

# Augmenting Grounds: AR Grid Translations as a Ground for Abstraction in Young Education

JONATHAN A. SCELISA

Pratt Institute

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**Augmenting the grid serves as an investigation into the use of augmented reality technology within early architectural education as means of introducing both historical and contemporary tools of abstract making and seeing. The research culminated in a pre-college two-week intensive design studio structured at an architecture design college for students in the surrounding local high-school communities. The class examined the critical usage of image-based software for its ability to bridge the digital-physical divide within a youth outreach population. The paper explores how the use of entertainment-based image and technological apps, can create new pathways into design education particularly in groups, whom may not have previously been exposed to architectural making, but might have native familiarity with readily accessible smart phone interfaces for camera based environmental capture. The research builds upon the optic history of architectural drawing procedures towards a new form of abstraction and representation using photogrammetry and augmented reality.**

## PROBLEMATIC PEDAGOGY OF THE PRE-IMAGE ERA

One of the inherent challenges inserted into architectural pedagogy by the modernist legacy of early education abstraction has been the inherent rupture away from the natural image-oriented way of seeing the world as a child. This lineage of education has in many ways been seen as a method of ‘breaking’ the realist view of the world, in favor of a reduction into raw forms that can be manipulated by the novice designer. Tim Love calls attention to this pedagogical phenomena in his essay *Kit of Parts Conceptualism*, where he writes “architectural curricula in the united states... [ express ] the need to instrumentalize a program of ‘forgetting’ to focus on the purity of autonomous architectural problems bears a strong resemblance to the ideological and strategic tenets of American Minimalism, perhaps best articulated by New Yorker Staff writer Lawrence Wechler in his book on Robert Irwin, *Seeing is Forgetting the Name of the Thing One Sees*. ”<sup>1</sup> Wechler calls to our attention to that a fidelity in the act of seeing is dispatched in early architectural education in favor of an examination of pure and minimal forms. Love goes on to point

out the effects of creating an education that privileges abstract and minimal form over ‘the everyday sight’ is an act of elitism and at worst a form of gatekeeping in the art – education world.

To discuss and understand the roots of abstraction in early design education versus use of everyday imagery and sight we must investigate the modernist artist’s anxiety of their own agency in the wake of the high-realist painting at the end of the twentieth century. Clement Greenberg comments on this in his dictum *Modernist Painting*, wherein he discusses that the step away from re-representing the environment and informing disciplinary abstraction was a moment of empowerment for artists.

“Having been denied by the Enlightenment... [ artists ] looked as though they were going to be assimilated to entertainment ...The arts could save themselves from this leveling down only by demonstrating that the kind of experience they provided was valuable in its own right and not to be obtained from any other kind of activity. ”

—Clement Greenberg, *Modernist Painting*<sup>2</sup>

Arguably, these ideas rippled through art and architecture pedagogy creating the effect that ‘the image’ or sight was something needing to be broken away from.

Contemporarily, minimalism due to its associations with the western abstraction core narrative above, can truly only be seen to use Love’s words again as a ‘life-style’ choice that benefits those whom, had access to such historical knowledges and techniques before entering collegiate design school. It is architecture education’s responsibility to investigate new core pedagogies that tie into the ways of seeing that younger generations investigate organically as a part of their daily experience in their times of leisure as a means of breaking down the barriers of what is considered ‘high-design’.

## IMAGE TECHNOLOGY

Image technology has often and historically been tied to the forms of theatrical entertainment, propaganda, and edification having a rich history embedded in the seventeenth - and eighteenth century. It could be argued that the very inaccessibility of

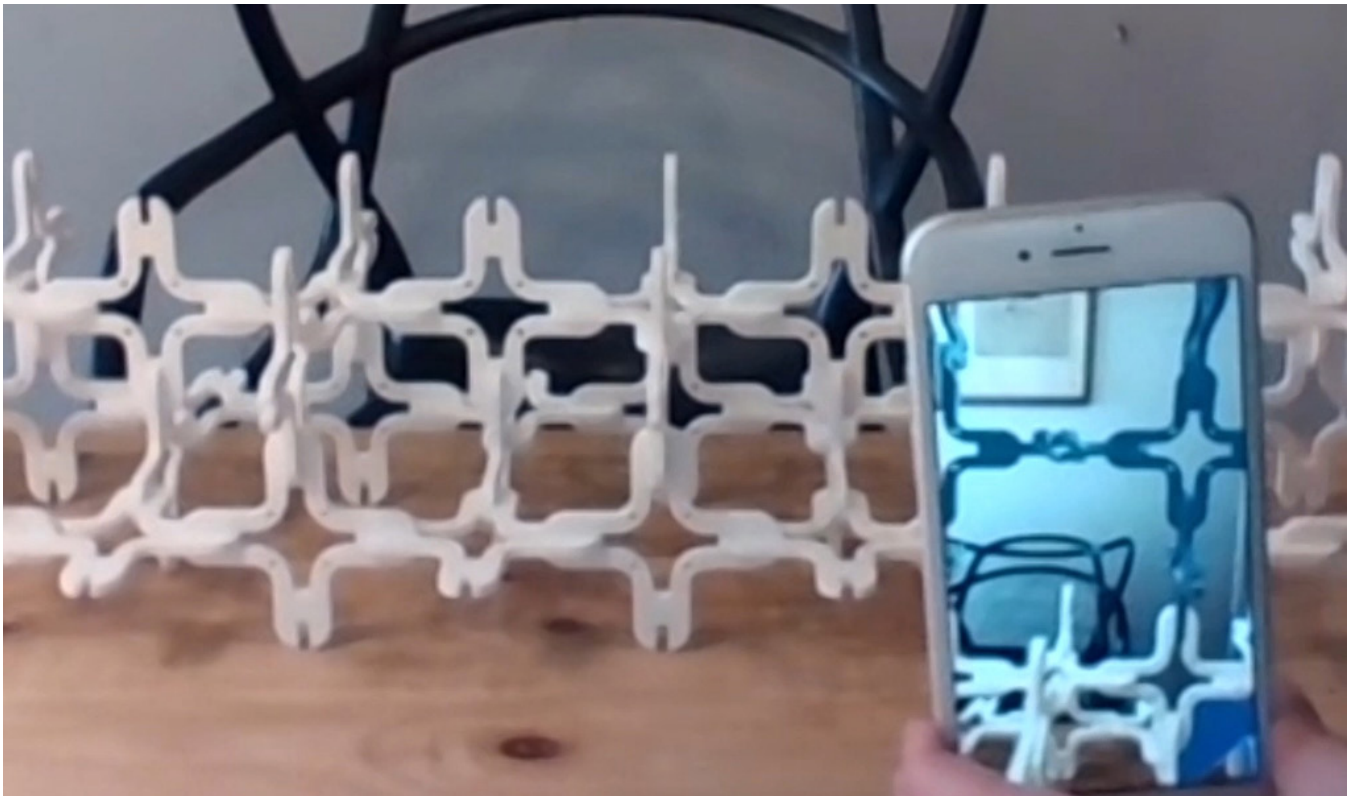


Figure 1. Unity Viuphoria Augmented Reality Model Completion. The Author with Yalai Peng.

abstraction in architecture lies in its third dimensionality at the outset, while the image or the second dimension has historically been a more economical device used as a bridge for edification. In his examination of the Technologies of the Fine Arts concerning ‘Optical Media’ author Friedrich Kittler summarizes Jaques Lacan’s account of the history of perspective as ‘simple act of economy. Instead of building the sacred void, it is much cheaper to paint it as a vanishing point.’<sup>3</sup> Kittler goes on to describe how during the Baroque period the act of projecting linear perspective over the three dimensionality of the architecture, became used as an integral part of the processes of edification, indoctrination, and propaganda of faith within the Jesuit Church “The same wave of innovation influenced both the interior architecture of churches and theaters...and because the theater was employed as a church for the propaganda of faith, the church conversely also became a theater...seized by this perspectivization of architecture.”<sup>4</sup> This theatricality of perspective was not alone in the baroque rococo transition, but re-appeared later again as technology of the spectacle in the nineteenth century.

At this time the proliferation of public devices such as the camera obscura, the catoptric cistula, and personal devices such as the stereoscope unleashed the ability for many to generate and control their own images as a means of class breakdown. In his book, *Techniques of the Observer*, Jonathan Crary draws attention to how this technology empowered social classes and group to overcome the “exclusiveness of signs’... Imitations,

copies, counterfeits, and techniques to produce them were all challenges to the aristocratic monopoly and control of signs.” The twentieth century certainly saw the manufacturing and production of much of its own image-based technology, inclusive of the xerox, and the film-based camera, though in many cases these were still in the realm of expensive gadgetry relegated to business and corporate use or the affluent acquisition. By contrast, the beginning of the twenty-first century saw a revival of the phenomena Crary observed in the nineteenth. Recently, we have witnessed the proliferation of access to high-resolution capture capability as incorporated into smart-phones available to all through incentive lease-based models of mobile phone providers. Through this new access we witness a new generation of users, who in some circumstances may not have had access to a computer or laptop workstation through their school or family but are introduced to computing and image making through the computer in their pocket. Despite this new access to image making computers, we have witnessed a very slow process of incorporation into Architectural Education. To this day most North American Architecture programs still maintain on their websites the pre-requisite of student acquisition of high-performance personal computers capable of running specified software towards the generation of abstract form.

#### **AUGMENTED MODELS + IMAGE OBJECTS**

Over the past ten years, simultaneous to the decrease in cost and increase in access to smart-phones several new long promised





Figure 2. Leonardo's Augmented World. Image drawn by the Author.

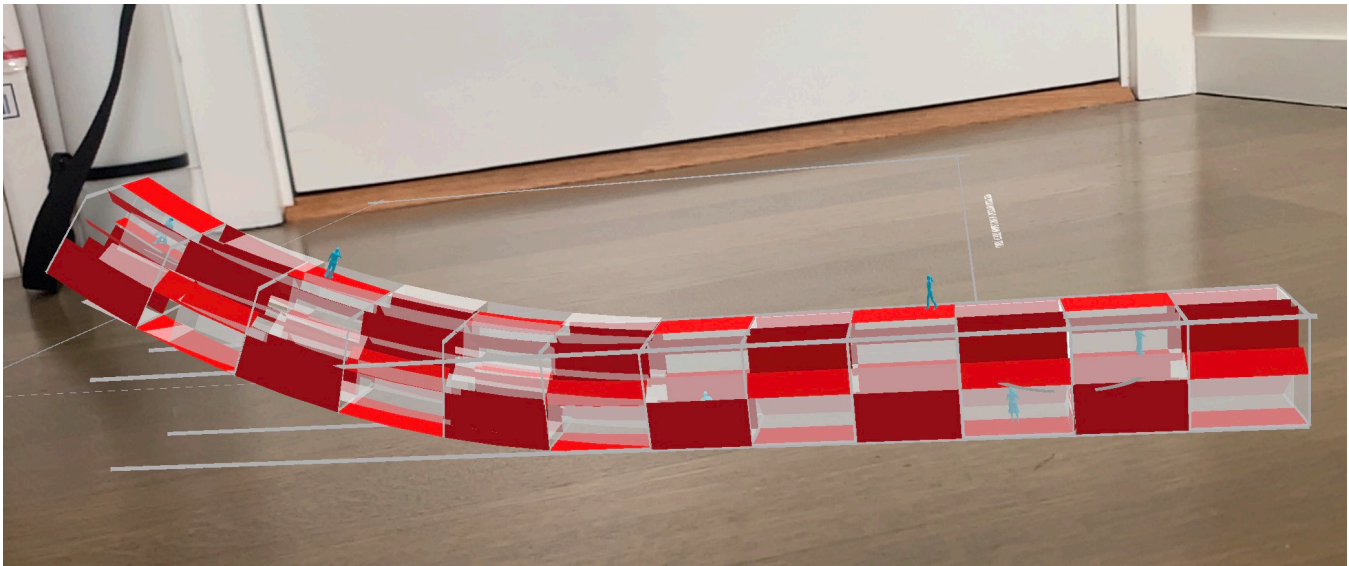


Figure 3. Amelie Maltz, Augmented Corridor Experienced in Space.

image - based technologies have gripped the entertainment and retail market that younger generations are familiar with. The fascination with expanded media inclusive of image has percolated into first year studios around the country. One program has asked students to examine 'Image-Objects' wherein computational image-mapping is brought into the abstraction process early to make objects replete with image as material that are situationally and optically attuned to their environment. While this and other techniques that align image techniques into early making process certainly create resonances with the cultural change of social media and screen culture, they fail to address the core critique of creating a bridge to populations that have no prior abstract formal and geometric background.

Augmented Reality, like its virtual-reality cousin, was long promised by the entertainment industry with limited early buy-in during the early ought's due to its high price tag. Only recently has augmented reality seemed to gain traction as popularized by youth games such as Pokémon Go as well as silly moustache and eyebrow filters for the purposes of image based social media. In its essence, AR allows young individuals to choose, design, and manipulate content as overlaid upon live images of the environment they are currently experiencing. Simultaneously other entertainment and market-based releases in the form of virtual furniture layouts and try before you buy virtual objects have familiarized the world that the phone can be a bridge between imagination and reality. Herein scanned images or virtual-twins, are elements that are scanned and composed into a scene rather than pieces which are purely imagined.

### A NEW PERSPECTIVE PEDAGOGY

This process for placement of composed scanned objects, as a technique of agency bears notable resonance with procedures that were existent in early renaissance drawing and the early

inceptions of perspective. The perspectival grid was deployed by artists as the spatial playing field for the arrangement of figures. This is readily observable in Leonardo da Vinci's initial sketches for his painting, 'Adoration of the Magi,' displayed in the Uffizi. Herein the artist first laid down a perspectival grid as a receding spatial device, upon which bodies and vegetation would be later deployed - almost as if grabbed by a 'transformation gizmo' or 'gumball' and moved around. Notably, the grid would be materialized in the architectural tile-work of the landscape and surrounding buildings as a reflexive sign of the spatial device and its operative vanishing point. Contemporarily, we might argue that Augmented Reality has effectively dissolved the perspectival grid into the image of our world allowing young designers to readily compose and think in spatial terms. The notable affinity of the false depth of architectural representation history, and its corollary in new technology become a means of structuring a window into both the past and the future as a bridge between physical and analog drawing procedures.

The pedagogy exposed students to analog, digital, and augmented versions of producing the image illusions of false depth, trompe l'oeil, and spatial collapse as a means of bridging the historical principles of architectural drawing into the new iterations of augmented reality technology. The first week allowed the students to familiarize themselves with drawing procedures, image production, scanning, digital modeling, and augmentation in the second dimension, while the second week repeated these techniques in the third. For the first week, the studio structured itself around discussions of a figural corridor as spatial architectural device, which could be designed, and manipulated by the students utilizing one-point perspective construction. Each student designed a figural corridor utilizing the Albertian method of constructing perspective, which were then inked, colored, and digitally scanned. Within the computer this drawing served as a



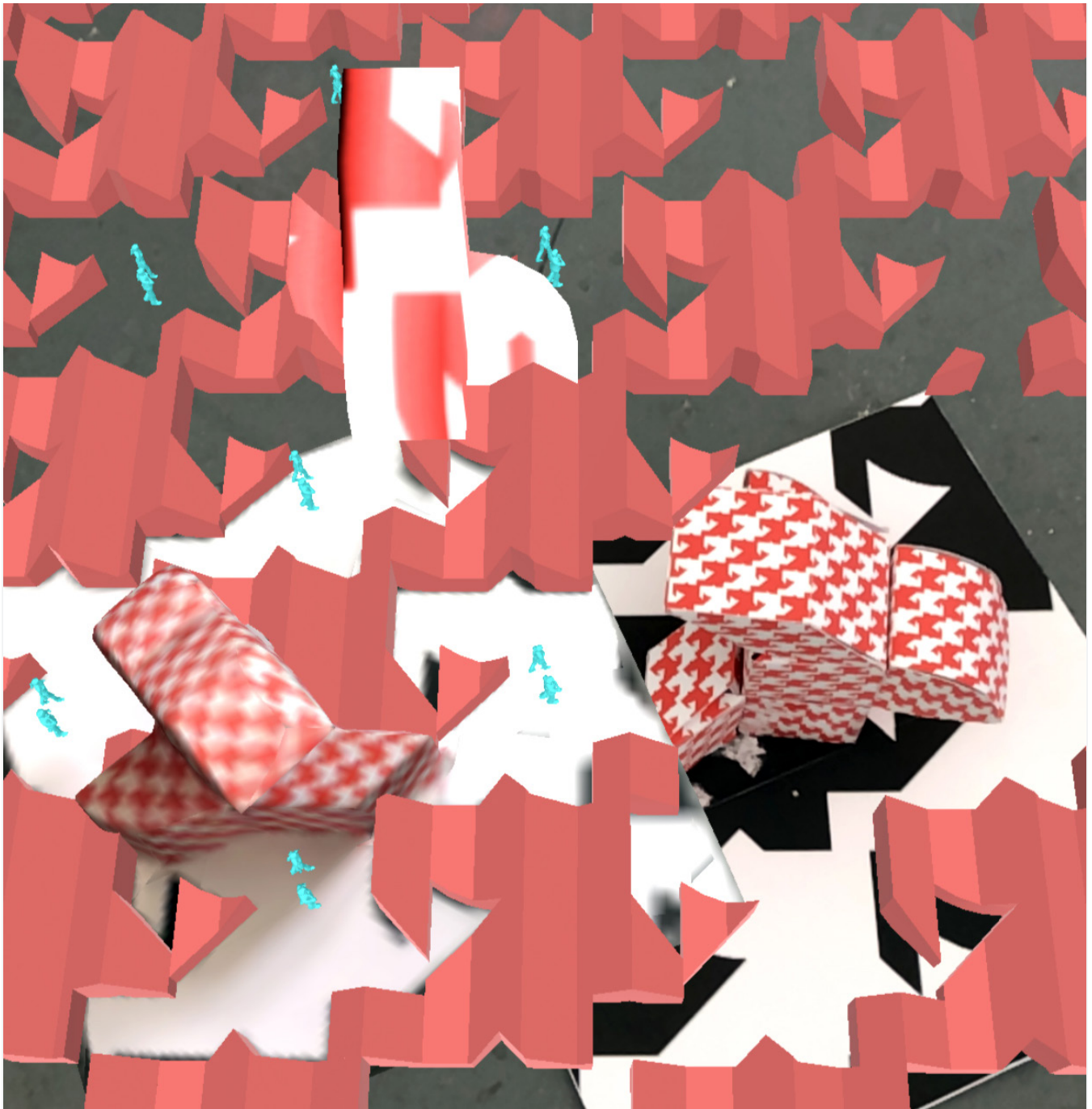


Figure 4. A cluster of Digital Twins, Amelie Maltz Urbanism Augmented Aerial Summer 2020.



Figure 5. Amelie Maltz, Augmented Corridor Experienced as Overlaid over initial perspective drawing which serves as the augmented trigger.

background upon which students could digitally spatialize their figural corridor in a digital model environment. Students began to investigate ways of altering the corridors form, populate with scale figures to inform a creative understanding of this linear world. The first week culminated in a review which allowed students to walk around and view each other's AR corridor environments wherein each hand-drawing served as a trigger that would utilize their phone to activate the augmented digital model of the corridor allowing for students to deploy these in their own personal realm.

The second week's exercise focused on the third dimensional application of image-scanning and augmented display surrounding a physical model environment. Students produced a third dimensional patterned proto-architectural object which was then scanned utilizing the student's personal smart phone camera to be deployed as photogrammetric object back into the computer. Within a digital modeling environment, students again altered their three-dimensional scanned image by adding new volumes and people as a means of exploring how this object sits amongst its contexts. The last day of the week allowed the students to deploy their new augmented digital creations amongst their physical models in augmented space and time, creating a palette of mixed realities, inclusive of the physical, the digitally scanned, and a third augmented object.

### CHALLENGES FOR AUGMENTATION

While this project demonstrates much possibility it was not deployed without its own challenges. The teaching technique was developed as a part of a fellowship in the author's Center for k-12 Education prior to the pandemic and first implemented during the early summer of the pandemic in 2020. One of the early findings and challenges was developing a skillset that was able to implement techniques across all platforms for both phone and computer. As a pedagogy the prefaces 'bring what you already know and have,' the investigator and research assistant, prioritized working with free-ware applications for both augmented reality and photogrammetry capture, to keep costs low for the student population outreach population. Given the inability to provide equipment, as the population was remote, some students were unable to complete portions of the photogrammetry and or the Augmentation. Another difficulty at the time, since-which has been remedied, was the software's requirement to have the phone tethered to the computer where the digital model resided rather than a cloud-based implementation strategy. This made it more difficult to explore the digital corridors in the student's space. Lastly, and perhaps most acutely, augmented reality as a technique which is experience on one's individual device, suffers the possibility of being experience collectively. This feature, which is somewhat lessened in person was of course compounded by the pandemic, which meant only being able to see digital twins after the act through individual uploads. Thankfully, many of these challenges are being address with the return to in-person teaching.

### CONCLUDING THOUGHTS

As the structure of the class was predicated on testing the ideas of augmentation in two different dimensions, second and third, the two-week intensive period made it difficult to provide time for students to reconsider designs once augmented. A critique, which one advanced student offered, that is very telling, was 'I wish I could redesign my corridor now that I see how the augmented pop-out interacts with the room.' This critique points attention to the idea, that augmentation like any other form of drawing provides a different window into how we see our projects, and thereby cannot be seen as purely a post representational tool but also be explored for its generative possibilities.

As a whole, the methodology employs the plasticity of the grid as a core part of it's education. The grid, similar to the ways it had been used as constructive scaffold throughout the history of western perspective, again becomes a mechanisms of grounding discussions through a multitude of mediums. The tracking of the grid allows the individual to find scale, and personal position whether it is in the cplaned twinned environment of the digital modeling space, the space of paper, or the space of the camera absorbing the augmented projected space in the rooms. The plasticity of the grid becomes the augmented ground upon which young individuals can figurally express and understand the abstractive capability of form through multiple media.

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### ENDNOTES

1. Tim Love. *Kit of Parts Conceptualism*, Harvard Design Magazine, Harvard University Press, Vol 13: 2003. 105.
2. Clement Greenberg, "Modernist Painting" Republished in the *New Art*, Ed. by Gregory Battcock, Dalton Paperback. New York. 1966: 102
3. Friedrich Kittler, *Optical Media*, Polity Press: 2010 59.
4. Ibid. 82.
5. Jonathan Crary, *Techniques of the Observer: on Vision and Modernity in the Nineteen Century*, MIT Press: 2012.12 - 13.
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