From Photography to 3D Models and Beyond:
Visualizations in Archaeology

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Donald H. Sanders

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Cover: Different visualizations of Temple B700, Jebel Barkal, Nubia (present-day Sudan). Left: engraving by Linant de Bellefonds, 1821, created with the aid of a camera lucida. Right: rendering from the virtual reality model by Learning Sites, Inc., 2006.

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Preface

My journey into virtual heritage was probably no more circuitous than most life trajectories. Its account, nevertheless, might serve well those who decide early on just how their life will unfold, only to find unexpected tangents and frustrating delays yield finally to a future unimagined, yet equally fulfilling. This introductory recounting is necessarily abbreviated, with many adventures omitted, but included here as it may provide insight into and context for the choices, points of view, and connections that comprise the bulk of this resource.

I recall it being in the 5th grade (but it may have easily been the 6th) when I first became aware of and interested in ancient history. It no doubt must have been the pyramids. To study archaeology, sift through 4000-year-old soil, and travel across foreign lands became imagined life pursuits (not yet full-fledged passions, other than one manifestation in a rather substantial hole in my family home's backyard). Still, during those formative years, it all seemed whimsically distant and unattainable. Years of education passed. At some point late in high school, results of the Kuder Preference Test strongly hinted that my career path would best be paved via the profession of architecture. Who was I to say otherwise. Off I embarked for a five-year stint in Cleveland studying architecture. Those were the turbulent, colorful, society-changing years of the late '60s and early '70s.

Radical changes were to affect me personally, as well. Time was spent (among other non-academic social activities) learning traditional skills and subjects, such as structural engineering, design, and drafting, along with a modicum of electives including symbolic logic, geology, and architectural history. The set of courses encompassing that last subject began with an archaeological exploration of early buildings; a first tantalizingly detailed glimpse into the ancient world. An old-school erudite teacher stood at the head of those classes, of which I took several throughout my undergraduate tenure. I do not recollect being exceptional, but I did pretty well grade-wise, expressing (during school and during private chats with the professor) not a little inclination toward Antiquity. Something in my questions or persistence (certainly not entirely in my GPA) led Prof. Henry S. Robinson, upon nearing my graduation with a Bachelor of Architecture degree, to ask if I might be interested in being his field architect in Greece, excavating the pre-Classical site of Ancient Corinth (Figure 1).

Seriously? I was dumbfounded; no, I was beyond elated. Who had leaked the contents of my crystal ball? Travel far away to an exotic land in the heart of the ancient world, participate as a staff member in an archaeological excavation, apply my newly honed architectural skills, AND get paid for it! Such a dramatic turn of events could not be ignored. It must be embraced, excitedly and with abandon, which it was. Not until my plane was descending into the Athens airport did it strike me that I didn't speak

Figure 1. View of the Temple of Apollo (6th century BCE), Ancient Corinth, Greece.
© 1972 Donald H. Sanders.

Greek (despite hours of page-turning through a handy little Berlitz language guide); I was traveling in a really foreign country alone for the first time; and I had no inkling about how an archaeological dig worked or what duties I was expected to perform. Mr. Robinson, as he was always called throughout our eventual nearly 20 years of professional and personal engagements, graciously provided me with instructions on how to travel from Athens to Corinth, the names of associates in Corinth, and a whole month during which I was to train before his fieldwork began.

Summertime in a small, quaint, off-the-beaten track town of Old Corinth wandering through 2500-year old ruins was perfectly glorious....for all of a few weeks. This narrative was to avoid distracting sidebars no matter how otherwise illustrative, but before Mr. Robinson could arrive, near the end of my initiation into the vagaries of fieldwork, the building in which I (along with several other excavators, students, and administrators) had been housed burned to the ground in the middle of the night (the great Corinth fire of 1972). Save for my glasses and pajamas, I lost *all* my belongings. Everything. Welcome to your first archaeological dig Mr. Sanders. And just like that, all physical connections to my old life vanished. I adapted to the precarious and tenuous nature of things, as well as life in an alien culture. Thereafter, the summers in Greece proceeded well. Although I continued to toil distractedly in architectural

firms during non-excavation months, my mind flitted elsewhere, tilting more and more toward favoring the dirt over the drafting table as the location of my vocational inclinations, despite Mr. Kuder's predictions.

In order to become a recognized archaeologist or, as in the case of my new focus, a professional field architect, one needed a doctorate proving one's worthiness to the discipline (classroom instruction passing along knowledge and insight to new generations is another of the discipline's unspoken requirements). Solitary architectural skills (drafting, surveying, envisioning the built environment in three dimensions) were deemed insufficient, if not somewhat insignificant. Seeking the expansion of my expertise led to additional fieldwork experience in the, even more exotic, deserts of Saudi Arabia, a brief graduate student stint and brush with anthropology at Harvard University, and eventually a PhD in archaeology with a minor in Gothic architectural history from Columbia University. The grand and somewhat intense seven-year New York City exposure to scholarship blended studies of multiperiod architectural history with archaeological theory and critical thinking, not to mention the machinations of departmental politics. Occasional teaching stints were interspersed (I discovered that too many students simply could not visualize the wonders of the ancient world when seeing only plan drawings and photographs of stone scatters; too many students disengaged when talk of grand civilizations seemed predicated on a few seemingly trivial stretches of walls in dusty trenches; my architectural training had led me to see the ruins of Antiquity a bit differently). Summers were again spent gallivanting across parts of Greece, continuing to work in Corinth, and researching for the opus that would grant me the necessary credentials to ply my trades assisting or directing excavations (Sanders 1985).

Ply as such I would not. A new and very different challenge presented itself. Another type of credential generally considered a valuable asset in the eyes of archaeological peers is the publication. I spent the better part of the next decade gathering, researching, and coordinating the work and papers of one of archaeology's truly inspiring and pioneering women (Sanders and Gill 2004). Eventual publication of Theresa Goell's excavations at the mountaintop sanctuary of Nemrud Dagi, Türkiye, provided another beneficial career twist (Figure 2; Sanders 1996). During that same period, moving into late '80s and the early '90s, hierarchical vocabularies and an innovation called online databases enveloped my work and leisure times. The Age of the Internet was creating as many new problems for information access as it was solving; as many obstacles as opportunities. Thesaurus construction to the rescue.

When not cubicularly-enclosed, work for the J. Paul Getty Trust's Art & Architecture Thesaurus (for a long time, I represented the 'architecture' part of the AAT equation, while also occasionally tossing in pertinent archaeological parlance) meant innumerable visits to diverse library stacks, participation in art-, museum-, information science-, and architecture-related conferences, and engagements

Figure 2. View across the East Terrace toward the colossal podium of the gods, Nemrud Dagi, Türkiye (1st century BCE). © 1985 Donald H. Sanders

in sometimes contentious editorial meetings sorting through 100s of years of terminological turmoil so that we could organize the English language to make the new digital activities of database search and retrieval yield meaningful results (AAT 1994; https://www.getty.edu/research/tools/vocabularies/aat/; viewed August 10, 2022). We were changing the world (or, at least, how the new computerized world communicated) one word at a time. However, minds are meant to wander and mine began to envision a new digital landscape lush with colorful digitally generated 3D models of ancient architecture. Could software and room-sized computing machines really create a realistic visualization of, say, a Corinthian column capital, I wondered? Software companies, the MIT Media Lab, and architectural firms using newly developed computer-aided drafting programs unanimously uttered a collective negative. Rats.

Distractedly meandering past display booth after display booth, on assignment for the AAT at an architectural conference, my lexicographic lethargy cracked upon spying colorful renderings of Egyptian-looking structures. William 'Bill' Riseman, Jr., had indeed succeeded (despite the naysayers) in combining customized powerful desktop computers, personally tweaked leading-edge Hollywood-movie graphics software, and his own programming code to build colorfully detailed, 3D digital

Figure 3. Left: Temple B700 pylon (7th century BCE), Jebel Barkal, Sudan.
Right: *Mastaba* 2110 of Nefer (4th Dynasty), western cemetery, Giza, Egypt.
Digital reconstructions and images © 1993 William Riseman, Jr.; used with permission.

models of archaeological remains (Figure 3; the bizarre thing was that back during those summers spent toiling in architectural firms, 25 years earlier, I had worked in William Riseman Sr.'s office !). Much conversation ensued; a budding partnership emerged. Converging revolutions in teaching methods, online research resources, computer graphics technologies, and desktop-based interactive visualization code could now put 3D digital re-creations of global heritage of any time and place at anyone's fingertips (even beamed directly into one's eyes for an immersive near-first-person experience of faraway worlds, faraway spaces, and faraway times). It seemed that I and the world had come a very long way from trying to grasp the meaning of the remnants of past civilizations via static, two-dimensional, black-and-white plans and photographs.

Ensuing tragedy in the sudden death of Bill Riseman (https://www.datacad.com/time_machine/1994/William_Riseman_Globe_Article.pdf; viewed April 3, 2023) plus triumph in the reconnection of programmers and curators spawned my founding of Learning Sites, Inc., in 1996, the oldest virtual heritage company in the world (http://www.learningsites.com; viewed August 10, 2022).

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