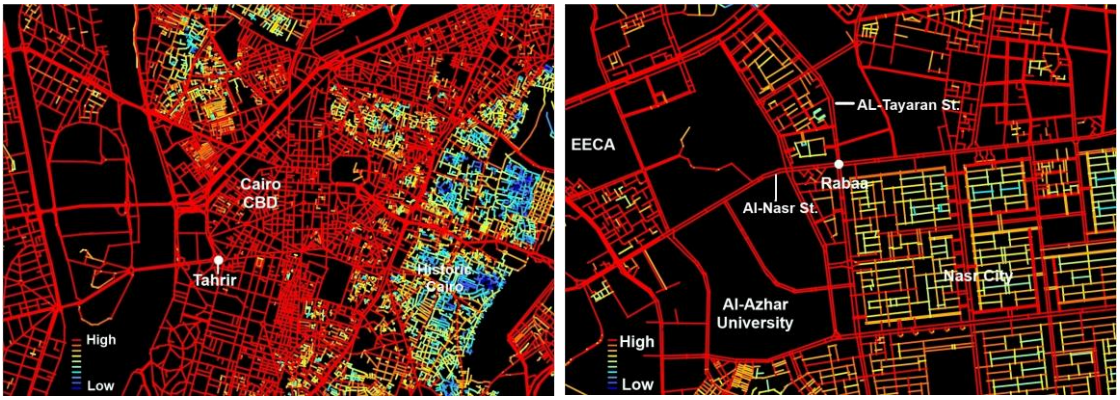
6. The spatial configurative analyses of the two squares

The street and road network analyses

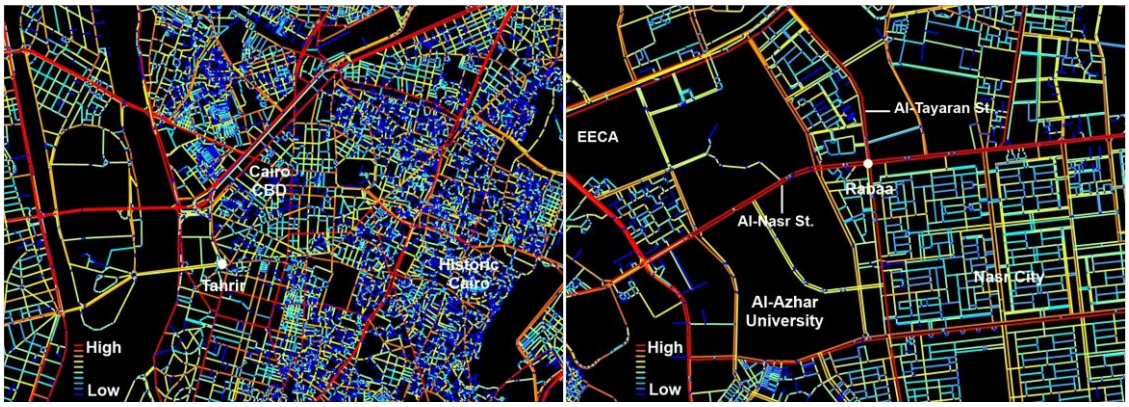
The map of angular global spatial integration analysis shows that both Tahrir and Rabaa Al-Adawiya squares are located in the most integrated part of the city, where red (the highest values) and orange lines are located (Figure 4 a). Both squares are highly trafficked, attract movement-seeking functions, and have a central location. Tahrir square is surrounded by important buildings, such as Parliament, the Egyptian Museum, hotels, the old campus of the American University in Cairo, and

several ministries and important government buildings. Likewise, Rabaa Al-Adawiya is close to many important locations such as Al-Azhar University, Cairo Expo Centre, the Cairo International Convention Centre, the Cairo Stadium, the Unknown-Soldier Memorial, and the Rabaa Al-Adawiya mosque. However, the two squares do not attain the same level of spatial integration (see table 1). When representing only the 2.5 percent most integrated lines, Tahrir square is significantly more integrated than Rabaa Al-Adawiya. (See Figure 5, where 2.5% most integrated lines is marked in red).

The angular choice Rn analysis shows that both Tahrir and Rabaa Al-Adawiya squares are connected to highly accessible roads (Figure 4 b). These accessible routes link different parts of the metropolis with each other. Tahrir Square represents a junction between Cairo and Giza governorate. Accordingly it is a hot spot of mass transportation where metro lines and buses intersect. The accessibility is higher in Tahrir Square than in Rabaa Al-Adawiya. Moreover, at the time of the sit-ins, Rabaa Al-Adawiya square was very far from metro stations (one about a half mile away opened within the past year).



a) Normalised angular global integration Rn (NAIN)



b) Normalised angular global Choice Rn (NAIN)

Figure 4: Syntactic analysis at a city scale.

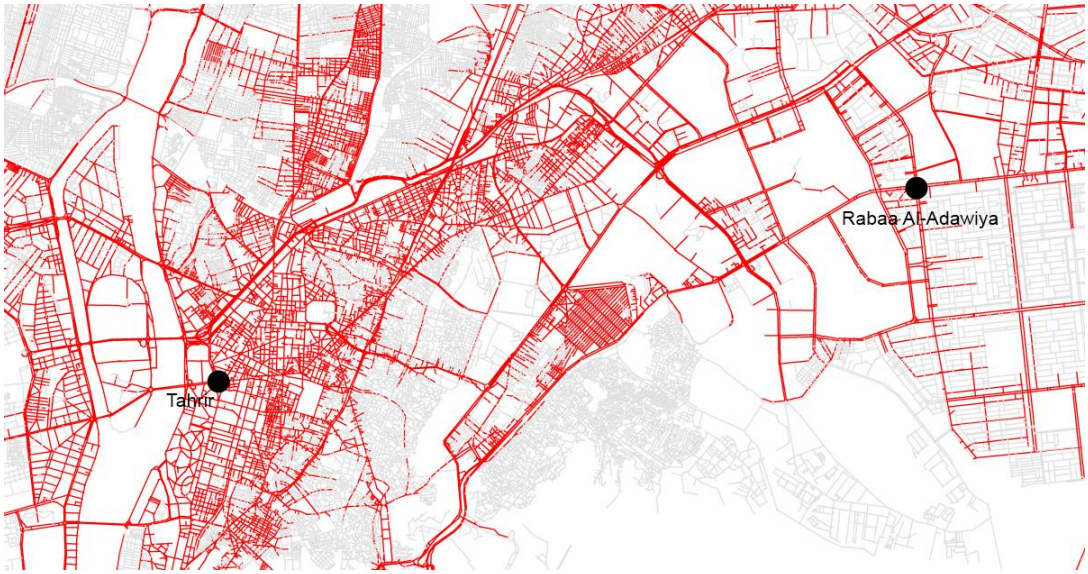
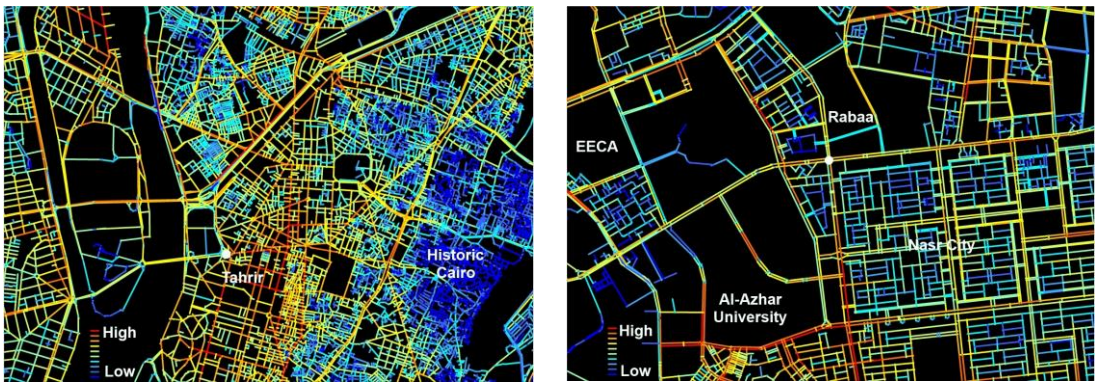
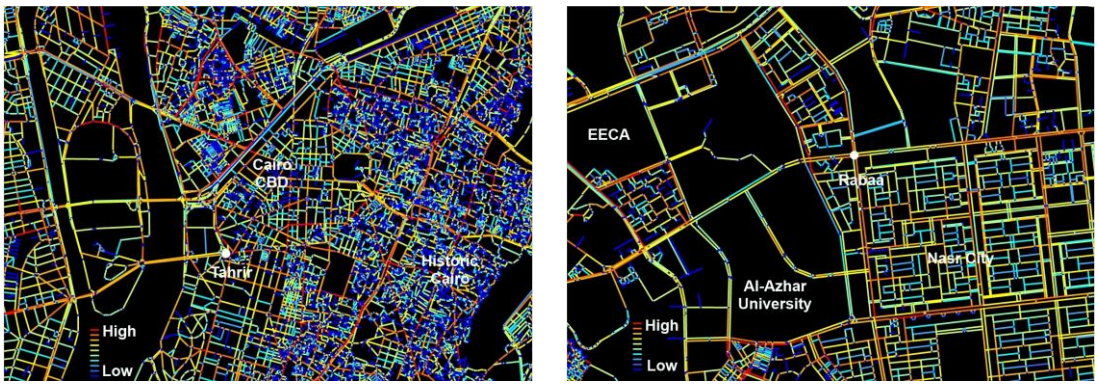


Figure 5: Angular segment analysis showing the 2.5% most accessible lines of Cairo. Angular integration Rn.

Various local spatial measurements show that Tahrir Square is highly accessible locally, which encourages high volumes of pedestrian movement. Unlike Tahrir Square, Rabaa Al-Adawiya does not have the advantage of being a pedestrian area due to a low local integration (see Figure 6 and table 1).



a) Normalised angular local integration R1200 meters



b) Normalised angular local Choice R1200 meters

Figure 6: Syntactic analysis at a neighborhood level.

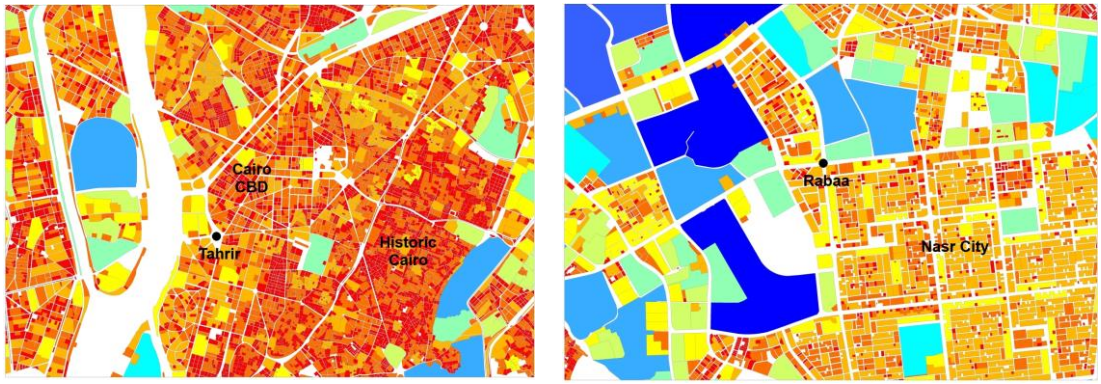
	Cairo CBD	Nasr City	Mean difference
Segments count	3793	4411	
Mean normalised angular integration Rn	**1.1408**	1.0180	0.1228**
Mean normalised angular integration R2000 meters	**1.1737**	1.0274	0.1463**
Mean normalised angular integration R1200	**1.1833**	1.0314	0.1519**
Mean normalised angular integration R800 meters (a 10 minute walk)	**1.1853**	1.0756	0.1097**
Mean normalised angular integration R500 meters (a 5 minute walk)	1.1778	1.1863	0.0085

Table 1: Mean global and local syntactic values of Cairo CBD and Nasr City. Comparing means shows that there is a significant difference between Cairo CBD and Nasr City at the 0.01 level (2-tailed).

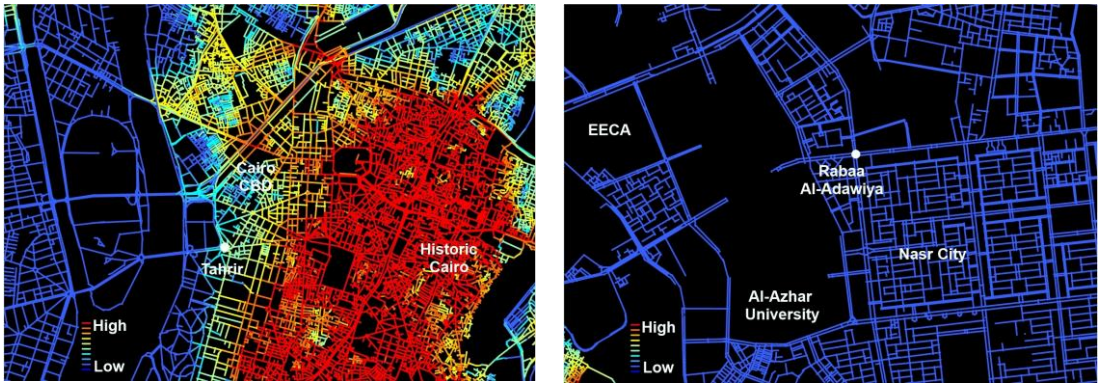
Large urban blocks create fewer urban islands. This encourages more vehicular movement than pedestrian movement. Smaller urban blocks foster walkability by virtue of minimising trip lengths and increasing choices. The top section of Figure 7 shows a thematic map of urban block size for the zones surrounding the two squares areas colouring from red, for smaller blocks, to blue, for larger ones. Cairo CBD has a predominance of fine grain (red and orange), where retail, catering, administration, and leisure uses are located. Conversely, Nasr city has a coarse-grain network of larger blocks (green and light blue) than those found in Cairo CBD.

The difference between the two areas in terms of fine-grained versus coarse-grained urban blocks can also be seen in the segment analysis where Cairo CBD has a larger number of street segments (node counts) in a short metric distance than Nasr City (Figure 7 b).

When comparing the protest behaviour with the spatial configuration of the two squares, the spatial layout in Rabaa Al-Adawiya prohibits protesters from fleeing from the police in case of a chase. Rabaa Al-Adawiya lacks flexibility, according to Bayat's criteria. That is why security forces succeeded in besieging protesters in Rabaa Al-Adawiya by isolating them from the side streets. This tactic obviously failed in Tahrir Square, where narrow streets and alleyways enabled demonstrators to escape. On the other hand, some interviewees in Rabaa Al-Adawiya stated that protesters refused to leave the camp. In fact, the usefulness of Rabaa Al-Adawiya square as a place to stage a sit-in may not have been the best since the grid layout of Nasr City creates squares, mere intersections of no more than two main roads. Marching up and down might be more effective for protesters than to stage a sit-in.



a) Urban block size. Red is small and blue is large.



b) Node count R1200 meters

Figure 7: Urban block size and node count R1200m in Cairo CBD (left column) and Nasr City (right column).

The visibility graph analysis (VGA) and agent-based analysis

The visibility graph analysis (VGA) shows the relation of each pixel or cell to the close spaces in terms of a panoptical view. Figure 8 (left) shows the VGA analysis of Rabaa Al-Adawiya square. As can be seen, both Al-Nasr and and Al-Tayaran streets have higher visibility and accessibility than other streets in the vicinity (coloured in red). The visibility is low in the whole area especially in the south.

The agent-based analysis shows that the two streets of Al-Nasr and Al-Tayaran have a higher number of agents, while the internal main streets have lower numbers. Most agents are dispersed along only Al-Nasr and Al-Tayaran streets. These streets were encircled swiftly by police and military forces. Hence, the square is a mere intersection of no more than two major streets.

In the VGA analysis, Tahrir Square as well as its connected main streets is the most visible areas. The red area highlights the vantage points of the square. The square has the advantage of being visible from six streets passing through it (Figure 9 left). This spatial configuration supports the protesting crowd and strengthens the sense of safety and 'togetherness'. Moreover, this high degree of spatial visibility probably made it easy for the media to monitor and to broadcast the protest event.

Similar to the results of VGA analysis, the agent-based modelling shows that most agents are concentrated in Tahrir Square due to its large open space. The Meret Basha, the segment linking Tahrir Square with Aldel-Muneim Riyad Square (north of Tahrir), is preferred by many software agents. That is the main area where clashes between demonstrators and pro-government forces occurred on 2 February 2011, also known as the Battle of the Camel. The analysis also highlights the segment linking Tahrir Square to the Nile, where most clashes of Friday of Anger between demonstrators and Central Security Forces (CSF) took place.

Moreover, the graph shows that the potential movement is lower in alleyways than in main streets. However, according to interviews, demonstrators agglomerated not only in Tahrir Square and throughout main roads intersecting it, but in surrounding secondary and narrow streets as well. According to the Egyptian Revolution Manual, spreading out over the whole area makes it difficult for security forces to besiege rebels. Compared to Rabaa Al-Adawiya Square, Tahrir Square is more visible and accessible. The geometric shape of Tahrir Square enables winding and congregating a huge number of people around it. This makes it more convenient for social activity and public discourse than Rabaa Al-Adawiya. It is relatively difficult for police to block all roads radiating from Tahrir Square. Therefore it is difficult to encircle demonstrators in Tahir Square due to the area's spatial layout.

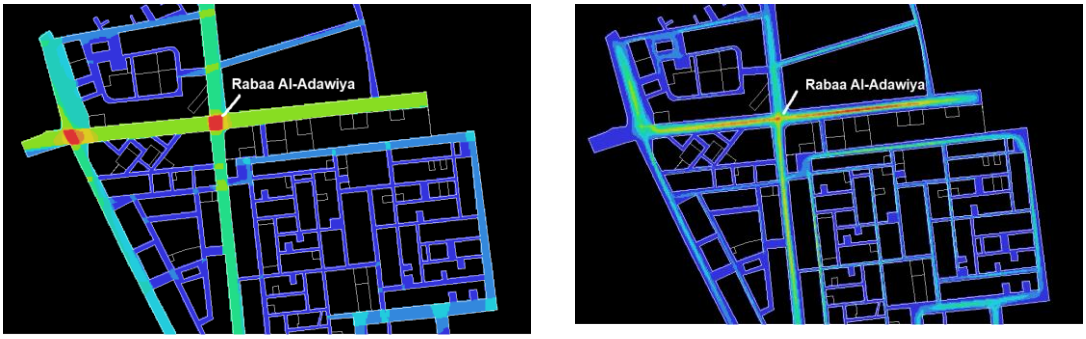


Figure 8: Visibilty graph analysis (left) and agent-based analysis (right) in Rabaa Al-Adawiya zone

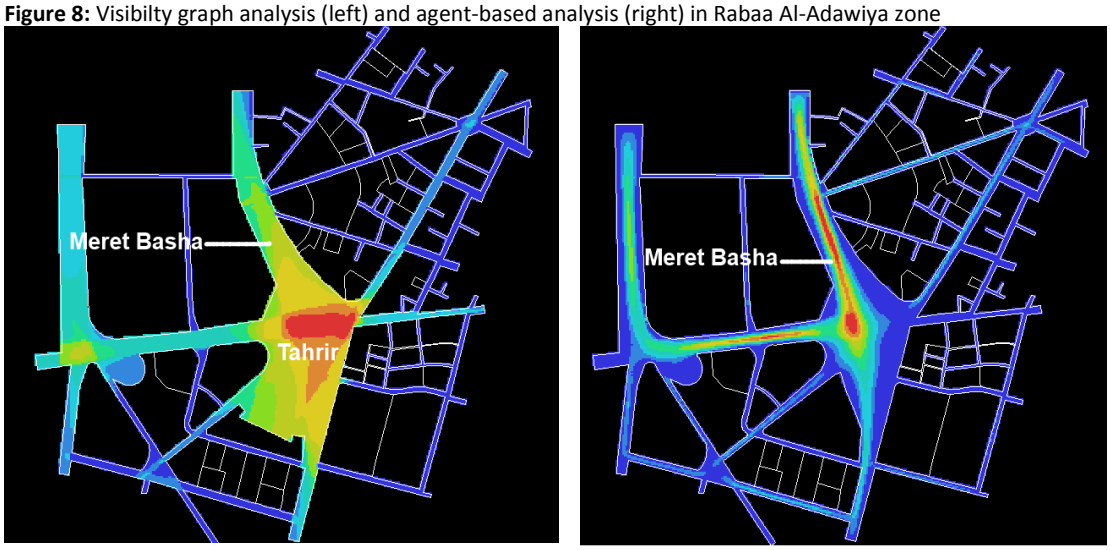


Figure 9: Visibility graph analysis (left) and agent-based analysis (right) in Tahrir area.

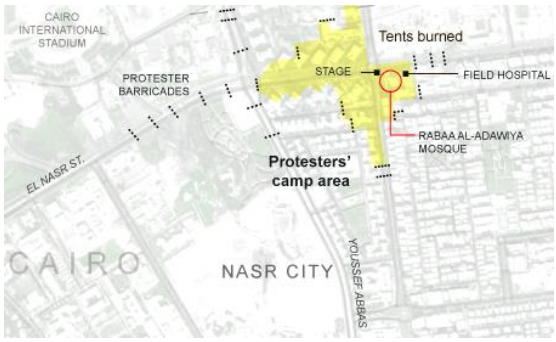
7. The role of road width

Often rebels construct barricades as a revolutionary technique to slow the progress of mounted troops allowing rebels to attain an organized withdrawal (Traugott, 2010). Barricading is less effective as a defence tactic when constructed along wide boulevards, since bulldozers can easily destroy barricades. However, the role of road width for successful protest works well only with other spatial variables. The barricades were erected by demonstrators in Rabaa Al-Adawiya square at wide roads allowing vehicle access. However, these barricades were not effective in stopping troops, due to that artillery roads consist of long segments and large urban blocks. This indicates higher traffic speed, longer walking distances, and a lack of escape routes in case of an emergency where every second counts.

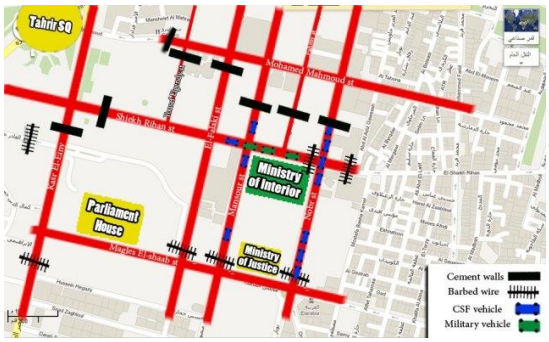
In contrast, the ministry of interior as well as military troops blocked many streets in the neighbouring vicinity of Tahrir Square using concrete barricades in the post-revolutionary period to protect themselves from protesters. The road width in surrounding streets might be significant to allow access to vehicles of police and military troops. However, Marshall and Garrick (2009) found

that a high number of intersections of a highly accessible street network reduce traffic speed and enhance safety, while broken connectivity enables high speeds and 'makes walking impractical' (Zack, 2013). Most streets in Cairo CBD have one-way traffic with several intersections, reducing car accessibility and traffic speed.

In sum, road width alone is not enough to influence how and where protests take place. Other spatial factors such as urban block length, degree of permeability to the neighbourhood and symbolic values of the place play also a role. Short urban blocks and high degree of connections to other streets reduce the speed of bulldozers and help protesters to escape quickly.



a) locations of barricades constructed by protesters in Rabaa Al-Adawyia (source: http://www.nytimes.com)



b) locations of barricades constructed by the Ministry of Interior in Tahrir Square (source: Trew, 2012)

c) Military forces swiftly removed makeshift barricades along the highway, Al-Nasr St., leading to Rabaa Al-Adawiya (Source: Daily News, 2013)

d) The ministry of interior constructed barricades in Cairo CBD by to wall itself in. (source: Metwally , 2012)

Figure 10: Barricades in Rabaa Al-Adawiya (left) and Cairo CBD (right).

8. Dynamic versus static crowd

Crowd behaviour is a key factor in emergency evacuation. In Rabaa Al-Adawiya, the two spatially integrated streets Al-Nasr and Al-Tayaran shaped the sit-in. The entrances to the space where the demonstrators clustered were limited in number due to barricades constructed by protesters along these two streets. Here the boundaries of space were defined and the street capacity was known. This type of crowd is called a 'closed crowd' (Canetti, 1960). On the other hand, the crowd in Tahrir was not confined to the square, but filtered into the surrounding streets and alleyways as well. The boundaries of the crowd where were poorly defined. And that is the second type of crowd, the 'open crowd'.

According to Canetti (1960) a 'closed crowd' is difficult to disperse since 'it is protected from outside influences' (Canetti, 1960: p.17), whereas an 'open crowd', though has the potential to grow, is dangerous and can be disintegrated. Seemingly, Canetti's thought cannot be generalised. When revealing the results from the agent-based modelling from depthmapX, the analysis shows that Tahrir's crowd is a mix of an open and closed crowd. It was a dynamic crowd of high concentration in Tahrir Square and in close vicinity as well. The high connectivity of the area enabled protesters to

stop attacks from assailants. That is a 'reversal crowd' phenomenon in which protesters can stop riot police. Unlike Tahrir Square, crowd in Rabaa Al-Adawiya was static or stagnating where the demonstrators are waiting to be besieged by security forces. Police and military forces easily demolished the barricades and defenders were physically stuck in the area.

Canetti (1960) stated that besiegers should strengthen the physical barriers. However, this did not happen in Rabaa Al-Adawiya. As a closed crowd, people from outside could not join the protest. Dispersal in event of panic is dangerous in locations of few entrances and broken local accessibility such as Rabaa Al-Adawiya. Crowds can trample people; weaker members of the crowd can be easily sacrificed. As such, a demonstration's information seems to be embedded in the shape of the crowd, which is determined by the spatial structure of urban space.

9. Conclusion

Although advanced media and communication technologies can initiate political movement and guide protesters, the physical layout of a built environment also influences how a crowd behaves during a protest. Protesters seek public squares that are locally as well as globally well integrated in the city. Moreover, these squares need to have a symbolic value. The virtual agora is not enough since meanings are shaped, shared and expressed in physical urban space (Elshahed, 2011b; Nur, 2012). Both Tahrir and Rabaa Al-Adawiya squares have a symbolic value functioning as a suitable location for protests.

To what extend a protesting crowd can confront government forces, depends on the degree of porosity of the vicinity of the squares. A square that is well connected to its vicinity makes it easier for demonstrators to escape and hide from police forces. The reverse is true; a square that is poorly connected to its vicinity makes it easier for the police forces to control the crowd.

Both Tahrir and Rabaa Al-Adawiya squares are accessible at a city scale. Main routes linking the various areas of the Cairo city intersect on both squares. Both sites are central junctions that attract a large amount of movement through the city. Moreover, Tahrir Square is surrounded by narrow streets and alleyways, which enable protesters to escape from security forces (Bayate, 2009: 167-168). Therefore, a high amount of both vehicular and pedestrian movement aggrandized the success of the square as a space of discontent. Conversely, Rabaa Al-Adawiya is poorly connected to its vicinity, which makes it easier for the police to control revolts.

The VGA analysis shows that Tahrir Square is more suitable for public speeches than Rabaa Al-Adawia. The space in Tahrir Square is more visible and accessible and can bear more people than Rabaa Al-Adawia. The agent based modelling shows also, to a certain extent, where congestion and the amount of pedestrian behaviour take place.

Seemingly, Tahrir Square fulfils the four criteria presented by Bayat to be the optimal space for protest, whilst Rabaa Al-Aadwiya lacks flexibility. Obviously, Tahrir Square has a higher degree of centrality, proximity and accessibility than Rabaa Al-Adawiya. Moreover, the network of narrow streets and alleyways in close vicinity of Tahrir Square help political escapees to hide from police. Notably, Rabaa Al-Adawiya lacks this network and consequently lacks the advantage of being a pedestrian friendly zone. In other words, large urban block length in Rabaa Al-Adawiya prohibited protesters from protecting themselves and escaping security forces in the event of conflict.

In short, the perfect protest space space must be integrated at both the city and settlement levels. However, the findings of this inquiry are just a preliminary step towards a better understanding of space and power. As the results show, a strategy for reducing revolts and demonstrations is to block local streets leading into large squares in cities of conflicts. Taken together, the spatial configuration of urban space combined with the symbolism of power, can strengthen, or constrain, protest. In other words, in protests, the symbolic value and the spatial configuration tend to complement each other, like gin and tonic. Simply, the symbolic value of artefacts attracts protesters, but the spatial configuration of the neighbourhood influences the behaviour pattern of the crowd and the control mechanism of the police forces.

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