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26–29 de abril de 2017
Oaxaca, México
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La Conferencia se llevará a cabo toda en español. Las inscripciones estarán abiertas desde hoy hasta el 14 de Abril de 2017. Hay un número limitado de espacios para inscribirse. Los eventos especiales y la visita a zonas arqueológicas están incluidas en la inscripción, pero cada participante debe anotarse para los eventos al momento de su inscripción a la conferencia.

Si tiene usted dudas o necesita algún apoyo para inscribirse, favor de contactar a Tobi Brimsek en: tobi_brimsek@saa.org
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Incised pebble from the Pentlatch site, in Courtenay, British Columbia. More than 100 of these objects were recovered from the site during Simon Fraser University's archaeological field school in 2016. This project was undertaken in collaboration with K'ómoks First Nation. The Pentlatch site is an inland shell midden located at the junction of two rich salmon rivers on K'ómoks IR No2. The cultural deposits from which these incised pebbles were excavated date from about A.D. 600–800.

(Photograph by Robert Muir, permission of K'ómoks First Nation)
In 1984, I was a second-year MA student in public archaeology at the University of South Florida. A requirement for finishing my degree was completing an internship within a university, agency, or firm. This eventually took me to the Bureau of Land Management in Wyoming, where I spent about a year and a half conducting fieldwork, writing reports, and even for a short time taking on the job of acting district archaeologist. I learned a lot about what we called section 106 and 110 work in the federal system, and overall it was an incredibly valuable experience for a fledgling archaeologist. Good internships offer real-world learning opportunities that would otherwise be hard to obtain in the classroom. They may also be critical steps toward future employment. It certainly worked out that way for me.

The March issue of the SAA Archaeological Record offers a diverse range of contributions that includes a special section on graduate internships in CRM, organized and introduced by Diane Gifford-Gonzalez. Amy Gusick and Peter Robertshaw introduce the internship program developed for the MA in Applied Archaeology degree at California State University, San Bernardino. Byron Loosle describes the DHA-RAI Program within the Bureau of Land Management and the remarkable opportunities it brings for interns. Duane Peter considers the challenges and prospects of internships within the CRM industry. Finally, Paul Schackel reviews the internship program associated with the Master’s of Applied Anthropology program at the University of Maryland.

As promised in our November 2016 issue, we deliver Part 2 of our “Video Games in Archaeology” section. Erik Champion, Colleen Morgan, and Tara Copplestone consider a range of issues in game creation, archaeological interpretation, and public education. We also include two additional stand-alone articles in this issue. Crystal Dozier introduces the cognitive development literature from the field of education and considers its utility for teaching archaeology at the college level. She also reminds us to consider joining the Teaching Archaeology Interest Group (TAIG) and to attend the forum on teaching archaeology at the coming meeting in Vancouver. Carmody, Sherwood, and Hoagland draw from paleoethnobotanical research to consider valuable plant foods for a sustainable future.

Finally, we include our two regular columns, the volunteer profile (this time with Chelsea Blackmore) and thoughts from our SAA president, Diane Gifford-Gonzalez. Both offer important information and ideas within this currently challenging sociopolitical environment.
In January, SAA joined with the American Cultural Resources Association, American Anthropological Association, and Society for Historical Archaeology in the Leadership Council for the Coalition for American Heritage (CAH). Coordinated by the experienced lobbying firm Cultural Heritage Partners, CAH will be a united voice defending cultural heritage law and policies. See http://cqrcengage.com/coalition-foramericanheritage/home.

In February, SAA also engaged a lobbying firm with extensive experience in environmental and heritage protection, tasked specifically with developing new champions among Republican senators and representatives. We know that cultural heritage protection is not a strictly partisan issue; however, the narrow votes of Senate confirmation hearings convince us that investing in the broadest possible engagement with both sides of congressional aisles is the way forward. Any successes here naturally will facilitate CAH’s mission.

SAA’s first “Take Action” notices using the home page’s new letter-writing portal were distributed February 9, regarding S. 33, the “Improved National Monument Designation Process Act.” With 27 Republican cosponsors, the bill proposes altering the Antiquities Act to restrict a president’s ability to designate National Monuments on federal lands. It would require Congressional approval for presidential monument designations and consent of the state legislatures where proposed monuments are located. S. 33 is yet to leave committee, but we deemed this a good point to demonstrate strong opposition to an array of senators.

Our letter-writing software application allowed members and nonmembers to write to appropriate legislators in a few straightforward steps. Over 750 letters were submitted. Members praised its ease of use. The portal’s main page offers a description of the issue and an editable letter template from SAA leadership. No member data from SAA’s profiles is used, nor is entered data communicated to SAA. The portal also offers a legislation-tracking option and can identify newspapers near you for writing op-eds.

Nonmembers in our sister organizations, the Council of Affiliated Societies (CoAS) and Council of Councils, will receive Take Action alerts and can use the portal to write to legislators. Please note that SAA did not select the title/gender options this software offers, which are keyed to current congressional formats for responses. The limitations of these choices may cause discomfort among some members, for which we apologize.

The pace of budget hearings and legislation is now picking up. We will be discerning in sending out Action Alerts, but when we do, this is the main event, folks. If you do not like plans to alter heritage protection law or vitiate its implementation in agencies, make your voice heard.

I urge USA members to talk with local avocational archaeological societies about joining CoAS. For $35/yr, CoAS members receive a copy of the SAA Archaeological Record, the preliminary annual meeting program, tables of contents of publications, and, now, our monthly Government Affairs Updates. Most importantly in the present political climate, SAA can reach CoAS member societies with Take Action alerts, thereby mobilizing grassroots support for archaeology. If your state or regional professional organization is not yet on the Council of Councils, another distribution mode for alerts, encourage them to do so. See https://ecommerce.saa.org/saa/staticcontent/static-pages/adminDir/affiliates.cfm.

SAA is reestablishing the Government Affairs Network of State Representatives (GANSR) to monitor state legislation paralleling anticipated assaults in Washington. Our California GANSR already alerted us to one such bill targeting CEQA. The map...
shows we have GANSRs in 16 of 50 states. We need better coverage. E-mail david_lindsay@saa.org to volunteer.

On December 13, 2016, the SAA Board voted to support the American Association of University Professors’ 1940 Statement of Principles on Academic Freedom and Tenure, requesting AAUP add SAA to their list of endorsers. See https://www.aaup.org/report/1940-statement-principles-academic-freedom-and-tenure.

This is my final president’s column. It has been an honor to serve you, and a privilege to work with our dedicated Board of Directors and staff. Special thanks go to Tobi Brimsek for her advice over the last two years. Donn Grenda, Government Affairs Chair and SAA’s representative on CAH’s Leadership Council, has my deep gratitude for his generosity in stepping up to greater responsibilities and his good counsel. A few words about your incoming president: working closely with Susan Chandler on critical decisions over the last six months, I have come to deeply respect her wisdom, humanity, and determination. She has proved a politically astute analyst and constructive team player in developing strategy. In Susan Chandler, SAA will have a wise and steady leader in challenging times, and at her back will be a truly exceptional team working to support SAA’s mission and ethics.

**Note**

1. The Coalition for American Heritage, of which SAA is a member, has a feature for legislative call-ins on their home page.
When I was asked to do this volunteer profile, I was confused initially. I have never thought about my work with SAA or any other professional organization as volunteering, but instead a logical extension of the work I do and the commitment many of us have to the discipline. But recognizing this work is even more important in the current political climate. Volunteering, regardless of its form, has become increasingly vital as a form of political resistance and of solidarity building within and outside of our profession. The SAA mission statement states that we serve the public interest, and we do so by seeking the widest possible engagement with society in “advancing knowledge and enhancing awareness of the past.” We volunteer and engage with the public because we believe that history matters; that visibility of the everyday, of peoples and pasts marginalized and made invisible should be central to what we do. As cochair for the Queer Archaeology Interest Group (QAIG), my focus has been on the diversification of our discipline, not only in how we interpret the past but in the very goals and missions of the society. The establishment of QAIG in 2014 reflected not only a growing interest in queer theory but the need to create all-inclusive spaces for LGBTQI archaeologists, students, communities, and allies. And it is this focus that has shaped my volunteer work not only in QAIG but in the other ways I contribute—from task force membership to the sessions and papers I give. Volunteering and political resistance rooted in archaeology can come in many forms, both in and outside of SAA. Most recently, my own work has been in creating connections and disseminating information online in groups like Archaeologists for a Just Future on Facebook. Established by Barbara Voss prior to the election, the group is “dedicated to activism that fights against specific threats to cultural resources, diversity, and civil liberties,” and advocates for the “values of anthropological archaeology in the public sphere through direct engagement with current political developments.” Volunteering in these small ways, particularly around issues of equity, has expanded how I think about archaeology’s value beyond its traditional focus on cultural heritage and preservation.

The current administration is quickly dismantling the world around us. Many people are feeling fear and insecurities that they had not experienced previously. If our mission is to disseminate knowledge and “to expand understanding and appreciation of humanity’s past,” we are uniquely situated to effect change. Because our work encompasses a broad view of the past, we can actively counter narratives that deny climate change, that dispute indigenous autonomy, and naturalize racism, homophobia, and misogyny. We can use our work, pre- and postcontact, as a means for public engagement and to dismantle political discussions rooted in ahistorical notions of human behavior and morality. But in serving the public interest, how do we also serve our membership, both in protecting their rights as human beings and as professionals? What responsibilities do we and the SAA have to our colleagues, students, mentors, and friends? As we do this work both in and out of the profession, we need to be acutely aware of ourselves and our privilege(s). This shapes not only how we interact with descendant and stakeholder communities but with those people (our colleagues and students) who are directly affected by the increasingly hostile policies of the new administration.
Teaching Archaeology in Higher Education

Instruction at the college level is one of the major career paths for archaeologists. Today, all prospective archaeologists are trained in the classrooms, field schools, and laboratories within institutions of higher learning. Therefore, the responsibility to ensure that future archaeology pushes the boundaries of scientific inquiry, while respecting the humanity behind our study, lies with college instruction. Archaeological training in higher education has two major learning objectives: the development of complex critical thinking skills and the internalization of our discipline-specific knowledge. Archaeological theory, methodology, histories, and ethics are all examples of discipline-specific knowledge. Critical thinking can be understood as the development of the cognitive ability to weigh information from disparate and contradictory sources in a rational, independent manner. The internalization of knowledge is predicated on this ability to distinguish between sources of knowledge, so cognitive complexity lies at the heart of archaeological instructional goals.

The development of cognitive complexity in students seems a daunting task. I argue that an understanding of student cognitive development theory can assist instructors of archaeology to choose pedagogical tools and tasks to maximize cognitive development. In order to do so, I first outline the academic understanding of cognitive complexity, primarily using the reflective judgment model of King and Kitchener (1994). I then demonstrate how this student development theory directly applies to teaching practice by emphasizing the essential role of cognitive dissonance. I argue that active learning practices and an engaged pedagogy help engross students in order to better achieve those goals of cognitive conflict and growth, and I focus on three pedagogical tools that are aligned with the implications of the reflective judgment model. All three are supplemented with examples from the SAA Curriculum Committee’s free online teaching resources repository, containing tried and tested syllabi and classroom activities (http://www.saa.org/Aboutthe-Society/EducationandOutreach/CurriculumCommitteeResources/tabid/1523/Default.aspx). In conclusion, I find that these practices are easy to embed into the archaeological classroom with forethought and reflection.

Student Cognitive Development in Higher Education

Cognitive complexity within education literature grapples with the increasing complexity in thought from childhood into adulthood. The concept of cognitive development originated with Piaget (1950), which soon propagated an entire field dedicated to understanding student development. Student development theory in higher education was established a little later, with Perry’s (1968) study of male students at Harvard; later theories draw heavily from these two resources by characterizing cognitive development in terms of stages, moving from simple acceptance of authority to critical, contextual evaluation of information. Most modern cognitive development theories follow such a trajectory while incorporating more diverse study populations (Love and Guthrie 1999).

For the purposes here, King and Kitchener’s (1994) reflective judgment model provides a useful lens for situating the discussion of cognitive complexity, as their focu was the consideration of ill-structured problems. Ill-structured problems are open-ended and have no single correct answer; classic examples include poverty, pollution, or overpopulation, and most questions of archaeological importance can be considered ill-structured (e.g.,
the development of state societies, the adoption/invention of new technologies, the interpretation of changes in material culture, etc.).

In King and Kitchener’s model, students move through stages of different strategies for attacking ill-structured questions. They label these stages broadly as pre-reflective thinking, quasi-reflective thinking, and reflective thinking. Pre-reflective thinkers prefer structured questions and may not recognize that multiple answers are possible. Quasi-reflective thinkers can recognize that multiple perspectives can exist but struggle with supporting their conclusions with properly justified data. Reflective thinkers understand the constructive nature of knowledge and use context, data, and reevaluation to attack ill-structured problems. Students may show differing levels of understanding and complexity depending on the context of the problem at hand, and may show different levels of cognition at the same time. King and Kitchener make a distinction between reflective thinking as a mode of increasing complexity in thought and critical thinking that would be indicative of the optimal type of reflective thinking in the final stages (Torres 2011:11). Cognitive dissonance, the internal conflict between preconception and experience, is essential to reassessing the epistemological assumptions underlying students’ thought processes, thus pushing the advance of cognitive complexity.

While King and Kitchener’s model is imperfect—although robust in sample size and including traditional and non-students, their study only sampled white midwesterners with high academic aptitude scores—their theories provide useful applications to higher education classrooms. Indeed, reflective practice has been one of the few “deep learning” approaches to learning that has been positively linked to improving students’ critical thinking scores (Laird et al. 2014).

Applying Student Cognitive Development to Teaching Practice

King and Kitchener’s reflective judgment model (1994) provides several suggestions for promoting students’ cognitive complexity in higher education. These suggestions are designed to challenge and support students with ill-structured problems at whichever level they are at (see Wolcott and Lynch 2000). Students understand multiple perspectives through the creation of cognitive dissonance, critical to the development of cognitive complexity. Growing consensus is coalescing around the idea that traditional lecture formats do not engage students fully enough for dissonance to be internalized (Ambrose et al. 2010; Fink 2013; Weimer 2013). Rather, an engaged pedagogy recognizes that active learning activities within and outside the classroom are critical for students to fully engage with ill-structured problems (Freeman et al. 2014). In fact, the incorporation of active learning techniques has been identified as one of the seven principles of teaching archaeology promoted by the Society for American Archaeology’s Curriculum Committee (Kamp 2014; Wholey and Nash 2014).

In 2015, the SAA Curriculum Committee set a goal to create an open space to share educational tools based in active learning and tried and tested by instructors in the classroom. This goal materialized in an online repository for archaeological activities and syllabi (http://www.saa.org/AbouttheSociety/EducationandOutreach/CurriculumCommitteeResources/tabid/1523/Default.aspx), with materials submitted by instructors, vetted by the Curriculum Committee, and available to all (McCurdy and Gonlin 2016). In this section I outline several evidence-based pedagogical tools (reflective formats, ill-structured questions, and role-playing activities) for actively engaging students consistent with the implications of cognitive development theory (King and Kitchener 1994), supplemented with examples of activities from the SAA repository that meet these goals. All specific activities referenced can be found in the online repository mentioned above.

Reflective Formats

The use of reflective assessments is perhaps the most direct application of the reflective judgment model. Reflective assessments can be given in a multitude of formats and in many different teaching arenas (Ambrose et al. 2010). They can be deployed as in-class activities (one-minute papers, class journals, discussion posts), within formal assignments (as central or ancillary to activity, within exams), or as separate assignments (journals, portfolios). Such reflective practice does not necessarily need to be written as prose but can take other forms such as information mapping (Toth et al. 2002). Portfolios are gaining prominence in other academic fields, such as engineering, as a comprehensive and reflective mode of assessing student progress (Wade and Yarbrough 1996). A good example from archaeology of an activity that incorporates reflective questions can be seen in the “Applying Excavation Strategies to Case Studies” activity in the SAA Curriculum Committee’s
online resources repository. In this activity, students are asked to determine excavation strategies for a variety of case studies, justifying and reflecting on why they chose the specific methods for their example.

Ill-Structured Problems

Ill-structured problems make up the bulk of archaeological study; understanding the actions, motives, and implications of the past from a material record requires cognitive complexity and critical thinking to assess which interpretative lens is most appropriate to analyze archaeological materials. As such, incorporating ill-structured questions into the archaeology classroom is not difficult; however, assessments incorporating ill-structured questions are not easy to develop in a multiple-choice format. To develop students’ abilities to cope with such questions, students can be asked to directly wrestle with complex problems. Instructional literature presents ill-structured questions as collaborative learning opportunities that are focused on problem-based learning (e.g., Gallagher et al. 1995). Assessments or activities that directly address ill-structured problems can work within or outside the classroom; a good example from archaeology that incorporates an ill-structured problem (how typologies can/should be created) can be seen in the “Store Typology” activity. In this activity students are asked to create their own typology based on artifacts of their choice at a local store. The challenges and advantages of typologies (their own kind of open-ended problem) are thus explored by students.

Role-Playing Activities

Role-playing activities force students to adopt perspectives that may be beyond their own experience and their own understanding of the world. This type of exercise helps expose students to the constructionist nature of knowledge—one of the critical steps in advancing reflective learning (King and Kitchener 1994). Role-playing activities can be employed within the classroom or as take-home assessments either to be done independently or within a group setting; examples can range from in-class debates, take-home writing exercises, or even performance (for anthropological examples, see Higgins 2001; Pedelty 2001). Role-playing easily incorporates aspects of ill-structured questions in a reflective format, thus capitalizing on cognitive gains. A good example from archaeology that highlights role-playing as a central aspect of the activity is the “Stakeholder Meeting Simulation.” In this activity students debate the archaeological, ecological, and economic ramifications of a potential fracking project; students adopt the perspectives of different stakeholders and develop arguments consistent with their assigned stakeholder group. This activity helps internalize the important role that stakeholders and diverse groups have in archaeology (Stone 2014).

Implications for Improving Instruction

As instructors of archaeology in higher education are responsible for the training of the next generations of archaeologists, it is crucial that instructors remain cognizant of the theoretical and pedagogical advancements in educational literature. Cognitive development literature can provide insight into choosing appropriate pedagogical tools for diverse classroom needs. These advancements, as highlighted in the suggestions above, are already employed in archaeological classrooms with great success. Resources such as the SAA Curriculum Committee repository can provide instructors with examples of active learning activities to employ within their own classrooms and laboratories (McCurdy and Gonlin 2016). While formal study of archaeological classrooms in higher education is wanting, the discipline can glean from the numerous advancements in educational practice to support students of archaeology.

For more information or resources for teaching archaeology, I encourage everyone to check out the SAA Curriculum Committee’s online repositories, consider contributing to these resources, and join the SAA Teaching Archaeology Interest Group (TAIG). Both the Curriculum Committee and TAIG will also be presenting a variety of activities in an interactive forum, “Hands-On Teaching: Archaeological Activities to Engage Students and Enliven Classrooms,” at the SAA Annual Meeting on Saturday, April 1, from 2:00 to 4:00 p.m. We hope to see you there!

References Cited


Among the many global environmental crises we face, one of the most certain is food production. The global food crisis has the potential to “explode within weeks and kill within days” (Cribb 2010:8). There are numerous examples in archaeology of how practices from the past can inform our future. Currently, the Sewanee Native Cultigen Project involves the reintroduction of a suite of wild plants indigenous to eastern North America that sustained hunter-gatherer groups before being domesticated or heavily cultivated between 5,000 and 3,400 years ago (Price 2009:6427; Smith and Yarnell 2009:6561) (Figure 1). These plants included amaranth (*Amaranthus retroflexus*), knotweed (*Polygonum erectum*), little barley (*Hordeum pusillum*), maygrass (*Phalaris caroliniana*), goosefoot (*Chenopodium berlandieri*), pepo gourds (*Cucurbita pepo*), sumpweed (*Iva annua*), and sunflower (*Helianthus annuus*). Today, most of these are largely considered tenacious weeds that we eradicate regularly.

Though important for thousands of years, these native cultigens were largely forgotten with the adoption of maize agriculture ca. 1,000 years ago. By the early 1800s, as the global population reached one billion (McClung 2014:699), economically important monocrops like rice, wheat, and corn were necessary to meet global food demand. Intensification of globally important monocrops provided the necessary means to feed growing global populations. Remarkable achievements over the past half century in technology and crop sciences (e.g., irrigation, fertilizers, pesticides, and farm equipment), beginning with the Green Revolution, has allowed for food production to keep pace with a human population that has more than doubled in size, from three to seven billion. During this time, global food output has increased by 178 percent and crop yields by 143 percent, while only expanding the total area of land under production by 11 percent (Pretty 2008:447; Pretty and Bharucha 2014:1573; Tilman 1999:5995). Today, while modern agricultural practices successfully produce more than enough calories to feed every person on the planet, the disastrous effects that they have had on the environment and human health have many people searching for more sustainable ways to produce food.

**The State of Modern Agriculture**

**Health**

The successes of modern agriculture have allowed food production to outpace population growth. However, this increase has not provided food security for all. While we produce 25 percent more food per person today than in the 1960s, one billion people remain chronically underfed (Lundqvist et al. 2008; Pretty 2008:447; Pretty and Bharucha 2014:1573). Malnutrition kills nine million people annually and is responsible for almost half of the deaths in children under the age of five, or 3.1 million deaths annually (World Health Organization [WHO] 2015). While the aim of many global food initiatives has been the production of calories, questions remain about the nutritional value of the many monocrops that are mass produced today. Two billion people suffer annually from micronutrient deficiencies (McClung 2014:699; Pretty 2008:448). Micronutrient malnutrition, specifically vitamin A and iron deficiencies, most greatly affect the health of women and children in developing countries (United Nations Food and Agriculture Organization [UNFAO] 2012). In stark contrast to those who suffer from the effects of malnutrition, one billion people are overfed. A transition toward a calorie-rich diet in the developed world has resulted in an...
increase in obesity, type II diabetes, and hypertension, all of which have emerged as serious threats to global health. Today, most of the world’s population live in countries where more people die annually from being overweight and obese than from malnutrition (WHO 2015).

Land
The effects of modern agricultural practices have been equally as disastrous for the health of the planet, if not worse. Currently, more land is under production than is under forest canopies. Thirty-eight percent of all global ice-free land is under agricultural production, either being used as cropland or for livestock grazing, representing the largest use of land on the planet, affecting between 80 and 90 percent of all habitable land (Balmford et al. 2012:2714; Sanderson et al. 2002:891). Research has shown that our food system releases somewhere between 9,800 and 16,900 megatons of carbon dioxide into the atmosphere. Additionally, the release of nitrogen and phosphorous from heavily managed fields pollute and contaminate freshwater, estuarine, and marine ecosystems. It is estimated that as much as 80 percent of all nitrogen applied to farmlands finds its way into the water supply (Pretty 2008:449).

Soil
Modern agricultural practices are considered to be the leading cause of global soil erosion and degradation. Today, one-third of all global lands are classified as marginal, meaning they are losing productivity, yet they support over 50 percent of the world’s population (Glover and Reganold 2010:41). This degradation is being driven by farming, forestry, and grazing and has resulted in the release of approximately 1.1 billion tons of carbon into the atmosphere, not only affecting soil fertility but also driving climate change.

Water
Water drives the production of every calorie that humans consume, making it inarguably critical to agricultural success. Since the 1950s global demand for water has tripled while supplies have diminished, leaving close to half a million people living...
in countries classified as water-stressed or water-scarce (Gleick 2003:1525). Irrigation agriculture uses 70 percent of all global freshwater resources and is responsible for 40 percent of all agricultural output (Balmford et al. 2012:2714; Rosegrant et al. 2002:1; Rosegrant and Cline 2003:1917), leaving only 30 percent for use in private homes and for energy production (Cribb 2010:31). Many see this balance as a major hurdle to sustainable agriculture in the future. Each calorie that we eat requires one liter of water to produce. People in more affluent countries consume approximately 792 gallons of water a day, 327,000 gallons annually (Cribb 2010:32). Depletion, pollution, and contamination of the world’s freshwater supplies lead many to suggest that water and not land poses a much greater threat to food security in the future.

Biodiversity

The greatest threat to the conservation of global biodiversity is agriculture. The expansion of monocrop agriculture has resulted in the largest replacement of the planet’s natural ecosystems (Balmford et al. 2012:2714). Global biodiversity has also been adversely affected by poor management practices and through the use of pesticides and agrochemicals that harm natural diversity, including pollinator insects, bird populations, and soil fertility. Biodiversity is also adversely affected by population. One billion people today live within the world’s 25 biodiversity hotspots, areas described as the most threatened species-rich areas of the planet (Myers et al. 2000:855).

This loss of biodiversity has resulted in the homogenization of the world’s ecosystem, as well as our food supply. Over 7,000 wild plant food resources have been used as food over the course of human (pre)history (Bharucha and Pretty 2010:2916). As a result of agricultural intensification, 10 crops (wheat, maize, rice, soybean, barley, sorghum, millet, cotton, rapeseed, and beans) account for two-thirds of global croplands (Balmford et al. 2012:2715), while only 150 species are exploited commercially (Pretty and Bharucha 2014:1571).

Agricultural Sustainability and the Future

With populations expected to exceed nine billion by 2050, our current system is both vulnerable and unsustainable (McClung 2014:699; Tilman 1999:5995). Today, the average consumer eats

Figure 2. Maygrass growing at the university farm. Photo courtesy of Stephen B. Carmody.
one-fifth more calories than in the 1960s (Cribb 2010:10). This increase in population and food demand means that food production will need to increase between 70 and 100 percent by 2050. So while food production is increasing 1 percent annually, population and demand are increasing 2 percent annually (Cribb 2010:10). The challenge for future generations will be to produce twice as much food using less water, land, fertilizers, and energy.

Soil erosion and degradation are widely considered to be the major obstacles to the sustainable growth of agriculture. By the year 2050, as a result of annual soil degradation, it is estimated that three billion people will live in deserts, meaning that new lands will need to be placed under production to meet future demands. We will need to feed twice as many people with half as much topsoil (Ruttan 1999:5962). Tilman et al. (2001) have suggested that an 18 percent increase of arable land will be required to feed a global population of nine billion. This increase will amount to an additional one billion hectares (3,861,021 square miles) of natural habitat, an area larger than the size of the United States (Tilman 1999:5997; Tilman et al. 2001:283). This trend will not only have a devastating effect on global biodiversity but would also require a tripling of nitrogen and phosphorous inputs, a twofold increase in water consumption, a threefold increase in pesticides, and a massive release of CO₂ from tillage and land clearing tremendously impacting the quality of soils, water, and air (Tilman 1999:5999). These data and projections make it clear that changes in the way we produce and consume food are crucial to human health and our very existence.

As rising global populations result in urban sprawl, demand for water is projected to increase 150 percent over the next few decades, placing an additional stress on water required for growing food. Inevitably, more scarce water resources mean decreased crop production and increased food costs for globally important crops, such as rice and maize, which could see price increases of 80 and 120 percent, respectively (Cribb 2010:38). Additionally, increasing median incomes across the globe will put added stress on water supplies, as demand for preferred cereals and proteins provided by meat, fish, and dairy is projected to increase in order to fulfill caloric requirements (Pretty 2008:448; Rosegrant and Cline 2003:1918).

Our Project

Whereas the Green Revolution greatly reduced world hunger, advances in production over the next 50 years will require environmentally sustainable solutions that provide a sufficient food supply. Alongside researchers from around the world, the Sewanee Native Cultigens Project looks to the archaeological record for local solutions to a currently troubled system of food production.

This project was initially inspired by the paleoethnobotanical and soils data from rockshelters (Early Archaic to Late Woodland) excavated on the southern Cumberland Plateau of Tennessee (Carmody 2014; Sherwood et al. 2012) and open-air sites in the Red River valley of Kentucky's northern Cumberland Plateau (Gremillion et al. 2008; Windingstad et al. 2008). Both projects were addressing (among other questions) the use and subsequent domestication of native cultigens in upland settings across the midsouth. These studies found that native perennial plants were used widely throughout prehistory and eventually cultivated and/or domesticated on upland slopes. In light of these findings and the unsustainable nature of food...
production across the globe today, we began to consider the potential for these “weeds” to again become a regional sustainable food source.

Today, over 80 percent of global croplands are devoted to annual crops that contribute 70 percent of human calories (Pretty and Bharucha 2014:1575). Perennial crops hold several advantages over heavily relied upon annual crops. Annual crops need to be replanted every season, require environmentally dangerous fertilizers and pesticides, do little to protect soils, and do not provide habitat for local wildlife. Conversely, native amaranth, chenopod, little barley, maygrass, and sumpweed resist drought, require little to no fertilizer and pest control, would increase local biodiversity, and could potentially help reestablish soil fertility (Tilman 1999:5998). These plants are reliable and nutrient-rich foods that produce substantial yields of both seeds and greens.

To date, our project has successfully grown between 50 and 100 of each of the five plants listed above at the University of the South’s university farm (Figures 2, 3, and 4). This initial trial has allowed us to observe the growth patterns, productivity, and space requirements of each while allowing a baseline for comparison of these attributes in other growing conditions. They will also provide us with samples for nutritional and yield analyses. In addition, they have provided seed stock for our experimental plots. These plots, which will begin to produce this year, will be established in a variety of environmental settings, allowing us to measure the relationships between growth, yield, and nutrition on varying soil type, moisture, sunlight, aspect (temperature), and elevation. Understanding how these microclimates affect crop yields has important implications for archaeologists studying prehistoric systems of food production as well as researchers studying sustainable food production in the future. Upland environments were productive locations for food production in the past and may provide important locales in the future as more land will be required.

Our collaborative project currently involves faculty, staff, and students from across the University of the South, including the on-campus dining services, which plan to integrate these crops into dishes in the dining hall (Figure 5). In the future we hope to expand experiments to different regional settings through collaborative research projects with other university farms and gardens.

Figure 4. Wild chenopod seed heads. Photo courtesy of Stephen B. Carmody.
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World Health Organization
The following articles emerged from discussions with federal agency representatives and heads of CRM firms about challenges of “succession issues” in their workplaces. Retiring baby boomers have worked for decades, often since the inception of their branches of federal or state agencies, public utilities, or private firms. They know the less explicitly articulated aspects of getting the job done not spelled out in their workplace “qualifications standards.” Their commonly expressed concern was that simply completing a master’s in CRM does not prepare their successors for working effectively in agency or firm environments. Across the board, they advocated closing this practical knowledge gap through internships during the master’s years. Accordingly, I asked archaeologists from various placements to discuss CRM master’s-level internships in agencies and firms. We’d planned master’s-level internship discussions in two articles from universities, one from a firm, and three from federal agencies. After Donald Trump’s election, doubtless due to demands of preparing for as-yet undefined impacts on federal agencies, our agency roster saw attrition. Nonetheless, as SAA and coalition partners work to keep historic preservation protections in place, we must keep our eyes on maintaining maximum quality in generational transitions in archaeology’s CRM workforce. These articles offer members informative and thought-provoking perspectives on this.

**Internships in a New MA Program in Applied Archaeology**

The Department of Anthropology at California State University, San Bernardino (CSUSB), welcomed its inaugural class of students to our new MA program in Applied Archaeology in fall 2015. More than six years had passed since one of us (Robertshaw) first put fingers to keyboard to draft the program proposal, and it has been a little over a year since we hired its director, Amy Gusick. It’s been a long road, and we are now witnessing the fruits of our labor as we prepare to confer degrees on our inaugural class of twelve students. After a successful first year, we fine-tuned the program with a few modifications and course additions, but one major aspect that remains unchanged is the internship component.

When designing the curriculum, we decided to offer internships for real-world cultural resources management (CRM) experience rather than developing a CRM firm of our own on campus. We did this for three reasons: 1) we want to be partners with, not competitors of existing firms and agencies in our region; 2) we do not want to find ourselves in the situation where the program director is too busy with CRM work to devote her full attention to our students and the program; and 3) we do not want our lab spaces, used by other faculty, to be in danger of being overrun by the demands of CRM work, nor do we want our undergraduates to be sucked into CRM work simply because there is money available. We had also witnessed the success of the museum internships that were a key component of our certificate program in museum studies. We found that these internships often led to jobs, and even when they didn’t, students found them to be enjoyable and valuable learning experiences.

With this format in mind, we developed our MA in Applied Archaeology with an internship component. One of our main goals was to offer an MA program that specifically focused on CRM. We were well aware of the common scenario of excited undergraduate students who obtained entry-level positions in CRM, only to drop out of the industry within a couple of years due to relatively low-paying, long, often lonely days in the field surveying new pipeline or transmission line routes across the deserts of the Southwest. Occasionally some of these former students realized that...
they could have a longer-term career in CRM if they went back to college and earned a suitable master’s degree. There were very few programs in southern California, however, that focused on applied archaeology and even fewer that had class schedules to accommodate a student who did not or could not quit his or her full-time job.

Thus began the process of developing a two-year MA program with all core courses offered in the evening to cater to those people wanting an advanced degree, but not wanting to quit their jobs. In designing the curriculum, we referenced a “Model Applied Archaeology Curriculum” that had just been published in the SAA Archaeological Record (Neusius 2009), which promoted the inclusion of internships into applied archaeology programs. To ensure that there was enough local interest in the program and willingness to support the curriculum by offering internships, we reached out to local CRM archaeologists and managers from public and private institutions and some of the Native American tribes in the region to discuss our plans and to encourage them to partner with the university to offer internships. We presented the internships for what they were, a win-win for everyone involved. The students would benefit from the real-world experience and the chance to create contacts and network in the CRM industry. The employers would benefit from the extra (free) help with their projects and be able to identify and train qualified people with the objective of hiring them once they completed their MA. As it turns out, this is exactly what has happened.

Upon arriving at CSUSB in fall 2015, Gusick began contacting local federal and state agencies, private firms, and tribal entities to discuss their willingness and capacity to provide meaningful internships. As part of these conversations, she was careful to discuss the educational goals for the internship that helped identify those entities that had viable projects on which they could train our students and in which our students were interested. We were keen to avoid a situation where a student took an internship that left him or her sitting in a room digitizing records or doing backlog filing. The 12 students in the inaugural class had varying goals for their internships. We had some students who wanted to try working at a federal agency, others who wanted to go into consulting, and still others who wanted to work with local tribes. This diversity of interests reflects our focus on making sure the students understand that the CRM industry has a wide variety of jobs and that the day-to-day tasks can be drastically different from one position to the next. We viewed these internship positions as a chance for the students to test-drive their planned career trajectory, so we wanted a variety of internship options from which the students could choose.

Having worked in the CRM industry for several years, Gusick leveraged her network of contacts, which led to numerous organizations willing to take on student interns, including the Bureau of Land Management, the U.S. Forest Service, state parks, five different local CRM firms, and a local tribal entity.

During spring quarter of their first year, the students took an internship for credit, which is a required course and counts toward their graduation. These internships were a smashing success. Five of the students were hired on at the place they interned after their internships ended, even before they had earned their degrees, and one student was able to secure a position with a federal agency because of her internship experience. All of the students gained valuable on-the-job training and made important connections in the CRM industry. As we enter the second year of the program, we have heard from all the previous internship providers about their excitement to continue their partnerships with CSUSB due to the professionalism and dedication our graduate students displayed while working at their internships.

As we prepare for the years ahead and strive to improve our program and offer a stellar education in applied archaeology, one component that will remain unchanged is our dedication to the internship model for graduate level applied archaeology programs. This has afforded our students the opportunity to begin learning the skills and creating the network of contacts necessary to secure a position with the CRM industry during or after completion of their MA degrees. We have received positive feedback from everyone involved in the internship process, including, most importantly, the students, who are excited to be active and contributing members of the CRM workforce.

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—Amy E. Gusick, assistant professor and director of the MA program in Applied Archaeology, Department of Anthropology, California State University, San Bernardino, and Peter Robertshaw, professor, Department of Anthropology, California State University, San Bernardino
Bureau of Land Management Internships

My internship allowed me to hone my field skills and exposed me to the policy and regulations guiding cultural resource management. My internship also gave me the opportunity to work on a project from start to finish, which is a bit of a rare thing,” explained Jamie Palmer, field archaeologist in the Cedar City Field Office, Utah.

Alissa Leavitt-Reynolds, archaeologist in the Grand Junction Field Office, Colorado, explained an important aspect of land management internship programs: “Through my internship I was exposed to a variety of multiuse programs and learned to interface with specialists from other fields.” Rebecca Spitzer experienced the need to be flexible and prepared for new tasks and challenges while working with people from other disciplines when wildfires broke out late in her internship. She was able to see her earlier cultural resource digitization work aid in fire control plans and collaborative actions.

Many archaeologists obtained their introduction and first opportunities for federal service in the now defunct Student Career Experience Program (SCEP) or Student Temporary Employment Program (STEP). A significant reorganization of the government’s internship programs occurred recently, which created new opportunities. President Obama signed Executive Order 13562, which established the Internship Program and the Recent Graduates Program and updated the Presidential Management Fellows Program (PMF). These two new programs, along with the PMF Program, collectively form the Bureau of Land Management (BLM) internship programs. Temporary (less than one year) and Career Pathways positions are advertised and coordinated through our partner organizations. The location and opportunities in this program will vary year to year based on the proposals from our field locations. Participating interns are not federal government employees. However, after successful completion of the rigorous internship program, along with their conferred degree, a DHA-RAI Program participant may be directly appointed without competition to a permanent position vacancy.

Rebecca stated, “The program itself has given me an amazing window into government work, especially within the BLM. I think that getting the chance to work in the agency before taking a permanent job is a great way for new graduates and the BLM to evaluate if they are a good fit for each other before making a full commitment. I have met many fantastic individuals in the field office who I hope to remain in contact with in the future. Even before the completion of the program, I have already received a job offer.” Rebecca, a 2016 intern, now works as a contact representative for the
Central Coast Field Office, California. Alissa summarized, “Seeing how passionate federal employees were about cultural resources and how they shared that passion through public interpretation and outreach helped me make the decision to become a federal archaeologist myself.”

For additional information this program, contact Takeya Bland at t bland@blm.gov or 202-912-7508.

—Byron Loosle, division chief of Cultural, Paleontological Resources and Tribal Consultation at the Bureau of Land Management

Internships within the Cultural Resource Management Industry: Opportunities and Challenges

Professional internships have been a part of the cultural resource management (CRM) industry for over two decades. Although not all firms within the industry have supported internship programs, the industry has a vested interest in the development of future professionals who will be the next generation of leaders. Successful CRM industry leadership is dependent on a wide variety of skills, including technical knowledge, management expertise (project, personnel, budgets, and schedules), and communication. The development of future professionals with the appropriate skill set for our industry is dependent on a multipronged approach involving cooperation among our industry, the academic system, professional organizations, and government agencies. The American Cultural Resources Association (ACRA) developed guidelines for internship programs in 2011 to provide greater consistency in the development and implementation of such programs. More recently, however, ACRA has taken a more proactive stance in encouraging internship programs as a means of opening a new dialogue with the academic system. This dialogue will hopefully provide new opportunities for the academic system and the CRM industry to collaboratively provide future leaders with the requisite skills for the sustainment of a healthy CRM industry. The opportunity also exists for the academic system and the CRM industry to work collaboratively in providing new solutions for cultural resource management and historic preservation. Hopefully, this dialogue will contribute to a better understanding of the needs and challenges for both the academic system and our industry.

As with most opportunities, there are also challenges in providing a successful internship program. These challenges include federal regulations, contractual obligations, the educational level of the student, long-term planning and commitment on the part of the firm, and the need for close supervision of the intern. The Fair Labor Standards Act provides the following criteria for a person meeting the definition of an intern:

1. The internship, even though it includes actual operation of the facilities of the employer, is similar to training which would be given in an educational environment;
2. The internship experience is for the benefit of the intern;
3. The intern does not displace regular employees, but works under close supervision of existing staff;
4. The employer that provides the training derives no immediate advantage from the activities of the intern; and on occasion its operations may actually be impeded;
5. The intern is not necessarily entitled to a job at the conclusion of the internship; and

In summary, the firm cannot derive immediate benefit from the intern, and the intern must be closely supervised. The six legal criteria noted above must be applied when making a determination if an intern is required to be paid. If your internship program does not meet all of these criteria, the intern must be paid.

Contractual obligations may also affect the firm-intern relationship. If the intern is working on a project being contracted through the Service Contract Act, the firm will be required to pay the Department of Labor Wage Determination for that area. In many cases this pay level is far above what a firm would customarily pay an intern; consequently, many firms are reluctant to support interns under such circumstances. Federal agencies that provide internships are not subject to these same requirements. Whether an intern is an undergrad or a graduate student also presents some challenges. Many firms typically require a bachelor's degree and a field school before accepting anyone for a field crew position. Undergraduates also have more restricted schedules that make it difficult to assign them to interesting projects. This situation often relegated the undergraduate intern to an office situation unless the firm and the intern agree to
an unpaid internship. Graduate students, on the other hand, more often meet field crew position requirements and have much more flexible schedules. They are also likely to have research interests that are separate from a specific project to which they are assigned.

For the internship experience to be meaningful, the firm must be committed to long-range planning, effective supervision, and meaningful assignments. Things to consider include workload and the availability of intern projects, staff support, office space, and financial resources. Due to the training nature of an internship, it is imperative that interns are provided with sufficient supervision. Considerable time investment will be needed, especially on the front end, to plan for and implement necessary training. It is also recommended that the supervisor plan ongoing weekly meetings to properly monitor the intern’s progress. Use care in identifying a seasoned staff member who understands the importance of the internship program. Students are seeking opportunities that will stimulate them and provide real experience. A good internship program will ensure the assignment of challenging projects and tasks.

Effective assignments are coupled with adequate documentation and evaluation to provide a meaningful experience. Documentation is very important for effective learning to take place. It is strongly advisable that an employer and intern create mutually agreed upon learning objectives. Well-documented learning objectives provide clear direction and targeted goals for the intern. This ensures both parties envision the same experience and reduces the possibility of misunderstanding and disappointment. Effective learning objectives are concise and measurable. Whenever possible, try to include the intern in organization events such as staff meetings and allow opportunities for networking and informational interviewing with key personnel.

In summary, the challenges for an internship program seem daunting, but the partnership among the employer, the student, and the school provides opportunities that establish the basis for a successful career choice for the student, collaboration between the firm and the school, and the knowledge that the firm is supporting the continued health of the profession and the CRM industry. Responsible CRM firms realize that they have a leadership responsibility in providing training for the industry’s future leaders.

—Duane E. Peter, vice president, Versar, Inc., and president of ACRA

Applied Anthropology Training and Internship Preparation on the Graduate Level

The call for academic institutions to train MA-level students for applied work in archaeology is not new; however, many institutions have been slow to respond. Most of us in the profession can probably agree that many students are not receiving the education and training needed to compete for and successfully perform the majority of jobs currently available to archaeologists entering the profession at the MA level.

The University of Maryland developed its MAA (Master’s in Applied Anthropology) program in 1984 and has since successfully trained several hundred students. About one-third of these students focused in archaeology and most are now employed throughout the region in various government agencies and CRM firms. The focus of the MAA program has been to participate in the building of anthropological practice.

The MAA program consists of 42 credits, which includes 18 credits of CORE coursework, a 12-credit internship sequence, and 12 credits of supporting course work. The supporting course work allows the student to focus on a specific area (such as the Middle Atlantic region history and archaeology) or specialty (like GIS). Students are also required to present the results of their internship in a departmental colloquium prior to graduation. There is no thesis requirement.

Several factors have helped to create a successful outcome in preparing students for various positions in the workforce. For instance, it is important for students to identify their career path early in the program. The student must assemble a committee consisting of department faculty and practitioners who offer supervision throughout the two-year program. The committee members provide advice, research guidance, and professional mentorship. The committee also assists the student in identifying an appropriate internship and supervises the student throughout the internship process.

The internship sequence consists of a 3-credit pre-internship course, 6-credit internship, and 3-credit post-internship. The pre-internship course is taken in the spring semester of the first year. Students work to find an internship and then write and defend a proposal for their internship work. The proposal should include a literature review (background), applicable theory, methods, goals and outcomes (products), timeline, and budget (if necessary). MAA students must
satisfactorily complete an internship proposal review with their advisory committee before beginning the internship.

The internship preparation course is then followed by a 6-credit internship, which is usually completed during the summer term between the first and second years of the program. The structured internship with a government agency or CRM firm provides practical training and the student is expected to create a useable product for the client. What is important for the student is that the internship results should be a product that he/she can claim on their CV, like the authorship of a site report (or chapters in a site report), or any other type of official document.

The 3-credit post-internship course supports the professional development of skills in writing and presentation. Students are expected to complete a professional-quality report or develop a publishable paper based on the internship experience. They will also present their internship results in a paper or poster at a professional meeting as well as to students and faculty at our annual colloquium. These products help students to professionalize and build their CVs.

While practical skills training is important for future employment, probably the most important aspect of our graduate level training is helping students develop critical thinking skills. Archaeologists, especially when they move into managerial positions, often find themselves working with various stakeholders, sometimes in very difficult situations. Ethics training and the development of ethnographic skills become part of a very important tool kit for operating in applied professions. For instance, while NAGPRA legislated consultation with American Indian tribes, other monumental projects, like the African Burial Ground in New York City, have made archaeologists aware of the necessity to work with local affiliated groups and acknowledge their perspectives.

Our last survey of MAA alum (2015) indicates that close to 90 percent of our archaeology graduates are employed in applied fields or in the academy, and the majority feel that their training has been valuable in their career success. While the MAA program at the University of Maryland does not necessarily train students for specific occupations, the success of our program involves students identifying their career path early in the MAA training and receiving strong support throughout their graduate career.

—Paul A. Shackel, professor and chair of the Department of Anthropology at the University of Maryland in College Park
BRINGING YOUR A-GAME TO DIGITAL ARCHAEOLOGY

ISSUES WITH SERIOUS GAMES AND VIRTUAL HERITAGE AND WHAT WE CAN DO ABOUT IT

Erik Champion

Erik Champion is a professor of cultural visualization in the School of Media, Culture and Creative Arts at Curtin University, Perth, Australia.

Wandering around museums or visiting art galleries and school fairs, a relatively impartial observer might notice the paucity of interactive historical exhibitions. In particular there is still a yawning chasm between serious games masquerading as entertainment and the aims and motivations of archaeology. Surely this is resolved by virtual heritage projects (virtual reality applied to cultural heritage) and interactive virtual learning environments? After all, we have therapy games, flight simulators, online role-playing games, even games involving archaeological site inspections. Unfortunately, we have few successful case studies that are shareable, robust, and clearly delivering learning outcomes.

Early virtual heritage environments were low resolution, unreliable, or required specialist equipment and had limited interaction. Games were and still are far more interactive and are arguably the most successful form of virtual environment, so it would seem to be a masterstroke to use game engines for virtual heritage.

Why have games succeeded where virtual reality has failed? In terms of consumer technology there is virtually no competition. Games are typically highly polished, focused products. Large and loyal audiences follow them and if they allow modding (modification of their content), then the community of fans will produce an enviable amount of content, useful feedback, and grassroots marketing for the game companies (Champion 2012). Virtual reality companies don't have the loyal audience base, the dedicated and copyrighted content and technology pipeline, or the free advertising.

Game consoles are now the entertainment centers of so many living rooms, the game consoles and related games can last and be viable for six or eight years or more (http://gamerant.com/ps4-xbox-one-life-cycle/), and in many countries the game industry makes as much or more money than the film industry, and the future looks even more profitable (Gartner 2013). Virtual reality (VR), by contrast, seems to constantly promise more than it delivers (Robertson 2015).

For example, a head-mounted display (HMD) is typically defined as a display worn on the head where the computer-generated visual field changes when the person wearing the display moves his or her head, and today's HMDs usually also provide stereoscopic vision (Figure 1). The recent media blitz of cheaper and more comfortable and effective VR equipment such HMDs is exciting (Kim 2015; Smith 2015) and no doubt I will also buy one, but just like the earlier pretenders, while the technology has obviously advanced, the inspiring long-term content only appears to exist in videos and artists' impressions.

As interactive entertainment, most computer games follow obvious genres and feature affordances (well-known themes, rewards, and feedback on performance), they challenge people to find out more rather than telling them everything (a sometimes annoying and overloading aspect of virtual environments), and in most games learning through failure is acceptable (and required). And here lies another advantage for games over virtual environments: games offer procedural knowledge rather than the descriptive and prescriptive knowledge found in virtual learning environments.

Most definitions and explanations of games include the following three features: a game has some goal in mind that the player works to achieve, systematic or emergent rules, and is considered a form of play or competition. Above all else, games are possibility spaces; they offer different ways of
approaching the same problems, and because they are played in the “magical circle,” failure does not lead to actual harm, which allows people to test out new strategies. That is why, unlike other academics, I don’t view a game as primarily a rules-based system. I think of a game as an engaging (not frustrating) challenge that offers up the possibility of temporary or permanent tactical resolution without harmful outcomes to the real-world situation of the participant.

Despite the comparative success of computer games, successful serious games and education-focused virtual heritage games are few and far between. The following preconceptions about games (and game-based learning) could explain why more interactive and game-like heritage environments have not emerged as both engaging entertainment and as successful educational applications.

The first and I think most common preconception of games is that they are puerile wastes of time. For an academic argument against this view, any publication on game-based learning by

Figure 1. A developer's version of the HTC VIVE head-mounted display. Photograph by Erik Champion.
James Gee will provide some interesting insights, while Steve Johnson in *Everything Bad Is Good for You* writes in a similar if humorous way on how games help hone skills.

Many critics believe games are only for children. Such a view would conveniently ignore the adult enjoyment of sports, but it also neglects the question of how we learn about culture. In the vast majority of societies around the world people learn about culture as children through play, games, and role playing. Games are also an integral method for transmitting cultural mores and social knowledge. In the “Operational Guidelines for the Implementation of the World Heritage Convention” (http://whc.unesco.org/en/guidelines/), UNESCO specifically states they may provide assistance for informational material such as multimedia to promote the Convention and World Heritage “especially for young people.”

A related criticism of computer games is that they are only about fantasy. While it is true that some human computer interaction (HCI) experts see fantasy as a key component of games, fantasy is also a popular component of literature, and fantasy provides a series of perceived affordances; players are asked to let their imagination fill in the gaps. So perhaps thematic imagination is a more appropriate term. Fantasy creates imaginative affordances, we have a greater idea of what to expect and how to behave when we see fantasy genres, and we are more willing to suspend disbelief. Fantasy helps induce narrative coherence and is a feasible vehicle to convey mythology connected to archaeology sites.

Games are not only about fantasy but for many are also highly dependent on simulating violence. Yet some of the biggest selling games are not violent, for example *Minecraft*, *Mario*, and the *Sims* series. A more serious problem for my research has been when the real-world historical context to simulate is itself both horrific and hard to grasp. My objection to violent computer games is not so much that they simulate violence but that they don’t provide situations for the player to question the ubiquitous and gratuitous use of violence. By definition computer games are good at computing options quickly so it is easier to cater to reflex-based challenges, stopping players from thinking, from having time to reflect, but challenging them to both move and aim (coordinate) at the same time. And when mainstream game interaction is applied to virtual heritage and digital archaeology, the information learned is not meaningful or clearly applicable to the real world, and the skills developed are not easily transferrable.

Marshall McLuhan apparently once said, “Anyone who thinks there is a difference between education and entertain-

ment doesn’t know the first thing about either.” I have not found the origin for this quote, but this saying is popular for a reason: many automatically assume entertainment is not educational or that to be meaningful, education cannot be entertaining. In the area of history this is a very worrying point. A recent survey of the American public found that while they were charmed and inspired by the word “past,” the word “history” reminded them of a school-time subject that they dreaded (Rosenzweig and Thelen 2000).

Gamification could be the commercial savior for many educational designers but it has many critics. Fuchs (2013) explained gamification as the use of game-based rules structures and interfaces by corporations “to manage and control brand-communities and to create value.” This definition reveals both the attraction of gamification to business and the derision it has received from game designers and academicks.

A more technical objection to using games for digital archaeology projects is that they can only provide low-resolution quality for images, movies, and real-time interaction. With all due respect, game engines (such as Crysis and Unreal 4) and archaeological environments created in game engines (such as http://www.westergrenart.com/ or http://www.byzantium1200.com/) would challenge many CADD (computer-aided design and drafting) showcases. In 2015 the Guardian released an article declaring we are entering the era of photorealistic rendering (Stuart 2015). Autodesk (the company behind the biggest CADD programs) has recognized the threat and now sells its own game engine. Even if CADD did produce higher-resolution and more accurate 3D models, what advantage would this offer over game-based, real-time interactive environments where the general public is free to explore?

The last preconception or rather I should say concern about games is that they are not suitable for preservation due to software and hardware obsolescence. Game-based virtual heritage environments are not great as digital heritage: the technology does not last and the content is not maintained and updated. I agree this is a major problem, but the problem is more a lack of suitably maintained infrastructure than technology. In terms of usability research, there are very few surveys and tangible results that have helped improve the field, but the biggest issue is preservation of the research data and 3D models. We still lack a systematic pipeline featuring open-source software; a well-organized online archive of 3D models in a robust open format; globally accepted metadata; and a community who reviews, critiques, augments, and maintains suitable content.
Definitions vary but virtual heritage is not an effective communication medium and is certainly not a great exponent of digital heritage. Many of the great virtual heritage showcases such as Rome Reborn or Beyond Space and Time (IBM) have been taken offline, use proprietary software, or have simply disappeared due to a lack of long-term maintenance. So there are very few existing exemplars and accessible showcases to learn from [CINECA’s Blender pipeline [https://www.blendernetwork.org/cineca] is an exception to the rule).

Many game engines can now export to a variety of 3D formats and run across a variety of platforms and devices. They can export Virtual Reality Modeling Language (VRML) and now also Web Graphics Libraries (WebGL), so interactive 3D models can run in an Internet browser without requiring the end user to download a web-based plug-in. Some game engines can dynamically import media assets at runtime; others can run off a database.

UNESCO recently accepted my proposal for a Chair of Cultural Heritage and Visualisation. This chair will help us develop infrastructure and a repository of 3D heritage models for better access by the public. We intend to survey and collate existing world heritage models, unify the metadata schemas, determine the best and most robust 3D format for online archives and web-based displays, provide training material on free, open-source software such as Blender, and demonstrate ways to link 3D models and subcomponents to relevant online resources.

Conclusion: Archaeologists and Games Do Not Mix?
Archaeologists and suitable games could mix if games existed that leveraged game mechanics to help teach archaeological methods, approaches, and interpretations. As far as I know, archaeologists don’t have easy-to-translate mechanics for their process of discovery and understanding that we can transform into game mechanics to engage and educate the public with the methods and approaches of archaeology and heritage studies. And yet virtual heritage environments should be interactive because data changes and technologies change. Interaction can provide for different types of learning preferences and interaction will draw in the younger generations.

My solution is to suggest that rather than concentrate on the technology, archaeologists should focus on the expected audience. What do we want to show with digital technology, for what purpose, for which audience, and how will we know when we have succeeded?

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Jagged hulks of wrecked cars, discarded soda cans, and gaudy signs advertising a virtual casino littered the digital landscape of Çatalhöyük in Second Life. After a long summer digging at the actual Çatalhöyük, we returned to the virtual version created by the Open Knowledge in the Public Interest group at the University of California under the guidance of Ruth Tringham in 2007. Attention to the excavation meant time away from the virtual reconstruction, and the digital detritus left by summer visitors to the Neolithic site always took a while to clean up. Once a visitor had left an impressive dragon snoozing on top of one of the houses, but it was usually more mundane drek like empty boxes or advertisements. On good days, the avatars of visitors came to the virtual reconstruction, investigated the buildings, filled out the guest book, waded through the nearby swamp, watched an interpretive film or two, tried on Neolithic fashions, and snapped selfies in front of the slow-moving sheep. On an exceptionally good day, someone reconstructed a huge version of Seated Woman of Çatalhöyük (Figure 1) and left a small votive offering in front of it.

But more than once we found ourselves “occupied” by hostile forces and dealing with pixelated garbage—evidence of the unauthorized use of resources and squatters. All of these were concerns that would seem more familiar and relevant to managers of heritage parks in “real life” (Finn 1997) but were unforeseen and surprising to our team of digital archaeologists. Other problems such as griefing and prim limits—restraints on the number of digital building blocks an avatar can use in a virtual space—are more unique to virtual heritage. One year, unbeknownst to us, a user built a vast palace high in the sky above Çatalhöyük and hosted weddings—we only figured it out when our space for building on the island was exceeded. Finally, we had to completely lockdown permissions on the island to only include the team of educators and students involved with the project at UC Berkeley. It was not exactly a win for multivocality or co-construction of the archaeological past. Yet part of me liked the controversy, messiness, and the sheer lunacy of building virtual reconstructions in an Open World like Second Life.

Such interventions are relatively rare. Most virtual reconstructions of archaeological sites are built within stand-alone software suites such as Blender or 3D Studio Max. The 3D models are then displayed with fixed, animated sequences such as fly-throughs, or with limited interaction, such as the ability to zoom in or spin the model around. Occasionally these models are imported into interactive platforms, such as those created with the Unity game engine, but even these models are not within a widely accessible context. Building archaeological reconstructions in an Open World provides a stark contrast to these stand-alone models; reconstructions in an Open World can be explored by other avatars, and, with the correct building permissions, houses, clothes, and artifacts can be modified, copied, and reused in other contexts (Morgan 2009). Sadly, Open Worlds that are flexible enough to use for archaeological reconstructions are rare. Further, they can be costly to use; Second Life ultimately became too expensive to host virtual Çatalhöyük. Consequently, the reconstruction ceased to exist in 2011, though we managed very basic “rescue” virtual archaeological recording during its last days. Yet I continue to find using Open Worlds and popular tools to encourage interaction with archaeological reconstructions compelling, and I have subsequently experimented with other platforms to explore the past in unexpected, delightful ways.

While it is not as detailed or interactive as Second Life, many archaeologists use the modeling application SketchUp to create basic reconstructions. I created a series of models based on the architectural remains of the sites of Al Zubarah and Fuwairit in Qatar. These models can then be geolocated and shared for others to remix or view in Google Earth. There is a relatively low bar for creating and uploading models of archaeological sites for inclusion in the Google Earth 3D Buildings Layer, and several amateur reconstructions are
widely accessible. 3D Warehouse hosts several hundred archaeology-related models and some museums and university buildings, but also elaborate archaeological reconstructions of sites, artifacts, and people. For example, the Great Pyramid at Giza has over 80 models available, with multiple interpretations of archaeological remains presented alongside each other (Figure 2). The models are available to download and to 3D print. While nowhere as interactive as a true Open World, SketchUp is relatively flexible and easy to use and the results can be shared widely and modified by other users.

Once imported into Google Earth, SketchUp models can interfere with current perceptions of the landscape. Currently, the archaeological remains of Fuwairit appear to be a series of low dunes next to a beach, but in the past it was a thriving center for trade and pearling (Figure 3). Geolocating the model within Google Earth reveals the low walls and winding passageways next to what is now a mangrove swamp. Similarly, though not created with SketchUp, Frischer’s Rome Reborn project allowed users of Google Earth to explore reconstructions of many of Rome’s historic buildings in place (Wells et al. 2010). Sadly, the Rome Reborn reconstruction is no longer available, and SketchUp and 3D Warehouse are being quickly outmoded by photogrammetric reconstructions hosted on Sketchfab, another repository for 3D models, so these modes of exploring geolocated virtual reconstructions have become stagnant.

In my pursuit of populist modes of virtual reconstruction, I began to experiment with Minecraft in 2014. Guided by Shawn Graham’s useful tutorials, I imported a digital elevation map of the Vale of Pickering, the landscape surrounding the Mesolithic site of Star Carr, into WorldPainter, an open-source interactive graphical map generator for Minecraft (Figure 4). Using the program I was able to tweak the landscape to include a deciduous forest and to exclude resources that would not have been part of the geological profile of the region, such as diamonds and lava. Initially, building in Minecraft was not tremendously different than other reconstruction projects. The benefits seemed obvious—Minecraft allows collaborative building but also excavation-like activities...
Figure 2. Giza Pyramids on 3D Warehouse.

Figure 3. Fuwairit model in SketchUp.
with tools that are familiar to archaeologists such as shovels, pickaxes, and buckets. At first the detractors were primarily morphological; it was fairly difficult to build round Mesolithic houses out of Minecraft’s distinctively pixelated square blocks. Perhaps consequently, most other archaeologists using Minecraft for virtual reconstructions were building classical architecture, such as Palmyra.

Not content to reconstruct Star Carr as a hypothetical exercise, we hosted an “Archaeology in Minecraft” event at a series of open days in the Department of Archaeology at the University of York. Hoards of children accompanied by skeptical parents were introduced to the Mesolithic landscape through the familiar world of Minecraft. This was perhaps the first difference between using a video game and other modes virtual reconstruction. In contrast to Second Life, which caters to an older demographic and the formal, architecture-based SketchUp, Minecraft was immediately accessible to children, and they demonstrated ownership and authority within this familiar landscape. The outreach activity incorporated the “real life” tools of Minecraft, which bridged archaeology and video games, and a video of a more formal virtual reconstruction created by Anthony Masinton. “Archaeologists think that houses in the past probably looked like this,” I would tell the children, pointing at Masinton’s lovely reconstruction, “but since they’re just holes in the ground, we aren’t sure. Can you help us think of other ways they might have looked?”

Many children rose to the challenge and peppered the landscape with structures, some more round than others, made out of the varied materials available in the “creative” mode of Minecraft. Creative mode allows access to all of the building materials in the game, and moves the landscape from being a struggle for survival to one that was more conducive to learning about archaeological remains. Or so I thought. While many of the children were content to build according to the guidelines of the helpful archaeologists leading the exercise, others decided to 1) dig as deeply as possible, ultimately trapping their avatars; 2) build great flaming towers; 3) blow up the other children’s work; and 4) create guns and start shooting at each other. As with Çatalhöyük in Second Life, what we constructed and perceived as a place for learning and outreach was repurposed for alternate uses. As
educators and archaeologists, we were not experts in these virtual worlds; I was not a regular inhabitant of Second Life or Minecraft and it took some time to understand local, in-game modes of communication and mores. Yet again this lack of authority in transmitting archaeological interpretations was exhilarating. I was astonished at how quickly children co-opted our mundane archaeological reconstruction for arcane purposes. Minecraft, a video game that we arguably made into “chocolate-covered broccoli”—a derogatory term used for educational games, was once again turned into a game where children were in charge, and there was little we could do but watch them build and destroy.

Later, after the digital dust had settled, I was able to explore the landscape and found myself again in the position of a virtual heritage warden, surveying the remains of popular interventions on an archaeological reconstruction. The video game venue encouraged a playful interaction with place, wherein archaeological landscapes were not cordoned off or static products of a single authoritative voice but places to host your own interpretation. Virtual archaeological reconstructions are too often modeled on a static museum exhibition framework when they could be places of collective interpretation, experimentation, and play. Seeking out software and tools to produce photorealistic models can severely limit collaboration and other affordances that ultimately may be more important for an interactive experience. Further, placing models in Open Worlds and popular venues brings archaeological reconstructions into the commons, where people can interact with the models on their own terms, rather than as a video of a photorealistic fly-through.

Using Second Life, SketchUp combined with Google Earth and 3D Warehouse, and Minecraft for virtual archaeological reconstructions is an interventionist strategy for the presentation of digital heritage. Rather than creating isolated, stand-alone models with limited interaction, archaeologists could be sneaking artifacts and interpretations into common virtual landscapes. To this end, many video games have extensive “modding” communities wherein players create unique content to share with others. While others have explored virtual landscapes as archaeologists, relatively few have explored the affordances of making archaeological reconstructions as creative interventions. Release 3D models into the world of play, and you may find yourself surprised, confused, and delighted at the virtual use-lives of archaeological remains.

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Video games, like the spoken word, books, photos, and movies that preceded them, are a form of media. Each media form has specific affordances, derived from the nature of the medium itself, which act to shape the way in which content can be thought about, structured, engaged with, and presented (Gibson 2014). This power to shape content means that the medium, far from being a passive receptacle for the message that the creator is trying to convey, becomes intrinsically and recursively bound to the message (McLuhan 1994). To this end it has been said that “the medium is the message” (McLuhan 1994). This entwining between the medium and the message goes a stage further, with the creative practitioners and their tools, platforms, and methods being recursively tied into the medium and the manner in which the message can manifest.

Video games are a form of new media, whose novel affordances facilitate active participation and agency through player interaction with both content and digital systems, thus providing the player with the ability to direct or alter the course and outcome of the game (within parameters set or procedurally generated by the developers of the game) as it progresses (Copplestone 2014). This potential for co-creation and codependency between the player and the creator requires unique ways of crafting, structuring, and deploying content via digital systems and structures. In the process of crafting a video game the creator can leverage and mold content through audio, visualization (2D and 3D), narrative (explicitly via written elements and dialogue, or implicitly via environmental and interaction based storytelling), and systems (through engine code or front-end control scripts) in any multitude of ways that span a focus on an individual element, realistic simulation, conceptual simulation, or abstract interactions (Chapman 2013). These outcomes are bound by the hardware, software, skills, and methods that the creator has at his or her disposal. Thus the act of creating video games requires the developer to engage with content in ways that reference the technical limits of the medium; leverages methods in coding, art, audio, and narrative; has reference to the specific affordances of player interaction and agency; and interpolates with the data, frameworks, and interpretations of the content being included.

Archaeology is one such subject area in which the video game medium might be used for research or representation. The systems-based aspect of the video game medium has possible implementations for archaeological simulation or environment exploration under a wide array of archaeological paradigms. However, the potential of the medium may prove to be especially meaningful for those working with paradigms, such as post-processualism, that value aspects of multivocality, nonlinearity, co-creation (with the players), and player agency given that these elements are afforded in the inherent structure of the medium and thus can manifest natively (Copplestone 2014).

Given this potential of the video game medium it is perhaps unsurprising that archaeologists—such as Reinhard (2013), Graham (2015), and Dennis (2015) to name but a few—have been taking an increasing interest in how video game creators have represented the content of archaeology through audio, visual, and inferred code systems in games such as World of Warcraft, Tomb Raider, Uncharted, Minecraft, and Destiny. Other archaeologists, such as Johnson (2013), have honed in on the role of the players and their relationship, understanding, and interactions with the archaeological content displayed in video games such as Skyrim, while others, such as Morgan (2012) and Giles et al. (2012), have modified games already in existence or built their own games from scratch using engines such as Twine or Unity as a way to portray and engage with the practices and processes of creating games or modifications to games.

While practitioners within the archaeological discipline have begun to engage in creating their own outcomes, the practices of knowledge sharing or co-creation between developers from the video game industry and archaeologists is not yet fully developed.
common. My MSc research demonstrated that the result of this disjunction is that many of the video games about archaeology produced by the video game industry include potentially problematic representations of the past (Copplestone 2014). In addition to this it was demonstrated that many of the video games produced by the archaeological discipline do not effectively leverage the inherent affordances of the video game medium. As such, this brief article will build on the issues identified through my MSc by asking what we can learn—about archaeology, media, and the process of knowledge formation—from the practice of creating video games about archaeology alongside other creative industry practitioners. To this end, it will briefly overview Adventures in the Gutter—a game created by a team of archaeologists, game designers, and writers as part of a game jam—and posit, through self-reflection, how the video game media form and the practice of creating through it might influence how archaeological interpretation and communication can be conceptualized, structured, and subsequently engaged with.

Introduction to the Case Study—Adventures in the Gutter

Adventures in the Gutter (AitG) (Figure 1) was created over the course of a week by Luke Botham (level designer in the video game industry), Daniel Dunne (interactive fiction designer, writer, and PhD student), Andrew Reinhard (archaeologist and musician), and myself (archaeologist and digital tinkerer) for the “Adventure Jam” competition. Daniel produced the narrative script for the game (4,452 words), Andrew composed and recorded the music loops (4 × 30 second loops), Luke created the main code (5,426 lines), and I produced the artwork (10 comic strips plus interactive objects), narrated the script, and produced part of the additional front-end code. Luke and I were responsible for the concept generation, system design, and management of the team over the course of production.

The game, which was created in the Unity 3D engine (using both C# and JavaScript), uses a comic strip as its basis and gets the player to enter into the spaces between the comic panels, called “the gutters,” to make decisions and direct how the action unfolds between two known points—thus inviting the player to take on the role that archaeologists tend to have during the interpretive process, mediating and discussing outcomes, meanings, and narratives based upon data gleaned from entities such as artifacts, samples, or landscapes (see Figure 2). In AitG we tried to take this a step further, bringing the archaeologists themselves into focus, highlighting the role they have as interpreters, crafters,
scientists, and people in the wider archaeological process by getting the player to enact these choices. Once you have played through a “gutter,” the comic changes form to show your choice and its repercussions. One completed run through of the game can be seen below in Figure 3.

To this end you play as two archaeologists—one based out of the British Museum with a focus on excavation planning and interpretation while the other archaeologist is based in the field providing commentary from the trowel’s edge. You can see the character sketches for these two in Figure 4.

The voice-over is conducted as a third-party narration that interpolates between the two archaeologists, while the player’s interactions direct how this narrative can unfold. Playing the game multiple times in multiple ways will provide different outcomes, interpretations, and dialogue. The overall goal of the game was twofold: firstly, to investigate how creating branching, interactive narratives challenges the traditional methods of writing archaeological accounts; and secondly, to reflect on how the different elements of the creative practice for such a video game (the creation of art, code, and audio) differed, challenged, or reinforced traditional models of knowledge generation, categorization, or expression. While the content of the game was fictional, the processes, people, places, and objects were taken from archaeological method, theory, and practice.

Discussion
The act of designing and developing AiTG in a multidisciplinary team provided a reflexive space where we could explore the relationship between the video game medium and archaeological narratives in relation to our (often divergent) creative and knowledge formation practices.

Working alongside a writer and a programmer who had limited exposure to academic or fieldwork archaeology meant investigating how and why the practices, outputs, and interpretations we take for granted occur before probing how else
Figure 3. One completed run through of Adventures in the Gutter—many further permutations are possible based upon how the player navigates and influences the story.
we might choose to represent or engage with them through the video game medium. Throughout the process of designing the code, Luke and myself would often have conversations that boiled down to “but that’s not how we talk or write X in archaeology” and “but that’s not how X works in games”—where X could relate to interpretation, agency, processes, or understandings. Further discussions between the coding team, the archaeologists, and our narrative designer often examined the distinction between “how we write narratives about the archaeological past as archaeologists,” “how archaeological narrative might be constructed by a narrative designer,” and “how either of these might translate into a video game.” The more we discussed why these disparities occurred, the more we came to understand that our practices, theories, and interpretations have been influenced by the mediums and creative practices that we are embedded into—translating archaeology into the content and narrative of a video game—and translating the traditional creative practices of video games and narrative design for use with archaeology was not going to work from one isolated framework alone. Of particular interest in this discussion was the issue that many of the frameworks we use in archaeology to discuss entities such as multivocality, multi-linearity, and agency are manifest through mediums that do not inherently support these features (an issue that Hodder [1999] has previously discussed). Working with the video game media form, alongside practitioners from the industry, highlighted that directly translating the medium-bound accounts of traditional archaeology into a form that has different affordances is problematic and potentially does not leverage the medium to its potential. The medium, to reiterate, is the message, but the use of the medium is shaped by the frameworks, practices, and tools of the practitioners crafting through it.

As we crafted AiTG the team became aware of how the structure of the medium was asking us to explore not only the questions of reconstruction (what would it have looked or sounded like?) but also to explore more ephemeral and intangible areas (how would that decision be made? What would the experience and outcome of that decision be? How would it feel to be there and interact in that way) and subsequently work to translate them, through mechanics, audio, and visuals into an experience for the player. Here the unique interplay between creator and player afforded by the video game medium became evident. In traditional text-based accounts the writer tends to present one linear account and as such, the consumer of the text is a passive recipient of the information rather than an active participant or co-constructor of the account. In video games the consumer, through agency and interaction, can take a far more active role, experiencing and potentially co-creating alongside the narrator. To this end, as you craft the audio, visuals, and narrative, you are asked to think not just about what happened and how to represent it, but why it happened, how else it might have happened, how interpretation occurred, where the agency and interactions happened, what the experience would be, and how you, as a creator now, can translate that (through simulation or abstraction) into the video game medium and how your player will be able to interact and alter those entities. Thus, our role in archaeological interpretation and communication in creating AiTG, was not about telling but rather more about facilitating. To this end, the practice of creating through the video game medium, as part of an interdisciplinary team, provided a reflexive and novel approach to archaeological knowledge formation, interpretation, and communication.

**Conclusions**

Working with practitioners from outside the archaeological discipline meant examining the structures for knowledge formation, interpretation, and communication that are embedded into and indeed structured by the media forms that have traditionally been used as part of the archaeological practice. To this end the act of creating video games was an important, reflexive exercise in how knowledge is, could, or should be interpreted and communicated in the archaeological discipline (Copplestone 2014).
Creating AiG was also an exercise in exploring how the traditional practices of video game development reinforce particular views of archaeology through the tools, methods, and normative system implementations leveraged in conjunction with the video game media form, thus feeding back into the current research being carried out by archaeologists regarding the rendering of archaeological content in externally produced video games. By working alongside a game development professional we were able to reflexively identify how our practices and frameworks interpolated with the video game media form and subsequently discuss how we might otherwise implement alternative practices.

In conclusion, video games offer multiple novel ways through which to explore archaeology, its practitioners, frameworks, and outcomes. These benefits range from the analysis of content in postproduction, the analysis of player reception, the construction of our own games to fulfil an outcome requirement, or, as was demonstrated here, as a reflexive exercise that questions, through making explicit the relationship with the medium via creation, how archaeology is mediated, constructed, engaged, and presented.

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Dena Ferran Dincauze, the late twentieth century’s preeminent scholar of northeastern North American archaeology, died on August 14, 2016, in Amherst, Massachusetts, from complications following a long illness. She was 82. Dena was the editor of the Society for American Archaeology’s flagship journal, *American Antiquity*, from 1981 to 1984, president of the SAA from 1987 to 1989, and a faculty member in the Department of Anthropology at the University of Massachusetts Amherst from 1973 until her retirement in 2000. Her distinguished career was marked by a steadfast commitment to moving the Northeast out of the margins and into the center of archaeological inquiry; an indefatigable devotion to governance at the state, regional, and national levels; and a profound dedication to the professional development of her graduate students.

Dena was born on March 26, 1934, in Boston and despite her extensive travels was a lifelong New Englander. Dena spent her formative years in Concord, Massachusetts, and graduated magna cum laude from Barnard College in 1956. While an undergraduate in New York, she benefited from the tutelage and mentorship of Nathalie and Richard Woodbury with whom she remained personally and professionally close for the rest of her career. She went into the field for the first time in 1955 as a member of the River Basin Surveys Program in South Dakota when the team was shorthanded. When she inquired about returning on the project for a second year, her application was rejected on the grounds that women were interested in joining field crews only to seduce men. Dena shared the rejection letter with faculty and friends and “burned it ignominiously in a mock witches’ sabbath” (Dincauze 1992:131). Dena persevered and earned a diploma in prehistoric archaeology with distinction from Cambridge University in 1957 and a PhD from Harvard University in 1967 for her analysis of cremation cemeteries in eastern Massachusetts. For the next five years she held various staff positions at Harvard’s Peabody Museum including Research Fellow in New England Archaeology and Assistant Curator of North American Archaeology. After teaching for one year at the State University College at Buffalo, she joined the faculty at the University of Massachusetts at Amherst in 1973.

Dena joined the faculty at UMass not long after her mentor Richard Woodbury became the first chair of the recently independent Department of Anthropology. On the basis of a series of influential publications on New England archaeology, Dena was promoted to full professor in 1985. She received the UMass Chancellor’s Medal in 1989 for her exemplar and extraordinary service to the university. On the occasion of her retirement in 2000, several of her graduate students compiled a festschrift, *The Archaeological Northeast* (Levine et al. 1999), to acknowledge her influence on their work and on the archaeology of precontact New England. Dena was tireless in her dedication to graduate and undergraduate teaching and mentoring. She chaired dozens of doctoral and master’s students’ committees and advised hundreds more, including avocational archaeologists. Dena’s advisees have gone on to make important contributions to the field in both scholarship and service. Her excitement about the wonders of prehistory—and her willingness to share that excitement—was the key to her effectiveness as a scholar, teacher, and exceptional archaeologist. Her legacy will live on for many years to come through her intellectual progeny.

Dena’s numerous publications and presentations have made important contributions to the precontact Native history of eastern North America, environmental archaeology, Paleoindian research, materials analysis of ceramics and lithics, and cultural resource management. She held herself and her students to the highest standards and her carefully constructed arguments were always elegantly articulated. Just a few of her major works include *Cremation Cemeteries in Eastern Massachusetts* (1968), *The Neville Site: 8,000 Years at Amoskeag, Manchester, New Hampshire* (1976), and *Environmental Archaeology: Principles and Practice* (2000).

In addition to making substantial scholarly contributions, Dena’s professional profile exhibits a high level of engagement with professional service, especially to the Society for American Archaeology. Dena calculated that during her term as editor for *American Antiquity*, she received 640 manuscripts and selected about one-third for publication, which resulted in her editing and preparing for press 6,780 manuscript pages.
(Dincauze 1985:217). She served as the third woman president of the SAA but proudly pointed out that she was the Society’s first presidential mother and grandmother (Dincauze 1992:132). She also chaired three SAA committees, including the Committee on Public Archaeology, and was particularly supportive of the Committee on the Status of Women in Archaeology. For all of these contributions and more, she received the SAA’s Distinguished Service Award in 1997. She held a number of other high-level professional services positions in her career, including president of the Society for Professional Archaeologists (1984–1985) and executive board member of the American Society for Conservation Archaeology (1977–1979). Dena’s service to the field of archaeology extended far beyond the walls of the university and the profession. She served as the editor of the Bulletin of the Massachusetts Archaeological Society (MAS) from 1975–1980 and as the MAS representative to the Massachusetts Historical Commission from 1978–1989. She was recognized by the Massachusetts Historical Commission in 2001 with their Lifetime Achievement Award for contributions to cultural resources management.

Dena was known for her strong character yet quiet demeanor. Although not a physically imposing person, Dena carried herself in such a way that commanded the respect of those who came into her presence. She spoke as she wrote, each word carefully chosen and every sentence carrying significant meaning. Her friend and colleague Alice Kehoe described her best when she observed that Dena had a characteristic stance of steel encased in silk.

Dena is survived by her daughter, Jacqueline; son, Eric; four siblings; and two grandchildren.

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—Mary Ann Levine, Franklin and Marshall College, and Elizabeth Chilton, University of Massachusetts Amherst
Florence Lister died at her home in Mancos, Colorado, on September 4, 2016, at age 96. She is survived by sons Frank of Mancos and Gary of Estes Park, Colorado. Despite declining vision and mobility in her last few years, her interests in writing and lecturing about archaeology remained strong; her last public presentation was at the Crow Canyon Archaeological Center in October 2015, and she has a submitted manuscript awaiting publication.

Born in Idaho, Florence grew up in California. In 1937, her father returned from a trip to New Mexico with a tale of an earthenware pot unearthed by friends. This sparked her desire to learn about archaeology, which in 1939 led to a move to the University of New Mexico to complete a BA in anthropology.

At the UNM Chaco Canyon field school in 1940, she met Robert (Bob) H. Lister. They were married in 1942. After military service in World War II, Bob received a PhD at Harvard and joined the University of Colorado faculty. Florence became an unpaid pottery analyst on projects in western Colorado and Mexico, and also often cooked for the field crews. Work in northern Mexico inspired her and Bob to write Chihuahua: Storehouse of Storms (1966) with Florence as lead author.

In the late 1950s and early 1960s, she was employed seasonally to analyze pottery from the University of Utah Glen Canyon Project work, and also for the Coombs site excavations directed by Bob at Boulder, Utah. This resulted in her monograph Kaiparowits Plateau and Glen Canyon Archaeology: An Interpretation Based on Ceramics (1964).

After a stint in Nubia on the Aswan Dan “salvage” project, the “Lister team” moved into historical archaeology in the late 1960s, with a focus on the widespread production and distribution of the tin-glazed earthenware called maiolica. This resulted in visits to colonial period collections in Mexico, North Africa, and Europe, and a series of publications, most with Florence as the first author. One of their most frequently cited works is A Descriptive Dictionary for 500 Years of Spanish-Tradition Ceramics (1976).

The Listers also recognized the need for publications providing accurate information about archaeology for a growing and increasingly well-informed general public. Bob took the lead on coauthored books such as Chaco Canyon Archaeology and Archaeologists (1981) and Those Who Came Before: Southwestern Archaeology in the National Park System (1983).

The Listers retired to Mancos in 1988 and immediately began leading educational tours for the Crow Canyon Archaeological Center in Cortez, Colorado. In 1990, Bob died suddenly while leading a group of friends to visit a remote cliff dwelling in Utah. After coming to terms with the loss, Florence regrouped and continued to write and to lead programs for Crow Canyon and other organizations. On Chaco Canyon trips, she often partnered with R. Gwinn Vivian (now retired from the Arizona State Museum). They had met on that 1940 Chaco field school, when she was a student and he was the young child of park archaeologist Gordon Vivian.

The 1990s and early 2000s saw a stream of publications, most oriented toward the general public and taking a historical approach. This encouraged readers to identify with the archaeologists as individuals and their work as attempts to solve interesting puzzles. In addition to books on the Chimney Rock and Durango areas, she published her encyclopedic yet eminently readable volume on the first century of Mesa Verde archaeology—Trowel Through Time (2004).

Florence Lister was a remarkable scholar, friend, and colleague, whose indefatigable engagement with both the past and the present is best represented in her autobiography Pot Luck: Adventures in Archaeology (1997). Memorial donations may be made to the Florence C. and Robert H. Lister Fellowship at the Crow Canyon Center, 23390 Road K, Cortez, CO 81321. The fellowship assists graduate students in the final stages of writing a dissertation.

Florence Lister’s full bibliography can be found at the SAA website (http://www.saa.org/Portals/0/Lister%20Bibliography.pdf).

—Bill Lipe, Washington State University
The Pre-Columbian Society of Washington, DC will host its 24th annual symposium, “The Pre-Columbian Heritage of the National Park System,” on Saturday, September 16, 2017, at the U.S. Navy Memorial and Naval Heritage Center, Washington, DC. Scholars will examine current and past archaeological investigations at park sites throughout the United States, with particular emphasis on the Southwest, Southeast, and Midwest. For registration information as of May 2017, see the PCS website, www.pcswdc.org.

National Park Service’s 2017 Archaeological Prospection Workshop

The National Park Service’s 2017 workshop on archaeological prospection techniques entitled “Current Archeological Prospection Advances for Non-destructive Investigations of the Pea Ridge Civil War Battlefield” will be held May 15–19, 2017, at the Pea Ridge National Military Park in Benton County, Arkansas. Lodging will be in Rogers, Arkansas, at a motel to be determined. The lectures will be at a meeting room in Rogers, Arkansas, at a place to be determined. The field exercises will take place at the Pea Ridge National Military Park. The park commemorates the March 7–8, 1862, Civil War battle between Federal and Confederate troops in northwestern Arkansas. The resulting Federal victory kept the State of Missouri in the Union. Co-sponsors for the workshop include the National Park Service’s Midwest Archeological Center, Pea Ridge National Military Park, and the National Center for Preservation Technology and Training, as well as the Arkansas Archeological Survey. This will be the twenty-seventh year of the workshop dedicated to the use of geophysical, aerial photography, and other remote sensing methods as they apply to the identification, evaluation, conservation, and protection of archaeological resources across this nation. The workshop will present lectures on the theory of operation, methodology, processing, and interpretation with hands-on use of the equipment in the field. There is a registration charge of $475.00. Application forms are available on the Midwest Archeological Center’s web page at https://www.nps.gov/mwac/index.htm. Payment may be made by credit card through the Friends of NCPTT for nongovernment employees. Federal employees may pay through a training form (SF-182) sent to the Midwest Archeological Center or by credit card through the Friends of NCPTT (NCPTT web page announcement). For further information, please contact Steven L. DeVore, Archeologist, National Park Service, Midwest Archeological Center, Federal Building, Room 474, 100 Centennial Mall North, Lincoln, Nebraska 68508-3873; tel: (402) 437-3529, ext. 141; fax: (402) 437-5098; e-mail: <steve_de_vore@nps.gov>.

SAA is looking for volunteers for our Government Affairs Network State Representative (GANSR) system! This network will comprise of a volunteer member in each state to keep SAA updated on state-level legislative and regulatory issues affecting archaeology. If you have a job that monitors state initiatives, or you already have an interest in this, please do volunteer.

The volunteers will be connected electronically to SAA’s manager, Government Affairs and will inform SAA about important state archaeological issues and when it is time to act on an issue before the state’s legislature or regulatory agencies. If you want to join the GANSRs, please contact David Lindsay (david_lindsay@saa.org) as soon as possible.


**CALENDAR**

**MARCH 29–APRIL 2**  
SAA’s 82nd Annual Meeting in Vancouver, BC, Canada

**APRIL 14**  
Registration Closes for SAA’s Tercera Conferencia Intercontinental in Oaxaca, Mexico

**APRIL 18**  
Online Seminar: Introduction to Archaeological Damage Assessment (2:00 p.m.–4:00 p.m. ET)

**APRIL 26–29**  
SAA’s Tercera Conferencia Intercontinental in Oaxaca, Mexico

**MAY 1**  
Submissions Open for SAA’s 83rd Annual Meeting in Washington, DC, April 11–15, 2018

**MAY 4**  
Online Seminar: Archaeological Curation for the Twenty-First Century (2:00 p.m.–4:00 p.m. ET)

**SEPTEMBER 7**  
Submissions Close for SAA’s 83rd Annual Meeting (3:00 p.m. ET)

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