

Chapter 1

An Introduction to Quantification in Archaeology

If archaeologists do anything, it is count. We count stone, bone, potsherds, seeds, particles of earth, buildings, and settlements—virtually everything that constitutes the archaeological record. We also measure essentially everything that we touch. Length, weight, thickness, depth, volume, area, color, and height are only some of the simplest measurements taken. We are only being slightly facetious when we state that our predilection for counting and measuring ensures fame (if not fortune) to anyone who brings to our attention some forgotten or never known aspect of the archaeological record that we should be counting and/or measuring.

While we know a few exceptions, most of us are in the counting and measuring business not for its own sake, but to help us fashion a meaningful perspective on the past. Quantification isn't required to back up every proposition that is made about the archaeological record, but for some propositions it is absolutely essential. For example, suppose we proposed an idea about differences in Clovis and Folsom adaptations in North America that could be evaluated by examining the variation that exists across the projectile point technologies that are a component of those adaptations. Having observed hundreds of the projectile points, we could merely assert what we felt the major differences and similarities to be, and draw our conclusions about the validity of our original idea based upon our simple observations. We could well be correct, but no one would take our conclusions seriously unless we actually took the relevant measurements and demonstrated that the differences and/or similarities were meaningful in a way that

everyone agreed upon and understood. Quantification and statistics serve this end, providing us with a common language and set of instructions about how to make meaningful observations of the world, how to reduce our infinite database to an accurate and understandable set of characterizations, and how to evaluate differences and similarities. Importantly, statistics also offer a means to make arguments about cause that will ultimately help us construct explanations.

As important as statistics are, we must remember that they are only tools, and subservient to theory. Our theoretical perspectives tell us which observations are important to make and how explanations are constructed. Statistics are useful only within this larger context, and it is important to remember their appropriate role. It is also important to recognize that the use of statistics does not equal science. The historical confluence of events that brought statistics, computers, the hypothetico-deductive method, and the theoretical advances of the New Archaeology to our discipline in a relatively brief span of time in the 1960's make it appear that they are inseparable. Nothing could be further from the truth. While this might seem self evident, at least one recent and quite popular introductory textbook to archaeology overstates the relationship, as a discussion of the role of science in archaeology begins with a brief discussion of statistics. Not the role of theory, not the scientific method, but statistics! Statistics do not a science make, and statistical analyses conducted in the absence of theory is merely vacuous description.

This book approaches quantification and statistics from the perspective that they are a simple set of tools that all archaeologists have to know. Most readers will use statistics innumerable times throughout their career. Others may never calculate a mean

or standard deviation willingly, but at least they will know the basics of the statistical tool kit. Choosing not to use a tool is fine. Remaining ignorant is unfortunate and unnecessary. At the very least, knowledge of statistics is necessary to evaluate the work of others who do use them.

So, why should two archaeologists write a book about statistics when there are thousands of excellent statistics books in existence? Here are our reasons, in no particular order. First, few of us entered archaeology because we wanted to be mathematicians. In fact, many archaeologists became interested in archaeology for very humanistic (or even romantic) reasons, and many avoided math in school like the plague. As a consequence, there definitely needs to be book that is sympathetic to those coming from a non-quantitative background. We have tried to achieve this goal by attempting to present the clearest description of techniques possible, and no math more complicated than simple algebra.

Second, most statistics textbooks use examples that are not anthropological, and some that are very hard to relate to the archaeological record. While knowledge of dice examples are useful when playing craps in Las Vegas, the implications of these examples for archaeological studies are often difficult to decipher. Our examples are almost exclusively archaeological or anthropological, and we hope that they provide good illustrations of how one might approach various archaeological data sets from a statistical perspective.

Third, archaeologists do not always need the standard set of statistics that are presented in popular texts. Some techniques of limited importance to archaeology are

over-emphasized in these texts, while other extremely important statistical methods are under-emphasized or do not appear.

Fourth, it is our observation that many degree-granting programs in archaeology are focusing solely on computer instruction in quantitative methods rather than on the tried and true pencil and paper method. We have nothing against the use of computers and statistical software, as long as they are used by people who first learn statistical techniques by putting pencil to paper. Otherwise, the computer becomes a magic black box that produces statistical output that students ignorant of what actually happens inside the box are trained to interpret. This lack of understanding can cause confusion and, more importantly, embarrassment when insupportable or erroneous conclusions are drawn. These poor under-trained students need a friendly text to which they can refer.

Hopefully, this text will serve all of these roles.