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Analogical Reasoning

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Preface

A great deal of anthropological practice revolves around the comparison of human similarities and differences. The predominance of comparisons in anthropology, particularly in archaeology and physical anthropology, places analogy at the forefront of anthropological theory and practice (Stepan 1990). My attention was drawn to this topic because the use of analogy is rarely discussed at either undergraduate or graduate levels, yet its importance to the theory and practice of anthropology is integral. Still, there are some in academia who reject this and regard analogy as subjective, poetic, un-scientific, and ultimately nothing with which they should be concerned. My goal in this paper is to demonstrate that analogy, theory, and practice are intimately linked and that all anthropologists should be careful and reflect on how they construct and use analogies. In many instances the effects of false analogies are not benign and can have serious social, political, and academic repercussions.

Introduction

On a basic level, analogy is the relationship between two things which are similar in many, though not all respects. In logic, analogy assumes that if two things are similar in one or more respects, they will be similar in other respects. In anthropology, we often construct and create categories or classifications that are then compared to arrive at what are hopefully some new and useful inferences (Durrenberger and Morrison 1977). For instance, archaeologists have used ethnographic accounts of the symbolic meaning of secondary burials to better understand similar behaviours in past cultures (Weiss-Krejci 2001; Kuijt 1996; Parker-Pearson, 1999). The debates that arise within anthropology and other disciplines about analogy are centred on a principal question: How do we, or can we, make justifiable arguments based on analogy? Branching off from this primary concern are questions of method and theory: How do we use analogy? How are similarities and differences chosen? When using analogy to explore relationships across large expanses of time, how much does the present inform us about the past, and vice versa? These elemental questions have led me to ask the following: Can we use the present as an analogical, and thus theoretical, tool to understand the past? How does the use of analogy create contingent...
representations and what effect does it have on how anthropologists define civilizations/cultures? What is the relationship between analogy, theory, and practice? Is analogy inescapable? What are the benefits and what are the pitfalls of analogical reasoning?

I will argue that justifiable arguments from analogy are attainable, and that they can provide useful insight into understanding the past. However, I think that a proper use of analogy is demanding because at a practical and theoretical level, it is intimately tied to, and influenced by, social metaphors and narratives. Consequently, reflexivity is necessary to limit the influence of these biases. Furthermore, analogies often suffer from several structural or logical problems independent of cultural or political bias. These must be acknowledged and dealt with as well. In my paper, I've chosen to illustrate these difficulties through the use of a number of short case studies. I will begin by first elaborating on my definition of analogy. I will then explore what makes a good analogy, how analogy relates to anthropological theory, and what analogy can be used for. Following these introductory arguments I will present a number of case studies that exemplify some of the problems in the use of analogy. The subsequent sections will cover the relationship between analogy, theory, metaphor, and how analogies are created. The final section will reveal some proper uses of analogy in anthropology.

What is Analogy?

As I mentioned earlier, analogy establishes a relationship between two things that are distinct, yet similar in many respects. In anthropology, and in other fields, this basic idea or concept of analogy should not be used to formulate analogical arguments. To do so would be to reduce analogy to a form of simile. Strong analogical arguments in anthropology incorporate and establish a relationship of "partial similarity that involves a consideration of differences as well" (Wylie 2002:147, italics mine). The emphasis on differences is essential to constructing valid analogical arguments; to neglect differences is to create a false or simple analogy, which is a logical fallacy (Wylie 2002). The realm of simile with its strict adherence to similarity (McGavin, 1989) is thus inadequate if we are to draw out useful inferences from analogy. As metaphors incorporate both similarity and dissimilarity (McGavin, 1989), they are perhaps a more useful hermeneutic tool. I will discuss the relationship between analogy and metaphor in greater detail in a number of subsequent sections.

Closely related to the proper consideration of similarities and differences is the issue of relevance. Full causal relationships are not necessary, but the analogs must share "determining structures" for relevance (Weitzenfeld 1984, 143; cited in Wylie 2002). This is akin to the problem of homology vs. analogy in biology.

In addition to a full consideration of similarities, differences, and relevance, a good analogy will have modest conclusions relative to the number and strength of the premises (Wylie 2002). This avoids problems of amplification: that conclusions can claim relationships that are not supported or are overextended beyond the foundation of established premises of similarity. Thus, the number and strength of inferred similarities must be greater than the conclusions drawn. For instance, arguments such as social Darwinism "so far overreach what the premises establish with respect to the similarities between sources and subjects that they exemplify [the] fallacy of simplistic analogy" (Wylie 2002, 151).

Analogy in Anthropology

Many academics consider analogy as part of, or embedded in, theory and subsequently in practice (Gould 1989; Wylie 2002; Rorty 1991; Stepan 1990). In anthropology, and particularly in archaeology and physical anthropology, theory is often used by "extending an established theory to new domains" (Wylie 2002, 148). Hence, theoretical inferences are always analogical: "the connections between material and behavioural or other variables - the determining structures or relations of structural and functional interdependence - are just what archaeologists cannot observe directly" (Wylie 2002, 148). We cannot observe events or things as they happened on their own terms in the past, so we rely on analogy and what we know about the present to compensate for this impediment.

There are a variety of structural forms of analogy, but many in anthropology take the form of the four-place analogy (Durrenberger and Morrison 1977). Four-place analogies are also variable, but some common forms are: A:B::C:D, A:B::B:C, and A:B::C:B (Durrenberger and Morrison 1977). Four-place analogies are read as follows: A relates to B as C relates to B, or ArB=CrB. The A and B grouping is called the subject-side relationship or context, while the C and B group is the source-side...
relationship. The four-place analogy A:B::C:B, is common in archaeology as ethnocentric analogy. In this association, cultures A and C are comparable because they share some similarity B. Thus, inferences of meaning can be made for some object or practice for a past culture if similar objects or practices are found among existing cultures. The following case studies demonstrate some of the more fundamental hazards to creating justified analogies.

Case Studies

"[W]e observe according to preset categories, and often cannot “see” what stares us in the face" (Gould, 1989: 128).

Stone Gorgets

This first case study is a summary of a fine example offered by Wylie (2002). Curren (1977, cited in Wylie 2002) analyzed groundstone gorgets and compared them to modern pottery-making tools. He concluded that the stone gorgets were used for pottery making on the basis of shape and edge treatment. Specifically, they had “thin with curved and beveled or serrated edges and central perforations” which are very similar to modern potter’s tools (Wylie 2002, 149). The similarity was strong, but Curren also accounted for a negative analogy, or potential difference, that modern potters’ tools are not made of stone (Wylie 2002). Curren (1977, cited in Wylie 2002) argues that this difference is not significant because modern pottery tools are made with a wide variety of materials. Subsequently, Curren (1977, cited in Wylie 2002) concluded that material was not a relevant difference and that the morphology/function relationship still held. Curren considered a wide variety of source-side possibilities, made a strong case for similarities as well as a consideration of differences, and avoided any ampliative arguments. Yet, he ultimately failed in his efforts to establish a good analogy between stone gorgets and modern potters’ tools.

Curren depended too heavily on source-side evidence for establishing the appropriateness of looking at common features and concluding similarity of function (Wylie 2002). Additionally, Curren failed to confirm correlates in the subject-side context (Wylie 2002). In other words, Curren failed to uncover that stone gorgets are frequently found in preceramic contexts, thus greatly reducing any validity his arguments had (Starna 1979, cited in Wylie 2002). Curren’s critical error was to not test his analogy against available empirical evidence. Wylie (2002) argues that tests for relevance are crucial; archaeological (empirical) evidence is needed to establish proper correlation between subject (stone gorgets) and source-side (modern pottery tools) contexts.

Man the Hunter and Physics for Apes

I’ve chosen to emphasize chimpanzee analogies in this section because they are commonly (mis)used in physical anthropology. My first case example is Sussman’s (1999) article “The Myth of Man the Hunter/Man the Killer and the Evolution of Human Morality”, in which he challenges the assumption that chimpanzee behaviour can be used as a model for early hominid behaviour. Wrangham (1995, cited in Sussman 1999) argues that because chimpanzees and hominids underwent different evolutionary paths only six to eight million years ago, and since early hominids were somewhat chimpanzee-like morphologically, the earliest australopithecine must have been chimpanzee-like in behaviour. Consequently, the shared behavioural traits must be biologically inherited and rooted in a common evolutionary past (Wrangham, 1995, cited in Sussman 1999). Wrangham and Peterson (1996, 24, cited in Sussman, 1999) then argue that only chimpanzees and humans display “intense, male-initiated aggression, including lethal raiding into neighbouring communities in search of vulnerable enemies to attack and kill”. This argument implies both a predetermined violent human moral nature (Sussman 1999), as well as a potential biological excuse for human violence.

The relationship between chimpanzees and hominids is a simple analogy at best; the analogy fails to consider that the behavioural differences among all living apes are significant (Sussman 1999), thus placing serious doubt that the analogy shares any determining structures.

Wrangham and Peterson’s analogy also fails because some of the basic information is simply wrong. Chimpanzees are not rampant killers (Sussman 1999). Thirty-seven years of intense observation has yielded little supporting evidence for Wrangham and Peterson’s position (Sussman, 1999). Although hunting and occasional violence are not uncommon, chimpanzees have many social mechanisms at their disposal to avoid conflict. Additionally, Sussman (1999) adds that chimpanzees have been evolving as we have since our ancestral split six to eight million years ago; to assume
The analogy formulated by Wrangham and Peterson is tied into their beliefs about human morality, male aggression and ‘dominance’, and the origin of hunting (Sussman, 1999), as well as Christian beliefs about sin (Landau, 1991). Their science was deeply influenced by social metaphors. I am not suggesting that there is a ‘culture-free’ alternative that can be labeled ‘pure science’; science is a social exercise and notions of objective purity are naïve at best. My criticism rests mainly on the fact that Wrangham and Peterson failed to consider how their own biases were influencing their findings, that some of their basic data was wrong, and that they failed to consider some important behavioural/cognitive differences between chimpanzees and humans.

It is with this emphasis on differences that I wish to introduce another case study focusing on chimpanzees. What Sussman showed in the previous example was that formulating a simplistic comparison between humans and chimpanzees is specious reasoning. Povinelli and Giambrone (2000) call this the ‘argument by analogy’. The ‘argument by analogy’ states that because chimpanzees and humans often engage in outwardly similar behaviours, and because we are similar in many morphological ways, we can thus understand chimpanzee behaviour by using human cognitive models. Through this reasoning, the concept of the chimpanzee ‘theory of mind’, or the ability to recognize and “read” another’s thoughts was born (Povinelli and Giambrone, 2000). The most common example provided by primatologists is deceptive behaviour. In their book entitled “Folk Physics for Apes”, Povinelli and colleagues question these basic assumptions and the simplistic associations made by the ‘argument by analogy’.

Uncovering what the determining structures between human and chimpanzee cognition actually are is crucial to physical anthropology because chimpanzee analogical models are regularly used, particularly in paleoanthropology. Contingency of representation is clearly at work since ‘modernity’ and the development of hominid intelligence and culture are often assessed using analogies based on chimpanzee tool use, social behaviour and cognition. What Povinelli and colleagues argue is that the chimpanzee/human analogy has been passively accepted and that we have not looked at chimpanzees and their behaviour in their own terms (Povinelli, 2000). In short, we have humanized chimpanzees and then used these skewed perceptions as analogical models in recreating human evolution.

Povinelli and colleagues conducted an impressive array of behavioural experiments to test this received wisdom of primatology. In short, they concluded that the theory of mind does not hold (as it is currently defined) for chimpanzees (Povinelli, 2000). Chimpanzees do not perceive the world as we do; their cognitive abilities and processes, although complex, are often very different from our own (Povinelli and Giambrone, 2000). I will quickly illustrate one of the experiments that led to this conclusion.

The first experiment conducted by Povinelli and Giambrone (2000:20) was to test the idea that chimpanzees can understand that “others ‘see’”. Appreciating that others see is to recognize another’s mind and thoughts, at least in terms of human cognition (Povinelli and Giambrone, 2000). Moreover, it could be argued that “most of our social interactions begin with a determination of the attentional state of our communicative partners. [T]he appreciation that we see (and hence experience) each other is the glue that seems (to us, at least) to bind us to our communicative partners” (Povinelli and Giambrone, 2000: 20, emphasis in original).

Povinelli and Giambrone (2000: 22) tested this through a number of ‘gaze-following’ experiments that sought to deduce whether “the ape simply understands the behavioural configurations that lead to successful interactions, or does it also mean that the animal represents the caregiver as possessing (unobserved) internal attentional states?” The logic behind the tests was that if the chimpanzees shared cognition similar to humans (as the argument by analogy assumes), they would behave similarly to human infants. The results showed that chimpanzee behaviour, or the motivation behind a particular behaviour, was often very different from human infants. Specifically, the tests concluded that chimpanzee gaze-following is a product of directional cueing (related to predator identification among other things), and not of an awareness of internal mental states (Povinelli and Giambrone, 2000).

The gaze-following experiments were only a part of a wider group of tests that provide compelling evidence for considerable differences between chimpanzee and human cognition (particularly thought processes behind tool use), behaviour, anatomy, and evolution. Clearly then,
previous studies have overemphasized the more noticeable similarities. Again, Wylie (2002) is proven correct when she argues that considerations of differences are vital to the formation of valid analogies, as are tests for relevance. Povinelli and Giambrone (2000:72) should be commended for showing that “[n]ot only is our human way of thinking about the relationship between our mental states and our behaviour not completely accurate, there is a significant chance that it is not the only game in town”. Thus, Povinelli and Giambrone (2000) do not deny that chimpanzees have intelligence or significant cognitive abilities, but rather that they differ significantly from our own mental states and preconceptions of intelligence.

Modern Foragers, Hominids, and Tubers

O’Connell et al. (2002) argue that meat-eating did not play an important role in the evolution of hominids during the Pliocene/Pleistocene boundary. They use a variety of sources, including archaeological evidence, changes in skeletal morphology, geological evidence, and some deductive reasoning to provide an alternative hypothesis, yet they rest most of their argument on ethnographic analogy. O’Connell et al. (2002) observed the Hadza, a modern foraging people, and found that women, and especially grandmothers, played a central role in helping to provide food resources for the young. The food resources they depend on are USOs, or underground storage organs. These USOs are tubers or root vegetables and they are an excellent nutritional source when processed properly through cooking (O’Connell et al. 2002). O’Connell et al. (2002) argue that this ‘provisioning’ pattern can be used as a model to explain the changes in human anatomy and behaviour from H. erectus onwards. Specifically, this subsistence pattern is thought to have had several ripple effects, such as decline in adult mortality, later age of maturation, increased female fecundity, earlier weaning times, and a variety of other modern human traits that we see in the Hadza and in other groups (O’Connell et al. 2002). In short, the modern Hadza subsistence patterns, behaviours, and life-histories were used as an analog for those of H. erectus and later species of Homo.

I have great difficulty with this use of ethnographic analogy to aid in the reconstruction of early hominid behaviour, subsistence, and life-history. Contemporary Hadza culture is a product of the recent past; it is not a carryover from our African hominid origins. Even though O’Connell et. al. found (questionable) correlates in the archaeological and skeletal records that could support their analogy, I believe that they failed to establish the relevance of the connection. The standard logic in such comparisons states that since early hominids and more recent hunter-gatherers use similar provisioning patterns, they can be compared. Thus, the underlying assumption here is that the Hadza are directly comparable to our earliest ancestors. This assumption fails for a number of reasons. For one, variation in social behaviours and provisioning strategies even among the Hadza is considerable. Perhaps more importantly though, this argument presupposes some form of cultural and even biological stasis in assuming that Hadza cultures have been unchanging over time. In short, using ethnographic analogy to reconstruct the behaviour of prehistoric people is a hazardous adventure that can easily lead to interpretations that are little more than projections of the images we have of the ethnographic present onto earlier populations (Gamble et. al., 2001: 186).

Cultures are dynamic (Ortner 1984), they are constantly changing and reacting to internal and external influences; they are not bounded entities. While it is possible that H. erectus may have used USOs, their use likely occurred under entirely different social contexts and subsistence strategies. There is no empirical evidence, other than the fact that both the early forms of Homo and the Hadza forage for food, to suggest any form of continuity. Furthermore, we have changed considerably, physically and socially, by any standard since the time of Homo erectus. Finally, O’Connell et. al.’s argument requires the controlled use of fire to render USOs digestible. Yet, the controlled use of fire did not emerge until a much later period than the one O’Connell et. al. situate their argument (Boaz and Ciochon, 2001).

Structurally, O’Connell et. al.’s argument fails due to a lack of relevance, a failure to consider important differences, and amplification. The Hadza and H. erectus may share the similarity of a general foraging strategy, but that is where the relationship ends since O’Connell et. al. did not adequately support their argument by analogy. Ultimately, the conclusions reached by O’Connell et. al. greatly exceed the strength of their premises.
Gender and Race

During the late Enlightenment and into the early 20th Century, the "fact" that gender and race were strongly analogous was firmly entrenched in anthropology and other related fields (Stepan, 1990). The analogy stated that a "scientist could use racial difference to explain gender difference, and visa versa" (Stepan 1990: 39). In other words, the comparison affirmed that the "lower races represented the 'female' type of the human species, and females the 'lower race' of gender" (Stepan, 1990: 40). For example, women's lower brain weights and more 'primitive' brains were analogous to those of the lower races, and so intellectual inferiority could be explained via racial inferiority (Stepan, 1990).

As a result, women were considered in evolutionary terms as more 'primitive' or 'conservative', while men were evolutionarily 'progressive' (Stepan, 1990). Once entrenched in physical anthropology, this analogy soon permeated many complex comparisons involving physical, psychological, class, and national categories (Stepan, 1990), to the great detriment of women and other subalterns.

The gender/race analogy, which took the form of 'man:woman::white:black', is fraught with problems. To begin with, it suffers from basic structural and relevance difficulties. For instance, brain/skull size is proportional to body size; factor into the equation that women are smaller than men and we find that women have larger brains, proportionally, than men do (Stepan, 1990). As is the case with so many analogies, these researchers relied more on "expectations of the model" (Gould 1988: 132) than on proper consideration of the data. The structural problems with the analogy are a minor issue when compared to the fact that this was a case of culturally accepted metaphors (or narratives) of gender and race inferiority completely overpowering empirical evidentiary constraints. I will use this analogy in the following section to illustrate the relationship between analogy and social metaphors and narratives.

Analogy, Metaphor, and Theory

Social Metaphors and Analogy

The gender/race analogy is a powerful example because it clearly illustrates that the choice of analogy is neither neutral nor arbitrary. Facts (data) are created as much as they are "naturally" present. With current 'facts' and academic trends in physical anthropology, the gender/race analogy would have been discarded immediately after it was first proposed. In the gender/race analogy, long-standing European male ethnocentric biases of racial and gender superiority were given scientific weight through empirical evidence (Stepan, 1990). It is important to note that all the biometric evidence gathered was real, to the extent that they were accurate measurements. The important point is that the choice of data was highly selective and was conveniently used to serve and propagate social biases. Again, this does not necessarily imply a culture-free scientific alternative. My point here is that there was a failure to consider alternatives, to consider contradictory evidence. There was no self-reflection, no consideration of how the data was chosen. In short, "[A]nalogies [become] 'naturalized' in the language of science, and their metaphorical nature disguised" (Stepan 1990: 42).

As Stepan (1990) argues, the analogy here became the science itself; without it the scientific evidence was meaningless.

The gender/race analogy is valuable in understanding the power of, and the risk inherent in, the use of analogy because it illustrates how social metaphors interplay with empirical evidence. Analogy in theory or in practice makes use of linguistic structures, concepts, and groupings. It is nuanced and beyond simple comparisons. It is truly a metaphorical exercise. Naturally, culturally accepted metaphors will work their way into analogies allegedly based solely on empirical data. So, language is neither neutral nor objective; it does not put us in "correspondence with reality" (Jenkins 1995: 107). Richard Rorty (1991) argues that metaphors are the best way to understand how meaning is created and how it is attributed to language. Social metaphors are in essence the collection of beliefs in a society; they are our great stories, our popular notions, and our accepted wisdom. Landau (1991) uses the term master-narrative when she describes the underlying cultural biases at play in paleoanthropological reconstructions of hominid evolution. I believe that both Rorty and Landau are correct; metaphor and narrative share a close relationship. The space between the two is fluid and dynamic, as seen in the gender/race analogy where a dominant narrative of the time (the superiority of Victorian culture) was used metaphorically in evolutionary and social comparisons of hierarchical relationships. For Rorty (1991), metaphors are fluid; they change as cultural acceptance of those metaphors.
changes. Consequently, the fleeting nature of social metaphors should remind us of the historical contingency of received wisdom; our faith on current metaphors should not be held firm. As an extension, we should question accepted analogies and metaphors in science and not accept them easily as fact or truth; they are cultural products as much as scientific ones and they often run the risk of becoming ideology.

Emily Martin (1992), in her book *The Woman in the Body*, explores anthropologically how allegedly scientific analogies have their metaphorical roots in a wider social context, and ultimately, in ideology. One of Martin's best examples of the link between social metaphors and analogy is her historical review of the way biomedicine has understood women's reproductive systems and their monthly menstruation. Historically, Western women were considered to have reproductive systems that were analogous to men's, except that they were internalized, as opposed to externally visible (Martin, 1992). This basic analogy stood for hundreds of years, until new advances in 17th century Britain (Martin, 1992). The explanation for this external/internal difference arose from the belief that since humans possess more 'heat' than lower animals, and that humans were then considered more perfect or advanced, the same logic must hold true for men in relation to women (Martin, 1992). Although the mechanism of this analogy, heat, changed over time, the belief that women were somehow deficient or evolutionarily inferior remained (Martin, 1992). By the 19th century a woman's menstruation was considered to be pathological; Walter Heape, an ardent anti-suffragist, held firm that menstruation was something "hardly possible to heal satisfactorily without the aid of surgical treatment" (Lacqueur 1986: 32, cited in Martin 1992). The metaphors in medical textbooks, even today, describe menstruation as a process of disintegration, of death, and of expelling (Martin, 1992). As Martin (1992) argues, they convey failure and dissolution.

The social effects of this male-centered perception (or master-narrative) of the functioning of women's bodies resulted in a set of 'scientific' tools that could be used to continue to suppress the role of women in society. Reminiscent of the gender/race analogy, the science behind the 'heat analogy' of humans:animals::men:women, with its flawed 'scientific' assumptions of evolutionary progress and development, was supported entirely by social metaphors narratives, specifically the inferiority of women. In other words, the humans:animals::men:women metaphor already existed in the minds of many; the analogy was simply formalized through science. This analogy, like that of the gender/race relationship, contributed to sexism and the subordinate role of women in society.

Many of the examples I presented demonstrate that we approach each situation, voluntarily or not, with particular theories and presuppositions in mind. For example, the belief in the scientific truth of the gender/race analogy was unfounded, to give one example, because there are no 'given' points of measurement on the human body; thousands of variations and points are possible (Stepan, 1990). Convenient associations can and were easily constructed to suit the desires of the researchers. The case studies I presented demonstrate that the comparison of cultures and the use of analogy is inherently a cultural exercise in itself; one that is "rooted in and shaped by the interests and belief structures that constitute the context of the researcher" (Wylie 2002: 154). How do we choose what information to use? Why? Where is the boundary between 'good science' and cultural invention? Invariably, information is omitted or ignored (Stepan, 1990). It is crucial to remember that

[A] metaphor or analogy does not directly present a *preexisting* nature but instead helps "construct" that nature, the metaphor generates data that confirm to it, and accommodates data that are in apparent contradiction to it, so that nature is seen through the metaphor and the metaphor part of the logic of science itself (Stepan 1990, 51).

Clearly then, Diderot was wrong in the literal sense. Ideas are connected because we create those connections, not because they reflect some real or preexisting relationship. However, the spirit of Diderot's comment that ideas awaken one another is true, and it is here that analogy's greatest asset can be found.

"The primary use of ethnographic parallels...is simple. It is to widen the horizons of the interpreter" (Ucko, 1969: 262, cited in Parker-Pearson, 1999: 21)
Arguments for Analogy

Good analogies are possible, but they must be relevant and empirically justified. Furthermore, reflexivity and critical evaluation are crucial to limiting structural errors and cultural biases. The dangers are clear; analogies tend to fade easily into fact or Truth, and are often taken literally, as opposed to metaphorically. The effects of 'getting it wrong' or accepting received wisdom are not always benign.

The benefits of analogy are multiple. For one, analogy allows us to see similarities or differences that were once unnoticed (Stepan 1990). Additionally, this 'discovery' aspect of analogy allows us to gather new information via empirical research (Stepan 1990). Analogy allows us to expand our realm of possibilities, of what we should expect and consider (Weiss-Krejci 2001). This is echoed in Landau's (1991) argument that our master-narratives have the potential to create new hypotheses and avenues of research because they are dynamic and fluid. For archaeology and physical anthropology, analogy can provide strong forms of interpretive arguments, and more importantly, "strikingly creative insight about the cultural past" (Wylie 2002, 152). Although often problematic and flawed, non-human primate models are essential in our understanding of human evolution because they "permit the recognition of generally valid principles that cannot be identified through the study of a single species" (Martin 2002, 3). Additionally, primate analogy helps to avert narrow approaches to the study of human evolution (Martin 2002). Analogy will never offer certainty. No theoretical tool can. However, it can be used to reduce error, assess likelihoods, improve credibility of arguments, and diminish uncertainty (Wylie 2002, 153). The following case studies will better illustrate these beneficial uses of analogy.

Consilience

Gamble et. al. (2001), in an article entitled "An Integrative Approach to Mortuary Analysis: Social and Symbolic Dimensions of Chumash Burial Practices", deliberately set out to use multiple lines of evidence to construct justifiable interpretations of Chumash burial practices and patterns to establish when Chumash chiefdoms first appeared in the Santa Barbara Channel. The study of mortuary rituals is inherently problematic, there are countless ways that archaeologists arrive at erroneous conclusions if "they simply equate the distribution of artifacts in cemeteries with social organization" (Gamble et. al. 2001, 186). However, many studies have shown that constructive information about social relationships of the living can be gleaned from the patterns of treatment of the dead (Gamble et. al. 2001). The primary interpretive challenge for archaeologists is the "arbitrary nature of symbolic systems" (Gamble et. al. 2001, 186). Moreover, without detailed ethnographic information, there is "often no empirical basis for deciding among several equally plausible alternative social explanations of mortuary data" (Gamble et. al. 2001, 186). Additionally, Anders (1989) argues that we often describe cultures, and I would also add the definition of civilization, through models implicitly based on Western ideals or expectations. Facing these daunting challenges, Gamble et. al. (2001) approached the study of Chumash burial practices from many angles. They incorporated ethnographic analogy, bioarchaeological evidence, and artifact analysis (Gamble et al. 2001). Together, multiple lines of evidence, if they consistently converge to a single conclusion, greatly increase the strength of a hypothesis while dramatically reducing the validity of alternative explanations (Wylie 1993, cited in Gamble et. al. 2001). This concept is known as consilience, when multiple lines of evidence "jump together" to arrive at one conclusion (Gould 1989, 282). I will briefly illustrate how Gamble et. al. (2001) used ethnographic analogy in an appropriate way, as opposed to the methodology used by O'Connell et. al. (2002) discussed earlier in the paper.

The key to using ethnographic analogy is to remain aware of its limitations. Useful insights into a group's prehistory can be gathered from well documented ethnographic sources (Gamble et. al. 2001). Gamble et. al. (2001) used ethnographic information of the Chumash themselves, from the time of European contact, to establish inferential links to earlier pre-contact periods. In many ways, this is the ideal scenario (Anders, 1989) given the unpredictable variability of cross-cultural comparisons, particularly in mortuary studies. These detailed missionary statements allowed "identifications of the material manifestations of social behaviour in specific cultural context" (Gamble et. al. 2001, 186). Instead of directly relying on these accounts and projecting them into the past, Gamble et. al. (2001) took the ethnohistoric accounts and generated hypotheses that could be tested against the other lines of evidence.

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Specifically, one aspect of the mortuary analysis was to compare archaeological evidence from historic-period cemeteries to ethnographic and ethnohistoric reports of Chumash social organization and burial practices (Gamble et. al. 2001). This produced an "empirical basis for understanding the culture-specific ways in which, through symbolism of burial rituals, historic-period Chumash social relations are reflected in the archaeological record" (Gamble et. al. 2001, 195). This information, in conjunction with other lines of evidence, could then be used to understand earlier periods of Chumash history. Thus, they used ethnographic accounts from a period after European contact as analogs of potential behaviour for earlier periods. This is a clear example of how analogy can be used to create new ideas and gain insights into the past. The hypotheses generated from the ethnographic accounts were justifiable in that they accounted for similarities, differences, and relevance, in addition to corresponding to the empirical record.

Although I find Gamble et. al.'s work above par, I must also consider Galloway's (1992) criticisms of ethnohistoric analogy. Galloway questions the reliability and contingency of historic accounts by colonial imperialists in the New World. Clearly, there is a form of 'double contingency' at work; in the bias of the original records and in our use of them to reconstruct the past. I would argue that this is not structurally different in any significant way from moving between modern ethnographies and archaeological reconstructions of the past. No ethnography, past or present, is free of cultural bias and (mis)representation. However, Galloway's point is well taken; most colonials had explicitly biased motivations that would clearly not produce fair representations of Indigenous cultures. Thus, we must be vigilant in our awareness of the contingency of representation, we must consider the authors themselves, who they were, why they were writing, and who they were writing for (Galloway, 1992). In a sense, we must develop a form of anthropological critique that mirrors literary critique. In short, we must be highly selective in our use of historic accounts.

Secondary Burials and European Dynasties

Secondary burials are a common form of burial practice encountered in the archaeological record. A secondary burial generally has two phases: the original burial or treatment of the body, followed by exhumation, secondary preparation, and then a subsequent reburial, often with many other individuals. I hasten to add that this definition serves simply to illustrate the general form of secondary burials; specific practices vary tremendously (Weiss-Krejci 2001). One of the problems of interpreting secondary burials is distinguishing what aspects of the formation processes were culturally created as opposed to environmentally produced (Weiss-Krejci 2001). Weiss-Krejci (2001) argues that analogy can be a useful tool to explore the range of possibilities of formation processes, as well as what caused them. The aim is to create better understandings and interpretations of secondary burials. Weiss-Krejci (2001) used the secondary burial practices of the Babenburg and Habsburg dynasties as analogs to Maya elite burial practices. Weiss-Krejci's goal was not to establish a direct connection between the two. Rather, her goal was to explore how and why those European dynasties performed secondary burials and use that information as a window to understand the contexts of elite secondary burials in general, and potentially, Maya practices in particular. The ultimate aim of her research was to gather information on elite burial practices that could then be tested empirically against archaeological evidence from Maya sites. This study was particularly valuable in that it contained written accounts of Babenburg and Habsburg burial practices, so motives and meanings could be directly related to specific practices (Weiss-Krejci, 2001). This is significant in that written records, combined with empirical evidence, greatly reduce the uncertainty in understanding mortuary practices (Flannery and Marcus 1996, cited in Gamble et. al. 2001). This case study exemplifies how analogy can be used to expand our knowledge base and discover new relationships that might have otherwise gone unnoticed.

Conclusion

I have shown that the use of analogy in anthropology as a whole, and particularly in archaeology and physical anthropology, is unavoidable; it is part of every scientific (and non-scientific or literary) practice. I have demonstrated by example that a proper use of analogy is within reach (Gamble et. al., 2001; Weiss-Krejci, 2001), yet analogical arguments often deteriorate into assumptions that are founded on cultural metaphors/narratives unrelated to the data (O'Connell et. al. 2002; Stepan, 1990; Sussman, 1999; Wylie, 2002). These assumptions have sometimes masked the


