

# Beyond the Limit in Piranesi's Art

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## Abstract

*The contribution investigates the theme of overcoming the limit in Piranesi's art, examining the subject in three different aspects: the technical, perspective and architectural fields.*

*In the technical sphere, Piranesi went beyond the limit during his incessant experimentation to get the secret of etching to which he aspired. The price he had to pay to achieve the freedom, poetry and freshness of sign, with which he expressed the power, depth and audacity of his imagination, concerned some technical failures found on the copper matrices.*

*His overcoming the limits in the field of perspective is demonstrated by the expedients with which Piranesi skilfully mastered perspective to adapt the composition to his aesthetic and expressive wishes, anticipating and synthesising modern cinematographic techniques in a single image.*

*In architecture, the overcoming of limits can be found in his inventions: in the impossible configurations of the Carceri and the colossal architectural fantasies collected in the Opere varie. Not having the opportunity to devote himself to concrete design practice, Piranesi entrusted his utopias to imagination and drawing.*

*Keywords: Piranesi, limit, etching, perspective, architectural fantasies.*

## Introduction

Henri Focillon ascribed the discomfort of space and time limits to visionary artists in his essay *Esthétique des visionnaires*, which first appeared in 1926 [Focillon 2006, p.13]. In this context, the *vox media* of the limit, whose etymology derives from two Latin nouns, *limes* (limit, term, boundary) and *limen* (threshold, entrance, beginning), assumes the fullness of its contradiction. While visionaries suffered the discomfort of space and time boundaries, it is in their overcoming that they entered into the completely original artistic journey that characterises them. For them, the limit is not the boundary that closes but the threshold that opens to new visions.

As suggested by the French art historian himself [1], Giovanni Battista Piranesi is one of them.

Taking its cue from some passages of Focillon's essay on the aesthetic of the visionaries, this contribution investigates the theme of overcoming the limit in Piranesi's art, thanks to the tools of the representation science, examining the subject through three aspects: the technical, perspective and architectural sphere.

Overcoming the technical limits is effectively summed up by the motto "*col sporcar si trova*" (you can find if you dirty), which the engraver included on the frontispiece of one of his collections [Piranesi 1764]. Piranesi's incessant experimentation with etching technique, on the one hand, led him to commit technical failures, which are illustrated by some of his copperplates, but on the other hand, it allowed him to achieve the freedom, poetry and

freshness of sign with which he expressed the power, depth and audacity of his imagination.

Overcoming the limits in the field of perspective is demonstrated by the expedients with which Piranesi skilfully masters the rules of perspective. The engraver's consideration for this method of representation is declared by himself in the dedicatory letter of the series *Prima Parte di Architetture e Prospettive*: "You will see how much Perspective contributed to all these drawings because some parts of them I wanted to be seen before others in the Observer's eyes. The great Master of Architecture Vitruvius said that perspective is necessary for the Architect: and I think we can add that, whoever does not understand its use and need in Architecture, does not yet know from where Architecture gets its greatest beauty." [transl. from Garms 1978, pp. 16, 17]. Surpassing the limits of architecture can be found in the etchings and drawings of his youth, which have architectural fantasies as their theme where the colossal buildings, sometimes subject to formal inconsistencies, could never have been built, even with today's technical knowledge.

## Technical field

"For these artists, to say that it is a question of pure procedures, of execution modes, is to misunderstand the essential character of the artist's psychology: active and creative psychology, which does not allow a distinction between emotion and vision on the one hand and technique and creation on the other [...]. The genius of the visionaries spontaneously creates the means and tools that are necessary to it." [transl. from Focillon 2006, p. 30]

Historiography agrees that Piranesi began his studies in engraving technique while still in Venice at Carlo Zucchi's studio [Rossi 2016, p. 27]. From the Venetian environment, he learned softness of tip, the economy of line and lightness of biting bath. After moving to Rome, Piranesi frequented the studio of Giuseppe Vasi, an excellent *vedutista* of Sicilian origin, where the young engraver perfected his use of the burin and the art of *morsure multiple* (multiple biting). Their relationship was mentioned by both Giovanni Ludovico Bianconi, who wrote in a negative tone that the pupil threatened his master with death because he refused to reveal "the real secret of etching" [transl. from Bianconi 1976, p. 128], and

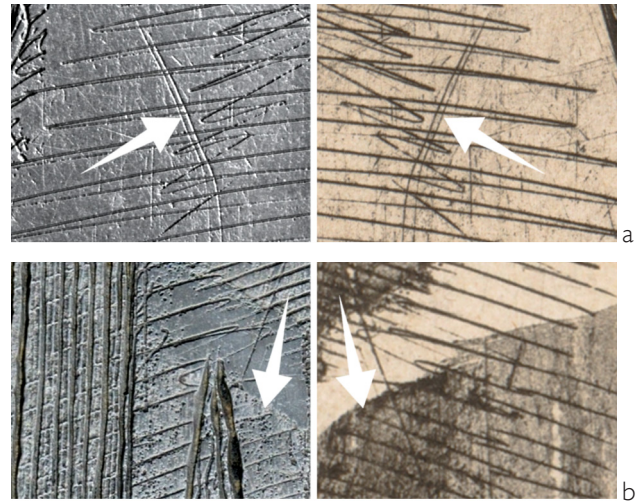


Fig. 1. Details of the copperplate (left) and the first edition print (right) of the frontispiece of the *Carceri*: unintentional scratches (a) and erosion of the protective layer of copper (b) (author's elaboration).

Jacques-Guillaume Legrand, much more diplomatic, who nevertheless admitted a contrast between the two and quoted Vasi's statement: "You are too much a painter; my friend, to be an engraver" [transl. from Legrand 1976, p.139]. Although in different tones, the first two biographers suggested Piranesi's need to achieve an uncommon technical quality.

Having found etching as a means through which to express his fervid visions, Piranesi immediately began lively experimentation. Focillon identified four evolution periods of his technique: the first manner was influenced by his Roman apprenticeship and can be seen in his invention architectures; the second manner, "the painter's etching", evoked the Venetian style of a free sign as seen in the early *Carceri* and *Grotteschi*. Then there was a moment of transition in which the engraver was looking for a more vigorous and complete technique. Finally, the apex of Piranesi's technique, the achievement of the etching secret he used to engrave his magnificent plates of ruins [Focillon 1967, p. 199].

Piranesi's technical experimentation traces are recorded on his copperplates, now preserved at the

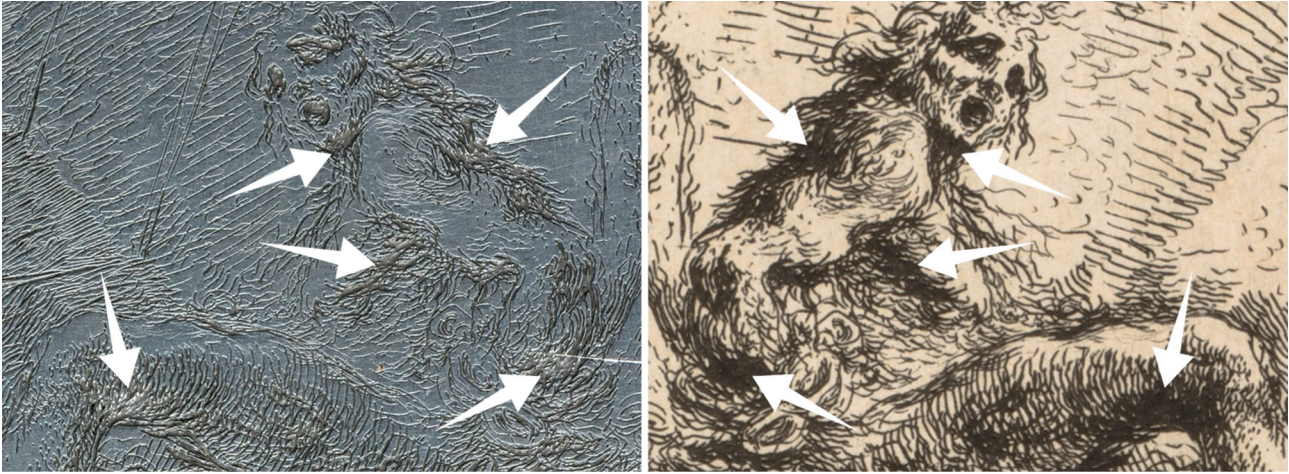


Fig. 2. Detail of the copperplate (left) and the first edition print (right) of the frontispiece of the *Carceri* with the corrosion between neighbouring marks (author's elaboration).

Istituto Centrale per la Grafica (ICG) in Rome [Mariani 2010]. In particular, the *Carceri* are an emblematic series for the study of Piranesi's engraved signs, as they present a stratigraphy of marks spanning ten years: from their production on 1749-1750 to their reworking in 1761.

During recent research carried out in collaboration with the ICG, it was possible to survey some matrices of the *Carceri* through the reflectance transformation imaging (RTI) technique [2]. RTI is a computational photography technique that allows to interactively re-illuminate the pictures (acquired with variable light conditions), perfectly simulating in a digital environment the observation and study operations that are traditionally carried out in chalcography, i.e. by moving the light source to follow the different direction of the engraved marks to observe the bottom. This technique makes it possible to record the two-dimensional metric components, the chromatic values and the third dimension implicitly with the perception of the shadows created in the engraved traces.

Through the RTI technique, it was possible to identify some of the technical failures Piranesi encountered in engraving the *Carceri* [3].

The first edition of the series is characterised by very free and fluid marks, which Piranesi obtained thanks to the use of a soft ground [Trassari Filippetto 2008, p. 15], with a waxy consistency, which allowed the tips to move freely but at the same time did not protect the copper from scratches and unintentional marks (fig. 1a). In combination with this ground, the engraver used a too strong acid which caused two types of problems. On the one hand, the mordant penetrated the preparation layer in some areas, removing the ground from the copper and resulting in a grey patina in print instead of the paper's white (fig. 1b). On the other hand, the nitric acid caused corrosion of copper between neighbouring marks, creating areas that inked badly and resulted in an uneven and faded black on the paper (fig. 2).

In the second edition, the technical failures are caused by the desire to find new expedients to widen the tone gradation and achieve even deeper blacks. To this goal, Piranesi added direct engraving tools to the etching: the burin and, in some cases, a chisel. The latter is a sort of burin without a handle, which is used by percussion. Its marks on the matrices are characterised by notches that identify the strokes (fig. 3a) [4]. In some cases, the strength



of this tool, which was not suitable for the type of material, compromised the thickness of the copper, which cracked after a few prints (fig. 3b) [Ghedin 2010, p. 20].

### Perspective field

“The masses are nothing more than the reference points of a perspective that multiplies endlessly, making it impossible to measure height, width and depth with any certainty” [transl. from Focillon 2006, p. 52].

Piranesi had intense training in perspective. Various 18<sup>th</sup>-century sources report a period of apprenticeship with Giuseppe e Domenico Valeriani [5], famous set designers and *quadraturisti* active in Italy and abroad, through whom the young engraver may have come into contact with Ferdinando Galli Bibiena’s treatise illustrating the “veduta per angolo” (angular perspective) and, perhaps, also with Andrea Pozzo’s treatise on *quadratura*.

Fig. 3. Use and consequences of the chisel: notches due to percussion in plate XVI (a) (author’s elaboration) and crack in plate X (b) (photo by Lucia Ghedin, ICG).

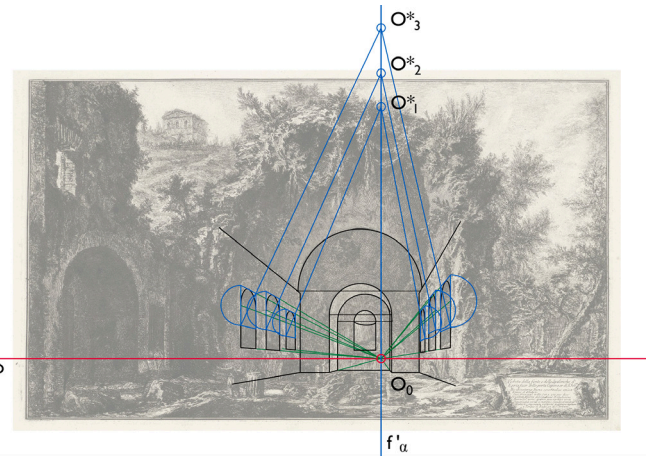
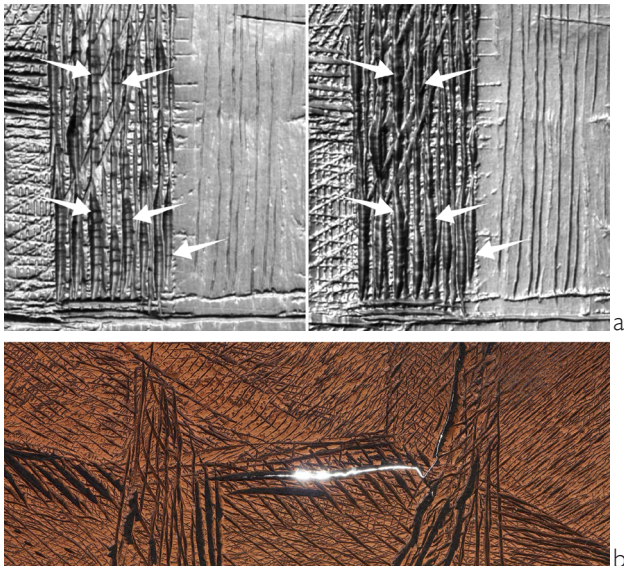


Fig. 4. Perspective layout analysis of the Egeria’s veduta with the multiplication of the projection centre overturn (author’s elaboration).

The waivers to the strict perspective construction found in several of Piranesi’s works result from expedients handled with the mastery of the perspective art.

This study aims to show that Piranesi applied these waivers to achieve specific results. Overcoming the limit in the perspective field allowed him to represent his visions with the greatest freedom of effect. Three etchings from three different themes were examined, presenting different themes: representations of existing structures (*Ninfeo di Egeria*) and fantastic architecture (*Ponte Magnifico* and *Carceri*).

The *Veduta della fonte e delle spelonche d’Egeria fuor della Porta Capena or di S. Seb.no* is an etching of about 1766 collected in the *Vedute di Roma*.

The analysis of the perspective layout [6] reveals a multiplication of the projection centre’s distance  $O^*_1$ ,  $O^*_2$ ,  $O^*_3$ , which varies according to the proximity of the arches to the picture plane (fig. 4). The projection centre’s distance can be defined by the 45° diagonals of the squares circumscribed by the round arches of the side niches. The three-dimensional reconstruction of the represented space, considering each of the three projection centres, shows the contraction and expansion of the perspective space (fig. 5). There is no single three-dimensional model or perspective layout that represents Piranesi’s etching. However, the latter is the union of various partial perspectives with different longitudinally aligned projection

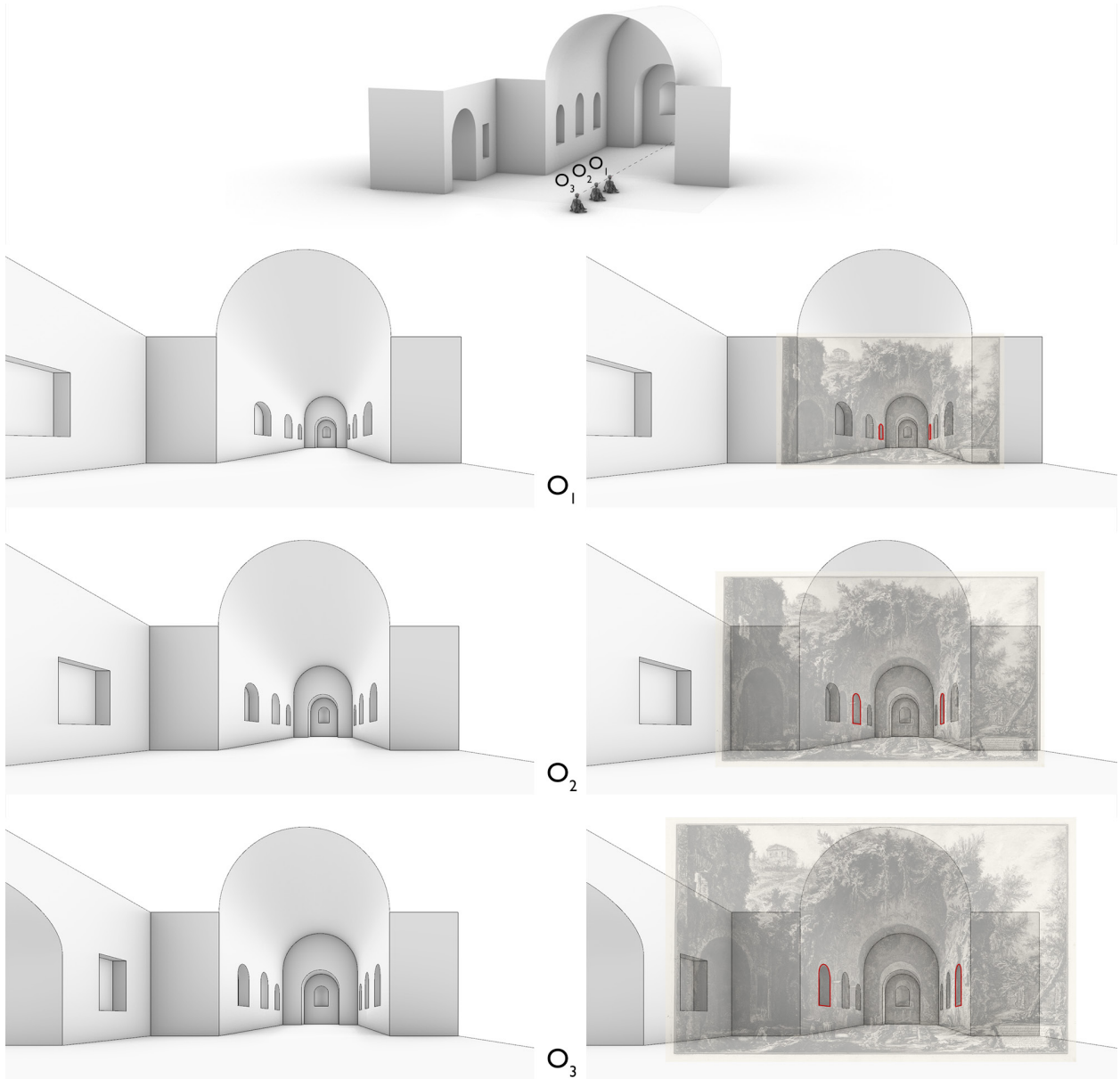
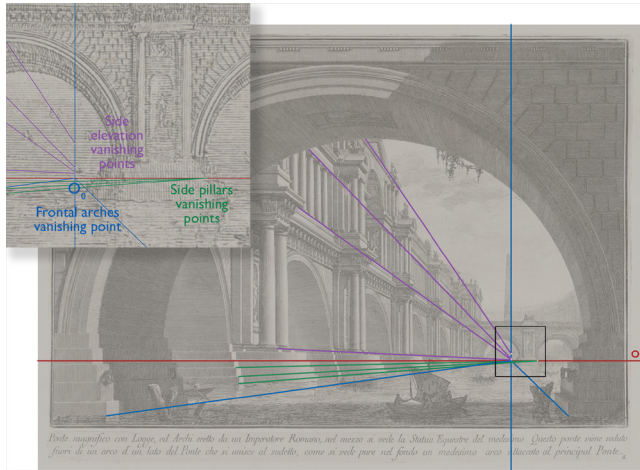
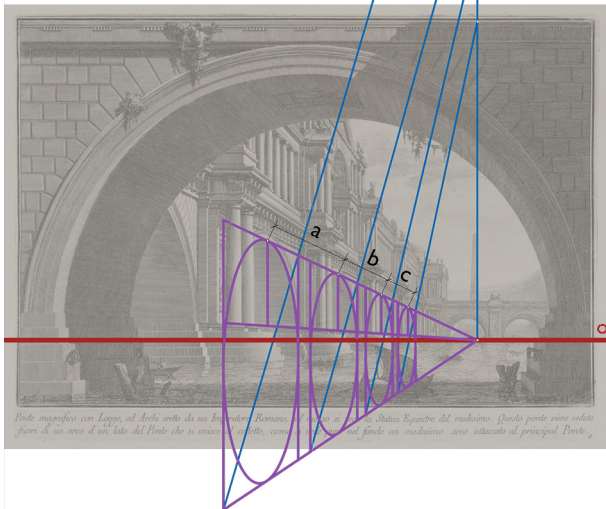


Fig. 5. Views of the 3D model from the three projection centres compared and overlapped with the etching where the elements consistent with each view are marked in red (author's elaboration).



Cross-ratio  
 a: 4,86 cm  
 b: 2,98 cm  
 c: 1,84 cm

Vanishing points of vertical squares' diagonals



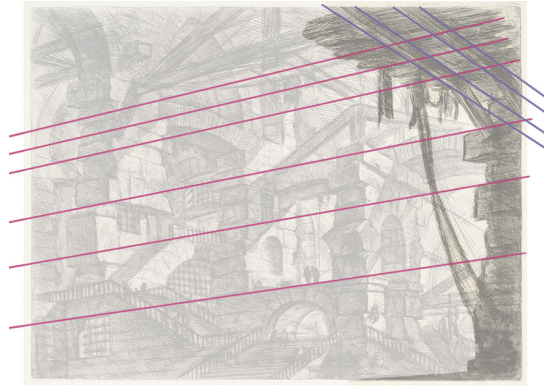
centres in which the decreasing of the apparent lengths varies: the closer the projection centre is to the picture plane, the more visibility the side walls have at the expense of a deformation that prevents the unitary representation of the architecture. So, Piranesi mediated with the desire to represent the whole nymphaeum and describe the side walls in detail. He is a forerunner in using what is known as the 'vertigo effect' in cinematography, i.e. a shot that combines a zoom-in and a backwards tracking shot, or vice versa. In this case, the effect is not experienced in a temporal sequence, but Piranesi synthesised and 'froze' it in a single picture that is the sum of different perspectives [7].

The *Ponte Magnifico con Logge, ed Archi...* is one of the etchings with an invention subject in the first collection published by Piranesi (*Prima Parte di Architetture e Prospettive*, 1743). The first analyses on the perspective layout identified a shift in the vanishing point of the assumed horizontal lines on the bridge elevation. In particular, these points tend to rise as one considers horizontal lines of higher architectural elements (fig. 6). This shift means that in perspective restitution, starting from the water level, which identifies a horizontal plane by its nature, all the friezes tend to rise to the right when looking at the elevation. This shift is the first expedient that Piranesi introduced so that the furthest part of the bridge would not be too reduced in height and would be clearly visible. With the same aim in mind, the straight lines identifying the steps of the pillars are not orthogonal to the picture plane but slightly inclined to allow them to protrude and better mark the spans of the bridge. It was found that the projection centres are multiplied and shifted as before (fig. 7). In addition, the cross-ratio measure, calculated at the keystone of the visible lateral arches, differs from the value of 1.33 that would identify spans of the same width [8]. Here too, Piranesi admitted the possibility of manipulating the perspective to emphasise the

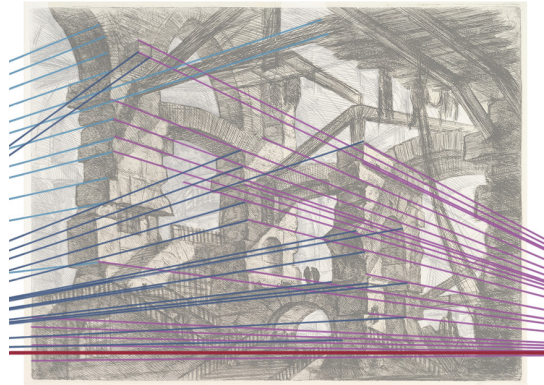
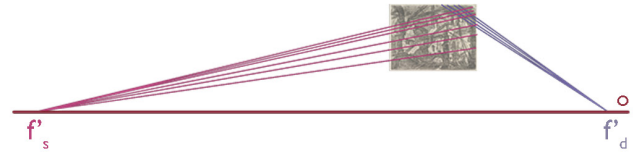
Fig. 6. Perspective layout analysis of the Ponte Magnifico (author's elaboration).

Fig. 7. Cross-ratio measures and multiplication of the vanishing points of the diagonals of the squared circumscribed by the arches (author's elaboration).

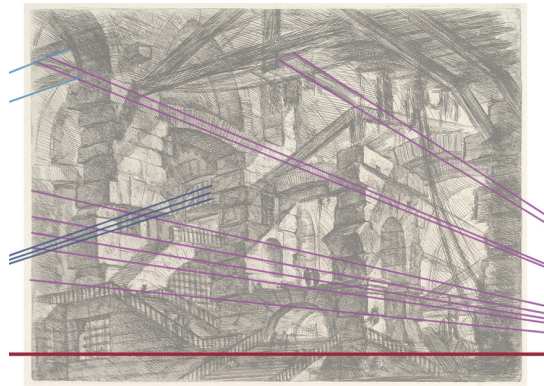
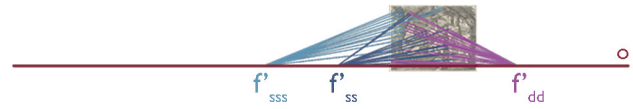




First depth plane



Second depth plane



Third depth plane



Fig. 8. Perspective layout analysis of plate XIV of the Carceri's first edition (author's elaboration).

architecture, as he declared in the dedicatory letter attached to the series.

As a final example, we report the plate XIV of the *Invenzioni capric di Carceri all'acquaforte* (first edition of the series dated 1749-1750). The work is one of the architectural fantasies Piranesi engraved at the beginning of his career.

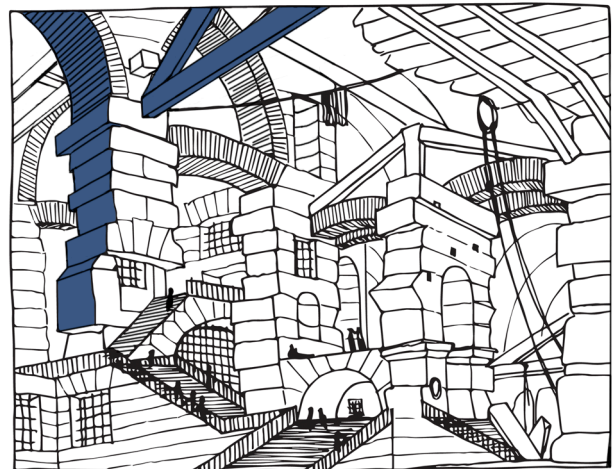
The perspective layout immediately appears more complex than in the previous cases. The key to solving the perspective enigma of the *Carceri* is to break up the plate into depth planes as if they were wings of a theatre and then analyse the perspective layout of each plane [9]. The decomposition into depth planes is carried out where we found the solutions of continuity of architectural groups. We identify three of them in plate XIV. If we examine the horizon position in the three cases, it is positioned lower in the first depth plane than in the other two, where it coincides (fig. 8). The exact coincidence is found in the vanishing points of the horizontal lines orthogonal to each other: those identified in the first depth plane differ from those of the successive two planes. The third plane presents a further dissimilarity: the left vanishing point splits at the side face of the first pillar on the left, which would otherwise have been too foreshortened (fig. 9).

### Architectural field

"Steps of colossal staircases climb the abyss and lose themselves in inaccessible heights. Forests of columns support arches of enormous span, behind these more, as they collapse into a background where their vanishing points drag them."  
[transl. from Focillon 2006, p. 51]

In his multifaceted training, Piranesi also dealt with architecture and engineering. He began his training in Venice with his uncle Matteo Lucchesi, *proto* of the Serenissima's Magistrato delle Acque [10], and later became an apprentice of Giovanni Scalfarotto, an anticipator of neoclassical taste and a follower of Palladian aesthetics. Unfortunately, Piranesi had few opportunities to create architecture [11]. What can be used to trace his profile as an architect are mainly the drawings he left behind. On the one hand, the

Fig. 9. Comparison between the Piranesian solution (top) and the solution without splitting the left vanishing point in the 2<sup>nd</sup> and 3<sup>rd</sup> depth plane (bottom) (author's elaboration).





early architectural fantasies show the power of his imagination and the influence of ancient architecture in his visions. On the other hand, the etchings of Roman ruins reveal his expertise in both surveying and ancient building techniques.

In the present study, some representations of fantastic structures were selected to show Piranesi's mechanisms in overcoming the architectural limit. The *Opere varie* (1750) collects this kind of subject and includes the *Prima Parte di Architetture e Prospettive, Carceri, Grotteschi* and two other prints [12].

One of the latter two is the *Pianta di ampio magnifico Collegio* (fig. 19). It is the plan of a gigantic complex with a central layout and various functions: a temple, a theatre, a riding school, oratories, refectories, libraries, picture galleries, and accommodation for priests, rectors and students. Concentric circles inscribed in a square and some annexes accommodate the distribution of the various buildings. The result is a composition reminiscent of fractal geometry: a multiplication of rooms, which can also be found in the later *Ichnographiam Campi Martii* (1762), which can be indefinitely extended as it depends only on criteria of contiguity.

Piranesi was openly inspired by ancient Greek gymnasium and Roman bath with majestic porticoes and staircase in composing this architecture. The staircase is a theme dear to the engraver, and we see a multiplication of this motif in the *Collegio*.

The same theme can be found in the plate *Parte di ampio magnifico Porto* (fig. 11), also contained in the *Opere varie*. In this *veduta*, the ramps initiate a climax to which all of the architecture contributes: "He piles palaces on bridges, and temples on palaces, and scales heaven with mountains of edifices" [Walpole 1871, p. 313]. The magnificence of the monuments is amplified by a low viewpoint and tiny human figures. Puffs of smoke help to hide joints and critical points: in this case, they divide two parts of what would appear to be the same curved wall but is not, as the openings and decorations are incompatible with each other.

The combination of magnificent structures, daring compositions and spatial ambiguities takes on great significance in the *Carceri*.

Plate XIV, whose perspective layout has already been seen, conceals a spatial inconsistency that

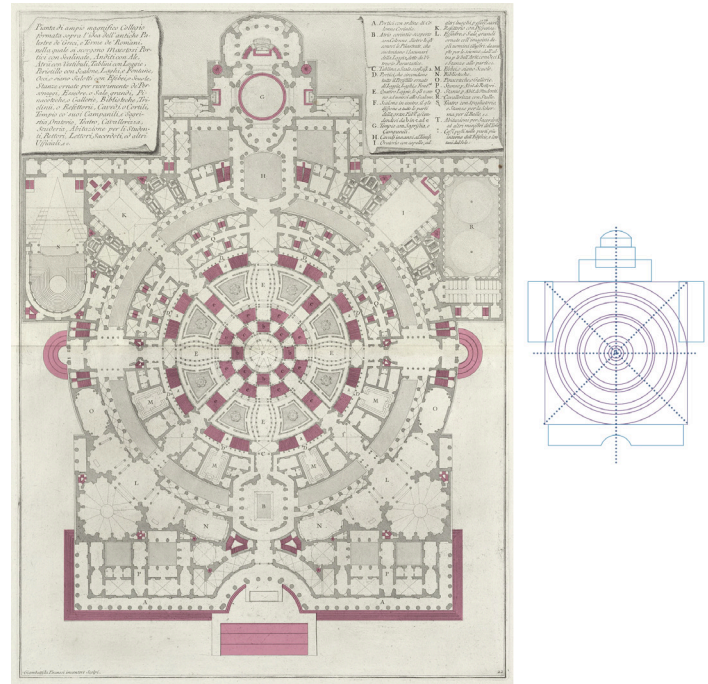


Fig. 10. *Pianta di ampio magnifico Collegio* with the staircase groups highlighted (left) and diagram of the compositional main line (right) (author's elaboration).

hinders the three-dimensional reconstruction of the space. The central pillar of the composition seems to be aligned with the wall with pointed arches, but at the same time, a flight of stairs separates it from the pillar on the left, making the previous alignment impossible. If we want to reconstruct the three-dimensional space represented, it is evident that the perspective restitution alone does not provide sufficient information. The method followed is based on integrating three different types of interpretation: architectural, perspective and perceptual [13]. By bringing together these different types of analysis, it was possible to propose a spatial interpretation of plate XIV that presents the same perspective as the etching and that simultaneously solves the spatial inconsistency by proposing a solution of continuity

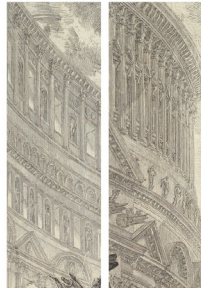
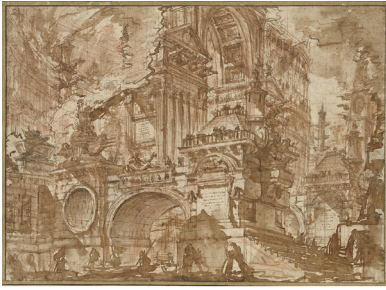


Fig. 11. *Parte di ampio magnifico Porto*: preliminary drawing by Piranesi (top) and etching with details of the two different compositional treatments of the curved wall (bottom) (author's elaboration).

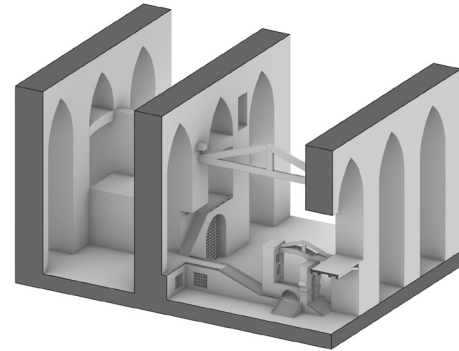


Fig. 12. *Reconstructive hypothesis of the Carceri's plate XIV*: comparison between the etching and the 3D model (top) and axonometric view (bottom) (author's elaboration).

that separates the ambiguous pillar from the wall with pointed arches (fig. 12).

The resulting reconstructive hypothesis highlights a smaller-scale architectural group within a more extensive architecture. This type of concentric spatial multiplication complements the 'serial' multiplication most frequently observed in the *Carceri*, where several rooms follow one another.

## Conclusions

Driven by the *vis* that distinguished his visionary genius, Piranesi created the means and perfected the etching technique, aiming to achieve a fluid, painterly mark and the greatest possible tonal range. Sometimes he went beyond the chemical-physical limit of the copper and failed in his experiments, but this price was paid against the achievement of a very high technical quality: a black

and white that can touch more deeply than the full register of colours.

In the *Carceri*, he overcame the limit of perspective, fragmented space and showed it from multiple viewpoints simultaneously, anticipating what in the 20<sup>th</sup> century would be some formal devices of spatial complexity typical of Cubism. Moreover, his kinaesthetic experience of the represented space anticipated one of the main themes of László Moholy-Nagy's research, which precisely concerned overcoming the Renaissance perspective space with a dynamic vision [Quici 2014, p.66].

Piranesi anticipated and preceded, but he was also a source of inspiration for later architects, artists, and writers because he stood out in the artistic and architectural field for his peculiarities. If, on the one hand, he anticipated, on the other hand, he created a legacy that will be continued by many subsequent artistic disciplines in a more or less explicit and direct way [14]. In his early production of fantastic architectures, he overcame the architectural limit by proposing out-of-scale

and ambiguous structures, too ambitious for any client: “he has imagined scenes that would startle geometry and exhaust the Indies to realise” [Walpole 1871, p. 313].

Not having the opportunity to dedicate himself to concrete design practice, the engraver entrusted his utopias to the imagination and drawing: “the only adequate outlet for an intellectual work that does not want to relinquish the commitment to making projects” [Tafari 1987, p. 29].

We saw the implications of Piranesi’s overcoming the limit in the technical, perspective, and architectural spheres, considering his early inventive production more. However, it can be said that Piranesi’s whole existence was characterised by a desire to push himself beyond the customs of the time.

In addition to the fields already considered, Piranesi also pioneered a new method of studying ancient remains: “because I realised that I could not deduce a positive assessment from what modern authors wrote about them [ancient ruins] because they did not become

involved in the investigation of the remains and of the places where they supposedly were built” [transl. from Piranesi 1784]. In some ways, he anticipated modern archaeological science, which is based on the study of ancient sources and direct research and verification of the remains *in situ*. Although his reconstructive hypotheses for ancient buildings are pretty extravagant, there is no denying that his method of studying, surveying and documenting is precise and consistent. Piranesi marks a landmark in the history of art and architecture. His various overcome limits enabled him to make innovations that were more appreciated by 19th century Romanticism than by his contemporaries, who were not culturally ready to accept his magnificent visions or reproduce his audacious engraving technique. His master Giuseppe Vasi could not reveal to him the secret of an etching that no one had yet made. Quoting Focillon one last time: “Piranesi anticipates everything: he anticipates himself” [transl. from Focillon 2006, p. 36].

## Notes

[1] Focillon was also one of the first to undertake a scrupulous work cataloguing Piranesi’s etchings [Focillon 1918]. This work was reviewed, commented, and translated into the Italian language in the volume edited by Maurizio Calvesi and Augusta Monferini [Focillon 1967].

[2] Algorithms of the RTI technique have existed since 2001 and have been applied effectively on various types of artefacts: for example, coins [Palma et al. 2012], epigraphs [Ponchio et al. 2018], and other types of relief works. The first experimentation on chalcographic material turns out to be the one reported in this paper. We would like to thank M.C. Misiti, G. Scaloni, L. Ghedin (ICG) and L. Carnevali, M. Fasolo, L. Baglioni (Sapienza University of Rome) for making this experimentation possible.

[3] An example of an RTI image of a detail of the *Carceri* frontispiece can be seen at this link <<https://visual.ariadne-infrastructure.eu/rti/76557f7b2a924841c162edd3c57eb02f>> (accessed 2021, August 31).

[4] Giuseppe Trassari Filippetto proposed Piranesi’s use of the chisel in a talk at the study day dedicated to Piranesi organised by the ICG in 2015.

[5] The relations between Piranesi and the Valeriani brothers are mentioned by Bianconi, Legrand, Stählin, Kennedy [Rossi 2016, pp. 25-28].

[6] The perspective study of the *Veduta della fonte e delle spelonche d’Egeria* is detailed in a previous publication [Menconero 2020a].

[7] A similar observation was made by Barbara Rapp [Rapp 2008]: analysing the *vedute* of the *Ponte Fabrizio* and the *Ponte Ferrato* published in the IV tome of the *Antichità Romane*, the author found two and three projection centres, respectively.

[8] The prospective study of the *Ponte Magnifico* is detailed in a previous publication [Menconero 2020b].

[9] A more in-depth description of the prospective analysis method applied to the *Carceri* can be found in the author’s PhD thesis [Menconero 2021].

[10] The *Serenissima*’s *proti* had a strong education in architecture, engineering and mathematics and were in close contact with the leading intellectuals of the time [Bevilacqua 2006, p.16].

[11] Piranesi was responsible for the renovation of the S. Maria del Priorato complex on the Aventine, commissioned by the Venetian Rezzonico family [Panza 1998, pp. 69-96].

[12] Piranesi’s early works of fantastic architecture were studied and catalogued by Andrew Robison [Robison 1986].

[13] See the author’s PhD thesis for a more detailed discussion on the method [Menconero 2021].

[14] Regarding Piranesi’s artistic legacy, see Angelo Marletta’s PhD thesis [Marletta 2011, 179-196] and Franco Purini’s essay [Purini 2008].



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