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Hyper-Realism and Loose-Reality

The limitations of digital realism and alternative principles in landscape design visualization

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Introduction: the digital realism revolution

At the end of the twentieth century, J. William Thompson (1998: 32) declared that digital landscape simulators had finally attained the technical capability to 'photograph the future'. If true, this capability fulfilled a long-held aspiration for a complete and truthful mechanism with which to visually communicate landscape design propositions. As Thompson noted, the ability to photo-realistically visualize the future embodies a disciplinary ideal that can be traced back to Humphry Repton's *Red Books* with their before-and-after foldouts that sought the seamless infusion of an existing scene with its projected improvement. Moreover, from a technical perspective, completely accurate landscape representation fits within virtual reality pioneer Ivan Sutherland's (1965) goal of an 'ultimate display' interface that is indistinguishable from the real world.

Today, substantial evidence exists in support of the visualization revolution prefigured by Sutherland and identified by Thompson. Firstly, sophisticated visualization software with the capacity for generating highly believable scenes is increasingly accessible to designers engaged in landscape visualization. This progress has been supported by a range of technical advancements that include specialist landscape rendering applications, advanced object libraries,

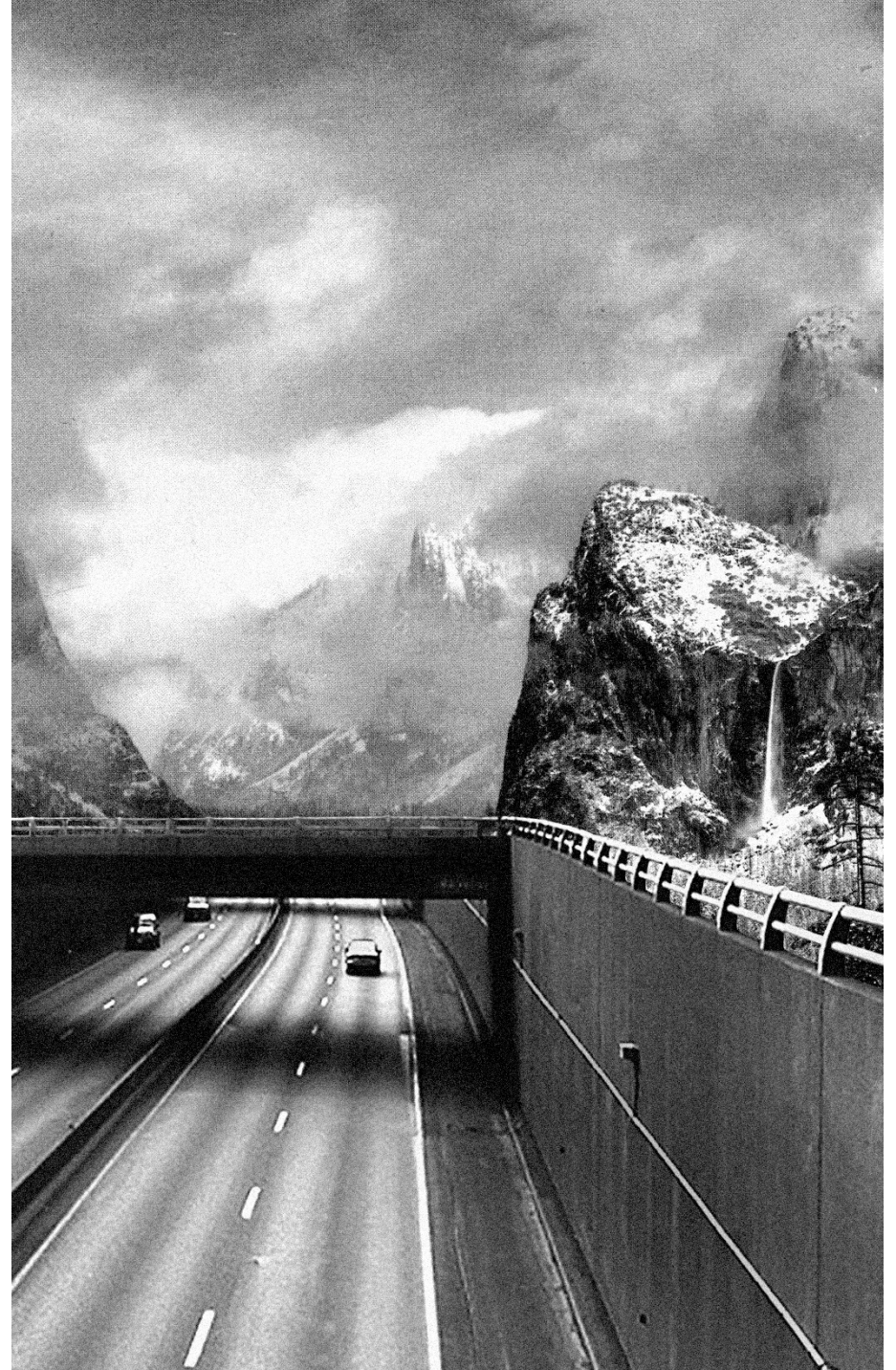


Image by Dani Winston, 2012

fractal geometry generators, improved integration between previously isolated software platforms, and more intuitive user-interfaces. Secondly, technologies and techniques developed and refined in fields as diverse as cinematic animation, urban simulation, visual impact assessment, and geographical information systems have converged and crossed over into the domain of landscape visualization. Together, these innovations appear to provide landscape visualization with a realistic and universally applicable one-stop rendering technique that is equivalent to the digital workflows already common in architecture and industrial design.

The results of these advancements are apparent across the full spectrum of design practice. In commercial landscape practice, digital realism represents a natural advancement on the analogue 'artist's impression' that often aspired to realism but was curtailed by the limitations of the medium (such as coloured pencil or Pantone markers) in the hands of all but the most skilled delineators. While this represents an apparently natural evolution in commercial practice, the incorporation of digital realism into more discursive praxis represents a more significant revolution in visualization style. This paradigm shift is illustrated by the overwhelming preference for realism in recent design visualizations that depict landscape and urban systems. By comparison, prior to the availability of realism through digital technology, speculative and discursive design projects tended to be more abstractly represented and often explicitly explored the visual obfuscations and semiotic slippages inherent in all representation.

Katie Kingery-Page and Howard Hahn (2012) associate ultra realistic landscape visualization with the kitsch. While once apparent, this correlation is increasingly difficult to distinguish, as realism in both discursive and commercial practice reflects the larger assimilation of design culture into society (Krupar and Al 2012). In this society of spectacle, design subcultures (including those of architecture and landscape architecture) are commodified and absorbed into the global branding of personal and national aspirations. This shift has arguably influenced the current paucity of digital theory when compared with

the more technically constrained pioneering era of digital visualization in the later twentieth century. [1] Stan Allen (1998: 243) presciently characterized this condition as the vacuous 'valorization of the new realism' that is inspired by cinematic special effects and increasingly transcends all types of design practice.

Alternative visualization techniques for landscape architecture

While notable examples of analogue-based realism are present in the history of landscape design visualization, digital techniques and technologies have delegated the possibility of attaining realism to every designer. In becoming the dominant design visualization paradigm, digital realism profoundly impacts the culture of landscape design communication. Despite the ascendance of this representation style, it is not certain that the ever-advancing techniques and technologies identified above actually deliver landscape visualizers the capability for true realism. Using the lenses of theory, practice and education, the article develops the argument that the limitations associated with realism are significant. Furthermore, notwithstanding improved user interfaces and software integration, the tendency towards complexity and sophistication of the digital workflows associated with realism drives a disjunction with everyday landscape architecture practice. Following these limitations, the article positions other visualization techniques that are typically already within the skill sets of many students and practitioners into an alternative representational rubric more suited to the non-linear realities of landscape visualization.

Methodologically, the research draws on analysis of visualization theories and practices, design competition visuals, and teaching practices. The author acknowledges that visualization labs and individual researchers across numerous fields are continually developing the cutting-edge of digital landscape visualization. The article complements this high-fidelity work by clarifying and reaffirming a low-fidelity visualization rubric useful in everyday practice and education.

Constraints: the limitations of hyper-realism

Within the specific context of landscape design visualization, digital realism is impacted by six key limitations that span perception, interpretation, technology, technique, education, and pedagogy.

1. Perception: contested foundations of direct realism

Realistic visualization is premised on the contested perceptual concept of 'direct realism'. By trusting the senses (primarily sight) to circumvent subjective interpretation and convey what exists directly to the viewer, direct realism assumes that the observation of a scene is simple, accurate and dense (see *Le Morvan 2004*). While this appears superficially apparent, our perception of the environment has been demonstrated to be extraordinarily complex, full of holes, and error prone (*Smallman and St John 2005*). Moreover, evidence indicates that we do not actually simulate realism when perceiving the world. Rather, we appear to simplify contrasting visual information into edges and relegate textural surfaces to secondary importance through a process termed 'sampling' (*Hochberg 2007*). This concept is supported in studies by the relative impact of degrees realism has in landscape design visualizations. David Barbarash (*2012*) established that visualizations exhibiting a medium level of realistic detail conveyed an impression that subjects found to be only marginally less complete than images with a high degree of realism detail.

To be certain, ecological psychology posits that the immersive web of interactions between a perceiver and their environment does foster a form of direct perception (see *Gibson 1986*). Nevertheless, landscape design visualizations are not integrated to these evolutionary interconnections between the perceiver and their environment. Design images are inherently isolated both in time (in the sense that the image pertains to something that does not yet exist) and in space (in the sense that the flat image is nearly always physically removed from its real three-dimensional site). When viewed in this insulated context, realism in landscape visualization is vulnerable to the critique of indirect realists who have articulated the richness of the abstract

world that lies beyond the confines of the senses (see *Schellenberg 2008*).

2. Interpretation: photo-realism, hyper-realism, and reality

In 3D Visualization, realism is generally defined as the ability to generate an image that is indistinguishable from a photograph (*Manovich 1995*). At its genesis, photography was championed as the truthful record of reality—a role that was reinforced through a century-and-half of exposure to images in news media. However, across this timeframe, the notion that 'the camera never lies' was also repeatedly exposed as a tenuous construct—as malleable to the points of view of the photographer, the subject, and the viewers as any other visual medium. In the digital age, the seamless manipulability of digital photographs further undermined the photograph's credibility as the truthful record of places and events in the real world. Interestingly, while the field of 3D Visualization uncritically seeks photographic likeness as its ultimate objective, photography continues to move in the opposite direction as a more malleable and diverse medium (*Morrison and Skjulstad 2010*).

As projections of a future, realistic design visualizations are more 'hyper-real' than photo real. Hyper-realism refers to an image that is presented as so accurate that it, in effect, becomes more real than the object of its representation, even though it does not yet (and may never) exist in reality (see *Baudrillard 1989*). By attempting to portray a scene with ultimate accuracy, hyper-realistic representation seeks to subjugate the interpretative relationship between the creator and the viewer. The images that result risk becoming closed and deterministic (*Richens 1997*). Certainly, hyper-realistic painters and photographers can maintain interpretive openness by exploring the fine line that separates the realism of the subject from the uncanniness of the representation (*Owen 2011*). The deferred reality of design visualizations unravels this relationship, whereby the subject of representation does not exist in the present and may or may not be realized in the future. Minus the existence of a real subject with which to authenticate the truth of the image, hyper-realistic visualizations

assume position of authority over the viewer that is primed for exploitation.

3. Technology: future deception

An image that claims to accurately represent a projection of a particular future in a particular setting is primed with the capacity to deceive an audience who has unwittingly suspended disbelief (*Mitchell 1992*). For example, it has been demonstrated that when examining realistic visual simulations, viewers still find it difficult to accurately assess significant variations to the scale of recognizable elements (*Lange 2001; Watzek and Ellsworth 1994*). While these variations may slip harmlessly past the viewer of an image, they risk serious implications, if and when they come to be actualized in the corporeal landscape (*Lange 2011; Balfour 2001*). Even where no deception is intended, the constructed design rarely approximates the image that was initially presented as its accurate simulation (*Rekittke and Paar 2009; Appleyard 1992*). In time, all manner of unforeseen contingencies add to the complex, messy, and dynamic real landscape, which exists both before and after it is designed or visualized (*Girot 1999*).

In addition to the depiction of physical elements, the future deception exerted by hyper-real visualizations extends to the period of time being represented. Certainly, almost all design visualizations involve a degree of idealized temporal conflation, whereby each element in the image is depicted in its most attractive, identifiable, or knowable moment in time. A typical image may represent trees at about twenty years in the future, wood with five years of light patina, hardscape, and furnishings as brand new, and fashion of both automobiles and people that dates back several years once a project reaches completion. In addition, an image may show the design being used to its fullest capacity through the inclusion of various uses that are unlikely to occur at the same time. The resulting spread of different timeframes combine to show the projected future in an idealized, but impossible light, while also providing samples of the familiar present through which the viewer can access the image. In a visualization that

does not aspire to hyper-realism, temporal variations in the image are likely to be either discernable through disjunctions between the layering of different elements, or sufficiently dissolved through abstraction. However, when these temporal disjunctions are seamlessly synthesized in a hyper-realistic visualization, the capacity for the viewer to imagine their future in the proposed landscape is diminished.

4. Technique: technical limitations

Despite on-going advancements in the realism capabilities and usability of digital visualization technologies, landscape remains a problematic subject to simulate due to its complex, expansive nature and dynamic lifecycle (*see Lange and Bishop 2005: 15*). This is despite the sense of anticipation prevalent in the late 1990s and early 2000s, where a range of technological advancements appeared to be ushering in a new era of truly representative digital visualization (*see Sawyer 1998; Lindhult 2002*). This period of optimism built on the advanced analogue and early digital simulation strategies explored and analyzed in the 1970s and 1980s in specialist facilities such as the Berkeley Simulation Lab (*see Appleyard 1977; Zube, Simcox and Law 1987*).

Nevertheless, the promise implied in this visualization and simulation genealogy has only been partially fulfilled. Today, while it is routine for even the most discerning viewer to be deceived by the hyper-reality of digitally generated imagery of industrial designs and architectural interiors (*see Guthrie and Bryant 2013*), the same deception rarely applies to equivalent landscape visualizations. In the real outdoor world, multifarious forms, unbounded sites, light, shadow, material, foliage, and atmosphere interact in intricate ways that continue to thwart even the most advanced examples of rendering software. Even the exceptional vegetal simulation capabilities of current landscape generating and rendering software such as *e-on Vue™* retain an uncanny likeness to the cinematic productions from which they are derived (*see Eggington 2012*). Given that we are conditioned to suspend disbelief only momentarily in the cinema, such an association

undermines the credibility of design visualizations intended for the real world.

5. Education: user skill-base limitations

While the progressive standardization and simplification of user interfaces continues to make hyper-real rendering software more widely accessible, in practice it remains the purview of advanced specialized users. This frequently conflicts with the generalist skill-base that predominates in the typically small-to-medium sized design practices that focus on landscape-oriented work (see *Lindhult 2008*). Visuals that attempt hyper-realism also tend to involve disproportionately large time investments, which can be problematic in terms of restricted timeframes, limited personnel, and efficient team workflows. Moreover, the process associated with hyper-realistic visualization is rarely dynamic and, consequently, tends to be undertaken at the very end of the concept design development to minimize redundancy (*Lange 2011; Rekitte and Paar 2008*). Often, this manifests as a deterministic digital hegemony that has a detrimental effect on the creative process.

The generations of design practitioners and educators whose careers transcend the analogue-to-digital transition have witnessed this digital ‘productivity paradox’ (*Landauer 1996: 73*). On the one hand, computing eventually brought measurable efficiencies to the documentation and organizational facets of practice and instruction. On the other, this has been more than offset by the increased proportion of time attributed to servicing the escalating graphic standards required to sustain a credible brand identity in a global marketplace that is saturated with ubiquitous imagery (*Tai 2003; Amoroso 2004*). These escalating standards are fuelled by the advanced visualization capacities of larger architecture firms that smaller landscape practices are often unable to match. In this sense, hyper-realism in landscape design visualization is both a cause and symptom of architecture’s increasing domination of the production and dissemination of visions for the cultural landscape.

6. Pedagogical limitations

Advanced hyper-real software comes laden with significant pedagogical hurdles. The disjunction between the specialization of advanced visualizers and generalist professional skills is also reflected in education practices. To stay within the limitations of orthodox degree structures and the demands of professional accreditation, landscape architecture programs necessarily represent a compromise across the wide spectrum of knowledge fields that underpin such a broad discipline (see *Miller 1997*). Consequently, design computing instruction in landscape architecture degrees is significantly less than the digital education of comparable architecture students (see *Girof et al 2010*). When combined with the common imperative within degree programs to make digital skills immediately applicable to parallel design studios, the compact window of opportunity for digital education necessarily limits the longer lead-time associated with becoming proficient in advanced techniques. As a result, most students—and by extension, professionals—do not become advanced visualizers and consequently must learn to use more basic to intermediate skills inventively.

Theory and precedents: persistence of the picturesque and alternative strategies

In addition to the theoretical, technical, and pedagogical limitations of hyper-real visualization, the difficulty in depicting landscape through digital realism is affected by the inherently resistive role of the landscape itself. As the most grounded of the arts, landscape architecture has traditionally been called upon to mitigate the impacts of the industrial world and the avant-garde of other design fields (*Corner 1999a*). Because of being positioned in resistance to modernity, a picturesque structure for delineating landscape has persisted from the late seventeenth-century (*Czerniak 2001; 1998*). By association, this resistive role of landscape has resulted in an enduring affinity with the traditions of analogue representational techniques (such as a drawing and collage) and a passive resistance to digital innovation.

From the late 1980s, landscape architects who sought to break with this tradition by re-identifying with the avant-garde drew heavily on the representational techniques of architecture, graphic design, and conceptual art. Designers clustered in California and the Netherlands were at the vanguard of efforts to displace the historically laden, analogue-based picturesque scene-view with alternative representational expressions of the denatured world. Nascent digital media had a prominent role facilitating these endeavours, including, for example, experiments with temporality, multiple viewpoints, and inclusivity of the viewer. Despite these on-going efforts, alternative representational visions have not made a significant impact in the digital era. On the contrary, digital output effectively increased market saturation of the static scenic view. This proliferation is curious given that the view is exposed to vision-power associations as critiqued by Michel Foucault (1997) and others (Evans 1995: 124; Sennett 1993: 156). Moreover, it has been argued that a view-centric design methodology smothers the other experiential senses and perpetuates the outmoded conception of landscape as a superficial scenographic veil (Corner 1999b).

Circumventing the view: critique and diagramming alternatives

Building on this critique while drawing on Deleuze and Guattari's (1987: 12–13) conception of mapping and tracing, James Corner (1999c) proposed that new kinds of creative mapping techniques were needed to move beyond such a limited and biased way of seeing, imagining, and designing the world. Attempts to actualize the type of representation that Corner advocated are manifest in the diagramming visuals that have been prevalent in recent design praxis. However, the diagrams that have emerged arguably contain obfuscations similar to the picturesque scenography they seek to displace. For instance, knowledge of a certain privileged visual language on the part of the viewer is often required to make useful interpretations; even with added temporal dimensions, it is doubtful that the map or diagram that is typically framed from overhead is any more inclusive than the perspectival view. On the contrary, Susan

Herrington (2006: 23) has argued that aerial images and diagrams still participate in the aesthetic norms of the picturesque. While many examples of contemporary design representations that attempt to push away from the picturesque have indeed 'eclipsed [its] stylistic and ideological trappings', Herrington contends that they 'nevertheless participate in its aesthetic'. Rather than interpreting this as a negative relic, Herrington views this rejuvenated picturesque mode as an integral and not contradictory component of contemporary design.

Re-exploring the view: examples of scene based conceptual/visualization processes

Building on Herrington's thesis, an alternative strategy to the diagramming trajectory involves embracing the view and its intimate association with the landscape by recalibrating and amplifying its effects. Two well-known design studios that have built a body of work around this method are Edinburgh firm Gross.Max and Berlin Büro Topotek 1. Whereas some practices have tended to produce perspectival views as an inconvenient necessity in order to be noticed in a world of ubiquitous media, these two practices appropriate the view as a legitimate mechanism for the design process. Noting that we are so habituated 'to the clichéd romantic image that we are no longer aware that [even] these images are 'faked'', Topotek 1 principal Martin Rein-Cano (2011: 9) exploits this semantic slippage in the representation of an artificial scene as generator for actual landscape proposals. Operating in similar territory, Gross.Max principal Eelco Hooftman defines this as the 'new picturesque'. For Hooftman, the image represents both a 'view' in the sense of depicting a scene and a 'point of view' in the sense of projecting a conceptual trajectory. Whereas the design processes for many designers begins with plans and diagrams and ends with highly realistic perspectives, Hooftman (2010) uses the view as a mechanism of exploration throughout the design process. In this way, the image is liberated from being an 'artistic impression or presentation' that paradoxically calcifies something that does not yet exist, and in its place becomes an 'expression and speculation' of an unfolding future.

The methodologies for creating points of view (rather than just views) that Rein-Cano and Hooftman undertake as part of their respective design processes draw heavily on analogue visual traditions that are extended into the digital arena through the application of hybrid collage, montage, wireframe, and rendering techniques. When viewed through this lens, landscape's residual affinity with both the analogue and the scene is reframed as a virtue rather than an archaic norm.

Key principles: towards loose-realism in digital landscape visualization

Given the limitations of hyper-realism in digital landscape design visualization, this section builds on the alternative precedents of view- and collage-based design processes to develop principles for digital visualization that reflect both the realities of practice and the messiness of the real landscape (*see Nassauer 1995*). The principles are underpinned by a visualization aesthetic characterized here as 'loose-realism'. As distinct from hyper-realism at the one extreme and abstraction at the other, loose realism implies a visual style that meets the objectives of most landscape design visualization to differentiate useful spatial, material, and atmospheric information about a design, while also maintaining a degree of openness for interpretation. In contrast to the complete but deceptive nature of hyper-realism, loose-realism implies an 'incomplete, but not false image' of the landscape (*adapted from Borges 1962: 29*).

1. The enduring value of the view as conceptual-visualization method

Notwithstanding the picturesque prejudices and power-associations that have been attributed to it, the view remains an indispensable element of landscape visualization. Nevertheless, more than other modes of landscape representation (for example, plan and section) the view has typically been heavily weighted towards finality, in the sense that perspective views usually form the last element in the visual production, well after the design concept and the other drawings are complete. The highly linear and time intensive nature of hyper-real rendering workflows further enforce the finality of the image, as does

the closed and complete representational intent of hyper-realism. As illustrated in the design methods of Gross.Max and Topotek 1, utilizing the view as an integral conceptual development method has value, both in terms of enriching the design process and of creating final visualizations that are more opened and inclusive. In summary, loose-realism digital methodologies for landscape visualization utilize the view as a fluid mechanism for concept development and design representation.

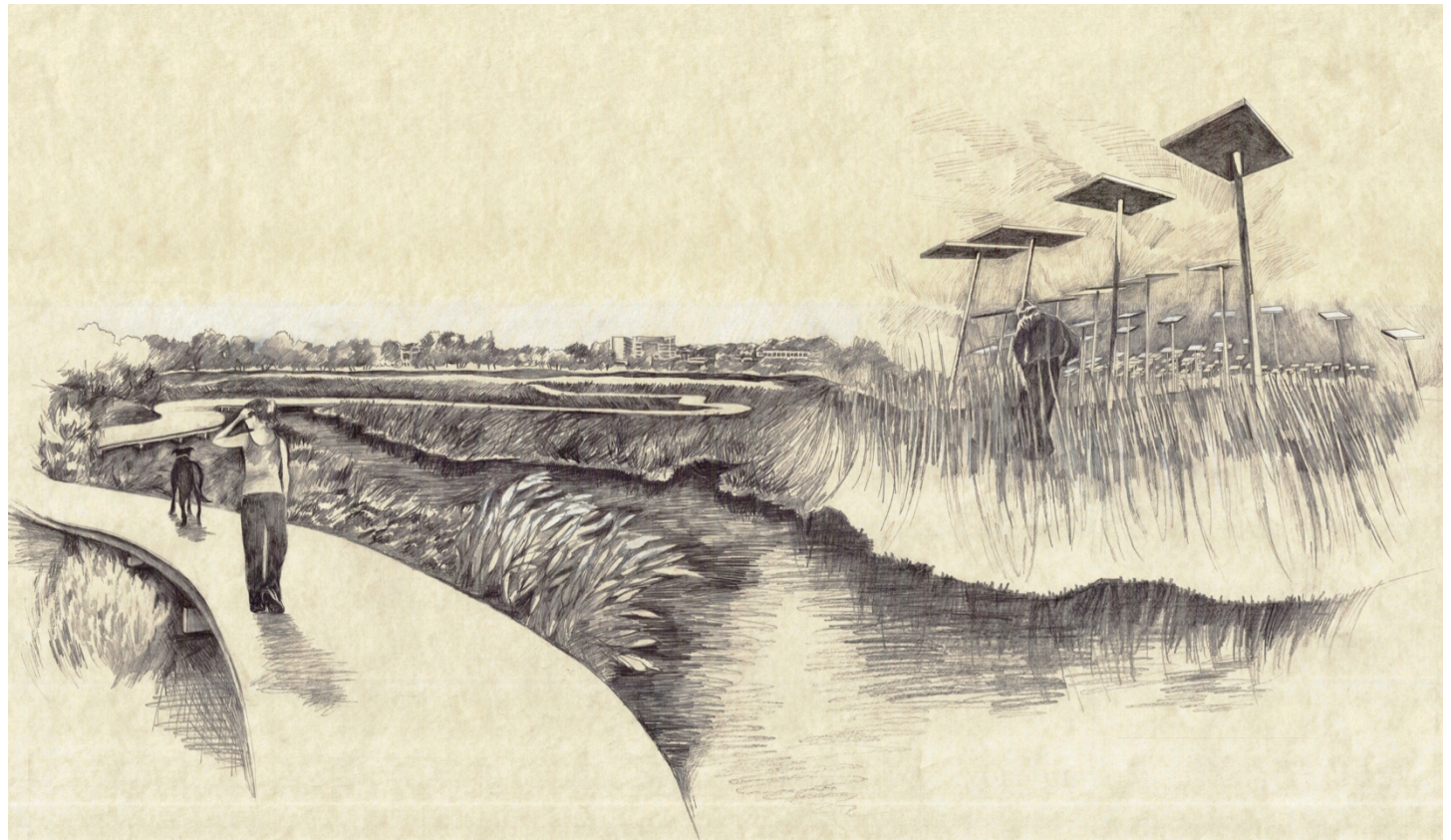
2. The residual value of the analogue

Prior to the development of the technologies that facilitate digital realism, the limitations of analogue and early digital techniques necessitated abstracted and hybridized approaches. In techniques that include sketching, collage, and wireframe perspectives, the inevitable gaps in the formation of a 'reality' require the viewer to participate in the completion of the meaning of the image. As Catherine Dee (2008: 62) noted, analogue techniques 'stimulate contingency and openness' through 'gaps in illusion to its simplified chroma', resulting in a 'tension from representing simultaneously what we do and do not see' (Fig. 1). By contrast, the exemplary but superficial qualities (clarity, sharpness, brightness, etc.) of hyper-real digital images discourage further consideration by making an 'unresolved idea look polished and complete' (*Grubbs 2008: 111*). The residual value of analogue methods in this context explains why many landscape architecture programs still offer courses in drawing the landscape, whereas architecture schools have overwhelmingly replaced instruction in analogue techniques with advanced digital techniques. [2] In summary, loose-realism digital methodologies for landscape visualization reflect the openness of analogue techniques.

3. The value of intermediate and incomplete digital technique

Aspiring to hyper-realism in landscape design visualization necessitates advanced techniques that are beyond many education programs and professional skill sets. Nevertheless, practical limitations to digital aptitude can be viewed as a benefit, in the sense that the inventiveness required to operate within a limited skill budget

Figure 1. Pencil representation of a landscape design proposal. The combination of multiple perspectives, white space and shading emotes both spatial and conceptual intent. Image by Julia Robinson, 2006.



presents opportunities for circumventing the shortcomings of hyper-real representation. In this regard, some of the more intriguing digital visuals that have emerged from design practice have involved more senior designers who self-taught basic-to-intermediate visualization techniques during their careers. In these instances, the process of trial-and-error and lack of knowledge regarding orthodox workflows leads the digital autodidact to establish unorthodox representational techniques that are also distinctive and evocative. Compromises that are necessitated by incomplete technique oblige the visualizer to adopt a point of view by establishing a hierarchy of information that is not dissimilar to analogue techniques. In summary, loose-realism digital methodologies for landscape visualization are potentially bolstered by the original and non-orthodox workflows that may arise from limited digital technique.

4. The value of maintaining control of digital media

Limited technique may imply relinquishing control over to the digital 'process' to a certain degree. While relinquishing some control through chance and permutation-based strategies has proven merit in the design process, it is more problematic as a digital representational methodology. In this realm, a lack of control leaves the visualizer vulnerable to being led by the formalistic or visual bias of a particular software application, which in turn leads to the creation of imagery that is readily attributable to its generative program and consequently, overtly prejudiced by it. As Tiffany Lin (2012: 63) observed in her interpretation of Suchman (1987), in the absence of a 'shared understanding' between 'designers and their digital tools', it is imperative to 'maintain control over computer programs'.

To be sure, any medium—whether digital or analogue—influences the terms of reference of a creative process undertaken with it. However, an overly determinate medium ‘restricts’ rather than ‘expands’ creative permutations in the manner that a ‘pressure sensitive’ medium such as a pencil does (*after Barron 2008*). While examples of restrictive media supporting creative adaptation do exist (for example, the pre-tuned accordion in music), this is less likely in the representation of the variable complexity of the landscape. In this regard, standard CAD, 3D modelling and image manipulation applications that were not originally developed for landscape visualization can be very restrictive. For landscape visualizers with limited technique, accessing the potential of these standard applications requires moving beyond the orthodox linear workflows of individual software applications. In summary, loose-realism digital methodologies for landscape visualization utilize hybridized, nonlinear workflows that rebalance the hand of the designer with the formalistic or visual will of particular software applications.

Rubric: low-tech digital visualization techniques for loose-realism

Building on the principles for loose-realism, the following section outlines a general rubric of loose-realism techniques that are used to frame introductory classes in landscape visualization at the University of California, Berkeley. The five categories were originally established by reverse-engineering contemporary landscape visualization in circulation in both the profession and academia, based on analysis of design concept imagery selected from two international design competition websites. [3] Although keyed out into discreet categories for pedagogical purposes, in practice the techniques often blur at the edges and hybridize with other methods.



Figure 2. Example of subject matter suitable for freeform-collage. The image comprises loosely collaged images from different sources and a superimposed hand sketched cross-section and notation. Image by Justine Holzman, 2012.

1. Freeform collage

This method involves appropriating images from varied sources, extracting fragments of these images from their original contexts and then recomposing the parts to create a new whole (Fig. 2). It is a literal translation from the analogue world, where collage in its modern incarnation has been a recognized artistic medium since the early twentieth century. ‘Freeform’ implies that the composition is created in a mostly visual manner, without the assistance of construction aids, such as a base image or perspectival wireframe. Accordingly, collage is most commonly used for creating imagery of a more conceptual, abstract, or atmospheric nature. Out of necessity, it is also employed in a more precise manner when little accurate or directly relevant source information is available. Such instances include a site that has not yet been constructed, will be highly modified, or is too remote to be accessed for imaging. Freeform-collage is particularly effective for scenes that are highly organic and for which the depth of field is

structured as a series of planes. Conversely, the interlinked perspectival structure associated with linear forms leading towards a vanishing point present a major constraint for free-form collage. This limitation notwithstanding, freeform-collage has the greatest margin for error; the viewer typically suspends disbelief regarding the accuracy of the subject, projection, and patina. Accordingly, it is the most intuitive of the methods for novice digital visualizers, regardless of illustrative aptitude in the analogue world.

2. Freeform montage

In contrast to the assemblage of multiple fragments that is associated with collage, the montage visualization method is typically used in situations where an existing photograph or drawing is available to act as the foundation for the composition. The technique involves modifying the base image by inserting new elements—either from external sources or sampled from the surface of the base image itself (Fig. 3). Importantly, these insertions are integrated with the perspectival structure of the base image. This feature distinguishes the method from visualizations that place the contextual landscape behind the design like a stage-set backdrop. The freeform-montage method also differs from more complex perspective-matching techniques as all modifications are undertaken by eye on the surface of the image without the assistance of 3D visual aids. Like collage, digital freeform montage is preceded in analogue, as illustrated by the drawing-photo renderings of Christo and the speculative images from Superstudio. In these examples, new information is synthesized into the base image, albeit in a manner that retains the distinction between the original and the imposed elements through the use of different media, or the sheer scale or audacity of the imposition.

Figure 3. Example of freeform-montage onto a base image. The power of the image results from close attention to matching the perspectival structure and lighting of the montaged element with the base. The photo-realism is offset by the impossibility of the real-world scale discrepancy between the elements.
Image by Dani Winston, 2012.



3. Wireframe collage

The wireframe collage visualization method involves utilizing basic 3D modelling techniques to construct a substructure for applying finished surfaces. The wireframe may comprise skeletal line work, a simple render, or a screen shot (Fig. 4). Other hybrid analogue variations for the base structure include using a scanned hand sketch, a photograph of a model, or even a two-dimensional plan photographed from an oblique angle. Wireframe methods provide greater perspectival accuracy to the overall structure of the image than freeform methods, while still permitting the rougher and more verdant patinas that are difficult to achieve through 3D rendering. In imaging scenarios that include orthogonal type elements and clear perspectival linkage between fore-, middle-, and background, the wireframe is an advantageous aid. However, this precision can also diminish certain images that benefit from the looseness of freeform, where perspective becomes a malleable constellation of associations rather than a

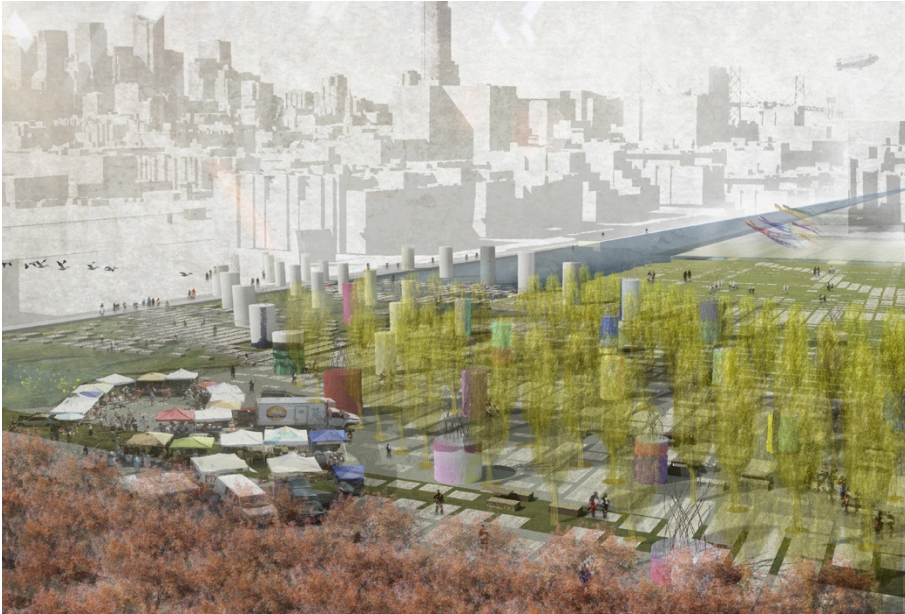


Figure 4. Example of wireframe-collage of an urban scene. A simple 3D model comprising the grid of paving slabs and cylinders generates the main structure of the image. The city skyline is generated from building LiDAR parsed into a separate 3D model. Trees and other elements are then collaged onto this framework. Image by Erik Jensen, 2013.

projected Euclidean truth. Other disadvantages include the additional time investment required to model the wireframe and the lack of flexibility to adjust a view once it has been set up and collaged.

4. Total-scene-render

This method involves creating a 3D model that is normally more detailed than that necessary for wireframe collage techniques and then utilizing rendering applications to apply the materiality and illumination to the final image. The total-scene-render is useful in situations where a higher degree of complexity, precision, or repetition is required than would be practical with wireframe or freeform techniques (Fig. 5). As per the collage techniques, but unlike the montage methods, total scene modelling is often employed



Figure 5. Example of a total-scene-render of a site whose context is unknown. The image is generated by a simple 3D model with scans of hand-linked textures bitmapped onto most surfaces. Image by the author, 2013.

where there is no available contextual imagery, or in instances where the site itself does not yet exist. There is a zone of overlap between the total-scene-render and wireframe collage techniques, where partial scene rendering is combined with a degree of post-render collage. A disadvantage of the total-scene-render method is the significant time investment usually required to accurately model and render the scene. However, once a model is set up, multiple scenes can be set and modified with modest investments of additional effort. The other limitation of total-scene-renders lies with the workflow that is shared with—and potentially leads to—hyper-realism. Alternatives to the hyper-real path include renders that simulate a physical model and the use of analogue originated textures in place of life-like materials.



Figure 6. Example of wireframe-montage of an infrastructural scaled landscape proposal. The image comprises a 3D model and CAD line work view-matched, rendered and then montaged into to an aerial image generated in Google Earth™. Image by Richard Crockett, 2012.

5. Wireframe montage

The wireframe montage is potentially the most complex of all the visualization methods as it involves matching and then fusing a 3D model view into an existing background scene. While ordinarily a photograph of an existing landscape, the background scene can also be a hand drawing or a photograph of a physical context model (Fig. 6). The wireframe montage is particularly useful where elements of a geometric nature are inserted into a contextual image with strong perspectival structure (for example, an oblique urban scene). The method is predicated on being able to match reference points between the image and 3D space, utilizing either an accurate 3D model of an element in the base image, a scalable plan, or key

dimensions of either a significant area or object within a photograph. Given the vagaries of lens distortion, the major disadvantage of this technique lies with the unreliability in accurately reverse engineering the perspectival construct of an image. However, once this is achieved and the perspective of a source photo is matched to the three-dimensional space of the model, any entities modelled into the virtual space are automatically sited within the perspective of the photograph. The montage process is then completed using either wireframe collage or total-scene-render techniques.

Conclusion: imaging/imagining the future

Throughout the history of technical innovation in creative media, new apparatus is explored in the first instance for its technological prowess. It is only later that creative exploration usurps the celebration of the technology itself, eventually resulting in its cultural assimilation. Both perspectival projection in the fifteenth century and photography in the nineteenth follow this pattern (*North 2005*). In the twentieth century, computer visualization followed a similar path, whereby engineers and scientists with access to rare, complex, and costly technology created the earliest computer-generated images (*Reas 2006*). It follows that over the past twenty years digital media has been absorbed into landscape design culture and so should no longer be viewed as principally a technical exercise. In reality, this is only partly actuated, with the resistive role of landscape architecture underpinning this lagging uptake. Moreover, it is further reinforced by the heavily procedural and linear nature of digital realism that thwarts creativity and solidifies outcomes that deceive the viewer.

In reaction, imaging critiques such as that levelled by Corner (*1999b*) (in which the view reinforces superficial scenography) have been interpreted to imply some type of digitally driven representational revolution. On the other hand, Marc Treib (*2008: ix*) has argued that digital media over-extends the distancing between the image-maker, viewer, and subject that was begun when photography displaced drawing as the principal mechanism for visual expression. While there is evidence in support of Treib's position beyond nostalgia for old-school techniques, not all digital methodologies are complicit. Moreover, while landscape design visualization would be impoverished as a 'dead art' if the pursuit of representational evolutions and revolutions were to be abandoned, the parallel repositioning of existing more elementary methodologies also retains relevance.

The loose-realism digital representational techniques that retain potentiality (and avoid determinacy) by requiring a point of view from both the author and the viewer potentially draw closer together the

author-subject-viewer diaspora that Treib highlighted. Opportunely, these methods are found in the every-day techniques familiar to designers with introductory to intermediate digital skills. These techniques are classified here as freeform collage, freeform montage, wireframe collage, total-scene-render, and wireframe montage. This rubric covers the wide range of digital visualization challenges that different landscape designs and contexts are likely to pose, and for which one-solution-fits-all hyper-real 3D techniques commonly used by other design disciplines are inadequate. That these methods almost all also have analogue precedents is a benefit since the analogue world is one where landscape design continues to draw existential strength. Moreover, the lessons of the analogue remain valid in the context of the on-going limitations with hyper-real visualization, both as an aspirational visual style and as a technologically challenged technique.

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Notes

1. Based on the temporal distribution of refereed papers on digital visualization in design journals as listed on the Avery design academic search engine, accessed 15 January 2014.
2. As sampled from the top 20 rankings in 'Design Intelligence', in *America's Best Architecture & Design Schools 2013*, <http://www.di.net/archschools/schools.html>, accessed 25 December 2013.
3. Categories derived from an analysis of design visualizations selected from two international design competition websites: www.wettbewerbe-aktuell.de, www.bustler.net/index.php/competitions/, sampled from the period 2006–2013, accessed 5 January 2014.

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