

Mystery Cemetery: Teachers

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Acknowledgment: Many thanks to Steve Daniels and Nicholas David, the creators of “The Cemetery of Bilj” (*The Archaeology Workbook*, The University of Pennsylvania Press, 1982: 98–104). Their invented cemetery, with which Jerry Rutter and I beguiled our students in a beginning archaeology class at Dartmouth College, convinced me of the value of inventing a similar project for a variety of ages and making it three-dimensional.

Caveat: This lesson is an exercise in critical thinking and is not intended to expose students to genuine mortuary analysis or excavation strategies (for excavation, see AIA Simulated Dig lesson plans). Teachers must use their own discretion and knowledge of their students in introducing this lesson to their classes, since the excavation and analysis of burials is a culturally sensitive issue. This analysis of a small 3-D cemetery is designed to teach students a variety of observation and inference skills needed in many disciplines. It is particularly relevant to archaeology, because students must use logic in interpreting material remains despite missing and insufficient information. The text of some handouts is informal and the tone is not always serious.

OVERVIEW

The cemetery mirrors in miniature some aspects of a cemetery that might be exposed by excavation. Fifteen small burials of plastic skeletons neatly laid out on a table represent the excavated section of a supposedly larger cemetery. The conceit of the already exposed burials avoids the difficulties of creating and conducting a simulated dig. The burial goods intentionally avoid culture-specific clues, not only in order to keep costs down, but also to force students to rely on logic rather than on inferences about culture. Teachers may choose to modify this lesson to include specific cultural clues.

The goal is for students to draw logical conclusions about the gender, age, and status of the skeletons, first identifying and using one piece of hard evidence, and then identifying and correlating attributes to group the burials into logical categories. This is both fun and frustrating, and students will be tempted to leap to conclusions that cannot be substantiated. The teacher may tell an exciting story at the end of the exercise to explain the cemetery, while emphasizing that the surviving evidence alone would not in fact have revealed the story. It is one of the

frustrations and realities of archaeology that the story behind the finds we excavate is not always handed to us!

The burials are represented on a colored map as well as in 3-D form. A second map represents the cemetery after another season of digging, when even more tombs have supposedly been exposed. As a follow-up exercise, once students have come to their conclusions (ideally stated as hypotheses) about the existing evidence, they can look at the second map to see whether their ideas have been validated in the course of further excavation. Alternatively, the lesson can be made more complex if students are given the larger map to begin with. If a teacher cannot afford the time and expense of the 3-D cemetery, it is possible to work with the map(s) alone, or with laminated images of the photographs included here. It is also possible to uncover burials one by one to mimic excavation. Two black-and-white maps allow the teacher to customize the assignment and ask students to color code or to create or label their own key. When students are given a colored map with a key at the beginning of the project, they tend to look less carefully at the 3-D site.

GRADE LEVELS

The cemetery analysis applies to a variety of disciplines and subject areas. Teachers of history, science, math, art, and ancient language have found applications for this lesson in their curricula. As presented, the cemetery project is primarily intended for high-achieving students of grades 6–10, but it can be modified for other ages. College students and adults thoroughly enjoy the cemetery, but finish the analysis far more swiftly. The analysis is a challenge for all ages, since it requires self-control to avoid being sidetracked by assumptions and inferences. The teacher can reduce or increase the number of burials or artifacts to suit different grade levels and can also spell out for younger students what groups they can expect to find.

GOALS

Essential questions

- How does categorizing help us decide what to believe?
- How can organizing and categorizing help, or limit, interpretation?
- How is understanding affected by missing or insufficient data?

At the end of this exercise

Students should understand that

- in archaeology, as in many fields, it is often not possible to arrive at a complete answer (“truth” is not necessarily attainable).
- patterns enable us to draw conclusions and make predictions.
- context (associations) is an essential element of interpretation.
- the most interesting inferences are often irrelevant or non-productive.

Students should know

- the meaning of the terms attribute, variable, correlation, and context, and their function in categorizing and analyzing.
- an “if... then...” format to express a hypothesis.
- the function of a top plan.
- the difference between an artifact and a feature

Students should be able to

- observe attributes and variables and categorize meaningfully.
- separate observations from inferences.
- present conclusions in a hierarchy of importance.
- develop a hypothesis to explain data.
- read a top plan.

MATERIALS AND PREPARATION

Initial preparation takes several hours, and this is not a “let them at it and leave them alone” kind of assignment. The teacher must find and buy objects, set up, and learn the rules and the key. Students must be guided fairly constantly throughout the process, so the teacher must thoroughly understand the project and have thought through all its aspects for him/herself.

On a table, the teacher lays out 15 burials, 12 in the main area of the cemetery, and 3 in an area walled off to the north by pennies or some other easy-to-find divider. The project challenges students to group burials according to gender, age, and status by virtue of observing attributes of burials, correlating them, and creating logical groups. I allow students to work together and ask each other questions, but they must write up their work separately.

Number of students

Ten students per cemetery of 15 burials is ideal. Students not viewing the cemetery can use the map. The greater the number of students viewing one cemetery, the longer the project may take and the harder it is for students to observe properly. The cemetery can be made larger, or several cemeteries can be set up around the room.

Materials

Halloween suppliers and hardware and gardening stores are your friends.

- 15 small skeletons of three sizes. (I have found foot-long rubber skeletons for as little as \$1.00 each.)
- Nails and screws for weapons.
- Silverware baskets of varying widths and colors for coffins.
- Small “gemstones,” found at craft and bead stores.
- Silver and gold washers for ornaments.
- Metal and ceramic “headstones” (the metal ones are pulls of some kind from the hardware store, while the ceramic pieces, from the garden supply store, are small stands to hold the bottoms of ceramic pots off the ground).
- Popcorn kernels.
- Small beads or ornaments, including marbles, decorative glass marbles or flat shiny used in vases, or the glass gaming pieces from mancala games.
- Black rocks (some painted white on top with white-out).

Cemetery maps and burial photographs

Maps of the cemetery and digital images of the individual burials are available on the AIA website. PDF handouts of all the images and maps are available for download.

CLASS TIME

While adults can accomplish the analysis in an hour or so, it may take students up to four class periods (at least 45 minutes each), not including time spent introducing the concepts. The assignment can be simplified fairly easily—either to suit different age levels or for swifter completion—by eliminating some of the burials or burial goods, and thereby reducing the possible number of associations to consider. Additionally, explaining to students exactly what is required (the number of categories that exist to be found, how to present their conclusions in a bullet-pointed key) can reduce the time and the analytical effort required while still providing a useful model of how to problem-solve and categorize.

PROCEDURES**Introductory exercises**

The goal is for students to discover that there exist distinguishable attributes and variables and attributes for at least two levels of status (royal and non), two genders (male and female), and three ages (baby, adolescent, and adult). The “odd” tombs must be explained separately (see answer key). They have mixed gender, age, or status clues as well as unusual features, such as missing body parts, and include artifacts and attributes different from those in the rest of the cemetery. There are also geographical considerations: to the east are “poorer” tombs and to the west are “richer” tombs.

Male children are buried to the south, while female children are buried near their mothers (a poor baby girl on the east, a royal adolescent girl on the west).

1. First, students conduct observation-inference exercises that reinforce the distinction between what they can observe and what conclusions they can safely draw, with special stress on the unreliability of inferences that are based on little evidence. I have used the "Boy in the Water" exercises from the Bureau of Land Management's archaeology workbook, *Intrigue of the Past* (which works for all ages, even if only to start a good conversation).
2. Students move on (if they do not yet know the term) to learn the definition of "artifact" and to practice categorizing artifacts that are familiar and easy to work with: first, clothes in a closet, and then M&Ms. I introduce an "if... then..." format ("if X is true, then I will expect to find Y") for testing one's assumptions. For an overview of archaeology basics, see *Basics of Archaeology for Simulated Dig Users*.

CLASS 1

In my class, we conduct observation-inference exercises that reinforce the distinction between what one observes and what conclusions one can draw, with special stress on the unreliability of inferences that are based on little evidence. I have used the "Boy in the Water" exercises from the Bureau of Land Management's Project Archaeology workbook, *Intrigue of the Past* (see <http://projectarchaeology.org/> for details).

Students learn the terms "artifact" and "feature" if they do not know them. As we then start to tackle the concept of categorizing, I write the terms "category," "attribute," "variable," and "correlation" on the board, without defining them. At the end of the lesson the students should be able to define them without help.

Clothing in closets: identifying and categorizing attributes

We start to categorize the clothes in my students' closets by identifying the attributes we consider significant. Our school requires uniforms, and everyone generally agrees instantly that the uniform has its own section of the closet. Discussion permits each student to participate. Those who are messy reveal that "absence" is a variable of the attribute "organization" of their closets, while neater students discuss the variable "presence of organization." As the students discuss how they organize clothing, I write the names of the artifacts, attributes, and variables on the board and categorize them with the class.

Categories of attributes will vary by school and by gender, but may emerge something like this

- organization: presence vs. absence (teaches that absence

as well as presence is a variable)

- uniforms vs. "normal wear"
- dressy vs. daily wear
- tops vs. bottoms
- shirts: sleeveless, short-sleeved, long-sleeved
- pants vs. skirts
- and so on . . .

We discuss why we categorize: for example, for convenience or for a sense of order; then we transition to more meaningful categorizing: to avoid danger (for example, noticing and categorizing the attributes of two pools of fish, one filled with piranha and one with goldfish, could prove helpful). Categorizing can help make meaning out of data.

M&Ms: correlating attributes

Next we transition to a focus on correlating attributes after identifying them. This exercise is even more fun if the students bring in M&Ms to work with and eat. I assign plain and peanut M&Ms to one category. (We discuss how including other candies might change the category, since we might want to separate out the nut M&Ms into a group with nuts, or to keep plain chocolates all together). I ask for attributes of M&Ms and we immediately assign variables to each attribute, still without defining the terms formally.

Attributes (variables)

Shape (round, oval)

Height top to bottom (tall, short)

Size (large, small; ones with nuts may vary according to the size of the nut)

Color (all colors are now possible with seasonal M&Ms)

Nuts (presence or absence)

Students may also include shell integrity (cracked or not), melting (presence or absence), and other attributes.

Correlating

As a last stage, we correlate "taste" with "color" and its variables—and everyone realizes that this is not a meaningful correlation, since all colors taste the same! Then we correlate "taste" with "nuts" (presence or absence), and everyone realizes that this is a meaningful correlation. Immediately we turn to a definition of the terms on the board, and the class helps define the four terms (category, attribute, variable, correlation) in simple language: categories = groups of artifacts associated because of shared attributes; attributes = characteristics of an artifact; variables = possible variations in the characteristics; correlation = association of one or more attributes.

CLASS 2

After we thoroughly discuss the project, its goals, and how it will be graded, students have time to observe. The students' first goal is to observe the cemetery closely and find some hard evidence for gender and status. I tell them that the skeleton size is a good indicator of age (small = baby, medium =

adolescent, large = adult). I hope some will observe closely enough to notice a clue: beads spelling the word k-i-n-g in burial 10 (one can avoid the problem of English “king” by using Greek or Latin or other languages). If no one notices the clue, I give hints. I chose to use beads in order to avoid having to use cultural clues or to ask students to start with assumptions, even ones that are frequently valid, such as “males may have weapons,” and “rich people will have more burial goods than poor people.” Instead of starting with these assumptions, students need to find the evidence for gender, age, and status, and work from it to group the burials. I assure the students that I am not trying to trick them; thus the beads do indicate male gender and royal status, while the size indicates adult age. We start to observe all the artifacts and notice variables. An example is coffins: presence and absence; wide and narrow; long and short; green, purple, and white.

CLASS 3

The second goal (Worksheet A) is for students simply to continue to notice and record what is there: skeletons, artifacts, and their attributes. They should not start with their assumptions about gender, but rather should observe attributes and variables of the known adult male king in burial 10. When they are ready, they look around for people with similar artifacts and attributes, and start to notice patterns.

CLASSES 4–5

The third goal (Worksheet B) is for students to start correlating various attributes to see if they can be joined into seemingly meaningful groups. They start with what they know (tomb 10’s royal adult male) and proceed to make correlations and identify groups of burials that seem to belong together. Starting with one or two artifacts, students ask themselves questions, ideally in an “if..., then...” format. At first, they do not know which attributes denote adulthood, which male gender, and which royalty. The presence of many burial goods and of “gemstones” generally leads to a preliminary association of these qualities with royalty, and most students associate weapons with men. Since they have been asked not to assume, however, they need to test some correlations to see if they seem to work. For example, a student might say to herself, “If #10 has a weapon and a wide coffin and if those are attributes of male gender, then I will expect to find that all people with weapons have wide coffins.”

Students will start to notice that large skeletons with weapons do share wide coffins, while smaller skeletons with weapons do not have coffins. Skeletons with weapons also share headstones, feet pointing north, faces turned to the east, and disks (washers). Slowly students should identify a subgroup of “men” with fewer and different artifacts, whose coffins are a different color and whose headstones are of a different material, and they can identify them as a “non-royal” group. They

may start to see that young (small) skeletons have translucent versions of the ornaments the larger skeletons have. They notice that there is a group with urns (instead of headstones), with no weapons, and whose bodies and faces point in a different direction. While it is not totally clear that these are “women,” it is clear that they are a different group.

Since there is very little hard evidence for them to use, students are of course making inferences as they go, but their job is to base them on logical groupings founded on knowledge of the attributes in tomb 10, and to avoid speculating (or at least to avoid mixing up speculation with observation). This is extremely difficult for everyone, including the majority of adults who attempt this exercise.

The final day is a wrap-up day on which students have the opportunity to suggest what they expect to find if they dig further. They express their hypotheses as “if..., then...” statements they can refute or validate by looking at the expanded map # 2. The teacher can also satisfy students’ curiosity by telling a story about the cemetery.

ASSESSMENT

Lastly, students must decide how to present their conclusions. Some cannot step back and easily see the big picture. The teacher must decide, based on students’ abilities, how much to guide them and whether or not to explain to them how to present their analysis. I have found that very few dare to create as succinct a key as I have provided (see *Key to Burial Groups*), despite the fact that I request succinct summaries and give A grades for them. Students must, at the least, be able to identify the gender, age, and status of each person except the burials in the walled off group, and be able to say which attributes are associated with gender, age, and status. They must explain what is odd about the oddities on the basis of knowing what is normal on the other side of the wall. I give my students considerable leeway as to how to present. Thus they may state their conclusions in brief, noting that all “adult non-royal females” share X, Y, and Z attributes (etc.) on a bullet-pointed key, or (less effectively, but providing more fun) they may illustrate each tomb, color coding the elements that identify the body’s gender, age, and status, or they may choose any number of other alternatives. For easy grading—and a far faster analytical process—the teacher can explain and require a chart or bullet-point key of the sort included here rather than letting the students wrestle with how to categorize and present. Both fun and frustration are thereby lowered.

SUMMING UP

Students should have time to present some of their conclusions and show their varied approaches. The teacher should take the time to review the key and discuss any alternative views of the evidence.