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Original Article

Information transmission and the oral tradition: Evidence of a late-life service niche for Tsimane Amerindians

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ABSTRACT

Storytelling can affect wellbeing and fitness by transmitting information and reinforcing cultural codes of conduct. Despite their potential importance, the development and timing of storytelling skills, and the transmission of story knowledge have received minimal attention in studies of subsistence societies that more often focus on food production skills. Here we examine how storytelling and patterns of information transmission among Tsimane forager-horticulturalists are predicted by the changing age profiles of storytellers' abilities and accumulated experience. We find that storytelling skills are most developed among older adults who demonstrate superior knowledge of traditional stories and who report telling stories most. We find that the important information transmitted via storytelling typically flows from older to younger generations, and stories are primarily learned from older same-sex relatives, especially grandparents. Our findings suggest that the oral tradition provides a specialized late-life service niche for Tsimane adults who have accumulated important experience and knowledge relevant to foraging and sociality, but have lost comparative advantage in other productive domains. These findings may help extend our understanding of the evolved human life history by illustrating how changes in embodied capital predict the development of information transmission services in a forager-horticulturalist economy.

"When Dojity arrived at Micha's house, Micha started to lose faith in him. Dojity stole his wife and fled up the Maniqui river with her. People heard of the theft and wanted to kill Dojity. Hearing this, he dressed in very old rags to disguise himself. When people saw him dressed so poorly, they asked: "When is Dojity coming?". And Dojity would answer: "He is on his way, he is well dressed and will be here soon." Dojity went on and then blew to turn these people into chuchio and tacuara for making arrows, and also into porcupines and iyopo trees. Dojity continued walking and headed upriver on the Maniqui, where the woman he had stolen finally gave birth. There Dojity transformed the woman into salt and her amniotic fluid turned into the Pachene salt springs that feed the Pachene River."

[-translated from Mayer and Clemente's (2000) version of *Dojity y Micha*]

1. Introduction

Before written language, mass printing, and electronic broadcast, cumulative traditional ecological knowledge (TEK) "about the relation of living beings (including humans) with one another and with their environment" was largely transmitted across generations using oral traditions (Berkes, Colding, & Folke, 2000: 1252). Across cultures, storytelling and music continue to play central roles in traditional education (Scalise Sugiyama, 2001). Stories and songs often encode fitness-relevant information about hazards, subsistence, morality, mythology, norms, marriage and relationships (Scalise Sugiyama, 1996). For example, most human subsistence skills require cumulative knowledge that is often transmitted from older to younger generations. Without effective information transmission, complex skill development using only individual learning and effort would be very difficult or impossible (Boyd & Richerson, 1985). Skilled communicators in the oral tradition can make difficult-to-acquire information salient, memorable, and amenable to re-transmission, helping individuals develop the complex skills they will need in adulthood (Rubin, 1997). Stories also provide listeners opportunity to engage in low-cost "cognitive play" as they imagine beliefs and desires of other minds, and simulate problems (Boyd, 2009).

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For example, traditional stories often feature solutions to unpredictable or rare events and potentially deadly problems (e.g. natural hazards, predators, adversarial conspecifics) that are of great importance but can be costly to discover through first-hand experience (Coe, Aiken, & Palmer, 2005a; Coe & Palmer, 2008). Independent of information value, stories and music are entertaining – providing a social lubricant among kin that can reinforce ties, mitigate conflicts, and improve gains from cooperation (Boyd, 2009; Coe & Palmer, 2008; Steadman & Palmer, 1997).

Social and ecological context may affect who tells stories and performs music and who learns from performances. Ethnographic accounts of subsistence societies often portray skilled storytellers and musicians as older adults or grandparents (e.g. Biesele, 1993; Hallowell, 1992; Simmons, 1945). Describing Yakutat Tlingit hunter-gatherers, de Laguna (1997, p.839) writes, "when an informant indicated how he or she had learned myth or legend it was from a grandmother or grandfather, less often from a father or mother". Though only a small percentage of the population, these "active bearers" are responsible for maintaining the oral tradition by intergenerational transmission (Acerbi, Kendal, & Tehrani, 2017; Coe & Palmer, 2008). While storytellers and musicians from traditional societies have been characterized as mostly older specialists (Archibald, 2008; Hale, 1998), little empirical evidence is available to support claims that oral tradition is learned from the oldest generations.

Much of what is known about narrative and musical skill development concerns economically advanced society, where a different pattern is described: according to Miller (1999), peak ages for popular music production (females 29, males 33 for rock; females 39, males 30 for jazz) and literature (females 50, males 43) coincide more with reproductive and parenting ages. Economically advanced society offers young adults more specialized career path options, while most people of the same age and sex have the same common skills and do the same work in traditional subsistence society. By performing a large repertoire of stories and songs in ways that lower-fitness competitors cannot, storytelling and music specialists can broadcast honest signals (e.g. of intelligence and experience, sensu Miller, 2011) that might attract mates and allies. Economically advanced societies are also faced with rapidly changing problem sets (i.e., each generation faces many novel problems previous generations did not) that are better served by novel cultural solutions. Cultural evolution theory (e.g. Boyd & Richerson, 1985) suggests that *horizontal* (learning from peers) transmission will be preferred where a premium is placed on new solutions; suggesting that the role of culture transmitter in economically advanced society need not be restricted to older adults.

Here we examine the life course trajectory of skill development in the Tsimane oral tradition and patterns of information transmission attributed to this developmental process. We consider whether Tsimane storytelling is better understood as a *common* or *specialized skill*. Schniter, Gurven, Kaplan, Wilcox, and Hooper (2015) showed that most traditional Tsimane skills are developed by most adults. As a *common skill*, we would expect storytelling to be developed by most adults and to be positively associated with ability and expertise across other common skills and forms of productivity. As a *specialized skill*, storytelling is only undertaken by those who are at a comparative advantage to do so, and who otherwise may be losing fitness-enhancing value to coresident kin due to senescence-related declines in other domains of productivity (e.g. hunting, farming, food processing). Whether older adults are expert storytellers because of the long learning curve which they share with all others their age, or because they represent the select few in their age cohort who can realize a competitive advantage in the oral tradition over other skill domains, is of direct relevance to the idea of longevity evolving with selection against post-reproductive cognitive decline due to the value of older adults' accumulative knowledge (e.g. Schwarz et al., 2016)."

Among Tsimane forager-horticulturalists of Bolivia, the oral tradition has long served as a form of enjoyable cultural education tied to the important tradition of *sobaqui*, visitation with kin, neighbors and friends (Ellis, 1996). Tsimane storytelling occurs most often when it creates the fewest opportunity costs for transmitters and receivers: when people get together to visit, especially at small fireside family gatherings (de la De La Quintana & Daillant, 1999).[1] Prior to the introduction of formal schools and radios in the second half of the 20th century, the role of educator and entertainer fell on local experts, including *cocojsi* or shamans. Shamans have almost entirely disappeared from Tsimane culture. However, when vats of *shocdye*—a homebrewed manioc beer—are available, family and neighbors gather to drink communally. At family and community gatherings, older adults broadcast their knowledge by conveying details about memorable hunting trips, telling personal and traditional stories, interpreting dreams, and with *jimacdye*—instrumental music and song (Ellis, 1996; Iamele, 2001; Schniter, 2014). We further explain facets of Tsimane oral tradition in Section 1.1.

We consider how informants' age, story knowledge, abilities, and available audiences affect patterns of information transmission across the lifespan in a small-scale forager-horticulturalist society. Embodied Capital Theory (ECT) proposes that several unique features of the human life course are adapted responses to a skills-intensive, socio-ecological niche (Kaplan, Gurven, Winking, Hooper, & Stieglitz, 2010). Specifically, ECT hypothesizes that the life course of skill performance is shaped by characteristics of specific tasks (i.e. their difficulty, strength, motor dexterity, and knowledge requirements), the changing capabilities of individuals with age and experience, and the changing needs of the family budget (Bock, 2002a, 2002b; Crittenden, Conklin-Brittain, Zes, Schoeninger, & Marlowe, 2013; Gurven & Kaplan, 2006; Schniter et al., 2015). As adults become grandparents and advance through their post-reproductive years, physical declines in strength, endurance, and manual dexterity reduce the profitability of various types of food production. In response to these declines, older adults are expected to shift their efforts towards low-strength yet knowledge-intensive crafts and services. Schniter et al. (2015) showed that oral tradition skills (storytelling, music performance, and dream interpretation) increase with age (Fig. 1) and that older adults aged 60 through the mid-eighties are regarded by their peers as most expert in low-strength but knowledge-intensive skills, including those in the oral tradition (Table 1). Performances in the oral tradition (music and stories) bear characteristics making them optimal for a late-life service niche: they require extensive learning and support the childrearing, socialization, and subsistence goals distributed within and between multi-generational familial groups, yet do not require physical strength.

While oral tradition performance may benefit performers and audience members by transmitting TEK, cost-benefit tradeoffs may affect the likelihood of information transmission (de Backer & Gurven, 2006). Receivers show preference for transmitters they trust and information sources they consider more reliable, and in doing so develop preferences for specific performers, performance styles, and norms for who is allowed to perform (Pinker, 1997; Scalise Sugiyama, 1996). For example, audience members in traditional societies with sex-specific divisions of labor may have reasons to prefer performances by same-sex non-parental older kin. Tsimane demonstrate same-sex vertical transmission of ethnobotanical skills and knowledge attributed to their habit for same-sex socialization and a strong division of labor along sex lines (Reyes-García et al., 2009). In Australian, Melanesian, North American, Indian, and African societies, Radcliffe-Brown (1950) observed more egalitarian relations between older relatives (e.g. grandparents) and children than between parents and children. Others have since reported this pattern of privileged familiarity between "alternate generations" (e.g., Apple, 1956; Hewlett, Fouts, Boyette, & Hewlett, 2011; Lee, 2002). Older kin may be preferred for their greater lifetime

[1] A similar pattern of fireside nighttime storytelling is reported among Ju/'hoansi (see Wiessner, 2014).