

Photorealistic Visualizations May Be Too Good

H. Eiteljorg, II

In past issues of the Newsletter, George Tressel and I have written about virtual reality and renderings. We have each discussed particular problems with the technology, and both of us mentioned how compelling computer visualizations can be. In my article ("[Virtual Reality and Rendering](#)," February, 1995, Vol. 7, no. 4), I indicated my concerns about the quality of the scholarship and the level of detail used in making renderings or virtual worlds. Mr. Tressel (in "[Visualizing the Ancient World](#)," November, 1996, Vol. IX, no. 3) wrote about the need to distinguish between real and hypothetical parts of a visualization, the need to differentiate materials, and the difficulties involved in creating the visualizations (some of which were included in the *Newsletter* in black-and-white and on the Web in color).

I am returning to this topic now, in part because the quality of the images available to us is improving so fast and in part because it seems now that neither Mr. Tressel nor I treated all the issues raised by the use of high-quality visualizations. The quality may be illustrated by new images of the older propylon that were created by Mr. Tressel (Figs. 1 - 3); these images are significantly more realistic than the earlier ones, but they do not represent the ultimate in quality, since they were created on a personal computer.



Figure 1 - General view of the entrance to the Acropolis. Appearance of Mycenaean Wall blocks was taken from photographs (an dexpanded to areas not photographed and/or not *in situ*, as were tones and textures of *in situ* portions of the entrance structure.



Figure 2 - Same view as in Fig. 1, but with the hypothetical portions designated by white construction lines and low-contrast, light tones. This is one way to distinguish between real and hypothetical portions of the entrance. False colors would be another.



Figure 3 - A general view of the entrance to the Acropolis, focusing on the *in situ* portion. Most of the Mycenaean wall shown here is restored, as are the extensions of the steps at the left and the facing of the Mycenaean wall in the background.

Mr. Tressel and I both wrote previously about how compelling the images can be, but we are now seeing images that seem to be photographs on a fairly regular basis. As the quality approaches and matches photorealism, visualizations will become harder and harder to treat as an artist's view of a particular time and place in the past. They will simply appear to be real photographs.

Many of us still retain Piet de Jong's images of Pylos, but we all understand that they are one artist's version of a particular time and place, based on the evidence at hand when the paintings were made. Will we be able to make that distinction when the images seem to be photographs, complete with shadows, convincing textures, even the flickering light of oil lamps in a video clip?

It may seem that scholars can be expected to resist the temptation to confuse image and reality. However, as one person who has worked with scholars on visualizations, Martin Emele (Staatliche Hochschule für Gestaltung, Karlsruhe), has said, "even scientists still fall for the magic of a near-perfect visualisation of images of the past, and are susceptible to the belief in the seeming infallibility of the objective computer." (Quotation from "The Assault of Computer-generated Worlds on the Rest of Time or Problems and Opportunities for Documentary Filmmaking in Virtual Reality," a paper presented at the Cinarchea conference dealing with archaeological film and video presentations in April of 1998.) So scholars too will find it harder and harder to maintain any scepticism about the accuracy of the images as those images get better and better. This is all the more true because of the misperception that the images are created by unbiased automata via a mechanical process that requires no human intervention.

So long as the images in question are fairly general views, the problem may not be too serious. However, the technology will permit us to move to very detailed views - with the same level of verisimilitude; sooner or later, we will be able to examine small details as well as general impressions. At that point, the potential for overwhelming our natural scepticism will, I suspect, have been fully realized.

If we are in danger of being overwhelmed by the power of computer visualizations, what are the specific dangers? Mr. Tressel and I have already written about the need to build accurate models and to distinguish clearly between the real and the hypothetical. I believe, though, that there are other issues of importance. In general, the other issues can be referred to collectively by pointing out the obvious - the distinctions between real and hypothetical are not simple but subtle, complex, and far-reaching. Is a block that is *in situ* but in a position required by secondary usage to be considered real or hypothetical? Are reconstructions of specific details that are virtually certain still hypothetical? How hypothetical is a restored Ionic capital on an *in situ* Ionic column, a capital with a required height and a known date of erection but one for which there are no physical remains? How do we decide on the lights and shadows to be added? What about the addition of landscape features: trees, shrubs, ground cover?

Another problem is the nature of the unstudied portion of a building or site. As Mr. Emele pointed out in his article, a partially known site cannot be reconstructed satisfactorily. If we show other structures, we know we are wrong. If we show nothing, we are avoiding certain error but providing a reconstruction that will be equally misleading by showing a void where there were structures.

Our reconstructions are also too clean and neat. The real world includes people, animals, plants, trash, signs of age and decay on structures, etc. Here again, we can only include some of these items and make mistakes or omit them and present an antiseptic world that is equally misleading.

Is it legitimate to present a compelling view of my reconstruction but not of a competing interpretation? This is a somewhat different issue, but it is nonetheless important, especially for those who are presenting their views to the general public. [\(1\)](#)

What can and should we do about these issues? We can be sure the technology will not wait while we decide, and we can be sure that our concerns will be ignored by the computer industry. This is our problem, not theirs.

First, we need some good studies of how such imagery impacts viewers. These studies will help us present

images that are real and compelling but that cannot overwhelm our judgment. That is, as we make various distinctions between the real and the hypothetical, we must be able to show those distinctions effectively without sacrificing visually compelling images. In the end, viewers should have both stunning images and the chance to understand that much of what they see is based upon common sense, *comparanda*, and arguments that cannot be proved.

Second, as we use the technology to make compelling images, we must also use it to add depth and complexity to our presentations of knowledge. Using current software to its full potential, we can present what we know and what we think in more complete and thorough ways so that viewers can understand the complexity of the archaeology and of the reconstruction process as well as the complexity of the physical world of the past. As computers give us the power to make these compelling visualizations, after all, they also give us the power to present many images and complex ideas so that our knowledge is more truly integrated - for the scholar and for the general public.

This needs some elaboration. We are accustomed to seeing views of the past that are more or less complete and internally consistent, with most of the doubts and problems swept out of the way. Of course, a good scholarly monograph will include the doubts and problems, but most presentations to non-specialists (and here I include even the professionals who do not happen to specialize in a particular area) will gloss over the problems and contradictions.

I believe we can no longer afford to present the past in such neat, simplistic ways; good visualizations make the presentations too real and dispel the viewer's sense of doubt. Fortunately, computers permit us to make our presentations more complex and more sophisticated without making those presentations harder to use. Both superb imagery and better, fuller information can be provided - and the users can decide when to access the one or the other. For instance, we can provide a series of views of a reconstruction, the first showing the *in situ* evidence, the next showing those additions that are most certain (along with the reasoning), the next adding less certain portions (again with the reasoning), the next adding surroundings (with discussion), then adding landscape elements and the like. At each step of the process there might be alternate choices for other scholars' views of the site or structure. Part of such a presentation should be a discussion of the process of making the images - choices of details, textures, colors, lighting, etc. - and part should be a frank discussion of how much is, in the end, unknowable. At all steps, the user would be able to decide what to see next.

These complex presentations of the past will require more time and effort on the part of the viewers, many of whom will not be bothered. They will only look at the visualizations and move on. I believe those viewers will be somewhat tainted by the experience, convinced by the imagery and missing the subtlety. For those who will take more time and spend more effort, I think we need to present a better, more full and accurate view of the past. If we only present a simplified and sanitized view of the past, especially one that seems real and is visually compelling, we will have failed those who want truly to understand, both as scholars and as users of the technology.

- H. Eiteljorg, II

For other *Newsletter* articles concerning the [use of electronic media](#) in the humanities or issues involved in using [CAD](#) in archaeology and architectural history, consult the Subject index.

[Next Article: The Lerna Database Again - Printing a Catalog](#)

[Table of Contents for the Fall, 1998 issue of the CSA Newsletter \(Vol. XI, no. 2\)](#)

 [Table of Contents for all CSA Newsletter issues on the Web](#)

[Return to CSA Home Page](#)

(1) Though a scholar should include discussion of evidence that may not fit his/her interpretation, I do not believe one scholar should be obliged to present the views of another when putting forward his/her own. That is not an appropriate burden to place on a scholar; nor would it be fair to the one whose views would be explained by a sceptic. On the other hand, I do think presentations by museums or similar third parties should include competing interpretations and discussions of the points at issue. [Return to text.](#)
