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Abstract

An international jury composed of Michael Crawford (University of Kansas, USA), Dennis O'Rourke (University of Utah, USA), and Stephen Shennan (University College London, UK) has awarded the Gabriel Ward Lasker Prize 2011 to Dr. Laura Fortunato for her articles entitled "Reconstructing the History of Residence Strategies in Indo-European-Speaking Societies" and "Reconstructing the History of Marriage Strategies in Indo-European-Speaking Societies" considered as the best contribution to the 83rd volume of *Human Biology* (2011).

Laura Fortunato is an Omidyar Fellow at the Santa Fe Institute in Santa Fe, New Mexico. She received her Ph.D. in anthropology from University College London in 2009; her doctoral research focused on the evolution of kinship and marriage systems. In particular, she has investigated the evolution of marriage strategies, wealth transfers at marriage, residence strategies, and inheritance strategies. Laura's current research activities apply conceptual and methodological tools developed in evolutionary biology to a diverse range of topics in anthropology, from matrilineal kinship organization to cultural evolution.

Keywords

Indo-European Societies, Residence Strategies, Marriage Strategies

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EVELYNE HEYER¹

An international jury composed of Michael Crawford (University of Kansas, USA), Dennis O'Rourke (University of Utah, USA), and Stephen Shennan (University College London, UK) has awarded the Gabriel Ward Lasker Prize 2011 to Dr. Laura Fortunato for her articles entitled "Reconstructing the History of Residence Strategies in Indo-European-Speaking Societies" and "Reconstructing the History of Marriage Strategies in Indo-European-Speaking Societies" considered as the best contribution to the 83rd volume of *Human Biology* (2011).

Laura Fortunato is an Omidyar Fellow at the Santa Fe Institute in Santa Fe, New Mexico. She received her Ph.D. in anthropology from University College London in 2009; her doctoral research focused on the evolution of kinship and marriage systems (Fortunato 2009). In particular, she has investigated the evolution of marriage strategies (Fortunato and Archetti 2010; Fortunato 2011a), wealth transfers at marriage (Fortunato et al. 2006; Fortunato and Mace 2009), residence strategies (Fortunato and Jordan 2010; Fortunato 2011b), and inheritance strategies (Fortunato, in review). Laura's current research activities apply conceptual and methodological tools developed in evolutionary biology to a diverse range of topics in anthropology, from matrilineal kinship organization to cultural evolution.

Evelyne Heyer: Dear Dr. Fortunato, we are pleased that the Gabriel Ward Lasker award for the best article in the 2011 volume of *Human Biology* is attributed to you for the article "Reconstructing the History of Marriage Strategies in Indo-European-Speaking Societies: Monogamy and Polygyny" (Fortunato 2011a). This paper was published together with a sister article, having very similar methods and aims, titled "Reconstructing the History of Residence Strategies in Indo-European-Speaking Societies: Neo-, Uxori-, and Virilocality" (Fortunato 2011b), and they both perfectly match the editorial focus of the journal. Would you mind summarizing the research question you address, the methodology you adopt as well as the major results?

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Figure 1. Dr. Laura Fortunato (photo courtesy by Kate Russell Photography).

Laura Fortunato: Thank you, I am delighted at the award! The two papers aim to reconstruct past modes of social organization for societies speaking Indo-European (IE) languages. The focus is on marriage and residence strategies. Marriage strategies specify how many spouses an individual may be married to at any one time: the analysis looks at monogamy (marriage allowed to only one spouse at any one time) and polygyny (marriage allowed to multiple wives simultaneously). Residence strategies regulate the pattern of sex-biased dispersal of individuals at marriage: the analysis looks at neolocality (residence of the married couple apart from the kin of either spouse), uxoriolocality (residence of the married couple with or near the wife's kin), and virilocality (residence of the married couple with or near the husband's kin).

Methodologically, the papers use ancestral state reconstruction, within a phylogenetic framework, applied to cross-cultural data (Fortunato 2011c; see Fortunato 2008 for a nontechnical introduction to the approach). The analyses reconstruct early IE society as practicing monogamy and prevailing virilocality with alternative neolocality. Overall, the results are largely consistent with previous inferences from linguistic and ethnographic data; however, as I discuss extensively in the papers, previous work is beset by substantial methodological flaws and bias in interpretation. I like to think that my results provide an independent line of evidence against which to evaluate previous inferences about early IE social structure.

EH: For those readers willing to better review such research questions, is there any article you would recommend reading?

LF: Your recent review paper “Sex-Specific Demographic Behaviours That Shape Human Genomic Variation” (Heyer et al. 2012) provides an interesting complementary perspective, with its focus on the genetic side of the story.

EH: You find that both Proto-Indo-Hittite and Proto-Indo-European had monogamous habits and were neo-/virilocal. Do you think these patterns of social organization arose because of the emergence of agriculture?

LF: Together with previous analyses (Fortunato et al. 2006; Fortunato and Mace 2009), the reconstructions of early IE social organization in the two papers point to a society practicing monogamy, virilocality with neolocality, and dowry. Based on the ethnographic evidence, this type of social structure seems compatible with interpretations of the linguistic evidence that attribute to IE society an economy based on domesticated plants and animals, with use of the plough, a settled lifestyle, and possibly some form of social ranking based on social-status differentiation (Mallory and Adams 2006, page 284).

The reconstructions seem harder to reconcile with interpretations of the linguistic evidence that tend to emphasize elements pointing to a pastoral economy and a nomadic lifestyle; these interpretations provide the basis for the traditional view that IE languages propagated across EurAsia with warlike nomadic pastoralists (e.g., Anthony 2007; Gimbutas 1991; Mallory 1989), but they are being criticized also on linguistic grounds (e.g., Krell 1998). In fact, the traditional view has strongly influenced reconstructions of other aspects of early IE social life; in turn, these reconstructions have been used to substantiate the traditional view of IE origin (Renfrew 1987, page 260). The approach I take avoids this circularity because the inferences are derived entirely from the cross-cultural data, in conjunction with the model of population history captured by the linguistic evidence (discussed below); consequently, the inferential process is relatively assumption-free regarding early IE social organization.

Ultimately, however, the final word rests with the archaeologists and the geneticists. Through analysis of strontium isotopic data, Bentley et al. (2012) find evidence of community differentiation and virilocality among the first farmers of early Neolithic central Europe, possibly associated with differential land use. The inference of virilocality is also supported through the analysis of genetic data (Rasteiro et al. 2012). This pattern is compatible with the interpretation I propose.

EH: Besides monogamy (and virilocality in the sister article you published in the same issue of the journal), do you think it would be possible to trace back patterns of social organization preceding Proto-Indo-Hittite and Proto-Indo-European? Furthermore, do you think that your methodology may be useful to investigate other aspects of social organization? If so which ones?

LF: As mentioned above, I have applied this approach to reconstruct the history of wealth transfers at marriage (dowry and bridewealth) in IE-speaking

societies (Fortunato et al. 2006). This framework can also be used to test co-evolutionary hypotheses: for example, I have used it to investigate the co-evolution of wealth transfers at marriage with marriage strategies (monogamy and polygyny; Fortunato and Mace 2009).

The “depth” of the reconstructions is constrained by the phylogenetic tree used as a model of population history. For example, if we knew how Proto-Indo-Hittite is related to other language families, our inferences could reach further back in time. The genetic data may prove useful in this regard.

EH: By inspecting the phylogenetic tree you present (Figure 4 in Fortunato 2011a and Figure 5 in Fortunato 2011b), I noticed that there are some shifts concerning the residence rules and the monogamy/polygamy habits. Can you provide any hypothesis about the possible reasons for this change like ecological factors or possible invasions?

LF: As discussed above, if early IE social organization did indeed include monogamy, virilocality with neolocality, and dowry, this may be linked to an economy based on domesticated plants and animals, use of the plough, a settled lifestyle, and possibly social-status differentiation (Mallory and Adams 2006, page 284). One possibility is that transitions away from this type of social structure (e.g., from monogamy to polygyny) reflect transitions to other subsistence systems, such as horticulture or pastoralism (Fortunato and Archetti 2010).

EH: I have a few questions about the methodology behind your findings. The phylogenetic approach you adopt outcomes reliable results only if the patterns of social organization remain quite stable through time without frequent shifts from one to another (like monogamy ↔ polygamy). As a consequence, and to justify your methodology, you must be quite confident that such social behaviors were stable through time. What kind of evidence do you have to justify such an assumption?

LF: Anthropologists have typically assumed that traits relating to family organization are relatively stable through time (e.g., Murdock 1949, page 196). However, systematic estimates of the rates of change in these traits, inferred from empirical data for specific case studies, are only relatively recent. For example, based on the information in colonial-period household registers, Lipatov et al. (2011) report a transition from a mixed pattern of uxori- and virilocal residence to the predominance of virilocal residence in Taiwan, over a 40-year period (1906–1945).

While Lipatov et al. (2011) emphasize the rapidity of this transition, at the same time their estimate suggests that cultural norms relating to family organization do not change “instantaneously,” especially in the context of the time-scales relevant to the process of cultural change. For example, an individual

may change attitudes toward uxoriocal marriage in a matter of seconds. That the transition at the population-level should take on the order of one generation suggests that the norm was somehow resilient to change.

More generally, I would argue that we need additional theoretical work, alongside additional empirical estimates, to fully understand the effect of the assumptions implicit in the application of the phylogenetic approach to the study of cultural evolution.

EH: Concerning the two scenarios about the possible origin of the IE language family (either from the Pontic steppes or from the Anatolian region), do you think that they may have an impact on the topology of the tree or do you think it would remain unchanged just having a consequence on the timeframe that the tree involves?

LF: The analyses were based on a tree sample generated by Pagel et al. (2007) through application of a phylogenetic tree-building method to IE basic vocabulary data collated by Dyen et al. (1992). In previous analyses of these data, Gray and Atkinson (2003) used the same approach to test between the two main competing hypotheses for the origin of the IE language family; they found support for the scenario proposed by Renfrew (1987), which posits the expansion of IE languages from Anatolia with the spread of agriculture beginning around 7000 to 6000 BCE (Diamond and Bellwood 2003). The alternative hypothesis, proposed by Gimbutas (1973a,b), places the homeland of the language family in the Pontic steppes north of the Black Sea; it envisages an expansion driven by nomadic horse-riding pastoralists starting after 4000 BCE (Diamond and Bellwood 2003).

Thus, the timeframes implied by the two scenarios differ substantially. In terms of topology, it seems likely that the relative positions of nodes close to the root of the tree would be similarly affected.

EH: It is striking that there are no co-authors in the two articles you published, as this is seldom the case in anthropological disciplines requiring an increasing level of collaboration. Does this mean that the research questions you addressed were very easily testable or, the reverse, which of the methods you used gave straightforward and easily interpretable results?

LF: These studies benefited from published data and methods. The tree sample used in the analyses was kindly provided by Mark Pagel and his collaborators Quentin Atkinson and Andrew Meade (Pagel et al. 2007). Mark Pagel and Andrew Meade also provided the BayesTraits package (Pagel and Meade n.d.). The cross-cultural data were obtained from the *Ethnographic Atlas* (Gray 1999; Murdock 1967), a compendium of coded ethnographic data.

However, I would not say that the questions were easily testable or the results easily interpretable—on the contrary, narrowing down the research questions and interpreting the results required much reading of the relevant

linguistic, archaeological, and genetic literature! Similarly, mastering the analytical techniques required much reading of relevant technical literature.

EH: As the recipient of the Gabriel Ward Lasker Prize of last year (Dr. Rohina Rubicz—Rubicz et al. 2010; Manni 2011), you are quite young. What kind of research positions are appealing to you and why? Is there any specific research group you would like to become a member of?

LF: I was trained in both biology and anthropology; consequently, I thrive in an environment that fosters research at the boundary between the two disciplines. The topics that I enjoy researching are very “anthropological,” for example, the study of kinship and marriage systems; at the same time, I approach them from a very “biological” perspective, both theoretically and methodologically.

During my time here at the Santa Fe Institute, I have had the opportunity to interact with scientists from an even wider range of disciplines, and I feel this has much expanded my outlook on science.

EH: What is next in your research?

LF: I am currently working on the evolution of matrilineal kinship organization, a social system that emphasizes interactions between individuals related only through females. For example, my work focuses on a particular form of matrilineal inheritance known as “mother’s brother–sister’s son” inheritance, where property is transferred from a maternal uncle to a sororal nephew (Fortunato, in review); this is a rare but recurrent practice across human societies (on the order of 10% of societies).

The occurrence of this social system has puzzled anthropologists and biologists for well over a century. Anthropologists have noted that matrilineal kinship organization involves conflict between a man’s rights and duties in his roles as brother/uncle (i.e., toward his matrilineal kin) versus husband/father (i.e., toward his patrilineal kin). From an evolutionary perspective, it is puzzling because investment is not directed toward individuals that provide the potentially highest reproductive returns (e.g., a man’s own offspring in the case of matrilineal inheritance).

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