Evolution and Human Behavior 38 (2017) 474–480

Contents lists available at ScienceDirect

Evolution and Human Behavior

journal homepage: www.ehbonline.org

Original Article

Cultural complexity and demography: The case of folktales

Alberto Acerbi [a,*], Jeremy Kendal [b], Jamshid J. Tehrani [b]

[a] School of Innovation Science, Eindhoven University of Technology, 5600 MB, Eindhoven, The Netherlands
[b] Centre for the Coevolution of Biology and Culture, Department of Anthropology, University of Durham, South Road, Durham DH1 3LE, UK

ARTICLE INFO

Article history:
Received 10 October 2016
Received in revised form 17 March 2017
Accepted 27 March 2017

Keywords:
Cultural evolution
Cultural complexity
Demography
Folktales
Cultural attraction
Content biases

ABSTRACT

We investigate the relationship between cultural complexity and population size in a non-technological cultural domain for which we have suitable quantitative records: folktales. We define three levels of complexity for folk narratives: the number of tale types, the number of narrative motifs, and, finally, the number of traits in variants of the same type, for two well-known tales for which we have data from previous studies. We found a positive relationship between number of tale types and population size, a negative relationship for the number of narrative motifs, and no relationship for the number of traits. The absence of a consistent relationship between population size and complexity in folktales provides a novel perspective on the current debates in cultural evolution. We propose that the link between cultural complexity and demography could be domain dependent: in some domains (e.g. technology) this link is important, whereas in others, such as folktales, complex traditions can be easily maintained in small populations as well as large ones, as they may appeal to universal cognitive biases.

1. Introduction

Recent work in cultural evolutionary theory has explored the relationship between demography (in particular, population size) and cultural complexity (French, 2015; Henrich, 2004; Shennan, 2015). Formal models, both involving selectively neutral (Premo & Kuhn, 2010; Shennan, 2001) and non-neutral traits (Henrich, 2004; Kobayashi & Aoki, 2012; Powell, Shennan, & Thomas, 2009; Shennan, 2001), predict that population size affects a population's ability to invent and maintain complex culture (but see, for a criticism to this approach: Querbes, Vaesen, & Houkes, 2014; Vaesen, 2012; Andersson & Read, 2016; Vaesen, Collard, Cosgrove, & Roebroeks, 2016a, 2016b).

These models are based on two widely shared intuitions: that small societies, due to having fewer inventors, have lower rates of invention; and that, in the rare event of invention, innovations are more likely to be lost in smaller populations, simply as a result of random loss or incomplete transmission (Richerson, Boyd, & Bettinger, 2009). For example, an influential model developed by anthropologist Joe Henrich (Henrich, 2004) proposes that, in any given population, individuals will attempt to copy the most accomplished demonstrator of a particular skill, but, since social learning is error prone, on average, learners would not be expected to attain the level of skill of the demonstrator, with only a small chance of equalling or surpassing him/her. Consequently, in a small population, it is rare that complex traits (for which errors are more likely) will be copied correctly, resulting in a loss of cultural complexity. "Population size" in this model is intended as the number of individuals that are potentially able to interact, and is referred to as "effective population size" to distinguish it from "census population size", i.e. census data on the estimated total number of individuals belonging to a particular ethno-linguistic group (Henrich et al., 2016, see also Lycett & Norton, 2010 for a similar definition). It has been pointed out that for cultural traits, the true "effective population size" may vary from a census count due to the possibility of cultural exchanges across ethno-linguistic boundaries (Henrich et al., 2016).

The existence of a positive effect of population size on cultural complexity is supported by a growing body of results from laboratory experiments in which larger groups of participants are able to create, and support, more complex culturally-transmitted behaviours than smaller groups (Derex, Beugin, Godelle, & Raymond, 2013; Derex & Boyd, 2015; Kempe & Mesoudi, 2014; Muthukrishna, Shulman, Vasilescu, & Henrich, 2014). In parallel, a number of empirical studies have explored the existence of a correlation between cultural complexity and population size. These studies generally focused on subsistence-related technologies (see e.g. Buchanan, O'Brien, & Collard, 2015; Collard, Buchanan, & O'Brien, 2013; Collard, Buchanan, O'Brien, & Scholnick, 2013; Collard, Kemery, & Banks, 2005; Collard, Ruttle, Buchanan, & O'Brien, 2013; Kline & Boyd, 2010; Read, 2008). The majority of cultural evolutionists consider the results of these analyses to provide robust support for a positive correlation between cultural complexity and population size (Henrich et al., 2016), although some researchers remain skeptical (Andersson & Read, 2016; Vaesen et al., 2016a, 2016b).

While the relationship between demography and cultural complexity has been a key debate in the field of cultural evolution, the evidence produced by the empirical studies above is restricted to the domain of technology. Some studies have explored how

* Corresponding author.
E-mail address: a.acerbi@tue.nl (A. Acerbi).

http://dx.doi.org/10.1016/j.evolhumbehav.2017.03.005
1090-5138/

linguistic complexity is influenced by demographic variables, but the results remain contentious (Hay & Bauer, 2007; Lupyan & Dale, 2010; Moran, McCloy, & Wright, 2012; Roberts & Winters, 2012). To our knowledge, no studies have explored, from a cultural evolutionary perspective, how population size might influence cultural complexity in other non-technological domains, where the same intuitions about social learning might be expected to apply. Here, we investigate one such domain, for which we have suitable quantitative information: folktales.

A folktale is defined as a prose narrative that cannot be attributed to any individual author, but, rather, constitutes a shared cultural tradition that has been passed on from person to person, and from generation to generation, usually by means of oral transmission (Thompson, 1951). While these stories will be familiar to many or most members of a population, literary and ethnographic research suggests that their long-term transmission depends on a small percentage of "active bearers" – expert storytellers who are directly analogous to "skilled demonstrators" in models of technological transmission (Henrich, 2004) – without whom these traditions would rapidly degenerate (e.g. Hansen, 2002; Sydow, 1948). Based on the demographic models discussed above, we might therefore expect the complexity of folk narrative traditions to covary with the number of active bearers available in a population. This is because when an individual invents a new tale or elaborates on an existing one (e.g. by introducing new characters and events) their innovations are more likely to catch on when there are other individuals who are sufficiently talented to memorise and reproduce them, in a manner directly analogous to the accumulation of technological complexity.

In what follows, using both data from the Aarne Thompson Uther (ATU) Index and from previous phylogenetic analysis of two tales, we analyse three levels of cross-cultural complexity in folk narrative, based on: (i) the number of "tale types", (ii) the number of narrative "motifs", and (iii) the number of traits in different variants of the same "type".

2. Material and methods

We define three levels of complexity in folk narrative.

2.1. The number of "tale types"

A tale type represents an independent (i.e. self-contained), stable, storyline constituted by a specific combination of core narrative elements known as "motifs" (e.g. a human marries an animal, or a hero is set impossible tasks). Data on tale type distributions were drawn from the Aarne Thompson Uther (ATU) Index, a catalogue of over 2000 "tale types" recorded in over 200 societies worldwide. We limited our analysis to the two most widespread genres of tale types in the ATU Index, "Animal Tales" (featuring non-human protagonists, as typified by Aesop's fables) and "Tales of Magic" (concerning beings or objects with supernatural powers, such as fairies, witches or magic rings). We considered only European and western Asian populations, to avoid (or limit) the effects of sampling biases, as the folktale traditions of these populations are better represented in the ATU sample than those of less well-studied groups. Fig. 1 shows, as an example of our data, the approximate geographical location, and the quantity, of "Animal Tales" used in our analysis.

We extracted contemporary population size data in Wikipedia, searching for the population/ethnic group page, i.e. not the language or the actual country (see e.g. https://en.wikipedia.org/wiki/Italians). Where population data were reported as a range (e.g. https://en.wikipedia.org/wiki/English_people) we simply considered the average. Populations with ambiguous estimates were excluded. Population sizes were log-transformed, as the relationship between population size and cultural complexity is predicted to be concave by the demographic hypothesis (e.g. Collard, Buchanan, & O'Brien, 2013). It is worth noting, however, that log-transforming the data does not change the qualitative result of the analysis. In addition to contemporary population sizes, we also calculated log-transformed population estimates at the end of the nineteenth century using information available from Wikipedia (https://en.wikipedia.org/wiki/List_of_countries_by_population_in_1900). These estimates provide a useful point of comparison for analysing the relationship between folktale complexity and demography, since many of the sources used in the ATU Index date back to the late nineteenth or early twentieth centuries (notice also that end of the nineteenth century population size estimates strongly correlate with contemporary estimates). Our final sample comprised 380 different Animal Tales types in 73 contemporary populations and 24

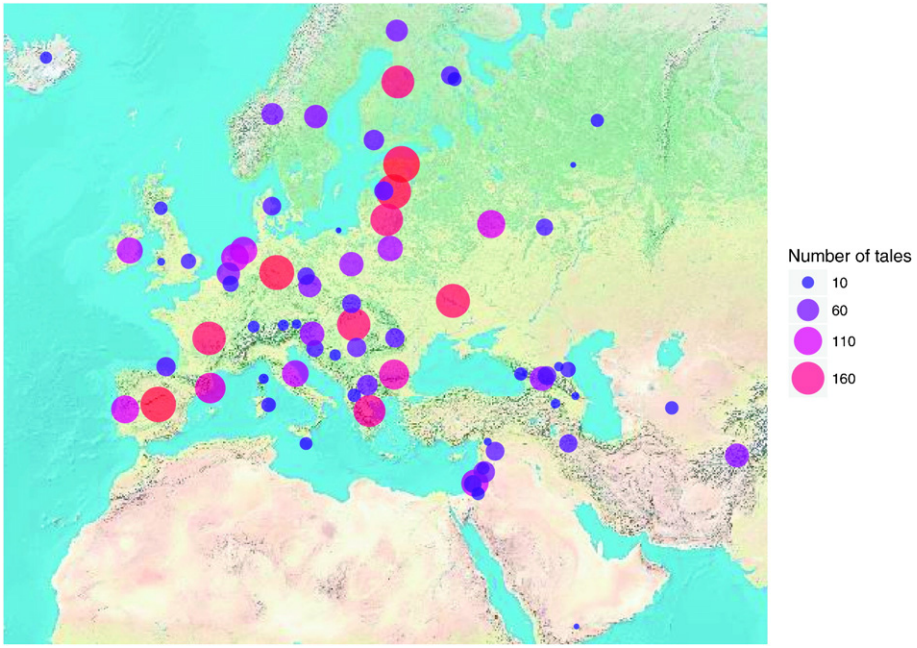

Fig. 1. ATU "Animal Tales". Visualisation of the approximate geographical location, and the quantity, of the tale types used in the analysis for the ATU genre "Animal Tales".