

THE VALUE OF THE CLOISTERS IN NAPLES' HISTORICAL CITY CENTRE AS QUIET AND RESTORATIVE PLACES

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ABSTRACT

The high population density of Naples' historical centre, on the other hand the most important touristic part of the city, lead to intense anthropic activity. Furthermore, traffic is noticeably present in some areas, especially motorbikes. Both factors lead to significant noise pollution. Hence, and due to the absence of parks, its cloisters can play a special role as quiet and restorative places. In the present study, sound recordings are carried out inside and outside of several of these historic places, in order to compare the acoustic differences from an objective point of view.

1. INTRODUCTION

The city of Naples is characterized by a high population density. In its historical city centre such concentration is especially noticeable, enhanced by the important presence of tourists. Hence, strong anthropic activity occurs along the whole area, due to bars, shops, small open-air markets, kids playing, etc. Additionally, in the areas in which the traffic is not totally restricted, vehicles (specially motorbikes) are dominant. All these factors lead to intensive levels of noise, favoured by narrow streets with high buildings.

Noise in urban agglomerations has become a growing concern in Europe, and can cause serious psychological effects (disturbance, stress reactions...), as well as physiological (increased blood pressure, risk of cardiovascular disease...). Focusing on environmental noise, the World Health Organization provides a summary of synthesized reviews of evidence of health impacts in [1]. The EU Directive 2002/49/EC [2] acknowledges the need for preventing or reducing environmental noise levels that may negatively affect human health, and highlights the need to preserve quiet areas. Recommendations based on examples of good practice in assessing and managing quiet areas in Europe can be found in [3]. In [4], it is shown that the presence of nearby green areas (and consequently quieter) helps to mitigate the adverse effects of noise, with regard to annoyance and stress. According to [5], the more time people spend outdoors in urban open green spaces, the less they are affected by stress. Even the temporary absence of noise experienced on a short visit can help to restore or compensate for the annoyance/stress and health effects of noise in the residential environment [6].

However, Naples historic city centre lacks of parks, and the closest green areas are placed next to streets with high-density traffic. In [7], soundwalks along the historic centre were carried out in order to identify quiet spots. Nevertheless, it becomes difficult to find restorative places in which it is possible to relax, especially important in such a noisy and vibrant urban area. For these reasons, the numerous cloisters present in the zone [8] should play an important role as restorative spots. About 30 cloisters can be found within this area. They are frequently well isolated from external noise, whereas their architectonic and historical properties offer a pleasant visual stimulus. Additionally, odours might also be appreciated due to the presence of greenery in many of them. Accordingly, a rich multisensorial perception is offered, in some cases noticeably improved with respect to the surrounding streets.

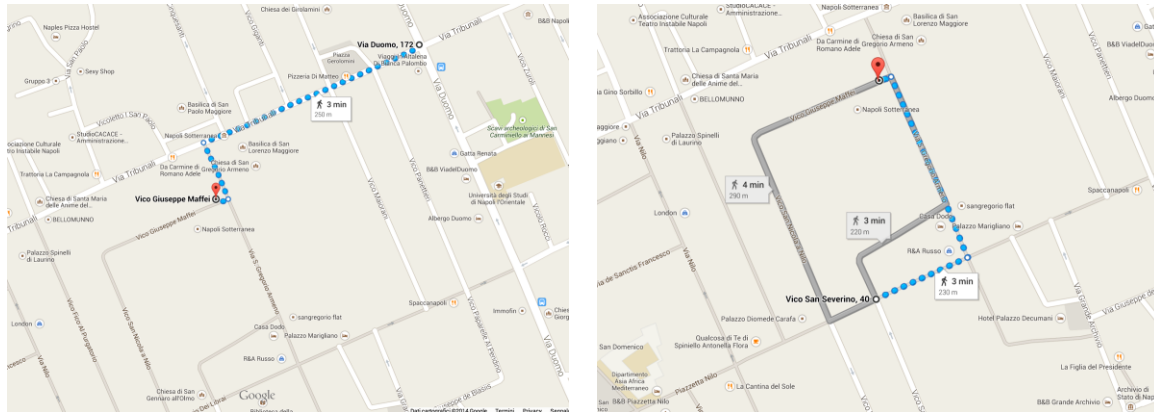
Most of the buildings that host cloisters in Naples historical centre have been adapted for a new specific use. Some examples are university faculties, high schools or council dependencies. Therefore, some of them are totally close to the public, or open only during specific days or after having asked for permission. Some of them, more focused on tourism, require an entrance ticket, as it is the case of the coloured Cloister of Santa Chiara, the most famous in the city. Nevertheless, there are still a number of cloisters that can be freely accessed to, even though the opening times are limited. However, due to their internal emplacements, many of them are unknown even for the locals, since they are not visible directly from the street.

As first approach from a quantitative point of view, the present research aims to assess the benefits in terms of noise reduction of 6 cloisters in Naples historical centre, with view to show their potential as restorative places in the city.

2.METHODOLOGY

For this research, 6 cloisters in Naples historical centre were chosen. The selection corresponds to those that allow full free access (without entry fee or need of permission). In this way, the cloisters found to be the most interesting as restorative places can be considered for immediate use. In addition, it has eased the measurements stage. A comparison between the sound pressure levels inside them and in the surrounding streets is subject to many factors, since the activity present during each recording might strongly differ from one take to another. Hence, a precise recording methodology is needed, in manner that unexpected influences are reduced as much as possible.

In order to get closer to a realistic scenario, the $L_{eq(A)}$ levels outside are averaged along soundwalks approaching the cloister entrance, at a speed of approximately 5 km/h. 220-250 meters distances have been considered as a representative length (150-180 seconds). Since several paths are always possible, and sometimes one can lead to much higher levels than another one (e.g. depending on traffic flow), for each cloister two different approaches have been chosen (named 'A' and 'B', each repeated twice): one corresponds to the most populated option (as considered the most likely to occur), whereas the second one follows an itinerary in



opposite direction (Fig.1).

Figure 1: Representation of the two opposite paths made for the San Gregorio Armeno cloister.

For each soundwalk, 4 minutes recordings have been also carried out in a quiet spot within the cloister. Therefore, each set consists of 4 soundwalks approaching the entrance (2 for each itinerary, leading to an averaged value over approx. 11 minutes), and 4 recordings inside, lasting 4 minutes (i.e. averaged values over 16 minutes). Moreover, each set has been carried out once during morning hours and once during afternoon hours¹. Since several of the cloisters evaluated in this research belong to university faculties, every recording has taken place during weekdays, during their opening times. The equipment employed consisted of a binaural recording headphones (HDS 451), and a portable recorder (M-Audio Microtrack 24/96).

3.CLOISTERS

For each cloister, a brief description of the soundscape found, both inside and along the soundwalks, is presented next.

1 – Chiostro di San Gregorio Armeno: Despite of the often presence of tourists (never massive in any case), the cloister tends to be quiet and practically empty. Due to its garden, irrigation sound can be found sporadically. Sometimes, the noise from children activities in the surrounding building (which works as boarding school) is predominant.

Path 'A' follows Via Tribunali, quite populated street full of small shops, in which motorbikes and cars are found easily. On the other side, path 'B' passes by a touristic and always populated pedestrian street, Via San Gregorio Armeno, but however free of vehicles (Fig.2.a).

¹Except San Gregorio Armeno cloister, which opens only during morning hours. Alternatively, two 'morning' recordings sets have been carried out for this case.

2 – Chostro di San Domenico Maggiore (also called “Chostro delle Statue”): This small cloister hosts a bar in one of its corners, which is however hardly frequented. The scant noise found in it consists on isolated voices from the bartenders or other workers in the building, as well as, sporadically, children playing in an adjacent yard.

For this case, both soundwalks follow again, in opposite directions, Via Tribunali, along stretches with characteristics similar to those found in the path ‘A’ approaching S. Gregorio Armeno cloister.

3 – Chostro di San Giovanniello: Since the building hosts the Faculty of Fine Arts, there is a strong presence of students in the cloister especially along the morning, thus being the predominant source. Nevertheless, attenuated traffic noise from outside still arrives, since there is an open entrance communicating both spaces.

Path ‘A’, starting close to the metro station ‘Museo’, follows a street with quite dense traffic, but still in just one direction. Path ‘B’, which starts in Piazza Bellini, is characterized by a much quieter pattern, in which vehicles are hardly found and the predominant source is anthropic activity from bars or pedestrians (Fig.2.b).



Figure 2: a) Street San Biagio dei Librai (Path B of San Gregorio Armeno cloister); b) Street Santa Maria di Constantinopoli (in front of San Giovanniello Cloister).

4 – Chostro di Santa Patrizia: Despite of hosting a university faculty, students are present but not massively. Other noise sources consist on voices from the surrounding building, certain machinery noise or wind hitting the trees.

Both paths coincide in their second part with the southern stretch of Via San Luciano Armani, very quiet usually. However, their first half (Via Pisanelli for path ‘A’, Strada della Anticaglia for path ‘B’) may have strong vehicles noise, specially that due to motorbikes, as well as pedestrians noise.

5 – Chostro di Sant’Andrea delle Dame: The soundscape in this cloister is similar to that found in Santa Patrizia, whereas the presence of students is slightly greater.

Due to the traffic, the first half of the path ‘A’ is quite noisy (coincident with the first part of San Giovanniello’s path ‘A’, starting close to the Museo metro station). Along the second it is possible to find vehicles but are not frequent. The path ‘B’, which follows Via del Sole, presents a balanced mix between moderate traffic and people voices.

6 – Chiostro dei Santi Marcellino e Festo: The soundscape in this cloister can strongly vary depending on the moment. It is easy to find people who come alone to read or simply relax, since it is spacious and enjoys of small green areas. However, especially in the afternoons families with children playing are usual, as well as young people or students of the faculty that the building hosts, eventually playing some instruments. Irrigation sound might also be listened sporadically.

Path 'A' follows mainly Corso Umberto, a street with very dense traffic in both directions. On the contrary, the path 'B' goes along Via Arte della Lana, with very limited both traffic and anthropic noise. In the figure reported below (Fig.3), the localization of the six cloisters in the historical city centre is reported, and for each of them a representative picture is also shown.



Figure 3 - Localization of the cloisters studied: 1) San Gregorio Armeno; 2) San Domenico Maggiore; 3) San Giovanniello; 4) Santa Patrizia; 5) Sant' Andrea delle Dame; 6) Santi Marcellino e Festo.

4.MEASUREMENT RESULTS

In Table 1 are summarized the results obtained along all the measurements. In particular, it can be seen that choosing one or another path (A or B) can result into a strong difference, leading to approx. 5 dB(A) deviations for the cloisters of San Giovanniello and Santi Marcellino e Festo. On the contrary, much smaller differences are found for the cloisters of San Gregorio Armeno (1.1 dB(A)), Sant'Andrea delle Dame (1.4 dB(A)) or Santa Patrizia (0.9 dB(A)). Nevertheless, once all the recording sets are averaged, the noise levels found outside each cloister do not change dramatically between them. Whereas the highest value is 72.8 dB(A) for both San Giovanniello e Santa Patrizia, the lowest is just 3 dB(A) less for San Domenico Maggiore, 69.8 dB(A).

	San Gregorio Armeno	San Domenico Maggiore	San Giovanniello	Santa Patrizia	Sant'Andrea delle Dame	San Marcellino e Festo
path A	71,0	68,3	75,3	73,2	73,4	73,4
path B	69,9	71,4	70,4	72,3	72,0	68,3
Average paths	70,5	69,8	72,8	72,8	72,7	70,8
Average cloisters	49,8	54,9	65,8	53,7	57,6	56,1
Difference	20,7	15,0	7,0	19,1	15,1	14,8

Table 1: A-weighted sound equivalent levels measured for different paths, inside the cloisters and the difference between the averaged values.

However, much higher differences are found between the levels measured inside the cloisters. The most quiet cloister is San Gregorio Armeno, with a value of 49.8 dB(A). On the other hand, the highest value is found in San Giovanniello, 65.8 dB(A). Such a big difference, 16 dB(A), is due to several opposite factors. Whereas San Giovanniello is usually full of students, San Gregorio Armeno is found often practically empty. In addition to this, in order to arrive to San Gregorio Armeno cloister, it is necessary to go towards a long and closed entrance, which is not the case in San Giovanniello, separated from the street by short open passage. Moreover, San Giovanniello's entrance faces a street with high traffic density.

Likewise, San Gregorio Armeno offers the greatest difference if comparing its outside and inside levels, 20.7 dB(A), whereas San Giovanniello offers only 7 dB(A) reduction.

5.DISCUSSION

The A-weighted sound equivalent levels $Leq(A)$ have been measured inside and outside six cloisters in the historical centre of Naples. Whereas the sound levels along their respective surrounding streets have been found to be quite similar (maximum difference = 3.4 dB(A)), the sound levels measured inside the cloisters differ up to 16 dB(A). Consequently, if comparing outside and inside A-weighted sound equivalent levels, a noise reduction from 7 dB(A) (San Giovanniello) to 20.7 dB(A) (San Gregorio Armeno) was measured. Nevertheless, despite of the particular soundscape of each cloister and according to the rest of results, it can be concluded that an attenuation of 15 dB(A) is easily reachable.

Thus, it has been shown that the cloisters in the historical centre of Naples offer a valid alternative to parks as restorative places. In addition to these quantitative benefits of the noise reduction, further studies should consider subjective assessments, since the sources found inside the cloisters tend to be more pleasant. Likewise, a multisensorial approach would be of great interest. The cloisters' historical characteristics, together with the usual presence of greenery, are prone to add positive visual and air quality impacts.

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