Patterns of Cultural Transmission in the Manufacture of Projectile Points: 1
Implications for the Early Settlement of the Argentine Puna

Rodolphe Hoguin[1] *and Federico Restifo*[2] 2

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Within the Andean region, the Puna is an elevated desert that rises beyond 3,000 masl. Human
settlement of this sector apparently began ca. 11,000 RCYBP during the Pleistocene-Holocene
transition, the result of human dispersion from other biomes because of demographic 4
pressures (Muscio 1999). The clearest archaeological records date to the early Holocene (ca.
10,000–8000 RCYBP). Early populations likely were of low demographic density and high
residential mobility, given to moving great distances (Aschero 1994). These characteristics
likely influenced cultural dynamics (Richerson et al. 2009).

Their lithic technology may have suffered from a loss of knowledge due to discontinuities
in cultural transmission as a consequence of high mobility (Henrich 2004). Technological
complexity develops as skills and know-how accumulate through time; interrupting
transmission hinders the growth of complexity (Henrich 2004). Within the context of early 5
settlement under highly unpredictable circumstances, the mechanisms of guided variation
(individual learning by trial and error) would have a significant effect on human adaptation.
Nonetheless biased transmission (social learning by imitation) would continue (Boyd and

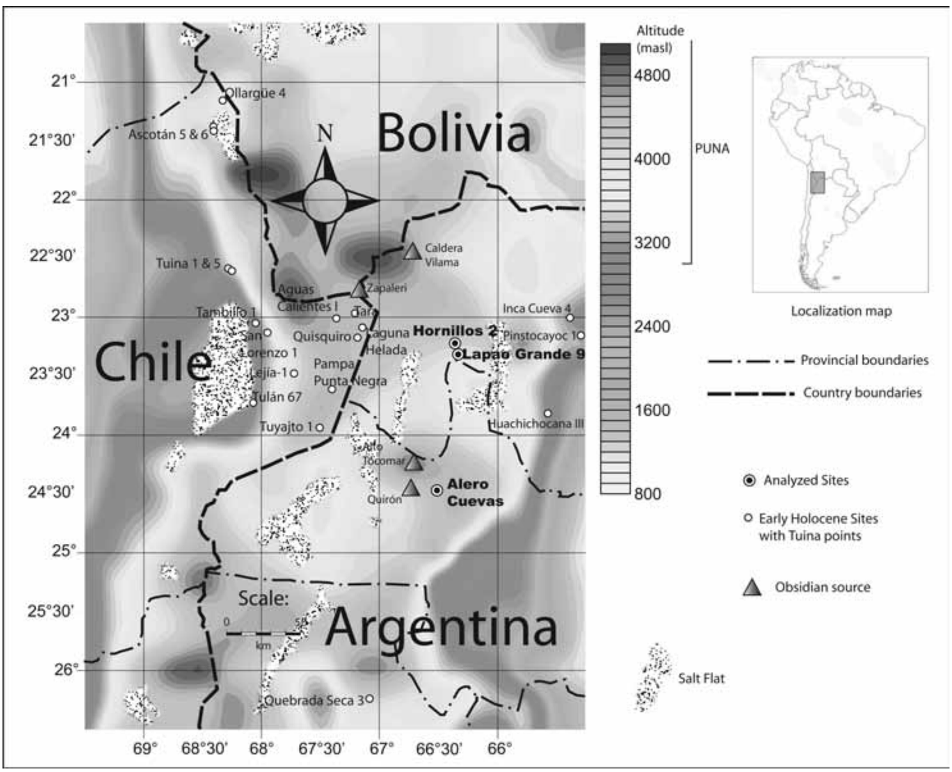
[1] CONICET-Instituto de Arqueología, Universidad de Buenos Aires, 25 de Mayo 221 3° (1002). Buenos Aires, Argentina. CNRS-UMR7041, MAE Université de Paris X, Nanterre, France; e-mail: roddh2002@yahoo.fr 12

[2] CONICET-Instituto de Arqueología, Universidad de Buenos Aires, 25 de Mayo 221 3° (1002). Buenos Aires, Argentina;e-mail: federicorestifo@gmail.com

Richerson 1985). With these two forces operating simultaneously, we would expect toolmaking to exhibit variability and technical simplicity, at least during certain stages. To evaluate this expectation, this paper studies patterns of cultural transmission associated with lithic technology. We chose as our subject a sample of projectile points because this class of artifacts requires considerable investment to acquire the skills and know-how for their manufacture, making it all the more sensitive to mechanisms of cultural transmission.

The sample is from three archaeological sites within two areas of research: Alero Cuevas, in the Pastos Grandes area; and Hornillos 2 rockshelter and talus 9 of Lapao Grande ravine, in the Susques area (Figure 1). We analyzed stratified projectile-point assemblages from
6 Alero Cuevas (n = 11) and Hornillos 2 rockshelter (n = 8) as well as three surface specimens from Lapao 9. These date to 9600–8200 RCYBP, based on four radiocarbon dates from Alero Hornillos 2 (Yacobaccio et al. 2008) and three from Alero Cuevas (López 2008).

To investigate aspects that affect cultural transmission of information for making early-Holocene triangular projectile points, we performed two discriminant analyses based on
7 distances (CAP program, see Anderson and Robinson 2003; Anderson and Willis 2003), taking into account nine qualitative technological variables by means of Jaccard distances and Euclidian distances of three continuous metric variables (Figure 2).



13 **Figure 1**. Early-Holocene sites with Tuina (unstemmed triangular) points. (Locations of sites after Núñez et al. 2005.)

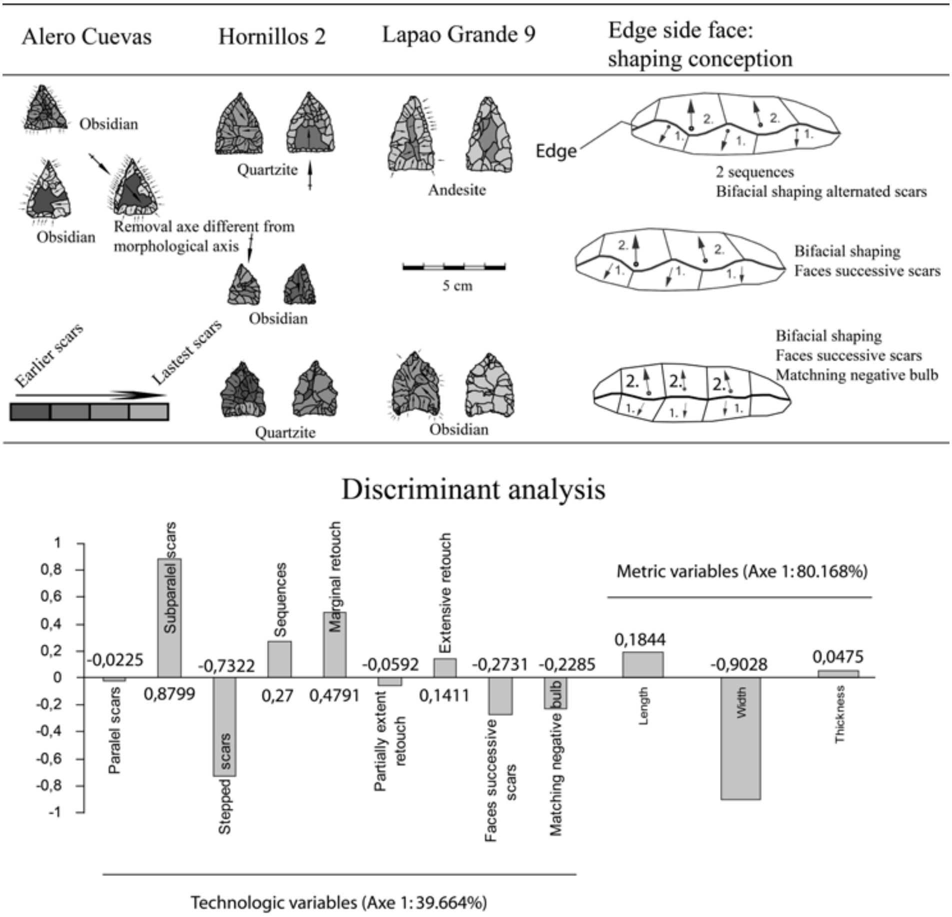


Figure 2. Manufacturing schemes and results of discriminant analysis. 14

Cross-validation yielded 100% correct classification for the Pastos Grandes sample, and 72.72% for the Susques sample. These results suggest greater heterogeneity in the latter sample. The variables that carry the most weight in discriminant classification among groups are stepped scars (occurring in greater frequency in the Pastos Grandes sample) and subparallel scars (more frequent in the Susques sample), and to a lesser extent, marginal scars (occurring in higher frequency in the Susques sample) (Figure 2). These specific tendencies reveal bias on the part of the toolmaker when making certain technical choices in each area. This analysis also 8
makes apparent the low weight of variables related to greater skill and ability to predetermine tool shape, as demonstrated by the shaping of faces in successive order and the coincidence of bulb scars (Figure 2). Furthermore, high variation detected in the orientation of the axis of extracted blanks in both areas (Figure 2) suggests that blank shape was not predetermined but was instead an opportunistic choice.

Analysis of quantitative variables shows only 45.45% exactitude in each area. In this case the discriminating variable is width (Figure 2), albeit not a robust one owing to the low degree of exactitude. Inexactitude prevents our detecting significant differences in metric variation.

Considering these results, it appears that the guided-variation mechanism played an important part in projectile-point manufacturing by the human groups that occupied the Puna during the early Holocene. This is a normal consequence of low demographic density and high residential mobility, since these factors impede the learning of skills and the transmitting of knowledge (Heinrich 2004). On the other hand, however, guided variation yields advantages
9 in finding solutions in an unpredictable unknown environment, specifically the circumstances of an initial population, thus promoting innovations in point morphology (Fitzhugh 2001) and production. Nearly as important as guided variation, biased transmission also would have been valuable in the early Holocene (López 2008), particularly in fostering efficient innovations, for example, in the technique of retouching specific to each area. The information transmitted may have circulated regionally along with goods such as obsidian, especially those from Quirón and Zapaleri (Figure 1) recorded in both areas (Mercuri and Restifo 2010; Yacobaccio et al. 2008).

Unstemmed triangular points are common in the diverse early archaeological contexts of the central southern Andes (Núñez et al. 2005) (Figure 1), although distinct differences exist peculiar to each area. A similar study in the eastern and western regions of Jujuy has
10 identified differences in the ranges of supply of lithic resources that nonetheless did not impede the flow of information between the regions (Yacobaccio et al. 2008). Likewise, the two areas studied here, despite their peculiarities, apparently enjoyed a firmer connection with each other than with the eastern region. Future studies will benefit from expanding the samples of artifacts, thus enlarging the database by integrating information from additional sites to test the hypotheses presented here.

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