

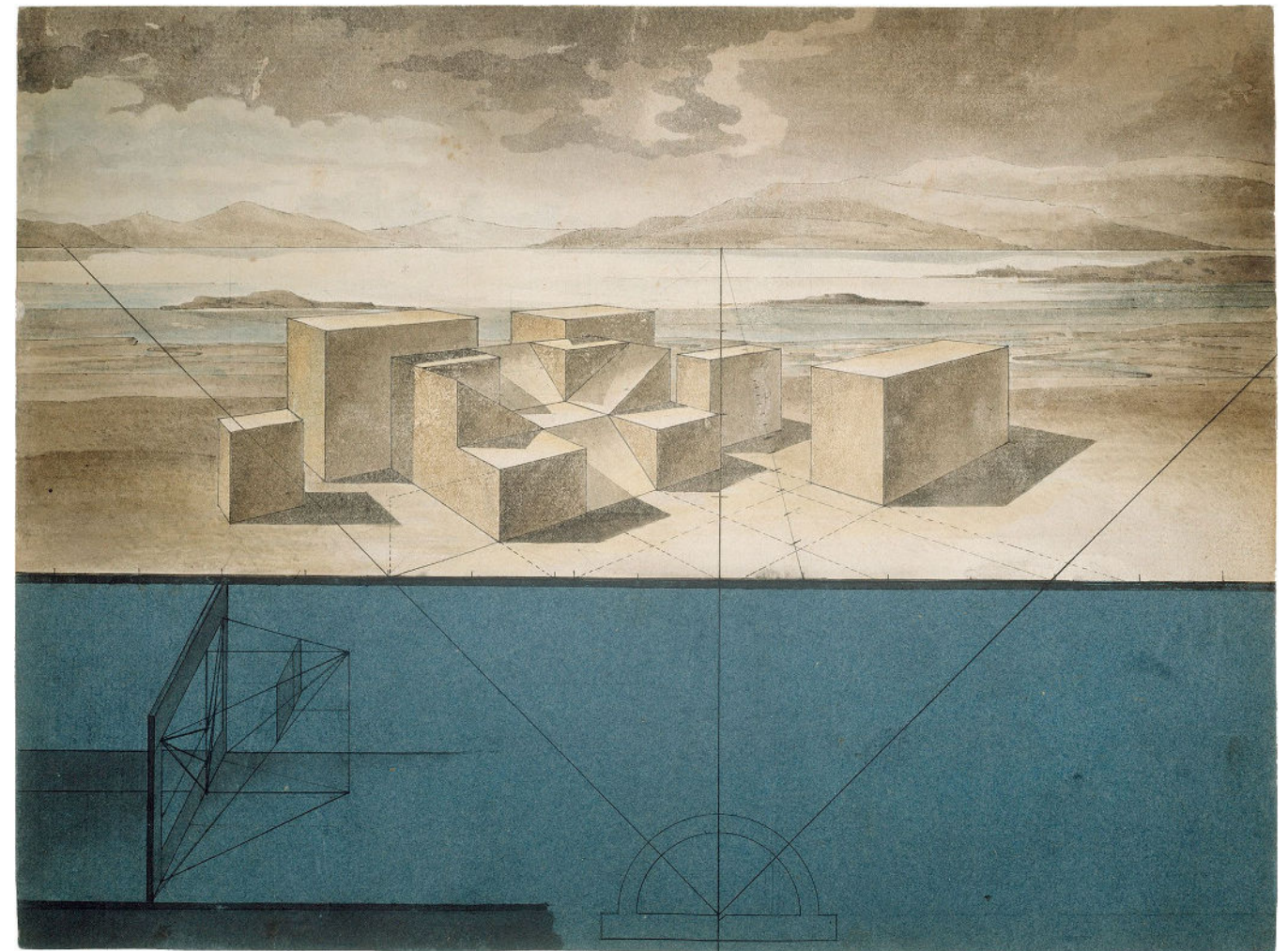
Of Lines Terrestrial and Occult: Friedrich Gilly, Alberto Sartoris, Adolphe Appia, and the Matter of Perspective —

Ross Anderson

This essay presents an analysis and offers an interpretation of three one-point perspective drawings. The first of these is a *Perspektivisches Studienblatt* ('perspective study') that the precocious late-18th-century architect and teacher Friedrich David Gilly made in preparation for the lecture course on perspective that he would deliver to his architecture students at the Bauakademie in Berlin; the second was made in the early 20th century by Alberto Sartoris while he was an architecture student at Geneva; and the third was produced by Adolphe Appia, who studied in that same city, though at the Conservatoire rather than the *École des Beaux-Arts*, and whose primary concerns were music and scenography rather than architecture. These particular drawings have been chosen for discussion in part because they possess compositional similarities – each is an orthogonal configuration of unadorned rectilinear volumes, steps or ramps, platforms and landings. But more fundamentally, it is because by considering them together we can cast light on some of the transformations in the theory and practice of perspective drawing over the stretch of time bracketed by the case studies.

The first two drawings, by Gilly and Sartoris, were made in educational contexts and are testament to the fact that the ability to execute a perspective drawing correctly – involving the delineation of forms and the shadows they cast – was long considered fundamental to becoming an architect. Both drawings are concerned to maximise the legibility of their perspectival armature – to push the hidden lines to the surface, both figuratively and literally – in order to demonstrate what can be achieved by mastery of technique. The third drawing, by Appia, presses in the opposite direction, since the scenographer erased all traces of its setting-out, choosing to make a diffusion of form and contour secondary to an overarching mood or atmosphere, that of a calm moonlit night. The perspectival set-up is a spectral presence,

Fig.1 Friedrich Gilly, *Perspective study in a landscape setting*, before 1800. Ink and watercolour over graphite on paper, 22.5 x 27.5 cm. Photo Dietmar Katz. Berlin State Museums, Kunstbibliothek/bpk, Inv. Hdz 77



as too is the German Romantic *Landschaftsseele* ('ensouled landscape'), inviting consideration of the issue of occultation, of hiding, placing in shadow, which complements my detailed discussion of the explicit geometric-metaphysical construction of the first two drawings.

The importance of perspective to architecture had been long attested. Sebastiano Serlio – writing at the time when perspective drawing as a method of representing three-dimensional forms on a two-dimensional page in a manner that is consistent and convincing was systematised and articulated – insisted: 'Perspective is absolutely necessary for the architect. Or, rather, perspective would be nothing without architecture and the architect nothing without perspective.'¹ It was Serlio who invented the term *linee occulte* ('concealed lines') for regulating lines that served as a practical guide when setting out the armature of a perspective drawing on the drafting table and that, for the Renaissance architect, also brought to the level of visual appearance the underlying order of natural – and potentially also constructed – forms. These *linee occulte* occupied the province between the vanishing point on the horizon, at which all lines converge, and the terrestrial line in the foreground that is the very first line drawn upon the page (Serlio tells us that it is the one from which 'all things have their beginning').²

In September 1799, Friedrich David Gilly posted a *précis* of his proposed lecture course on 'Optics and Perspective as the Foundation of Theoretical-Artistic Instruction in the Art of Draughtsmanship, Especially for Architects' to the director of the Bauakademie in Berlin, where Gilly had been appointed a professor just two years before at the age of 26.³ In alliance with the lectures that he was proposing to deliver to the seven students in his *Privatgesellschaft junger Architekten* ('Private Society of Young Architects'), which he had divided into three sections – 'Linear Draughtsmanship in Theory and Practice; Lessons in Light and Shade; and Lessons in Colour' – Gilly made a set of drawings that were as inventive as they were didactic. One of these, *Perspektivisches Studienblatt mit landschaftlicher Szenerie* (*Perspective study in a landscape setting*), is emblematic of the new architecture that he was proposing, one impelled by the practice of architectural drawing itself (Fig.1).

Gilly's ink and wash *Studienblatt*, which is in fact scarcely larger than a contemporary A4 sheet of paper in landscape format, is divided horizontally in two – a pictorial part above, and what might be thought of as the technical, mechanical part of the drawing below. In the upper part, a collection of variously sized stereometric prisms bears down on sandy ground, standing before a sea horizon that stretches from one side of the drawing to the other and above which rises a landscape that might be Mediterranean but could equally be Baltic. This ambiguous terrain is quite barren – a mere profile – and this, coupled with the fact that the prisms are devoid of decorative detail and of an indeterminate scale (they might be the size of chess pieces, or of a building, or of an entire urban configuration), allows the drawing to intimate that primary forms underlie the complexity of nature and that these might be discovered and then composed, if only one had both the discipline and the creativity to do so.

For Gilly, it was the geometric framework of linear perspective that was fundamental for the exercise of what we would now call 'imagination', enabling an artist, architect or scenographer – and Gilly seems to have thought of himself as each of these at various times – to compose drawings in a way analogous to how a composer works with scales and modes when constructing a musical score.

The story of the development of perspective – from Latin *perspicere*, 'to see through' – as a method of representing three-dimensional reality on a two-dimensional page, in a manner that is reliable and believable, of course centres on the Renaissance. An important aspect of this history is the significance that came to be assigned to correctly locating the 'eye' of the observer of a scene, which was naturally coincident with

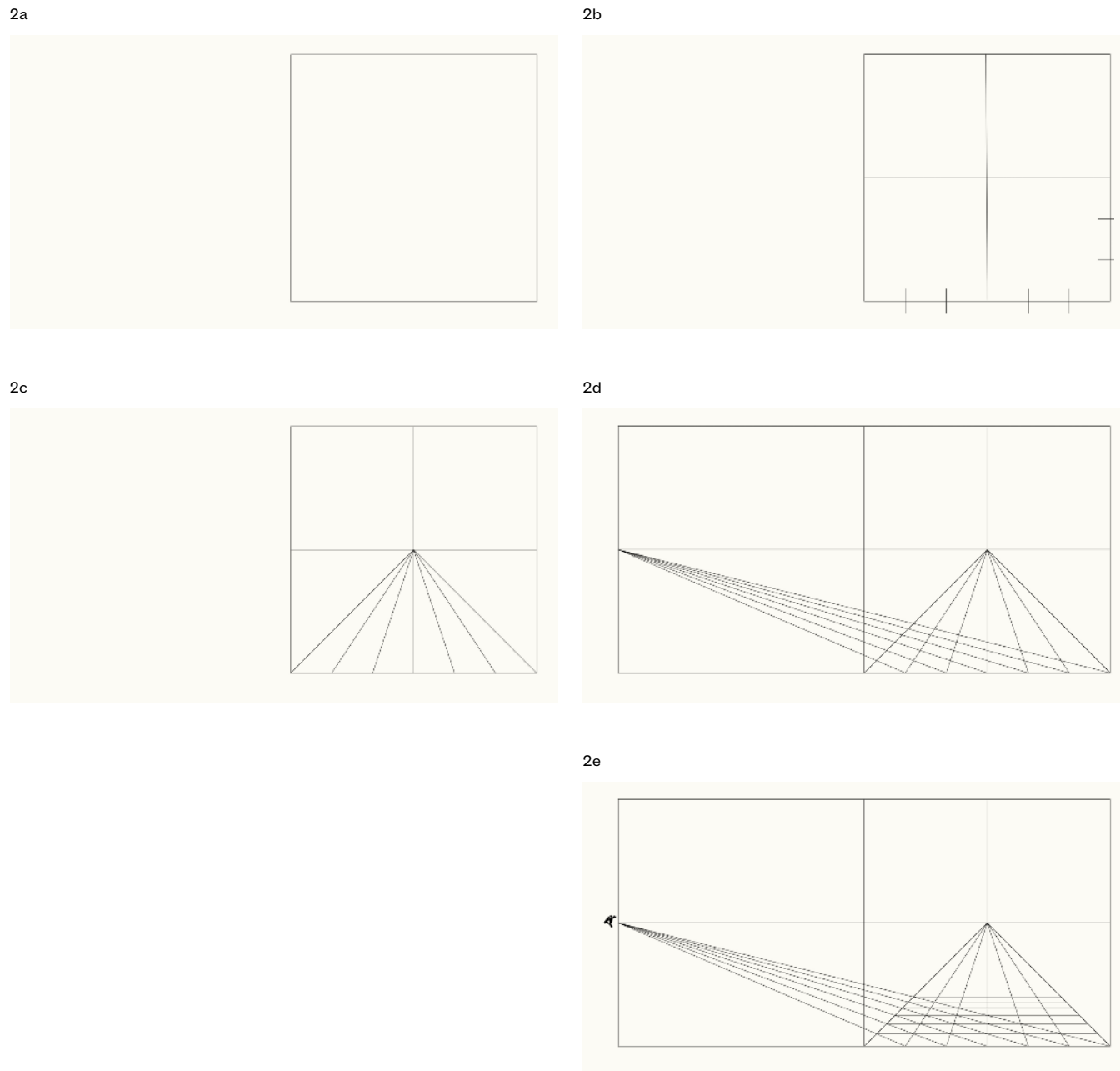
the 'eye' of that scene's creator. It was Leon Battista Alberti who formulated the insights and observations of those who came before him – most notably Filippo Brunelleschi – into a simple, universal and readily demonstrable method that even in his own time came to be recognised as indispensable for making drawings and paintings. Alberti accompanied his axiomatic written assertions with elemental diagrams of extraordinary clarity, the most famous – justifiably so – of which appears at the end of the first book of his three-part treatise *Della pittura* (*On Painting*, 1435).⁴

Alberti begins with a horizontal line that is drawn down towards the base of the page and over to the right-hand side. This baseline is the 'sill' of the 'window' through which the creator and then afterwards the observer of the drawing will view the scene in front of them ('I inscribe a quadrangle ... which is considered to be an open window through which I see what I want to paint', he writes) (Fig.2a).⁵ The height of the largest human figure to be painted in the picture is then determined, and this measurement is divided into three *braccia*, the unit of measurement used by artists and builders in Florence at Alberti's time of writing. Using this same *braccio* measure, six lengths are marked out along the baseline, thereby determining the length of the 'sill'. Directly above the centre point of the baseline – at the height of three *braccia* – a point is placed representing the target of sight, 'a point that occupies that position where a centric ray would strike' (Fig.2b).⁶ Lines are then drawn from each of the divisions of the baseline up to this. These 'visual rays' represent lines that are parallel to each other in plan but that converge on a position in the infinite distance of perspectival space – the vanishing point (Fig.2c).

That which has been marked out thus far is the bilaterally symmetrical frontal view, and now the same equal divisions of the baseline and also the vanishing point are used to lay out the visual rays in profile. A horizontal line is drawn across the page at the height of the vanishing point – this is the horizon line of the drawing. A point is then placed on this horizon at a distance along the plane of representation which must be slightly greater than the distance between the 'eye' of the spectator and the picture plane, meaning that the point necessarily stands outside the frame of the 'window' (Fig.2d). Lines are then drafted between the original baseline divisions and this point, intersecting with the sill of the picture frame on the way. These points of intersection establish the diminishing intervals of the baseline divisions and are transferred across to the frontal view as horizontal lines that cross the foreshortened 'visual rays', meaning that now a 'chequerboard' of *braccia quadrate* ('square tiles') has been marked out in perspective, and will be the basis and guide for constructing figures and buildings in the correct proportion relating to the established viewpoint of the creator – and then later the observer – of the drawing (Fig.2e). Since in Alberti's method the eye of the creator-observer and the vanishing point are necessarily located directly opposite each other – a conjunction of the viewing and the viewed – the vanishing point is a 'counter-eye, so to speak, to the true eye that views it and is inseparably and reciprocally connected to it'.⁷

A vast literature on the construction of perspectival drawings accumulated in the wake of Alberti's concise theoretical formulation – his *costruzione legittima* – including critical commentaries and texts proposing alternative systems that were nevertheless tied, through concepts such as that of the relation between the eye and the vanishing point, to the original. Thus, by the time that Gilly was assembling his own library in the final decade of the 18th century, along with the reading list for his eager *Privatgesellschaft* students, some discernment was needed. Gilly devoted the first section of his

Fig.2 Reconstruction by the author of the drawing operations followed by Alberti in the set-up of his paradigmatic perspective drawing in *Della pittura* (*On Painting*, 1435).



three-part lecture course to ‘Linear draughtsmanship in theory and practice’, beginning this with a ‘Critical-historical overview of the art of perspective drawing’ that he would have prepared on the basis of a host of books in his library on the topic of perspective drawing.⁸ It is impossible to review them all here, but on the basis that they accord in many ways and generally share a common lexicon for the parts of a perspective drawing and the procedures followed to arrive at them, a look at one these books – Jean Dubreuil’s *The Practice of Perspective: Or, An Easy Method of Representing Natural Objects According to the Rules of Art* (I will be using the 1765 English translation from the original French) – will help first to identify various constituent elements of Gilly’s *Studienblatt* and then to serve as the basis for its interpretation.⁹

The horizontal line that divides the upper, pictorial part of the drawing from the lower, mechanical part of it below is in effect the sill of Alberti’s window, but by Gilly’s time it had become referred to as the ‘terrestrial line’ (Fig.3a). Much as Alberti had done before him, Gilly divided this horizontal line into equal lengths that can be thought of as one measure within the particular world of this perspective drawing. He then drew a perpendicular line through one of the points that he had marked out along the ‘terrestrial line’, near the centre of the page. This vertical line would become the hinge for the bilaterally symmetrical perspectival set-up, and in recognition of its special importance within the hierarchy of lines in the drawing, it was called the ‘principal ray’ (Fig.3b).¹⁰ At a distance of four measures along the horizontal line from this ‘principal ray’ – right and left – he drew lines that met up at the same four-measure distance below the terrestrial line, which they therefore met at 45 degrees each, making a right angle turned through 45 degrees, as it were. He extended each of these lines – which were called ‘extreme rays’ – above the ‘terrestrial line’ for the same distance as they projected below it. The endpoints of the two ‘extreme rays’ are termed ‘points of distance’ and they lie on the horizon, as of course does the vanishing point, which Alberti had termed the *punctus centricus* but by Dubreuil’s time was referred to as the ‘point of sight’. The distance along the horizon line between the ‘point of sight’ and each of the ‘points of distance’ is crucial to the success of a perspective drawing: ‘For as the beauty of a perspective depends on the point of distance, so the eye ought never to be placed too near the object, nor too far from it, but at a convenient distance, for in this situation the visual angle will be at a right angle or 90 degrees, and this is the largest angle that the eye can well discover at one cast.’¹¹

The reason that the ‘cast of the eye’ is invoked with respect to the ‘points of distance’ is because the latter lie as far along the horizon line from the ‘point of sight’ as the eye of the creator-observer does from its position on the picture plane. Indeed, this equidistance is didactically denoted in Gilly’s drawing by the protractor drawn near the bottom of the page. Gilly joined up all the measures along the ‘terrestrial line’ to one of the points of distance to create one radial set of lines, and then joined up the measures to the other ‘point of distance’ to create another, resulting in a dense web of lines – ‘visual rays’ – that tile the ground plane on which the stereometric prisms stand (Fig.3c). These tiles would be squares if seen in plan, or in ‘ichnographic projection’, to use Dubreuil’s terminology. The term he used for a ‘projection made on a plane perpendicular to the horizon’¹² – what we would now refer to as an elevation drawing – was ‘orthographic projection’. On the principal ray that in the picture plane stands perpendicular to the horizon, Gilly marked out the same regular measure – four in total – spanning the distance between the ‘terrestrial line’ and the ‘point of sight’. By drawing a line parallel to the horizon through one of these measures until it intersects with a given vertical line drafted up from one of the measures on the ‘terrestrial line’, and then joining this point of intersection back

Fig.3 Reconstruction by the author of the likely sequence of drawing operations followed by Gilly in the set-up of his drawing *Perspective study in a landscape setting*.

3a



to the 'points of distance', the corner of a volume that is one measure high is delineated. By way of demonstration, Gilly drew a dashed line across to the left from the point that is one measure up until it met with a dashed vertical line that he extended from the point where the 'terrestrial line' meets the 'extreme ray' – that is, four measures across. And then, finally, he joined this point of intersection back to the left-hand 'point of distance'. These kinds of dashed lines were called 'occult' lines, as they brought to vision the three-dimensional, cubic grid that despite its omniscience was otherwise invisible. As we have already noted, it was Serlio who coined the term *linee occulte* for these lines that ultimately served as a practical drafting guide for the architect, but that for Serlio himself were in fact testament to an underlying formal order.¹³

Those, then, are all the constituent elements of the perspectival construction on the basis of which Gilly composed his 'cubes in the sand' that proclaim, as Fritz Neumeyer has asserted, 'the utopian vision of an architecture cleansed of superfluity, a naked architecture that gains its three-dimensional suggestiveness only through the effects of abstract solids' (Fig.3d).¹⁴ The shadows that these abstract solids cast on the ground and on each other of were of course drawn last, and although they are prominent in the final drawing, they were less systematically constructed than were the forms themselves. The sun must be high in the sky on the left of the scene, but its rays do not all fall parallel. And the edges of some shadows have been established by drafting lines back to one of the two 'points of distance' while others are parallel to the 'terrestrial line'. For Gilly, there was evidently more room for personal discretion regarding the delineation of shadows than there was in the creation of the forms that cast them. In addition to the shadows themselves, the faces on the shadowy side of the forms are darker than those on which the sun shines, and Gilly has 'feathered' the shading to approximate the effect of light reflecting off the sandy ground back on to the forms (Fig.3e).

Below the 'terrestrial line', in the deep blue lower portion of the *Studienblatt*, Gilly drew a small isometric drawing over to the left-hand side that is descriptive of the mechanics of the perspective drawing above, and that offers itself up for consideration as a telling depiction of a style of seeing and thinking – a way of seeing oneself seeing, as it were. This is drawn as though it is an apparatus mounted on a table whose upper surface is parallel to the 'terrestrial line' and registers the precise location of the 'eye' of the creator-observer, not only in 'ichnographic projection' as is the case in the actual perspective drawing above, but also in 'orthographic projection'; it thus reveals what is in fact a fundamental property of the perspectival set-up that Gilly has adopted and that differs from Alberti's original formulation – the horizontal distance from the 'eye' to the 'point of distance' is equal to the height of the 'eye' from the table. One consequence, and it is revealed only in the isometric, is that the 'principal ray', which seems to be a line on the ground coursing towards the horizon if we only look at the 'painterly perspective', is in fact best understood as a vertical line dividing the picture plane in two. In addition, the isometric drawing reveals that the protractor, which, read in relation to the perspective drawing, seems to appear in plan, should also be understood to have a vertical counterpart that is set at 90 degrees along the axis of the 'principal ray', and therefore the 45-degree angles that it denotes with purpose in its horizontal iteration also hold for the vertical.

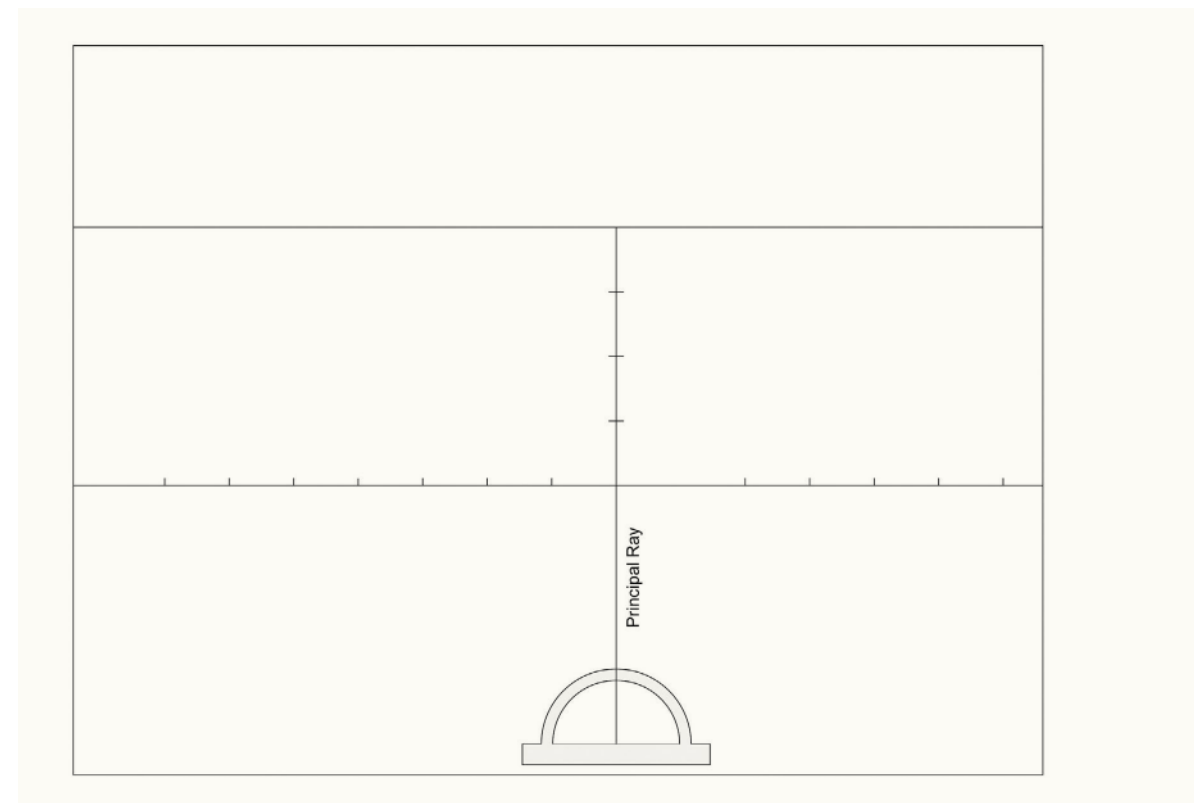
On the basis of both his drawings and his writings – such as an essay in which he lamented that even though architecture had long been admitted as a companion of the fine arts, in recent times it had only been 'conceded half a vote in the congress of the arts, citing its ignominious subservience to necessity and utility'¹⁵ – the overall

Fig.3 Reconstruction by the author of the likely sequence of drawing operations followed by Gilly in the set-up of his drawing *Perspective study in a landscape setting*.

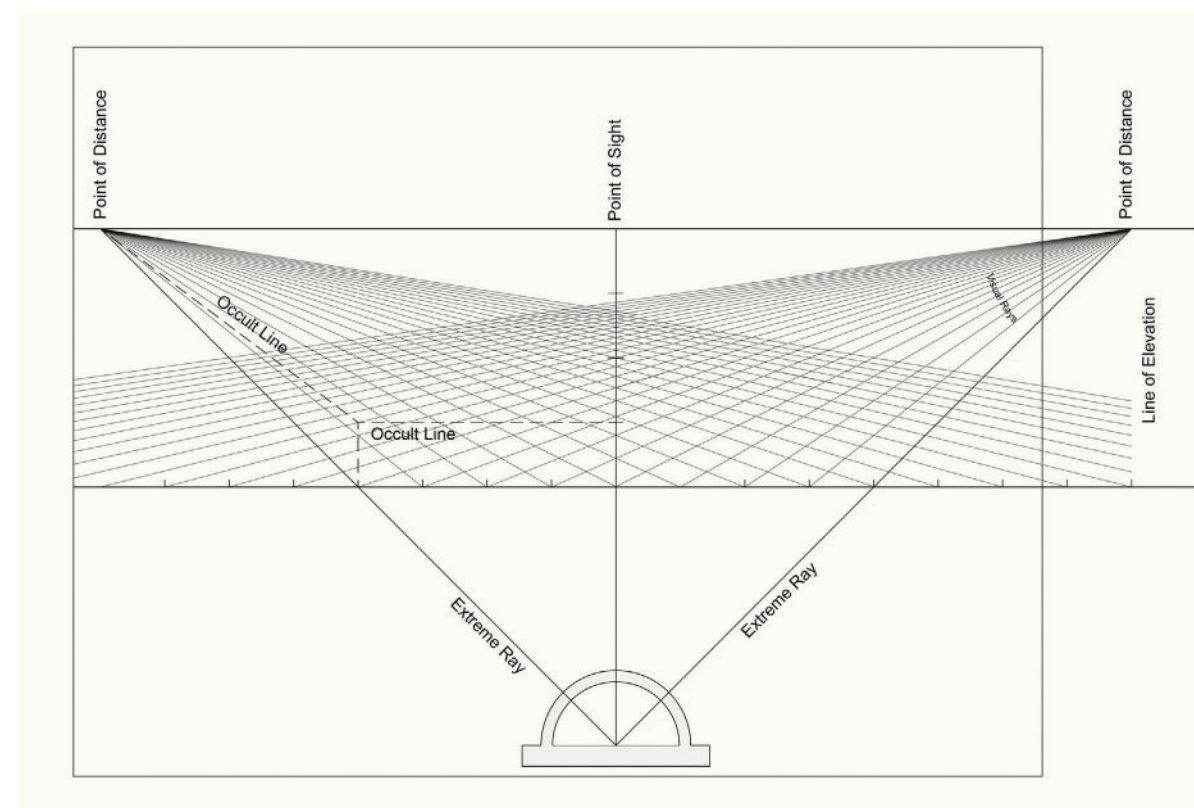
3a



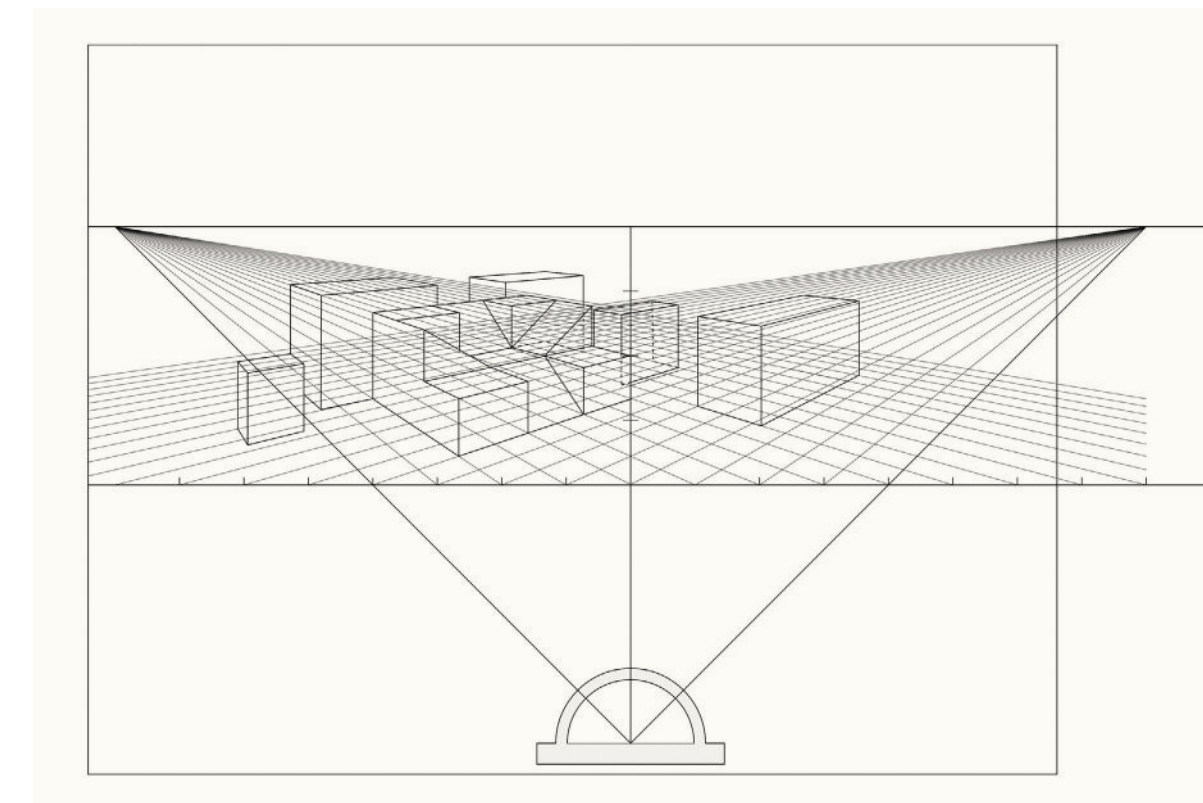
3b



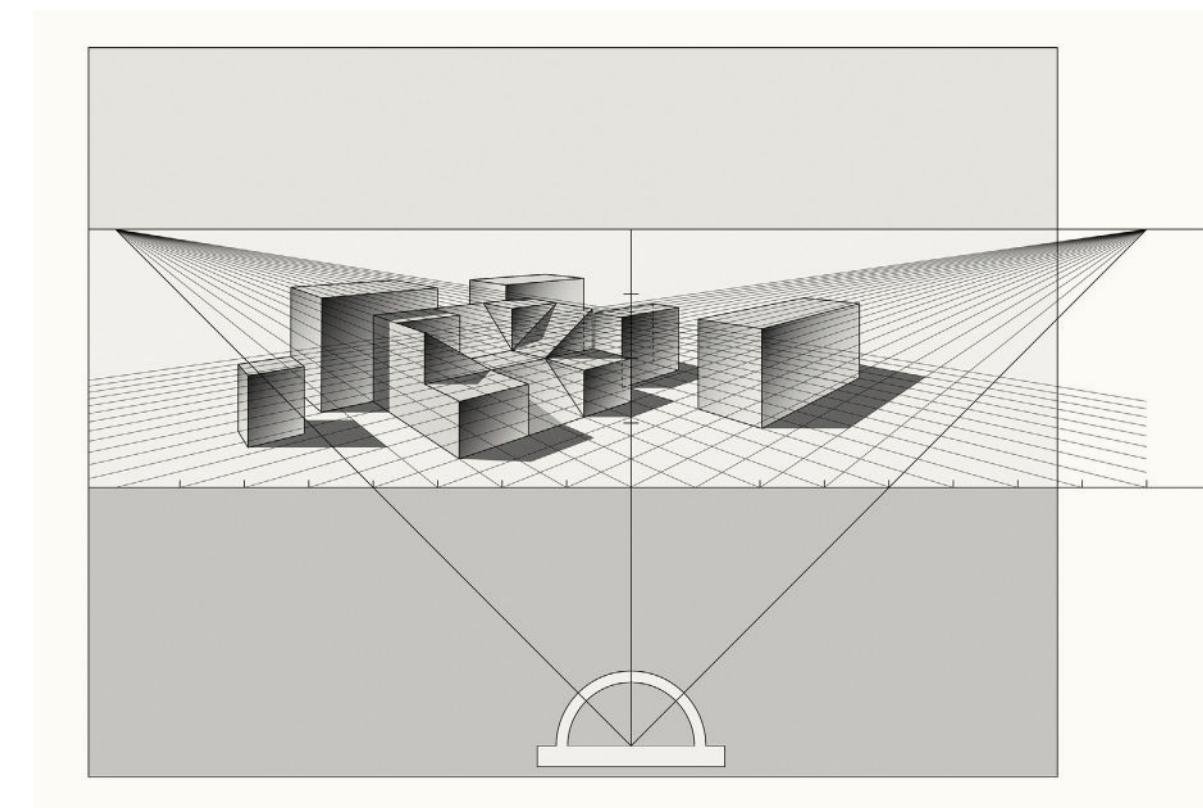
3c



3d



3e

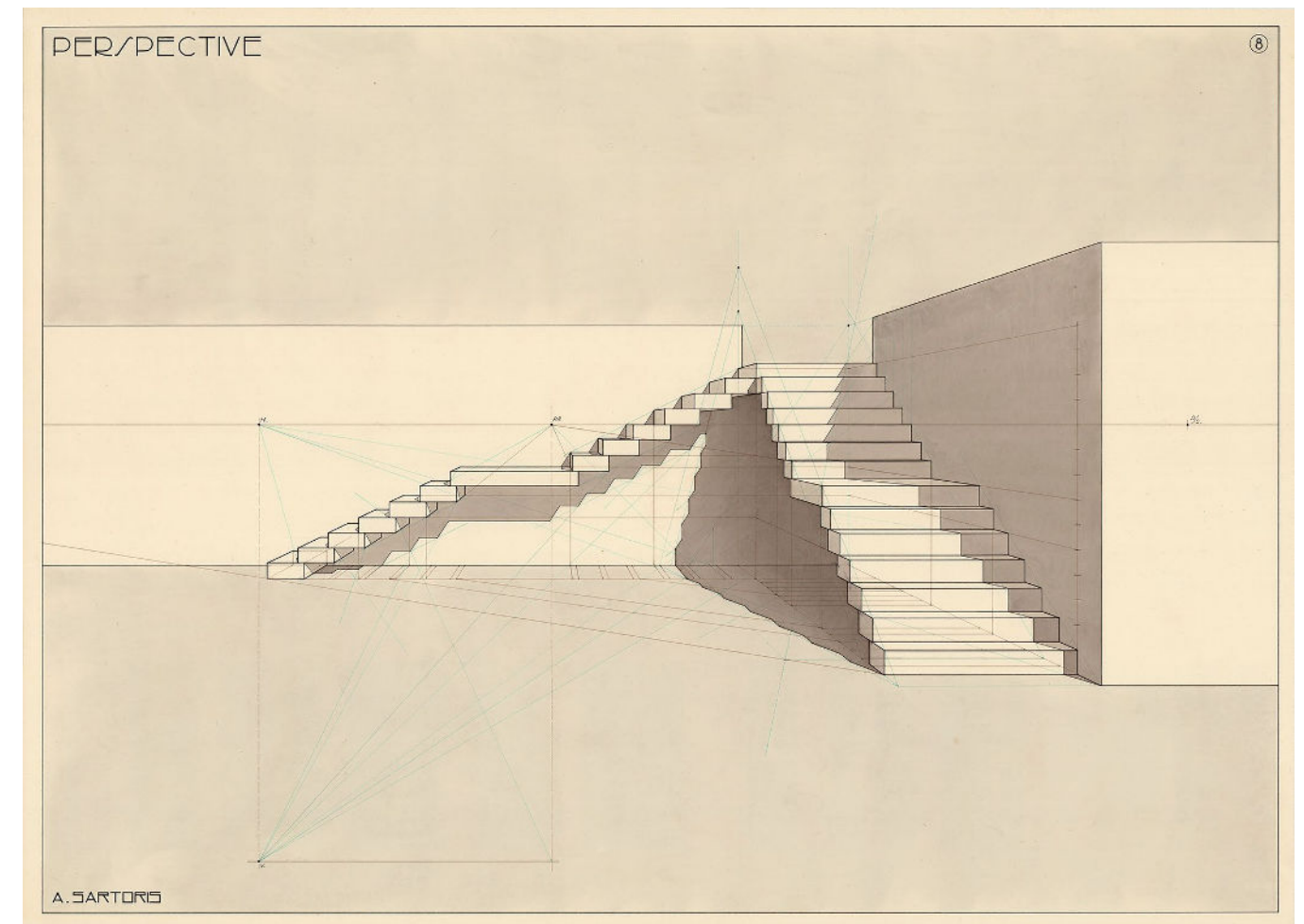


impression one receives is that Gilly was in fact a painter at heart, and that it was this painterly sensibility, which needed the geometry of perspective to apply some discipline to what might otherwise be dismissed as fantasy, that allowed him to imagine an architecture that took his contemporaries by such surprise. It is not easy to account for why so strange a drawing should appear just when it did – perhaps its strangeness is to do with his position as a young, original thinker still finding his feet but sufficiently authoritative to have been employed as a professor at the Bauakademie. In any case, it certainly seems to be true that Gilly's drawn projects, most significantly his *Friedrich der Große Denkmal* (*Frederick the Great Memorial*), was the seed for the architecture to come, Prussian Classicism. Karl Friedrich Schinkel is of course the most famous proponent of the style, and it is worth noting here that he had in fact been among the very first cohort of students in Gilly's lecture course at the Bauakademie and was awarded his teacher's highest grade, *ausgezeichnet und viel Fähigkeit* ('excellent, and much ability').¹⁶ Though it is probably apocryphal, the story goes that Schinkel decided to become an architect – then and there – upon sighting Gilly's *Denkmal* drawing as a 16-year-old schoolboy in 1797. What is certain, however, is that the impression it made on Schinkel was an enduring one.¹⁷ The future *Baumeister* inherited it when his teacher died tragically young at the age of 28 in 1800, and then many years later he hung it in the Bauakademie that he had designed to replace the original one in which Gilly had taught his lecture course on 'Optics and Perspective as the Foundation of Theoretical-Artistic Instruction in the Art of Draughtsmanship, Especially for Architects' to his *Privatgesellschaft junger Architekten*, accompanied by a suite of drawings that included his remarkable *Perspektivisches Studienblatt*.

Moving forward into the 20th century, we will now turn to a *Studienblatt* that was likewise made in the context of the academy rather than architectural practice, and that was, like Gilly's, preoccupied with issues of architectural representation rather than with the messy entanglements of physical construction on the building site (Fig.4). This drawing, by Alberto Sartoris, is locatable within the same disciplinary tradition as Gilly's, in that it is testament to the fact that the ability to execute a perspective drawing accurately was regarded as essential to becoming an architect. However, this time it was made by a student rather than a teacher, which means that it serves in part as a demonstration of what this pupil has learned. At the same time, for us it equally serves to foreground the creative opportunities of perspectival representation that emerged between the time of Gilly and Sartoris as the 'rules' of perspective drawing – codified by Alberti and Serlio and that still held sway in Gilly's time – became more malleable. They were tried and tested procedures that had been found to work out well on the drawing board, and that could now be treated more freely – adjusted, combined and occasionally discarded in the service of the expression of modern architectural ideas and forms.¹⁸

Sartoris was a final-year architecture student at the *École Supérieure des Beaux-Arts* (School of Fine Arts) in Geneva when he made his perspective drawing at the age of 18 in 1919. His minimal orthogonal composition – everything is either parallel to the picture plane or perpendicular to it – involves a long wall of continuous height that starts out parallel to the picture plane and proceeds from the left-hand side of the drawing towards the right, halting approximately two thirds of the way across and pivoting through 90 degrees to return towards us – the viewers – before turning again and covering the short distance that remains to the right-hand edge of the picture frame. A flight of stairs runs most of the length of the first section of wall, ascending to the right and meeting in the corner with a second set

Fig.4 Alberto Sartoris, perspective drawing exercise made while a student at the School of Fine Arts in Geneva, 1919. Swiss Federal Institute of Technology, Archives de la construction moderne, Lausanne, Inv. 0172.04.sc



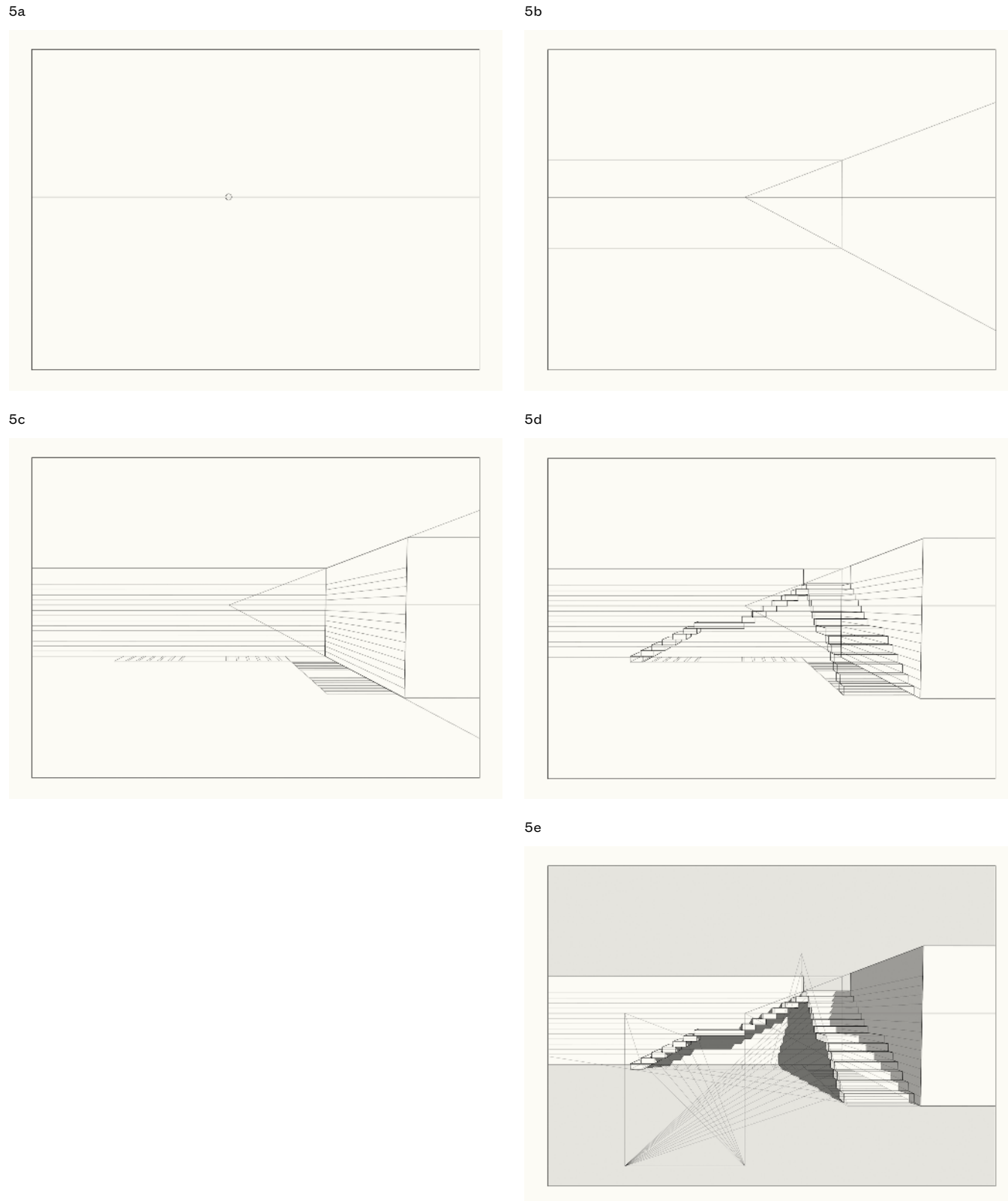
of identically composed stairs – six treads, an intermediate landing, and then another six treads – that is turned through 90 degrees, running almost the entire length of the second section of wall standing perpendicular to the first. They reach a common top landing level, the height of a balustrade below the upper edge of the walls, so a notch that accords with the width of the landing is cut out of the first section of wall to permit passage through it. Whether the walls are freestanding or retaining and what lies beyond them are mysteries, since they are taller than we are – the horizon beyond is at the height of the tenth step. The architectonic expression is an abstract stereometric one; the opaque walls and stairs cast shadows but possess no clues as to their materiality. It is as though the whole monochromatic composition has either been cast in plaster or carved from alabaster.

Sartoris's first act when setting out his perspectival armature, and it was two-part, must have been to locate the vanishing point – just left of centre and a little over halfway up the page – which simultaneously determines the line of the horizon (Fig.5a). This was not required, though, for the set-out of the long section of wall with which the composition proper commenced, since it stands parallel to the picture plane, but as soon as the 'space' of the drawing was introduced by the return of the section of wall standing at right-angles to the first, the vanishing point towards which the top and bottom of the wall converge became ineluctable (Fig.5b). Once the extents of those two lengths of wall fundamental to the composition had been established, the armature of the drawing was in place and Sartoris could turn his attention to the set-out of the stairs that side up to them. He measured out the treads of the stairs along the horizontal line that is the base of the first section of wall, and marked out their risers on a vertical line drawn on the face of the second length of wall near the edge closest to the viewer (Fig.5c). He could then align an edge of his set-square with the vanishing point and with each of these measured points in turn, and draft lines that projected forward or backward as required to demarcate the edges of the stairs in either plan or elevation. It is probable that Sartoris drew the set of stairs parallel to the picture frame before the set perpendicular to it, since its horizontal measurements are true rather than foreshortened. A key decision that he then had to make was how wide the stairs should be, and he probably did this by eye, based upon what seemed intuitively right given the riser and tread dimensions already established. He proceeded to mark out the stairs in plan – though it was a perspectival plan rather than an orthogonal one – and from there projected lines up vertically to meet the correct height for each stair, forming a web of lines, the intersections of which became coordinates within the three-dimensional space of the drawing. The next thing Sartoris had to do was to translate the true horizontal dimensions of the first set of stairs to the second set that is perpendicular to the picture plane and that therefore cannot be marked out in the same straightforward fashion. In order to do this, he placed a point on the horizon some way off, to the left-hand side of the drawing. Again, there is no 'correct' place to pin this point. The effect that its location has is 'leverage', or 'mechanical advantage' to use the language of engineering; the closer to the picture it is, the further towards us elements of a composition will project – in this case the stairs – and if it encroaches too far then these stairs will break through the picture frame and will continue their descent behind our heads. So here – as elsewhere – aesthetic judgement is called for; the run of stairs was always to conclude its final descent to the ground within the bounds of the scene as presented to us, stopping one tread's length short of the final right-angle turn in the wall. And with that, so far as form goes, the drawing is complete (Fig.5d).

But the shadows cast by these forms are still to come. And it is at this point that the sway of individual interpretation truly comes to the fore, since the rendering of shadows in a way that was both scientifically assured and subjectively convincing was a matter of contention; the various competing solutions were more often than not the result of a great deal of trial and error, and it was difficult to explain why they delivered a serviceable approximation of the way that rays from the sun are occluded by the forms they strike. A textbook for architects entitled *Architectural Shades and Shadows* can help to contextualise the whole issue of perspective and skiagraphy – the rendering of shadows – in the early 20th century. Henry McGoodwin entitled the introduction to his 1904 book 'The Point of View', and in it he wrote that the student 'should realise at the outset that in casting shadows on architectural drawings he is dealing with materials of art rather than with materials of mathematics. The shades and shadows of architectural objects are architectural things, not mathematical things. They are architectural entities, having form, mass and proportion just as have other architectural entities.... The student is urged, then, to regard the mathematical part of the study of architectural shadows not as its object or its essence, but merely as its means – having no greater architectural importance than the scale or triangle or other tools used in making drawings.'¹⁹ And later on, he wrote: 'A shadow should never be "guessed at". By this it is not meant that it should never be drawn without being constructed geometrically, but that it should be drawn with intuitive reasonableness and a knowledge of its form, at least, which is not "guessing".'²⁰

The particular method for the casting of shadows passed down to Sartoris by one of his teachers at the School of Fine Arts in Geneva is indeed intuitively reasonable, involving first of all drawing a square that has its top edge coincident with the base of the first section of wall, and its right-hand edge directly below the vanishing point. The meeting of these two lines located the top right-hand corner of the square. Now, once again, individual judgement was called for – the square needed to extend down and across to the left, but just how far was at the discretion of the creator of the drawing. Sartoris decided to locate the bottom left corner of his square just to the left of the first tread and down below it. He used his magenta-coloured pencil to draft the square using dashed lines, and further extended the left-hand edge of it up to the horizon line – the point of intersection would be used in one of the later shadow-drawing operations. The first operation involved picking up his pale blue pencil and drafting a web of lines from the bottom left corner of the square up to the right, meeting with both the top and bottom corners of the treads that make up the second run of stairs. The point where the extended left-hand edge of the square intersected with the horizon line then came into play; a line drawn from it over to the base of the corner that forms the junction between the second and third sections of wall determined the angle at which the shadow it cast met the first tread of the second run of stairs, from which the shadows cast on the other treads rising above the first could be drawn in turn. The shadows are all given a solid outline – like the forms of the walls and stairs themselves – which is a feature that distinguishes Sartoris's drawing from Gilly's *Studienblatt*, in which the shadows cast by the prisms are uniformly shaded fields of grey. Sartoris too filled in the outlines of all the shadows cast by the sun, which he did in a mid-range grey wash. And, last of all, he shaded the ground in the homogeneous light grey wash that he also used for the sky (Fig.5e). Since Sartoris's drawing is at least as much an educational demonstration as it is an architectural proposition, it is unsurprising that the elements making

Fig.5 Reconstruction by the author of the likely sequence of drawing operations followed by Sartoris in the set-up of his perspective drawing exercise made while a student at the School of Fine Arts in Geneva, 1919.



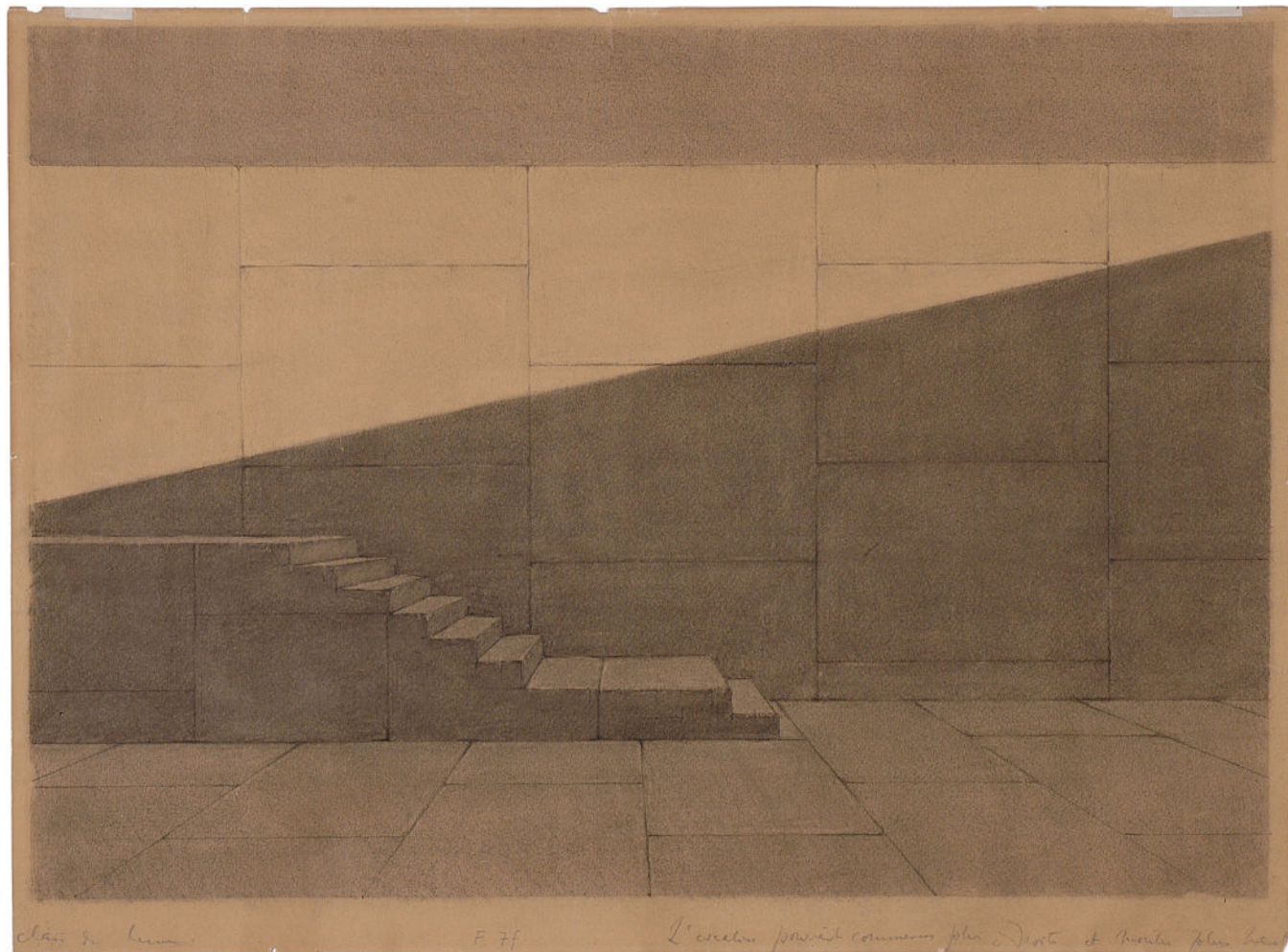
up the composition – the stairs foremost amongst them – are to a certain extent paradigmatic for perspective drawings, recalling Serlio’s assertion that ‘of all the elements which have a great power of demonstration in perspective, I find that staircases come out best, and the more returns they have the better the effect’.²¹ And, again bearing in mind that the drawing is an illustration of technique, it is no surprise that the perspectival set-up and the steps that the young student of architecture correctly followed to arrive at his composition of walls and steps, plus the shadows that they cast on each other, can be clearly read; he drafted everything in coloured pencil first – magenta for forms, pale blue for shadows – and left these lines on the drawing as evidence for his teacher after carefully outlining with sharp black lines the final composition that they delivered to him.

The disciplinary context within which Sartoris made his drawing was a wholly architectural one. Our discussion of perspective will now shift into the related domain of scenography, via one exemplary drawing from amongst a set of austere yet atmospheric one-point perspective drawings that the modern Swiss scenographer Adolphe Appia made in 1909 – ten years earlier than the Sartoris exercise that we have been considering – and that he collectively termed *Espaces rythmiques* (*Rhythmic Spaces*).²² Delineated in graphite pencil and charcoal and illuminated in part by white pastel, these drawings frame a series of minimal but monumental scenes taking in walls, terraces, platforms, stairs and landings. The composition of one of these *Espaces rythmiques* – *Clair de lune* (*Moonlight*) – is very similar to Sartoris’s perspective drawing; a run of stone steps ascends parallel to the picture plane up and to the left – one shallow step, then a platform, then six more steps rising to another platform that extends beyond the bounds of the drawing (Fig.6). The run of steps and platforms abuts a wall of carefully laid ashlar masonry, above which there is an evenly illuminated slot of sky. What might lie beyond the wall is unknown and, unlike in Sartoris’s drawing, there is no gap in it through which one might pass. The lower part of the drawing is cast in the shadow of a bright but low-lying moon off to the right, beyond the frame of the drawing. The angle and height of the shadow it casts intimates that there is a right-angle return to the ashlar wall, back towards the apprehending perspectival eye of the creator-observer.

There is both less and more in Appia’s drawing than in Sartoris’s; there is less evidence or information with regard to just how the perspective drawing was made, since the scenographer removed all traces of its setting out, but there is much more in the way of material expression – the unyielding ashlar masonry has clearly been hewn, probably a long time ago and by masons both capable and strong. And the whole scene, which might be a fragment of an ancient citadel or the forecourt of a temple, is imbued with the quiet atmosphere of a moonlit night. It reads as a semi-sacred nocturnal setting for gods just departed or soon to arrive, and the German Romantic *Landschaftsseele* – a surrogate for the deities who have fled – is a spectral presence in this drawing as it is in Appia’s other *Espaces rythmiques*. And this invites comparison with paintings that were made around the same time that Gilly was drawing his *Studienblatt*, but which seem to be unconditioned by perspectival geometry, made by artists who were part of the project of German Romanticism, and who in Joseph Leo Koerner’s words navigated a purgatory, ‘where the artist fashions his works again as altars but must leave out the gods’.²³

The best-known German Romantic painter of all is Caspar David Friedrich, whose enigmatic paintings mediate a religious experience. In Koerner’s words, what his canvases are finally about ‘remains

Fig.6 Adolphe Appia, *Espace rythmique: Clair de lune*, 1909. Charcoal, graphite and chalk on paper, 49.2 x 66.5 cm. Swiss Archive of the Performing Arts, Bern, Inv. Appia 07f



always only *almost* visible'.²⁴ While Koerner was referring to content, the 'almost visible' also generally holds for what one literally sees in Friedrich's paintings, master as he was of 'all transitions between the visible and the invisible'.²⁵ That is certainly so under normal lighting conditions, but when his paintings are seen under other conditions, a great deal more is revealed. Infrared radiation has a greater wavelength than visible light, and it penetrates deeper into the structure of a painting, making any otherwise hidden underdrawing visible. An infrared reflectogram was made of Friedrich's famed painting *Abtei im Eichwald* (*Abbey in the Oakwood*) – which shows a sombre wintry scene centred on the ruined remains of an abbey dimly lit by a sliver of crescent moon – as part of its 2016 restoration by the Nationalgalerie in Berlin.²⁶ This infrared image is interesting for us as it discloses that the building was in fact diligently set up in one-point perspective; the columns of the fragmentary remains of the nave of the abbey recede behind the west façade towards the 'point of sight' that with symbolic significance is located on the altar. In Koerner's words, Friedrich 'allows loss, absence, the departure of things close to us, all to occur within our immediate experience of the image: as the fog that renders nature fugitive'.²⁷

One of the things that has been 'rendered fugitive' in *Abtei im Wald* is its perspectival set-up, which is also the case in Appia's *Espaces rythmiques*, likewise palely illuminated by the moon. And in this respect, they extend our understanding of *linee occulte* by introducing the theme of occultation and shadowy concealment alongside the summoning of form seen in the sunlit drawings by Gilly and Sartoris that make the geometric-optic construction as explicit as possible for the sake of those architecture students or teachers for whom they are to serve as a demonstration of knowledge and skill.

Gilly's *Studienblatt* invites reflection that the intrinsic revealing-concealing character of *linee occulte* is naturally part of the appeal of perspective drawing. Returning to it, we observe that the prisms stand in the liminal location on the very edge of the shoreline – between water and land that is in constant flux, since the tide ebbs and flows. It is not obvious whether the prisms have just been revealed by the ebbing of the tide as the water returns to the sea, or whether they will soon vanish out of sight under the incoming waters, sand will wash over them, and they will never be seen again. It is possible that when making his drawing, Gilly had in mind the idea that those same processes of decay and renewal taking place in the natural world are also at play in architecture, and that, in time, it will be on the basis of the geometric-optic discipline of perspective that a new architecture for his time will be created. The drawings by Sartoris and Appia might be seen in the same light, insofar as they delineate compelling architectural forms but do not describe fully worked-out propositions for buildings; for his part, Appia described his *Espaces rythmiques* 'not as destinations, but rather only as points of departure'.²⁸

Finally, as fragmentary 'set pieces' all three drawings can be thought of as a conjunction of architecture and scenography. They exist not in the two-part world of 'ichnographic' and 'orthographic' projection, but rather in the third type of projection in that triumvirate – that defined in one of those books on perspective on which Gilly based his lecture course: 'When the projection of any object is made by rays flowing from the several parts of the object, uniting in one point where the eye is supposed to be placed', the representation is called the scenography of that object, so that to 'draw the scenographic projection of any object is to draw the several parts of it as they will appear to the eye situated at a convenient distance from the object upon a plane placed perpendicular to the horizon, and in a proper situation to receive the object; and how this is to be done, is the proper business of perspective'.²⁹

- 1 Sebastiano Serlio, *On Architecture. Books I–V of 'Tutte l'opere d'architettura et prospetiva'*, trans. Vaughan Hart and Peter Hicks (New Haven: Yale University Press, 1996), Book 2, folio 25v.
- 2 *Ibid.*, folio 25r.
- 3 A transcription of Gilly's *Richtlinien für den Unterricht an der Bauakademie* that is held in the Geheimes Staatsarchiv Preußischer Kulturbesitz is reproduced in *Friedrich Gilly und die Privatgesellschaft junger Architekten*, ed. Carlheinz Feye and Jürgen Nottmeyer (Berlin: Verlag Willmuth Arenhövel, 1987), 245–47.
- 4 Leon Battista Alberti, *On Painting*, trans. John Spencer (New Haven: Yale University Press, 1966). For a compact treatment of Alberti's perspectival method, see Alfonso Procaccini, 'Alberti and the "framing" of perspective', *The Journal of Aesthetics and Art Criticism*, 40.1 (1981), 29–39.
- 5 Alberti, *op. cit.*, 56.
- 6 *Ibid.*, 177.
- 7 Timothy Kitao, 'Prejudice in perspective: a study of Vignola's perspective treatise', *The Art Bulletin*, 44.3 (1962), 178.
- 8 For a list of all the books on perspective drawing that Gilly held in his library, see *Friedrich Gilly: Essays on Architecture 1796–1799*, ed. Lynne Kostman (Santa Monica: The Getty Centre for the History of Art and the Humanities, 1994), 99.
- 9 Jean Dubreuil, *The Practice of Perspective: Or, An Easy Method of Representing Natural Objects According to the Rules of Art*, trans. Ephraim Chambers (London: John Bowles, 1765).
- 10 The term that Alberti used for what came to be known as the 'principal ray' in a perspective drawing was a 'centric ray', and for him it was above all an optical phenomenon: 'The centric ray is the most active and the strongest of all the rays.... We could say many things about this ray, but this will be enough – tightly encircled by the other rays, it is the last to abandon the thing seen, from which it merits the name, prince of rays.' Alberti, *op. cit.*, 48.
- 11 James Hodgson, 'The Theory of Perspective', in Dubreuil, *op. cit.*, ii.
- 12 *Ibid.*, iii.
- 13 Drawing an analogy between *linee occulte* and the human skeleton, Serlio stated that there is 'no difference between a transparent body and a solid body, any more than there would be in seeing the skeleton of a dead body without the flesh upon it and seeing the same body alive with its flesh.... In the same way, those artists who have seen the skeletons of humans and animals are more skilful and have a better understanding of the art than those who deal with the subject superficially, only making use of the outward appearance.' Serlio, *op. cit.*, Book 2, folio 25r. Alberti's concept of *lineamenta*, or building lineaments forming construction lines defining and enclosing the surface of a building, was similar to that of Serlio's *linee occulte*. See Alberti, *On the Art of Building in Ten Books*, trans. Joseph Rykwert et al. (Cambridge, MA: MIT, 1988), 7–32.
- 14 Fritz Neumeyer, introduction to Kostman, *op. cit.*, 72.
- 15 Friedrich Gilly, 'Some thoughts on the necessity of endeavouring to unify the various departments of architecture in both theory and practice', in Feye and Nottmeyer, *op. cit.*, 170.
- 16 Cited in Mario Alexander Zadow, *Karl Friedrich Schinkel: Ein Sohn der Spätaufklärung* (Stuttgart: Axel Menges, 2001), 148. On Gilly as a teacher see 'Friedrich Gilly als Lehrer Die "Privatgesellschaft junger Architekten"', in Feye and Nottmeyer, *op. cit.*, 174–78.
- 17 Many years later Schinkel hung it in the meeting room of the Bauakademie that he had by then designed as a place of education for the next generation of architects. Barry Bergdoll has gone so far as to say that this single drawing 'might be said to have stamped Schinkel's entire career'. Bergdoll, 'A postponed architectural career: Schinkel's vision for architecture', in *Karl Friedrich Schinkel: An Architect for Prussia* (New York: Rizzoli, 1994), 10.
- 18 It is here worth noting that Sartoris became best-known for his oblique parallel projection drawings, for which he generally adopted the paradigmatic 45/45-degree angle of axonometry, a prominent example of which is the one that Kenneth Frampton placed on the cover of his seminal 1980 book *Modern Architecture: A Critical History*. Since there is no convergence towards a vanishing point in parallel projection, one is never closer or further away from one part of the drawing than another; there is no privileged vantage point as there is in perspective drawings, which is what gives axonometrics their 'floating' quality. They are precise, reliable and measurable – qualities that are all highly valued in science and engineering, and also in the project of Rationalist architecture. That Gilly decided to use oblique parallel projection to clearly communicate the 'mechanics' of his *Perspektivisches Studienblatt* can also be understood in the light of the drawing technique's 'scientific' qualities.
- 19 Henry McGoodwin, *Architectural Shades and Shadows* (Boston: Bates & Guild, 1904), 11.
- 20 *Ibid.*, 17.
- 21 Serlio, *op. cit.*, 72.
- 22 Further on Adolphe Appia, within the theatre studies context see Richard Beacham, *Adolphe Appia: Artist and Visionary of the Modern Theatre* (Berlin: Harwood Academic Publishers, 1994); and with particular reference to his place within architectural history and discourse see Ross Anderson, 'The Appian Way', *AA Files* 75 (2017), 163–82.
- 23 Joseph Leo Koerner, *Caspar David Friedrich and the Subject of Landscape* (London: Reaktion Books, 1990), 20.
- 24 *Ibid.*
- 25 *Ibid.*, 93.
- 26 See Kristina Mösl and Philipp Demandt, eds, *Der Mönch ist zurück: Die Restaurierung von Caspar David Friedrichs Mönch am Meer und Abtei im Eichwald*, (Berlin: Staatliche Museen zu Berlin – Nationalgalerie, 2016), 7, 27.
- 27 Koerner, *op. cit.*, 93.
- 28 Adolphe Appia, *L'œuvre d'art vivant* (Paris: Edition Atar, 1921), unpaginated.
- 29 Hodgson, *op. cit.*, iii.