

The Perspectival Inventions of Alvar Aalto

RANDALL OTT
University of Arkansas

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Aalto's architectural compositions never fail to engage our vision while we approach. No matter how sculptural the forms of his buildings might seem at first glance, they inevitably surpass themselves in dynamism and visual transformation when we begin to move about them. Aalto's success in manipulating complex, dynamic forms no doubt rests on many interrelated aspects of his work. Still, we should single out for special attention the way he was able to let his shapes unfold and gesture directly toward us as we walk the site, thus becoming *expressive* in the most interactive and literal of ways.'

The exterior facade of Aalto's Finlandia Hall in Helsinki displays this highly interactive quality. As we move toward either end of the long facade, we recognize immediately that the three huge, rectangular planes capping the auditorium's wedge-shaped seating tiers are rotating against each other in plan, and thus we naturally assume that they will turn spatially relative to the low, planar facade as we move parallel to it. But this knowledge hardly prepares us for the unexpectedly swift, apparently effortless pirouette that these three planes perform when we actually pass below them on the quay. Our own motion provokes a peculiar heightening of the architecture's anticipated movement, resulting in a curious tension. Aalto's buildings often elicit such an experiential richness.

The enhanced rotational effect at Finlandia Hall remains subtle, hovering just at the level of conscious perception. We find ourselves wondering if we really saw it, or whether this strange acceleration might have just been our imagination. It is surprising to discover, then, how carefully contrived the effect really was. Aalto manipulated our sense of sight, creating a fleeting false perspective. The auditorium's three major faces are not orthogonally shaped at all, but instead are totally angular. Only a close inspection of the stone jointing pattern reveals the true magnitude of their distortion. The perception of an unusually swift

rotation is based upon an incorrect assumption about these planes' rectangularity.

The many perspectival inventions of Aalto reward careful study. Through them his buildings become illusionistic spaces, full of mock shapes and depths that alter unexpectedly as we experience them. His distortions create spatial tensions energized only by a moving observer at the site, thus entwining the viewer's motion and the architecture. These tensions dramatize our approach, contrasting first impressions with subsequent experiences. Most importantly, they create a *virtual* site which itself comes into tension with the *actual* site.

PRECURSORS

Aalto, of course, was not the first to build illusory perspectives. While these angular distortions are hardly common, examples have appeared occasionally throughout the history of architecture. Among the more surprising and diverse instances for which scholars have made claims are the angularly placed ranges of the warped courtyard in the "Nunnery" complex at Mayan Uxmal,² and the non-parallel nave walls in many post-rebellion churches built under Spanish missionary supervision by the Pueblo Indians of colonial New Mexico.' Whether or not such examples were consciously created is always a topic of controversy. Following the discovery of scientifically constructed perspective during the Renaissance, unambiguously intentional distortions appeared, and quickly entered an era of considerable popularity. The ingeniously distorted stage scenery erected in Palladio's Teatro Olimpico in Vicenza is the most famous remaining Renaissance example.⁴ The theater was a natural venue for these effects, given their inherently theatrical quality. These illusions broke outside of the realm of the theater and reached an apogee during the Italian Baroque with perspectively distorted constructions like Bernini's Scala Regia at the Vatican or Borromini's Galleria in the Palazzo Spada in Rome.

Most perspectival inventions begin with a radial distortion of a Cartesian grid. If three-dimensionalized, this

distorted grid becomes a warped box whose angular faces conjure the illusion of being truly rectangular and perpendicular when seen from the one correct viewing position—the fixed station point of the perspective system. Viewed away from the station-point, the illusion is exposed, and the resulting volume seems caught halfway between a flat perspective drawing and a fully three-dimensional, rectangular space. Such a box's appearance of orthogonality, like all perspectival illusions, rests upon a careful understanding of our habits of vision. After years of experiencing buildings, we become so accustomed to right-angled architecture that a distorted box easily fools our eyes. Not only do we misread the form as rectangular, but its apparent depth seems increased. As was the case at Borromini's Galleria, the device is normally employed where space is limited, and the telescoping quality of the false perspective can give the illusion of a deeper volume.

Aalto, though, was one of the rare architects who made perspectival distortions even in instances lacking any depth constraints. While he did at times use this device to lengthen spaces, his most imaginative creations came when he employed it solely for the peculiar spatial tensions and dynamics that it induced. Another difference was Aalto's emphasis on a moving observer. While he certainly acknowledged the importance of the station point—and indeed he always led us across it initially—he did not require the observer to stay fixed there. A dynamic interaction of viewer and viewed was Aalto's own contribution to the field of perspectival inventions.

JYVÄSKYLÄ TOWN HALL

Perhaps Aalto's most obvious experiment with distortion appeared in his proposal for an addition to the existing Town Hall in Jyväskylä, Finland. Here, in a gesture much less subtle than that at Finlandia Hall, he apparently tried to directly graft a fragment from a two-point perspective to the side of the Town Hall's existing building. If we extend the angular lines of Aalto's addition out in both directions, the vanishing points and horizon line of the original perspective can be easily found. As the bottom edge of his elevation shows, he even went so far as to make an upward sloping entry plaza which recreated, in physical space, the effect of the false perspective's rising lines at the new addition's base.

All the compositional evidence suggests that Aalto's motive for introducing this perspectival fragment went far beyond just a desire to appropriate its interesting, angular silhouette. He positioned the horizon line at exactly the height of our eye as we would approach the entry doors, indicating that he fully intended us to interpret this strange volume as the perspective image suggests—that is to see a truly rectangular prism rotated at roughly three-quarter's view. The very existence of the plaza argues the same. By setting his building far back from the road, he gave the composition viewing distance and insured that we would approach across the general region of the station-point. Most

telling of all, Aalto drew two arrays of lines on the surface of his plaza—apparently intended as a paving pattern—which created a preferred avenue of approach, directing the eye exactly along the most effective angle of view. Aalto did everything possible, so it seems, to help his perspectival illusion become reality. The complicated, prow-like plan of the new addition's assembly room clearly shows the incredible complexity of architectural form required to support this desire.

A perspectival composition like the Town Hall has two quite distinct sites: one *actual* setting in physical space, and one *virtual* setting grounded only in the visual conventions that serve to link our eye and brain. Bernhard Schneider, one of the few who have studied these kinds of distortion, has written about how the eye itself becomes an alternate locale for perspectival buildings. In reference to Borromini's Galleria, Schneider suggests that a visitor to such a distorted space is, in fact,

*moving around inside their own eye, experiencing their own perceptual habits and forms of visualization in the perspective structures of a room defined by horizon, eyepoint, and vanishing point.*⁵

Aalto's innovation was to use our motion to bring these two "sites"—one on the ground and the other within our eye—into tension. He accentuated rather than concealed the differential depth clues the two sites offered. When we enter the Town Hall's plaza, our initial reading of the warped volume as rectangular makes it seem far away and *gigantic*—a skyscraper off in the distance. The false perspective pushes the building back, and our eye—following habit—accepts this illusion of a remote vantage-point. The virtual site within our eye *seems* huge. When we move a few paces deeper into the plaza, however, our nearness to the existing building and its immediate proximity to Aalto's addition make us question the real distances involved. As we pass the side of the existing building, its own truly rectangular perspective framework gradually contradicts the false perspective's depth cues. Increasingly, the perspectival effects erode, until we find ourselves standing almost immediately in front of a complicated angular form. The eye's virtual setting gives way to the actual setting on the ground. Our motion generates the flux within this tension, and thus dramatizes the approach to the building.

VILLA SCHILDT

It is even more apparent that Aalto sought exactly this tension between actual and virtual sites in another example—his Villa Schildt in Tammisaari, Finland. On this fresh piece of land, there existed no conventionally-shaped building against which he could contrast a perspectival volume, and so he provided one of his own.

Again we find a deep foreground—the broad lawn, and also find a preferred angle of approach—the linear entry drive. The villa consists of two basic volumes: the first a

lower, rectangular entry piece housing the garage and services, and the second an angular, elevated living room. Lines drawn on this house's front elevation show how the sloping roofs and fenestration of the upper volume diminish toward a vanishing point, again resulting in a sharp prow-like plan shape. The side elevation reveals the true extent of the angularity. On both facades, the lower form displays no sign of perspectival distortion. There exists in the Aalto Archive file for this project an unpublished preliminary study for the main elevation of the house which shows the facade prior to the angularization of the second story windows, and illustrates a very oblique view of the side of the upper, warped volume.⁶ In this study, with two faces of the upper volume visible, its two-point perspective genesis seems obvious.

In this project, Aalto once more brings the two "sites" come into tension. On approach, the angular upper volume reads as a rectangular prism. Tracing over photographs, it rapidly becomes clear that even the angular splay of the balcony on the upper level participates, when one is standing before the building, in creating this illusion. Raking shapes in both plan and elevation have been carefully coordinated. Instead of spatially receding as did the warped box at the Town Hall, the upper, distorted forms of this building leap forward. Aalto knew that depending upon specific differences in the perspective construction a distorted volume can be made to loom as easily as recede. At the Villa he chose the illusion of close proximity rather than great distance. The eye's virtual site is condensed. Again the conventional volume contradicts the reading, in this case challenging the apparent nearness of the distorted element. The tension between the conventional and perspectival volumes is stronger here than at the Town Hall since the Villa's two elements directly collide, making it impossible to see either independently. Their alternate depth readings being to oscillate, the volumes straining against each other. The relative strengths of their depth clues change as we move forward. Eventually, the outward thrust of the perspectival volume can no longer sustain itself as we venture too far forward from the region of the station point. Near the house, the two-dimensional, visually simple surface of the lower volume "reigns in" the much more three-dimensional, visually aggressive upper volume, providing a conclusion as spatially surprising as it is arresting. The quiet foil prevails, the "virtual" site once again giving way to the "actual." As with the Town Hall, drawings or still photographs cannot adequately record the tensions of this evolving choreography; only our body's motion on the site can generate it.⁷

The visual experience of approaching this house, with its fluctuations between readings of far and close, three-dimensional and flat, has few near parallels in visual experience. One vaguely similar sensation would be watching a 3D movie. In such a presentation, stereoscopic glasses are used to allow each individual eye to selectively see one of two superimposed images, each filmed from a slightly different position. If we quickly flip the glasses on and off while the 3D film is playing, the effect can be akin to the oscillation of

depths at Aalto's villa. With the glasses on, the film achieves an almost intoxicating three-dimensionality. Objects jump forward or backward in an exaggerated, deep space. With the glasses off, the image collapses back to a blurry two-dimensions, taking its virtual sense of depth with it. When watching the film, it is we who remain stationary while the film moves before us; at the Villa Schildt the situation is reversed—we are in motion before the architecture. Turn-of-the-century stereoscopic cards, which are made to be viewed through a stereoscope, were the intellectual and technological forerunners of 3D movies, and work on much the same basic principle. These, with their pair of slightly different images placed side by side rather than superimposed, more closely resemble the bipartite facade composition of Aalto's villa, though of course they lack the effects of motion possible with film. Both these cards and 3D films share a central difference from Aalto's villa. The two images in any kind of stereoscopic display each represent actual views. Thus the illusory complexity of Aalto's creations is lacking. Yet despite this important distinction, the comparison does point out how Aalto's achievement at the Villa Schildt relied just as much on a careful study of vision as did the invention and implementation of stereoscopic depth.

PAROCHIAL CHURCH AT RIOLA

Aalto's most extensive and complex essay in perspectival space came in his Parochial Church of Santa Maria Assunta, completed in the small town of Riola, near Bologna, Italy, a number of years after Aalto's death.⁸ Unlike the prior two examples, this church contains no sharp contrasts between distorted and normal volumes. But what it lacks in oscillations of depth it more than compensates for with its episodic character. Here Aalto employed a sequence of no less than three discreet perspectival passages. Each is rich in interactions between the building and our moving vantagepoint, entwining the physical site and our sense of sight.

The church is located on the opposite bank of a small river, and can only be reached from the center of the town by crossing an ancient bridge. The first of Aalto's three perspectival deceits becomes visible just as we begin to pass over the water. Aalto oriented the nave of the church parallel to the river, turning the longest side of the building toward us as we approach. The side elevation demonstrates how he radially distorted the entire length of the building, even going so far as to propose sloping the tops of the bell tower pylons down toward the same distant vanishing point. Unfortunately, the construction of these pylons was delayed.⁹ The restricted access point of the bridge pulls us far in front of the church, where we can observe this false perspective from the ideal vantagepoint—a raking glance down the full length of the building. From this angle, the body of the church seems dramatically stretched.

When we reach the end of the bridge and pivot toward the main stone facade, the Church's second false perspective activates. In this instance Aalto condensed a distortion

directly onto a two-dimensional plane.¹⁰ The curves crowning the facade diminish in a precise perspectival recession, somewhat resembling a series of sails stepping away toward the horizon. Aalto again placed his illusion's horizon line at the level of an observer's optical plane, and made a plaza for viewing distance. This illusion's effect, though, is quite different from all the others we have seen because this perspective never purports to be anything other than a totally flat surface. Unlike his warped three-dimensional forms—which are in reality more sculpturally active than would be the equivalent rectangular boxes that they visually pretend to become—this surface at first seems a mere graphic. Still, it harbors a power.

When we cross the plaza, the distortion makes us gradually question the facade's overall spatial orientation. As we move forward, the perspectival recession of curves torques the entire stone surface to the right. Once in motion before the facade, we have remarkable difficulty in finding a spot where it appears truly perpendicular to our view. What at first seems a static, frontal plane becomes instead a dynamic surface. The nearer we venture, the more it backs away and turns from us. Eventually, we progress so far forward of the image's station point in the plaza that the perspectival effects evaporate. Just a few paces from the door, the facade quickly sweeps back square in front of us, standing firm and broad like a huge wall.

This church's facade may be Aalto's most surprising perspectival invention precisely because of its flatness in real space. Aggressively angular forms like those at Jyväskylä or the Villa Schildt promise a rich spatial experience under any circumstances. Even if they lacked perspectival distortion, they would hardly be spatially bland. The bluntness of the Church's front facade, however, initially promises no spatial complexity. Once we have crossed the plaza and experienced it, we can only feel disbelief at the sculptural dynamic it possesses.

As we enter the Church, Aalto's conjures his third false perspective. He took perspectival space inside of this building—again a condition not found in the previous examples. While the interior rooms within the warped volumes at Jyväskylä and the Villa Schildt lack any reading of false perspective, the Parish Church's nave systematically narrows both in elevation and plan, telescoping down toward the altar. The walls and the ceiling beams which support the curved skylights meet at a false vanishing point, raking sharply inward. The space dramatically extends. This funnel-like effect immediately recalls Borromini's Galleria. Like this Baroque passage, Aalto's Church interior stretches depth by proportionately diminishing everything in view." In Aalto's nave the walk toward the altar seems ever longer until—as if by an act of faith—we are nearly upon it. This is the final and certainly most poetic of the Parish Church's trio of perspectival inventions.

This interior rendition shows how close Aalto could come to the Renaissance's and Baroque's tastes in these devices. Yet if we consider together all of Aalto's various distorted

buildings, it is the differences rather than the similarities between his methods and those of these earlier architects which become most important. Renaissance and Baroque practitioners often limited themselves to exactly such funnel-like shapes. These were carefully framed to remove any tension from their edges. Borromini's goal, for example, was to integrate his illusionistic tunnel with the conventional architecture of the Palazzo's courtyard. Success meant that no seam would show, that reality and illusion would fuse. This necessitated exactly distorted detail and a quite precisely defined viewing distance. Working within these constraints, effects of astonishing believability and depth could be achieved. Yet these illusions' very specificity—the source of their success—is what robs the observer of motion. The Galleria, so powerfully deep and so convincingly woven into the surrounding fabric when seen from the courtyard's center, loses much of its imaginary depth when we shift only a few steps to either side of the illusion's station point. Possibly one reason these distorted funnels enjoyed such wide popularity in the theater was that the audience remained stationary. Even then, the number of seats in the audience that were near enough to the image's station point to enjoy a powerful sense of depth was never very large.¹² For this very reason, the station point was often located in the royal or ducal loggia of these Renaissance theaters, reserving the most successful view for the members of the nobility.¹³

In contrast, Aalto's perspectival inventions were both more ambiguous and more fully spatial as creations in the round than the painterly and exacting constructions of these earlier practitioners. He sought no integration of reality and illusion, and instead exploited the experiential tension that perspectival distortion could offer. Rather than restricting himself to funnel-like hollows with an intense specificity of distortion, he experimented with large, free-standing objects which feigned only broadly rectangular profiles. These could sustain and also surrender their illusion over greater distances. His experiments with direct juxtapositions of perspectival and conventional boxes created a welter of contrasting depth readings, ebbing and flowing as we approached. Far from building statically oriented tableaux, he allowed us to freely wander both "sites"—virtual and real.¹⁴

AALTO'S SKETCHING PROCESS

How did Aalto evolve this unique variant? His drawing method holds a clue. This should not be surprising since typically these intentional distortions are based, in some way, upon a knowledge of perspective drawing. While Baroque architects conceived their effects through exactly constructed perspectives, Aalto's projects were formed through a remarkably free sketching process. Often he worked simultaneously with many various projection types, bringing plans, sections, elevations, and perspectives into immediate contact on the same page.¹⁵ This opened up the possibility that the views, in their close adjacency, could not only influence one another, but also could touch or even

fuse. Sometimes his sketches became a froth of interwoven images.

A good example of this process at work would be a page of Aalto's sketches for his Wolfsburg Church. Here, four interior views occupy the corners of the page, all representing studies of the same assembly space. The two sketches on the right side of the sheet clearly are a plan and a section, while the sketch in the upper left-hand corner is obviously an interior perspective. It is the lower left-hand corner sketch that is hard to identify as a projection type. It seems at once a combination of both the section and the perspective. Another example of possible interaction between views occurs in a sketch Aalto made for the Villa Schildt. Here again he placed perspective and orthographic projections together on a sheet. It is easy to visually imagine that the angular volume from the small perspective sketch on the right has been translated across the page and lodged into position in the elevation.

I suspect that Aalto's perspectival volumes resulted primarily from sketch collisions and transferences of this kind. Though this kind of freedom of experimentation and interaction between views might seem quite unusual, it was really nothing new for Aalto. His entire creative production is permeated with a movement between various mediums. Forms from his paintings and woodwork studies routinely appeared in the shapes and profiles of his buildings.¹⁶ If indeed perspectival distortion evolved from the close adjacency of different projections in his interactive sketching technique, it was for Aalto merely another step in a long history of flow between numerous kinds of compositional techniques. Had he worked in a different way, his particular variant of perspectival space would probably never have evolved.

FINLANDIA REPRISE

Having analyzed the most obvious of Aalto's perspectival inventions, we can return to a more subliminal example like Finlandia Hall and better probe its subtlety. Its soft spoken quality derives from the fact that each of the three falsely rectangular planes that terminate the auditorium's lobes rakes toward its own independent vanishing point. Thus the ensemble lacks an overriding perspectival system. Without such a coordinated framework controlling all three planes, the perspective effect becomes more faint and fragmentary. Nonetheless it acts. Instead of oscillations like at *Jyväskylä* and the Villa Schildt, or a collection of differing passages like at the Parish Church, we feel only a serial repetition of a peculiarly accelerated turning. Again Aalto shows exquisite choreography between our path of movement on the site and our sense of sight. The building's position close to the edge of *Töölö* Bay means that it can only be physically approached on the water side when moving almost parallel to the length of the facade. Thus, the three perspectival surfaces are often viewed from the ideal vantage to display their quickened *pirouette*—one appearing right after another

from the extremely oblique angles of view along the quay." As has already been noted, this heightened sense of rotation is so understated that it could easily escape conscious notice.

This very subtlety, though, may be Finlandia's greatest attribute. Throughout this discussion of Aalto's perspectival inventions, the experiences at his buildings have been described as if the observer consciously perceived and understood them while on site. Examples like Finlandia, however, should make us doubt whether Aalto ever wished the observer to cognitively register his distortions, much less analyze and understand their underlying visual mechanics while in front of the building. The vague and fleeting effects at Finlandia suggest that he sought to tantalize more than to expose. Perhaps Aalto hoped all along that his perspectival inventions would remain largely cloaked, their lack of detailed specificity helping to hide them. Even the Villa Schildt's tensions—which certainly register higher on a scale of perception than Finlandia's—still elude any definitive analysis while at the site. We feel, but do not know. Aalto, in seeking ever deeper tensions, might have rated the success of his false perspectives according to their subtlety. After all, the tensions often felt most deeply are precisely those that are sensed only subliminally.

NOTES

- ¹ The buildings of well known "expressionist" architects—think, for instance, of the curving forms of Erich Mendelsohn or Hans Poelzig—appear to be in motion even as the viewer remains stationary. Aalto, in contrast, created forms whose unique characteristic is that they achieve their greatest sense of compositional motion only when the viewer is in motion, too. For a critique of the various modes of expressionism and their relationship to Aalto, see Demetri Prophyrios, *Sources of Modern Eclecticism* (London: Academy Editions/St. Martin's Press, 1982), pp. 41-4.
- ² Frans Blom, "Uxmal: The Great Capitol of the Xiu Dynasty of the Maya," in *Art and Archeology* 30 (June), pp. 199-209.
- ³ The naves of many of these churches narrow as one approaches the altar. See George Kubler, *The Religious Architecture of New Mexico* (Colorado Springs: The Taylor Museum, 1940) pp. 69-70.
- ⁴ The actual involvement of Palladio in the design of the wooden scenery has been the subject of much controversy. Most likely it was designed by Scamozzi, see J. Thomas Oosting, *Andrea Palladio's Teatro Olimpico* (Ann Arbor: UMI Research Press, 1981), pp. 140-1.
- ⁵ Bernhard Schneider, "Perspective Refers to the Viewer, Axonometry Refers to the Object," in *Daidalos* 1 (Berlin: 1981), p. 81.
- ⁶ The file for the Schildt Villa is as yet unorganized. The drawing of the facade in question is a 1/50 scale study dated 29/11/1969. I want to thank the Aalto Archive for providing me with access to the file during the summer of 1994, and for providing a copy of the drawing for scholarly use.
- ⁷ Another of Aalto's villas that contains a large sloping roof also displays perspectival possibilities, though much less strong than at the Villa Schildt. At his Villa Carre, built in Bazoche-sur-Guyonne, France, in 1959, the mono-pitch roof extends over the entire house. From the garden side, it can easily be misread as a flat roof, again pulling the entire volume much closer to the viewer. For a photograph illustrating this effect,

see Alvar Aalto, *Complete Works*, ed. Karl Fleig (New York: Wittenborn, 1963), p. 241. Notice, in particular, the convincing perspectival relationship between the main block and the smaller projecting wing, and also how the one quite small, truly rectangular window gives away the illusion.

- ⁸ The church was designed by 1968, but the start of construction was long delayed. The church was finally opened in June, 1978.
- ⁹ These pylons, with their sloping tops, were probably integral to Aalto's conception. They would have dramatically extended the visual field of the pattern of distortion, and commenced the effect on the bridge itself.
- ¹⁰ Another possible example of this compression of a perspectival effect onto a flat plane would be the facade of Aalto's "Lappia" Theater and Radio Building, completed in 1975 in Rovaniemi. The elevation overlooking the main town square has five inverted "v"-shaped elements, each occupying its own plane vertical plane. When viewed from the square, the five shapes can appear to be box-shaped elements, with their rounded corners turned toward the viewer. The sense of illusory depth is considerable.
- ¹¹ Other examples of this effect in Aalto's work would be his unrealized winning competition entry for the Church and Community Hall at Lahti, of 1950, and his completed Church at Seinajoki.
- ¹² When the members of the Bibiena family first popularized the use of two-point perspectives as theatrical stage scenery, it was immediately noticed that this type of image allowed a much larger segment of the audience to "correctly" see the impression of depth, and they were rapidly adopted by many designers. See A. Hyatt Mayor's Introduction to Guiseppe Galli da Bibiena, *Architectural and Ornament Designs Dedicated to his Majesty, Charles VI, Holy Roman Emperor* (New York: Dover 1964), p. vi.
- ¹³ Ibid. This apparently also occurred in the now-destroyed stage scenery by Scamozzi in the Ducal Theater at Sabbioneta, see Kurt Foster, "Stagecraft and Statecraft: The Architectural Integration of Public Life and Theatrical Spectacle in Scamozzi's Theater at Sabbioneta," *Oppositions* 9 (Summer, 1977), p. 74.
- ¹⁴ I don't mean here to imply here that the Renaissance and Baroque examples are less successful than Aalto's, but rather only to stress that the different methods they employ achieve very different results. At Borromini's colonnade in the Palazzo Spada, the visitor, when walking across the main axis of the courtyard and viewing into the opening of the colonnade on the left, experiences a sudden sweep of depth that is quite startling. Then, as quickly as it came, the effect disappears. Whether one prefers such instantaneous experiences or the more episodic character of Aalto's creations is largely a matter of personal choice.
- ¹⁵ For a full discussion of Aalto's sketching technique, and its impacts on his architecture, see Mark A. Hewitt, "The Imaginary Mountain: The Significance of Contour in Alvar Aalto's Sketches," in *Perspecta* 25 (New York: Rizzoli, 1989), pp. 162-177.
- ¹⁶ In a number of publications on Aalto, his paintings are presented adjacent to plans or views of his buildings which have very similar forms and lines. See, for example, the pairings in Alvar Aalto, *Synthesis*, ed. Bernhard Hoesli (Basel: Birkhauser Verlag, 1970), pp. 98-99, 132-133, and 160-161.
- ¹⁷ The full elevation can be seen from across the bay on the opposite bank, and from there the non-rectangularity of the three planes is much more apparent at first glance.