Architecture traditionally mediates joints with mouldings. Modern architecture instead uses the reveal, a distained and loved shadow joint. Does the modern reveal signify a building without quality?

Illuminating quality in architectural reveals

Marcia F. Feuerstein

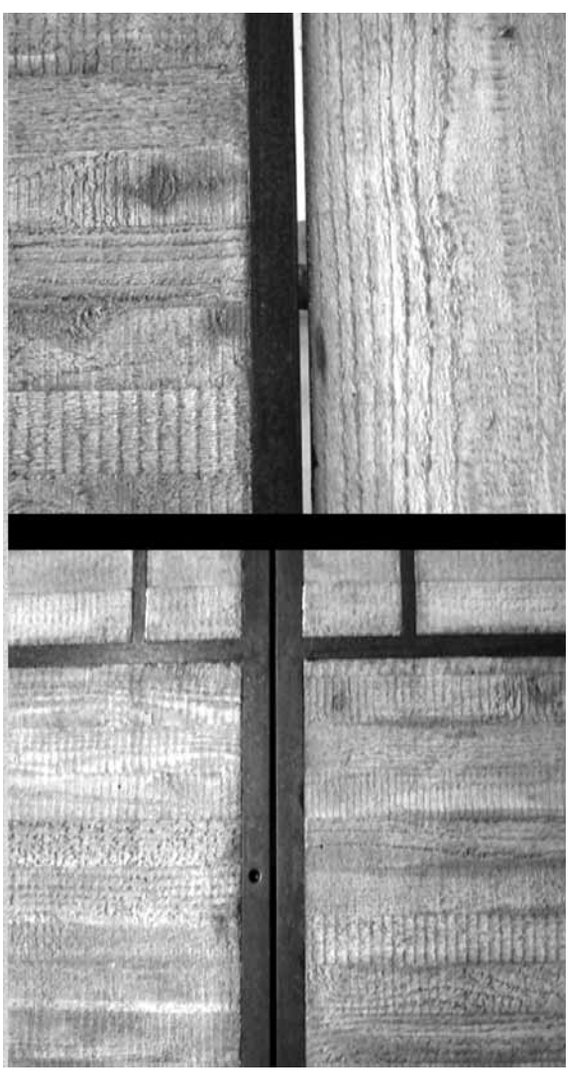
Traditionally, architecture mediates joints with mouldings whose qualities describe, like a human face, their character. In contrast, modern architecture uses a reveal or shadow to mark joints. This ubiquitous yet overlooked modern shadow has slipped between the cracks of architectural theory. Is the modern reveal, distained and beloved by architects, the sign of a building without quality?

In his novel *The Man Without Qualities* (*Der Mann ohne Eigenschaften*), Robert Musil introduces Ulrich, a 'modern' Viennese man living in 1913 with no distinguishing characteristics, lacking firm conviction and constantly adapting himself to changing fashions. Ulrich mirrors the Vienna of the time: a hollow shell with a distinctive but useless character, obsessively dreaming of being 'a kind of super-American city where everyone rushes about, or stands still, with a stopwatch in hand before switching, and pausing for a few seconds, to rush somewhere else'.[1] Ulrich makes no time to experience life – he merely passes through.

The man with qualities (*Eigenschaften*) is 'self-made'. *Eigenschaften,* composed of *Eigen*, strange or particular, and *Schaften* (shafts, rods, even columns and associated with shank or leg), evokes Erwin Straus's famous essay on the upright posture: someone with their 'own' backbone; standing straight as a column on his/her own two legs, while casting a distinctive shadow, an *Eigenschatten* (*schatten* or shadow), Ulrich/Vienna, without quality, is without a shadow.[2]

The intimate connection that architectural and human bodies have with their shadows is illustrated in the tales of three 'Peters'.[3] Peter Schlemihl, Adelbert von Chamisso's character in *Peter Schlemihl, the Shadowless Man*, barters his shadow and his soul for gold.[4] This Peter becomes wealthy yet repulsive to other humans, all of whom are distinguished from him by their shadows. Peter Pan is the eternal youth who loses his shadow because he is constantly in playful motion; he lacks a fixed character until Wendy sews his shadow onto his feet. Saint Peter's miraculous shadow restores health to the sick once they stand in his distinctive shadow.

Architects striving for the quality of a self-made man sometimes find themselves in Ulrich's/Vienna's situation: dim, indecisive or wavering among the three Peters: the gold-loving shadowless Schlemihl, the distracted Pan, and the healing Saint. The three exemplify absent, misplaced or distinctively attached shadows. We may speculate about those aspects of quality in architecture that character theory reveals, granting distinctive airs and shadows while we consider the reveal.



1 Shadowy and airy reveals: Carlo Scarpa, Brion Cemetery (1970–72)

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The reveal is a unique and idiosyncratic architectural shadow. Unlike the three Peters, it is self-made yet exists without a separate body. It casts no shadow beyond itself, yet is shadow. Its shadow is a space of absence between materials. It is defined through its distinctive air – filled with air, shadow, shade and mystery. Yet the reveal is a unique architectural situation in the history of shadow casting. It is a shadowed joint created by a gap or recess, delineating seams, joints and play between materials, elements and three-dimensional spaces.

Architects both love and hate the reveal. Some assert it should be abolished. They argue that reveals erode quality in architectural design, construction and detailing, and skilled designers and builders must control architectural design precisely to a degree that accepts zero tolerance. To do otherwise promotes shoddy or thoughtless construction, a lack of control that disconnects design from construction. While the reveal is simple and easily reproducible, its 'abstract' quality denies the material presence of architecture. Since its character lies in the shadow, no matter what the material, the joint remains the same: a shadow line.

Others praise well-designed and constructed reveals whose perfectly aligned edges reveal honest and clear expressions of the play between materials and architectural elements. These joints have no mouldings; they are open, uncovered and exposed, so shifting off the right angle immediately 'reveals' mistakes. This position praises the clarity, precision and emphatic linear engagement that create a distinctively modern shadowed profile within – rather than beyond – itself: the reveal remains the same. Its front elevation is a line, its profile is non-existent and its section is a mystery *[1]*.

Distinct profile and shadow

In architecture, cast shadows delineate the profound relationship between an upright body and light. A shadow, the body double, stands for something else beyond; near or at a distance from its obscured source. It is cast by falling through the air onto a surface. The solid body creates the casting for its shadowed profile through stark distinguishing characteristics, recalling Pliny's story of the origin of drawing: where a maid of Corinth traced the shadow of her lover's profile onto a wall to capture his



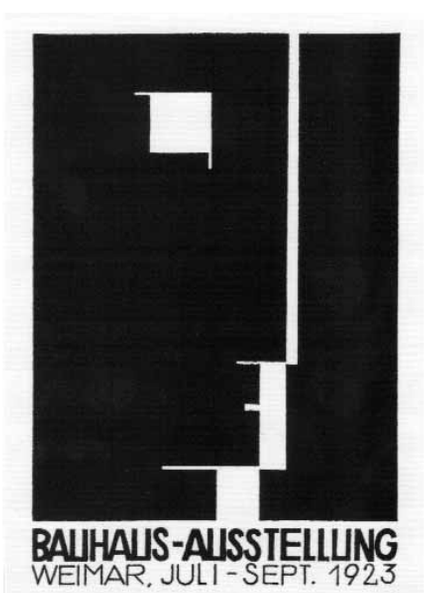
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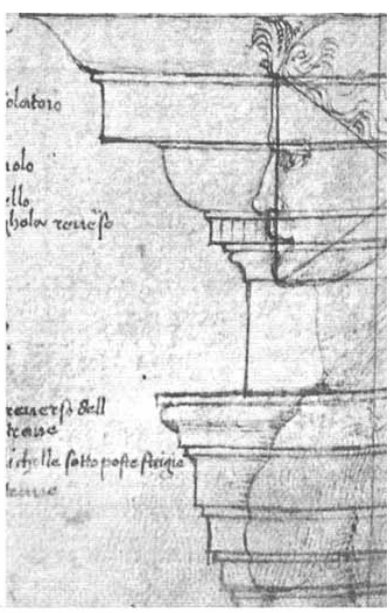
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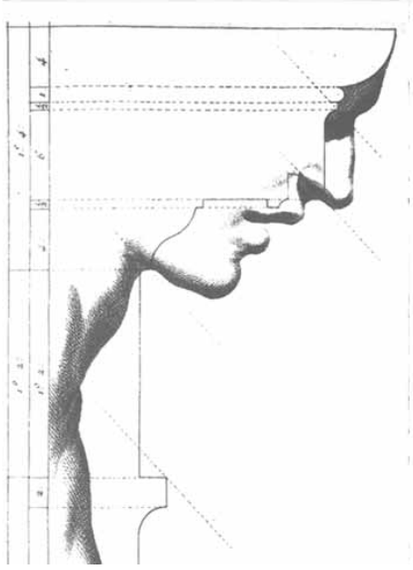
unique presence before they part *[2]*. Projected light, cast as architectural shadow, implicitly discloses the precise, physiognomic character of the body, with its shading. Between light and darkness, the shadow cast by sunlight also traces the body through time, sweeping it through air from morning to night.[5]

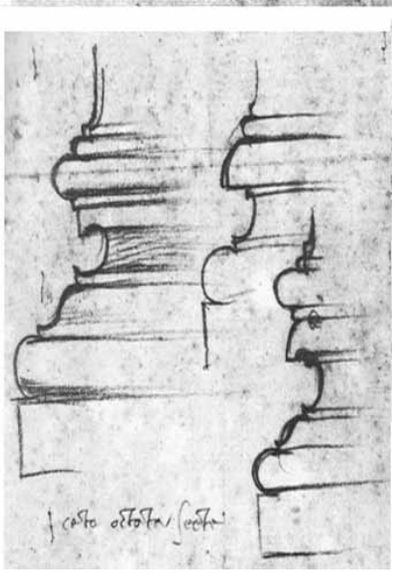
By considering architectural shadow through the lens of Charles Sander Peirce's semiotic triad, we discern three simultaneous meanings or signs: indexical, iconic and symbolic.[6] For example, the distinctive shadow of the Corinthian lover's profile cast from his body lands beyond his body and somewhere else in space. This profile is an index of his body. The two-dimensional silhouette signifies the maid's lover's three-dimensional form, or the space of his body, is an iconic form for her lover. Finally, the shadow itself becomes a symbol that stands for his soul and her love for the man she knew, missed and remembered.

Shade, located on the portion of a body turned away from light, also carries multiple meanings in architectural representation. For example, Jacques-François Blondel (1705–44) both contrasted and equated a shaded human profile with its precisely drafted architectural entablature – for example the Tuscan profile – by laying one image over the other.[7] Blondel used these shaded/drafted drawings to transfer his studies of human types and profiles onto architecture, teaching that building character – its inner being, use and function – had the same quality as its doubled human character. In this way buildings actively communicated their character to inhabitants through a particular 'facial physiognomy'. Throughout architectural history, we see formal comparisons of human type to architecture type that attached an inner human quality to building character including Vitruvius's discussion of three human types that described the architectural orders[8] and Michelangelo's facial profiles designed for the Medici Chapel (c. 1524) *[3]*. Shade and shadow casting were essential components of architectural education even into the twentieth century. Both Jules-Jean-Désiré Pillet at the Ecole des Beaux Arts, in the late nineteenth century, and Henry McGoodwin at MIT, in the early twentieth century, taught the art and science of shadow-making *[4]*.[9] The shadow revealed the power and strength of the body and its presence – being on the









2 Casting Shadow's Memory in *The Origin of Painting* (George Woodall, 1920)

3 Human and architectural profiles facing each other through time (clockwise from top left) Bauhaus Profile after Oskar Schlemmer (Herbert Bayer, 1923); cornice/profile (Francesco di Giorgio Martini, ca.1470); profile/moulding for Medici Chapel/Tomb (Michelangelo, ca. 1524); shaded Tuscan profile/entablature after Vignola (Jacques-François Blondel, 1771–77)

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ground and in the world. Architects who designed shadows controlled and projected particular characters and qualities within, through and from their buildings.

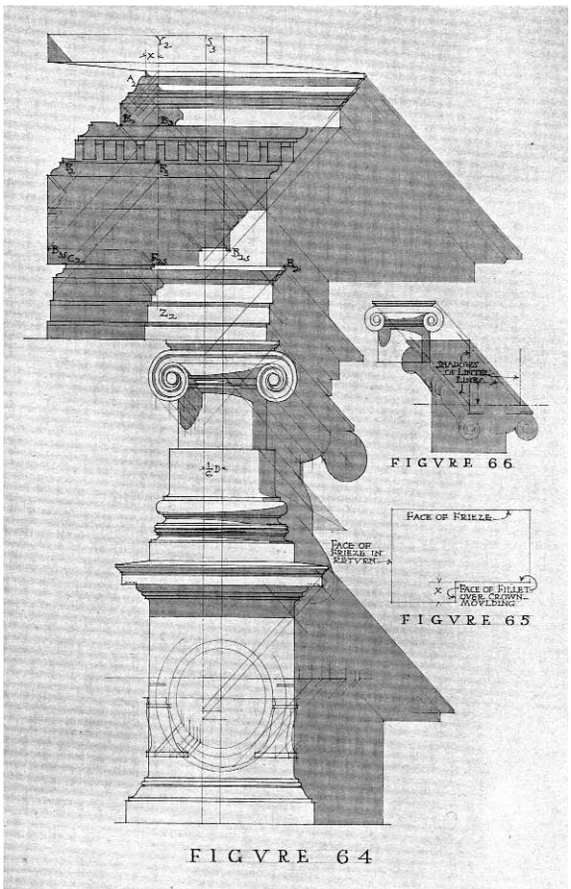
The reveal obscured: shadow without profile

If, in architecture, the profile and its shadow established traditional qualities (characters), how might we read the character of a reveal – a shadow without a profile? Designed as a shadow, it is a dark void, a linear recess, a slotted joint filled only with air. Distinguished by having no distinct profile or separate body that casts unique indexical, iconic or symbolic meanings, it creates and maintains its own shade and shadow. This somewhat deceitful non-cast shadow, created by faceless profile, intertwines within a recessed space regardless of the time of day or season. Is the reveal without quality because it is not distinguished within a range of shadowy characters, like the three Peters?

Perhaps the reveal evolved from the right angle profile of the human face and moulding/entablature. The study of the human profile to describe and define character, assumed profiles represented and revealed distinct inner qualities, natural character and passion. The human profile and physiognomy are found in Vitruvius and others. Blondel studied René Descartes's (1596–1650) physiognomic character studies via Charles Le Brun (1619–90).[10] Eighteenth-century scientists quantified comparisons between human and animal profiles and skulls by tracing facial silhouettes and measuring facial angles of skulls. Johann Kaspar Lavater (1741–1801) traced facial profiles into dark silhouettes, which became a text for reading into one's soul.[11] In his *Cephalometrics,* Petrus Camper (1722–89) reiterated Renaissance and Ancient beliefs that 'good' human form was based on the right angle, such as described in the early Egyptian and Greek canons, demonstrating well-formed faces approached a 90-degree facial angle.[12] Modern artist/designer Oskar Schlemmer's 1922 black right-angled profile, designed as the Bauhaus Logo, representing the Bauhaus and ideal body/building relationships recalls both the Lavater and Camper/ancient physiognomic sources. Schlemmer's right-angled Bauhaus profile was then used by other Bauhaus artists, such as Herbert Bayer *[3]*. Perhaps this right angle became an individual sign that separated itself from the body and stood alone. The line translated into a rectangular slot created when two straight-edged materials or planes meet yet never touch: a void became the right-angled profiled figure.

Revello and *tableau*

What is the architectural tradition of the modern reveal? The traditional reveal, defined by Joseph Gwilt in 1899, was the vertical side of a recessed space from the outside/face of a wall to the face of a door or window frame.[13] Gwilt attributed the word 'reveal' to the Latin verb *revello*, to tear, pull away, and pull up (referring to skin or a vein). In 1904, Julien Guadet (1834–1908) described the reveal as a *tableau*.[14] The *tableau* (outside recess) created, with the *ébrasement* (inside splay) and *feuillure* (a 'rabbet' for the door or window between inside/outside), the space of a threshold or sill (*seuil*). The exterior *tableau* was rectilinear – at right angles to the face of the wall – while the *ébrasement* or splay was bevelled into the interior to allow the door (or window) to open beyond the right angle and increase the amount of light projected into the interior *[5]*.[15]



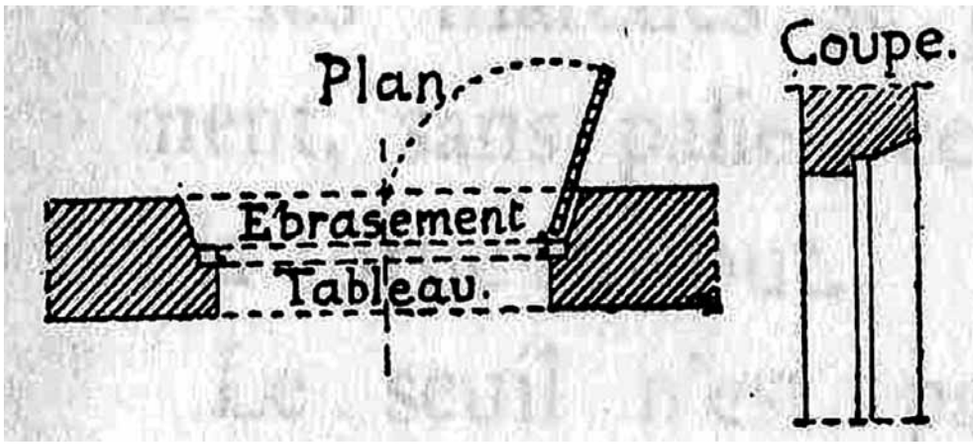
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Gwilt's reveal implies a tear in a body while Guadet places it within a scenographic pictorial tradition: a picture and scene in painting and theatre. For both it was a recess that provided access between the outside and inside, opened the wall to light and air, and both shadowed and framed views into and out from a building. It 'revealed' the depth of the wall and the inside to the outside and vice versa as either a tear or cut into a body, through the skin of the wall (Gwilt) and or pictorially as a framed view of lit or shadowed space recessed into and through the wall (Guadet). As the outside space of the opening, cousin to the niche, it makes space within the wall for a door, and for inhabitants or visitors' bodies, like statues occupying a niche, part of the wall, while they wait to enter the building. The reveal was a space to pause in shadow, then move through, opening to light. A space framing the beginning (entrance) or end (exit) of a human drama or event, when the 'curtain' (door or window) at the *feuillure* parted, it admitted light into and emitted light from the interior. The clarity of this traditional recess as a space to occupy while pausing within a wall is generally missing in architectural definitions and technical drawings from the 1920s to the present.[16]

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4 Architectural shadow making: Roman Ionic Order (Henry McGoodwin, 1904)

5 *Tableau*, *feuillure* and *ébrasement* (Julien Guadet, 1904)



The modern reveal as a recessed gap between surfaces was established in the 1960s[17] and formally defined in John Pile's 1990 *Dictionary of 20th Century Design* as:

> *A groove or slot separating two elements* [...] *applied to a recess between elements that creates a shadow line emphasizing the meeting point* [...] *in place of a molding* [...] *to emphasize a line,* [...], *easing the construction difficulties of creating and finishing a perfect butt line. A reveal is often introduced where a wall and a ceiling meet, at the edge of a door frame where it meets a wall, or where panels meet in walls or in furniture. The shadow line it creates makes the joint crisp and emphatic without requiring an applied strip of molding or trim.*[18]

After applied mouldings were discarded and the gap between elements exposed and uncovered, this recess became a primary feature of the new reveal. It shared a number of traits with its traditional parentage. Both traditional and modern reveals are recessed and shadowed openings cut into a wall. The modern reveal implies Gwilt's etymology as a cut into, rather than through, a body. However, while the traditional reveal discloses the hidden substance of the body beneath the cut, the modern reveal conceals it within a blank shadow.

The blank shadow of the modern reveal is tied to both the niche and to Guadet's theatrical *tableau*. His traditional reveal created a space in which we could pause; the modern version creates a dramatic and mysterious presence between elements, planes and surfaces. The modern reveal hides all construction behind a veneer of simple floating elements that defy gravity to simply exist as abstract planes mysteriously held together to create inhabitable space. This creates the illusion of a deus ex machina, allowing us to suspend our disbelief that the elements are held together through magic.[19] The *tableau* no longer frames a dramatic event – rather the architectural construction is itself the theatrical event, a black box that leaves the reality of building and its construction mute. Guadet's architectural *tableau* disclosed the dramatic scenic presence within and through the wall – lighting the interior and exposing events of daily life from within the wall and inside the building. The people/their bodies entered and paused within a traditional reveal and became part of the action – as actors and characters within the dramatic sequence of the *tableau*. The modern reveal framed abstract planar construction itself, leaving its underpinnings in the dark. The people who inhabited these spaces remained on the outside, never able to enter through a reveal to become a part of the body of the wall. They remained spectators, outside the walls or, if curious, slipped a fingertip into the gap. This double bind hides and reveals mysterious unknowns within walls and between surfaces. A spectator might not be aware that the walls are hollow yet functioning containers.

A *tableau* for angels to pause

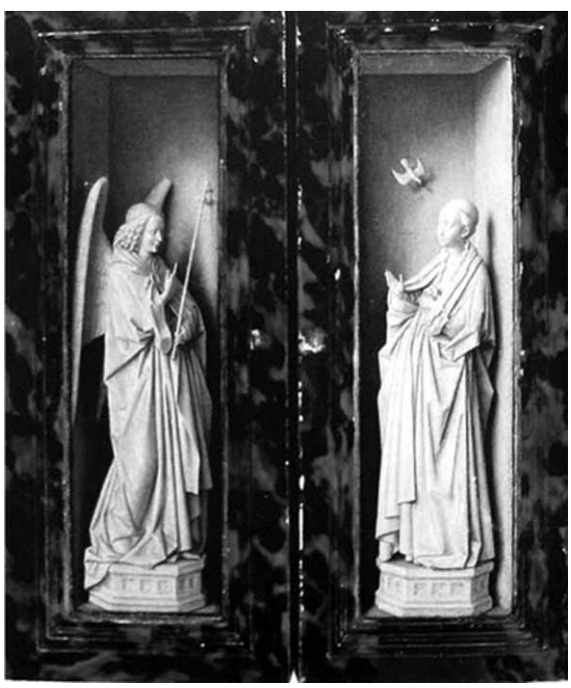
In his discussion of shadow, Victor Stoichita described annunciation diptyches through cast shadows and a column that separates spiritual/angelic space from everyday space of human daily life.[20] Filippo Lippi's *Annunciation* (1440) is one example. Here, the angel/messenger occupies one panel while Mary inhabits the other with a column between the two. An angel's shadow, cast across the angelic space, behind the column, and into the human space, signifies the immaculate 'incarnation'.[21] This impossibility originating from the airy ephemeral angelic being casts another shadow, like St. Peter's, across the earthly/spiritual divide. The column, delineating the two spaces, also functions as a traditional moulding to cover the joint created by the hidden understructure that joins the two panels together into a diptych. As a moulding it covers the construction joint while signifying a threshold between angelic and human space.

Jan van Eyck's *Annunciation* (1437) diptych has no column *[6]*. Instead the two panels that make up the diptych are set next to each other with a gap, or airy reveal, between the two paintings. Van Eyck's two painted panels represent separate rectilinear niches, each painted as if containing in one, a brightly lit statue of the angel, and in the other, the virgin. Each statue's cast shadows and shaded and darkened corners fill the paintings. Each *tableau* of painted/shadowed boxes and airy cubicles is surrounded by painted frames which, when set next to each other are separated from one another to create the diptych with an actual gap of air between the two panels. This dark gap is a reveal: the airy space that bestows a mysterious potency to the paired paintings. The dark space, rather than a

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moulding or column, separates the messenger from the receiver, the angelic from the virgin and does nothing more than act to reveal a mysterious spiritual air that separates the sacred from the profane.

Lippi's traditional moulding is transformed by van Eyck's airy gap. The column in one and the airy joint in the other provide yet another example of how this joint has upended traditional architectural detailing and shadow play. This play between Lippi's column and van Eyck's air as well as a reveal/*tableau* and reveal/*cut* appear in two iconic modern buildings:



6

Notre Dame du Haut, Le Corbusier's pilgrimage church at Ronchamp (1950–54)[22] and the East Wing, National Gallery of Art (1974–78), by I. M. Pei.

The modern version of the reveal as lit recess and shadow in Le Corbusier's Notre Dame du Haut is contrasted with a traditional reveal, which holds the church's statue of Mary high in the eastern 'Mary Wall' *[7]*. Here, a framed opening set within the wall constructed from rubble of the historic destroyed church, acts like a door at the *feuillure* for Mary, an open niche, and a Guadetian *tableau*. This *tableau* for the statue, set within the wall, has Mary pausing between the inside and the outside, ready to rotate either out towards the sun or into the interior of the chapel, depending upon the location of the service.[23] Le Corbusier's *tableau* recalls the previously discussed Annunciations with a modern twist. Viewed in 'section', Mary takes the role as the central column albeit a pivoting column, covering a joint between two worlds: the heavens (sky) and the earth (building/chapel), overlooking both human and spiritual space. When viewed from the inside, with full sun on her back, she appears like a silhouette surrounded by sunlight. From the outside, her rectilinear niche/*tableau* projects slightly out from the exterior wall while she is standing in the now dark opening, her features, lightly lit by the sun, somewhat visible below. (At the same time, the statue's pivoting mechanism remains hidden within the wall, employing Mary, the turning column, as that previously mentioned deus ex machina. This mysterious pivot recurs in the processional entry door that, while heavy, lightly turns to open on its centre axis.)

Le Corbusier also designed a modern reveal whose character transformed when seen from the outside



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and then from the inside. He used this airy joint as a cut between the top of the 'Mary Wall' and the underside of the roof. (All but the west wall have this reveal.) From the outside, and like an exploded axonometric drawing, the heavy roof inexplicably appears light. Here the cut is a dark shadow and the roof, mysteriously lifted and free from gravity, floats above its heavy rubble wall about to take flight. This is the reveal as modern architects know it, a dark line casting its hidden depth between the underside of the roof and the top of the exterior wall, hiding through both shade and shadow the structural underpinnings that hold this theatrical-architectural event. The answer to this mystery is disclosed when we move to the inside. Here, viewed inside the chapel, the shadow line becomes its opposite: lit by the sun, the airy gap brings light from the outside into the chapel, demonstrating that this miraculous event is also an architectural ploy: the shadowed cut, becoming sunlit gap, exposes the roof's superstructure faintly visible in the shadows. Columns that carry the structural load of the roof are dark gaps within the bright linear joint. When the reveal is viewed from the inside, we might comprehend that while the roof does not defy gravity it still seems to float.

6 Denuded joint: *Annunciation* diptych (Jan van Eyck, 1437)

7 Taking turns: Chapel of Notre Dame du Haut, Ronchamp (Le Corbusier, 1950–54)

8 Floating turns: East Wing of the National Gallery (I. M. Pei, 1970–74)

Shadow without body

In the East Wing of the National Gallery of Art (1967–68), I. M. Pei recalled Gwilt's cut body rather than Guadet's *tableau*. His reveals became a version of the dark and airy gaps in van Eyck's *Annunciation* diptych. These gaps are major reveals, located high and just below the atrium roof and skylight structure, to breathe out and supply fresh air to the large central atrium space. They are like dashed lines that follow the top of the atrium frame/beam but stop whenever the load-bearing steel framed roof system engages the beams *[8]*. The air from these reveals moves down through the atrium into gaps near the floor, located beneath stairs, at the edges of the bridges, which also act as crossbeams, and window walls, invisibly returning through hidden plenum spaces. Like lungs, the building breathes out (supply) and back in (return) through these major architectural elements. Some reveals are gaps, others simply rectangular dark spaces surrounded by highly polished frames that contrast with the darkness of the air spaces, all were designed to appear airy, light, floating, even mirrored – reflecting light while consuming light. Each reveal passes air from open lit space into dark, hidden plenum spaces.

The building, filled with large works of art selected for the space, supports Alexander Calder's large mobile that hangs in the huge 'three stories high and seventy-six feet wide' atrium. The roof, which supports Alexander Calder's large mobile, also allows it to float and move within the atrium. After installation, the reveals were tuned and adjusted to



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direct air that causes the mobile to slowly turn and rotate.[24] Unlike the pivoting and contained statue of Mary, Calder's huge mobile moves and pivots slowly within its huge open space, catching the designed internal breeze that flows around and through the space. The entire open space expands around the moving sculpture with stairs, walkways and balconies that allow us to climb 'around' yet never touch the floating work of art. As the sunlight enters the skylights and moves across the sky so do the shadows of the sculpture, which move and turn as they are cast across and through the large space.

This large open sunlit space is fed by dark and airy reveals, which Pei used throughout various exhibition and academic spaces. Most gaps are supplies and returns for the HVAC system to receive and expel air from the body of the building between floors and walls, and walls and ceilings. The reveal is used for other purposes: doors disappear into shadowed slots, lighting is both contained and concealed in ceiling shadow joints, window frames, sills and library cabinetry seem to float by means of the reveal that cuts into a hollowed out functioning body-container and disappears into dark unknown spaces. One exception is a large open slot of the main atrium, which created the major separation between upper reception areas and the main atrium. This large space locates private and semi-private spaces that look out onto the main atrium, each open and in view to the other from one sunlit space into another, a distant relative to the slot between the roof and wall in Ronchamp.

The generalised darkened gaps and the wide-open airy space between upper reception and main sunlit gallery stand in opposition to the expressive reveals in Ronchamp. Mary stands, tightly contained, in the window/door *tableau*/reveal in Ronchamp, lit when she faces out to the sky and shaded when she turns in to the sanctuary. Play between inside and outside, light and shadows, ground and sky also occurs in the shadow line between roof and wall, revealing two worlds at once: mysterious, anti-gravitational, dark and airy from the outside, lit and structurally salient from the inside.

Wonder and mystery

Perhaps the character and quality of the modern reveal is this: to create reality with unreality, a sense of wonder and mystery in a world filled with rushing about and little time to pause and contemplate the unknown. A life in the human-made world makes more sense when some non-sense is embedded within its details to give us pause, a time to stop, reflect and exchange some meaningful or trivial words. These pauses, I suspect, are behind the reveal.

This ubiquitous modern joint holds a unique place in architectural tradition. It declares the junction of play between two materials, surfaces and within three dimensions yet, in an absolute sense, it remains dark and hidden, revealing the depth of its joint while delineating separateness within its body. It mysteriously suggests hidden connections and immeasurable deep, dark and hollow interiors, receiving darkness from and within itself. While it lacks a shadowed profile, the shadow is its character, existing without a separate body. A shadow joint, in German the *Schattenfuge*, *fuge* means seam or joint, from *fuge*, the Latin meaning flight. The reveal allows architecture to appear to be joined through invisible and unknowable means, maintaining its hidden structures from view. Pei gives us dark airy gaps that spin huge mobiles in the air casting shadows through the space and on visitors as they turn and take flight through the air. Le Corbusier shifts between light and dark – illuminating the truth while creating mysterious shadows in the building, while turning the column/Mary within her door. Both create a human-made world of sense and non-sense to cause us to pause, stop, reflect and wonder. Theatrically presented, we are asked to move from truth, to suspend our disbelief that architecture (held together by spirit, darkness and air) is a weightless assemblage floating and taking flight.[25]

Notes

1. Robert Musil, *The Man Without Qualities*, trans. by Sophie Wilkins (New York: Vintage International, 1996 (1952)), pp. 26–27.
2. Erwin W. Straus, 'The Upright Posture', in *Psychiatric Quarterly* 36 (October 1952), 529–61.
3. See Victor I. Stoichita, *A Short History of the Shadow*, trans. by Anne-Marie Glasheen (London: Reaktion Books, 1999) for illustrations of these three examples: Schlemihl, Figure 67, p. 174; Peter Pan, Figure 69, p. 175, and Masaccio, *St Peter Healing the Sick with his Shadow*, Figure 16, p. 73.
4. Schlemihl is also Yiddish referring to *Shelumiel*, derived from two possible sources: Numbers xxv. 6, an unfortunate man mistakenly killed or a corruption of *schlimm mazzal* – 'unlucky star'.
5. Stoichita, 1999 is one of many excellent sources on shadow.
6. Peirce's semiotic triad consists of the representamen (the form of the shadow), the interpretant (the mental effect of the shadow on its interpreter, the sense made of the sign), and the object (what the shadow refers to or stands for). Peirce noted that anything could be a sign as long as someone interprets it as standing for something other than itself. Marco Frascari applied this method of analysis in 'A Secret Semiotic Skiagraphy: The Corporal Theatre of Meanings in Vincenzo Scamozzi's Idea of Architecture,' in *VIA 11 SHADOW, The Journal of the Graduate School of Fine Arts*, ed. by David Murray (New York: Rizzoli & University of Pennsylvania, 1990), p. 33, fn 6.
7. Jacques-François Blondel: Shaded Tuscan Profile after Vignola (1771–77) is illustrated as *Entablement Tuscan de Vignole* in Joseph Rykwert, *The Dancing Column* (Cambridge, MA & London, England: The MIT Press, 1996), pp. 34–36.
8. Marcus Vitruvius Pollio, *de Architectura*, ed. and trans. by Frank Granger, London and Cambridge, MA: William Heinemann and Harvard University Press, 1945 (27 B.C.).
9. Henry McGoodwin, *Architectural*

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Shades and Shadows (Boston: Bates & Guild Company, 1904), pp. 11, 15, 33 and the accompanying introduction by Tony P. Wrenn, pp. i–xiii (ix–x, fn. 5, 6 p. xxiii).

10. Le Brun's source was René Descartes, *Les passions de l'âme* (Paris, 1649).
11. Johann Caspar Lavater, *Essays on Physiognomy: for the promotion of the knowledge and the love of mankind,* trans. into English by Thomas Holcroft, London: G. G. J. and J. Robinson, 1789; see also Knipe, Penley, 'Paper Profiles: American Portrait Silhouettes', in *Journal of the American Institute of Conservation*, 41, 3 (2002) 203–23, Crawford, John S., 'Physiognomy in Classical and American Portrait Busts', in *American Art Journal,* 9, 1 (May, 1977) 49–60.
12. Petrus Camper, 'The Works of the Late Professor Camper on The Connexion between the Science of Anatomy and The Arts of Drawing, Painting, Statuary, …', trans. by T. Cogan, M.D., London: C. Dilly, in the Poultry, 1794; see also Miriam Claude Meijer in her Introduction to Petrus Camper, 'On the Origin and Color of Blacks', *History of Anthropology Newsletter* 24 (December 1997) 3–9; for ancient canons of human proportion see Gregory Leftwich, 'The Canon of Polykleitos: Tradition and Content', in *Canon*, *The Princeton Journal Thematic Studies in Architecture*, 3 (Princeton Architectural Press, 1988), 37–78.
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15. The depth of the *tableau* 'harmonised' with neighbouring windows and adjusted for function, use, and shelter. Guadet, 1906, pp. 214–15.
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25. Many thanks to Paul Emmons, Jaan Holt, Donna Kirk, David Leatherbarrow and Nechama Masliansky.

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Biography

Marcia F. Feuerstein, Ph.D., A.I.A. is Associate Professor at Washington Alexandria Architecture Center, Virginia Tech, teaching architectural design and theory since 1996, and a licensed architect. Feuerstein studied at Tufts University, SUNY/Buffalo, and University of Pennsylvania, where she completed her Ph.D. (Architecture). She has practised in the US, and has taught and lectured in Europe, Canada, Pakistan and the US. Publications include 'Body and Building inside the Bauhaus's Darker Side: On Oskar Schlemmer' in *Body and Building* (2002) and *Changing Places: ReMaking Institutional Buildings* (1992).

Author's address

Dr Marcia F. Feuerstein
Virginia Tech, School of Architecture + Design
Washington Alexandria Architecture Center
1001 Prince Street
Alexandria
Virginia 22314
USA
mfeuerst@vt.edu

https://doi.org/10.1017/S1359135510000084 Published online by Cambridge University Press

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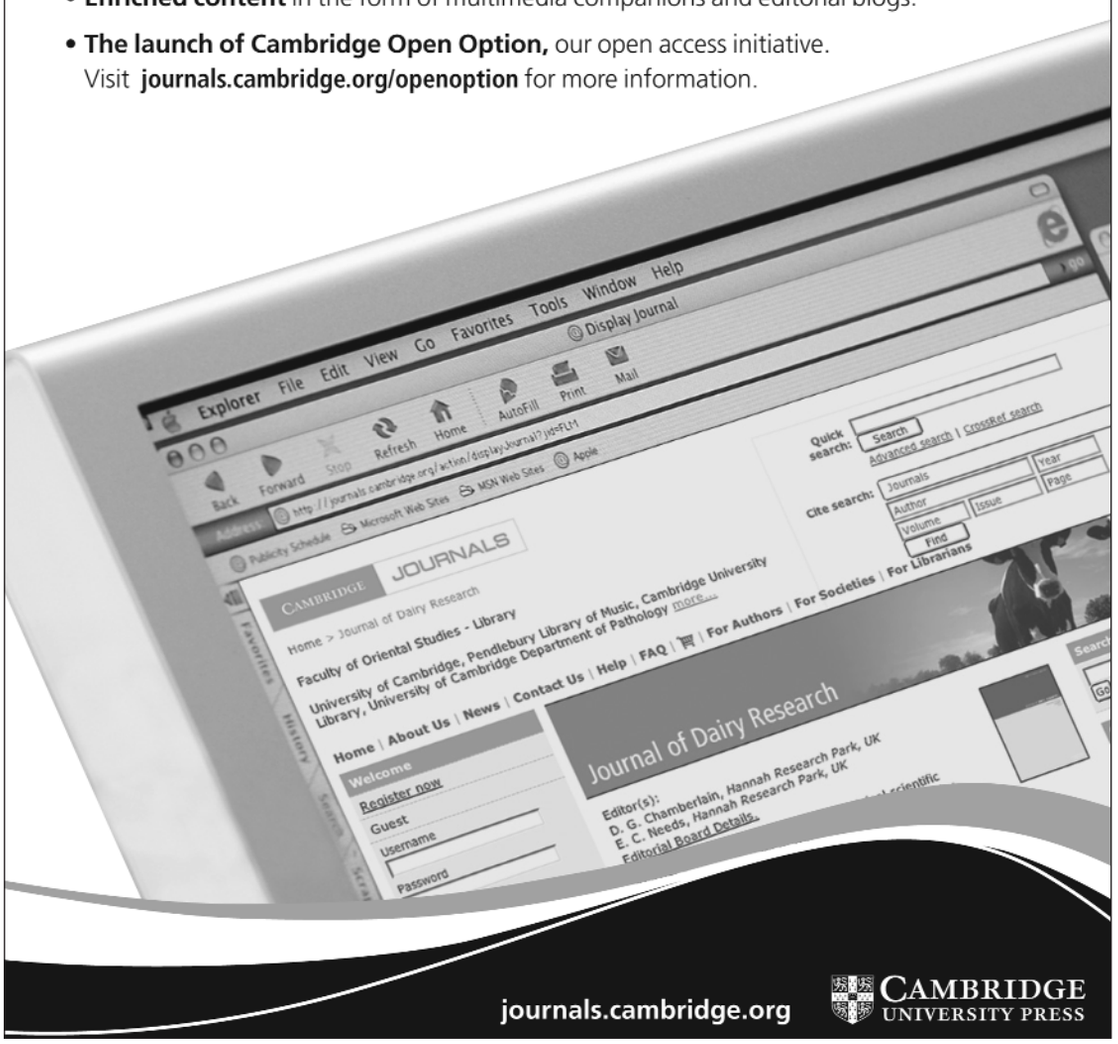
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