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The Use of Material Culture to Establish the Ethnic Identity of Victims in Genocide Investigations: A Validation Study from the American Southwest*

ABSTRACT: Successful prosecution of genocide requires that the victims constitute one of four protected groups: national, religious, ethnic, or racial. Establishing victim identity in prior trials has relied on positive identification of decedents, been largely presumptive, or was based on untested methodology. This report details a validation study of one untested method: the use of material culture in establishing ethnic identity. Classes of clothing and personal effects were scored on 3,430 individuals of known Hispanic or White ancestry from autopsy records in New Mexico. Significant differences were seen in evidence of language, nationality, and religious affiliation between the two groups, as well as clothing types and currency. Predictive models used to estimate ethnic identity in random, blind subsets produced an overall accuracy of 81.5% and estimates of 61–98% in specific subsets. Results suggest material culture, when present, can provide reliable evidence of ethnic affinity in genocide investigations.

KEYWORDS: forensic science, forensic anthropology, human rights, personal identification, genocide, ethnicity

All crimes require that prosecutors demonstrate two elements to the court: the physical element that describes the act and the mental element that encompasses the notions of motive and intent. Prosecution of genocide requires a third element: victim group identity (1). According to the international definition of the crime of genocide (2), the victims must represent one of the four groups afforded protection under the law: ethnic, racial, religious, or national. Victim group identity differs from personal identification. Personal identification establishes the decedent's name to a degree of scientific certainty through the comparison of antemortem social data with evidence derived postmortem. Victim group identity is a social construct in which an individual's membership within a specific group can be perceived or self-proclaimed. If personal identity relies on individualization, group identity is based on shared class characteristics (3). Demonstrating group identity in court requires the recognition and quantification of such class characteristics for each group of interest and the generation of predictive models that enable investigators to accurately classify victims to the appropriate social group.

The past decade has seen a significant increase in the participation of forensic anthropologists in international human rights investigations (4). Inherent in such rapid growth has been the use of *ad hoc* and untested methodologies (5). One such method is the use of material culture in establishing victim identity. Material culture (clothing or personal effects) has considerable evidentiary value to investigators in that it endures postmortem, is normally recovered in direct association with human remains, and has the

potential to record evidence of trauma such as bloodstains and bullet defects. Material culture may also reflect the social identity of the individual. Clothing and personal effects have been used in previous genocide trials in Rwanda (6), the former Yugoslavia (5), and Iraq (M. Trimble, personal communication, 2006) to establish personal identification and victim group identity. While investigators made every effort to ensure the accuracy of their specific results, no empirical testing was conducted nor has the method itself been validated. The accuracy of any predictive model or method must be evaluated through tests of internal validity (the extent to which the model is true for a particular sample or population) and external validity (whether the model or method remains accurate when applied to other populations or samples).

This report tests the internal validity of using material culture to establish ethnic identity in a specific population. While the use of material culture to identify cultural groups in the archaeological record is well accepted (7–12), its validity in modern forensic contexts is untested. In historic and prehistoric communities, material goods were produced on a limited scale, production was typically localized, and trade networks were restricted by social isolation, distance, and modes of transport. The question remains, in the age of Wal-mart and the global marketplace, whether material culture continues to reflect ethnic identity or does mass production and distribution homogenize material culture within a geographic region.

In order to understand the current relationship between material culture associated with the dead and ethnic identity, autopsy records from positively identified decedents of known ethnicity were examined. As genocide often involves ethnic groups within a defined geographic region, this study focused on White Hispanic and White non-Hispanic decedents (hereafter referred to as Hispanic and White, respectively) from the American southwest.

Data were abstracted from autopsy records, containing full written descriptions and photographs of clothing and personal effects, from the New Mexico Office of the Medical Investigator (OMI). To best approximate decedents in genocidal conflicts, only

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individuals who died unnatural, unexpected deaths (homicidal and accidental manners of death) were included in the study. The goal of the research was to determine (1) whether clothing and personal effects could be reliably categorized and scored, (2) whether statistically significant differences exist between the two ethnic groups, and (3) whether such differences could be used to construct a model that accurately predicts ethnic identity in unknown individuals.

Materials and Methods

Data were collected from OMI autopsy records from 2002 through 2005. Only positively identified decedents over 18 years of age were included in the study. A computer query identified all individuals whose death certificate indicated White Hispanic or White non-Hispanic ancestry. Ancestry on the death certificate (used as the known or gold-standard in this study) was provided by the family or next-of-kin informant completing the personal information section of the death certificate. Excluded from the study were those who had experienced thermal damage resulting in the destruction of clothing or artifacts and those who had their clothes or personal effects removed by hospital personnel or law enforcement prior to autopsy. A breakdown of the demographic composition of the sample is provided in Table 1.

In addition to demographic information, categories of clothing and personal effects were scored. Initial attempts to score clothing by item (i.e., pants) were cumbersome, not replicable, and produced large quantities of data that were ultimately of little value. A revised unisex scoring protocol that focused on style of clothing (e.g., work, casual, business, athletic) resulted in greater reproducibility and captured sufficient information. Personal effects were divided into three major categories: those providing evidence of nationality or personal identification (driver's licenses or government issued documents, currency); items indicating language (non-ID documents, jewelry, prescribed medications, books); and articles suggesting religious affiliation (jewelry, icons, documents such as prayer cards).

Data were entered into an Excel spreadsheet and statistical analyses were conducted using SAS version 9.1. Categorical variables were analyzed for univariate associations using chi-square or Fisher exact tests. Continuous variables were analyzed using *t*-tests. *p*-values of 0.05 or less were considered significant.

Following preliminary analysis, a second categorical system was introduced that evaluated the material culture evidence associated with each individual in terms of its potential to establish ethnic identity. Evidence was weighted reflecting its contribution. For

example, evidence of language was considered a more reliable indicator of ethnicity in isolation than evidence of religious affiliation, currency, or clothing styles. Multiple sources of information were considered preferable to isolated indicators. A total of five classes of identity potential were scored for the total sample:

1. Well-defined, multiple sources of identity. Criteria include at least one source of national identity and one indicator of language.
2. Reasonable sources of identity. Criteria include either multiple sources of potential information (i.e., indicators of religious affiliation) OR a single credible source of identity (evidence of language or nationality).
3. Ambiguous evidence of identity. Clothing or personal effects were recovered but were not definitive (i.e., indicators of religion or bilingual documents).
4. No potential for identity. No material culture was associated with the decedent OR only a single, nondescriptive item (such as underwear) was present.
5. Investigator error. Evidence was noted as present at autopsy but was not described in sufficient detail to allow for categorization. Individuals in this category were removed from subsequent analysis.

A simple model was then developed to predict ethnic affinity in unknown individuals. Based on the relative frequency of a trait within each population, the presence of the trait was considered neutral (no significant difference between populations), or as an indicator of Hispanic ancestry when its observed frequency was greater in the Hispanic sample than in the White sample, or as an indicator of White ancestry when the trait was more frequent in the White sample. For example, the complete absence of any clothing was more common in the White sample (21%) than in the Hispanic population (16.1%); when "absence of clothing" was evident in an unknown individual, the model would predict the individual was White based on that trait. The final classification of an unknown individual was based on the majority of traits scored for that individual. If an unknown individual had three traits consistent with Hispanic ancestry and one trait indicative of White ancestry, the individual would be classified as Hispanic.

Blinded, breakout subsets ($n = 100$, 50 Hispanic, 50 White) were randomly selected and the ethnicity of the individual was estimated using the evidence available. A total of 400 individuals were tested representing the following subsets: general population (drawn from potential identity classes 1 through 4); potential identity class 1 (well-defined); potential identity class 2 (reasonable); potential identity class 3 (ambiguous).

Intra-observer error tests were conducted and kappa statistics were calculated to determine the reliability and reproducibility of trait scoring, determining identity potential, and ethnicity prediction models. A random sample of 25 individuals was re-scored several weeks after the initial data collection and the results were compared. Kappa values were interpreted using the classification proposed by Landis and Koch (13).

Results

Table 1 presents the distribution of demographic characteristics of this study population, as well as a breakdown by manner of death (accident vs. homicide). In this study population, Hispanic decedents were 2.03 times more likely to be male than White decedents (95% confidence interval [CI] = 1.74–2.36) and 2.07 times more likely to be homicide victims than accident victims (95% CI = 1.69–2.54). The Hispanic decedents in this study were significantly ($p < 0.0001$) younger than the White decedents.

TABLE 1—Demographic breakdown of study population.

Characteristic	Hispanic <i>n</i> (%)	White <i>n</i> (%)	Total	<i>p</i> -value
Gender				
Male	1287 (77.2)	1104 (62.6)	2391 (69.7)	<0.0001
Female	379 (22.7)	660 (37.4)	1039 (30.3)	
Total	1666 (48.6)	1764 (51.4)	3430	
Age (years)				
Mean	42	52		<0.0001
Minimum	18	18		
First quartile	28	38		
Median	39	49		
Third quartile	50	66		
Maximum	99	100		
Manner of death				
Accident	1357 (81.5)	1589 (90.1)	2946 (85.9)	<0.0001
Homicide	309 (18.5)	175 (9.9)	484 (14.1)	

TABLE 2—Distribution of material culture by ethnicity in total study population (n = 3430).

Characteristic*	Hispanic n (%)	White n (%)	p-value
Clothing			
None	269 (16.1)	370 (21)	0.0002
Present	1397 (83.9)	1394 (79)	
Currency			
None	1164 (70)	1363 (77.3)	<0.0001
U.S.	413 (24.8)	368 (20.9)	
Mexican	19 (1.1)	0	
Other	70 (4.2)	33 (1.8)	
Nationality			
Unknown	1324 (79.5)	1465 (83.1)	<0.0001
U.S.	260 (15.6)	276 (15.6)	
Mexico	50 (3)	0	
Other	32 (1.9)	23 (1.4)	
Documents			
None	1324 (79.5)	1465 (83.1)	0.014
Driver's license	113 (6.8)	85 (4.8)	
Other	229 (13.7)	216 (12.2)	
Language			
Unknown	1583 (95)	1472 (83.4)	<0.0001
English	62 (3.7)	290 (16.4)	
Spanish	13 (0.8)	1 (0.06)	
Language source			
None	1584 (95)	1475 (83.6)	<0.0001
Documents	41 (2.5)	216 (12.2)	
Other	41 (2.5)	73 (4.1)	
Religion			
None/unknown	1396 (83.8)	1702 (96.5)	<0.0001
Christian	270 (16.2)	59 (3.3)	
Other	0	2 (0.12)	
Evidence of religion			
None	1396 (83.3)	1702 (96.5)	<0.0001
Jewelry	239 (14.3)	57 (3.2)	
Other	31 (1.9)	5 (0.3)	

*Detailed description and distribution of characteristics included in Table 3 (types of clothing, descriptions of documents included as "other," etc.).

The frequency of material culture type by ethnicity is reported in Table 2. Statistically significant differences between the two groups were seen in all aspects of material culture, from clothing to evidence of religious affiliation. More detailed descriptions of the distribution of these characteristics are presented in Table 3. Hispanic and White decedents differed significantly in several aspects of clothing, including (1) the absence of clothing, with White decedents 1.38 times more likely to have no clothing present at the time of death (95% CI = 1.15–1.65), (2) the presence of casual clothing (Hispanic decedents were 1.81 times more likely to be wearing casual attire compared to other types of clothing [95% CI = 1.51–2.17]), and (3) the presence of bed clothing, with White decedents 2.35 times more likely to be wearing pajamas or other bed clothes at the time of death (95% CI = 1.78–3.10). Comparing types of currency, Mexican and mixed currency (U.S. and Mexican) were 17.8 times more frequently associated with Hispanics (95% CI = 4.18–107.3).

Documents relating to nationality are detailed in Table 3. The two groups differed significantly in frequencies of recovered immigration cards and driver's licenses. Hispanic decedents were 28 times as likely to have an immigration card (95% CI = 4.04–554) and 1.4 times more likely to have a driver's license present at the time of death than White decedents (95% CI = 1.07–1.94).

Table 4 presents the proportions of the total sample that were categorized into each of the five identity potential classes. More than half of the total sample (53.4%) had ambiguous evidence of identity, while only 14.6% were recovered with multiple, well-defined sources of identity. It is interesting to note that more

TABLE 3—Scoring protocols and frequencies of material culture traits, by ethnicity.

Trait	Hispanic [n = 1666] (%)	White [n = 1764] (%)
Clothing		
No clothing	269 (16.1)	370 (21)
Single item, underwear	118 (7.1)	163 (9.2)
Work/service uniform	20 (1.2)	25 (1.4)
Casual (jeans, t-shirt)	1131 (67.9)	976 (55.3)
Business attire	6 (0.4)	11 (0.6)
Athletic wear	28 (1.7)	19 (1.1)
Bed clothes	85 (5.1)	183 (10.4)
Clothing noted but not described	9 (0.5)	17 (1)
Currency		
None	1164 (70)	1363 (77.3)
U.S. currency	413 (24.8)	368 (20.9)
Mexican currency	19 (1.1)	0
Mixed (U.S./Mexican)	21 (1.3)	2 (0.1)
Canadian currency	0	2 (0.1)
Other foreign currency	3 (0.1)	2 (0.1)
Money present but not described	46 (2.7)	27 (1.5)
Documents indicating nationality		
None	1324 (79.5)	1465 (83.1)
Driver's license	113 (6.8)	85 (4.8)
Passport	0	2 (0.1)
Immigration card	26 (1.6)	1 (0.1)
Social security card	12 (0.7)	11 (0.1)
Bank/credit card	9 (0.5)	14 (0.8)
Voter registration	6 (0.4)	0
Military ID	2 (0.1)	12 (0.7)
Multiple IDs	144 (8.6)	154 (8.7)
Documents noted but not described	30 (1.8)	22 (1.3)
Language (English, Spanish, bilingual)		
No language source	1556 (93.4)	1450 (82.2)
Documents (not IDs)	42 (2.5)	216 (12.2)
Jewelry	11 (0.7)	22 (1.3)
Clothing	10 (0.6)	19 (1.1)
Personal effects (i.e., books)	6 (0.4)	12 (0.7)
Prescribed medications	14 (0.8)	23 (1.3)
Documents present but not described	27 (1.6)	22 (1.2)
Religious affiliation (Catholic/Christian, Jewish, Muslim, other)		
No evidence	1396 (83.3)	1702 (96.5)
Jewelry (rosary, crucifix)	239 (14.3)	57 (3.2)
Clothing	4 (0.2)	0
Religious icon	16 (1)	1 (0.1)
Document (prayer card)	11 (0.7)	3 (0.1)
Other (i.e., Koran)	0	1 (0.1)

TABLE 4—Number of individuals in the total sample (n = 3430) attributed to each potential identity class.

Class	Criteria	# attributed (% of total sample)
1	Well-defined, multiple sources of identity	500 (14.6) White = 228 Hispanic = 272
2	Reasonable sources of identity	416 (12.1) White = 197 Hispanic = 219
3	Ambiguous evidence of identity	1832 (53.4) White = 943 Hispanic = 889
4	No potential for identity	594 (17.3) White = 357 Hispanic = 237
5	Investigator error (noted but not described—excluded from testing)	88 (2.6) White = 39 Hispanic = 49

Hispanics were recovered with well-defined or reasonable sources of identity while Whites were more likely to have ambiguous or no evidence of identity.

TABLE 5—Results of blind, random tests using the model to predict ethnicity.

Test sample (n)	Ethnicity correct (%)
General population—classes 1 through 4 (n = 100)	61
Well-defined identity sources—class 1 (n = 100)	98
Reasonable identity sources—class 2 (n = 100)	87
Ambiguous identity sources—class 3 (n = 100)	80
Overall accuracy—classes 1 through 4 (n = 400)	326 (81.5)

Results of the blind, random tests using the model to predict ethnicity are presented in Table 5. Comparing ethnicity predicted to known ethnicity yielded an overall sensitivity of 88.3% and a specificity of 78.5% for predicting Hispanic ethnicity, with a positive predictive value of 80.4% and a negative predictive value of 87%. Ethnicity was correctly estimated in 81.5% of the 400 individuals tested and ranged from 98% correct in those with well-defined sources of identity (class 1) to 61% in the general population sample (which included individuals from classes 1 through 4).

Tests of intraobserver error produced kappa values of 1.0 for trait scoring and identity potential classification and $k = 0.92$ for ethnicity prediction.

Discussion

The New Mexico Bureau of Vital Statistics recognizes Hispanic as an ethnicity, while White is considered a racial designation. Although these two groups may initially appear to represent two different groups under genocide law, there are several important considerations. First, neither the UN Convention nor any other international legal document defines the terms racial or ethnic (1). Second, prior international tribunals prosecuting acts of genocide have argued that the groups “partially overlap” (14) and that the concepts of race and ethnicity should be “assessed in the light of a particular political, social and cultural context” (15). Within the American southwest, White Hispanic and White non-Hispanic refers to groups sharing common notions of ancestry, linked by language, culture, and religious affiliation. Neither designation exclusively references physical or biological traits and are therefore best described and officially recognized as ethnic identities.

The model was highly sensitive (good at predicting which decedents were Hispanic), and also had an acceptable level of specificity. Kappa values of 1.00 indicate excellent replicability and reliability (13). This suggests that the scoring protocols for material culture traits and identity potential classes are well defined, easily interpreted, and reproducible. The slightly lower kappa value (.92) for ethnicity prediction still indicates “almost perfect” agreement (13). The single misclassification occurred with an individual scored as a class 4 or “no potential for identity,” indicating there was no credible evidence upon which to base the ethnicity estimate.

One potential source of bias in the study was the statistically significant differences in the mean age and age per quartile between the two groups. This raises the possibility that observed differences in frequency may be the results of secular trends. Reanalysis of the clothing style data, controlling for age (by decade cohorts), revealed statistically significant differences between the two populations in all clothing styles.

Another potential source of bias in this study is the proximity of the U.S./Mexican border to the study area and the significant influx of Mexican nationals into New Mexico contained in the Hispanic sample. This proximity and the mobility of the Hispanic

population play a considerable role in the presence of foreign currency and identification documents. The intent of the study is not to provide standards that can be generalized to the entire U.S., particularly more northern states with American-born Hispanic populations. Rather, the study is intended to replicate and test conditions common to genocide, specifically a geographically definable region with discrete ethnic populations, and to determine if variation in material culture can be quantified among the populations of that region.

While direct association between an individual and material culture is interpreted as a reliable relationship in archaeological contexts, some caution is warranted in contemporary, forensic settings. The postmortem manipulation of clothing and effects by the perpetrators of genocide has been reported. Victims in the former Yugoslavia have been placed in different clothing postmortem, identifiable by discrepancies between holes in clothing and bullet wounds (16). Decedents have also been fully stripped of all clothing and effects prior to disposal of the body (17). Victims themselves may also purposefully or unintentionally alter their clothing or possessions prior to death. Individuals have been recovered carrying multiple identification cards, often representing different family members (personal observation, D. Komar), or have obtained false identification documents in an effort to escape detection (18). Simmons (19) describes a young male decedent who was recovered wearing women’s clothing in the mountains outside of Srebrenica and who was likely killed when the deception was discovered.

Clothing and effects have also been shown to prompt attacks in genocidal contexts. For example, Kosovar Albanian men wearing the traditional white hat or *plis* were expressly targeted during the conflict in the former Yugoslavia (16). A recent study (20) examining variables that influence how perpetrators select or recognize potential victims during acts of genocide found that the victim’s clothing was the identifying feature prompting an attack in 4% of sampled cases prosecuted by the International Criminal Tribunal of the Former Yugoslavia. Personal effects and documentation were also found to be significant variables. Finally, the absence of material culture can also initiate victimization. For instance, “[t]he lack of any proper identification documents and the purported necessity for police to establish someone’s identity” was the most commonly cited reason for arrest in Kosovo (21).

Findings from this study are equally relevant to local investigators tasked with identifying decedents. For example, 83% of the total unexpected, unnatural deaths involved decedents recovered with no form of identification. A total of 18.6% were recovered with no clothing, while a further 8.2% had only a single, largely uninformative article of clothing such as underwear.

A potential limitation of this method is the high proportion of decedents with no evidence of certain types of material culture, and the instances where documents, clothing, or language/religion sources were noted but not described in sufficient detail to allow classification. Over 70% of decedents had no currency with them at the time of death (or it had been taken, in the cases of homicide), and over 80% had no documents with them to indicate nationality. In 2% of the study sample, items of interest were present but were not described by the forensic pathologist as part of the autopsy record. This study highlights the need to remind forensic pathologists and investigators of the importance of describing tattoos, clothing, jewelry, and documents found on decedents, as these represent potential avenues of identification.

The diagnostic value of evidence of religious affiliation must also be interpreted with caution in this geographic region. While the proportions of individuals identifying as Roman Catholic are greater among Hispanics than Whites, there is considerable

diversity of religious preference in both populations (22). Further, religious affiliation is a malleable concept, subject to change throughout an individual's lifetime, variability of personal expression, and misinterpretation of symbolism (23,24). Evidence of religious preference proved to be a more significant and reliable indicator of ethnicity in the former Yugoslavia (16), where each ethnic group (ethnic Albanians and Serb) had a predominant religion (Islam and Serbian Orthodox, respectively).

Conclusions

It is vital that all methods be subjected to rigorous testing of both internal and external validity before they are applied in forensic contexts (25). This paper presents the results of the initial phase of an internal validation study of the use of material culture to establish ethnic identity in genocide investigations. Results indicate that reliable, replicable scoring protocols can be developed to assess the material culture of decedents and that, when present, clothing and personal effects allow for the accurate classification of unknown decedents to their appropriate ethnic group. The second phase of this research, to be presented in a future publication, further examines the internal validity of the methodology through testing of an expanded model (evaluating whether the accuracy of the predictive model increases with the addition of information relating to tattoos), regional variation, outgroup comparison, and interobserver error testing. The final phase of research examines the external validity of the method through testing on other regionally and temporal diverse populations.

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