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**The Proper Role of Technology in the  
Determination of Cultural Affiliation**

***Abstract:***

Two types of technology are of particular recent interest to Aboriginal Peoples in the repatriation process. Currently, the supposed potential of one type of technology, genetic science, is overstated in the repatriation process. Conversely, the potential of another type of technology, computer-assisted relation of spatial information, is underutilized and underrepresented in the repatriation context. This paper surveys the reasons why attempts to utilize genetic science in repatriation should be abandoned, and more intensive efforts to use spatial information should be implemented instead. An example of successful utilization of technology applied to a set of information that is available, yet seldom used by the cultural heritage information community, to assess cultural affiliation.

## ***Introduction***

Determining the cultural affiliation of prehistoric remains and artifacts is often a difficult task for both archaeologists and aboriginal people. Two fields of science are, at the present time, of particular interest to those faced with assessing cultural affiliation as part of the repatriation process. But these two fields of science are of interest for somewhat opposing reasons. One field, the science of genetics, is frequently thought to be potentially helpful in the repatriation context. But, as this paper explains, genetics cannot be of much use in assessing cultural affiliation. Further, utilization of genetic analysis in repatriation is harmful in that the information generated by genetic analysis can wrongly be afforded more weight than is warranted in the face of information from other types of sources, which is more appropriately applicable in the repatriation context. The other field of science, use of modern methods of managing spatial information, such as Geographic Information Systems (GIS), can be particularly useful in the repatriation context, although utilization of this technology in repatriation efforts is only in its infancy. Archaeologists attempt to identify cultural affiliation based upon geographic location and the content of the archaeological record. Tribal people trace ancestry through oral information about occupancy and movement throughout a territory. Both of these spatial information sources can be brought together to assist in assessing cultural affiliation.

### ***Genetic Science: False Prophet***

Proponents of the utilization of genetic testing in repatriation misunderstand the capabilities of the science; the science simply cannot do what is needed in the repatriation context. Supporters claim that genetic testing of human remains can help establish cultural affiliation of remains. But the science cannot provide this kind of information.

At best, genetic testing can only establish a likelihood that someone is related to someone else, by showing a similarity of genes. Genetic analysis would yield, at most, either a conclusion that the genes present in a particular set of remains are similar to a particular group of people living today, or a conclusion that the genes are not similar. Proponents of using the science in the repatriation context would argue that such a conclusion helps to assess cultural affiliation between the remains and modern tribal groups. As the argument goes, if the genes in the remains are more similar to the genes of a modern group, the remains are more likely affiliated with the modern group.

The dominant society sets up scientific information as sacrosanct. Scientific conclusions are seen as fact, as determinations of the way things really are. Because of this tendency, conclusions about cultural affiliation based on genetic correlation stand to be given significant weight in the assessment of cultural affiliation.

However, the tendency to give great weight to conclusions drawn from genetic correlation is a tendency towards error. First, conclusions about likelihood of relationship do not say anything about cultural affiliation. To argue otherwise is to ignore traditional notions of cultural affiliation. Requiring biological, genetic relationship in order to establish cultural affiliation ignores the distinction between biology and culture. A person may be affiliated culturally without being biologically related at all. For example, biological relation says nothing about traditional notions of intermarriage. When a person marries a member of a tribal group, that person may become a member of the group; they may become culturally affiliated, although they are not biologically related at all. Yet the traditional values of most aboriginal societies encourage this type of relationship. From my own experience, I know that traditional Lakota wisdom teaches young men to find a wife "outside of your own camp circle." Moreover, requiring biological relationship for cultural affiliation also ignores other tribal values, such as the importance of adoption. Through adoption, in many tribes, conclusive relationship is established ceremonially. The adopted person becomes a part of the adopting family. The adopted person becomes part of the same culture as the adopter; biological relationship is irrelevant.

The fact that a likelihood of biological relationship is not relevant to cultural affiliation is not the only reason to reject the use of genetic science, however, because the science itself cannot even do what proponents appear to claim for it. All that genetic science can do with certainty is establish that two genetic samples are

not from the same person. The useful application of this knowledge occurs in the criminal law context: it can be used to exonerate the accused from commission of a crime. If the accused's genes do not match the genetic evidence left behind by the perpetrator of a crime, the accused cannot be the guilty. But patterns in genes vary over time, and among present individuals. With each generation, genes change slightly. These changes add up over generations. The changes over many generations, as would have occurred in the case of comparing genes from ancient remains to modern aboriginal people, mean that any conclusion based on genetic similarities becomes increasingly tenuous as time between when the people who carried the genes lived. Thus, the older a set of remains, the less likely genetic analysis is to provide any realistic reflection of potential biological relationship.

Finally, the weight naturally given to conclusions based on genetic analysis is improper because giving the information offered by genetic science circumvents other, more useful, information that can be used to assess cultural affiliation. Given the shortcomings of the ability of the science to establish biological relations at all over time, and the tendency of traditional cultures to encourage practices like adoption and intermarriage with people from outside of the group, other sources can provide information that is more helpful in determining cultural affiliation, and therefore in the repatriation context. Tribal cultures already have a multitude of information sources that can be used to determine whether an individual was likely affiliated culturally with their ancestors.

Aboriginal peoples already have their own oral histories and creation stories telling them who their ancestors were, where they lived, and where their people originated. This spatial information, information about where things happened, can be of great utility in assessing cultural affiliation. Oral histories and tribal traditions also explain how people lived. This information can be used to assess cultural affiliation based on artifacts found with remains, or for artifacts themselves. As obvious as the connection seems, these sources of information are frequently ignored in the repatriation context. As one example, remains found clearly within the ancestral and present-day homelands of the Numu or Paiute people in the Great Basin in the United States, and found with obviously Paiute-related artifacts, have yet to be repatriated. The science and museum industry want to conduct more studies on the remains, including genetic analysis. Genetics can reveal nothing more to establish the cultural affiliation of the remains. Spatial information, where the remains were found, and the oral histories the area native people answer very clearly the question of with whom the remains should be entrusted. Yet the remains have not been returned, and press accounts depict the affiliation of the remains as a great mystery of the shared heritage of all present-day inhabitants of the "New World."

### ***Spatial Information Technology***

Unlike genetic information, spatial information can be utilized quite effectively to assist in the assessment of cultural affiliation. Human remains and associated funerary artifacts can be geo-referenced, so it is feasible that ancillary sets of spatial information such as aboriginal territories, reservation boundaries, and cultural event sites may be utilized to discover a relationship between unidentified human remains, funerary artifacts, and cultural affiliation.

Yet, the role of spatial information in repatriation procedures seems to be under-emphasized and remains relatively unexplored. Museum inventory lists often provide only a geographic reference for human remains as a Cartesian or other coordinate such as a Township and Range grid, a Provenance, or a Province or State. In this format the lists of geographic references available to Bands, Nations, and Tribes are of limited utility and will not enable an Aboriginal community to make a determination of cultural affiliation. However, the geographic references for unknown human remains do have utility when they are placed on a map and associated with geographic reference features such as aboriginal territory, reserve boundaries, and cultural event sites. When the geographic locations of human remains are delivered to an aboriginal community in map format, the community has a valuable set of functional data which they can use to place the location of the human remains in context.

It seems logical that consulting maps of originally occupied lands or aboriginal territories should be a necessary part of burial site protection and the repatriation of human remains and funerary objects. In fact,

the collection, display and analysis of the following types of relevant spatial information could significantly aid the entire process of assessing cultural affiliation:

- a.) Ancestral aboriginal territories (including: traditional land use areas, originally occupied lands, historic resource use areas);
- b.) Ceded lands (including: delineation and quantification of lands taken and delineation and quantification of off reservation resources);
- c.) Reserve boundaries;
- d.) Reserve land ownership/tenure;
- e.) Federal (including National Park boundaries), Provincial and local governmental administrative boundaries;
- f.) Historic maps prepared by aboriginal people;
- g.) Treaties;
- h.) Oral histories;
- i.) Census records;
- j.) Archaeological sites;
- k.) On and off reservation traditional land use and resource harvesting locations; and
- l.) Significant event sites, i.e., shrines, battlefields.

Each of these sources of spatial information can be used to assess or establish spatial relationships between unclaimed human remains and tribal communities.

#### ***Spatially Assisted Ethnographic Research:***

The efficiency of the entire repatriation process would be improved if the above types of spatial information were collected and used to supplement the ethnographic research required to assess cultural affiliation. It is possible to utilize basic cartographic overlay methods to examine the relationship between the location of the human remains and other relevant geographic features such as aboriginal territories, reservation boundaries, etc. For example, a basic map overlay operation may allow a tribal community to discover that unknown human remains fall within a mapped aboriginal territory or a reserve boundary or within a certain proximity to a cultural event site. The tools to facilitate the map overlay process and conduct proximity analysis can conveniently be found in Geographic Information Systems (GIS), which can inventory, manage and analyze many disparate types of spatial information.

#### ***An Example of the Utility of Computerized GIS Application Assisting in Repatriation Efforts***

The simple cartographic overlay process of displaying the locations of burials without a cultural affiliation, with judicially determined aboriginal boundaries, allows tribal and academic researchers to make an initial determination of possible cultural affiliation. To demonstrate this process, unknown burial sites were selected from the ARGUS database of the Colorado Historical Society (CHS), Office of Archaeology and Historic Preservation. The CHS staff performed several processing steps to produce a simple ASCII file containing the site identification numbers and geographic (x,y) coordinates for the unknown burial locations.

Two of the authors received the ASCII file and performed several additional editing steps in order to produce a file acceptable for use with the Arc/Info GIS software. The result of this experience led to the realization that there is a need for museum database standardization as well as a requirement for a flexible data management environment which enables SQL functions on museum databases.

Using the Arc/Info GIS software and the site identification information, two point layers in the GIS were generated. The points were then displayed with another map layer, which delineated the "Judicially Established Indian Land" in the area where the remains were found. Although these judicially established areas do not really coincide with a tribe's true aboriginal territory, these boundaries can be used to make an initial determination of cultural affiliation for unidentified human remains.

For example, nine of the unknown burial locations in Colorado fell within the judicially established territory of the Cheyenne and Arapaho Tribes. When the locations of these human remains were placed in graphic form and displayed with judicially established aboriginal boundaries, the Cheyenne and Arapaho Tribe could rapidly make a determination as to whether or not they are interested in these remains.

This simple cartographic overlay process enables tribal and academic researchers to make initial determinations of possible cultural affiliation with relative ease.

### ***Museum Databases***

In this case, using the map overlay process to make the initial determination of cultural affiliation as Cheyenne/Arapaho was significant. Perhaps additional support for a Cheyenne/Arapaho cultural affiliation could be established by examining the spatial proximity of the human remains to Cheyenne or Arapaho encampments identified in the archaeological record or other cultural event sites.

In addition to a lack of information on cultural affiliation, museum records often lack geographic coordinates, which can be used to place unknown burial locations within an aboriginal territory. In order to demonstrate the above map overlay process, only unknown burial locations with geographic coordinates (x,y) were selected from the CHS ARGUS files. The remaining records in the CHS ARGUS files either do not have geographic coordinates or the documentation provided geographic location information in terms of a grid reference system (i.e., Townships, Ranges and Sections). Obviously, it is difficult to define the position of a point using a grid reference system. However, Public Land Survey grids can be overlaid with aboriginal territory boundaries so that those unknown burial locations, identified by a specific Township, Range and Section, can be correlated with an aboriginal territory.

Obviously, the lack of cultural affiliation and geographic reference information in museum records is a hindrance to the determination of cultural affiliation. However, an effort to standardize museum records to include geographic positions will do much to enhance Band and Tribal efforts in determining cultural affiliation.

### ***Aboriginal Territories Re-defined by American Indian Tribes:***

Rather than making decisions based upon the artificially contrived boundaries like the "Judicially Established Indian Land Areas", Bands and Tribes have the opportunity to re-delineate aboriginal territories from their own perspective. Importantly, the ability of the GIS to overlay and intersect disparate data sets will benefit aboriginal groups in their endeavors to re-delineate aboriginal territories.

Re-delineation of aboriginal territory boundary lines may begin with mapping: a.) event sites related through oral histories; b.) watersheds; and c.) extent of traditional resource use areas. Mapping may also include information obtained from historic maps or the integration of the boundary lines presented by ethnographers as testimony in treaty land claims.

As long as all the different boundary lines are adjusted to a standard base map before automation, the abilities of the GIS can be used to combine the different boundary lines into an acceptable new aboriginal territory boundary. In other words, it is possible to map, automate and enter into the GIS various versions of Tribal aboriginal boundaries from different sources. Once residing in the GIS, the boundaries can be displayed and overlaid with one another, or overlaid with resource utilization zones. Through a comparative analysis process the most logical boundary can be determined.

After a redefined aboriginal territory has been agreed to, the boundary line can be overlaid with resource use zones, reservation boundaries and administrative boundaries such as state and county lines. Maps resulting

from the overlay process could be used in the burial protection and repatriation process to visualize aboriginal territories as defined by aboriginal communities themselves.

Regardless of the source, re-delineating aboriginal territories will probably result in a variety of different boundary lines. Importantly, these new boundary lines will extend beyond artificially contrived boundaries such as the "Judicially Established Indian Land Areas" into the aboriginal territories of other First Nations. Thus, the process of defining or re-delineating aboriginal territories should be of interest to most aboriginal communities in North America, especially in those regions where many bands are identified as historically occupying the same territory. An indigenous-initiated re-delineation of aboriginal territories would be especially critical to determining which tribes have affiliation with or responsibilities for burial sites or cultural items in overlap zones. Again the abilities of the GIS to overlay disparate data sets would allow indigenous groups to visualize and measure the overlap between indigenous-defined aboriginal territories.

In situations where it is difficult to determine the affiliation of cultural materials, museums could assist Tribes in the process of defining or re-delineating aboriginal territories, by providing technical support, such as mapping and research. Through such an effort museums would actually provide the indigenous communities with functional data.

### ***Historic Indian Maps:***

Historic maps prepared by Indian peoples on birch-bark and other materials can play a significant role in the repatriation process. Obviously, these maps are difficult to find. However, we believe that an effort should be made to locate such maps and determine their utility in the identification of cultural affiliation. In addition, we would like to conduct research into the possibility of using a GIS to simultaneously display current cartographic representations of landscapes used by Indian people and proto-historic and historic maps of the same locations actually produced by Indian people.

### ***Oral Spatial Information:***

Traditional indigenous ecological knowledge is often in an oral format similar to oral histories. Since the indigenous ecological knowledge held by aboriginal people is spatial in nature, it is possible that it can be translated into map form and put into a GIS for: 1.) land use planning purposes, 2.) protection of traditional and cultural resources, and 3.) preservation of the traditional ecological knowledge.

Oral histories are also spatial in nature since they contain vast information on land use and event sites. If it were possible to translate the oral land use information into a map form to be inserted into a GIS, the spatial information from oral histories could be used in the repatriation process of determining cultural affiliation.

The incorporation of traditional land use information into a GIS is a topic that has not yet been thoroughly researched. We are interested in conducting research which examines how indigenous oral information, which is of a spatial nature, can be translated into a map format, automated and used in a GIS. Modern cartographic representations of a landscape used by indigenous peoples are suitable for the translation of oral spatial information. New mediums for representing space will have to be developed because there is a polarity between how indigenous peoples represent space and the Euro-American icons of spatial representation. Any research into incorporating oral histories into map form will have to take this fact into consideration.

### ***Treaties:***

Treaties contain spatial information that should be examined for relevance to repatriation. We believe that treaties should be included in the list of source documents relevant to determining the tribal affiliation of cultural items.

***Relevance of Research:***

In order to understand the relevance of this application project, a small survey was initiated in order to seek comments from some repatriation practitioners. The survey began with the Office of Archeology and Historic Preservation (OAHP) at the Colorado Historical Society (CHS) since they graciously provided the sample set of data. An initial review of the application was presented to the staff at the Colorado Historical Society and was met with much enthusiasm and commitment to go forward with more data. It is commendable and very forward thinking for such an institution to be proactive rather than reactive toward the principals of repatriation. As well, this initial map was presented to the Cheyenne Tribe of Oklahoma by the CHS Archaeological Information Specialist for their consideration in submitting a claim for the unclaimed human remains that once resided in their traditional territory. This application and map was also presented to other Tribal members involved with repatriation and resulted in comments that indicated the ease of understanding museum data more clearly and the recognition of ease for determination by elders in their respective communities.

***Conclusion:***

Since this paper demonstrates how geographically referenced Museum and Federal Agency information can be re-presented in a much more useful format; it is with a sincere interest that information guidelines for repatriation procedures be evaluated and standardized to incorporate appropriate information technologies. Commitment to meaningful repatriation efforts mandates a process of dialogue and negotiation between affected Museums, Agencies, and First Nations. The authors of this paper suggest that GIS may be utilized to present a viable and efficient way to procure and organize the information needed to meet the challenge of efficient and effective repatriation efforts.

Genetic analysis, on the other hand, is of little or no utility in the repatriation process. Proponents of genetic analysis in the repatriation context have made inroads, however, and aboriginal peoples need to be made aware of the capabilities, and incapacities, of this technology. The science itself cannot provide much useful information for repatriation purposes, but perhaps more importantly, focusing on genetics as a science in repatriation can lead to a perception that other sources of relevant information, such as traditional knowledge from oral histories and creation stories, are not as important and useful as they really are for assessing cultural affiliation.